

# WASTEWATER MANAGEMENT AT NIST-BOULDER

NIST S 7301.13

Document Approval Date: 07/13/2023

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## 1. PURPOSE

The purpose of this suborder is to establish the requirements and associated roles and responsibilities to ensure NIST-Boulder will comply with all regulations, codes, and permits as they pertain to the discharge of wastewater.

## 2. BACKGROUND

- a. The NIST – Boulder site generates wastewater from research, construction, facilities operation and maintenance and sanitary processes. This wastewater is discharged offsite to the sanitary sewer system maintained by the City of Boulder Water Quality and Environmental Services (WQES). The sanitary sewer subsequently discharges to the 75th Street Wastewater Treatment Facility owned by the City of Boulder.

The quality of the wastewater discharge is regulated under an Industrial Wastewater Discharge Permit (IWDP) issued by WQES. The permit, CIU 2021-4, A9962C2619\_NIST, is a vehicle for communicating regulatory requirements to NIST.

- b. [NIST P 7300.00](#) articulates NIST’s commitment to making management of wastewater discharges in compliance with applicable regulations and permits an integral core value and vital part of the NIST culture by, in part:

- (1) Complying with applicable laws, regulations, and other promulgated safety and health requirements; and

- (2) Abating deficiencies and taking actions to prevent incidents from occurring.

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<sup>1</sup> For revision history, see Appendix A.

c. NIST-Boulder must meet the requirements of the following:

(1) 40 CFR 104-149;

(2) BRC 11-3; and

(3) Industrial Wastewater Discharge Permit, CIU 2021-4, A9962C2619\_NIST.

### 3. APPLICABILITY

a. This suborder applies to all activities and processes in the NIST-Boulder facility related to the generation, and discharge of wastewater under IWDP. This includes space leased by the National Telecommunications Information Administration.

b. This suborder does not apply to:

(1) Buildings owned by the General Services Administration and leased by the National Oceanic and Atmospheric Administration<sup>2</sup>;

(2) The NIST WWV/WWVB and WWVH broadcast facilities; and

(3) NIST personnel performing work on the University of Colorado campus.

### 4. REFERENCES

Legal and other requirements common to all NIST Environmental Suborders can be found in [NIST O 7301.00 \*Environment Management\*](#). The legal and other requirements specific to this suborder are as follows:

a. [Code of Federal Regulations \(CFR\), Title 40, Subchapter D](#)

b. [Boulder Revised Code \(BRC\), Title 11, Chapter 3](#)

c. [Industrial Wastewater Discharge Permit, CIU 2021-4, A9962C2619\\_NIST](#)

d. 6 CCR 1007-3, Parts 260-273 and 279, [Hazardous Waste Regulations](#)

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<sup>2</sup> These buildings discharge to the City of Boulder sanitary sewer at a location separate from the outfalls listed in the permit and are outside the scope of this suborder.

**5. APPLICABLE NIST SUBORDERS**

Other NIST Environmental Suborders applicable to work covered by this suborder include the following:

- a. NIST S 7101.24: *Incident Reporting and Investigation*
- b. NIST S 7101.60: *Chemical Management*
- c. NIST S 7301.01: *Environmental Management System*
- d. NIST S 7301.07: *Chemical Waste Accumulation/Disposal at NIST-Boulder*
- e. NIST S 7301.09: *Oil Storage and Handling at NIST-Boulder*
- f. NIST S 7301.11: *Stormwater Management at NIST-Boulder*

**6. REQUIREMENTS**

a. General

Chemicals shall not be released to the sanitary sewer without review and approval by the Program Manager for Wastewater Management at NIST-Boulder. The following exceptions apply:

(1) Household products used as directed by the manufacturer for household use; and

(2) Substances approved for discharge to the neutralization system in Building 81. See Section 6.c(2)(b) for more information.

b. Discharge Restrictions

All NIST staff (employees and associates) and contractors operating on the NIST-Boulder facility shall comply with the terms of the IWDP (Appendix B) and BRC 11-3 (Appendix C), including ensuring their activities do not discharge pollutants listed in BRC 11-3-4 to wastewater, exceed levels specified in BRC 11-3-5, dilute discharges to be no higher than the limits on concentrations per BRC 11-3-7 and the IWDP (whichever is less).

c. Equipment Specific Requirements

(1) All sinks, floor drains, and other drains discharging to the sanitary sewer must be posted with signage prohibiting the discharge of chemicals.

