

WILDFIRE RESPONSE

Guide for Environmental Public Health Professionals

Summer 2023

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Introduction

This guide is intended for environmental public health professionals responding to a wildfire as part of an immediate response or recovery process. It provides information needed in the event of a wildfire within a jurisdiction, with potential considerations and roles for environmental public health professionals.

The guide outlines steps that can be taken before, during, and after a wildfire event. It is not intended to provide a comprehensive discussion of each key environmental health area. A number of guidance documents and weblinks are provided to review hopefully before a wildfire occurs. For each of the key areas, this guide identifies environmental public health concerns and their corresponding immediate response and recovery objectives.

Also included are:

- boilerplate messages
- web links and forms that can be used to meet objectives
- links to guidance documents
- possible cross-sector partners

Before the Event

Due to the many environmental public health responsibilities, a review of this and other referenced guidance is recommended before a wildfire occurs. Periodic reviews, training, and updates should also be considered. It is prudent to recognize disaster potentials and trends (for example, climate change and its local impacts) to make informed decisions regarding emergency preparedness and response.

Response and Recovery

This guide will focus on response and recovery activities, with consideration for preparedness duties. Response activities immediately follow a wildfire starting, where the focus is on protecting lives/ property and managing its spread. Recovery activities are taken to return the community and conditions to normal after a wildfire including the rebuilding process, educating communities, and developing better wildfire prevention practices. This guide is not intended to be comprehensive within each topic area, but to provide environmen-

tal public health staff with ideas about what to consider when a wildfire occurs.

What is a Wildfire?

A *wildfire* (also known as a forest fire, brush-fire, wildland fire, or rural fire) is defined as an unplanned unwanted fire. A wildfire includes unauthorized human-caused fires, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.¹ Wildfires can occur almost anywhere in the United States and many parts of the world.

Wildland Fires

Wildland fires are non-structural fires that occur in the wildland,² have existed for millennia, and have served to maintain the health of a forest or ecosystem, including returning nutrients to the soil; opening up space for additional sunlight for younger trees and plants; releasing seeds when a fire melts the resin that holds seeds inside cones or fruits; clearing undergrowth of flammable materials; and decreasing insect infestations or invasive plant species.

Prescribed Fires

A prescribed fire is a planned fire intentionally ignited to meet certain objectives such as preventing high-intensity wildland fires by reducing hazardous fuel loads near developed areas. There has been much debate on the pros and cons of prescribed fires, also called prescribed burns, but if properly managed, can reap benefits that outweigh the cons of its use.³

Changes in Wildfire Frequency and Intensity

Many factors have led to the increase in wildfires, their intensity, and impacts on homes. These include:

- climate change,
- drought conditions,
- under-use of prevention techniques such as prescribed burns or brush clearance,
- fire-resistant building construction, and
- population centers moving into what are known as wildland-urban interfaces (WUI).

Droughts in recent years have led to beetle infestations that have killed trees and created an enormous amount of dry fuel. Invasive plants have displaced native species that differ in flammability.

The focus over the last century has been to “extinguish”⁴ every fire, no matter how small. These historic forest management practices have resulted in enormous undergrowth and fuel loads that can facilitate the spread and intensity of wildfires. There are now larger fires, longer-lasting fires, a longer fire season, and hotter droughts. In recent years, these once rare “mega-fires” have resulted in more deaths, more destruction of buildings and homes, and more acreage burned or destroyed.^{5, 6}



Role of Environmental Public Health

Wildfires have long been thought of as being responded to by fire agencies; however, local environmental public health staff have a vital role in wildfire response.

Partnership with Emergency Services

Environmental public health responsibilities must be part of the *response* paradigm and also major roles in other components of the emergency management (EM) cycle. This cycle includes preparedness, response, recovery, and mitigation. It is important to recognize that for the most part, environmental public health will have limited duties and responsibilities in the fire zones while the wildfire is active and engaged.⁷ However, many activities can be performed in locations outside the fire area such as messaging, air sampling, and response to wildfire smoke.

Developing and Updating Protocols

Environmental public health entities should create, review, or update emergency/disaster protocols. Larger environmental public health organizations may be better positioned to do this, but smaller or rural organizations are also impacted by larger-scale wildfires and will also need to update their protocols. The number of people impacted will vary, but the responsibility to protect, inform, advise, and educate is similar between large and small jurisdictions.

Determining Agency Involvement

Environmental public health professionals must decide what their involvement with the components of the EM cycle will look like. Specifically, how will staff prepare the agency and communities for a major wildfire. A review of agency capacity, capabilities and the types of resources necessary in a fire disaster is crucial to preparing for wildfire response and recovery.

For example, environmental public health organizations must determine their involvement and duties



as it relates to water availability, safety, communities, and directives. Will another agency be primary to the environmental public health responsibilities? How will directives be communicated and which agencies will play a role in its crafting? Who is the primary responsible party to investigate and mitigate water impacts? How does the environmental public health organization currently interact with agencies that have primary lead status? These questions and more should be analyzed and determinations made before a wildfire occurs.

Wildfire Smoke and Air Quality

Wildfire smoke is its own hazard with its own set of health impacts and interventions. It often has a wider geographic impact than wildfires since smoke travels and can affect areas not directly impacted by the fire. Wildfire smoke and ash has always been a concern, but additional effort is being placed in sampling for more harmful smaller size particulates (particulate matter 2.5). Environmental public health staff assist the public through air sampling,⁸ messaging, and providing guidance (or delivery) of HEPA portable air cleaners or box fan filter kits which can be constructed easily at a lower cost.



Staffing

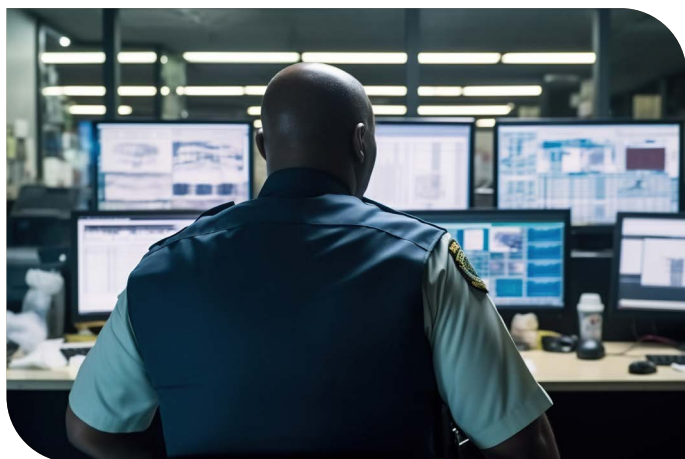
The most important resources are the professionals working within environmental public health organizations. Management should review staffing policies and procedures because a wildfire event may impact their staff directly or indirectly. This may include:

- how to support employees whose homes might be damaged/destroyed
- work expectations for recall
- changing duties
- job assignments
- organizational structure
- what your agency is willing to take on during and following the wildfire
- mental/behavioral health issues
- longevity of the response
- how to continue agency responsibilities in areas not impacted by wildfires

Response Role

Responsibilities within the fire area might include activities at the base camp or command post to ensure minimum standards are met for feeding, water supply, and housing of response staff. Environmental public health duties could also include staffing emergency operations centers to support the needs and requests made by emergency operations. Staff should:

- monitor fire activity
- find out the scope of damaged or destroyed homes or buildings
- evaluate personnel and resource needs
- review guidance and public information documents



Recovery Role

During recovery, staff responsibilities could last a significant amount of time – from months to years. Recovery involves government at all levels working to support wildfire-impacted communities. These activities involve:

- permitting and reconstruction of homes
- ensuring safe housing, food, and water
- providing temporary housing
- restoring health, social, and community services
- rebuilding infrastructure
- re-establishing normal living conditions



Mutual Aid

This guide does not cover “mutual aid.”⁹ Smaller or rural jurisdictions might consider obtaining outside resources from nearby environmental public health agencies or others with specific abilities or credentials. Recent large California wildfires required local mutual aid-type assistance, especially during recovery operations. State-facilitated mutual aid plans and processes may help environmental public health agencies. Explore the state’s involvement in wildfire recovery. In some states, for example, removal of household hazardous waste might be taken on by the state agency charged with hazardous waste regulatory responsibilities. Local hazardous waste regulatory entities are advised to participate and support where possible and when appropriate.

Role of Environmental Public Health Before a Wildfire Happens

There are many steps environmental public health entities and staff can take to prepare for a wildfire. These include:

- Discuss and decide use of staff before, during and after a wildfire.
- Train professionals in the basics of emergency management: National Incident Management System (NIMS), National Response Framework (NRF), the Incident Command System (ICS 100, 200, and 300 levels)¹⁰ and the state processes and systems where the professional lives and works.¹¹
- Train staff on field safety, personal protection, first aid, mental health, Environmental Health Training in Emergency Response (EHTER)¹² Hazardous Waste Operations and Emergency Response (HAZWOPER) and any other training necessary to perform duties.
- Provide ongoing education on the many aspects of emergency management.
- Work with partner agencies that might have strike team or mutual aid assistance capabilities to determine parameters and resource request processes.
- Hold meetings with other agency principals who may have interactive roles with environmental public health staff. Check to see if there is an emergency planning committee and participate. Repeat annually.
- Identify and procure appropriate personal protective and emergency supplies.
- Determine vehicle, equipment, communications, go bag and other resources needed to deploy staff.
- If applicable, consider impacts of wildfires in adjoining jurisdictions on services and resources needed to sustain public assistance.

- Discuss monitoring stations and sampling strategies for smoke/air quality.
- Identify, craft, or update emergency forms or messaging boiler-plate (pre-scripted) documents. Many of these documents can be posted before any wildfire activity as part of ongoing communications.
- Identify media and public information protocols. Train key staff.
- Examine data collection and processing systems that could be used to collect and give out appropriate information through dashboards.
- Examine health and safety policies and procedures.
- Review protocols to ensure mental well-being in a disaster situation.
- Examine/address logistical needs for staff deployed in a wildfire disaster area.
- Examine availability of data systems to collect field survey information and how it can be available to the public or cooperating agencies.
- Conduct annual refresher sessions to make sure staff stay current on important topics identified by management.
- Build GIS maps with critical infrastructure (hospitals, long-term care facilities, schools, childcare, shelter locations, etc.).
- Evacuation route planning.
- Shelter air quality planning.
- Water resource needs for responders and the community during and after a wildfire.



Emergency Response Planning

Environmental public health professionals should play an active role in emergency response planning to determine duties and responsibilities, first at the local level, then at the state and federal levels. Familiarity with your local and state emergency response plan helps you understand what can and should be done and how to access additional resources. If a wildfire is significant in size or jurisdictions impacted, additional resources (including those through mutual aid/assistance) may be necessary. This should be discussed at the regional and state levels.

Messaging, public advisories, and acting as local public and environmental health technical specialists for responding agencies will be important roles for staff. Some issues will arise during the wildfire, but most will be a concern after the wildfire has been contained and recovery operations have begun. Local environmental public health staff will be called upon to perform many functions directly or indirectly related to normal program responsibil-

ities. The environmental public health agency must decide its involvement.

All-Hazards Planning

Wildfires are only one of many disaster scenarios that a local environmental public health agency could face. Prudent planning and consideration of an all-hazard¹³ approach with collaboration and interactions of key response agencies are critical. Environmental public health agencies recognize the key role they play in various disaster situations and must consider preparations common to any disaster.

Agency Coordination

There are numerous governmental, non-governmental, and quasi-governmental entities that staff will potentially interact with during and following a wildfire. They are too numerous to list specifically, as every fire will be somewhat different. However, key players are listed here. Some entities are indicated as local/state/federal because of their involvement at all levels, not that they are necessarily government operations.



Agency Type	Local	State	Federal
Fire Services	X	X	
Bureau of Land Management, National Park Service, US Forest Service ¹⁴			X
Law Enforcement	X	X	
Public Works and Planning agencies	X		
Flood Control Agencies	X		
City Resource Agencies	X		
Animal Control, Fish and Wildlife	X	X	X
Public Information Offices	X	X	X
Other Public Health Entities outside EPH	X	X	X
Local or State Public Health Officer	X	X	
Local and regional medical/health coordinators	X	X	
Air Quality entities	X	X	X
Building and Safety	X		
Disaster and Emergency Management agencies	X	X	X
American Red Cross, Salvation Army and other disaster aid entities	X	X	X
State agencies environmental protection departments or agencies		X	
Agricultural Commissioner offices	X	X	
Farming and Ranching Associations or Organizations	X	X	
Public Social Services, regional planning	X		
Rural water association	X		
Mental Health	X	X	
Bureau of Indian Affairs and other offices		X	X
Various utilities	X	X	X
Various political offices	X	X	X
Beaches and harbor agencies, parks agencies	X	X	
Legal support	X	X	
Department of Defense		X	X
Environmental laboratories	X	X	
Insurance companies	X	X	

Role of Environmental Public Health During and After a Wildfire

Expect the unexpected. There will be challenges that are not in the playbook. Be flexible with your response.

