

# **NORTH CAROLINA POLICY COLLABORATORY FIREFIGHTING FOAM (AFFF) INVENTORY AND RECOMMENDATIONS**

Final Report submitted to the North Carolina General Assembly  
Joint Legislative Oversight Committee on Agriculture and Natural and  
Economic Resources and the Environmental Review Commission

*April 15, 2021*

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## 1.0 INTRODUCTION

On November 6, 2019 the North Carolina General Assembly (NCGA), in the passing of Session Law (S.L.) 2019-241, Sections 7.(a) through 7.(c), directed the North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (the Collaboratory) to “*create an inventory of Aqueous Film-Forming Foam (AFFF) used or stored by fire departments in North Carolina operated, managed, or overseen by units of local government, including those located at or serving airports.*” The legislative language also specified that “*The Office of the State Fire Marshal of the Department of Insurance and all units of local government shall provide any assistance requested by the Collaboratory to acquire and compile the data required by this section*”. Furthermore, per Section 7.(b), the Collaboratory “*shall develop a proposal for identifying and collecting AFFF that is expired or no longer needed or wanted by each fire department in North Carolina*” and the “*proposal should include recommendations on which State agency or agencies could oversee such a collection effort and cost estimates on this collection, stockpiling, and disposal.*” All provisions passed by the NCGA [related to this project] in Section 7 of S.L. 2019-241 are included as Appendix I of this report. It should be noted that while the legislation enacted in November 2019 mandated an inventory of AFFF be generated for the year 2018, the project team collected data for year 2019 instead.

The Collaboratory leveraged existing resources to support this effort and identified a faculty member from within the North Carolina Per- and Polyfluoroalkyl Substances Testing Network (NC PFAST Network) to lead the AFFF Inventory Project. Dr. Wanda Bodnar is an Assistant Professor in the Department of Environmental Sciences and Engineering at UNC Chapel Hill and has served on the NC PFAST Network management team as the Scientific Program Analyst for the past two and a half years. Dr. Bodnar recruited two UNC Chapel Hill Master’s degree students Erin Hong, DDS (Adams School of Dentistry) and Hope Thomson (Gillings School of Global Public Health) to assist with collecting and compiling the required data for the Collaboratory.

## 2.0 REPORTING REQUIREMENTS

Reporting requirements for the AFFF inventory project were initially outlined in Section 7.(c) of S.L. 2019-241, which stated: “*The Collaboratory shall submit an interim report with the results of the studies required by subsections (a) and (b) of this section no later than April 1, 2020, and a final report no later than October 15, 2020, to the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources and the Environmental Review Commission.*” In addition, Section 7.(d) of S.L. 2019-241 extended the submission date for the Collaboratory’s NC PFAST Network final report from December 1, 2019 to October 15, 2020 (Appendix I). However with the outbreak of the COVID-19 pandemic in early 2020 and the shutdown of North Carolina university campuses, the NCGA enacted Session Law 2020-74 on July 1, 2020 further extending the NC PFAST Network final report deadline to April 15, 2021 (Appendix II). The Collaboratory subsequently requested permission from the chairs of the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources and the Environmental Review Commission to submit the AFFF inventory final report concurrently with the final report of the NC PFAST Network and received approval from Representatives Jimmy Dixon and Pat McElraft and Senators Brent Jackson and Norman Sanderson to submit the AFFF inventory report on April 15, 2021.

### 3.0 BACKGROUND

During the past several years, Per- and Polyfluoroalkyl Substances (PFAS) have been detected throughout the state of North Carolina in surface and ground waters, treated drinking water, private wells, air, biota, and people. There are more than 7,000 fluorinated chemicals which can be classified as PFAS, and they are used in many industrial processes and manufacturing of consumer products marketed as heat, stain, water, or grease resistant. The chemical properties which make these substances useful also make them persistent environmental contaminants with the potential for bioaccumulation and/or biomagnification. Evidence from epidemiological and laboratory studies suggests that exposure to certain PFAS can be associated with adverse effects on ecosystems, wildlife, and human health and development. To eliminate or minimize the presence of PFAS in North Carolina, sources need to be identified and the relative contribution and significance of individual sources assessed so that appropriate mitigation strategies can be developed and prioritized for implementation. One source of PFAS contamination of drinking water supplies is the use of Aqueous Film Forming Foams or “A triple F” (AFFF) in firefighter training and in emergency situations involving fuel-based fires and spills. Firefighting foams are proprietary mixtures containing mostly water plus organic solvents, hydrocarbon surfactants, fluorosurfactants (PFAS), and other additives. The AFFF concentrates are typically prepared as 3 or 6% solutions with water and produce an aqueous film that spreads across the surface of a hydrocarbon fuel acting as a thermal and evaporative barrier to inhibit combustion, extinguish flames, and suppress vapors. Each foam has a unique chemical signature and the complex composition varies by manufacturer and has changed through the years.

Two main types of firefighting foams are designated Class A and Class B. Class A foams are used on structural fires (wood, paper, plant-based, etc.) and do not contain PFAS. Class B foams are effective on spills and fires caused by combustible liquids such as gasoline, oil, and jet fuel. Class B foams can be either fluorine-free foams (F3) or fluorine-containing foams which include AFFF containing PFAS. Perfluorooctane sulfonate (PFOS) is a long-chain (C8) PFAS component in older stocks of “legacy” AFFF no longer in production (since 2000) and is also formed from the chemical breakdown of precursor compounds. Perfluorooctanoic acid (PFOA) is also a long-chain (C8) legacy PFAS. Although PFOA is not an intentional component of AFFF, it can be generated as a side product during the manufacturing process and may be present in AFFF at parts per billion (ppb) levels. Modern AFFF formulations (fluorotelomer-based) contain shorter chain PFAS (C6 or fewer) which are believed to be less toxic than legacy and longer chain PFAS, but still contain polyfluorinated surfactants which can breakdown under certain environmental conditions to form Perfluorohexanoic acid (PFHxA), Perfluoropentanoic acid (PFPeA), and other fluorotelomer PFAS which need to be evaluated for their potential impacts on ecosystems and human health.