(2) The pretreatment systems in use at NIST-Boulder are as follows:

(a) Building 21 Oil-Water Separator

The oil-water separator in Building 21 shall be maintained in accordance with the manufacturer's specification.

(b) Building 81 Acid/Base Neutralization System

Employees and associates in Building 81 shall ensure that only the substances listed in Appendix D are discharged to the neutralization system, provided that they are not contaminated with other material that is regulated as a hazardous waste per the following characteristics and regulations:

- i. Ignitability (D001) [6 CCR 1007-3.261.21];
- ii. Reactivity (D003) [6 CCR 1007-3.261.23];
- iii. Toxicity (D004 – D043) [6 CCR 1007-3.261.24]; or
- iv. Being listed in 6 CCR 1007-3.261.31, 32 or 33

Discharges must also comply with the requirements listed in Section 6.b. See Appendix D for a list of allowable discharges to the Building 81 Acid/Base Neutralization System.

d. Requesting Authorization to Discharge

(1) Personnel planning to discharge waste streams not identified in the Wastewater Classification Survey (Appendix E) or specifically authorized under the permit or listed in Appendix F shall request approval from the Program Manager for Wastewater Management at NIST-Boulder. The requestor shall provide the Program Manager for Wastewater Management at NIST-Boulder with the following information:

- (a) Name of chemicals to be discharged;
- (b) Safety Data Sheet (SDS) for each substance to be discharged;
- (c) Quantities of material to be discharged;
- (d) Volume of water to be discharged;
- (e) Date(s) and time(s) of proposed discharges and/or frequency of discharge;
- (f) Procedure for discharging the material; and
- (g) Any additional information requested by the City of Boulder, Water Quality and Environmental Services (WQES) Industrial Pretreatment Group, including analytical results of required sampling.

**NOTE:** The Industrial Pretreatment Group has up to 30 days to approve or deny a request for authorization to discharge.

- (2) The Program Manager for Wastewater Management at NIST-Boulder shall review the request for compliance with permit terms, BRC 11-3 and 40 CFR 122, Appendix D, Tables II, III, IV and V and submit discharge authorization requests to the City of Boulder, Water Quality and Environmental Services, Industrial Pretreatment Group. This applies to the discharge of any chemical waste not presently authorized, discharge of treatment/cleaning chemicals during construction or maintenance and substances not listed in Appendix D as allowable discharges to the acid/base neutralization system.

**NOTE:** Flushing of uncontaminated firewater systems shall be discharged to stormwater as allowed under the Municipal Separate Storm Sewer System (MS4) Permit. Water containing treatment chemicals (other than those added by the City of Boulder) may be considered to contain pollutants and be subject to the requirement for discharges to be authorized by the City of Boulder.

e. Analytical Monitoring of Wastewater and Routine Reporting

- (1) In accordance with the IWDP, sampling and analysis of the NIST-Boulder Site wastewater shall be conducted quarterly. Samples shall be collected from the outfalls specified in the permit. Monitoring parameters, sampling frequency, sample type and responsibilities are summarized in Appendix G.

- (2) NIST shall submit quarterly wastewater analysis reports the WQES to demonstrate compliance with the requirements of the IWDP. The reports corresponding to the previous quarter are due each year on April 28, July 28, October 28, and January 28.

- (3) The Program Manager for Wastewater Management at NIST-Boulder shall conduct the quarterly monitoring and submit the analytical reports.

f. Notification Requirements

- (1) NIST shall notify WQES both verbally and in writing if it is discovered that any requirements of the IWDP are not being met. Non-compliance with requirements may be discovered through routine sampling, WQES conducted sampling, bypass of NIST pretreatment systems, or accidental discharges of prohibited materials (Section 6.b.) into the wastewater system.

(2) The Program Manager for Wastewater Management at NIST-Boulder shall make all notifications to WQES. All non-compliance shall follow the notification procedures listed here:

(a) Notify WQES verbally within 24 hours of becoming aware of the non-compliance.