When a wildfire first occurs:

- obtain information on fire behavior and spread to determine impacted residential areas or businesses
- examine resource needs
- look at the potential need for additional resources
- review policies and procedures on disaster response
- review and update existing guidance to the public
- gear up or stand down based on intel provided

The impact on local communities in the path of a wildfire is obvious. Residents in wildfire-prone areas, especially wildfire urban interface (WUI) areas are well advised to prepare their own family plans by following “Ready, Set, Go” guidelines.^{15,16}

In the wildfires seen in the last decade, however, surrounding communities are also affected. A fire’s impact and its smoke may be widespread and involve surrounding cities, counties, and states. Environmental public health and emergency response agencies need to be aware and plan accordingly. Some of the possible impacts might include:

- law enforcement, fire, and ambulances sent to the disaster
- establishment of evacuation centers
- medical centers filled from evacuations of hospitals
- pharmacy and oxygen demand overload
- animal shelters are overwhelmed
- hotels overloaded
- increased demand and use of sewage systems
- solid waste, debris, and mudflow issues
- increased demand on water infrastructure

- physical, chemical and biological contamination of surface waters¹⁷
- unsafe outdoor and indoor air
- increased demand on telecommunication systems

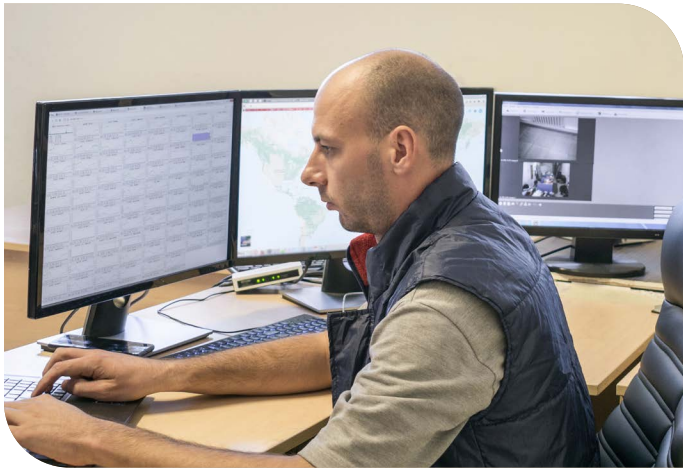
The responsibilities of environmental public health professionals during and after a wildfire will be broad. Smaller jurisdictions may opt to allow the state or another agency to handle some of the workload. Priorities and what environmental public health staff take on should be what they are familiar with and within their scope of duties. Some of these include:

- Indoor and outdoor air quality
- Food safety including mass feeding locations
- Mass care facilities
- Drinking water safety
- Sanitation
- Vector and pest management
- Solid waste and debris removal and landfill duties
- Hazardous waste / materials removal
- Healthy homes and re-entry
- Guidance for homeowners and businesses¹⁸
- Institutions, schools, hospitals, and other care facilities
- Public health advisories
- Animal Control
- Emergency Operations Center (EOC) duties
- Disaster assistance center duties
- Infection control matters
- Assessment of regulated facilities



Coordination with Incident Command

During an active wildfire event, it is important that any interactions in the field occur at the incident command level. An “agency representative” can be assigned to the “command post” and report to the “Liaison Officer”. Environmental public health is considered a “cooperating agency”¹⁹ under this scheme. The liaison officer is the incident command’s point of contact for representatives of cooperating governmental agencies, jurisdictions, non-government organizations (NGOs), and private sector organizations that are not included in the unified command. After the wildfire is contained, incident command could be transferred to another agency such as environmental public health or public works to begin the process of debris removal, cleanup, and recovery. Key players can then re-define the organization.²⁰



Department or County Emergency Operations Center

An emergency operations center (EOC) is a necessary focal point for support of an emergency, especially one that is widespread, large, or ongoing. Typically, the lead agency or department for the emergency operations center calls for its activation and assembles representatives from a number of different agencies to help support its functioning.

EOCs can be established at city, county, state, or federal levels, and, in larger incidents, all of these may have functioning EOCs. Within a county there may both department and county EOCs. An EOC’s primary functions include:

- collecting, analyzing, and sharing information
- supporting resource needs and requests, including allocation and tracking

- coordinating plans and determining current and future needs
- in some cases, providing coordination and policy direction

There will be situations where the EOC serves as a focal point for the establishment of mass care locations or points of distribution, allowing incident command to focus on the incident. They may also be involved with coordination of efforts when the wildfire covers multiple counties or several wildfires converge on a path. A critical function is to provide communications and updates with incorporated cities within the wildfire area. They can also let them know of the establishment of assistance centers and often will be involved with assistance in locating those centers. As a key interface with their communities, cities will often provide valuable assistance in holding community meetings and providing the conduits to the impacted public.

In many situations, especially during the recovery phase, environmental public health departments may have their own EOC with staff who become the focal point for environmental public health resources, planning, communications, and coordination.^{21, 22}

Joint Information Center

Coordination with other involved agencies or entities is imperative to avoid public confusion that may lead to further risk or injury. A Joint Information Center (JIC) is typically established for major or large incidents, where such public messaging is coordinated and distributed. It is always a good idea to inform your public information office of all of the agencies/entities involved. They should coordinate media communications among agency PIOs or representatives, as appropriate.

Initial Damage Assessment

The initial response from environmental public health will be to assess the breadth of destruction and/or damage to homes, facilities, and businesses. This initial assessment will determine current needs and how to fulfill unmet needs. Some of those activities will occur during the active or “response” phase even while the wildfire is still actively being fought by fire personnel and will mandate a plan to ensure the safety and well-being of staff. No environmental public health staff should be dispatched in or through active wildfire

areas, and care must be given to routes and locations of, for example, command posts or mass care facilities.²³

Recovery Resources

As the wildfire progresses or is contained, EPH must switch gears and begin “recovery” phase. Involvement should be predetermined and based on departmental objectives, political desires, and resources available. Involvement will also depend on the level of state and federal resources and the desire on their part for local participation.²⁴ Consider agency resources, since recovery operations may be extensive and long-lasting.

Guidance/Form Review

Environmental public health staff should review forms and guidance for specific activities. For example, local inspectors can use boilerplate evacuation center inspection forms. Environmental public health guidance, forms, and advisories will require review and updates and possibly the creation of new ones. Preferably, this can and should occur

before a wildfire breaks out, but often, public guidance will be assembled and crafted as the wildfire unfolds.

There may or may not be specific statutory or regulatory requirements in all situations. However, staff can reference broader or generic regulatory authorities found in other situations. For example, hazardous wastes must be handled and disposed of appropriately, even though households may not be specifically mentioned in state or local laws or ordinances.

Most agencies have many different, typically checklist-style forms for their various regulatory programs. At times, a blank notice of violation with references to applicable state regulations or statutes can be used to direct compliance or minimize specific threats to the community or public health. The use of existing forms for many situations is appropriate and easily attainable.



Key Environmental Health Areas

Air Quality

The smoke from major wildfires has drawn attention within the last several decades, because of the size and ferocity of wildfires generating the smoke, as well as the reach and extent of the smoke. The impact on sensitive populations and potential harmful contents of the smoke continues to be studied. There are few options to eliminate smoke, especially with larger, more intense wildfires. If there is smoke in the air for any extended period, it will enter buildings and structures, so concerns are for indoor as well as outdoor air. Public health measures involve reducing exposure to the extent possible through engineering controls, advisories, and focus on sensitive populations such as the young, pregnant, elderly, medically vulnerable, or those in low socioeconomic areas where certain controls may not be available.

Health Impacts

The principal known harmful pollutant in wildfire smoke is small particulate matter (PM), which is suspended in the air and is typically made up of solid particles and liquid droplets. Coarse particles have a diameter less than 10 micrometers and may irritate the throat, eyes, and nose but generally do not penetrate deep into the lungs. Fine particulates less than 2.5 micrometers in diameter pose the greatest risk because they can reach deep into the lungs and enter the bloodstream, affecting vital organs. Other pollutants of concern generated by wildfire smoke including carbon monoxide, carbon dioxide, methane, nitrous oxide, and ozone.²⁵

If a wildfire reaches a populated area or impacts industrial facilities, the smoke could include many other toxic materials. Air pollutants could be generated by plastics, pesticides, or other hazardous materials/waste found in building construction, households, industrial, or retail facilities. Some of the burned locations could also have asbestos-containing materials (ACM) or heavy metals. See the



section of this guide on hazardous materials/waste.

The impacts are serious and include respiratory problems, especially for people with asthma, such as chronic obstructive pulmonary disease or other lung diseases. Other impacts are cardiovascular, especially for individuals with underlying heart disease. Eye and skin irritation are also connected to wildfire smoke. Reduced visibility makes driving dangerous.

Public Education

Environmental public health professionals will provide health prevention and risk content for public messaging and recommendations to protect the community (especially sensitive or disadvantaged populations). After the wildfire is contained, recommendations might include protections during mitigation or cleanup and other steps during recovery activities.

Environmental and public health departments have also become more involved in supporting efforts to distribute indoor air filtration devices such as portable air cleaners or do-it-yourself box fan filters.²⁶ Environmental public health staff may be deployed to impacted areas and need to know how to address their own health and safety concerns.

Air Sampling

One unique feature of recent wildfires such as the Dixie²⁷ fire in California and the Bootleg fire in Oregon,²⁸ is the distance and impact smoke has on populations far away from where the wildfire is located. Coordinate efforts between jurisdictions including air quality agencies and health agencies at the state or federal level. At the very least, know who the air agencies are and their capabilities. For example, air sampling resources might be found in larger juris-

dictions, state agencies, the Forest Service, or universities and colleges. Some states have developed guidance or protocols for smoke-related wildfire response, such as the one developed by Oregon.²⁹

Public Message Coordination

Messaging must be consistent, accurate, and timely across all responding agencies. Developing relationships before a wildfire is very important because it establishes the conduits to synchronize messaging. Messages with smoke measurements should include actionable recommendations to be communicated across all media channels. If you have one, ensure your PIO is communicating with their points of contact to coordinate.

Outdoor Air Quality Objectives

Other agencies may have a stronger role in air quality matters. A large multijurisdictional wildfire and air quality objectives should be coordinated between the many agencies that might be involved. Staff will generally be involved with collecting data and information to formulate public health messages. In some counties, the local public health officer might be involved with decisions and recommendations on when to cancel outdoor events or school activities.

Sample Messaging^{30,31}

- [EPA AirNow Chart showing air quality index basics](#)
- [CDPH Wildfire Smoke Considerations for Public Health Officials 2022 Guideline](#)
- [EPA et al Wildfire Smoke Guide for Public Health Officials 2019](#)
- [Washington Air Quality Guide for School & Child Care Activities](#)
- [Washington Guide for Public Health Actions for Wildfire Smoke](#)
- [Wildfire Smoke Local PHO Guidance for Canceling Outdoor Events or Activities and Closing Schools April 2022](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide

Immediate Response Objectives

- Develop risk and prevention messages for the community, including actions for special populations in the primary languages spoken in the impacted community.
- Coordinate messaging across the involved agencies.⁷¹
- Ensure populations with heightened vulnerabilities, such as senior citizens, are informed of options to minimize smoke exposure.
- Consider recommending evacuations where communities may be in the path of heavier smoke, especially sensitive populations that have minimal engineering controls available.
- Monitor and track the pathway and intensity of the wildfire and constantly evaluate messaging in coordination with fire and other emergency entities.
- Ensure pets have an evacuation location with provisions for water and the appropriate pet foods.

Recovery Response

- Develop and distribute guidance and information on reducing smoke and ash exposure after the wildfire is contained and residents are allowed to return home. Information provided on a website as well as printed for handouts is ideal.
- Ensure communities are aware that returning residents and occupants may stir up ash and dust during retrieval activities.
- Minimize exposure to sensitive populations during retrieval activities.
- Ensure communities are aware of protocols and safeguards for cleanup that may generate ash and soot within structures or burned areas.
- Emphasize concerns and recommendations if windy conditions exist.

Indoor Air Quality Objectives

Indoor air quality (IAQ) mitigation involves reinforcing measures to maintain or improve conditions within a home or other occupied building during an active wildfire where smoke could be significant (even at long distances from where the wildfire is burning).

IAQ issues involve a multitude of factors such as building construction, damage (incurred or not), residential sensitivities, and proximity to the wildfire. There will be concerns and steps that can be taken during the wildfire smoke event and certainly afterward as it relates to cleanup and decontamination. EPH will be involved in providing post-fire mitigation advice and recommendations.

