BAY AREA MUNICIPAL
STORMWATER (BAMS) COLLABORATIVE

Regional Firefighting Emergency Discharges Report

Submitted in compliance with the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit, Order No. R2-2022-0018, Provision C.15.b.iii.(2)

Prepared on behalf of:

Alameda Countywide Clean Water Program

Contra Costa Clean Water Program

San Mateo Countywide Water Pollution Prevention Program

Santa Clara Valley Urban Runoff Pollution Prevention Program

Solano Stormwater Alliance

September 30, 2025

TABLE OF CONTENTS

List of Figures

List of Tables

1 INTRODUCTION

This Regional Firefighting Emergency Discharges Report (Regional Report) was prepared by the Bay Area Municipal Stormwater Collaborative (BAMS Collaborative) to address discharges associated with emergency firefighting activities. The Regional Report was developed in compliance with the Municipal Regional Permit (MRP) for urban stormwater, adopted on May 22, 2022, by the San Francisco Bay Regional Water Quality Control Board (Permit Order No. R2-2022-0018, MRP 3.0), Provision C.15.b.iii. Emergency Discharges of Firefighting Water and Foam. Overall, the MRP regulates stormwater discharges from municipal separate storm sewer systems (MS4s) owned and/or operated by 79 cities, counties, and other public agencies (i.e., Permittees) in the San Francisco Bay Area.

The BAMS Collaborative represents 103 stormwater management agencies in the San Francisco Bay Area, including 88 cities and towns, eight counties, and seven special districts. The BAMS Collaborative is focused on regional challenges and opportunities to improve the quality of stormwater flowing to our local creeks, the Delta, San Francisco Bay, and the Pacific Ocean. The BAMS Collaborative was organized in 2021 by the Board of Directors for the Bay Area Stormwater Management Agencies Association (BASMAA) to continue the information sharing and permittee advocacy functions of BASMAA after BASMAA's dissolution. The BAMS Collaborative continues BASMAA's mission to encourage information sharing and cooperation, and to develop products and programs that are required and/or more cost-effectively completed regionally than locally. The BAMS Collaborative has collectively developed this Regional Report in fulfillment of MRP Provision C.15.b.iii.

1.1 PURPOSE AND STRUCTURE OF THE REGIONAL REPORT

The purpose of the Regional Report is to describe progress on, and recommendations regarding the implementation of items in MRP Provision C.15.b.iii.(2), which is intended to address discharges of firefighting water and foam associated with emergency firefighting activities that may impact water quality as described in the next section.

This Regional Report does not address discharges of firefighting water and foam associated with non-emergency firefighting activities, such as training. These discharges are neither exempted nor conditionally exempted by Provision C.15. If there are discharges to storm drain systems or watercourses of firefighting water and/or foam (or other non-stormwater) associated with non-emergency (e.g., training) firefighting activities, then Permittees would address those illicit discharges under their Illicit Discharge Detection and Elimination (IDDE) programs as required in MRP Provision C.5.

The Regional Report summarizes key discussions from the Regional Firefighting Discharges Work Group (Regional Work Group) meetings (described in Section 1.3), along with insights gathered from separate meetings with local firefighting departments and post-fire restoration contractors. The sections and sub-sections of the Regional Report directly align with the best management practices (BMPs) outlined in C.15.b.iii.(2) and the MRP Fact Sheet. Specific scenarios discussed and important findings from the Regional Work Group are highlighted in text boxes for clarity.

1.1.1 Best Management Practices for Addressing Firefighting Discharges

Firefighting discharge BMPs described in the Regional Report can be broadly grouped into three categories:

- **Procedural BMPs**: These involve operational steps and communication protocols, such as incident notification procedures, and inter-agency coordination.
- **Administrative BMPs:** These BMPs guide operational choices during firefighting incidents, and include staff training on environmentally responsible foam use, procurement policies for eco-friendly foams, and recordkeeping and reporting systems for discharge events.
- **Structural BMPs**: These are physical or engineered solutions to prevent or mitigate water quality impacts, such as storage and disposal of unused foam, use of dechlorination tablets, and storm drain protection during post-fire cleanup.

Additionally, emergency firefighting operations can be categorized into pre-emergency operations, emergency operations, and post-emergency operations. Firefighting discharge BMPs differ based on the phase of the operation, as described in the below examples.

- **Pre-Emergency BMPs:** Staff training, communication and reporting procedures, Standard Operating Guidelines[1] (SOGs), and foam procurement.
- **Firefighting BMPs:** Using foam only when necessary and applying the minimum effective amount of foam.
- **Post-Fire BMPs:** Collecting and properly disposing of residual foam and water, following appropriate documentation and reporting procedures.

The BMPs implemented before, during, and after emergency firefighting activities all play a role in addressing water quality impacts from emergency discharges of firefighting foam and water as shown in Figure 1-1. Recommendations or suggested BMPs in this Report do not override the priorities of fire departments during an emergency, i.e., preservation of life and property before the environment. This effort is intended to support BMPs to limit the impact of fire-fighting related discharges, with an emphasis on containment and cleanup as well as appropriate communication/procedures to reduce water quality impacts.

[1] The MRP calls for Standard Operating Procedures (SOPs) to be developed, but this type of documentation is not common or recommended for firefighting activities. Given the unique and variable conditions presented with each fire event, SOGs are the more common and preferred approach for firefighting, not Standard Operating Procedures (SOPs).

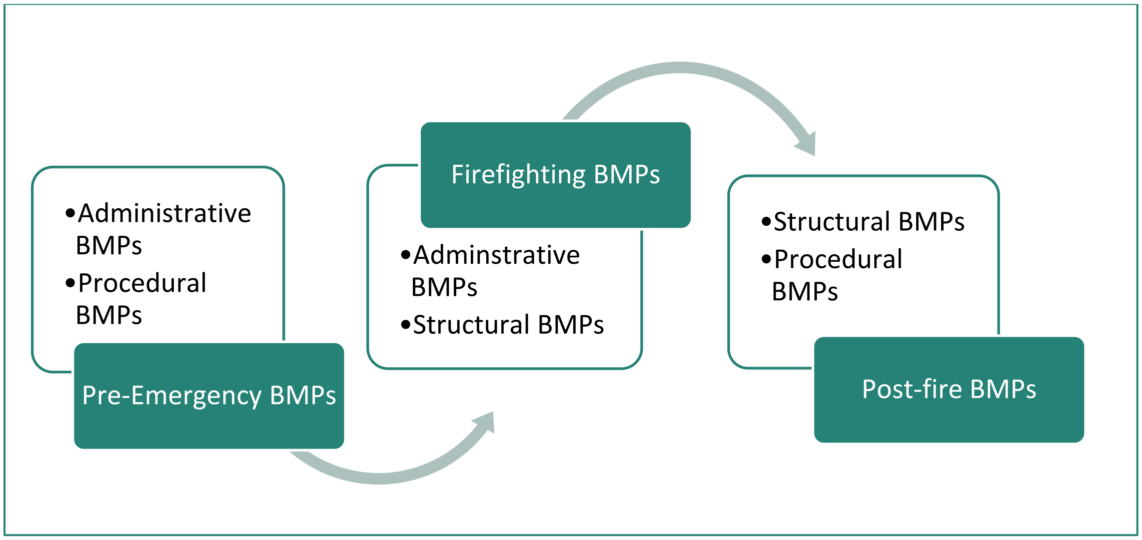

Figure 1-1 Interrelationship of Firefighting Emergency Discharge BMPs

The discussions of BMPs/SOGs and resulting recommendations are intended as examples for local municipalities and firefighting departments when evaluating strategies to mitigate the impact of emergency firefighting foam and water. These recommendations should not be regarded as standard practices for all municipalities or firefighting departments. The Regional Work Group plans to continue exploring this issue and will develop additional guidance as needed.