(b) Within 5 days, submit a written report to WQES, which must include:

- i. A description of the exceedance or discharge and the cause of noncompliance;
- ii. The period of noncompliance with exact dates and times, or if not corrected, the anticipated time the noncompliance is expected to continue;
- iii. Steps being taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance; and
- iv. Results from additional sampling, if required by WQES.

g. Management of Change

On an ongoing basis, the Program Manager for Wastewater Management at NIST-Boulder will evaluate new projects and changes to existing systems and equipment, to evaluate compliance with the IWDP, and then determine any necessary actions that must be taken by NIST prior to implementation (*e.g.*, request authorization to discharge, amend the wastewater classification survey, or request permit modifications). The Program Manager for Wastewater Management at NIST-Boulder will then provide guidance to implement action items needed to ensure full compliance throughout the change process.

h. Training

Training requirements under the IWDP shall be fulfilled by completing the training listed below as applicable to the employee's duties:

(1) All NIST staff handling or generating hazardous or universal waste shall complete one of these courses:

(a) [NIST S 7301.07: Hazardous Waste Generator Training for NIST-Boulder](#); or

(b) [NIST S 7301.07: Boulder Labs Hazardous Waste Generator Training for OFPM Boulder Personnel](#).

(2) All NIST staff shall complete the appropriate version of NIST S 7301.07: *Accidental Hazardous Material Release Training* for their duties as listed below:

(a) [Employees and associates using chemicals](#) as part of their responsibilities; or

(b) [Employees and associates not using chemicals.](#)

(3) Employees and associates assigned responsibilities requiring the operation or maintenance of petroleum storage tanks or oil-filled equipment with a capacity of 55 gallons or more shall complete one of the following dependent upon which division the personnel are under:

(a) [NIST S 7301.09: SPCC Training for Division 184](#)

(b) [NIST S 7301.09: Boulder Spill Prevention, Control and Countermeasures Training \(FMD-B, 194\)](#)

(c) [NIST S 7301.09: Spill Prevention, Control and Countermeasures Training for Division 647](#)

(d) [NIST S 7301.09: Spill Prevention, Control and Countermeasures Training for Division 688](#)

(4) Job-specific training for all NIST staff shall include requirements for waste handling, including the following information when applicable to the staff members' and contractors' duties:

(a) Location of waste containers;

(b) Types of waste containers;

(c) Wastes that are compatible and may be combined;

(d) Wastes that are incompatible and must be segregated;

(e) Labeling of waste containers; and

(f) If applicable, materials that may be discharged to the Building 81 neutralization system.

i. Recordkeeping

NIST will maintain records as necessary to demonstrate compliance with the IWDP.

(1) General Records

The following records shall be maintained:

(a) Any records, books, documents, memoranda, reports, correspondence, and summaries of these materials relating to testing, internal or external monitoring, calibrations, investigations, and chemical analyses made by or on behalf of NIST associated with a discharge; and

(b) All records that pertain to matters that are the subjects of special orders or any other enforcement or litigation activities brought by the City of Boulder shall be retained and preserved until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

(2) Equipment Specific Records

Records to demonstrate compliance with equipment-specific requirements shall be maintained by the owners of the equipment.

(3) Retention of Records

All records required by this Suborder shall be maintained for a minimum period of three (3) years.

**7. DEFINITIONS**

Definitions common to all NIST EMS suborders can be found in NIST O 7301.00. There are no definitions specific to this suborder other than those in 6.b.

a. NIST-Boulder – The personnel (including associates, tenants and contractors) buildings and facilities of the National Institute of Standards and Technology located the Department of Commerce Boulder Laboratories facility. This excludes buildings and facilities owned by the General Services Administration and leased to the National Oceanic and Atmospheric Administration.

b. Wastewater Classification Survey – The questionnaire covering the discharges from the facility industrial wastewater users must complete and submit to WQES per the requirements of BRC 11-3-14 to receive an IWDP.