Sample Messaging

- [EPA Wildfires and Indoor Air Quality \(IAQ\)](#)
- [EPA “Wildfire Smoke Resources to Protect Your Health” with further links to resources and guidance. Health Fact Sheets are particularly useful in crafting local fact sheets](#)
- [EPA “Smoke Ready Toolbox for Wildfires” with numerous links to resources and guidance](#)
- [Washington State DOH weblink for Smoke from Fires with FAQ’s and resource links](#)
- [AirNow Be Smoke Ready](#)
- [Cal EPA Guidance for Schools During Wildfire Smoke Events -2019](#)
- [Oregon Wildfire Response Protocol for Severe Smoke Episodes June 30, 2022](#)
- [EPA Research on DIY Air Cleaners to Reduce Wildfire Smoke Indoors](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide

Immediate Response Objectives

- Initial concerns are in the immediate vicinity downwind of an active wildfire when the smoke is most intense. Evacuate if advised by fire officials.
- Develop and distribute public messaging. This might include:
 - During the wildfire, advise residences to close all windows and doors and seal gaps and leaks around doors, windows or anywhere smoke can enter.
 - Filter air with portable air filters or central air filters in recirculation mode.
 - Consider air cleaners that are effective in removing particles without generating ozone, such as high-efficiency particulate air (HEPA) filters or electrostatic precipitators.
 - Stay indoors, minimize, or avoid heavy or prolonged physical activity, and reduce other sources of indoor air pollution.
- Become familiar and check the [AirNow.gov](https://www.airnow.gov) website for air quality advisories.⁷²
- Coordinate messaging to the public with the many involved agencies.
- Work with schools and other institutions to ensure IAQ practices help prevent exposures to wildfire smoke.
- Ensure special populations, including older adults, young children, individuals with health conditions such as asthma or chronic obstructive pulmonary disease, and those with limited resources are provided culturally appropriate messages and guidance.
- Work with schools and other institutions to ensure IAQ practices help reduce exposure to wildfire smoke.
- Consider recommending evacuations where communities may be in the path of heavier smoke, especially sensitive populations that have minimal engineering controls available.
- Translate all communications into languages primarily spoken in the impacted area.

Recovery Response Objectives

- When the fire is contained and smoke is no longer present, building and home cleanup may be required. This may necessitate a disaster recovery professional.
- Residents will want to return to their homes/businesses that have been destroyed or damaged to salvage what they can. Provide messaging on safety precautions to be taken in the primary languages spoken in the community.
- Environmental public health staff may be asked to provide guidance on removing smoke and ash contamination. Public demand may require establishing call centers to address questions and complaints, although it is ideal to include as much information as possible on your website, as well as a digital submission process.
- Because ash may be present throughout a household or building, cleanup guidelines should address how to minimize exposure. Protective outer gear should be worn, including good boots, gloves, masks, and long-sleeved clothing.
- There may be items that are uncleanable.
- Ensure returning residents and occupants are aware that their retrieval activities may stir up ash and dust and that exposure to sensitive populations should be minimized.
- Ensure communities are aware of protocols and safeguards for cleanup that may generate ash and soot within structures.
- Translate all communications into languages primarily spoken in the impacted area.

Key Cross Section/Specialty Partners

Many organizations are involved with air quality including governmental, non-governmental, private businesses, and universities or colleges. Take advantage of opportunities to foster cross-section/specialty partnerships during and after a wildfire. For example, if there are no sampling capabilities in smaller rural jurisdictions, are there federal, state, or local agencies, or colleges/universities that could help with sampling? Look to these outside entities for assistance, if needed.

The Washington State Department of Health³² recognizes the public health threats from wildfire smoke and in 2018 established a Wildfire Smoke Impacts Advisory Group. Representatives from state and local health jurisdictions, tribal representatives, public information officers, health officers and academic professionals meet to develop consistent messaging and fact-based health guidance for agencies developing guidance for the public.³³

The Interagency Wildland Fire Air Quality Response Program ([IWFAQRP](#))³⁴ was created to directly assess, communicate, and address risks posed by wildland fire smoke. The program depends on four primary components: specially trained personnel called Air Resource Advisors, air quality monitoring, smoke concentration and dispersion modeling, and coordination and cooperation with agency partners.

Food

Wherever food is served to the public or responders, food safety is a concern. Environmental public health professionals play a critical role in ensuring that foodborne outbreaks will not occur or, if they do occur, are quickly and effectively investigated and measures are put in place to prevent reoccurrence. This might entail:

- spot inspections or assessments
- complaint investigations
- other monitoring means

Standard foodborne illness protocols should be employed when outbreaks occur.

Health Risks

Food pathogens are one source of potential food borne illness. Primary interventions include application of safe food practices, implementation of employee health policies, controlling hands as a vehicle of contamination, and time/temperature parameters for controlling pathogens. Environmental public health staff should be watchful for other ways food may become contaminated including with chemicals.

Food contamination may occur following a wildfire due to smoke and ash-exposed foods or produce in fields. Many food safety messages for areas impacted by power outages have already been developed. Two examples can be found in the Messaging links below.

Donated foods

Following a wildfire, mass care facilities or base camps can be overwhelmed by good intentioned people who want to help by providing, among other things, food donations for displaced individuals, workers, and responders. All prepared foods and food that must be kept cold, frozen, or hot should be strongly discouraged. The potential for food borne illnesses can be significant if proper controls are not part of the preparation or storage of such prepared foods. Messaging should be developed for what will be accepted as a donation. These might include boxed or bagged food, canned food, bottled or canned drinks, water or juices, and dried packaged foods.



Food Facilities

It may become necessary to close regulated food facilities. Consider modifications to operations that will serve a public need as long as certain basic conditions are met. Some of the reasons for closure might include:

- Building/electrical safety
- Utility outage
- Lack of or unsafe water
- Waste disposal
- Unsafe food supply
- Vectors and/or pests
- Necessary cleanup

Sample Messaging

- [Boulder County Public Health Food Safety After a Fire](#)
- [CDC Social Media Graphics Safe Food After a Disaster](#)
- [Minnesota Advance Practice Centers Emergency Readiness for Food Workers](#)
- [USDA Emergency Response Pocket Guide-Food Safety](#)
- [Boulder Co PH Electrical Outage Checklist](#)
- [Boulder Co PH Food Safety Factsheet](#)
- [Boulder Co PH Food Safety After a Fire Factsheet](#)
- [Boulder Co PH Boil Water Advisory Guidance for Restaurants, Bars & Other Food Retailers](#)
- [Sonoma County Post-Fire Food Safety Webinar October 2019, UC et al.](#)
- [Food borne pathogens](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide.

Immediate Response Objectives

- Ensure safe and clean eating facilities at evacuation centers or mass feeding locations. Conduct inspections or assessments and/or address complaints as appropriate.
- Ensure safe and clean eating facilities at command post or base camp locations. Conduct inspections or assessments and/or address complaints as appropriate.
- Reach out to impacted food establishments with disaster guide information.
- Address complaints and make sure food outbreak investigations occur in a timely manner.
- Identify and order correction of any critical violations at feeding locations.
- Establish protocols to separate (to the extent possible) any individuals with diarrhea and/or vomiting in base camps, mass care evacuation centers, or other lodging facilities to prevent further transmission.
- Ensure public messaging is provided in any Public Safety Power Shutoffs where, for example, high winds can bring downed trees or debris into contact with energized lines, damage equipment, or ignite a wildfire. This may include regulated facilities as well as households.
- Translate all communications into the primary languages spoken in the impacted communities.
- Maintain communications from field operations on the status of closures due to foodborne illness outbreaks, utility shutoffs, lack of water, or other serious conditions.
- Document all activities including those experiencing foodborne illnesses with their contact information.

Sample Forms

- [Disaster Assessment, Response and Recovery Checklist](#)
- [Boulder Co PH Disaster Report Boil Water Order Inspector Checklist for Retail Food Facilities](#)
- [Boulder Co PH After a Disaster Reopening a Retail Food Establishment Guide and Checklist](#)
- [Boulder Co PH Disaster Report Fire and Salvage Checklist for Inspectors](#)
- [Boulder Co PH Inspector Checklist Electrical Outage](#)

Sample forms can be downloaded at: bit.ly/wild-fire-guide.

Recovery Objectives

- Identify and map regulated facilities within the wildfire zones and conduct inspections or assessments to determine their status.
- Determine wildfire and smoke impact on regulated food and market facilities. Inspect and document as appropriate for necessary follow-up inspections.
- Ensure reopening procedures are established and followed by facilities that have been closed.
- Ensure contaminated foods are properly managed and disposed of. Establish mechanisms to pick up and destroy contaminated foods from homes and commercial locations soon after the wildfires are contained.
- Provide technical assistance and consultation to owners/managers of food establishments on food safety.
- Assist and educate regulated food establishments in re-opening following a wildfire. Ensure appropriate inspection and permit requirements are met.
- Ensure reopened regulated facilities can provide safe and hygienic food preparation and service.
- Provide messaging on home food safety following wildfires where power outages may have occurred. Ensure messaging is available online and via print and in the primary languages spoken in the community.
- Ensure regulated facilities or institutions housing sensitive individuals or populations such as hospitals, schools, prisons, or senior care facilities are operating under current regulatory requirements if within impact areas of the wildfire smoke.
- Assist and educate the public and community on appropriate disposal practices for spoiled, contaminated, or exposed foods, including any available assistance.
- Address complaints and ensure continuance of food outbreak investigations.

Water (Including Stormwater)

Water is a critical concern for environmental public health professionals during and after a wildfire because it can become physically, chemically and/or microbiologically contaminated. Water, including drinking water may also become limited or unavailable requiring alternative sources. Building-specific and small unregulated water systems need to be assessed and evaluated. Critical messaging should be prepared and forwarded to impacted communities. For example, citizens need to know what actions to take to determine if their system is contaminated and poses a health risk. They also need to understand what repairs may be necessary for private wells and the potential need for an alternate water source (e.g., trucked in or bottled water) and how to obtain, store and use such water.

This guide cannot cover all the nuances of water safety. Consider the many impacts a wildfire may have on the entire breadth of water systems and determine the role your agency will play in protecting public health and safety.

Impacts on water and distribution systems can be related to pressure issues, power cutoffs, telecommunication outages that might impact monitoring systems, personnel limitations, and contamination issues that require clear direction on alternatives and actions necessary.

Some of the concerns are:

- Damage to piping and equipment on private drinking water wells leading to possible water contamination from fire and smoke chemical byproducts.³⁵
- Ash and debris in watersheds and runoff, which can contain heavy metals, pesticides, and other harmful chemicals. This can also increase the risk of flooding due to the loss of vegetation that can also cause contaminants to be washed into water sources. Additionally, past land use (e.g., mining) can also mobilize pollutants into downstream urban waters.
- Damage to water infrastructure and public water systems such as water treatment plants or pipelines making it difficult to treat and distribute water.
- Impacts on water supply from firefighting activities.
- Impacts on water treatment facilities from power outages.



Alternative Water Supplies

Agencies will have to address many of water safety concerns with water purveyors and operators, private citizens, and the community. Develop advisories for “boil water” (if no chemical contamination is possible), “do not drink water” (if pressure loss and structure/asset destruction occurred) or “do not use water” (with chemical contamination). The needs for alternative water supplies may be immediate and will necessitate pre-planning and logistical considerations. Mitigation efforts and reconstruction will have to include water quality issues.

Damage Assessment of Drinking Water Systems

Drinking water safety may be compromised both during and after a wildfire. Ash and sediment in water sources can lead to issues at pumping or treatment plants. This can result from watershed runoff into water sources. Private and public water systems and wells are a broad topic that involves wells, water sources, chemical contamination following a wildfire, drinking water quality and stormwater issues. It is highly likely that many residents will want to return to their homes and establish portable or temporary water tanks or systems that may require evaluation and approval by local environmental public health agencies.

A growing concern, especially for private or smaller water systems, is potential contamination from the burning of plastics and debris found in water systems.³⁶ Contaminants might include volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).³⁷ This will usually occur with a loss of pressure or damage to the system. Benzene alone and benzene, toluene, ethylbenzene, and

xylenes (BTEX) are not predictors of other contamination in drinking water.

Recent wildfires where these components were tested resulted in a do not use advisory with specific instructions on how to replace then flush the pipelines and components.³⁸ The challenge is the policy for dealing with systems where chemical contaminants are found, often with advice and recommendations from state water agencies.

Testing

In past wildfires, drinking water issues were not consistently addressed by public agencies and homeowners were essentially left with their own resources. But evidence is now pointing to a new emphasis on rapid, standardized, and widespread testing, validated SOPs and controls, implementing strict “do not use” water orders for fires in WUI areas, examining policy priorities before the next disaster and improving guidance to homeowners to protect public health and plumbing infrastructure.³⁹ It is recommended that water primacy agencies be contacted as a planning issue to discuss how these matters will be handled in your state.

