

NORTH CAROLINA  
ENVIRONMENTAL MANAGEMENT COMMISSION

COUNTY OF GUILFORD

IN THE MATTER OF	)	
NORTH CAROLINA	)	SPECIAL ORDER BY CONSENT
NPDES PERMIT NC0047384	)	
	)	EMC SOC WQ S19-010
HELD BY	)	
CITY OF GREENSBORO	)	

Pursuant to the provisions of North Carolina General Statutes (G.S.) 143-215.2, this Special Order by Consent is entered into by the City of Greensboro, hereinafter referred to as the City, and the North Carolina Environmental Management Commission, an agency of the State of North Carolina created by G.S. 143B-282, and hereinafter referred to as the Commission.

1. The City and the Commission hereby stipulate the following:

- a. This Special Order by Consent (Special Order or SOC) addresses issues related to the discharge of elevated levels of 1,4-dioxane from the T.Z. Osborne WWTP to South Buffalo Creek. On November 14, 2019, the North Carolina Department of Environmental Quality (the Department) issued a Notice of Violation (NOV) to the City related to the elevated discharges of 1,4-dioxane.
- b. The City holds North Carolina NPDES permit NC0047384 for operation of an existing wastewater treatment works, and for making an outlet therefrom, for treated wastewater to South Buffalo Creek, Class WS-V, NSW waters of this State in the Cape Fear River Basin. NPDES Permit NC0047384 does not currently contain discharge limitations for 1,4-dioxane.
- c. 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.
- d. 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, cause the compound to be identifiable in reportable concentrations in groundwater, and within surface water downstream of industrialized and urbanized areas.

- e. 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.
- f. 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.
- g. 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.
- h. 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 (Department or DEQ) conducted follow up stream sampling studies to better determine the concentrations of 1,4-dioxane, and their potential sources within the basin. Results of the DEQ studies noted above indicated detectable concentrations of 1,4-dioxane downstream of the discharge from the City of Greensboro's T.Z. Osborne WWTP.
- i. Beginning in 2015, the City of Greensboro voluntarily began a 1,4-dioxane source identification and reduction plan, which included monitoring of WWTP influent and effluent and the City's wastewater collection system. The City's efforts included meetings with industrial users to ask their assistance in identifying potential sources. Information from the industrial community and collection system monitoring revealed where to focus reduction efforts. By October 2015, the City's program had identified one of its Significant Industrial Users (SIU) as a quantifiable source of 1,4-dioxane to the WWTP. The SIU voluntarily agreed to conduct its own source reduction plan. Since the implementation of the plan, the discharge of 1,4-dioxane from the T.Z. Osborne wastewater treatment facility has been reduced by over 50% for the four-year period from February 2016 to the present.
- j. On October 31, 2017, the Division of Water Resources (DWR), via administrative letter, required the City to begin monthly monitoring of the effluent from the T.Z. Osborne WWTP for 1,4-dioxane and to report the results of their analyses on monthly monitoring reports, beginning with the report for December 2017.
- k. Results from T.Z. Osborne WWTP effluent monitoring have routinely indicated the presence of 1,4-dioxane. On August 7, 2019, an effluent concentration of 957.5 µg/L was reported. DEQ calculations predict that 1,4-dioxane concentrations of this

magnitude within the T.Z. Osborne WWTP effluent discharge may cause the instream concentration of 1,4-dioxane to exceed the 35 µg/L EPA health advisory level at a downstream drinking water supply raw water intake location.