1.2 REGULATORY BACKGROUND

MRP Provision C.15.b.iii.(2) requires Permittees to collectively convene the Regional Work Group with Regional Water Board staff to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activity. It also requires the Regional Work Group to address the following:

- Assessment of existing BMPs to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup), including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate.
- Based on this assessment, identification of the adequacy of existing BMPs. If needed, suggest changes to those BMPs or develop new model BMPs. Types of BMPs referenced include:
    - Using least environmentally harmful firefighting foams.
    - Proper disposal of more environmentally harmful firefighting foams.
    - Reducing the use of firefighting foams during emergencies.

- Assessment of the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters.
- Investigation into which firefighting foams are the least environmentally harmful.
- Discussion on reporting on emergency discharges of firefighting water and foam.
- Development of outreach materials on containment and cleanup BMPs for contractors hired by private parties.
- Development of outreach materials with good housekeeping practices and preventive measures for sites that are prone to firefighting emergencies.

As required by the MRP, the Regional Work Group must develop this Regional Report and submit it to the Regional Water Board by September 30, 2025. The MRP also requires implementation of the Regional Report recommendations to begin following the submittal.

1.2.1 MRP Fact Sheet

The MRP Fact Sheet provides additional explanations, reasoning, and references to support the inclusion of provisions in the MRP. For Provision C.15.b.iii, the Fact Sheet references 40 CFR and 64 Fed. Reg., which states that discharges or flows from firefighting activities are excluded from the effective prohibition against non-stormwater and need only be addressed where they are identified as significant sources of pollutants to waters of the United States. The regulation indicates that significance is determined with reference to the category of discharges, not individual fires. Specifically, the 64 Fed. Reg. text states that if an MS4 is concerned that flows from firefighting are, as a category, contributing substantial amounts of pollutants to their system, they can develop a program to address those flows prospectively. While the Fact Sheet acknowledges the intent described in 40 CFR and 64 Fed. Reg., it deviates by asserting that water quality impacts from individual fires can illustrate the significance of the category of discharges. To support this, it lists 11 examples (not an exhaustive list) of potable water discharges from non-fire-related activities (e.g., water providers) over a 14-year period and cites one fire-related example, described further below.

The Fact Sheet presents a more proactive approach to addressing concerns with discharges or flows from firefighting activities and aligns with the US EPA’s PFAS Strategic Roadmap (US EPA, 2021). Provision C.15.b.iii provides an opportunity for Permittees to collectively gain a better understanding of the significance of the discharge type and potential adverse water quality impacts of firefighting water and foam discharged during emergencies.

Berkeley Incident

In April 2019, Berkeley firefighters were called to an emergency involving a cardboard recycling truck that had caught fire on the 1600 Block of Rose Street near the intersection of McGee Avenue. Prior to arrival of firefighters, those present on the scene attempted to stop the fire by using a handheld extinguisher and then compressing the contents of the truck, neither of which were successful. Initially, firefighters attempted to extinguish the fire solely with water. However, because there were gas tanks in proximity to the fire, they made the decision to use foam due to the explosion hazard associated with the gas tanks. Approximately, 20 gallons of Class A firefighting foam was used to extinguish the fire safely.

Cleanup. Once the fire was extinguished, the City's Public Works crews used vactor trucks and street sweepers to clean up the foam remaining onsite. When it was discovered that foam reached the storm drain and reached Codornices Creek, firefighters from both Berkeley and Albany tried to remove the top layer of foam from the creek surface utilizing equipment such as absorbent booms.

Reporting. The Fire Department had reporting protocols already in place. As a result, more than 20 local, regional, state and federal agencies were contacted by the Berkeley Fire Department to notify them of the incident. The City of Berkeley also sent Environmental Health and Toxics Management staff to investigate the incident further.

1.3 REGIONAL WORK GROUP

As required by the MRP, the Regional Work Group was established to discuss the requirements in MRP and collectively develop this Regional Report. The Regional Work Group consists of:

1. Municipal stormwater staff from MRP Permittee agencies.
2. Countywide Stormwater Program representatives from the Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, and Solano Stormwater Alliance.
3. Firefighting and Certified Unified Program Agencies (CUPA) agencies who provided additional insight and information on BMPs designed to address non-stormwater discharges associated with firefighting activities, including the use of foams.
4. Representatives from regulatory agencies including the Regional Water Board and U.S Environmental Protection Agency (EPA) Region 9.
5. Outside agencies and organizations[2] that were contacted to request information and/or invited to participate. Organizations that participated and contributed information

[2] Other organizations that were contacted to request information and/or invited to participate in the Regional Work Group include the following: California Department of Forestry and Fire Protection (Cal Fire), Fire Fighting Foam Coalition (FFFC), California Department of Toxic Substance Control (DTSC), National Fire Protection Association (NFPA), The Academy (South Bay Regional Public Safety Training), and Petro-Chemical Mutual Aid Organization (PMAO).

include Toxic-Free Future, Clean Production Action, and Texas A&M University-San Antonio Institute for Water Resources Science and Technology.

The Regional Work Group met twice in each of Fiscal Years (FY) 22-23, 23-24, and 24-25.[3] In addition, separate meetings were held with individual local firefighting departments and post-fire restoration contractors to obtain their input. The Regional Work Group will continue to meet annually after the submission of the Regional Report.

The intent of the Regional Work Group meetings was to:

- Inform firefighting staff about the requirements in the MRP;
- Learn about existing BMPs for preventing stormwater pollution from firefighting activities;
- Understand the use of firefighting foam applications, including proper storage and disposal; and
- Obtain information on post-fire cleanup operations.

The information gathered from the Regional Work Group meetings has informed Sections 3 and 4 of this report. The information gathered in the Regional Work Group meetings has been supplemented with additional communication and research by Regional Work Group members outside of meetings.

1.4 WATER QUALITY

The MRP identifies discharges of potable water disinfectants, such as chlorine or chloramines, and pollutants associated with firefighting foams as the primary concerns that Provision C.15.b.iii is intended to address. A summary of potential water quality impacts of these pollutants is described below.

> Since PFAS-containing foams are banned in California, any mention of pollutants associated with firefighting foams in the Regional Report refers exclusively to non-PFAS foams.

1.4.1 Potable Water Discharge

Firefighting activities may result in discharges of potable water to the storm drain system and ultimately, into creeks or rivers. EPA requires all water suppliers to treat drinking water with disinfectants, such as chlorine and chloramine, to kill pathogenic organisms (EPA, 2023). Chloramine contains both chlorine and ammonia, produces significantly lower levels of disinfectant byproduct, and remains in the water for a longer period.

Chlorine may become toxic to aquatic life at or above certain concentrations in the receiving water. Chlorine can damage the cells of fish gills, thereby reducing their ability to absorb dissolved oxygen from the water. Chloramine does not directly impact the gills; however, it will chemically bind to iron in the hemoglobin of red blood cells, which reduces the ability for oxygen to attach to blood cells. Concentrations of chloramine as low as 0.07 mg/L have been shown to be lethal to coho salmon in 96-hour studies (SFPUC, 2010).

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[3] Meetings were held on the following dates: March 14, 2023, June 1, 2023, March 26, 2024, June 17, 2024, January 14, 2025, and April 22, 2025.