Guidance

Authors in one article⁴⁰ reviewed scientific, industry, and government documents that revealed national

Immediate Response Objectives

- Assess and evaluate impacts or potential impacts on water systems.
- Track wildfire activity to determine system impacts. Determine impacts from power loss or outages, waterline breaks, or increased consumption from firefighting efforts.
- Depending on wildfire damage and destruction, work with your PIO to develop, review and update messaging.
- Develop or review plans to test water and decide what to test. This could result in guidance for homeowners and/or providing some form of assistance in sampling.
- Develop, review, and distribute boil water, do not drink water or do not use advisories.
- Research and draft plans on how to deal with possible chemical contamination of water sources, distribution lines, and/or homes.
- Locate potable water resources and develop plans to distribute.

Recovery Objectives

- Evaluate data and feedback on partially or unburned homes where residents may return and require water.
- Review and update certified testing laboratories available to residents.
- Seek advice from state water agencies (primacy agency) to ascertain current policies.
- Include water issues and updates in community meetings and disaster assistance centers.
- Determine through testing the potential for chemical contamination from distribution systems.
- Include updated messaging in tools. Consider evidence of chemical contaminants in water supplies from damaged or destroyed piping and distribution systems.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.
- Determine impacts of subsequent rainfall in watershed areas that lead to water reservoirs or treatment plants. Typically, water treatment plants are not set up to handle high turbidity source surface water.
- Seek recommendations from local public works or flood control agencies for Best Management Practices (BMPs).
- Evaluate need to protect wells, treatment plans and other infrastructure from flooding and debris flow following significant rainfall, such as with sandbags and other barriers.
- Provide assistance in disinfection and/or decontamination of water distribution systems, storage tanks, and water tanker trucks.

and industry approaches for water system contamination response to wildfires do not exist.⁴¹ Environmental public health professionals must review current information and data available and make best judgments and decisions to protect the public and water systems.

Stormwater and Flood Runoff

When wildfires are followed by extreme rainfall, runoff can destroy communities. Engineers must determine whether mud and debris flow will necessitate mandatory evacuations. The January 9, 2018 Montecito mudflow in Santa Barbara County killed 23 people and destroyed more than 100 homes following the massive 281,000-acre Thomas Fire that was finally contained early in January 2018.⁴²

There are numerous other examples of mud and debris flows following a wildfire, especially in areas where wildfires have not burned in years or decades. Public works departments, land management, or stormwater staff should be consulted to develop plans to deal with this type of event.

As a general rule, it is the property owner's responsibility to control stormwater runoff from their property. Property owners and contractors on burned lots and rebuild sites must take action to prevent pollutants, including sediment, from entering storm drains, creeks, rivers, and wetlands. Installation of erosion and sediment control BMPs may be necessary and BMP materials such as wattles, mulch, and silt fencing, are available for purchase at various agriculture, garden supply and hardware stores. BMPs are used to minimize erosion and control sediment to keep pollutants from entering storm drains and our natural water bodies like creeks and rivers.⁴³

Sample Forms

- [CDC Rapid Assessment Form for Wells Affected by Wildfire](#)

Sample Messaging

- [CDC Private Wells after a Wildfire](#)
- [US EPA Addressing Contamination of Drinking Water Distribution Systems from VOCs After Wildfires](#)
- [CDC Disinfecting Wells After a Disaster](#)
- [Purdue University Response and Recovery to Wildfire Caused Drinking Water Contamination-Resources](#)
- [Colorado Office of Communications, Colorado Boil Water Advisory Due to Fires, 2021](#)
- [County of Santa Cruz, Water Wells and Springs](#)
- [Napa County FAQs on fire-related debris flow or landslides](#)
- [US Forest Service Burned Area Emergency Response Weblink](#)

Sample messaging and forms can be downloaded at: bit.ly/wildfire-guide



Sanitation

Most emergency operations will have sanitation facilities brought to the incident command post and to other areas within the fire impact area. Communities will generally be in a holding pattern until the fire is contained, then some of the issues related to power outages, destruction of septic systems, and availability of portable toilets will begin to show.

Sanitation in mass care, feeding locations, and base camps will be extremely important and should be included and reviewed as part of an inspection of such facilities or encampments.

Providing guidance and direction to the public is key to ensure appropriate options are considered when sewage, water, or water systems are impacted.

There are several options for disposal of human waste in a post-fire scenario depending on the state of their current facilities, the availability of water and power, the impacts being placed on septic systems, chemical toilet needs, and the location of the service needs. While people want to reoccupy their residences, they need to consider available utilities and disposal services.

Solid Waste Removal

Solid waste removal, especially of putrefied foods and other perishable materials, may become necessary. This should be coordinated with appropriate vendors and landfills. This issue will arise as more people reoccupy partially damaged or undamaged homes that have been under prolonged power shutoffs.

Septic Systems

Septic systems may be impacted in a wildfire and require evaluation and alternatives until the system can be evaluated and cleared for use. A septic system service professional may be necessary to evaluate and/or determine the necessary repairs. In the meantime, temporary toilets are recommended.

Sample Messaging

- [Guidance for Septic Systems Before, During and After A Wildfire](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide.

Immediate Response Objectives

- Establish who will have overall responsibility for addressing sanitation.
- Monitor damage to sanitation facilities and infrastructure.
- Ensure breakdowns in sanitation do not lead to contamination of water supplies.⁷³
- Ensure breakdowns in sanitation do not lead to degradation of surface and groundwater quality.
- Ensure toilet and handwashing facilities are available and maintained in a safe and clean manner at camps, bases, and mass care facilities.

Recovery Objectives

- Coordinate provision of emergency waste disposal facilities.
- Evaluate the need for commercial chemical toilets throughout the impacted communities. Ensure contracts include servicing and pickup.
- Advise communities on the importance of personal hygiene.
- Advise communities on alternative human waste disposal options where chemical toilets are not available.
- Advise and direct the public to working sanitary facilities such as schools, government buildings or community centers.
- Distribute guidance on septic system evaluation/repairs and alternative and temporary toilets that can be used.
- Advise communities on how to properly sanitize water.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.

Vectors And Pests

Vectors and pests may become an issue following a major wildfire in the form of mosquitoes and flies, rodents, Africanized bees, and other vectors endemic in areas of the country. Increased contact between humans and vectors and pests can be a result of the wildfire or the conditions following a wildfire. Events may create migration effects that lead vectors and pests into nearby inhabited areas and the presence of unchecked food wastes or other sources of food may increase the presence of vectors and pests.

Animal Control

There may also be dead, injured or displaced animals (wild and domestic). Displaced or injured animals may be confused and unpredictable. Local animal control authorities should be contacted to handle animal matters and if it becomes necessary to handle carcasses, appropriate protective clothing should be worn.

Displaced individuals will often bring their domestic pets to evacuation or mass care facilities. Those facilities will often have locations to house pets or animals and with exceptions, disallow them in sleeping areas or other common areas.

Education

Awareness of problem locations and an aggressive public information advisory campaign will help dampen the effects of an increasing presence of vectors and pests. In some cases, medical attention may be necessary following outbreaks that may be vector-borne. Increased vector presence is not only a nuisance but can also impact the stress and anxiety of all involved.



Immediate Response Objectives

- Monitor locations where people are congregating to determine if more direct vector and pests messaging is appropriate.
- Ensure staff that enter impacted areas are trained and equipped to deal with an increase in vectors and pests.
- Ensure pets and animals are provided with care and shelter. Keep documentation of pets that were relocated, euthanized, or died.

Recovery Objectives

- Coordinate provision of emergency waste care facilities, base camps, and other points of congregation to minimize vectors and pests and wild animal egress.
- Ensure public and private refuse haulers reinstate services and consider special pickups where necessary.
- Address vector and pest complaints and implement or recommend implementation of controls.
- Evaluate and ensure applicable standards are applied to animal evacuation centers.
- Work with your PIO to develop and distribute messaging for the public, including the location of impacted areas and the contributing environmental factors.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.
- Continue messaging the broader public on vector and pest control measures.
- Work with mosquito abatement programs to address complaints and where vector control measures can be applied.
- Advise the public on potential diseases, symptoms, control measures, avoidance tactics, and insect repellent use.
- Ensure messaging includes snakes and other wild animal threats, what to look out for and how to handle contact. This will also apply to any staff entering the field.

Sample Messaging

- [CDC-Protect Yourself from Animal- and Insect-Related Hazards After a Disaster](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide.

Hazardous Materials/Waste (Including Soil Sampling)

Following a wildfire where there are significant numbers of private residences or commercial structures damaged or destroyed,⁴⁴ the need to remove hazardous waste, ash and debris quickly is important and protective of public health and the environment. The quick cleanup of such materials minimizes dispersion into the air and run-off to surrounding soils and waters. In addition, the quick and consistent cleanup of hazardous materials/waste, ash, and debris is often desired for political or economic reasons.

Health Impacts

Ash, charred debris, and other contaminated materials from burned structures may be hazardous with the potential to cause health effects. Some of the concerns in this debris pile might be asbestos containing materials or heavy metals (arsenic, lead, and cadmium).⁴⁵ In addition, there may be a number of chemicals including propane (tanks), batteries, pool chemicals, fertilizers, electronic waste, asbestos siding or insulation, paints, ammunition, solvents, and oils.

While much of the materials will be consumed in the fire, often properties will have intact containers of various hazardous wastes. Hazardous waste will pose a variety of health risks depending on the materials involved and should be carefully handled using appropriate personal protective equipment (often by contractors). Health effects will vary depending on the specific chemicals in the debris, the magnitude of the exposure, and the exposure route. Exposure can occur through inhalation of smoke or debris dust, dermal contact with debris, ingestion of contaminated food products and water, or incidental ingestion from contaminated hands.

Hazardous Waste Removal

The process for removal of these chemicals⁴⁶ can involve contractors paid and hired by state regulatory entities or paid by local funds in emergency or disaster declarations and overseen by local hazardous materials programs. In cases where the number of damaged/destroyed homes is small, the removal might involve partnerships with household hazardous waste collection coordinating agencies that might be involved with door-to-door collections or consolidated collection locations. This removal, in

larger incidents involving hundreds or thousands of homes, is often considered Phase I⁴⁷ activities. Local or state hazardous materials/waste agencies should consider oversight of contractors⁴⁸ and documentation of the status and completion of such removals.

Local Declarations

In the last decade of California wildfires, local declarations of emergency or local disaster declarations have preceded the removal of hazardous waste, so entry onto private property by contract workers and local hazardous materials/waste staff is allowed on the basis of removing a public health threat. Owners are advised what will occur and then contractors move in to remove any hazardous waste that can be separated from debris piles for packaging and removal. Often, advisories explicitly direct property owners not to remove hazardous waste and the dangers of retrieval activities. Hazardous waste removal has often been funded through state emergency removal funds and, where necessary, federal removal funds coordinated by the US EPA.

Asbestos Assessment

Homes that have been damaged or burned may contain asbestos or asbestos containing materials (ACM). Asbestos might be found in attic or wall insulation containing vermiculite, vinyl floor tiles, roofing or siding shingles, hot water and steam pipes covered with an asbestos blanket or tape, or automobile clutches and brakes. An evaluation for potential asbestos should be performed and appropriate protections taken when the ash/debris is removed. Often, ACM cannot be separated from debris piles. However, if the assessment and testing reveal asbestos, transportation and disposal options must include provisions to protect against undue exposures. Specific state laws or regulations may govern handling and disposal. Seek guidance from regulatory experts in asbestos handling, transportation and disposal.⁴⁹

Asbestos Exposure Prevention

Because asbestos in its friable form is the principal danger to the public or responders and cannot be seen or detected, often asbestos is overlooked. With older construction or structures, one must be aware of potential ACM that might have been damaged during the wildfire. Environmental public health professionals must take this into account, not stir up fire debris, and take appropriate measures when debris is being moved, such

as appropriate personal protection for workers and wetting debris to minimize exposures. In some situations, covering openly exposed asbestos materials or applying materials to minimize airborne releases may need to be considered.

Naturally Occurring Asbestos

Naturally occurring asbestos is found in rock formations or soil in some areas of the country. The US Geological Survey (USGS) has reported naturally occurring asbestos in 35 states.⁵⁰ Both naturally occurring asbestos and manufactured products present similar health risks when fibers are released into the air. Knowing that areas impacted by wildfires might have naturally occurring asbestos is helpful in not only how you might address debris and ash removal, but also sampling protocols afterwards with a need to temper expectations for clean-up levels. The main focus should be on taking due precautions when the potential for exposure exists from naturally occurring asbestos.

Cleanup Posting

Once these locations are remediated and the hazardous waste removed, the location is posted as such and information uploaded into collector apps for residents to see their property's cleanup status online. In addition, once an area is cleared of hazardous waste that can be separated and removed, the Phase II process can be initiated. Postings can refer homeowners to the next steps of government-involved removals and where information can be found.

Standards

Some private property owners may want to do their own cleanup because they feel they can do so more quickly than a government-run program or for other reasons. Standards that are comparable to government programs must be established and staff available to review necessary plans.⁵¹

Exemptions

There are situations where a home is okay, but burned debris on the property is from a fence, non-structural debris, or a non-occupied structure. In those cases, local, state, or federal coordinating agencies should consider processes for exemptions to be granted for Phase II government run operations.