- l. The Department has instituted a special study of the T.Z. Osborne WWTP effluent, conducting its own monitoring of the discharge and sharing its data with the City.
  - m. Sampling of waters downstream of the T.Z. Osborne WWTP discharge has indicated instances when the EPA health advisory concentration of 35 µg/L for 1,4-dioxane has been exceeded. The sampling results indicate that Greensboro's discharge contributes to the exceedances but they do not establish that Greensboro's discharge is the sole source of the exceedances.
  - n. The purpose of this Special Order is to reduce the concentrations of 1,4-dioxane being discharged from the T.Z. Osborne WWTP. It is not intended to resolve, be applicable to, or encompass all other point and non-point sources that may be causing or contributing to elevated levels of 1,4-dioxane in the Cape Fear River Basin. The initial and primary goal of this Special Order is that the City's effluent discharge will not cause concentrations of 1,4-dioxane in downstream drinking water supplies to exceed the EPA health advisory concentration of 35 µg/L.
  - o. The discharge of elevated levels of 1,4-dioxane causes or contributes to pollution of the waters of this State named above, and the City is within the jurisdiction of the Commission as set forth in G.S. Chapter 143, Article 21.
  - p. The Commission and the City acknowledge that the activities enumerated in this Special Order are designed to reduce 1,4-dioxane concentrations within the Cape Fear River Basin, and that significant future reductions will require both technological advances and the cooperative institutional resolve of all affected parties. Acknowledging that the physical and chemical properties of 1,4-dioxane create challenges for its treatment and/or removal from municipal wastewater, and that large scale treatment technologies for the removal of 1,4-dioxane at municipal WWTPs do not currently exist, this Special Order recognizes that source reduction will be the primary and most effective means of reducing 1,4-dioxane concentrations in the T.Z. Osborne WWTP effluent and the Cape Fear River Basin.
  - q. Since this Special Order is by Consent, neither party will file a petition for a contested case or for judicial review concerning its terms.
2. The City of Greensboro, desiring to significantly reduce its contributions of 1,4-dioxane to the Cape Fear River Basin, hereby agrees to undertake the following activities in accordance with the indicated time schedule:

- a. Increase T.Z. Osborne's WWTP 1,4-dioxane effluent Electronic Discharge Monitoring Report (eDMR) monitoring frequency for grab samples to weekly when the Department's Special Study ends.
- b. Special Order Year One [to be achieved upon the execution date of this SOC and continued for the first 12 months]:
  - 1) Provide the Department with a copy of the City's existing 1,4-dioxane monitoring plan, and implement the following:
    - i. Resample, analyze, and report at previously identified junction locations, including North Buffalo Transfer Pump Station (1650 miles of sewer line as of January 10, 2020).
    - ii. Determine trunkline and industrial contributions and investigate further as concentrations or loadings warrant.
    - iii. Investigate and determine background levels of 1,4-dioxane that shall include the following: 1) industrial contributions, 2) domestic contributions, 3) commercial contributions, 4) all drinking water contributions, and 5) surface intake water contributions.
    - iv. Meet with the Department's Winston-Salem Regional Office on a quarterly basis to present progress updates and provide a written meeting summary.
    - v. As circumstances warrant, review and modify the existing 1,4-dioxane monitoring plan. Provide the Department a copy of proposed changes prior to their implementation.
  - 2) Contact, interview, and survey indirect dischargers with identifiable, contributing, 1,4-dioxane concentrations of greater than 100 µg/l.
  - 3) Require analyses of all potential (new) industrial flows to the collection system for the presence of 1,4-dioxane prior to the City's approval or acceptance of the wastewater. The City may require the same or similar analyses of new commercial flows at its discretion. The City shall also obtain a description of the character of any new discharge, its estimated volume, and its location within the collection system.
  - 4) Continue collaboration and oversight regarding industrial dischargers of 1,4-dioxane to the WWTP.
    - i. Identify Significant Industrial Users (SIUs) that are indirect sources of 1,4-dioxane.
    - ii. Develop source reduction program.
    - iii. Review adequacy of slug control plans and update if necessary.
    - iv. Increase inspection of selected SIU sources to three (3) times per year [per 2(b)(2)].
    - v. Submit summary of oversight activities in the Year One Report.