Use of legacy AFFF formulations is an emerging public health concern as the release of PFAS from AFFF poses both an occupational hazard for firefighters and a threat to the environment and its inhabitants, particularly if discharged foam reaches drinking water sources such as groundwater, surface waters, or other natural waters. Legacy AFFF has a long shelf life, so there are likely existing stocks at some fire departments. Federal law doesn't prohibit the use of legacy AFFF products, however any discharge to public waters may be considered an emergency release of contaminants into the environment according to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which provides resources to clean up uncontrolled or abandoned hazardous waste sites (Superfund sites), spills, and other emergency releases of pollutants and contaminants into the environment. However, PFAS are not yet classified under CERCLA as hazardous substances, so cost recovery under Superfund may not be allowable.

Six PFAS were included in the U.S. EPA's Safe Drinking Water Act (SDWA) third Unregulated Contaminant Monitoring Rule (UCMR 3) program: PFOS, PFOA, Perfluoroheptanoic acid (PFHpA), Perfluorononanoic acid (PFNA), Perfluorobutanesulfonic acid (PFBS) and Perfluorohexanesulfonic acid (PFHxS). Under [UCMR 3](#), public water systems monitor for these PFAS (and 24 other constituents) to collect data for contaminants suspected to be present in drinking water, but that do not have regulatory standards set under the SDWA. The U.S. EPA uses this occurrence and exposure data to help develop advisories and regulations. In 2016, the U.S. EPA issued a Lifetime Health Advisory relating to the levels of PFOA and PFOS, two legacy PFAS that may potentially be found in drinking water, and various states have been setting their own permissible levels of certain PFAS. As more data are generated, the regulatory landscape concerning PFAS and firefighting foam continues to evolve, and some state agencies are considering establishing maximum contaminant levels (MCLs) in drinking water that are lower than the U.S. EPA level of 70 nanograms per liter (ng/L) or parts per trillion (ppt) for the sum of PFOA and PFOS. The U.S. EPA's health advisories and views on PFOA and PFOS can be accessed by this link: <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>.

#### **4.0 PROJECT DESCRIPTION**

The main objectives of the project were to create an inventory of Aqueous Film Forming Foams (AFFF) being used and/or stored at fire stations throughout the state of North Carolina and to develop recommendations and estimated budget for tracking, collection, storage, and disposal of class B firefighting foams (AFFF) containing PFAS. Project team lead Wanda Bodnar and Collaboratory Executive Director Jeffrey Warren met with Chief Deputy State Fire Marshal Robert Roegner in November 2019 to outline the scope of the project and secure the assistance of the NC Department of Insurance Office of the State Fire Marshal (NC DOI OSFM) in this effort. They also met in early March 2020 with Michael Scott, Director of the Division of Waste Management in the NC Department of Environmental Quality (NC DEQ DWM), to discuss plans for collecting and sharing data related to the AFFF inventory including, storage, use, collection, and disposal. Unfortunately due to the COVID-19 pandemic response, the project team was unable to hold a kick-off event or attend in-person meetings to explain the purpose of the study and answer questions.

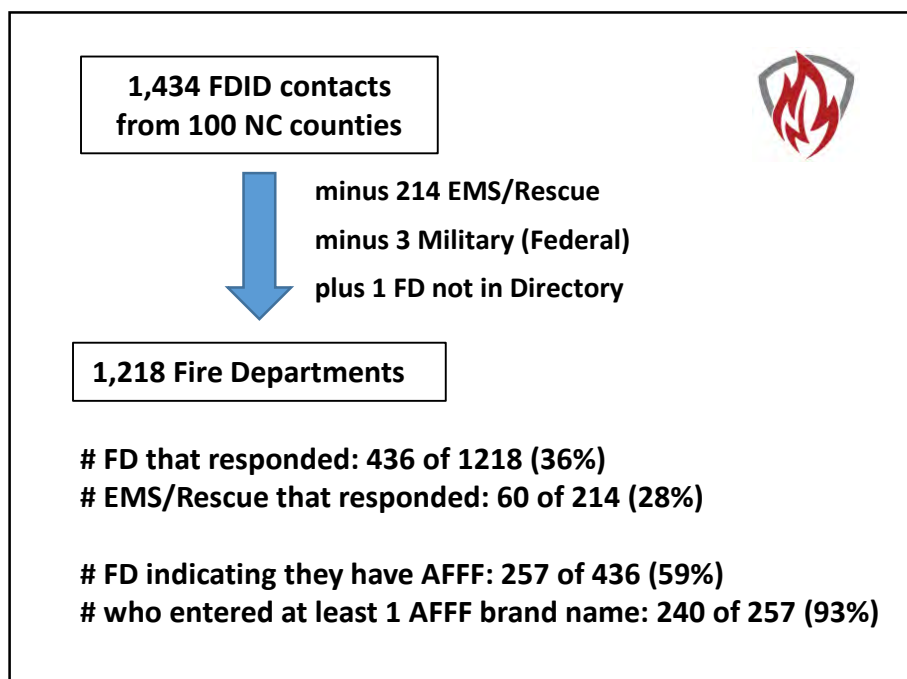
An electronic survey (Qualtrics) was created and sent to all 100 North Carolina County Fire Marshals at the end of May 2020 to facilitate collection of relevant data (fire station identifier, manufacturer, lot and product number, expiration date, volume stored, and volume used). An introductory e-mail with a link to the survey and an accompanying set of instructional slides was provided to the county fire marshals to distribute to their respective fire departments. As of July 30, 2020 only 100 survey responses had been received, so the Office of the State Fire Marshal sent a memo signed by Chief State Fire Marshal Brian Taylor (Appendix III) to County Marshals urging participation of their departments in this state-mandated inventory project. Based on feedback from individual fire departments, the survey was also redesigned to make completion easier. An e-mail distribution list was generated from the OSFM's Fire Department/Rescue/EMS Directory downloaded Aug. 2020 from: <https://www.ncosfm.gov/fire-department-rescue-ems-directory>, and follow-up reminders with the survey link were sent in September and mid-October 2020 to the approximately 1400 Fire/Rescue/EMS contacts asking for them to complete the online AFFF inventory survey (or respond that they do not possess AFFF) by December 2020.

