

Day(s) in the Life of a Drinking Water Quality Analyst

By Mason Caceres



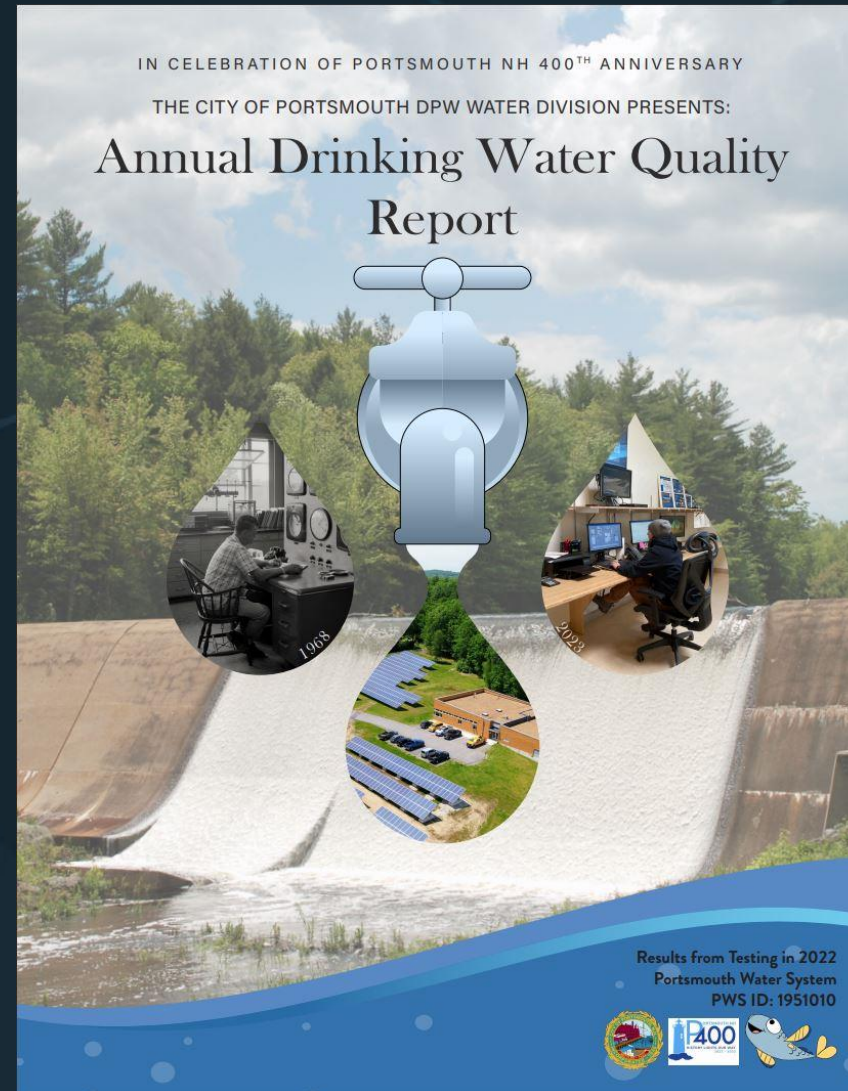
Path of Personal Development

- B.S. in Environmental Science from the University of New Hampshire
- Background in water quality testing at UNH lead to further interest in drinking water treatment
- Started with the City of Portsmouth Public Works Dept. in May of 2019
- Currently hold Water Works Operator, Treatment Grade II, and Distribution Grade II Licenses issued by the Department of Environmental Services (NHDES)



Overarching Duties & Responsibilities

- Test and monitor various characteristics/parameters of water samples collected before, during, and after treatment to ensure optimal treatment operations and regulatory compliance.
 - Applies to both Portsmouth and Pease Tradeport Water Systems
- Calibrate and maintain ‘in-house’ laboratory equipment and in-line analyzers deployed at source water locations and Madbury Water Treatment Facility.
- Record and track water quality concentration data used for annual water quality reports.
 - Manage design and formatting of these reports as well.



Compliance Sampling and Testing

- Chain of command: under the Safe Drinking Water Act (SDWA), the EPA sets legal limits on levels of certain contaminants in drinking water.
 - Individual states (in our case, the NH Department of Environmental Services) can set and enforce their own drinking water standards if the standards are, at a minimum, as stringent as EPA's national standards.
 - Public water systems (PWS^s) must follow the rules and regulations set forth by the state.
 - Each rule holds several layers of requirements that PWS^s must follow:
 - Collection and testing frequencies, max contaminant levels (MCLs), quantities (# of samples/round), sample locations, reporting deadlines, response to violations, etc.