- 5) The City shall not exceed the Department's calculated effluent Year One daily maximum grab sample SOC compliance value of 45 µg/l ("Year One SOC Compliance value") to protect downstream drinking water intakes.
- 6) Develop and implement an ongoing 1,4-dioxane public education outreach plan with applicability toward individual, commercial and industrial users of City Water Resources Department services. Submit a summary of the plan in Year One Report and post on the City's Water Resources Department website.
- 7) Report all T.Z. Osborne WWTP effluent 1,4-dioxane sampling results monthly by email to the Department (in a format acceptable to DEQ) no later than the last calendar day of the month following the completed reporting period.
- 8) Report by telephone within 24 hours to the Division's Winston-Salem Regional Office (WSRO) after receiving any data (including any individual result from a grab, composite, or split sample if taken) indicating a T.Z. Osborne WWTP effluent 1,4-dioxane concentration greater than 45 µg/l. The City is also required to submit a written report on any finalized data regarding the exceedance, its cause, effects, and its duration to the WSRO within 5 business days by email of the City's first knowledge of the exceedance.
- 9) Modify SIU permits or develop other pretreatment program mechanisms as necessary.
- 10) In addition to any other reporting required by the Department, no later than forty-five (45) calendar days after the end of Year One, the City shall submit to the Department a written report on the Year One activities and post on the City's Water Resources Department website. The report may be submitted by hard copy or electronic means and must contain the following (at a minimum):
  - i. Summary of the City's investigation results [outlined in 2(b)(1)].
  - ii. Summary of any potential (new) industrial or commercial flows to the collection system [outlined in 2(b)(3)].
  - iii. Any oversight activities [outlined in 2(b)(4) and 2(b)(9)].
  - iv. Public education outreach plan [outlined in 2(b)(6)].
  - v. A table of all monitoring results for 1,4-dioxane collected during the SOC Year One.
  - vi. In the case of noncompliance with the Year One SOC compliance value, a statement of the reason(s) for noncompliance, remedial action(s) taken, and a statement on the extent to which subsequent dates or times for accomplishment of listed activities may be affected.
  - vii. Based on Year One data and any follow-up monitoring activities, including IU inspections and oversight and City of Greensboro split sample data, determine the following and provide a summary to the Department:
    - o Long-term achievable effectiveness of source reduction efforts and resulting T.Z. Osborne WWTP effluent reductions
    - o Industrial contributions

- Domestic contributions
- Commercial contributions
- Surface and drinking water contributions

c. Special Order Year Two [to be achieved upon the first day of Year Two and continued for the second 12 months]:

- 1) Continue investigating industrial sources and engage with sources not defined as SIUs (concentrations above the yearly 1,4-dioxane SOC compliance value) to reduce or eliminate 1,4-dioxane discharges.
- 2) Meet with the Department's Winston-Salem Regional Office on a quarterly basis to present progress updates and provide a written meeting summary.
- 3) Report all T.Z. Osborne WWTP effluent 1,4-dioxane sampling results monthly by email to the Department (in a format acceptable to DEQ) no later than the last calendar day of the month following the completed reporting period.
- 4) The City shall not exceed the Department's calculated effluent Year Two daily maximum grab sample SOC compliance value of 33 µg/l ("Year Two SOC Compliance value") to protect of downstream drinking water intakes based on EPA's drinking water health advisory.
- 5) Report by telephone within 24 hours to the Department's Winston-Salem Regional Office (WSRO) after receiving any data (including any individual result from a grab, composite, or split sample if taken) indicating a T.Z. Osborne WWTP effluent 1,4-dioxane concentration greater than 33 µg/l. The City is also required to submit a written report on any finalized data regarding the exceedance, its cause, effects, and its duration to the WSRO within 5 business days by email of the City's first knowledge of the exceedance.
- 6) Modify SIU permits or develop other pretreatment program mechanisms as necessary.
- 7) Calculate a T.Z. Osborne WWTP effluent 1,4-dioxane mass balance using all data (industrial, domestic, commercial, drinking water, and collection system data) and submit to the Department in the Year Two Report.
- 8) In addition to any other reporting required by the Department, no later than forty-five (45) calendar days after the end of Year Two, the City shall submit to the Department a written report on the Year Two activities and post on the City's Water Resources Department website. The report may be submitted by hard copy or electronic means and must contain the following (at a minimum):
  - i. Summary of the City's oversight activities [outlined in 2(c)(1) and 2(c)(5)].

- ii. Public education outreach plan [outlined in 2(b)(6)].
  - iii. 1,4-dioxane mass balance [outlined in 2(c)(6)].
  - iv. A table of all monitoring results for 1,4-dioxane collected during the SOC Year Two.
  - v. In the case of noncompliance with the Year Two SOC compliance value, a statement of the reason(s) for noncompliance, remedial action(s) taken, and a statement on the extent to which subsequent dates or times for accomplishment of listed activities may be affected.
3. In case source reduction alone may not lead to the effluent SOC compliance value being achieved consistently, the following shall apply:
- a. If greater than or equal to 25% of eDMR data exceed the Year One SOC compliance value of 45 µg/L at the end of SOC Year One, the City shall address 1,4-dioxane in the T.Z. Osborne WWTP effluent by performing the following:
    - 1) Submit to the Division for approval within 45 calendar days of the end of SOC Year One a report that considers the items below:
      - Investigation of alternate/additional treatment processes for removal of 1,4-dioxane at major industrial sources.
      - Investigation of the technical and economic feasibility of treatment technologies for the removal of 1,4-dioxane at wastewater treatment plants.
      - Investigation of the technical and economic feasibility of treatment technologies for removal of 1,4-dioxane at drinking water treatment facilities.
    - 2) Following the investigations in 3(a)(1), submit to the Division within 180 calendar days of the end of SOC Year One a draft Best Management Practices/1,4-dioxane Minimization Plan, which will include an implementation schedule that must be approved by the Division before proceeding.
    - 3) Upon Division approval of Items 1 and 2 above, post both items on the City's Water Resources Department website.
4. The City of Greensboro, desiring to resolve the matters contributing to alleged water quality standard violations associated with its discharge of 1,4-dioxane from the T.Z. Osborne WWTP, hereby agrees to pay an upfront penalty in the amount of \$5,000.00 as settlement of the alleged violations noted in the November 14, 2019 NOV correspondence as well as any and all other alleged violations related to 1,4-dioxane beginning December 1, 2017 through the execution date of this SOC.