In the environment, chlorine and chloramine are relatively unstable and neutralized upon reaction with air, sunlight, landscaping, paved surfaces, and the storm sewer. For example, small discharges of potable water will interact with the soil particles found in the flow path, removing residual chlorine or chloramine (a process called “chloramine demand”) before it enters the waterway. In these cases, dechlorination can occur passively (with no chemical addition) (CA-NV AWWA, 2019). Larger volumes of potable water that are discharged in close proximity to a waterway may pose an acute health risk to aquatic life without BMPs in place.

1.4.2 Firefighting Foams

There are two classes of firefighting foam typically used by fire departments: Class A and Class B. Class A firefighting foams are generally used on -flammable non-liquid materials, such as wood, paper, brush, and vegetation (e.g., wildland) and are widely used by many fire departments for structure fires. Class B firefighting foams are typically used only for flammable liquid fires (e.g., gasoline, oil, and jet fuel). The properties of the two classes of foams are described below.

Class A Firefighting Foams. Class A foam is formulated from hydrocarbon-based surfactants and increases the wetting effectiveness, which allows for greater penetration into the fire. It also gives water a foaming ability, which allows water to remain and cling to surfaces without runoff and absorbs more heat. Class A foams are generally considered nontoxic when used in a diluted form and will biodegrade over time (National Wildfire Coordinating Group, 1993).

Class B Firefighting Foams. There are two types of Class B foams used for fires: protein-based and synthetic.

Protein-based firefighting foams have three forms: Regular Protein Foam (PF); Fluoroprotein Foam (FP); and Film-Forming Fluoroprotein Foam (FFFP). Protein-based foams are formulated from hydrolyzed proteins, typically derived from natural animal by-products or other protein-rich materials. The hydrolyzed protein acts as the primary foaming agent, forming a thick, cohesive, and heat-resistant foam blanket. Since they are derived from natural proteins they can decompose naturally. This makes them more environmentally benign, especially compared to synthetic foams, though fluorinated variants may still pose environmental concerns.

Synthetic foams fall into three general categories: Aqueous Film Forming Foams (AFFF); alcohol-resistant aqueous film-forming foams (AR-AFFF); and fluorine-free foams (FFF, also called F3). The AFFF type foams typically contain perfluorooctanesulfonic acid (PFOS) or perfluorooctanoic acid (PFOA), which are part of the broader family of Polyfluoroalkyl substances (PFAS). These chemicals are highly persistent in the environment and are termed ‘forever chemicals.’ PFAS are highly mobile in soil and water allowing them to spread easily through the environment and making them difficult to find and remediate (Clean Production Action, 2021). Many PFAS bioaccumulate, or increase in concentration, up the food chain. A recent study conducted by the U.S. Centers for Disease Control and Prevention (CDC) outlines a host of health effects associated with PFAS exposure, including cancer, liver damage, decreased fertility, and increased risk of asthma and thyroid disease (Clean Production Action, 2021). PFAS foams are no longer allowed to be used in California (see Section 1.4.3 below). Fluorine-free foams are mostly based on hydrocarbon surfactants and are free of any fluorosurfactant. Although the fluorine free foams do not contain PFAS, they still contain other unknown proprietary chemicals. However, the toxic effects for both fluorine and non-fluorine foams are considered relatively low. Fluorine free foams also tend to be biodegradable and do not persist in the environment or bioaccumulate, thus making them more environmentally benign than PFAS containing foams (Clean Water Action, 2024).

REGIONAL WORK GROUP FINDING:

In the Bay Area, Type 1 fire engines typically carry Class A foams.
Class B foams are used infrequently by municipal firefighting agencies. Many fire department representatives present at the Regional Work Group stated they rely on mutual aid (i.e., assistance from other nearby fire departments) in the rare instances where Class B foams are required. Class B foams are required at refineries and airports due to the likelihood of flammable liquid fires presenting risk to human safety and property at these locations.

1.4.3 Senate Bill 1044: PFAS Ban

In September 2020, due to the highly toxic and persistent nature of PFOS and PFAS (found in Class B firefighting foams), California passed and signed Senate Bill 1044 into law. This legislation banned the manufacture, sale, and use of PFAS in Class B firefighting foams in most applications starting on January 1, 2022. As a result, chemical manufacturers have started to develop substitute foams that do not contain PFOS or PFAS. Many of these types of foams do not contain fluorine. The law provides exemptions with later deadlines for facilities that meet various criteria, including the following:

- Terminals and oil refineries may apply for exemptions until January 1, 2028, for use on flammable liquid storage tanks greater than 120 square meters in surface area or for use on fuel-in-depth pools. Further extensions may be issued for terminals and oil refineries in cases where no clear, effective substitute is available. These extensions may be granted in two-year terms until January 1, 2032.

This law additionally sets reporting procedures for the use of PFAS-containing Class B foams and identified requirements for minimizing discharges of PFAS-containing Class B foams to the environment. All uses of PFAS-containing Class B foams must be reported to the State Fire Marshal's office within five business days, and the report should include the following:

- Identity of the foam,
- Quantity used,
- Total PFAS concentration,
- Application for which the foam was used, and
- Duration of the fire.

In addition, the use of PFAS-containing Class B foam must not allow any release to the environment, contain all releases onsite, implement containment procedures such as berms and ponds, dispose of all wastes in a manner that prevents environmental discharge, and report if any wastes are discharged to the environment. Since the legislation banned the manufacture, sale, and use of PFAS in Class B firefighting foams, these requirements now apply only to exempt facilities.

REGIONAL WORK GROUP FINDING:
Foam is typically preloaded into fire engines but, in general, fire departments avoid excessive use. One reason is that foams are expensive. The actual use of foam during emergency firefighting operations is determined by the incident commander for a particular fire and can vary on the scene. For some common fire types, such as vehicle fires, foam application is not the default as certain materials cannot be penetrated. Foam is typically stored on fire engines in five-gallon containers of concentrate. Firefighters use a batch mixing process to mix foam with water.

1.5 COMPLEXITY OF ISSUE

The Regional Work Group recognizes the significant value of regional collaboration, knowledge sharing, and resource exchange on the topic of emergency firefighting discharges. During the development of the Regional Report, participants expressed concerns that the Regional Water Board's proposed strategies in the MRP Fact Sheet do not fully address the underlying complexities, emphasizing that the challenges are more intricate than they appear. This section highlights several key factors that influence the implementation of the recommendations in this Regional Report.

1.5.1 Prioritization and Urgency

Managing emergency firefighting discharges, including water and foam, is highly complex with multiple, often competing considerations. The urgency inherent in firefighting operations significantly limits the time and focus available for addressing water quality during emergencies. Firefighting personnel, including municipal staff and contractors, are tasked with controlling immediate threats from the fire, leaving little time or resources to focus on managing potential discharges from water and foam used during suppression efforts. As outlined in the MRP, the priorities for firefighting operations are the protection of life, property, and the environment (in that order). In an emergency, firefighters need to balance the urgency of rapid, effective firefighting with the unpredictable nature of each situation. While mitigating water quality impacts are an important operational consideration, effectively deploying stormwater pollution prevention BMPs during emergency activities is difficult and in some cases in opposition to fighting the fire or saving lives.

Furthermore, the unpredictable nature of firefighting operations poses additional logistical challenges that complicate the execution of stormwater BMPs. Firefighters are often required to leave the scene for other emergencies before they could address the environmental impacts of fire-related discharges. Each firefighting incident is unique, and the actions and decisions made in the moment can vary significantly based on the specific circumstances at hand. While stormwater programs implement established BMPs and SOPs for stormwater quality management , fire departments rely more on guidelines for pollution prevention due to the unique nature of fires and the evolving nature of each situation.