Regulated Rules, Sample Submissions and Associated Chain of Custodies

Contaminant Type	Regulation
Chemical contaminants	<ul style="list-style-type: none"> • Arsenic rule • Chemical contaminant rules • Lead and copper rule • Radionuclides rule • Variance and exemptions rule
Microbial contaminants	<ul style="list-style-type: none"> • Aircraft drinking water rule • Ground water rule • Stage 1 and stage 2 disinfectant/disinfection byproducts rule • Surface water treatment rules • Total coliform rule and revised total coliform rule
Right-to-know rules	<ul style="list-style-type: none"> • Consumer confidence report rule • Public notification rule

Searching OneStop

Explore the many documents, permits, data and reports on our OneStop database.

NHDES ONESTOP >

System Name: PORTSMOUTH WATER WORKS
60 FRESHET RD
MADBURY NH
PORTSMOUTH NH 03801

To display/save a [SINGLE](#) form, click on a form name below. Other...
If you have questions about these forms or sampling...

[Master Sampling Schedule \(MSS\)](#)

Available Analysis Request Forms

[Total Coliform Rule \(TCR\) - Routine](#)
[Total Coliform Rule \(TCR\) - Repeats](#)
[Groundwater Rule - Triggered Monitoring \(GWR-TM\)](#)
[Groundwater Rule - Triggered Monitoring \(GWR-TM\) - Confirmation Samples](#)
[Groundwater Rule - Investigative Monitoring \(GWR-IM\)](#)
[Chemical \(CHEM\)](#)
[Disinfection By Product \(DBP\)](#)
[DBP Precursor Removal \(DBP\)](#)
[Lead and Copper Rule \(LCR\)](#)
[General System Evaluation \(GSES\)](#)

Monthly and Quarterly Reporting Forms

[Monthly Operating Report for Filtered Surface Water Systems](#)
[D/DBP Quarterly Report](#)

PFAS Forms and Guidance

[PFAS Consecutive Sampling Waiver Request](#)
[PFAS Sampling Reduction Request After 2 Non-Detects](#)
[PFAS Sampling and Testing Guidance for Public Water Systems](#)

Lead and Copper Program Forms and Guidance

[Lead and Copper Forms](#)
[Lead and Copper Initial Water Quality Parameters \(LCRWQP\) - Systems NOT treating for Lead/C](#)
[All ACTIVE Lead and Copper Sites](#)

Consumer Confidence Report (CCR) Information

[CCR Guidance](#)
[CCR Forms](#)

Other Forms, Applications and Templates

[Chemical Monitoring Waivers](#)
[Public Notice Forms](#)
[Compliance Sampling Site Change Form](#)
[Level 1 Assessment Form](#)
[Level 2 Assessment Form](#)



Drinking Water and Groundwater Bureau
Analysis Request Form
BACTERIA Routines (Total Coliform Rule)
Compliance Sample Site(s) per Master Sampling Schedule

June 6, 2023
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PWS ID: 1951010 Collected By: _____ (Print Name)

System Name: PORTSMOUTH WATER WORKS Signature: _____

PWS Town: PORTSMOUTH Phone Number: _____

Sample Type: Routine Results for the Month of: _____ Year: _____

Are Sample(s) Chlorinated? Yes No * For chlorinated samples please circle Free or Total. Default value will be Free.

Site ID	Sample Site Location	Date & Time Sample Collected	Free/Total Chlorine Residual (mg/L)*	Lab Sample ID	Date & Time Sample SETUP / PREPARED	Date & Time Sample READ / ANALYZED	Total Coliform Count / P or A	E. coli Count / P or A	Method
006	PORT CITY NISSAN /A								
009	GREENLAND LIBRARY /A								
011	PORTSMOUTH LIBRARY /A								
013	WATER ST SHAW WAREHOUSE /A								
021	PORT CITY NISSAN /B								

Note: For systems collecting three additional routines, all samples must be collected from the distribution system and you must include at least one sample from the regularly scheduled site(s). Systems with fewer than three service connections may take multiple samples at the same site. According to DES records, this system CHLORINATES. Chlorine residual concentrations must be measured and recorded at the time of sample collection. If CHLORINATION is not in use, please contact DES DWGB to update the appropriate records by email DWGBinfo@des.nh.gov or by calling (603) 271-2513.