## 5.0 RESULTS

Data from the AFFF inventory survey have been compiled in a spreadsheet which will be provided to the NC Office of the State Fire Marshal and the NC Department of Environmental Quality and will be made available on the NC PFAS Testing Network website at:

<https://ncpfastnetwork.com/aff-inventory-project/>.

- Survey participation was lower than desired, with many fire chiefs/captains expressing concerns about the study and how the data will be used. Responses, either within the survey or via direct e-mail message to the graduate student assistant, were received from 436 out of a possible 1218 fire departments in North Carolina (36% response rate). A breakdown of response rate by county is provided in Appendix IV. Although Rescue, EMS, and Military stations with Fire Department ID (FDID) numbers listed in the OSFM directory were included in the survey request, those who responded indicated that they do not use or store AFFF, therefore they should not be included in future data collection efforts.



- A total of 230 fire departments responded that they do possess class B AFFF at one or more of their stations and 179 respondents indicated they do not have or use AFFF. An additional 27 fire departments did not respond either “yes” or “no” but still entered at least one AFFF brand name for a total of 257 out of 346 respondents. A few fire chiefs also followed up by e-mail asking about plans for collection, disposal and replacement of unwanted AFFF, and whether funding would be made available to them.
- The data received via the electronic survey was not uniform in terms of the AFFF brand names, locations and volumes of stocks entered and was challenging to summarize, highlighting the need for a better approach to data collection and analysis. Additional analysis of the existing data will be required to better estimate the amount of legacy AFFF needed to be collected, disposed or exchanged. The following summary of the survey data is considered preliminary

and represents a lower estimate of AFFF in use or stored by North Carolina fire departments based on the 436 participants who responded. The high degree of uncertainty reflects inconsistent terms entered among participants (e.g. stored, in stock, expired, for disposal etc.).

# Training/Testing events	332
# Gallons AFFF used for Training/Testing	1,916
# Gallons removed/collected	1,260
# Supression/Spill events	364
# Gallons used for Suppression/Spill	3,314
# Gallons removed/collected	659
# Trucks carrying AFFF*	319
# Gallons AFFF on trucks*	25,121
# Gallons AFFF in storage*	8,766
*high degree of uncertainty	
<b>Total \$ spent on AFFF in 2019</b>	<b>\$157,632.00</b>

- Fire departments were also asked to provide brand names and photographs of the AFFF containers. Uploading photos was difficult for many respondents, so that question was removed from the revised survey. A selection of the pictures of AFFF containers provided in the survey are provided in Appendix V.
- The Fire Chief from Deep Run Volunteer Fire Department (FDID 05422) contacted the project team because his station had inherited 4 unlabeled containers of firefighting foam from the Forestry Service. Professor Mei Sun at UNC Charlotte analyzed the unknown foam samples for total fluorine and determined that the samples contained relatively high levels of fluorine between 4 and 5 g/L, indicating a high likelihood that they contain PFAS.
- Although not technically part of the legislative mandate for the AFFF inventory, there was also an opportunity to analyze AFFF and surface water samples following a tanker spill in Denver, NC that occurred January 28, 2020. Dr. Sun's lab performed total fluorine analysis on samples of the Thunderstorm and FireAde foams that were discharged (250 and 400 gallons, respectively) to mitigate the spill, and found that the foam concentrates contained approximately 4 g/L of fluorine. Analysis of water samples downstream from the incident revealed the presence of PFAS including PFHxA, PFBA, PFOA, and fluorotelomers (Appendix VI). A manuscript detailing the sample collection and analysis is currently being prepared for publication by Dr. Sun and colleagues.

