Wildfire Emergency Response Resources and Burned Service Connection Sampling Project

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Fall Training
November 2, 2021

Oregon Health Authority

(Enter) DEPARTMENT (ALL CAPS)
(Enter) Division or Office (Mixed Case)

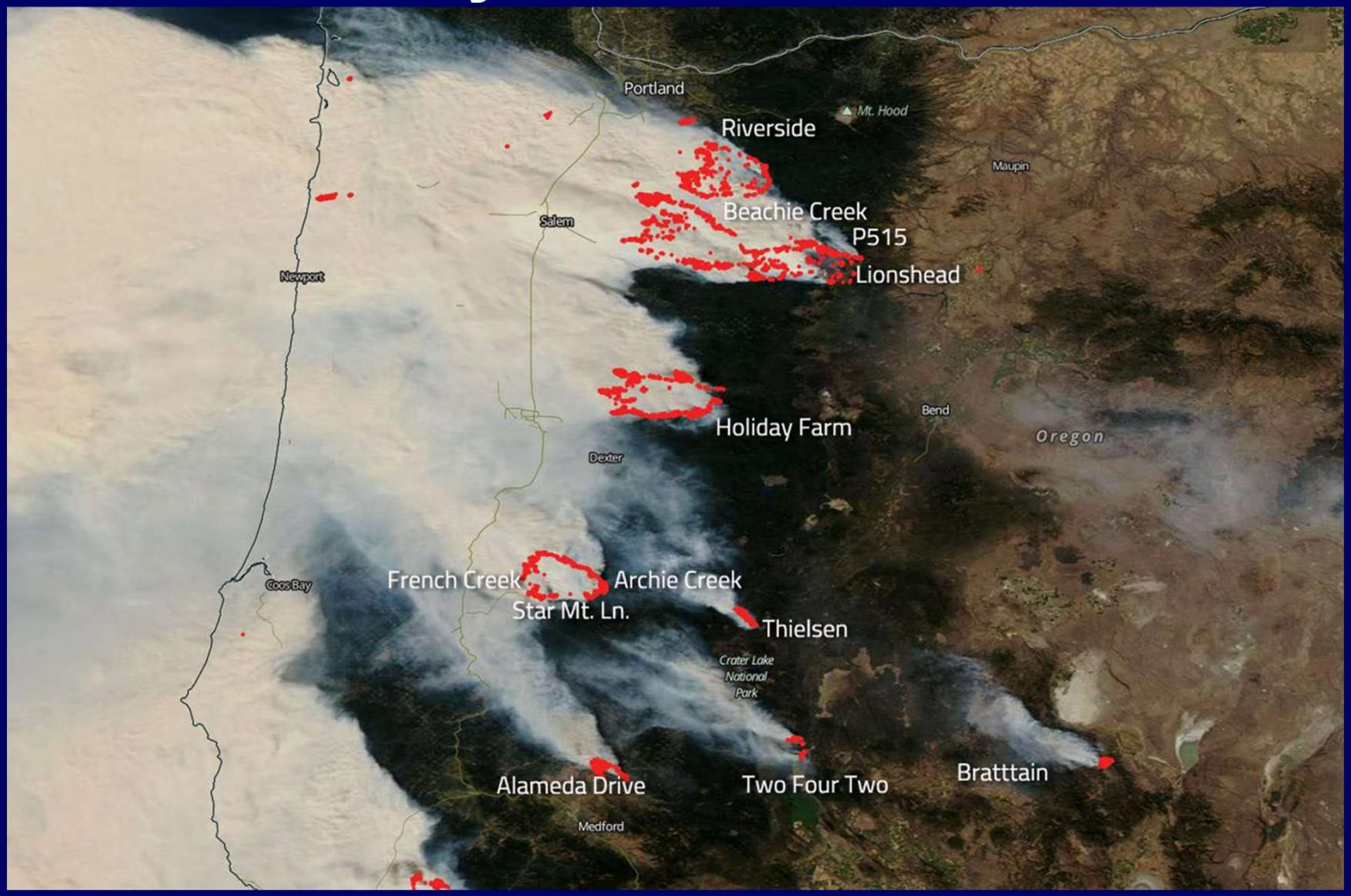
Topics

- Introduction
- 2020 Labor Day Wildfire Overview
- VOC Contamination and Monitoring Project
- Wildfire Resources
- Future of Wildfire Planning
- Questions

2020 Labor Day Weather Forecast

A red flag warning and high wind warning have been issued for Monday, September 7, across parts of northwest Oregon.
National Weather Serivce