**NOTE:** Sampling is required to identify pollutants discharged by the facility.

**8. ACRONYMS**

Acronyms common to all NIST EMS suborders can be found in NIST O 7301.00. The acronyms specific to this suborder are as follows:



- a. AHMRRP – NIST Accidental Hazardous Material Release Reporting Procedure
- b. EMS – NIST Environmental Management System
- c. FMD-B – NIST OFPM Facilities Maintenance Division - Boulder (194)
- d. OFPM – NIST Office of Facilities and Property Management
- e. SDS – Safety Data Sheets
- f. SPCC – Spill Prevention, Control and Countermeasures
- g. WQES – City of Boulder, Water Quality and Environmental Services

## **9. RESPONSIBILITIES**

Roles and responsibilities common to all NIST Environmental Suborders can be found in NIST O 7301.00. The roles and responsibilities specific to this suborder are as follows:

- a. The Chief Safety Officer, as NIST's designated Environmental Manager, is responsible for overseeing NIST's efforts in complying with the requirements identified in this suborder.
- b. OU Directors are responsible for:
  - (1) Establishing implementing policies and procedures, as needed, for the requirements of this suborder to be met;
  - (2) Ensuring subordinate managers have the authority, resources, and training needed to implement OU-established policies and procedures; and
  - (3) Using OU funds to pay any civil penalties identified in regulatory inspections and resulting from regulatory violations in their respective OUs.
- c. Division Chiefs and Group Leaders are responsible for:
  - (1) Implementing this suborder as it applies to activities involving their personnel and space in accordance with any applicable OU-established policies and procedures;

(2) Ensuring employees and associates in the OU are trained in the handling and accumulation of chemical waste specific to the areas in which they work. See 6.h(4) for required contents.

(3) Ensuring contaminants and pollutants are handled in a manner preventing unauthorized discharges;

(4) Ensuring regulatory inspectors are provided access to areas under their supervision;

(5) Upon receiving inspection reports on their respective workplaces, ensuring corrective actions are performed; and

(6) Ensuring deficiencies or violations resulting from regulatory inspections of areas operated by that OU are addressed in the timeframe required by the regulatory agency.

d. NIST-Boulder Employees and Associates are responsible for:

(1) Completing the appropriate training per Section 6.h;

(2) Ensuring [signage prohibiting discharges to drains](#) is posted at sinks and drains in their work areas;

(3) Ensuring their activities do not release pollutants to wastewater, unless specifically authorized in the IWDP or a separate authorization issued by the City of Boulder;

(4) Ensuring discharges from laboratory spaces in Building 81 comply with Section 6.c(1)b;

(5) Reporting to the Program Manager for Wastewater Management at NIST-Boulder any activity that may cause unauthorized discharges to wastewater; and

(6) Reporting any spills or releases in compliance with the NIST-Boulder *Accidental Hazardous Material Release Reporting Procedure (AHMRRP)*.

e. The Program Manager for Wastewater Management at NIST-Boulder is responsible for:

(1) Ensuring sampling is performed in accordance with the terms of the IWDP and that samples are analyzed following collection, including functioning as the contracting officer representative for the sampling contract and procuring analytical services;

(2) Coordinating sampling and flow measurement activities;

- (3) Performing an [internal audit](#) once per calendar year at a minimum to verify ongoing compliance with the IWDP;
- (4) Submitting reports to WQES as required under the IWDP:
  - (a) Quarterly Reports; and
  - (b) Reporting releases to wastewater;
- (5) Communicating the regulatory requirements to affected personnel and providing training as necessary. Providing informational outreach to NIST staff in regard to wastewater management;
- (6) Assisting NIST personnel by submitting requests for authorization to discharge to WQES;
- (7) Reviewing of site design packages to ensure that wastewater systems comply with the IWDP and BRC 11-3;
- (8) Providing appropriate signage prohibiting discharge of chemical waste to NIST-Boulder personnel on request;
- (9) Maintaining this suborder and related training; and
- (10) Maintaining general records as required under the IWDP.

f. The NIST Chief Facilities Management Officer is responsible for:

- (1) Ensuring wastewater treatment systems in areas controlled by the NIST Office of Facilities and Property Management (OFPM) are maintained in good working order and in accordance with the manufacturer's instructions. This includes:
  - (a) The oil-water separator in Building 21; and
  - (b) The acid/base neutralization system in Building 81;
- (2) Ensuring sanitary sewers within the NIST-Boulder facility are maintained in operable condition and in compliance with BRC 11-3;