1.5.2 Organizational and Structural Complexities

The diverse structure of firefighting agencies in the Bay Area adds another layer of complexity to managing firefighting discharges as shown in Table 1-1. Not all fire departments are municipal entities; many are organized within special districts or county-level services. For example, the City of Emeryville is served by the Alameda County Fire Department; areas like Livermore and Pleasanton are served by the Livermore-Pleasanton Fire Department, a Joint Powers Authority; the cities of Moraga and Orinda are served by the Moraga-Orinda Fire Department, a special fire district, and the City of Los Altos contracts with the Santa Clara County Fire Department. In some jurisdictions the fire department may be the CUPA agency, that performs stormwater inspections or responds to hazardous material spills. In these instances, there may be a better internal understanding of stormwater pollution prevention, whereas other fire departments may not have any ongoing interaction with stormwater programs. These structural differences result in varying levels of resource availability, operational coordination, and organizational approaches, which have the potential to complicate containment and cleanup efforts in the context of emergency firefighting operations.

In the Bay Area, where fires (both municipal and wildfires) can be frequent and mutual aid from multiple fire departments is common, staffing shortages can further limit the availability of personnel to assist with post-fire discharge cleanup, making BMP implementation even more difficult.

Table 1-1- Bay Area Fire Departments by Permittee

Fire Department	Permittee(s) Being Served
Alameda County	
Alameda Fire Department	City of Alameda
Albany Fire Department	Albany
Berkeley Fire Department	Berkeley
Alameda County Fire Department	Dublin, Emeryville, Newark, San Leandro, Union City, and Unincorporated Alameda County
Fremont Fire Department	Fremont
Hayward Fire Department	Hayward
Livermore-Pleasanton Fire Department	Livermore and Pleasanton
Oakland Fire Department	Oakland
Piedmont Fire Department	Piedmont
San Mateo County	
Menlo Park Fire Department	Atherton, East Palo Alto, and Menlo Park
San Mateo Consolidated Fire Department	Belmont, Foster City, and City of San Mateo
San Mateo County Fire Department	Unincorporated San Mateo County

Fire Department	Permittee(s) Being Served
Central County Fire Department	Burlingame, Hillsborough, and Millbrae
Coastside Fire Protection District	Half Moon Bay
Colma Fire Department	Colma
North County Fire Authority	Brisbane, Daly City, and Pacifica
Redwood City Fire Department	Redwood City and San Carlos
San Bruno Fire Department	San Bruno
South San Francisco Fire Department	South San Francisco
Woodside Fire Protection District	Portola Valley and Woodside
Santa Clara County	
Santa Clara County Fire Department	Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, Saratoga, and Unincorporated Santa Clara County
Milpitas Fire Department	Milpitas
City of Mountain View Fire Department	Mountain View
City of Palo Alto Fire Department	Palo Alto
San Jose Fire Department	San Jose
Santa Clara Fire Department	City of Santa Clara
City of Sunnyvale Fire Department	Sunnyvale
Contra Costa County	
Contra Costa County Fire Protection District	Antioch, Brentwood, Clayton, Concord, Lafayette, Martinez, Oakley, Pinole, Pittsburg, Pleasant Hill, San Pablo, Walnut Creek, and Unincorporated Contra Costa County.
El Cerrito Fire Department, Kensington Fire Protection District	El Cerrito
Richmond Fire Department	Richmond
Moraga/Orinda Fire District	Moraga and Orinda
Rodeo/Hercules Fire District	Hercules
San Ramon Valley Fire Protection District	Danville and San Ramon
Solano County	
Suisun City Fire Department	Suisun City
Cordelia Fire Protection District	Fairfield
Vallejo Fire Department	Vallejo

1.5.3 Funding Constraints

Another major challenge lies in funding and the financial constraints posed by laws such as Proposition 218, which limits local governments' ability to raise funds for stormwater management. This constraint means that the costs associated with developing and implementing new BMPs for managing emergency firefighting discharges will increase the financial burden on municipalities. This is especially problematic given the existing stormwater management expenses municipalities already face. As a result, BMPs must be feasible, effective, and cost-efficient to ensure they are realistic and sustainable in the long term.

2 FIREFIGHTING FOAM BMPs

Section 1.4 describes the two main types of firefighting foams, i.e., Class A and Class B. Section 2 discusses the BMPs outlined in the MRP.

2.1 DETERMINING LEAST ENVIRONMENTALLY HARMFUL FOAMS

The MRP required the Regional Work Group to investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), for both Class A foams and Class B foams. Based on this evaluation, the Regional Work Group was then required to develop BMPs that: (1) prioritize the use of the least environmentally harmful foams during emergency responses and provide guidance for their appropriate disposal; and (2) minimize the overall use of firefighting foams without compromising the protection of life or property.

2.1.1 Phase out PFAS containing foam

As described in Section 1.4, Senate Bill 1044 banned the use of PFAS in Class B firefighting foams in most applications starting January 1, 2022. In the Regional Work Group, municipal firefighting departments reported they had already discontinued the use of firefighting foams with PFAS. The transition for airports took a longer period because the Federal Aviation Administration (FAA) had to approve the use of alternative foams.

In December 2022, the FAA was directed to develop a Transition Plan (termed the Aircraft Firefighting Foam Transition Plan) to transition from PFAS firefighting foam to a replacement firefighting foam (FAA, 2023). The FAA considers foams that meet the Department of Defense (DoD) fluorine-free foam military specification published on January 6, 2023, and certified by DoD to be acceptable.[4] In addition to identifying acceptable replacement foam, the Transition Plan includes research on cleaning procedures for equipment and vehicles with residual PFAS.

Regional Work Group Example Scenario:

The City of San José is currently in the process of procuring fluorine-free foam (F3) for the San José Airport Fire Department based on FAA guidance. San José will be following the guidance on properly cleaning and disposing of the old Aqueous Film-Forming Foam (AFFF) as provided in the FAA Cert Alert (National Part 139 CertAlert May 8, 2024 Department of Defense's (DoD's) Memorandum on Rinsing Aircraft Rescue Firefighting (ARFF) Vehicles Transitioning from Aqueous Film Forming Foam (AFFF) to Fluorine-Free Foam (F3). The Cert Alert recommends draining AFFF and then rinsing equipment once with water. However, it does not provide guidance on disposal and refers airports to their local jurisdictions. The City of San José opted to engage with an existing consultant for support on developing an approach to remove/dispose of old AFFF, clean all impacted equipment, and transition to a new F3 product.

[4] The DoD certified F3 foams can be found in the Qualified Products Database.

2.1.2 Selecting Environmentally Friendly Firefighting Foam

During Regional Work Group discussions, some fire departments expressed that they are already using or intend to use or purchase environmentally friendly firefighting foams. Safety Data Sheets (SDS) provided by manufacturers are used to make this determination.