## 6.0 RECOMMENDATIONS

1. An annual review and update of the fire departments directory including points of contact is needed to ensure accuracy and facilitate communications. The current Fire Department/Rescue/EMS Directory identifies the county fire marshal as well as FDID numbers, fire chief/captain, addresses, phone numbers, and e-mail addresses for each fire department in the county. Each fire department however is comprised of one or more fire stations, and it was not possible to determine whether survey responses represented a single station or the composite data for multiple stations within a fire department.
2. The State should implement an easy-to-use interface (e.g., web-based portal, standalone app, etc.) and require any department using PFAS-containing AFFF to report every incident of deployment. A system for logging information such as date, time, location, volume of foam used, concentration (foam-to-water ratio), name of product, manufacturer, and picture of product label could be developed and maintained through the Collaboratory in partnership with other supporting units (e.g. the UNC Institute for Convergent Science).
3. The data collected by this project was insufficient to propose a budget for the collection and disposal of expired and unwanted AFFF. Additional firefighting foam inventory data are needed in order to develop a cost estimate for collection and disposal of PFAS-containing foams. The State should consider requiring annual inventory reporting of foam type and volume to help identify PFAS-containing AFFF that could be picked up and disposed of properly. Inventory and pickup requests could also be managed through the online reporting tool for AFFF-deployment recommended above.
4. Fire Departments should be directed to restrict their use of legacy foams containing PFOS and long chain PFAS to emergency situations in which there are insufficient amounts available of newer, short-chain AFFF or fluorine-free foams or when there is an immediate threat to life, public safety, or property. Since all foams are not the same, performance specifications and system requirements must be taken into account, and systems should be designed with components for containment, run-off control, and collection of foam (and unburned fuels) to prevent contamination of nearby waterways and soil.
5. Funding should be made available to assist stations with the costs associated with replacing expired and unwanted fluorinated AFFF stocks and associated system components and equipment contaminated with PFAS. 3M is in the process of implementing a [stewardship program](#) supporting proper disposal of their legacy AFFF product (3M Light Water) which customers may still possess, and other states like Massachusetts have implemented AFFF take-back programs. A summary of National and State information related to PFAS regulations, clean-up and disposal as of February 1, 2020 is provided in Appendix VII.
6. Fluorine-free alternatives to PFAS-containing AFFF are now available from manufacturers and should be used in all firefighting training. A list of recommended products and vendors should be provided to fire stations.
7. Baseline biomonitoring of PFAS is highly recommended for NC firefighters exposed to PFAS via AFFF discharge and wearing of protective gear to assess firefighter exposure levels compared to the general public and to determine whether interventions are necessary to ensure occupational safety.

## 7.0 ADDITIONAL RESOURCES

- The Interstate Technology and Regulatory Council (ITRC) created fact sheets to summarize the science and emerging technologies related to PFAS. These fact sheets available at <https://pfas-1.itrcweb.org> include: (1) History and Use; (2) Nomenclature Overview and Physical and Chemical Properties; (3) Regulatory Summary; (4) Environmental Fate and Transport; (5) Site Characterization, Tools, Sampling Techniques, and Laboratory Analytical Methods; and (6) Remediation Technologies and Methods. They also created very helpful information and video training modules for AFFF users (first responders, regulators, environmental managers and environmental professionals) who manage AFFF releases. Topics covered include: Best management practices; Mechanism of release into the environment; Procurement, inventory tracking, storage, and disposal; Emergency and training use; and Replacement of foams and foam systems. These free resources are available at: [https://pfas-1.itrcweb.org/3-firefighting-foams/#3\\_7](https://pfas-1.itrcweb.org/3-firefighting-foams/#3_7).
- The Firefighting Foam Coalition (FFFC) also offers resources related to the use, discharge, and disposal of AFFF products. Their Best Practice Guidance for Use of Class B Firefighting Foam is available for download along with other useful information on their website: <https://www.ffc.org/>.



# APPENDIX I

## LEGISLATION PASSED BY THE NORTH CAROLINA GENERAL ASSEMBLY (Session Law 2019-241, Sections 7.(a) through 7.(d), Nov. 6, 2019)

### GENERAL ASSEMBLY OF NORTH CAROLINA SESSION 2019

#### SESSION LAW 2019-241 SENATE BILL 433

AN ACT TO MAKE VARIOUS CHANGES TO THE STATUTES GOVERNING THE DEPARTMENT OF NATURAL AND CULTURAL RESOURCES AND TO REMOVE CERTAIN LANDS FROM THE STATE NATURE AND HISTORIC PRESERVE, AS RECOMMENDED BY THE DEPARTMENT; TO AMEND CERTAIN REPORTS OF THE NORTH CAROLINA POLICY COLLABORATORY TO THE GENERAL ASSEMBLY; TO CLARIFY CERTAIN APPROPRIATIONS IN THE 2018 HURRICANE FLORENCE DISASTER RECOVERY ACT; TO CORRECT AN EFFECTIVE DATE; TO REPEAL AND REPLACE AN ACT PROVIDING FOR EMERGENCY OPERATING FUNDS FOR UTILITIES; TO ADJUST FOR INFLATION THE THRESHOLD FOR DEPARTMENT OF ADMINISTRATION APPROVAL OF STATE LEASES; AND TO CLARIFY AND AMEND THE SEPTIC TANK SITE SUITABILITY DETERMINATION PROCESS.

The General Assembly of North Carolina enacts:

#### **COLLABORATORY/FIREFIGHTING FOAM**

**SECTION 7.(a)** The North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (Collaboratory) shall create an inventory of aqueous film-forming foam (AFFF) used or stored by fire departments in North Carolina operated, managed, or overseen by units of local government, including those located at or serving airports. This inventory shall include, at a minimum, the following:

- (1) The name and address of each fire department that owns or otherwise has on the premises of a fire station a firefighting vehicle that carries AFFF or a storage tank or other vessel for AFFF.
- (2) The volume, trade name, and CAS number of AFFF used by each department in 2018 for fighting fires or firefighter training.
- (3) The number of firefighting vehicles carrying AFFF and the volume of AFFF carried by each vehicle.
- (4) Each fire department's annual cost of acquiring AFFF and last known purchases of AFFF.
- (5) The volume, trade name, and CAS number of AFFF stored by each fire department or unit of local government for firefighting use and the portion of these AFFFs that are no longer utilized and could be removed from inventory for disposal.
- (6) Other data deemed relevant by the Collaboratory to establish a statewide inventory of AFFF used for fighting fires or firefighter training.