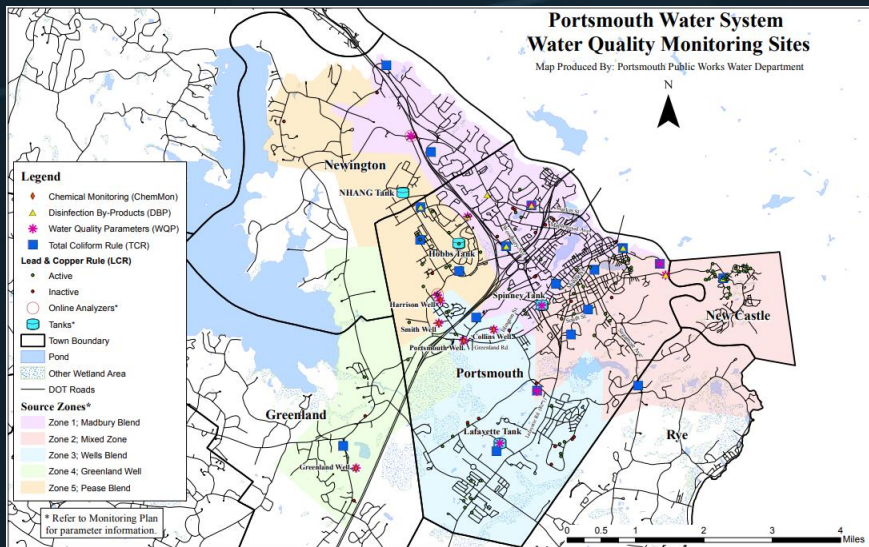
FOR LAB USE: Temp C (upon receipt): _____ On Ice? Y / N Batch ID (if different than sample ID prefix): _____ List QUALIFIERS (if any): _____
 Relinquished by: _____ Received by: _____ Date/Time: _____
 Relinquished by: _____ Received at Lab by: _____ Date/Time: _____
 Lab Conducting Analysis: _____ Signature: _____ Lab Accred. ID: _____ Phone: _____
 Reporting Lab (if different): _____ Signature: _____ Lab Accred. ID: _____ Phone: _____
Results must be reported to DES within 2 business days of analysis completion unless acute contaminants are present/exceeded which must be reported within 24 hours.

* Open 2023 Sampling Schedule

* Distribute WQ parameter list

Compliance Sampling Rounds - Total Coliform Rule

- Purpose: to ensure proper disinfection (i.e. deactivation of bacteria) throughout water system(s) via sodium hypochlorite dosing. Water samples are collected, submitted, and tested for the presence/absence of total coliform & E. coli bacteria.
 - Quantity of samples collected are associated with the population served. (>33,000 people = 30 samples/month)
 - Sampling events occur bi-weekly on Tuesdays.

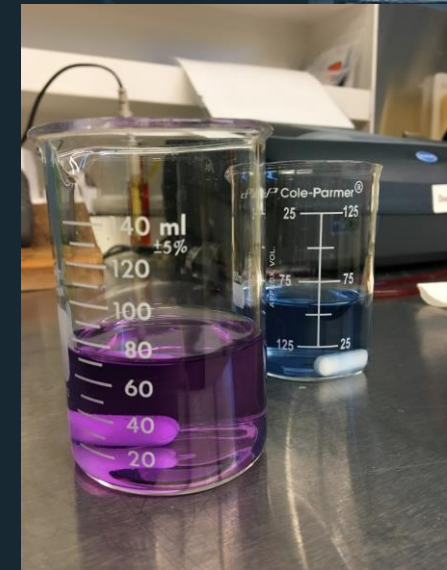
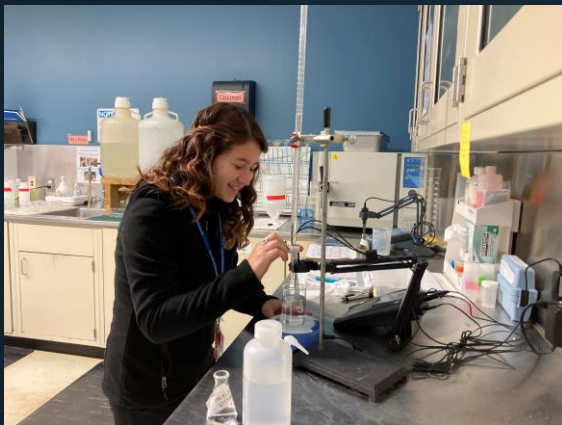