Another tool to assist with the selection of environmentally-friendly firefighting foam is the use of products recommended by GreenScreen® for Safer Chemicals. Representatives from Toxic-Free Future and Clean Production Action presented information on the selection criteria for GreenScreen Certified® at a Regional Work Group meeting. The GreenScreen® certification aims to prevent regrettable substitutions for PFAS-containing firefighting foams and guarantees the absence of PFAS chemicals. Additionally, manufacturers of GreenScreen Certified® products have disclosed their entire formulation to GreenScreen® for Safer Chemicals. All formulations for certified products have been checked for potentially harmful chemicals including organohalogens, siloxanes, alkyl phenols, and over 2000 other chemicals of high concern. GreenScreen Certified® products have also been examined for acute aquatic toxicity in concentrate form. GreenScreen® has identified several potential replacement chemicals that should be avoided due to their persistent, bioaccumulative, and toxic effects to aquatic organisms. These include organohalogens, Siloxanes (D4, D5, and D6), Alkyl Phenols & Alkylphenol Ethoxylates and over 2,000 other chemicals of high concern . (GreenScreen Certified® Firefighting Foam fact sheet). The list of GreenScreen Certified® foams is available at this link: https://www.greenscreenchemicals.org/certified/products/category/firefighting

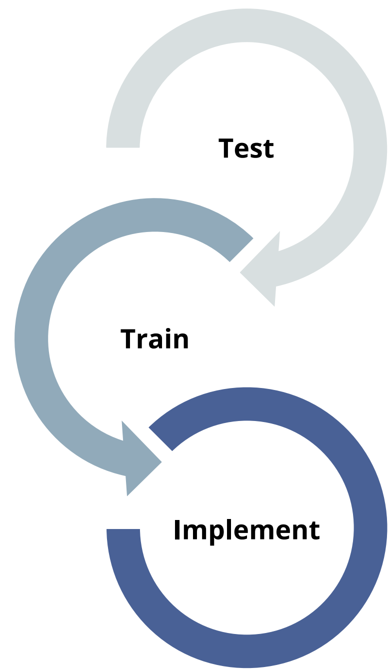

Figure 2-1 Process for Switching Foam Products

Discussions with a Firefighting Foam Coalition (FFFC) representative, a non-profit trade association representing foam manufacturers and distributors, stated that while some member manufacturers have opted into GreenScreen® certification, some manufacturers may be hesitant to disclose the entirety of their formulations to third party organizations. Discussions with both FFFC and GreenScreen® representatives illustrated that while presence on the GreenScreen Certified® products list may suggest lower potential for environmental harm, absence from the list does not suggest higher potential as there are many reasons that a product may be absent from the list unrelated to potential for environmental harm.

Making the switch to a new type of firefighting foam can be challenging. Decisions such as these have the potential to impact public and firefighter safety and, as such, cannot be made lightly. It is recommended that fire departments and their municipal partners thoroughly vet the SDS of potential foam products. To simplify the selection process, firefighting agencies may consider choosing a GreenScreen® Certified product such as Micro Blaze-Out which has been implemented successfully in the Bay Area on several different fire types. Products such as this offer foam quality that can match Class A and B in most scenarios. The Alameda County Fire Department was one of the first in the Bay Area to switch to the Micro Blaze-Out foam. As shown in Figure 2-1, their approach can be broadly broken down into three phases, and may be used for other firefighting agencies looking to switch to environmentally-friendly foams:

Phase I: Test. Once a product is selected, obtain a small amount. Review the SDS and test the product with a qualified lab. Then, identify scenarios in which the product could be tested in the field. Start off slow and focus on small fires for testing. Obtain testimonials from firefighters on their experience.

Phase II: Train. Following testing of the product train firefighting staff on the new product. These trainings are generally provided by foam manufacturers. The method of application of the new product may be different and the way the foam looks on a fire may be different. The fluorine-free foam products are likely to look and act differently than the thick Class B foam that may be more familiar.

Phase III: Implement. Once the product demonstrates effectiveness through testing and training has been provided, plan for wider use and larger fires. Continue to collect testimonials to expand the understanding of effectiveness in different fires and incorporate processes for use.

2.2 PROPER DISPOSAL

Firefighting foam may need to be disposed of if it is deemed unsuitable (e.g., expired) or if it contains PFAS and can no longer be used. All types of firefighting foam should be properly stored with the appropriate BMPs in place to prevent contamination of stormwater runoff until they have been disposed. In preparation for disposal, coordination with solid and hazardous waste municipal departments can be an important first step. It is also typical to use private environmental contractors to remove and dispose of foam concentrates. In addition to stored foam, residue on equipment should be rinsed and disposed of properly. As mentioned earlier, guidance is available from the FAA regarding properly cleaning equipment and disposing of the rinsate and the foam.

As mentioned previously, the use of PFAS in firefighting foams in most applications was banned in California as of January 1, 2022. Any remaining PFAS containing firefighting foams need to be disposed. In 2024, the EPA developed interim guidance for destruction and disposal of PFAS containing materials. The guidance considers hazardous waste combustion facilities as an option for liquid PFAS. However, it notes that there are still uncertainties around the recommended disposal and destruction methods and their ability to prevent migration into the environment.

While most fire departments have disposed of PFAS-containing firefighting foam, there may be some remaining that have not. These departments could refer to the *Solutions for Firefighting Foam Transition* webinar, by CDM Smith, or the FAA Transition Plan research for guidance, and coordinate with the appropriate municipal staff handling solid and/or hazardous waste. If PFAS-containing firefighting foam is determined to still be stored onsite, then proper labeling/signage must be provided and BMPs such as berms and covers must be implemented to avoid accidental use or spills.

REGIONAL WORK GROUP FINDING:
The majority of Bay Area fire departments have already disposed of all PFAS-containing Class B foams through enlistment of private environmental contractors or through Mutual Aid/Petrochemical Mutual Aid Association. They reported significant costs to dispose of the foams. Trade association representatives to the Regional Work Group noted that environmental waste disposal groups currently store hazardous PFAS-containing Class B foams in accordance with local regulations, but these organizations are currently awaiting further guidance from regulators about proper methods for disposal.

2.3 PROPER USE OF FIREFIGHTING FOAM

Foam can rapidly extinguish fires, has saved many lives, and has reduced the loss of property. Rapid fire extinguishment also reduces some environmental impacts, especially related to air quality. Use of foam can also reduce the amount of water needed to extinguish a fire. Firefighters are trained on foam application basics in the Firefighter I curricula. The use of foam during emergency firefighting operations is determined by the firefighter Incident Commander (IC). The person who assumes the role of IC varies based on the incident, department, and qualifications of personnel. While pre-planning foam usage prior to arriving at an emergency event is not always possible given the unpredictable nature of emergencies, there are some BMPs that can be incorporated generally into firefighting practices and applied as appropriate and feasible based on unique scenarios. These BMPs are described in Sections 2.3.1-2.3.4.

The MRP calls for SOPs to be developed, but it should be noted that this type of documentation is not common or recommended for firefighting activities. Given the unique and variable conditions presented with each fire event, SOGs are the more common and preferred approach for firefighting. These allow for incident command to have onsite flexibility to make decisions freely using best professional judgement based on the particular conditions and with an emphasis on securing the safety of life and property as quickly as appropriate.

2.3.1 Avoid the use of firefighting foam when it is not necessary

From discussions with the Regional Work Group and individual representatives it is understood that, generally, Bay Area fire engines are pre-loaded with Class A foams. Firefighters are trained on the use of the proper firefighting foam depending on the type of fire in the Firefighter I curricula.

Incident command and firefighters should consider incorporating the use of foam into adaptive management planning for emergencies if they do not already.

Some fire departments incorporate certain levels of pre-planning prior to arriving at the emergency scene and plan to use only water if the conditions are appropriate. For example, if the type of fire can typically be extinguished with water alone and there is sufficient water supply then a water-only approach is implemented. Based on whether the water-only approach is effective or whether conditions change making it less optimal, a new approach that includes the use of foam may be necessary.

Fire departments are investigating and piloting alternative BMPs for extinguishing challenging fires (e.g., battery fires), such as fire blankets, submersion pits, and cutter extinguishers. These methods can help reduce the volume of firefighting foam and water used, thereby minimizing the potential for runoff containing toxic materials.

2.3.2 When firefighting foam is used, limit the amount used

From discussion with Regional Work Group members, it is understood that incident command can incorporate consideration of the amount of foam needed for extinguishing a fire as time allows. The preferred approach is that just enough foam be applied to accomplish the task and ideally, no more. The Regional Work Group found that fire departments typically avoid excessive use of foam primarily because they are expensive. However, environmental conditions should continue to be acknowledged and enhanced as an influencing factor for following training guidelines on the amount of foam to use.