- (3) Ensuring drawings of the NIST-Boulder sanitary sewer system accurately reflect conditions;
- (4) Ensuring discharges from activities related to projects managed by OFPM personnel comply with the IWDP or a separate authorization issued by the City of Boulder;
- (5) Ensuring complaints or comments related to the operation of the sanitary sewer system are addressed in a timely manner; and
- (6) Ensuring construction of sanitary sewer systems within the NIST-Boulder facility complies with the requirements of the IWDP and BRC 11-3 as well as applicable building codes.

g. The NIST-Boulder Emergency Coordinator is responsible for:

- (1) Ensuring the Occupant Emergency Plan is followed during response to any emergency;
- (2) Informing the DoC Boulder Labs Boulder Board of Directors of the emergency and the nature of the response; and
- (3) Reviewing reports of releases submitted to regulatory agencies.

h. The Department of Commerce Police are responsible for:

- (1) Secure areas around reported releases that present a significant risk to human health, safety or the environment;
- (2) Notify Emergency Manager of release;
- (3) Serve as incident commander until relieved; and
- (4) Assist emergency responders from outside agencies (Boulder-Fire Rescue) with accessing the DoC Boulder labs facility and locating the release.

## 10. AUTHORITIES

There are no authorities specific to this suborder alone. For authorities applicable to all NIST Environmental Suborders, see NIST O 7301.00.

**11. DIRECTIVE OWNER**

Chief Safety Officer

**12. APPENDICES**

A. Revision History

B. Industrial Wastewater Discharge Permit

C. Boulder Revised Code Title 11, Chapter 3

D. Allowable Discharges to the Building 81 Neutralization System

E. Wastewater Classification Survey

F. Authorized Discharges

G. Sampling Parameters

**Appendix A. Revision History**

Version	Approval Date	Effective Date	Description of Change
1	07/13/23	07/13/23	NA

## Appendix B. Industrial Wastewater Discharge Permit



NIST S  
7301.13-Industrial D

## Appendix C. Boulder Revised Code Title 11, Chapter 3



NIST S  
7301.13-Boulder Rev



## Appendix D. Allowable Discharges to the Building 81 Neutralization System

Boric Acid ( $\text{H}_3\text{BO}_3$ )  
Carbonic Acid ( $\text{H}_2\text{CO}_3$ )  
Hydrobromic Acid ( $\text{HBr}$ )  
Hydrochloric Acid ( $\text{HCl}$ )  
Nitric Acid ( $\text{HNO}_3$ )  
Periodic Acid ( $\text{HIO}_4$ ,  $\text{H}_5\text{IO}_6$ )  
Phosphoric Acid ( $\text{H}_3\text{PO}_4$ )  
Sulfuric Acid ( $\text{H}_2\text{SO}_4$ ), unless drained from a battery  
Ammonium bicarbonate ( $\text{NH}_4\text{HCO}_3$ )  
Ammonium carbonate ( $(\text{NH}_4)_2\text{CO}_3$ )  
Ammonium hydroxide ( $\text{NH}_4\text{OH}$ )  
Calcium carbonate ( $\text{CaCO}_3$ )  
Calcium bicarbonate ( $\text{CaHCO}_3$ )  
Calcium hydroxide ( $\text{Ca}(\text{OH})_2$ )  
Magnesium hydroxide ( $\text{Mg}(\text{OH})_2$ )  
Potassium bicarbonate ( $\text{KHCO}_3$ )  
Potassium carbonate ( $\text{K}_2\text{CO}_3$ )  
Potassium hydroxide ( $\text{KOH}$ )  
Sodium bicarbonate ( $\text{NaHCO}_3$ )  
Sodium carbonate ( $\text{Na}_2\text{CO}_3$ )  
Sodium hydroxide ( $\text{NaOH}$ )