In some cases, property owners may choose not to clean up their property or take part in govern-

ment run operations. Local entities should review whether existing ordinances exist to enforce and abate such properties, perhaps through nuisance abatement processes. Cost recovery for such properties may also be a consideration and placement of liens a common tool.

Soil Sampling

Sampling and soil testing following completion of Phase II removals may be warranted. When private homes burn, the toxic outcomes are very different from the burning of wildlands or forests. Burning plastics, household appliances, electrical equipment, household hazardous waste, paints, pesticides, and automotive fluids may be released and deposited. Heavy metals have been found in wildfire debris as have a variety of hydrocarbons.⁵² Environmental public health and local hazardous materials/waste programs familiar with the geology and soils in the area might be asked to provide feedback as to "how clean is clean" and determine (with their local health officer) constituents of concern.⁵³

Once debris and ash are removed from the home location, vendors may sample and test soils for key contaminants of concern. Typically, these are heavy metals and include the more toxic metals such as arsenic, lead, chromium, mercury, nickel, and selenium.

Typically, crews brought in to remove ash and debris (after hazardous waste is removed) will scrape a certain quantity of soil from the ash footprint (for example 3-6 inches). When this is completed, soil sampling will be conducted and tested to ensure the levels are consistent with background levels of similar soils on the property.⁵⁴ The metals tested, the levels considered adequate and safe, and clearance following this process is typically overseen by environmental public health staff. An alternative approach is to remove larger amounts of soil to avoid continuous sampling.

Sample Messaging

- [Declaration of a Local Health Emergency 2015 Calaveras County](#)
- [Declaration of a Local Health Emergency 2020 Fresno County](#)
- [Proclamation of a Local Health Emergency 2017 Napa County](#)
- [Household Hazardous Waste Assessment and Removal Fact Sheet, 2018 LA County Fire](#)

- [Emergency Cleanup Guidance for Wildfires and Disasters LA County Fire](#)
- [Protect Yourself from Wildfire Smoke, Guidance by LA County Fire](#)
- [Health Effects from Home and Building Ash Template, LA County Fire](#)
- [How To Manage Propane Tanks and Cylinders Template, LA County Fire](#)

Sample Forms

- Debris Removal Right of Entry Permit Template
- Proclamation Of a Local Health Emergency. LA County Health Officer, Template

Sample messaging and forms can be downloaded at: bit.ly/wildfire-guide.

Immediate Response Objectives

- The local agency responsible for hazardous materials/waste regulatory programs should monitor the wildfire spread to determine if regulated facilities may be impacted.
- If a regulated facility with extremely hazardous materials onsite is in the path of a wildfire, local hazardous materials/waste regulatory programs should evaluate the possible emissions to warn responders and downwind community members.
- As the wildfire involves more and more residences, local hazardous materials/waste programs should evaluate their eventual involvement with the Phase I removal operations and how they will interact and coordinate with state or federal agencies.
- Funding mechanisms should be explored and hazardous waste removal options considered.
- Hazardous materials teams should be available to address issues that arise during the wildfire. This may involve regulated facilities where a fire could have serious health implications.
- Fire agencies should have all hazardous materials inventory and business plan information for facilities in the path of the wildfire.
- Public information should be reviewed and/or developed regarding the public health threats posed by hazardous waste and debris piles.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.

Recovery Objectives

- Local agencies must decide their Phase I roles and responsibilities in the removal of hazardous waste/debris and who will be the lead agency.
- Local agencies must determine the extent and amount of state assistance that might be available for Phase I operations.
- Local hazardous materials/waste programs should review public advisories on a number of topic areas (see messaging appendices below).
- Local hazardous materials/waste programs and the Phase I lead agency should communicate how hazardous waste removal will be managed with the affected public.
- Hold community meetings with all cooperating agencies to advise and answer questions.
- Local hazardous materials/waste programs may be involved with contractor oversight, coordination with state or federal agencies, working out funding/contract issues, documentation of completion, posting sites to indicate hazardous materials/waste removal, uploading information into a GIS-based dashboard, locating base camps for managing hazardous wastes removed from home locations, and working with appropriate agencies for any necessary approvals.
- Before Phase I activities are completed, educate the public on Phase II operations to remove ash/debris. This might involve establishment of disaster assistance centers to communicate necessary forms that require completion such as ROE forms (see example under solid waste) to allow contractors onto properties to remove ash/debris, take soil samples, and return properties to condition where rebuilding can begin.
- Establish processes for property owners who wish to clean-up their own properties to apply for and seek approval of cleanup plans that are consistent with government cleanup programs.
- Designate due process and legal considerations for property owners that choose not to do anything within certain time frames to clean-up their property.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.

Solid Waste and Debris

The removal and safe disposal of solid waste, ash, or debris may be a daunting element in the recovery process. Recovery and removal of solid waste following a wildfire often involves not only damaged homes and buildings but also impacted trees and brush, especially to clear roadways and bridges. Of equal importance is to evaluate and determine how the wildfire may have impacted the delivery of services from waste haulers to landfills.

For a number of reasons, governmental entities will want to remove debris as quickly as possible from impacted areas. Government led programs may help expedite the removal and cleanup of hazardous waste and debris from private homes when needed.

Considerations for seeking government assistance with debris might include:

- The magnitude, location, and nature of the debris
- Whether the debris poses an imminent threat to public or environmental health
- Will failure to completely remove the debris create long-term threats to public health? For example, elevated levels of a chemical that might lead to future restrictions on recovery activities
- Whether the magnitude of the debris creates potential economic threats to the community if not removed in a timely manner
- If resources are available to run a public assistance program
- If funds and assistance are available from state or federal resources⁵⁵

Complex legal, logistical, and insurance challenges must be overcome with government led solid waste and debris removal. The staff and resource needs may be extensive and long-term.

One challenge is in the line drawn between a government led program and relying on private citizens to work within their own means to mitigate their properties. This alternative could be accomplished when the number of impacted homes is small and with local guidance and assistance. For example, household hazardous waste programs could be used for its disposal, especially in partial burn areas. Assistance with private citizen work may involve communications with contractors and ensuring removals are done properly and within the law. Either option (owner option or government program option) will require a certain amount of



oversight and direction from environmental public health staff.

Health Impacts of Cleanup

General trash collection, storage, and disposal delays throughout a populated area could result in public health concerns. Special considerations must be given to the large volume of debris following a wildfire, including impacted vegetation, that must be removed as soon as possible. This may include a process to manage the volume of waste before it reaches an ultimate disposal location. An example might be staging areas to receive solid waste before hauling the materials to landfills. Local staff should consider their involvement at these locations.

While discouraged, mixed debris piles may contain hazardous waste that cannot be separated easily. Local or state oversight authorities might need to consider conditional waivers for specific local landfills. Local enforcement agencies must consider if landfills can handle the disaster debris volume and also consider transportation plans when limited landfills are available. Other conditions of operation may be reviewed for consideration of waivers such as tonnage and hours of operation.

Assistance for Property Owners

The process to remove remaining debris and ash (called Phase II) after all hazardous waste and hazardous trees are removed, begins long before Phase I is completed. This might include activities to alert private property owners of their options for cleanup. There might be a public assistance program available, where property owners will be asked to sign Right of Entry (ROE) agreements

allowing access to remove debris. Some owners will need assistance or have questions and recovery agencies should consider local assistance centers or Debris Removal Operation Centers (DROC).

Hazard Tree Cleanup

Another major consideration is the presence of hazard trees, especially when forested areas are involved in wildfires. Those trees that block roadways and access to impacted areas need to be removed as soon as possible. Also, any trees that might fall and pose a hazard to the public or vendors that are brought in to clear the property of ash and debris should also be addressed in a timely manner. In addition, trees that threaten to fall and impact public right of way or public infrastructure should also be removed in a timely manner.

Immediate Response Objectives

- Ensure temporary base camps, mass care facilities, or encampments have appropriate receptacles for disposal of trash within required timeframes.
- Work with lead solid waste and debris agencies (such as public works) to ensure that critical/major roads are free and clear of debris for emergency vehicles.
- Work with lead solid waste and debris agencies to ensure removal of debris, when it is safe to do so, that poses a threat or hazard to priority facilities and critical infrastructure in the community. Examples include, but are not limited to, hospitals, healthcare facilities, power grids/stations, water/wastewater treatment plants, etc.
- Begin collaborating with response partners to determine where temporary debris management sites will be established.
- Discuss and establish how garbage, debris, and perishables will be disposed of and how they will be containerized prior to pick up at all potential sites including camps, homes, and commercial locations.
- Ensure critical facilities are not impacted by a disruption in solid waste disposal.
- Work with your PIO to review and update community advisories for distribution and posting on websites.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.

Recovery Objectives

- Ensure the continuance of the solid waste management system for the general population.
- Contact critical solid waste governmental entities, vendors, and operators to determine service delivery impacts including transportation routes.
- Serve as a key contact for guidance, oversight, and liaison to businesses and the public.
- Address rights of entry for accessing private properties to support debris removal.
- During debris/ash removal, consider and implement recycling rather than disposal options.
- Ensure compliance through routine inspections to ensure materials do not create secondary hazards and conditions that can threaten public health or the environment.
- Advertise and advise on emergency collection procedures and locations of emergency disposal and/or transfer sites.
- Consider requesting that companies limit access to rollaway or dumpster rentals to the general public unless authorized.
- Examine plans to remove disaster debris and the resources necessary to implement such a plan.
- Determine the lead agency for hazardous waste and disaster debris removal and identify key assisting agencies.
- Determine the processes necessary to implement the Phase II solid waste and debris removal plan and seek advice from counsel where necessary.
- Work with state partners to determine funding options and available assistance.
- Work with your PIO to create strong public messaging on the process and what to expect and to hold community meetings to explain plans and hear concerns.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.
- Provide resources and forms at community disaster assistance centers.
- Provide the same resources if a DROC is established.

Automobile Removal

In major wildfires involving numerous homes or businesses, there will always be a quantity of automobiles that must be removed. Coordinate with state highway law enforcement or motor vehicle departments to determine what may be required for car owners to have their automobiles and other permitted vehicles taken out of state databases.

Sample Messaging

- [CDPH WILDFIRE CLEANUP - Considerations for CA Public Health Officials](#)
- [CDC Fact Sheet: Clean Up After a Disaster](#)
- [Debris Removal Guidelines Template – LA County Fire](#)
- [Debris Removal Right of Entry Permit Template – LA County Fire](#)

- [Health and Safety Concerns for Property Cleanup – LA County Fire](#)
- [Marshall Fire Asbestos Guidance, Boulder County Public Health](#)

Sample Forms

- Alternative fire debris removal program-Clean-up completion certification – County of Shasta City of Redding
- Template for right of entry agreement
- Right of Entry Permit Example Kern County

Sample messaging and forms can be downloaded at: bit.ly/wildfire-guide.



Mass Care

Mass care is a critical function in response to wildfires, especially when evacuations are ordered by fire departments. The American Red Cross (ARC) may play a key role in providing support for these mass care facilities. This might include the establishment of mass sheltering, feeding, distribution of emergency supplies, and reunification activities. Quite often, city or county parks have pre-screened parks or locations to establish these centers.⁵⁶

The ARC also spends significant efforts assessing locations for its suitability as evacuation centers prior to any disaster, including wildfires. In larger urban areas, there may be dozens of locations identified. In smaller jurisdictions, environmental public health staff might reach out to determine if locations have been established and any concerns they might have.

There are a number of key cooperating agencies involved with the services provided at an evacuation center. Identify those key players, their responsibilities, and how they can assist.

Oversight

Environmental public health plays an important role in overseeing all aspects of mass care facilities including sanitation, food safety, minimal toilet facility requirements, and available resources. Often, the ARC will have mental health support, medical support, and documentation processes to ensure participants are known and can be located by relatives and concerned people outside the wildfire area. The ARC is extremely efficient in establishing pre-designated evacuation centers, then providing all the logistical support to ensure mass care functions are successful. Mass care facilities are established as soon as needed when homes are evacuated.

ARC staff are well trained to ensure confidentiality of information collected to ensure only the right people get that information. Mass care facilities may also serve as information hubs so fire authorities or others can share updates and status information.

Special needs issues may arise and require resolution, typically through the ARC.

- Evacuations are communicated by fire and police agencies responsible for notifying the public and advising where evacuation centers are located.

Sample Forms

- [Environmental Health Assessment Form for Disaster Shelters CDC](#)
- [Environmental Health Disaster Shelter Assessment Guide](#)
- [Environmental Health Assessment Form for Disaster Shelters During Covid-19 CDC](#)
- [Guidance for Environmental Health Assessment Form for Disaster Shelters During Covid-19 CDC](#)

Sample forms can be downloaded at: bit.ly/wild-fire-guide.