Firefighters responsible for mixing the foam with water in the field and application of foam receive additional training.

2.3.3 Use the proper firefighting foam, depending on the type of fire

As described earlier, the two main types of firefighting foams are Class A and Class B. Class A generally poses a less significant impact on the environment and is generally prioritized when it is an option. Examples of when Class A foams can generally be prioritized, include, but are not limited to wildland fires, residential, and structural fires.

Class B foam is generally limited only to situations that pose a significant flammable liquid hazard to reduce environmental impacts. Examples of where significant flammable liquid hazards may be present include airport operations, storage tanks, terminals and petroleum/chemical processing, highway and rail transportation, marine and military applications, industrial facilities, and some power generating facilities. Class B foams may not be necessary for smaller flammable liquid threats such as automobile fires without a significant fuel spill, or electric vehicle fires caused by batteries, and these should be evaluated for water or Class A foam use by the incident command (Firefighting Foam Coalition, 2016).

REGIONAL WORK GROUP FINDING:
Some fire departments do not have Class B foam which makes the decision to use it more strategic as they would need to specifically call for mutual aid. In this case, the Class B foam is still limited based on incident command guidance.

Firefighters are trained on the selection and use of firefighting foam based on the type of fire in the Firefighter I curricula.

2.3.4 Discourage the use of firefighting foam where it may discharge to receiving waters.

Firefighting foam usage depends on the type of fire and material burning. In general, applying BMPs focused on avoiding, limiting, and proper use of firefighting foam is a robust approach supporting areas discharging to receiving waters, including those that may have sensitive habitat, such as habitat for special status species. To further avoid impacts on receiving waters, BMPs related to Emergency Firefighting Activities (Section 3) should be emphasized and training and/or outreach should be provided to inform firefighters on environmental considerations.

Regional Work Group Example Scenario:

The Alameda County Fire Department responded to a fire directly adjacent to the Bay at the San Leandro Marina. The firefighter in incident command had been informed of the environmental impacts of foam to receiving waters and implemented a water-only approach. It proved to be effective for the particular fire scenario and, as a result, prevented the likely discharge of Class A foam to the Bay.

Firefighting training on the use of foams is a standard for fire departments. If water quality considerations are not included in the training platforms or resources currently being used by the fire department, municipal staff could work with the fire departments to develop training or outreach materials. These materials would provide a connection between the training fire department personnel receive on the appropriate use of foam and how implementing that training also benefits water quality.

3 EMERGENCY FIREFIGHTING ACTIVITIES

As stated previously, and throughout this Regional Report hereafter, the focus of firefighters during an emergency fire response is on protecting life, property, and the environment (in that order). To address the protection of the environment, this section describes the coordination between municipal departments, firefighting agencies, and cleanup crews before, during, and after an emergency. This section also discusses the BMPs for managing stormwater pollution from emergency firefighting discharges.

3.1 COORDINATION AND COMMUNICATION

The MRP identifies communication and coordination between both municipal staff (e.g., fire, public works, environmental services) and external responding agencies (e.g., CalFire, special district fire departments) as a possible BMP. The Regional Work Group identified coordination and communication between responding fire departments and relevant municipal staff as a crucial BMP.

Coordination opportunities, processes, and level of effort may vary widely among municipal jurisdictions given the varied organizational structures of fire departments serving communities and size and resources of the municipality. For example, the City of Emeryville is served by the Alameda County Fire Department. In addition to coordinating with the Alameda County Fire Department, they may also need to coordinate with the cities of Dublin, Newark, San Leandro, and Union City, and Alameda County, who are also served by the Alameda County Fire Department, to ensure consistent objectives.

Regional Work Group Example Coordination Scenario:

The City of San José Environmental Services Department has identified representatives from the City of San José Fire Department and City of San José Airport Fire Department to attend periodic meetings. The purpose of these meetings is to review implementation of the MRP requirements, review any recent CalOES reported discharges, and discuss lessons learned.

Regional Work Group discussions suggest that the first step for establishing coordination between municipalities and fire departments is to identify key contacts within each agency. As contacts are identified, their roles and responsibilities can be considered within the context of emergency fire discharges. From there, an organization or contact chart can be created, and updated as needed. Several agencies have established procedures for ongoing coordination (e.g., as-needed meetings or emailed updates) as changes to contacts, policies, and procedures occur. These meetings offer opportunities to debrief on lessons learned either via incident report sharing or other internal coordination (e.g., meetings).

Based on conversations within the Regional Work Group and individual conversations with fire departments, there are instances when additional coordination beyond fire department and municipal staff is needed. There are many local, regional, state, and federal agencies that may need to be notified at different points during or following an emergency fire discharge event. These may include county health departments, California Department of Fish and Wildlife (CDFW), Regional Water Board, or the EPA. In Regional Work Group discussions, it was noted that fire response teams often initiate this external coordination.

Municipal staff can work with their fire departments to designate municipal points of contact and establish clear lines of communication. This collaboration can support the development of mutually agreed-upon policies or procedures that may be necessary during emergency firefighting responses (see Section 3.2).

Some general topics identified in emergency response policies or procedures may require regular review, maintenance, and updates at defined intervals. If not already incorporated into existing agency protocols, municipalities can develop a coordination strategy to document key components such as points of contact, roles and responsibilities, organizational structure, urgency thresholds, and coordination topics or meeting schedules. Where appropriate, municipal staff may be able to leverage or integrate existing procedures and contacts from their illicit discharge detection and elimination programs or Hazardous Materials Response Teams to support this effort.

3.2 CATEGORIZING FIRE TYPES AND ESTABLISHING BMP/SOG IMPLEMENTATION BASED ON CATEGORIZATION

To further support the process described in Section 2.3, municipal staff can work with fire departments to understand different types of fires at a high level and identify appropriate BMPs for each.

While each fire event will be different and present unique challenges, there may be an opportunity to establish general guidelines or BMPs for categories or types of fires. For example, fire departments could contact the identified municipal point-of-contact if foam is used in certain situations, and communicate other stormwater-relevant details, as determined in the coordination process.

Regional Work Group Example Scenario:

The City of Berkeley Department of Public Works has requested the Berkeley Fire Department contact them when foam is used in fighting fires.

Municipal staff are encouraged to coordinate with their local fire departments to define reasonable thresholds and categories of fire incidents that would warrant notifying the municipality. This could be done when developing policies and procedures (see Section 3.1). The determinations will differ based on variables such as the size of the jurisdiction, the frequency of firefighting emergencies, and the type of land uses/facilities/structures. Determinations of when fire departments communicate with municipal staff will also differ based on the established outcomes needed of municipal staff involvement (e.g., deploying staff or contractors to assist with BMPs for post-fire cleanup, making observations of potential receiving water impacts, being notified of additional fire department response activities, etc.).

3.3 RESOURCES AVAILABLE TO DETERMINE POTENTIAL RECEIVING WATER IMPACT

Municipalities maintain MS4 maps, which can be valuable tools for understanding the location of fire incidents in relation to creeks, stormwater infrastructure, and sensitive habitats. These maps may help determine appropriate BMPs to implement to protect nearby water bodies. For example, “proximity to a creek” could serve as a key incident category for selecting BMPs during emergency response efforts. MRP Provision C.5.f. requires permittees to review current MS4 maps, identify missing information and develop a plan and schedule for updating the maps. The plans are due with the September 2026 Annual Reports. Through this process permittees can ensure they have adequate MS4 maps to assist with their determination of appropriate BMPs based on the location of the fire (e.g., proximity to creek). Depending on the communication procedures established with local fire departments, these maps could be made available to dispatch personnel, fire department incident commanders, designated municipal contacts or other outside agencies that may be involved in illicit discharge responses (CDFW, California Office of Emergency Services (CalOES), etc.), as determined when coordinating the communication plan.