Population	Minimum Samples/ Month	Population	Minimum Samples/ Month	Population	Minimum Samples/ Month
25-1,000*	1	21,501-25,000	25	450,001-600,000	210
1,001-2,500	2	25,001-33,000	30	600,001-780,000	240
2,501-3,300	3	33,001-41,000	40	780,001-970,000	270
3,301-4,100	4	41,001-50,000	50	970,001-1,230,000	300
4,101-4,900	5	50,001-59,000	60	1,230,001-1,520,000	330
4,901-5,800	6	59,001-70,000	70	1,520,001-1,850,000	360
5,801-6,700	7	70,001-83,000	80	1,850,001-2,270,000	390
6,701-7,600	8	83,001-96,000	90	2,270,001-3,020,000	420
7,601-8,500	9	96,001-130,000	100	3,020,001-3,960,000	450
8,501-12,900	10	130,001-220,000	120	≥ 3,960,001	480
12,901-17,200	15	220,001-320,000	150		
17,201-21,500	20	320,001-450,000	180		

*Includes PWSs which have at least 15 service connections, but serve <25 people.

“In-House,” Additional Testing

- Additional sampling and water chemistry analysis beyond routine requirements.
 - Examples: Corrosion control, general water quality parameters, Bellamy Reservoir & tributaries, internal processing; validations of in-line analyzers
 - Going above and beyond as a water system.
- Difference between accredited laboratory analyses and non-accredited.



Before Treatment (Source Waters)

- Purpose: to preemptively monitor potential changes to water quality and prepare for adjustments in treatment processes.
- Weekly trips to reservoir
 - Dissolved oxygen profiles
 - Physical, chemical, biological testing at different depths
 - Water level and secchi disk measurements on-site
- Bi-weekly trips to tributaries (5 in total)
 - On-site tests and collections for further lab testing
 - Nutrient dynamics, general water quality parameters, flow calculations
- Groundwater sources: far less variability in water quality compared to surface water
 - Visited monthly for bacteria testing
 - Quarterly for general WQ parameters (in-house) and chemical monitoring (compliance)



During Treatment (Madbury WTF)

- Purpose: to actively track internal treatment processes (as they occur) to confirm optimal chemical dosing and analyzer accuracy.
- Daily 'checks' performed by treatment operators
 - Collect and test samples from front of facility (in-coming water from Bellamy) to finish (filtered, and combined with groundwater sources)
 - pH, alkalinity, turbidity, dissolved oxygen, conductivity, color, UV254, chlorine residual (once added)
 - Depending on the level of these parameters, adjustments are made accordingly
- Weekly iron and manganese testing throughout facility
- Monthly bacteria, TOC (total organic carbon), and alkalinity testing (compliance)
 - % removal of TOC is a great indicator of how well we're treating our water