## Appendix E. Wastewater Classification Survey



NIST S 7301.13-NIST  
Boulder wastewater

**Appendix F. Active Discharges Authorized by the City of Boulder**

Description / Chemicals	Approval Date	Frequency
Neutralized H <sub>2</sub> SO <sub>4</sub> -H <sub>2</sub> O <sub>2</sub> etchant, 200mL/month	9/26/2008	On-going
Killed E. coli lysogeny culture	6/11/2009	On-going
Polisher rinse water	7/14/2010	On-going
Algae inhibitor from 2-2802/2810, 20 L/month	7/13/2011	On-going
Water system flushing using 0.4% NaNO <sub>2</sub> solution + dilution water approx 1500 gal per discharge	1/20/2012	On-going
GaN trace from cleaning equipment and Opti-Shield wash	12/6/2012	On-going
Small quantities of Aluminum and Copper etchants	12/10/2012	On-going
Killed cell culture	5/16/2013	On-going
Cooling tower cleaning water after neutralization	5/28/2013	On-going
Cooling tower blowdown with small quantities of treatment chemicals	1/13/2014	On-going
Cleaning the pure and ultrapure water systems. Annual PM.	11/18/2014	On-going
Small closed loop chiller PM discharges.	7/30/2015	On-going
Cleaning solution from the flushing of chilled water lines during construction.	2/9/2016	On-going
Rinsate from Electra-92 use on circuit wafers	5/16/2017	On-going
Chilled water system, 800 ppm Nalco 8338, 1000 gallon batches during construction and maintenance	7/27/2018	On-going

## Appendix G. Monitoring Parameters and Daily Loading Limits

### Outfall 001

Parameter	Limit	Units	Sampling Method	Sampling Frequency
Flow (gpd/mgd)	-		24-hr measurement	Quarterly
pH (SU)	5.5 – 10.5	SU	Handheld meter	Quarterly
Chemical Oxygen Demand – COD	700	mg/L	410.4	Quarterly
Phosphorus, Total	8	mg/L	365.1	Quarterly
Total Kjeldahl Nitrogen – TKN	55	mg/L	351.2	Quarterly
Total Suspended Solids – TSS	300	mg/L	2450D	Quarterly
Arsenic, Total	0.0548	lb/day	200.8	Semi-Annually
Cadmium, Total	0.0322	lb/day	200.8	Semi-Annually
Chromium, Total	1.74	lb/day	200.8	Semi-Annually
Copper, Total	0.2041	lb/day	200.8	Quarterly
Lead, Total	0.1266	lb/day	200.8	Semi-Annually
Mercury, Total	0.0026	lb/day	245.1	Semi-Annually
Molybdenum, Total	0.0580	lb/day	200.8	Semi-Annually
Nickel, Total	0.1680	lb/day	200.8	Semi-Annually
Selenium, Total	0.0902	lb/day	200.8	Semi-Annually
Silver, Total	0.0293	lb/day	200.8	Quarterly
Zinc, Total	1.48	lb/day	200.8	Semi-Annually
Volatile Organics	-		624	Semi-Annually
Semi-Volatile Organics	-		625	Semi-Annually

**Outfall 003**

Parameter	Limit	Units	Sampling Method	Sampling Frequency
Flow (gpd/mgd)	-		24-hr measurement	Quarterly
pH (SU)	5.5 – 10.5	SU	Handheld meter	Quarterly
Chemical Oxygen Demand – COD	700	mg/L	410.4	Quarterly
Phosphorus, Total	8	mg/L	365.1	Quarterly
Total Kjeldahl Nitrogen – TKN	55	mg/L	351.2	Quarterly
Total Suspended Solids – TSS	300	mg/L	2450D	Quarterly
Arsenic, Total	0.0548	lb/day	200.8	Semi-Annually
Cadmium, Total	0.0322	lb/day	200.8	Semi-Annually
Chromium, Total	1.74	lb/day	200.8	Semi-Annually
Copper, Total	0.2041	lb/day	200.8	Quarterly
Lead, Total	0.1266	lb/day	200.8	Semi-Annually
Mercury, Total	0.0026	lb/day	245.1	Quarterly
Molybdenum, Total	0.0580	lb/day	200.8	Semi-Annually
Nickel, Total	0.1680	lb/day	200.8	Semi-Annually
Selenium, Total	0.0902	lb/day	200.8	Semi-Annually
Silver, Total	0.0293	lb/day	200.8	Quarterly
Zinc, Total	1.4825	lb/day	200.8	Semi-Annually
Volatile Organics	-		624	Semi-Annually
Semi-Volatile Organics	-		625	Semi-Annually