The Office of the State Fire Marshal of the Department of Insurance and all units of local government shall provide any assistance requested by the Collaboratory to acquire and compile the data required by this section.

**SECTION 7.(b)** The North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (Collaboratory) shall develop a proposal for identifying and collecting AFFF that is expired or no longer needed or wanted by each fire department in North Carolina operated, managed, or overseen by units of local government, including those located at or serving airports. This proposal should include recommendations on which State agency or agencies could oversee such a collection effort and cost estimates on this collection, stockpiling, and disposal. The Department of Insurance Office of the State Fire Marshal, the Department of Environmental Quality, the Department of Health and Human Services, and the Department of Public Safety shall provide any assistance requested by the Collaboratory to acquire and compile the data required by this section.

**SECTION 7.(c)** The Collaboratory shall submit an interim report with the results of the studies required by subsections (a) and (b) of this section no later than April 1, 2020, and a final report no later than October 15, 2020, to the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources and the Environmental Review Commission.

**SECTION 7.(d)** Section 13.1(g) of S.L. 2018-5 reads as rewritten:

"**SECTION 13.1.(g)** The North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (Collaboratory) shall identify faculty expertise, technology, and instrumentation, including mass spectrometers, located within institutions of higher education in the State, including the Universities of North Carolina at Chapel Hill and Wilmington, North Carolina State University, North Carolina A&T State University, Duke University, and other public and private institutions, and coordinate these faculty and resources to conduct nontargeted analysis for PFAS, including GenX, at all public water supply surface water intakes and one public water supply well selected by each municipal water system that operates groundwater wells for public drinking water supplies as identified by the Department of Environmental Quality, to establish a water quality baseline for all sampling sites. The Collaboratory, in consultation with the participating institutions of higher education, shall establish a protocol for the baseline testing required by this subsection, as well as a protocol for periodic retesting of the municipal intakes and additional public water supply wells. No later than December 1, 2019, October 15, 2020, the Collaboratory shall report the results of such sampling by identifying chemical families detected at each intake to the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources, the Environmental Review Commission, the Department of Environmental Quality, the Department of Health and Human Services, and the United States Environmental Protection Agency."

## APPENDIX II

### LEGISLATION PASSED BY THE NORTH CAROLINA GENERAL ASSEMBLY (Session Law 2020-74, Section 8.(a), effective July 1, 2020)

#### GENERAL ASSEMBLY OF NORTH CAROLINA SESSION 2019

#### SESSION LAW 2020-74 HOUSE BILL 308

AN ACT TO PROVIDE FURTHER REGULATORY RELIEF TO THE CITIZENS OF NORTH CAROLINA.

#### COLLABORATORY REPORTING CHANGES

**SECTION 8.(a)** Section 13.1(g) of S.L. 2018-5, as amended by Section 7(d) of S.L. 2019-241, reads as rewritten:

"**SECTION 13.1.(g)** The North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (Collaboratory) shall identify faculty expertise, technology, and instrumentation, including mass spectrometers, located within institutions of higher education in the State, including the Universities of North Carolina at Chapel Hill and Wilmington, North Carolina State University, North Carolina A&T State University, Duke University, and other public and private institutions, and coordinate these faculty and resources to conduct nontargeted analysis for PFAS, including GenX, at all public water supply surface water intakes and one public water supply well selected by each municipal water system that operates groundwater wells for public drinking water supplies as identified by the Department of Environmental Quality, to establish a water quality baseline for all sampling sites. The Collaboratory, in consultation with the participating institutions of higher education, shall establish a protocol for the baseline testing required by this subsection, as well as a protocol for periodic retesting of the municipal intakes and additional public water supply wells. No later than October 15, 2020, April 15, 2021, the Collaboratory shall report the results of such sampling by identifying chemical families detected at each intake to the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources, the Environmental Review Commission, the Department of Environmental Quality, the Department of Health and Human Services, and the United States Environmental Protection Agency."

## APPENDIX III

### MEMO FROM CHIEF STATE FIRE MARSHAL TO NC COUNTY FIRE MARSHALS



**MIKE CAUSEY**  
INSURANCE COMMISSIONER & STATE FIRE MARSHAL

**BRIAN TAYLOR**, CHIEF STATE FIRE MARSHAL

August 12, 2020

Re: North Carolina Aqueous Film Forming Foam (AFFF) Inventory; Survey Follow-up

Dear North Carolina County Fire Marshals,

In May 2020, NC County Fire Marshals were sent an e-mail from UNC Chapel Hill containing a link to an online survey and were asked to forward the survey and background information to each of the fire departments within their county.

The NC Office of State Fire Marshal is now requesting your assistance in encouraging your fire departments to complete these surveys to satisfy the NC legislative mandate. *(Section 7, Session Law 2019-241) to create a statewide inventory of Class B AFFF (firefighting foams) containing perfluoroalkyl or polyfluoroalkyl substances (PFAS) such as perfluoro octane sulfonate (PFOS) or Perfluorooctanoic acid (PFOA).*

Based on the low initial response rate and feedback received, the team has updated the survey to make it easier for you to complete. The deadline has been extended to **September 1, 2020**.

