

3 NIST-Gaithersburg Drinking Water

6 NIST S 7301.04

7 Issue Date: 01/12/2021

8 Effective Date:¹ 03/06/2018
9

10 1. PURPOSE

11 This suborder delineates requirements for maintenance and monitoring of the drinking water system at
12 the NIST Gaithersburg site.²
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15 2. BACKGROUND

16 Drinking water is supplied to the NIST Gaithersburg site by the Washington Suburban Sanitary
17 Commission (WSSC), the agency that provides drinking water to Montgomery and Prince Georges
18 Counties in Maryland. WSSC conducts a rigorous maintenance/monitoring program to ensure the
19 drinking water meets the National Primary Drinking Water Regulations [40 Code of Federal Regulations
20 (CFR) 141] promulgated by the U.S. Environmental Protection Agency (EPA). NIST maintains an on-
21 site system of water supply piping and appurtenances. It is NIST's responsibility to ensure that the
22 onsite water supply system conveys the drinking water safely to the employees, associates, and visitors
23 at the NIST Gaithersburg site.
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26 As classified by the U.S. EPA, the NIST-Gaithersburg drinking water system is considered a
27 consecutive, non-transient, non-community system³. Other entities with this type of drinking water
28 system include schools, factories, and office buildings. As a consecutive water system that meets the
29 exemption requirements of 40 CFR 141.3, NIST Gaithersburg is exempt from the monitoring
30 requirements included in the National Primary Drinking Water Regulations.
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32 It is NIST policy to maintain the drinking water system at the NIST-Gaithersburg site in accordance
33 with the International Plumbing Code, and to monitor the quality of drinking water at the Gaithersburg
34 site annually.
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¹ For revision history, see Appendix A.

² A separate suborder (NIST S 7301.05) addresses drinking water at the NIST Boulder site.

³ Consecutive water systems are supplied all of their water by a public water agency, such as the WSSC. Non-transient, non-community water systems supply water to at least 25 of the same people for at least 6 months per year.

36 **3. APPLICABILITY**

37 This program applies to the drinking water system at the NIST Gaithersburg site.

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40 **4. REFERENCES**

- 41 a. 40 CFR Part 141, [National Primary Drinking Water Regulations](#)
- 42
- 43 b. Code of Maryland (COMAR) Regulations 26.04.01, Quality of Drinking Water in Maryland
- 44
- 45 c. International Plumbing Code, International Code Council, 2015
- 46
- 47 d. Reduction of Lead in Drinking Water Act, Amendment to the Safe Drinking Water Act, 2011
- 48
- 49 e. EPA 816-R-03-002, Cross-Connection Control Manual, 2003
- 50
- 51 f. EPA 812-B-94-002, Lead in Drinking Water in Schools and Non-Residential Buildings, 1994
- 52
- 53 g. U.S. Department of Commerce Energy and Environmental Management Manual, 2012
- 54
- 55 h. NFPA 25, Inspection, Testing, and Maintenance of Water Based Fire Protection Systems
- 56
- 57 i. NFPA 291, Recommended Practice for fire Flow Testing and Marking of Hydrants
- 58
- 59 j. WSSC Plumbing and Fuel Gas Code, July1, 2015, Sections 502.3.4, 504.1, 504.2, 504.3, 504.5,
60 504.6, 504.7, 507.1, 507.2, 507.3, 508.1, 508.2, 508.4

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63 **5. APPLICABLE NIST ENVIRONMENTAL OR OTHER SUBORDERS**

- 64 a. NIST S 7301.01, Environmental Management System

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67 **6. REQUIREMENTS**

- 68 a. Maintenance of the NIST Gaithersburg Drinking Water System

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71 (1) Maintenance of the drinking water system at NIST Gaithersburg shall be performed by the NIST
72 Office of Facilities and Property Management (OFPM) in accordance with the International
73 Plumbing Code.