In accordance with MRP Provision C.5.c.ii.(5), municipalities are required to maintain and regularly update a spill, dumping, and complaint response system. This includes a phone number and a response flowchart or phone tree that outlines the roles and contact information of various agencies responsible for responding to incidents that exceed the Permittee's immediate capabilities. Municipalities may consider sharing these tools with their fire departments to support more coordinated and informed responses to discharges of firefighting water and foam, particularly those with the potential to impact receiving waters.

Additional resources for responding to and mitigating impacts from emergency fire discharges include municipal staff in stormwater programs, county hazardous materials departments, and public works, police, and fire departments. Each of these entities can play a supporting role in identifying, preventing, and reducing pollutant discharges to creeks and the Bay during emergency firefighting activities.

3.4 DISCHARGE BMPS

The MRP requires the Regional Work Group to discuss BMPs for the containment and cleanup of discharges of firefighting water and foam associated with emergency firefighting activities. This section summarizes the discussions and Regional Work Group findings.

3.4.1 Plugging storm drain inlets

Plugging storm drain inlets is not always the preferred BMP during emergency activities for preventing discharges to the issues highlighted below:

- **Flooding and Safety Risks:** Blocking storm drain inlets can cause street flooding, which poses serious hazards for first responders. Flooded streets can impede victim evacuation, cause fall/slip hazards, disrupt emergency vehicle and firefighter movement, and compromise overall response effectiveness.

- **Limited Equipment Space**: Fire apparatus is designed to carry essential health and safety equipment. Due to space constraints, there is typically no room to store materials needed for blocking or plugging storm drains.

- **Operational Priorities**: Firefighters must remain focused on life-saving operations. Diverting attention to storm drain management without adequate personnel can interfere with critical emergency response duties.

REGIONAL WORK GROUP FINDING: *Firefighting and municipal personnel have expressed significant concerns regarding the impacts that plugging storm drains could have such as safety hazards, flooding, property damage, traffic and access issues. Therefore, implementation of BMPs such as plugging storm drain inlets to keep water and foam onsite are considered after emergency actions being taken by fire department personnel have ceased.*

Considering the challenges associated with fire personnel implementing BMPs related to storm drain protection, emphasis should be placed on improving coordination such that response times from cleanup crews that can implement BMPs after emergency activities are over is improved.

All firefighters receive the First Responder Awareness (FRA) training, which includes information on blocking storm drain inlets. Information on containment is also included in the hazardous materials training for firefighters (e.g., Fire Fighter 1B Course Plan). . In addition, several fire departments host or send staff to Firefighter Academy trainings. However, the Regional Work Group was not able to obtain copies of the training curriculum to review these trainings' stormwater protection BMPs.

As previously mentioned in Section 2.3.4, an emphasis should be placed on stormwater pollution prevention training or outreach for firefighters. As awareness of stormwater pollution prevention is improved, better decisions can be made during emergencies that could result in municipal staff and/or cleanup crews responding in an efficient and timely manner. Training or outreach to firefighters on important aspects like surveying onsite drainage patterns associated with firefighting activities could help minimize polluted discharges during fire response and abatement. This training can empower firefighters to direct containment or cleanup crews appropriately as they anticipate the need, based on the emergency location drainage.

3.4.2 Dechlorinating discharges

With emphasis on prioritizing the use of water only to extinguish fires, it is important to consider BMPs to address chlorinated or chloraminated water runoff. Some fire departments have considered the use of dechlorination tablets or mats, which take up minimal space on fire engines and can be placed in the flow path (e.g., curb and gutter) when emergencies occur near sensitive water bodies. However, in most cases, if large volumes of water are being discharged, during an active emergency, it is likely that fire department personnel will be focused on the protection of life and property. Therefore, practical implementation of active dechlorination during such events may be limited.

Passive dichlorination may occur when there is enough time and/or distance between the discharge and the receiving water. The effectiveness of passive dechlorination will be different for water disinfected with free chlorine than chloramine, which is more persistent in the environment.

3.4.3 Coordination with containment/cleanup crews

Based on discussions within the Regional Work Group and individual conversations with fire departments, there is general recognition of the importance of clearly identifying roles and responsibilities when emergency discharges of water or foam affect the public right of way. Effective coordination between firefighting crews and containment or cleanup personnel can help support timely and appropriate response actions.

Some agencies have found that response efficiency can be improved through clear workflows and thresholds for engaging internal or external cleanup support. This may be addressed through established guidance, emergency response plans, or informal coordination strategies.

In certain cases, making this information accessible to firefighters in the field, or automating response actions based on fire alarm levels[5], has proven useful.

Where staff capacity or equipment limitations exist, some municipalities have explored the use of contractors to assist with spill containment and cleanup. In these cases, administrative contracts, interagency agreements, or pre-qualified contractor lists have been used to help expedite response times of the contractors when needed. These tools generally support the administrative process and do not incur costs unless services are activated.

Existing emergency procedures developed by other departments, as well as stormwater programs, related to spills, illegal dumping, and complaints may offer useful models for establishing internal processes that enable timely response. Where used, response contracts may include scopes of work that provide access to best management practice expertise, equipment, and supplies (such as absorbent booms, berms, or storm drain inlet covers), along with required incident documentation and reporting deliverables.

4 REPORTING

In California, the Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA) requires immediate reporting by the responsible person of any significant release or threatened release of a hazardous material to Cal OES State Warning Center (800) 852-7550.[6]

The Cal OES State Warning Center provides a standard Hazardous Materials Spill Report that is filled out and submitted by the person responsible, which may include fire personnel in the case of emergency firefighting discharges that include foam concentrate. The MRP fact sheet states for firefighting personnel, the reportable quantity of hazardous material released to the environment is five gallons and that five gallons of firefighting foam is the size of a typical concentrated foam container). . The form includes a section for a description of the incident, substance type, and amount discharged. This form also serves as a mechanism for triggering reporting for other agencies and includes a section for the contact information of the applicable agency representatives. As was exemplified in the Berkeley incident, the Fire Department had reporting protocols in place and, as a result, more than 20 local, regional, state and federal agencies were notified of the incident by the Berkeley Fire Department.

The Cal OES Spill Release Reporting Notification Guidance recommends notifying the appropriate Regional Water Board for significant waterway spills or releases. A review of Cal OES records from 2019-2024 show that firefighting water and foam discharges are routinely reported in Cal OES. The Cal OES State Warning Center provides a standard report that provides agencies (including the Regional Water Board) with a transparent source of information about the usage of firefighting water and foam when it reaches a creek. In previous years, Regional

[5] Fire alarm levels are used by fire departments to communicate the severity of a fire, the number of firefighters needed, and how long it will take to reach the fire. The levels range from one to five, with each level requiring more resources than the previous.

[6] https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/

Water Board staff have followed up with municipal Permittees to request more information regarding emergency firefighting discharges reported through CalOES, demonstrating CalOES is a sufficient reporting method. The State's system and Spill Release Archive Files webpage serves as a tool that can be used for tracking incidents of foam discharge over time.

Senate Bill 1044, which banned the manufacture, sale, and use of PFAS in Class B firefighting foams in most applications, sets reporting procedures for use of PFAS-containing Class B foams and identifies requirements for minimizing discharges of PFAS-containing Class B foams to the environment. All uses of PFAS-containing Class B foams are to be reported to the State Fire Marshal's office within five business days, and the report should include the following:

- Identity of the foam,
- Quantity used,
- Total PFAS concentration,
- Application for which the foam was used, and
- Duration of the fire.