Please note: If you do not have Class B AFFF foam at your fire station, please indicate so when prompted in the survey. If your department has already completed a survey, thank you! There is no need to do it again.

The survey can be accessed by clicking on the following link or by copy/pasting into your browser (Chrome or Firefox is recommended)

[https://unc.az1.qualtrics.com/jfe/form/SV\\_6Lv911iWhw96Xul](https://unc.az1.qualtrics.com/jfe/form/SV_6Lv911iWhw96Xul)

If you are unable to complete the online survey or have questions, please email:

Rob Roegner: [rob.roegner@ncdoi.gov](mailto:rob.roegner@ncdoi.gov) The Survey can be filled out in PDF or word format.

Thank you for your prompt attention and participation in this important data collection project for the state.

Respectfully,

A handwritten signature in black ink that reads "BRIAN TAYLOR".

Brian Taylor  
Chief State Fire Marshal

OFFICE OF STATE FIRE MARSHAL

1202 MAIL SERVICE CENTER | RALEIGH, NC 27699-1202 | [WWW.NCDOI.COM/OSFM](http://WWW.NCDOI.COM/OSFM)

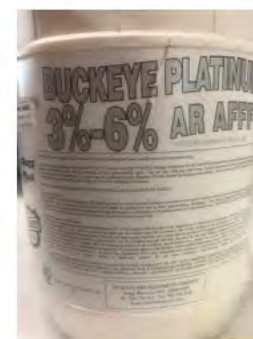
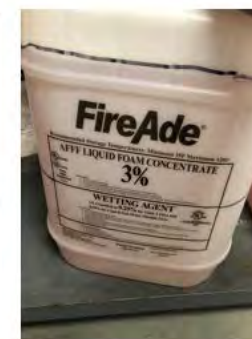
## APPENDIX IV

### AFF INVENTORY SURVEY RESPONSE RATE BY COUNTY

County	Fire Dept. Responses	Possible Number of Fire Depts.	% Responded	County	Fire Dept. Responses	Possible Number of Fire Depts.	% Responded
Alleghany	0	5	0.0	Watauga	4	12	33.3
Ashe	0	11	0.0	Wake	7	20	35.0
Avery	0	8	0.0	Caldwell	5	14	35.7
Gates	0	5	0.0	Wayne	9	25	36.0
Hertford	0	9	0.0	Franklin	4	11	36.4
Tyrrell	0	1	0.0	McDowell	4	11	36.4
Bladen	1	15	6.7	Anson	3	8	37.5
Cherokee	1	13	7.7	Chatham	3	8	37.5
Duplin	2	20	10.0	Davidson	9	24	37.5
Richmond	1	9	11.1	Sampson	6	16	37.5
Johnston	3	24	12.5	Cabarrus	5	13	38.5
Yancey	1	8	12.5	Rowan	10	26	38.5
Cleveland	2	15	13.3	Moore	6	15	40.0
Jones	1	7	14.3	Yadkin	4	10	40.0
Mitchell	1	7	14.3	Edgecombe	5	12	41.7
Vance	1	7	14.3	Buncombe	8	19	42.1
Bertie	2	12	16.7	Surry	8	19	42.1
Perquimans	1	6	16.7	Craven	6	14	42.9
Polk	1	6	16.7	Dare	6	14	42.9
Halifax	2	11	18.2	Stanly	6	14	42.9
Iredell	3	16	18.8	Gaston	10	23	43.5
Montgomery	2	10	20.0	Randolph	7	16	43.8
Pasquotank	1	5	20.0	Lenoir	4	9	44.4
Washington	1	5	20.0	Lincoln	5	11	45.5
Catawba	3	14	21.4	Haywood	6	13	46.2
Pitt	5	23	21.7	Camden	1	2	50.0
Madison	2	9	22.2	Carteret	9	18	50.0
Clay	1	4	25.0	Caswell	5	10	50.0
Lee	2	8	25.0	Chowan	1	2	50.0
Person	2	8	25.0	Forsyth	8	16	50.0
Swain	1	4	25.0	Graham	1	2	50.0
Transylvania	2	8	25.0	Orange	5	10	50.0
Wilson	3	12	25.0	Scotland	3	6	50.0
Robeson	8	31	25.8	Brunswick	11	21	52.4
Nash	4	15	26.7	Cumberland	9	17	52.9
Greene	3	11	27.3	Granville	7	13	53.8
Macon	3	11	27.3	Burke	10	18	55.6
Stokes	3	11	27.3	Northampton	5	9	55.6
Union	5	18	27.8	Mecklenburg	8	14	57.1
Currituck	2	7	28.6	Davie	7	12	58.3
Jackson	2	7	28.6	Columbus	12	19	63.2
Wilkes	7	24	29.2	Hoke	6	9	66.7
Rutherford	5	17	29.4	Pender	6	9	66.7
Alamance	4	13	30.8	Martin	5	7	71.4
Beaufort	4	13	30.8	Durham	3	4	75.0
Rockingham	6	19	31.6	Henderson	9	12	75.0
Hyde	2	6	33.3	Guilford	16	20	80.0
Onslow	6	18	33.3	New Hanover	4	5	80.0
Pamlico	3	9	33.3	Harnett	7	8	87.5
Warren	5	15	33.3	Alexander	8	8	100.0