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75

(2) Maintenance of the drinking water system shall include the following:

76 (a) Development and implementation of written drinking water system maintenance procedures
77 for the following:

- 78
- 79 i. Flushing (e.g., unidirectional, conventional) of the NIST system;
 - 80
 - 81 ii. Valve and hydrant exercise and maintenance in accordance with NFPA 25 and 291
82 and NIST Gaithersburg site requirements;
 - 83
 - 84
 - 85 iii. Maintenance of a current water distribution map;
 - 86
 - 87 iv. Appropriate disinfection of pipelines after maintenance work is performed; and
88
 - 89 v. Back flushing and maintenance of water filters installed by OFPM (e.g., whole
90 building filters, drinking fountain filters) in accordance with manufacturers'
91 requirements.
 - 92

93 (b) Cross-Connection Surveys and Back Flow Prevention – Qualifications

- 94
- 95 i. All cross-connection surveys and back flow preventer testing, repair, and replacement
96 shall be conducted by individuals meeting the following:
97
 - 98 (i) Successful completion of a Maryland Certified Backflow/Cross Connection
99 Training course of at least 32 hours, along with an 8-hour refresher course
100 every three years after the initial training; or
101
 - 102 (ii) Equivalent training certified by another state.

103

104 (c) Cross Connection Survey

- 105
- 106 i. A cross-connection survey of the NIST Gaithersburg Drinking Water System shall be
107 conducted and updated as changes are made to the system. The following shall be
108 included in the survey:
109
 - 110 (i) All end uses of the system shall be surveyed.
 - 111
 - 112 (ii) All cross-connections shall be documented and evaluated for elimination.
 - 113
 - 114 (iii) If a cross-connection is required, an approved backflow preventer must be
115 installed, inventoried, and maintained.

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(d) Backflow Prevention

- i. Non-potable water systems shall be isolated from the main potable water distribution system at the Gaithersburg site by either eliminating a cross-connection or installing a backflow preventer.
- ii. The selection of backflow preventers shall be based on the hazard levels described in Table 1 below.
- iii. Any cross connection between the chilled water system and the potable water system at the NIST-Gaithersburg site shall be considered “High Hazard” as described in Table 1 below.

Table 1. Backflow Preventer Requirements

Cross-Connection Hazard Level	Description	Types of Backflow Preventer Allowed
Low Hazard (Non-Health Hazard)	A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the potable water supply. The substance must be non-toxic and non-bacterial in nature with no significant health effect.	Testable backflow preventers rated for low-hazard applications, such as double-check backflow assemblies, should be considered whenever possible. Non-testable backflow preventers are allowed but must be replaced or rebuilt every 5 years. Backflow preventers suitable for high-hazard applications may also be used.
High Hazard (Health Hazard)	A cross-connection or potential cross-connection involving any substance that could, if introduced into the potable water supply, cause death or illness, spread disease, or have a high probability of causing such effects. The substance may be toxic to humans either from a chemical, bacteriological, or radiological standpoint.	Air-gap-separation or testable reduced-pressure-principle backflow preventers should be considered whenever possible. Air gaps must be at least the width of the supply pipe above the flood level of the receiving container or a minimum of one (1) inch, whichever is greater. Testable backflow preventers specified in the 2015 International Plumbing Code rated for high-hazard applications are also acceptable.

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137 (e) Backflow Preventer Testing and Maintenance
138

- 139 i. All required backflow preventers shall be certified as operational by an individual
140 meeting the qualifications in Section 6a(2)(b) in accordance with the following
141 schedule:

142
143 (i) High-Hazard Applications – Testable Backflow Preventers:

144
145 [i] At least annually;

146
147 [ii] At installation;

148
149 [iii] After repair, relocation, or replacement;

150
151 [iv] Following any backflow incident;

152
153 [v] Prior to any reactivation of a water system from intermittent use; and

154
155 [vi] Repaired or replaced as needed.

156
157 (ii) Low-Hazard Applications – Testable Backflow Preventers: Follow same
158 schedule as High-Hazard Applications.

159
160 (iii) Low-Hazard Applications – Non-Testable Backflow Preventers: Replace or
161 rebuild every 5 years.