Immediate Response Objectives

- Monitor wildfire activity and direction to determine whether WUI or other residential areas will be impacted.
- Make contact with ARC representatives, or other players, to determine options being considered for mass care facilities and any support needed.
- Track locations of mass care facilities for future evaluations.
- Determine whether staff will be involved with the establishment of mass care centers before they are populated to guide safe and effective use of those locations.⁷⁴

Recovery Objectives

- Document locations of evacuation centers and conduct inspections to ensure compliance with requirements.
- Work with evacuation center staff to make necessary corrections.
- In some situations, wildfire updates can be funneled to evacuation centers and meetings held with fire representatives to provide status reports.
- Ensure compliance with standards for the duration of time evacuation centers are open to the public.
- In some situations, and when they are available, the ARC may arrange for evacuees to stay in commercial facilities such as hotels or motels. Staff should know where these are located and be available to answer questions or address complaints.
- Address any animal care needs and where residents can take their animals.

Healthy Homes and Re-Entry

There are two considerations when the decision is made to allow re-entry into areas where the wildfire has burned or destroyed homes:

- Allow residents to go through a destroyed/ burned home to sift through the debris in search of personal relics and property. In this situation, there are a number of cautions to communicate to the public. This can only be done after approval from the lead fire agency or unified command. It is often a very sensitive time for owners, and environmental public health staff must be aware that emotions may run high.
- The second scenario is when a home or building is minimally damaged or not outwardly damaged at all. These may still require decontamination and steps to remove ash and odors that have entered the home.⁵⁷

There is often intense pressure to allow citizens to re-enter wildfire impacted areas or re-occupy homes that are undamaged or have escaped major damage. Environmental public health staff will need to get ahead of this issue and prepare cautionary guidance and fact sheets on re-entry, re-occupancy and how to clean-up their property if undamaged or partially damaged. Public health advisories and directions are key and there are numerous documents that explain what to look for, any dangers in returning, and steps on how to decontaminate.

After a major wildfire, environmental public health staff may observe various markings on buildings and structures. These are to avoid duplication of effort and indicate the date and time of the search, if there were any victims, if there were any hazards to be aware of, and the team that performed the search. While these markings are more common with other disasters, after wildfires they are occasionally needed. These are usually shown by painted Xs on the outside building surfaces and include date/time, search team name, hazards found and whether or not there are victims present.

Other markings may be found to indicate that the building and safety department has assessed the building or structure. Be aware of these postings so as to not enter dangerous structures. Typically, one of three types of indications is posted:

- The structure is safe to occupy (white tag)
- The structure is unsafe to enter or occupy (red tag)

- The structure has issues and only restricted or cautious entry and use is allowed (yellow tag)



Sample Messaging

- [EPA “Dealing with Debris and Damaged Buildings”, November 22, 2022](#)
- [Post-disaster Building Safety Evaluation Guidance, FEMA 2019](#)
- [Indoor Air Quality After a Wildfire, State of Colorado guidance](#)
- [Restoring Your Home After a Wildfire, LA County Fire guidance](#)
- [Protect Yourself and your family: Re-entering areas burned by wildfire safely, LA County Fire](#)
- [Reduce Exposure to Ash When Returning Home After a Fire, CA DPH](#)
- [Stay Safe After a Wildfire, CDC](#)
- [Returning Home After a Wildfire, Cal-Fire](#)
- [Swimming Pools Impacted by Smoke and Ash Template, LA County Fire](#)

Sample messaging can be downloaded at: bit.ly/wildfire-guide

Immediate Response Objectives

- Monitor the wildfire path and direction with particular attention to residential areas.
- Once a wildfire goes through an area, residents will want to return to their homes to see if it survived and what can be salvaged. In some situations, the wildfire may not be totally contained and only fire representatives can give approval for residents to return.
- It can be emotional for residents to view the damage/destruction of personal homes. Be prepared.
- Advising residents is a key activity and public information on returning home should be reviewed, updated, and distributed via all available channels.
- Translate all communications into significant languages found within the impacted area.

Recovery Objectives

- Ensure all messages and instructions on returning to undamaged, damaged, and destroyed homes are distributed through the public information mechanisms.
- If a building is partially damaged and has potential building safety concerns, do not recommend entry without first seeking clearance from building and safety inspectors.
- Oversee residents returning home and offer advice and/or recommendations.
- Give careful consideration to re-occupancy, especially where utilities, sewage and water may yet be restored.
- Consider distribution of nominal personal protective gear to the public returning home to salvage belongings.
- Be available to answer questions regarding cleaning or decontamination of private residences.
- Environmental public health staff may not want to advise residents to close off their houses at this point. Often opening up the house will assist in evacuating odors and smells.
- There may be items that are uncleanable for those returning home.
- Review and distribute messaging from indoor air sections to the public.
- Ensure messaging is available online and via print and in the primary languages spoken in the community.

Worker Safety

There are many health and safety concerns for inspectors/staff that might be brought into a wildfire area. These issues will vary depending on the type of wildfire and its location (for example, whether it is in a wildland-urban interface area), buildings and houses impacted, whether the wildfire is completely extinguished, and many other factors.

Several states have established or are in the process of approving regulations through their occupational health agencies to tackle the issue of employee exposure to wildfire smoke. Although only a handful of states such as California, Oregon, and Washington have such requirements, others offer guidance and suggestions that employers should take into account. It is important for all employers to stay informed about these regulations and recommendations and to develop strategies to manage smoke events.

Some of the hazards an inspector may encounter⁵⁸ include:

- Power shutoffs or interruptions
- Utility hazards including live power lines or gas leaks
- Smoke, including lingering smoke
- Chemicals present and potential exposures
- Reignited smoldering debris
- Obstacles and pits (especially when unseen)
- Infectious diseases carried by responders/public
- Trees that burn on the inside and fall unexpectedly
- Structural integrity of buildings
- Asbestos concerns
- Hazardous driving and road conditions
- Safety within work areas
- Heat related illness
- Cold related illness and dangers
- Slip, trips, and falls
- Animal hazards both from pets and wild animals
- Bees, especially Africanized bees
- Dehydration
- Stress, fatigue, and exhaustion
- Debris piles
- Infectious diseases such as Covid
- High noise levels
- Insect concerns such as Africanized beehive disruptions

- Carbon monoxide issues, for example at congested base camps
- Poisonous plants such as poison oak/ivy
- Mental health

It is important to discuss safety concerns with staff before entering the field. When encountering unknown hazards, it is best to be cautious. Staff should always be sent in teams with proper training, communication devices, first aid kits, and personal protective equipment. It is also recommended to consult with agency staff on observed health and safety issues and to reach out to command safety officers for further evaluation.

Recognizing that staff may be exposed to hazardous substances when responding to various locations following a wildfire, appropriate training is essential. The federal Occupational Safety and Health Administration (OSHA) and the 28 OSHA approved states implementing their own occupational safety and health programs have Hazardous Waste Operations and Emergency Response (HAZWOPER)⁵⁹ standards with minimum training based on worker responsibilities.⁶⁰

Federal OSHA does not cover local and state government employees; however, the 28 OSHA

approved states do cover local and state public sector employees. HAZWOPER training levels include 8-hour, 24-hour and 40-hour training requirements depending on the duties and assignments of environmental public health staff. The requirements can be confusing but if staff will be assigned to the field in any disaster scenario where the potential for exposures to hazardous substances exist, it is incumbent on the agency to either train staff appropriately or assign such work as stated above.

There may be a time when fire operations and their incident command is terminated. Another lead agency might evolve to deal with hazardous materials/waste and ash/debris removal. In this situation, it is recommended that the incident command system be utilized, especially with the preparation of Incident Action Plans and the appointment of a Safety Officer to emphasize and highlight any ongoing health and safety concerns.

Resources

- [Wildfires- Response/Recovery - OSHA](#)
- [Cal OSHA Worker Health and Safety in Wildfire RegionsCDC Worker Safety During Fire Cleanup|Wildfires \(cdc.gov\)](#)



Other Considerations

Any major disaster situation will be a challenge to all government agencies called to respond, large or small. Wherever you live or however your department is organized, a response to a major wildfire can be overwhelming and extremely stressful.

When assistance appears in the form of the public, private companies, or non-governmental organizations (NGOs) showing up, it is often welcomed by communities, but can present its own challenges. People and organizations may offer home-cooked meals, meals provided to the community by setting up kitchens and feeding locations, ash and debris cleanup, or rescue and recovery operations. Some of these organizations are experienced and have personnel that are well trained to perform the work they do. Others struggle. Local environmental public health staff will need to address these challenges as they arise.

Some of the other considerations below may require more effort in pre-planning and should be discussed to determine how to initiate and move forward. Undoubtedly, many environmental public health entities are mindful of the potential for disasters to occur, including wildfires in most areas of the country. Looking deeper into disaster management and utilizing local expertise in this area is always recommended.

Strike Teams

Several local and state entities have developed the capacity to respond to requests for environmental public health staff work, through the applicable local requesting processes.⁶¹ Several teams have also entered into agreements should the request come from adjoining States through the Emergency Management Assistance Compact (EMAC).

A strike team is typically a self-contained unit consisting of a supervisor or team leader and team members. Whether resources are from an adjoining jurisdiction, state resources, or from other states, members typically possess a high level of emergency response type training and have the ability to respond quickly. Specific equipment, instruments and personal protection are desirable and may be necessary depending on the circumstances. Member and Team Go-Bags⁶² are necessary and key in the initial phases of a wildfire response.

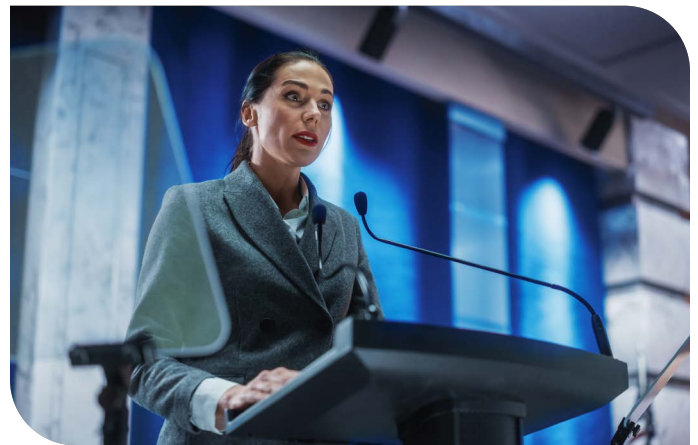
Training should cover the gamut of environmental public health emergency preparedness and response activities including a familiarity with the incident command structure. While hazardous materials or waste regulatory programs may be found within local or state environmental public health entities, they may be in a different department or division and those resources should be requested separately.

In the initial phases of a wildfire, where base camps, mass evacuation and feeding centers have been established, environmental public health Strike Teams may assist in initial assessments or inspections to determine whether basic requirements are being met.⁶³

Political Impacts

It is extremely important during a major wildfire that political representatives be updated on environmental public health activities and concerns. Most political concerns will not occur during the active wildfire, but rather during the recovery phase. Typically, management will connect with politicians visiting fire command posts and are advised to continue with briefings and updates during the entire event.

Political complaints will often be made and pressure will come to agencies that have a role in ensuring appropriate and safe measures for the public to take when returning. Staff must be careful not to overexert their cautions, and the message, direction and oversight must be clear yet considerate of the emotions invariably faced by returning members of the public.



Private residents, depending on their resources, may see the government response as slow and desire a quicker cleanup and approval process. It is important to recognize that some may not want

government representatives on their property and may see their presence as an intrusion. With complaints to political entities, environmental public health and other assisting agencies should be prepared to explain their responsibilities and most importantly, the timelines. Political updates and seeking their input will provide the best outcomes.

Some may not want to participate in a “government” cleanup and may, in the absence of action, require some form of enforcement to get their property addressed. Complaints will occur and environmental public health staff should be prepared to address concerns. Community meetings may be highly charged or emotional and the appropriate public relations staff need to be involved.

All complaints and emotions will be focused either on the responsible agency or the political representative they feel comfortable in attacking. Staff must be prepared and communicate appropriately with those political entities to ensure both are acting as quickly as possible and if not, find out why. Information and feedback should be routine and transparent, especially as it relates to the status of cleanup operations. Getting ahead of complaints is a high priority.

Mental/Behavioral Health

As is the case with any major or widespread disaster, staff may experience difficult situations, including but not limited to death and destruction on a wide scale during and after a wildfire. Staff may feel the impact of a major wildfire on their own property and perhaps will experience neighbors, friends, and co-workers suffering loss of homes, possessions, and perhaps life. Agencies must ensure staff are taken care of if this is the case, including time off to address any and all personal needs.

Staff may also encounter a grieving community who may share their grief with anyone who will listen. Staff should know that mental health assistance is available not only for themselves but for community members. Feelings of despondency and depression may be widespread and permeate shelters and recovery centers. Staff is encouraged to find mental/behavioral health professionals to assist evacuees.

Supervision must be alert and observant of staff who are overworking to compensate for any loss or a grieving community. At times they will insist

on working long hours or for many weeks without rest or rehabilitation. Gaging how each responding person is doing and directing them to available resources must be policy and management-directed. If a department is large enough, group or peer counseling should be encouraged with an ability to engage individually available and marketed. Management must take feedback seriously and not overlook staff who may be asking for help.