# APPENDIX V

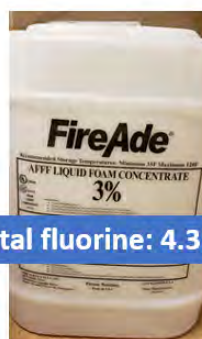
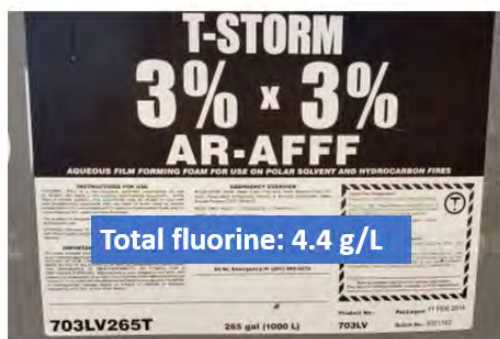
## SAMPLE PHOTOGRAPHS OF AFFF PROVIDED BY NC FIRE DEPARTMENTS



## APPENDIX VI

### AFFF release in Denver, NC

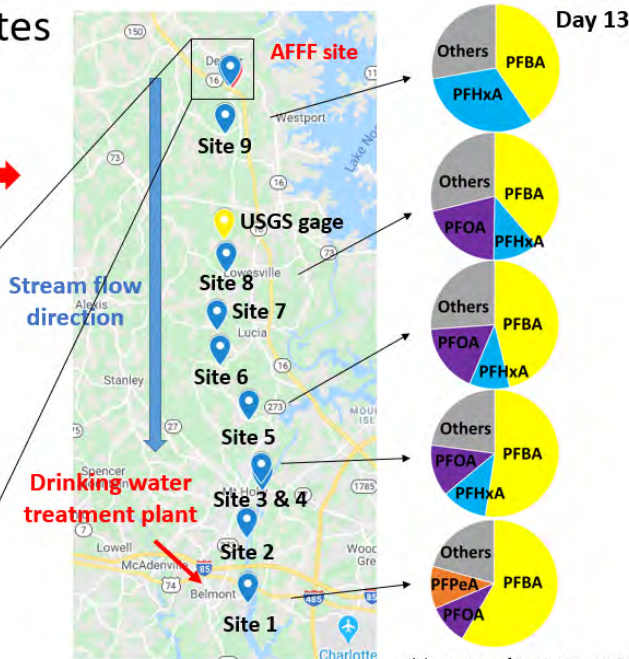
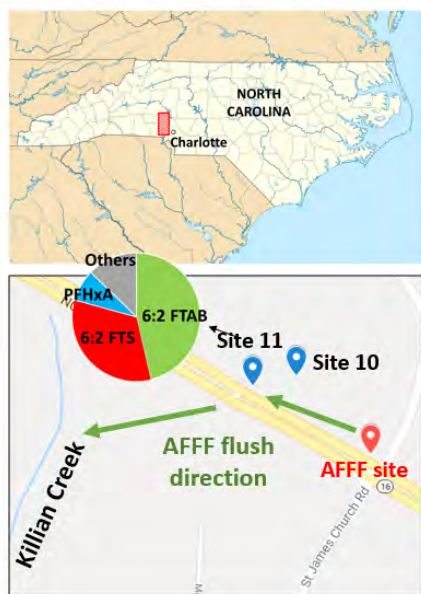
- When: Jan 28<sup>th</sup>, 2020
- Where: NC Hwy 16 (35°30'58.7"N, 81°01'27.2"W)
- AFFF used: 250 gallons T-Storm & 400 gallons FireAde



The firefighters dilute the product to 3% with water when using it, so the TOF in the sprayed mixture is about  $4 \times 0.03 = 0.12 \text{ g/L}$

Slide courtesy of Dr. Mei Sun, UNC-C

### AFFF release and sampling sites



Slide courtesy of Dr. Mei Sun, UNC-C

## APPENDIX VII

### SUMMARY OF NATIONAL AND STATE ACTIONS REGARDING AFFF (Information current as of February 1, 2020)

#### Nationally

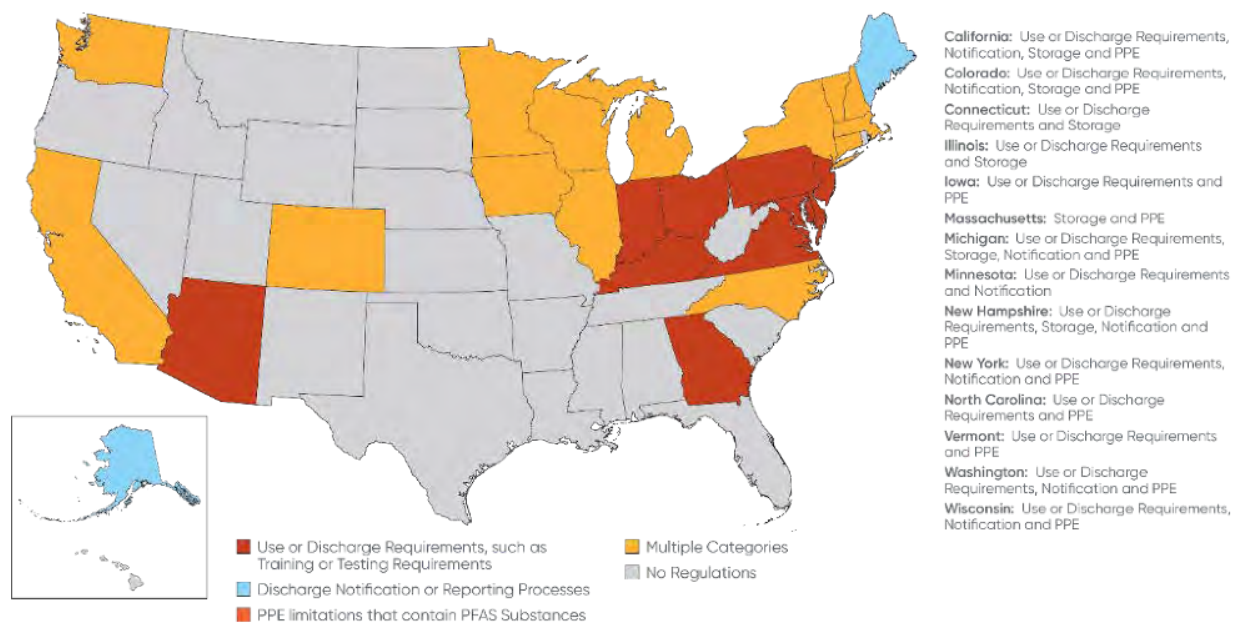
- On Dec 20, 2019, congress passed the National Defense Authorization Act to phase out the use of AFFF (Aqueous Film-Forming Foams), with some expectations at all military sites by Oct 1, 2024 ([Source](#))
- No Federal regulatory value currently exists for PFAS under the Safe Drinking Water Act (SDWA). However, a health advisory level for combined concentrations of PFOA and PFOS was set at 70 ppt in 2016 by the EPA. (Source: PFAS Brief)
- EPA largely phased out the use of PFOA and PFOS in US commerce through the Toxic Substances Control Act (TSCA) by 2015. (Source: PFAS Brief)
- In February 2019, the EPA released its [Per- and Polyfluoroalkyl Substances \(PFAS\) Action Plan](#). This plan outlines five major goals that the EPA has to address the growing concerns of PFAS contamination. (Source: PFAS Brief)