162
163 ii. All backflow preventers shall be tagged with testing, maintenance, and installation
164 information.

165
166 iii. As a recommended practice, personnel who test backflow preventers should be
167 separate from the personnel responsible for installing and maintaining the same
168 devices.

169
170 iv. A current inventory shall be maintained of all backflow preventers at the NIST
171 Gaithersburg site. The inventory shall include:

172
173 (i) The manufacturer recommended procedures for maintenance and repair; and

174
175 (ii) A schedule for routine inspections, testing, and maintenance in the first bullet
176 in Section 6a(e) above.

177 v. High-hazard back flow preventers shall be maintained on the water mains servicing
178 the NIST-Gaithersburg site. Annual test reports for these back-flow preventers shall
179 be submitted to the WSSC. Any failure of these back-flow preventers shall be
180 reported to the Environmental Management Group (EMG) in the NIST Office of
181 Safety Health and Environment (OSHE) and to the WSSC.
182

183 b. Monitoring of the NIST Gaithersburg Drinking Water
184

185 (1) Routine monitoring of the drinking water at the NIST-Gaithersburg Site shall be performed by
186 Maryland-certified drinking water samplers and a Maryland-certified drinking water testing
187 laboratory. OFPM shall contract the drinking water sampling and laboratory analysis.
188

189 (a) Monitoring Locations

190 Drinking water samples shall be collected and analyzed from the following
191 locations on the NIST-Gaithersburg Site:
192

- 193 i. Every drinking water fountain;
- 194
- 195 ii. Every kitchen sink; and
- 196
- 197 iii. Every water line connected to a refrigerator.
198

199 (b) Monitoring Frequency

200 The frequency of drinking water monitoring shall meet the following:
201

- 202 i. Each monitoring location, as described above, on the NIST-Gaithersburg
203 Site shall be analyzed once every three years; and
204
- 205 ii. Annually, drinking water samples shall be collected and analyzed at one
206 third of the monitoring locations on the NIST-Gaithersburg Site⁴.
207

208 (c) Monitoring Parameters

209 Each drinking water sample shall be analyzed for the parameters listed in Table 2
210 below.
211

212 (d) Sampling Protocol Requirements

- 213
- 214 i. Drinking water samples shall be collected by Maryland-certified drinking
215 water samplers.

⁴ Assuming the NIST Gaithersburg Site has 264 sampling locations, each year 88 samples shall be collected and analyzed.

- 252 (a) Ensure that signs are posted immediately at the designated fountains and sinks to indicate
253 that they are “out of service”. (OFPM)
254
- 255 (b) Communicate the findings to NIST management, the Public Affairs Office, and potentially
256 affected NIST employees, associates, and visitors. (EMG in consultation with OFPM)
257
- 258 (c) Resample the affected drinking water source(s) and analyze for the contaminant(s) of
259 concern. (EMG)
260
- 261 (d) Seek to provide bottled water to affected NIST employees, associates, and visitors if
262 necessary (see Section (5) below). (OFPM)
263
- 264 (e) Investigate the drinking water non-compliance immediately to identify the root cause and
265 necessary corrective actions, e.g., equipment repairs; cleaning/disinfection of affected pipes,
266 valves, and other appurtenances; flushing the affected systems. (OFPM in consultation with
267 EMG)
268
- 269 (f) After corrective actions have been implemented, re-sample the drinking water and analyze
270 for the contaminants of concern. (EMG)
271
- 272 (g) If the sampling results do not confirm the success of the corrective actions in addressing the
273 drinking water non-compliance, start the above actions again.
274
- 275 (h) If the sampling results do confirm the success of the corrective actions, place the drinking
276 water system back in service. (OFPM)
277
- 278 (i) If the sampling results confirm the success of the corrective actions, issue follow-up
279 communications to NIST management, the Public Affairs Office, and potentially affected
280 NIST employees, associates, and visitors. (EMG in consultation with OFPM and NIST
281 management)
282
- 283 (2) For any analytical results indicating contaminant concentrations greater than one half
284 of the Primary Drinking Water Standard or suspected to originate from NIST
285 Gaithersburg activities, the Chief Facilities Management Officer and the Chief Safety
286 Officer shall be consulted and potential corrective actions shall be considered.
287
- 288 d. Purchase of Bottled Drinking Water Using Appropriated Funds
289 In accordance with U.S. Comptroller General Decision B-247871 on the Purchase of Bottled
290 Drinking Water (1992), appropriated funds may be used to purchase bottled drinking water only
291 upon a showing of necessity. Necessity shall be established prior to any purchase of bottled water