If environmental public health staff see conditions that warrant mental health intervention, they should be trained on where to refer individuals, including their own. To overlook the mental well-being of staff in a disaster scenario, especially if there is widespread community destruction and death, will only lead to further complications and issues. Plan before the wildfire or disaster occurs and make the contacts within the appropriate agencies to seek help and assistance.

Continuity of Operations Plan (COOP)⁶⁴

Continuity of Operations Plan is the term used by public and government entities for mitigation and planning strategies that create resilience and allow key services to continue to be provided in the face of a range of challenges. Emergency wildfire response activities may impact normal duties and responsibilities and make it necessary to put in place the COOP developed by the agency.

While there are many areas to cover in the plan, for the most part, how your agency continues with essential or critical functions, even though a majority of staff are diverted to address the wildfire and all associated activities, should be addressed in this plan.⁶⁵

Hospital/LTCF Evacuations

A wildfire, perhaps driven by a windstorm, may impact healthcare facilities, including hospitals, long-term care facilities (LTCF), or other residential care facilities. Healthcare facility staff should be communicating with fire and public safety staff to determine if an evacuation is appropriate or if shelter in place is a viable option. Once the decision is made, healthcare facilities will more than likely follow their emergency plans to commence the evacuation. Environmental public health staff will play a supportive and coordination role, perhaps from the emergency operations centers and not necessarily a direct role.



For a larger medical facility, an evacuation is a significant decision and wildfire command staff must weigh alternatives. In the past, hospitals tended towards sheltering in place but since Hurricane Katrina, evacuations must be considered given the disaster and the ability to function and provide services after it occurs. In a fast-moving wildfire, the time to prepare and to make decisions may be minimal and require immediate evacuation or defaulting to sheltering in place.

Facility management must be in communication with fire and police command to determine if evacuation is even an option, given the dynamics of the wildfire. When wildfire behavior indicates a higher level of concern and due consideration of implementing evacuation plans, hospital and facility staff must decide and then move quickly to begin and carry out an evacuation.

Resources

- [Hospital Evacuation Checklist CHA](#)
- [Hospital Evacuation Checklist DHHS](#)

Damage Assessment

One key area for many agencies to participate in is the assessment of the damage to ascertain workload potential, resource needs, funding mechanisms, and whether a local entity will require outside resources. For state resources, this might also be a function of how many fires may be occurring throughout the state, the size and scope of those wildfires, the resources being committed, and the potential of not being able to support more operational commitments.

Recent wildfires have seen a multitude of agencies and entities performing some type of visual damage assessment work following the passage of a

wildfire.⁶⁶ These agencies have their own reasons for conducting the work but often it involves their primary roles and responsibilities:

- Fire agencies perform quick and dirty damage assessments under the Situational Unit Leader/Field Observers to initiate assistance funding and declaration of disaster work often followed by more extensive assessments.
- Building and safety staff evaluate the safety of remaining structures or partially damaged structures.
- Environmental public health departments may perform assessments of hazardous materials, water treatment facilities or private wells, regulated food service or retail market facilities, solid waste capacities, mass feeding and housing locations, animal control or the many other aspects of environmental public health regulatory programs.
- Red Cross may make assessments for the purpose of allowing the public to initiate assistance grants and relief funding.
- Air quality monitoring assessments.
- Private companies to assess damage/destruction to their facilities impacted and what will become necessary for their own recovery.



With all the different assessment work being performed, there may be opportunities to share information or ask for certain assessments to be consolidated. For example, with appropriate training, damage assessments can also key in on locating damaged wells and collecting information that might be useful for environmental public health entities. Another example is to select staff who are trained in performing damage assessments to also perform hazardous materials assessments.

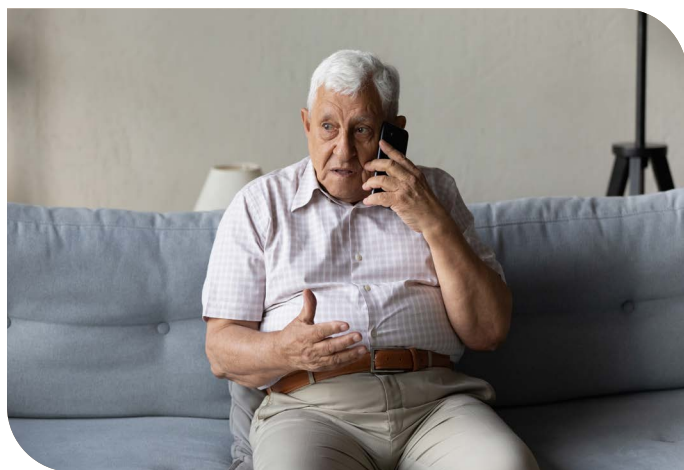
If possible, environmental public health agencies should use these other entities to collect damage information for their own purposes. Sharing assessment information should be a preplanning topic to determine who is collecting what information and how it can (or can't) be utilized by environmental public health.

It is desirable where data can later be shared to expedite evaluation and progression of decisions and work that needs to be performed. With data systems and corresponding GIS-based platforms, information can be downloaded and integrated into your own data and dashboard systems. This is an area to discuss with internal IT staff and the cooperating agencies that might be involved.

GIS Mapping

Today, smartphones are loaded with apps that collect the necessary information with much of the redundant information hand-selected from scroll-down choices, photographs taken and stored automatically, and locations documented by latitude/longitude readings from software. Once entered, this information automatically populates an on-line database for review and posting through a web-based dashboard. These could then be presented as maps with specific locations colors coded according to the damage and background information or specific conditions found at the location.

Use of this type of technology and the ability of maps to overlay specific information such as topography, location of facilities, schools, institutions, and many other features found in common mapping apps has advanced reporting and status information in real time. In addition, hazardous materials business information can be overlain so those facilities can be assessed and emergency



efforts initiated. Documentation in the field with cell phones will often eliminate the need to return to base camps for data entry and uploading of information into the program of choice.

Most larger jurisdictions have this capacity in specific departments and environmental public health staff should determine if they can justify obtaining such technology and supporting it long-term.

In the absence of a GIS/mapping tools at the local level, environmental public health staff can ask state agencies how they might be able to assist in using this technology in the future. For example, several state hazardous materials/waste or solid waste entities have these tools available, which can then be applied at the local level in an emergency situation.

Communication

Communication is a critical component during and after a wildfire. The audience or intended receiver of information determines the complexity, details, and types of communications that should be considered. All communication should be concise, clear and to the point. Some of the concerns during a wildfire might include:

- Impacts to communication infrastructure and equipment such as cell towers, power lines, and telephone poles.
- Overload of communications networks and systems that make it difficult to get critical information to those who need it.
- Limited access to information that is timely and accurate.

It is important to have communication plans including alternative communications channels such as radios, satellite phones, or ham radio operators. Some examples to consider:

- Communications between staff and management can be handled with the issuance of cell phones when reception is good. In many situations, especially wildland fires, reception may be a challenge and staff must go to locations where reception is good.
- Two-way radio communications might also be used if infrastructure exists within the organization.
- Communications with the community impacted by a wildfire is extremely important and needs to be thought through before the event occurs. It is vital to coordinate with your public information office to ensure you can get word to the public regarding evacuations, boil water advisories,

locations for services, processes that will require the public engagement, health and safety, and other public announcements and cautions.

- Communications should reflect the needs of the incident; however, most often multiple communications channels (e.g., websites, mass evacuation centers, text alerts, phone calls, social media, and media briefings) are necessary to reach the population. Ensure messaging is available online, via print and in the primary languages spoken in the community.
- Communications should be coordinated and reviewed by appropriate cooperating agencies to ensure conflicts do not exist and the messaging is clear, timely, and accurate. For example, with multiple agencies concerned about air quality and the effects on the community, they all need to coordinate with each other to ensure the messages do not conflict.
- Be clear when announcing evacuations as to whether they are mandatory or voluntary. Lack of specificity on evacuation borders and evacuation types (voluntary versus mandatory) can lead to confusion and speculation.

Disaster Assistance Centers

Disaster assistance centers (DAC) may be called various things but their core function is to provide a location where the public can receive assistance and information regarding their property. The DAC will often assemble a multitude of agency staff who will bring flyers, guidance, fact sheets, forms for completion, and provide a point of contact to answer questions and concerns. The idea is to provide a one-stop location for the public to get information and answers to their questions topic by topic. Agencies that might be included:

- Fire agencies
- Law enforcement
- Environmental Health services
- Public Health
- Mental health
- Federal Emergency Management Agency
- Housing support services
- Social support services
- State offices of emergency services
- Public Works and Road Departments
- Mortgage companies
- Highway Patrol and/or Department of Motor Vehicles
- Insurance agencies and companies
- Taxing entities
- Animal care agencies



- Solid waste agencies
- Mass care entities such as the American Red Cross
- Legal support
- Local business assistance entities such as restaurant and market associations
- Small Business Administration

DACs can be specific to a particular process such as a point to obtain and complete rights of entry agreements, or more generic, covering a broad spectrum of services. In some wildfires, more than one DAC can be established because of the distance covered or the location of population centers or evacuees.

Each agency, including environmental public health, will need to determine what to bring to the DAC in the form of information and how to staff the location. For example, in rural jurisdictions there may be a lot of questions regarding drinking water wells, septic systems, and removal processes of hazardous waste and debris. Staff possessing this knowledge is desired and may lead to several staff at the same DAC.

Staff need to be prepared to experience the grief and frustration felt by people and their communities who are coming to the DAC. Dealing with emotional people on a constant and ongoing basis requires management to be watchful and mindful of signs, symptoms and relief for staff working in the DAC.

Environmental Justice/Equity

Environmental justice (EJ), as defined by the US EPA, is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.⁶⁷ While wildfires are not purely an EJ issue, the impacts on people of lesser means can be significant.

Environmental public health staff must be cognizant of not only traditional EJ communities but also elderly and other infirmed individuals. When distributing flyers and guidance, ensure they are provided in the primary languages spoken in the impacted communities and ensure community meetings have live interpretation available.

Environmental justice and equity issues have seen increasing attention as it relates to wildfires and particularly the exposure to wildfire smoke and the

lack of access to technology to improve indoor air contaminated with wildfire smoke and ash.

Ensure all members of the public have access to and input into activities and actions being taken to recover from a wildfire experience. This can be accomplished through messaging, community meetings, and establishing local assistance centers.

It is important that public messaging and how it is distributed consider EJ communities and their access to information about exposure to wildfire smoke. For example, if web-based information is exclusively used, it might not be accessible at homes of all impacted communities and populations. One must consider equal access by everyone to the information and processes that are being considered or implemented.

Cross-Sector/Specialty Partners

During the course of a wildfire and during recovery operations, there may be opportunities to establish partnerships with businesses or non-profit entities. These private-public partnerships (P3) are defined as any type of mutually beneficial cooperative arrangement, informal or formal, between two or more organizations to enhance the life safety, economic security and resilience of jurisdictions.⁶⁸ These partnerships serve to increase scale, should be replicable and sustainable, improve effectiveness, increase efficiency, and create systemic changes that help solve global challenges in supply chains and communities alike.⁶⁹

While an environmental public health employee may not be involved with the formation of a P3, they may see these partnerships in action when they are in the field following a major disaster or wildfire. Private companies and NGOs providing various levels of supplies and services for disaster communities, partnerships with large facilities and institutions to provide mass care, animal care NGOs who assist with animal recovery and housing, and many more depending on the incident or event.

In many situations, the development of these partnerships is complex and involves many factors to align in order to be sustainable and successful. There is a growing body of information and guidance on how best to create these P3s and how to navigate the many complexities. Emergency Support Functions (ESF) in several states provide guidance and coordinate issues with the business community in all phases of emergency management.⁷⁰

Lessons Learned Post-Fire Event

At some point after major environmental public health activities are coming to an end, establish “hot wash” or “lesson learned” meetings while key players and memories are still fresh and before they return to normal operations. Be sure to incorporate lessons into standard operating procedures for the next event. There is so much to consider and deal with in a major disaster such as a wildfire, but always remember to take care of employees to ensure their safety and mental well-being. In the end, many of your colleagues will want to learn from your experiences and be able to handle their own events well. Consider writing about how your event was handled and how it can be done better in the future. Finally, always remember your mission mandate of protecting public health and the environment to guide your decisions.