A certified check in the amount of \$5,000 must be made payable to the Department of Environmental Quality and sent to the Director of the Division of Water Resources (DWR) at 1617 Mail Service Center, Raleigh North Carolina 27699-1617 not later than thirty (30)

calendar days following the date on which this Special Order is approved and executed by the Commission and received by the City.

- a. **Stipulated Penalties.** The City agrees that unless excused under Paragraph 5, the City will pay the Director of DWR, by check payable to the North Carolina Department of Environmental Quality, stipulated penalties according to the following schedule for failure to meet the deadlines and requirements set out in Section 2.

Description	Stipulated Penalty
Failure to provide 24-hour notice to WSRO of elevated discharge levels specified in Sections 2(b)(8) and 2(c)(5) of this Special Order	\$1,000 per event; \$100/day thereafter
Failure to submit to WSRO complete Annual Reports in Sections 2(b)(10) and 2(c)(8) of this Special Order by specified date	\$1,000 per event; \$100/day thereafter
Failure to meet the grab sample effluent daily maximum SOC compliance value in SOC Year One or Year Two	Exceedance 1-5 per SOC year: \$1,000 per event, per SOC year Exceedance 6-10 per SOC year: \$2,000 per event, per SOC year Exceedance 11 and up per SOC year: \$3,000 per event, per SOC year
Failure to achieve any other requirement of this Special Order	\$1,000 per event

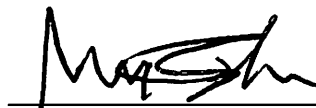
- 5. The City and the Commission agree that the stipulated penalties are not due if the City satisfies DWR that noncompliance was caused solely by:
  - a) An act of God;
  - b) An act of war;
  - c) An intentional act or omission of a third party, but this defense shall not be available if the act or omission is that of an employee or agent of the defendant or if the act or omission occurs in connection with a contractual relationship with the permittee;
  - d) An extraordinary event beyond the permittee's control. Contractor delays or failure to obtain funding will not be considered as events beyond the permittee's control; or
  - e) Any combination of the above causes.

Failure by the City to within thirty (30) calendar days of receipt of a written demand either to pay the penalties, or challenge them by a contested case petition pursuant to G.S. 150B-23, will be grounds for a collection action, which the Attorney General is hereby authorized to initiate. The only issue in such an action will be whether the thirty (30) calendar days has elapsed.



6. This Special Order by Consent and any terms and/or conditions contained herein, hereby supersede any and all previous Special Orders, Enforcement Compliance Schedule Letters, terms, conditions, and limits contained therein issued in connection with NPDES permit NC0047384.
7. Noncompliance with the terms of this Special Order by Consent is subject to enforcement action in addition to the above stipulated penalties, including injunctive relief pursuant to G.S. 143-215.6.C. Noncompliance with the terms of this Special Order will not be subject to civil penalties in addition to the above stipulated penalties.
8. This Special Order may be modified at the Commission's discretion, provided the Commission is satisfied that the City has made good faith efforts to complete the Compliance Schedule activities specified herein.
9. The permittee, upon complete execution but no earlier than May 1, 2021, of this Special Order by Consent, will be expected to comply with all schedule dates, terms, and conditions of this document.
10. This Special Order by Consent shall expire on April 30, 2023.

For City of Greensboro Water Resources Department:




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Michael Borchers, Director of Water Resources  
City of Greensboro

Date February 5, 2021

For the North Carolina Environmental Management Commission:



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Chair of the Commission

Date February 24, 2021