A public records request submitted to CalFire indicated that California firefighting agencies have not reported any use of PFAS-containing foam in 2022, 2023, and 2024. This indicates that the use of PFAS-containing firefighting foam has been phased out.

Regional Water Board and local municipalities receive CalOES reports that meet the intended purpose for reporting as described in the MRP, and discharges of PFAS foam are reported to the State Fire Marshal's office. Therefore, additional reporting through the MRP stormwater annual reports is not required.

5 OUTREACH MATERIALS

The MRP requires the development and distribution of the following outreach materials:

- Containment and cleanup BMPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities.
- Good housekeeping practices and preventive measures for sites that are prone to firefighting emergencies.

Regional Work Group representatives met with two fire restoration contractors to obtain information on standard procedures for containment and cleanup operations. Based on this information, additional research, and knowledge of typical spill prevention and clean up BMPs, standard BMPs for these operations were developed. The standard BMPs were provided to Countywide Stormwater Program representatives for internal review. The BMPs were formatted according to each Program's standard fact sheet/brochure template and revised based on comments received from member agencies. Each Countywide Stormwater Program distributed the fact sheets/brochures to local fire restoration contractors in the summer of 2025. Some fire restoration contractors operate in multiple locations and have received fact sheets from more than one Countywide Stormwater Program. The Regional Work Group agreed that this duplication is appropriate, as it highlights the regional scope of the requirement and ensures that contractors have access to contact information specific to each Countywide Stormwater Program.

Regional Work Group Countywide Program leads shared BMPs developed for good housekeeping practices and preventive measures for sites that are prone to firefighting emergencies, as identified by individual Permittee agencies and/or at the Countywide level. These BMPs focus on ongoing practices that minimize the flow of firefighting water, foam, and other debris into the storm drain system during emergency firefighting activities. The Countywide Stormwater Programs provided BMP fact sheets on this topic to their member agencies for internal review, and revised BMPs according to feedback received. Individual Permittees have distributed their corresponding countywide program fact sheets to facilities they identified within their jurisdictions through direct mailing or inspection programs.

6 CONCLUSIONS AND RECOMMENDATIONS

As required by the MRP, a Regional Work Group consisting of municipal staff, firefighting agency representatives, regulatory agency representatives, and other interested parties was formed to discuss emergency discharges (i.e., water and foam) associated with firefighting that impact water quality and develop recommendations for addressing these discharges. The Regional Work Group met a total of six times from FY 22-23 to FY 24-25. Based on the discussions at the Regional Work Group meetings and additional conversations with fire department representatives, it appears that discharges of foam and water during firefighting activities are being controlled to the extent possible, i.e., without hindering firefighting operations. PFAS containing foam was banned in 2022, foam is used only as needed, and several fire departments have reported using environmentally friendly firefighting foams. The Regional Work Group's information sharing identified BMPs, including programmatic improvements, that could be implemented by fire departments and municipal staff to reduce the impact on water bodies from emergency firefighting discharges. These recommendations are summarized below.

Recommendations for Managing Discharges from Emergency Firefighting Operations: Information regarding storm drain protection BMPs and water quality impacts is included in the basic training received by all California firefighters. Deployment of stormwater management BMPs during an emergency firefighting situation depends on the conditions at the site and is not always recommended or feasible. The priorities for firefighting operations are the protection of life, property, and the environment (in that order). Therefore, as described previously, it is also essential to implement pre-emergency BMPs and post-fire BMPs. To address the protection of the environment, the Regional Report recommends the following:

- Municipal staff and firefighting agencies should consider reviewing their coordination and communication procedures for ensuring proper coordination between municipal departments, firefighting agencies, and cleanup crews to manage discharges to the MS4 that may impact water quality after the emergency is over.
- Municipal staff should maintain a spill, dumping, and complaint response flow chart, phone tree, or contact list that shows the various responsible agencies and their contacts, and who would be involved in illicit discharge incident response that goes

beyond the Permittee's immediate capabilities according to MRP Provision C.5.c.ii.(5). Municipalities can use this contact list or provide it to the fire department for use, as needed, for responding to discharges of firefighting water and foam that impact receiving water.

- Municipal staff and firefighting agencies should consider incorporating resource-sharing practices, such as providing access to drainage system maps and identifying critical drainage release points, where appropriate. This information can support, help prioritize, and potentially mitigate water quality impacts of firefighting activities.
- Passive dechlorination may be an acceptable BMP used to reduce chlorine in firefighting water discharges.
- Plugging/covering storm drain inlets is not recommended during active emergency firefighting activities due to the risk of flooding, street or traffic hazards, and potential infrastructure damage.
- If conditions allow, dechlorination tablets and storm drain covers/plugs may be considered during post-fire cleanup efforts in the public right of way as a tool to help prevent harmful discharges from reaching nearby waterways.
- Municipal staff and firefighting agencies should consider developing and delivering training materials or outreach on water quality impacts and applicable stormwater BMPs if not already available. These trainings or outreach should be made available to firefighters municipal staff, and contractors involved in the containment and cleanup of discharges from firefighting emergencies.

Use of Foam during Emergency Firefighting Operations: PFAS containing foams are banned in California and all firefighting agencies that participated in the Regional Work Group confirmed that they have phased out the use of these foams. Foam is used because it can rapidly extinguish fires, has saved many lives, and has reduced the loss of property. Rapid fire extinguishment also reduces other environmental impacts, especially related to air quality. Use of foam can also reduce the amount of water needed to extinguish a fire. All firefighters receive training on foam application and are trained to use foam only when necessary. The Regional Report recommends the following for proper foam application guidelines to prevent water quality impacts:

- Firefighting agencies should continue to purchase and use the least environmentally harmful foams. Municipal staff can assist by making the resources identified in the Regional Report (e.g., Safety Data Sheets, GreenScreen Certified® products, example procedure for choosing the least environmentally harmful foams) available to their local fire departments.
- For those departments that have not yet disposed of PFAS-containing foams, it is recommended that they refer to *Solutions for Firefighting Foam Transition* webinar, by CDM Smith, or the FAA Transition Plan research for guidance, and coordinate with the appropriate municipal staff handling solid and/or hazardous waste.
- Fire departments should continue to ensure that personnel making decisions on the use of foam and overseeing deployment of foam are properly trained on the use of foam.

Reporting: In California, CERCLA requires immediate reporting of any significant release or threatened release of a hazardous material to the CalOES State Warning Center (800) 852-7550, and either UPA or 911. Senate Bill 1044, which banned the manufacture, sale, and use of PFAS in Class B firefighting foams in most applications, requires that all PFAS-containing Class B foams be reported to the State Fire Marshal's office within five business days. Therefore, additional reporting is not recommended. Municipal staff can work with their local fire departments to ensure the CalOES and State Fire Marshal's reporting systems are being utilized.

In conclusion, firefighting agencies recognize the importance of protecting water quality during emergency firefighting activities and are actively transitioning toward using environmentally friendly foams. In addition, programmatic improvements, such as increased coordination and communication with municipal agencies, and ongoing training will help address the water quality impacts from emergency firefighting activities. The combination of procedural, administrative and structural BMPs implemented pre-emergency (e.g., training), during emergency firefighting activities (e.g., appropriate use of foam) and post-fire cleanup (e.g., protection of storm drains) will address concerns with water quality impacts while ensuring fire department personnel prioritize the protection of life, property, and the environment(in that order).

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