General References

A broad spectrum of general reference materials is available to understand how emergency management works. Some of the key training and guidance materials include:

- [National Incident Management System \(2008\)](#)
- [NIMS 2017 Learning Materials](#)
- [Incident Management](#)
- [ICS Review Document from ICS 300](#)
- [Glossary of Related Terms from ICS 300](#)
- [Federal Emergency Support Function \(ESF\) Annexes⁷⁵](#)
- [Post Wildfire Recovery Project Resources | NWCG](#)

Acronyms

ACM – Asbestos Containing Material

ARC – American Red Cross

BCP – Business Continuity Planning

COOP – Continuity of Operations Plan

DROC – Debris Response Operations Center

EHTER – Environmental Health Training in Emergency Response

EMAC – Emergency Management Assistance Compact

EOC – Emergency Operations Center

EPH – Environmental Public Health

ESF – Emergency Support Functions

FEMA – Federal Emergency Management Agency

HAZWOPER – Hazardous Waste Operations and Emergency Response

IAP – Incident Action Plan

IAQ – Indoor Air Quality

ICS – Incident Command System

JIC – Joint Information Center

LTCF – Long-Term Care Facility

NIMS – National Incident Management System

NPS – National Park Service

NRF – National Response Framework

ROE – Right-of-Entry

VOC – Volatile Organic Compounds

WUI – Wildland Urban Interface

About this Project

The National Environmental Health Association (NEHA) represents the second-largest section of the governmental public health workforce. Our mission is to build, sustain, and empower an effective environmental public health workforce. One method of doing so is to provide up-to-date information and training relevant to the topics and challenges of the day.

In the United States, professionals working in health departments have roles and responsibilities to address environmental-related threats and hazards. Environmental public health professionals form a critical component of the public health system, providing services to curb environmental health threats and prevent adverse health outcomes.

We are the recipient of federal award NU38OT000300 CFDA #93.421 from Health and Human Services, Centers for Disease Control and Prevention, for programmatic activities for

Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health.

We retained William Jones Consulting (Jones.7441@gmail.com) to develop this wildfire guidance using research, consultation, knowledge, and experience. Subject matter experts were also utilized to review and provide input:

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Endnotes

¹ National Park Service Wildland Fire Program Wildfires, Prescribed Fires, and Fuels

² National Wildfire Coordinating Group, “Glossary of Wildland Fire Terminology”, July 2012

³ Western Fire Chiefs Association, The Pros and Cons of Prescribed Burns, November 29, 2022

⁴ US Department of Agriculture, Forest Service, “Confronting the Wildfire Crisis”, January 2022

⁵ IQAir, “Are wildfires increasing or decreasing?” August 13, 2022

⁶ Andrew Moore, Climate Change is Making Wildfires Worse-Here’s How”, NC State University College of Natural Resources News, August 29, 2022, <https://cnr.ncsu.edu/news/2022/08/climate-change-wildfires-explained/>

⁷ While fire departments are actively fighting the fire, environmental public health agencies may be involved with many activities related to mass care and evacuation facilities, base camps and command posts, air monitoring, public messaging and various preparations for recovery activities.

⁸ EPH professionals often will work with local or State air quality professionals for sampling and/or public messaging of conditions or sampling results. Depending on the resources available, EPH staff should reach out and ascertain the sampling capabilities and resources of local, State or federal air quality agencies that might also include universities or colleges.

⁹ The mutual assistance model (a form of mutual aid) is the current expectation seen in recent major wildfires in California with payment agreements negotiated for the resources provided. However, for many state resources brought to support the fire, staff are not obtained through a mutual aid/assistance process. Typically, these resources are at no cost to local EPH or their responsible entities.

¹⁰ NIMS/ICS FEMA Training Link: <https://training.fema.gov/nims/> NRF <https://www.fema.gov/emergency-managers/national-preparedness/frameworks/response>

¹¹ Suggest working with the county/city/state emergency management department and seek recommendations and locations of training for responding to wildfires.

¹² EHTER Training, CDC. <https://www.cdc.gov/nceh/ehs/elearn/ehter.htm>

¹³ CDC Office of Public Health Preparedness and Response, “All-Hazards Preparedness Guide,” March 2013

¹⁴ Each agency has professional firefighters in its ranks with US Forest Service having the most.

¹⁵ Austin Wildfire Coalition, Travis County Ready, Set, Go

¹⁶ National Interagency Fire Center, Ready, Set, Go! Sandy Fire Department, Utah

¹⁷ Proceedings of a workshop. Washington, DC: The National Academies Press. [National Academies of Sciences, Engineering, and Medicine. 2020. Implications of the California wildfires for health, communities, and preparedness.](#)

¹⁸ Jurisdictions handle public information and its dissemination differently. If a PIO is available and actively involved with EPH activities, it is appropriate they facilitate fact sheets or guidance with key input from EPH staff. It is recommended that EPH ascertain how information will be disseminated and the PIO role mostly for the recovery portion of a wildfire response. It is typical that the fire incident command structure will have an active PIO presence for most information disseminated during the active wildfire. For the most part, fire PIO’s will not be active in formulating EPH information, and will defer to EPH staff or the appropriate PIO.

¹⁹ These terms can be found in ICS training workbooks or guides.

²⁰ An IC structure can be established for recovery operations to manage all activities outside of firefighting. This can be done before the fire is contained and fire operations closed.

²¹ [Emergency Operations Center How to Quick Reference Guide, October 2022](#)

²² [CDC’s Emergency Operations Center](#)

²³ Adjacent EH jurisdictions must also be brought into the conversation as shelters and feeding locations may be established outside of the jurisdiction being impacted directly by the wildfire.

²⁴ In a busy wildfire season, state and federal resources may be engaged in multiple wildfires with staffing potentially stretched thin. In those situations, more local involvement may be necessary.

²⁵ [California Department of Public Health \(CDPH\), “Wildfire Smoke, Considerations for California’s Public Health Officials”, August 2022](#)

²⁶ [The Corsi-Rosenthal Box: DIY Box Fan Air Filter for COVID-19 and Wildfire Smoke | Western Center for Agricultural Health and Safety \(ucdavis.edu\) March 15, 2022](#)

²⁷ [LA Times Story on air quality during wildfires September 10, 2020](#)

²⁸ [CNN Wildfire smoke from West’s massive blazes stretches all the way to the east coast July 20, 2021](#)

²⁹ [Oregon Wildfire Response Protocol for Severe Smoke Episodes June 30, 2022](#)

³⁰ See EPA weblink “Wildfire Smoke Resources to Protect Your Health” under Indoor Air for guidance and fact sheet examples.

³¹ Click on links listed links or pdfs below when available throughout document.

³² This example is mentioned to give ideas to similar groups in other states.

³³ [Washington State Wildfire Smoke Impacts Advisory Group](#)

³⁴ [Interagency Wildland Fire Air Quality Response Program](#)

³⁵ [Wildfire damage and contamination to private drinking water wells AWWA Water Science Volume 5 Issue 1 February 15 2023](#)

³⁶ Purdue University, Center for Plumbing Safety, "Response and Recovery to Wildfire Caused Drinking Water Contamination", <https://engineering.purdue.edu/PlumbingSafety/resources/wildfire-response>

³⁷ There is differing guidance from a variety of States on what to test in water potentially impacted by chemical contamination. This is an area that should be explored to create consistent guidance.

³⁸ [County of Sonoma, "Do-Not-Drink and Do-Not-Boil Water Advisory" Issued for Two Specific Areas of Fountaingrove](#)

³⁹ Proctor, C; Lee, J; Yu, D; Shah, A; Whelton, A, "Wildfire caused widespread drinking water distribution network contamination" American Water Works Association, July 20220 <https://awwa.onlinelibrary.wiley.com/doi/10.1002/aws2.1183#aws21183-bib-0023>

⁴⁰ Ibid

⁴¹ Whelton, A Seidel, C Wham, B Fischer, E Isaacson, K Jankowski, C MacArthur, N Mckenna, E American Water Works Association, The Marshall Fire: Scientific and Policy Needs for Water System Disaster Response, January 17, 2023 <https://awwa.onlinelibrary.wiley.com/doi/10.1002/aws2.1318>

⁴² Cal OES News, Montecito Mudslides Anniversary, Reflections, Through Images, <https://news.caloes.ca.gov/montecito-mudslides-anniversary-reflections-through-images/>

⁴³ LA County Department of Public Works, [Homeowner's Guide for Flood, Debris and Erosion Control 2018](#)

⁴⁴ Business structures may not be involved in government run programs to remove hazardous materials/waste or solid waste/debris but may require some oversight.

⁴⁵ [Assessment of Burn Debris-2015 Wildfires, Lake and Calaveras Counties, CA](#)

⁴⁶ The removal of hazardous materials/waste usually starts with containers and materials that can be easily separated from the debris pile. There may also be hazardous materials/waste that is intermixed with debris and ash requiring consideration during removal activities and possibly requiring soil sampling following completion of removal.

⁴⁷ Phase I includes all necessary activities to remove hazardous waste including trees or debris removed to

eliminate imminent dangers to responders or the public. California uses this term to differentiate from Phase II removal of solid waste and debris. Your state may use other terms.

⁴⁸ Local hazardous materials/waste agencies can be found in local EH entities, certain fire agencies, State agencies who implement programs locally, or other agencies that have regulatory responsibility and expertise in dealing with hazardous materials and waste matters.

⁴⁹ Whitmer, M., Asbestos and Natural Disasters Guide, <https://www.asbestos.com/asbestos/natural-disasters/>

⁵⁰ [Pennsylvania Dept of Health Naturally Occurring Asbestos FAQ's](#)

⁵¹ See sample blank plan/form from the City of Redding, CA for an example of what a local agency might require of property owners taking on their own cleanup.

⁵² Assessment of Burn Debris – 2015 Wildfires Lake and Calaveras Counties, California, Geosyntec Consultants, December 7, 2015 <https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/Disaster-Documents-2015yr-FireSample.pdf>

⁵³ It is critical that soil sampling and cleanup levels not be overemphasized and drive whole communities into expensive remediation that is neither protective or below background levels of certain contaminants. These are truly "local" decisions and should have input from a variety of assisting agencies with expertise in soils remediation.

⁵⁴ One purpose of background sampling is to determine whether certain constituents of concern, such as arsenic, and other heavy metals, are found at certain levels in area soils. These naturally occurring levels will assist in the determination of cleanup standards.

⁵⁵ [California Department of Public Health, Wildfire Cleanup Considerations for California's Public Health Officials](#)

⁵⁶ This is a critical preparedness and planning activity that needs to occur before the event.

⁵⁷ [County of Santa Clara DEH, "Safety When Returning to Your Home or Business after a Fire", August, 27,2020](#)

⁵⁸ Safety must be prioritized before staff respond. Each of the topics can at times seem minor, until it occurs. The National Institutes of Health (NIH) has an overview of health and safety concerns in a PowerPoint presentation with graphics that might assist in understanding the specific issues. [National Institute of Environmental Health Services, NIH, Updated December 2021](#)

⁵⁹ [OSHA HAZWOPER Training](#)

⁶⁰ Hazwoper rules and regulations are complex and require close examination by local management to ascertain applicability to staff.

⁶¹ Georgia Department of Public Health, Environmental Health Strike Team program Overview, [file:///C:/](#)

[Users/wjone/Downloads/EH%20Strike%20Team%20Program%20Overview%20\(2\).pdf](#)

⁶² Go-bags are an assemblage of supplies and personal gear that a team member might bring to a wildfire response or recovery to perform their duties. A team go-bag might include instrumentation, forms, test kits, or other tools necessary to document, measure, test or sample within their scope of duties. <https://www.emacweb.org/>

⁶³ Strike teams are mentioned not only to advise of their potential presence and use, but that local environmental public health agencies may want to consider setting up their own for deployment outside their jurisdiction.

⁶⁴ Continuity of Operations/Business Continuity Planning, US Department of Health and Human Services website <https://asprtracie.hhs.gov/technical-resources/17/continuity-of-operations-coop-business-continuity-planning/110>

⁶⁵ In California, continuity of operations has on occasion been handled by bringing in mutual aid for environmental health and hazardous materials resources. Long term incidents will often be offset by longer term contracts with similar resources from other jurisdictions.

⁶⁶ There may be assessment work that is more immediate than others but all occur relatively soon after the wildfire passes. Some entities may combine resources to perform for example damage assessment, hazardous materials assessments, building assessments, and drinking water well assessments.

⁶⁷ [US EPA Environmental Justice weblink](#)

⁶⁸ [Building Private-Public Partnerships, FEMA, July 2021](#)

⁶⁹ [The Guide to Cross Sector Collaboration, Resonance](#)

⁷⁰ [Emergency Support Function 18, Business and Industry, Florida](#)

⁷¹ This role may be performed by involved PIOs.

⁷² Specific states may also have their own weblinks to similar air quality information such as [Washington Smoke Information](#)

⁷³ While most sanitation issues during the wildfire event will be focused on base camps, command posts, or mass care facilities, the larger issues may arise after the fire is contained in communities impacted. Working early on with the community and local vendors will become critical.

⁷⁴ In many disaster locations, the ARC is involved with mass care. They receive extensive training to ensure the mass care locations are compliant with applicable codes or safe practices.

⁷⁵ A number of State's have their own ESF annexes, often with more than the 15 federal ESF's. Environmental public health should be familiar with their own State's ESF structure and lead agencies.