292 using appropriated funds, in consultation with EMG. All purchases of bottled water shall be
293 approved by the NIST Office Acquisitions and Agreements Management. Necessity is established,
294 for example, where the available drinking water has been analyzed by appropriate authorities and
295 found to pose a health risk. Practically this translates to any exceedance of a Primary Drinking Water
296 Standard.

297

298 e. Safe Drinking Water Considerations in Design and Construction

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300 (1) Design and construction projects involving potable and non-potable water systems shall be
301 carried out in accordance with the International Plumbing Code and other applicable
302 requirements or regulations.

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304 (2) Drinking water treatment/filtration systems shall not be installed OFPM unless they will be
305 maintained by OFPM. Improperly maintained treatment/filtration systems can become a source
306 of drinking water contamination.

307

308 f. Communications

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310 (1) All drinking water monitoring results and corrective actions shall be made readily available to
311 NIST management and staff by EMG.

312

313 (2) The following actions shall be performed annually by EMG:

314

315 (a) Obtain WSSC's annual consumer confidence and tap water analysis reports;

316

317 (b) Review the reports to determine if any water quality deterioration is occurring;

318

319 (c) Amend the reports with information on testing conducted at NIST Gaithersburg; and

320

321 (d) Post the reports on the Drinking Water Program web page.

322

323 (3) Communications of monitoring results and amended WSSC annual reports shall encourage the
324 NIST staff to report drinking water concerns to OFPM.

325

326 g. Internal Compliance Assessments

327

328 (1) Internal compliance assessments shall be conducted by EMG at least once per calendar year to
329 verify ongoing compliance with the requirements of this suborder.

330

331 (2) Internal compliance assessments shall include:

- 332 (a) A review of the drinking water system maintenance procedures and records for cross-
333 connection control, backflow prevention, valve exercise, hydrant flushing, and disinfection
334 practices during all water main repairs; and
335
336 (b) A review of water quality monitoring results, including any non-compliances and corrective
337 actions.

338
339 h. Records

340
341 (1) The following records shall be maintained by OFPM for the periods of time indicated and shall
342 be made available upon request:

- 343
344 (a) Cross-connection inspection records – 5 years
345
346 (b) Backflow preventer testing and maintenance records – 10 years
347

348 (2) The following records shall be maintained by EMG for the periods of time indicated:

- 349
350 (a) Bacteriological monitoring results – 5 years
351
352 (b) Aluminum, lead, copper, cadmium, and zinc testing results – 12 years
353
354 (c) All other chemical monitoring results – 10 years
355
356 (d) Actions taken to correct non-compliances – 3 years after the actions have been completed
357
358 (e) Consumer confidence reports – 5 years
359
360 (f) Internal compliance assessments – 5 years
361
362

363 **7. DEFINITIONS**

- 364 a. Air Gap – The unobstructed vertical distance through free atmosphere between the lowest effective
365 opening from any pipe or faucet conveying water or waste to a tank, plumbing fixture, receptor, or
366 other assembly and the flood level rim of the receptacle. These vertical, physical separations must be
367 at least twice the effective opening of the water supply outlet, never less than 1 inch above the
368 receiving vessel flood rim.
369
370 b. Backflow – An unwanted flow of potable water in the reverse direction, often caused by siphonage
371 or backpressure of water due to a water main break or loss of pressure.