#### Statewide

- **26 total states have passed or have pending legislation on addressing firefighting foam** ([Source](#))
  - Restrictions in 4 general areas:
    - Discharge or use requirements
    - Storage or “take-back” provisions
    - Notification or reporting requirements
    - Limitations on personal protective equipment
- Michigan, Minnesota and North Carolina have reached out to public institutions to organize research on topics such as exposure risk, effects on wildlife and human health effects. (Source: PFAS Brief)
- The following states have passed or are considering legislation to limit or fully prohibit use of PFAS. (Source: PFAS Brief)
  - Arizona – [Senate Bill 1526](#)
  - Colorado – [House Bill 19-1279](#)
  - Michigan – [House Bill 4390](#)
  - Minnesota – [HF 359](#)
  - New York – [A00445](#)
  - Washington – [Senate Bill 6413](#)



## ENACTED AND PROPOSED PFAS FIREFIGHTING FOAM REGULATIONS



As of November 10, 2020

**What states have done about the collection and disposal\* of AFFF: (some of these are not yet enacted, but proposed). \*Highlighted in yellow is information specific to clean-up.**

### Alaska

- Report discharges
- Clean up: Nothing stated

### Arizona

- Can't discharge for training or testing purposed unless the testing facility has implemented appropriate containment treatment and disposal measure to prevent releases to the environment
- Clean up: Nothing stated

### California

- 2022: Manufacturers of AFFF are prohibited from selling or distributing it. Discharges or uses of AFFF for training purposes are also prohibited
- Clean up: Nothing stated

### Colorado

- 2019: a person or fire department may not discharge or use any AFFF for training or testing purposes
- 2021: a manufacturer may not sell or distribute any AFFF that contains PFAS substances subject to certain exceptions
- Department of Public Health and the environment shall purchase and dispose of eligible materials subject to available funds
- Clean up: Nothing stated

### Connecticut

- Can't use unless there isn't an alternative by April 1, 2021
- Clean-up: In process
  - Oct 2021: an agency shall develop a take-back program for municipal sources of PFAS substances

#### Delaware

- Jan 2021: unlawful to discharge AFFF except for emergency firefighting or training/testing
- Clean up: Nothing stated

#### Georgia

- No one, including fire departments can discharge AFFF, some exceptions
- Clean up: Nothing stated

#### Illinois

- No testing/training with AFFF, no manufacturing after Jan 2021, state agencies can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment
- There is a voluntary take-back provision for local fire departments storing old foam with PFAS

#### Indiana

- No training or testing until the facility has implemented appropriate containment

#### Iowa

- Clean up: Nothing stated

#### Kentucky

- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment

#### Maine

- Must report discharges into waters
- Clean up: Nothing stated

#### Maryland

- Clean up: Nothing stated

#### Massachusetts

- Extensive AFFF materials are disposed in a [take-back program](#)

#### Michigan

- Report immediately after use of AFFF by fire department
- Collection program for properly disposing of firefighting foam containing PFAS

#### Minnesota

- Must report after use by fire department
- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment

#### New Hampshire

- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment
- Department of Environmental Services will establish a take-back program beginning July 2021

#### New Jersey

- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment (two years after enactment which hasn't yet happened)

New York: Specific Info from their state linked [here](#)

- Clean up: Nothing stated
  - Small cities may not incinerate AFFF

North Carolina

- Beginning 2022: Provide written notice to purchaser that there are PFAS, no discharge for training purposes
- Clean up: Nothing stated

Ohio

- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment

Pennsylvania

- Can't test/train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment

Vermont

- Clean up: Nothing stated

Virginia

- Can't train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment

Washington

- No training, must notify when discharging
- Clean up: Nothing stated

Wisconsin

- Can't train until they can implement appropriate containment treatment and disposal measure to prevent releases to the environment
- Notification of discharges
- Proposed program to collect and store or dispose of foam that contains PFAS voluntarily surrendered