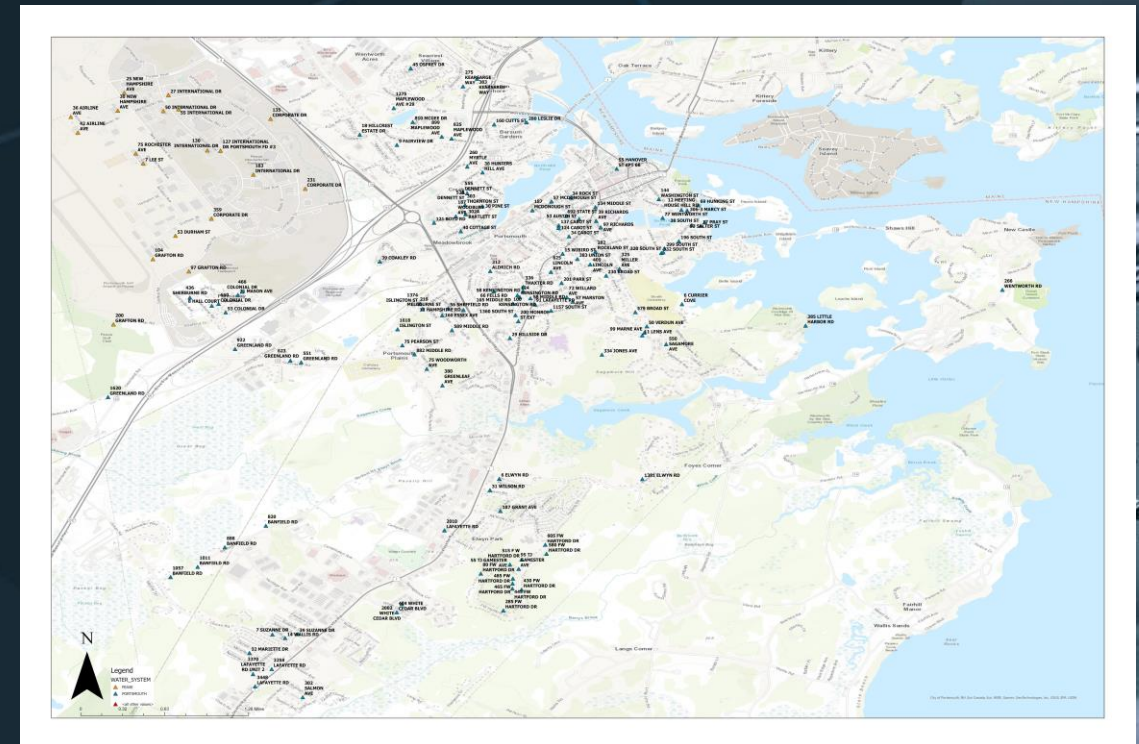
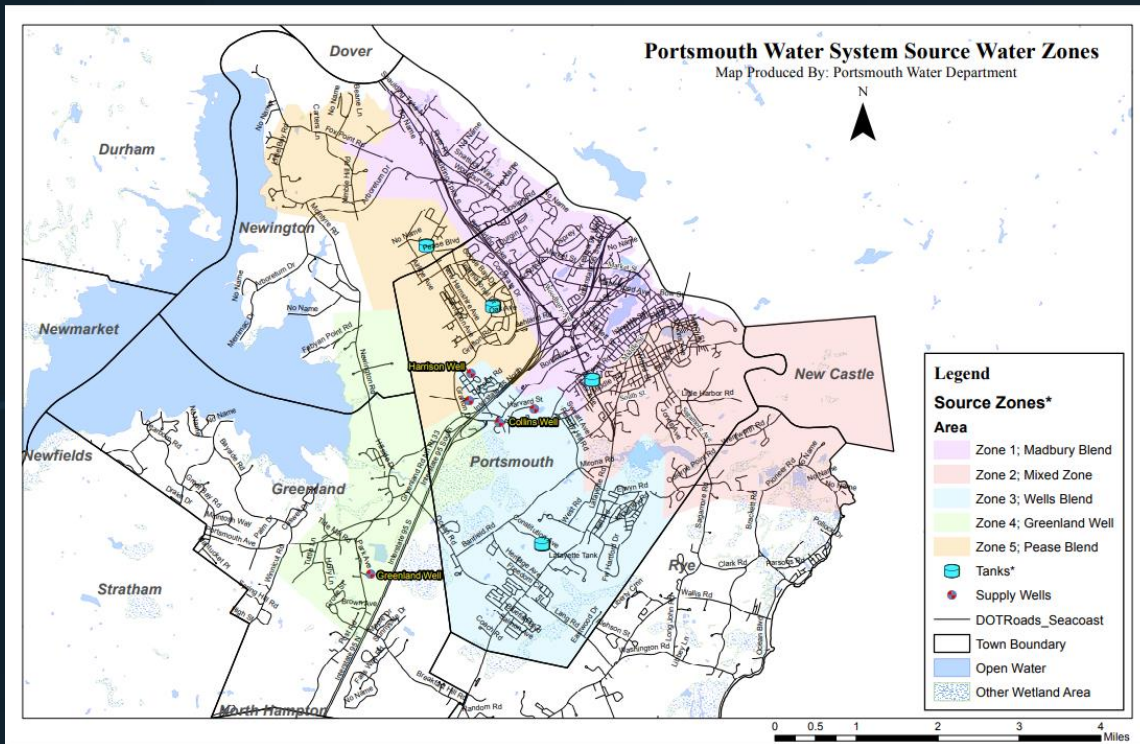
After Treatment (Distribution System)

- Purpose: to retrieve a final 'picture' of the treated drinking water we serve to our consumers through collection, testing, and compilation of water quality data.
- Weekly fluoride testing at storage tanks & source locations
- Bi-weekly bacteria, chlorine residual, and conductivity testing (both Pease and Portsmouth Water Systems)
 - New Castle = 1x/month
- Quarterly disinfection byproduct testing
 - Portsmouth system locations (4)
 - New Castle system locations (2)
 - Pease Tradeport system locations (2, only in quarter 3)
- Quarterly corrosion control testing at a variety of distribution locations
- Semi-annual lead and copper testing from residential properties
 - Portsmouth system locations (60)
 - New Castle system locations (20)
 - Pease Tradeport system locations (20, only in quarter 3)



Distribution System Maps

- Purpose: to retrieve a final 'picture' of the treated drinking water we serve to our consumers through collection, testing, and compilation of water quality data.



Any Questions?