- 372 c. Backflow Preventer – A device used to protect potable water distribution lines from contamination
373 due to backflow.
374
- 375 d. Backpressure – A pressure, higher than the supply pressure, caused by a pump, elevated tank, boiler,
376 air/steam pressure, or any other means, which may cause backflow.
377
- 378 e. Community Water System – A community water system is a public water system that serves at least
379 15 service connections used by year-round residents, or regularly serves at least 25 year-round
380 residents.
381
- 382 f. Consecutive Public Water System – A water system that has no water production or source facility
383 of its own, obtains all of its water from another water system, and meets the definition of a public
384 water system.
385
- 386 g. Consecutive Water System – A water system that obtains some or all of its water from another water
387 system. Often a consecutive water system has no water production or source facility of its own.
388 NIST Gaithersburg is classified as a consecutive water system.
389
- 390 h. Consumer Confidence Report – A consumer confidence report is an annual report that provides
391 water quality information. The report must contain certain mandatory information and be delivered
392 to customers annually by July 1. This deadline applies to the WSSC, as the public water utility.
393
- 394 i. Cross-Connection – A connection or potential connection between any part of a potable water
395 system and any other environment containing other substances in a manner that, under any
396 circumstances, would allow such substances to enter the potable water system. Other substances may
397 be gases, liquids, or solids, such as chemicals, water products, steam, water from other sources
398 (potable or non-potable), or any matter that may change the color of or add odor to the water. Bypass
399 arrangements, jumper connections, removable sections, swivel or changeover assemblies, or any
400 other temporary or permanent connecting arrangement through which backflow may occur are
401 considered to be cross-connections.
402
- 403 j. NIST Gaithersburg Drinking Water Program Manager – An OSHE staff member appointed by the
404 Chief Safety Officer who carries out OSHE’s assigned roles and responsibilities for the Drinking
405 Water Program at NIST Gaithersburg.
406
- 407 k. Non-Transient, Non-Community Water System – A public water system that is not a community
408 water system and that regularly serves at least 25 of the same persons over 6 months per year.
409 Examples of entities having such systems include schools, factories, office buildings, and hospitals.
410

- 411 l. Public Water System – A system for the provision of water for human consumption through pipes or
412 other constructed conveyances, if such system has at least 15 service connections or regularly serves
413 an average of at least 25 individuals at least 60 days out of the year.
414
- 415 m. Service Connection – A service connection is the opening, including all fittings and appurtenances,
416 at the water main through which water is supplied to the user.
417
- 418 n. Washington Suburban Sanitary Commission (WSSC) – The local water utility that supplies all of
419 NIST Gaithersburg’s potable water.
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422 **8. ACRONYMS**

- 423 a. CFR – Code of Federal Regulations
424
- 425 b. COMAR – Code of Maryland Regulations
426
- 427 c. EMG – Environmental Management Group, OSHE
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- 429 d. EPA – U.S. Environmental Protection Agency
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- 431 e. OSHE – Office of Safety, Health, and Environment
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- 433 f. OU – Operational Unit
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- 435 g. WSSC – Washington Suburban Sanitary Commission
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438 **9. RESPONSIBILITIES**

439 The roles and responsibilities specific to this suborder are as follows:
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- 441 a. Chief Facilities Management Officer:
442
- 443 (1) Ensuring that the requirements applicable to OFPM in Section 6 of this suborder are met.
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- 445 b. EMG Leader:
446
- 447 (1) Ensuring that the requirements applicable to EMG in Section 6 of this suborder are met; and
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449 (2) Serving as NIST's principal point of contact with WSSC, Maryland Department of the
450 Environment, and EPA regarding drinking water issues, or designating another member of EMG
451 to do so.

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454 **10. AUTHORITIES**

455 None

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458 **11. DIRECTIVE OWNER**

459 Chief Safety Officer

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462 **12. APPENDICES**

463 A. Revision History

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Appendix A. Revision History

Revision No.	Approval Date	Responsible Person	Brief Description of Change; Rationale
0			None – Initial Document
1	1/12/2021	April Camenisch	Updated NIST suborder links.