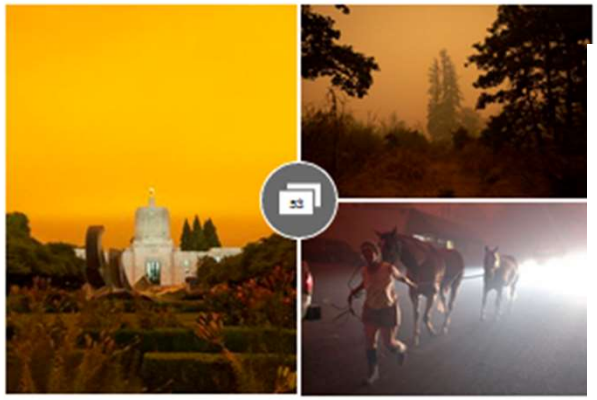
2020 Labor Day Wildfires



Unprecedented Fire Season

Oregon wildfires: Governor declares emergency, calls situation 'dangerous'

Updated: Sep. 10, 2020, 3:43 p.m. | Published: Sep. 08, 2020, 3:34 p.m.



Wildfires and wind damage across Oregon

57,854 shares

By Jayati Ramakrishnan | The Oregonian/OregonLive and K. Rambo | The Oregonian/OregonLive

Update: Live updates from Wednesday on Oregon wildfires

Gov. Kate Brown on Tuesday declared a wildfire emergency in Oregon, where fire in the Santiam Canyon east of Salem forced evacuations and wildfires elsewhere burned through at least two towns and sent thick smoke across the western part of the state.

Brown -- along with health, fire, forestry and emergency officials -- addressed the magnitude of the situation during a midafternoon news conference.

- 1.2 million acres burned
- 9 fatalities
- 4,026 homes lost
- 1,052 people in shelters
- 10% of Pop. under evacuation orders
- Hazardous air quality across the NW United States

Labor Day fires of 2020 burned more of the Oregon Cascades than had burned in the previous 36 years combined

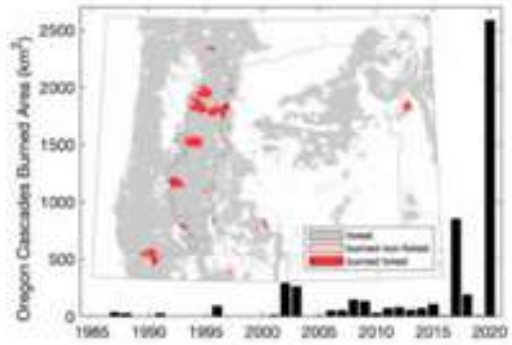


Figure 1. Time series of annual burned area for the portion of the Cascades ecoregion in the State of Oregon for 1984–2020 (black polygon in inset map). Inset map shows perimeters of fires in 2020, including much of the forested burned area in western Oregon that burned during the 7–9 September period.

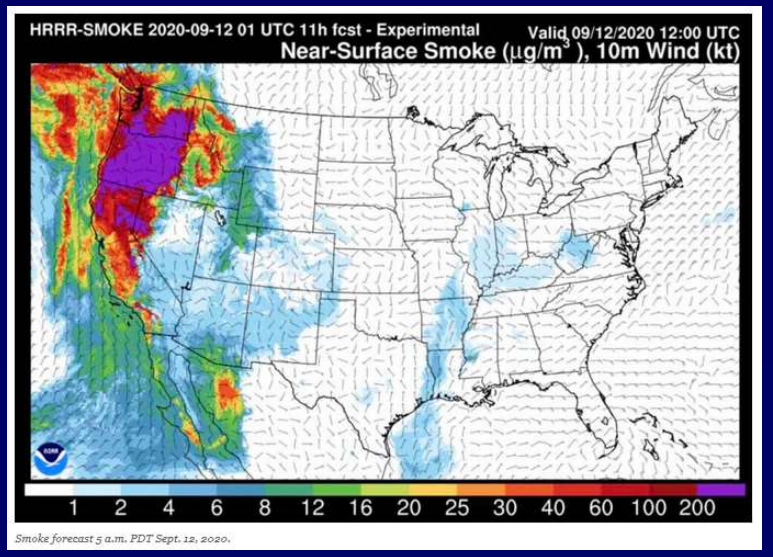
An analysis of the Labor Day 2020 wildfires in Oregon determined that the combination of high temperatures, unusually dry fuels, and strong winds occurring at the same time was unprecedented in the area. That led to an unprecedented number of acres burned in the Oregon Cascades, about 11 percent of the mountain range, and more than the previous 36 years combined.

Below is a summary of research published last month titled, "Compound Extremes Drive the Western Oregon Wildfires of September 2020," by John T. Abatzoglou, David E. Rupp, Larry W. O'Neill, and Majtaba Sadegh.

"Several very large fires in western Oregon spread rapidly during an unusually strong offshore wind event that commenced on Labor Day in 2020. The Labor Day fires burned more area of the Oregon Cascades than had burned in the previous 36 years combined and very likely exceeded the area burned in any single year for at least the past 120 years. The fires damaged over 4,000 structures, led to several fatalities, placed over 10% of the state's residents under some level of evacuation advisory, and contributed to the hazardous air quality across the Northwestern United States.

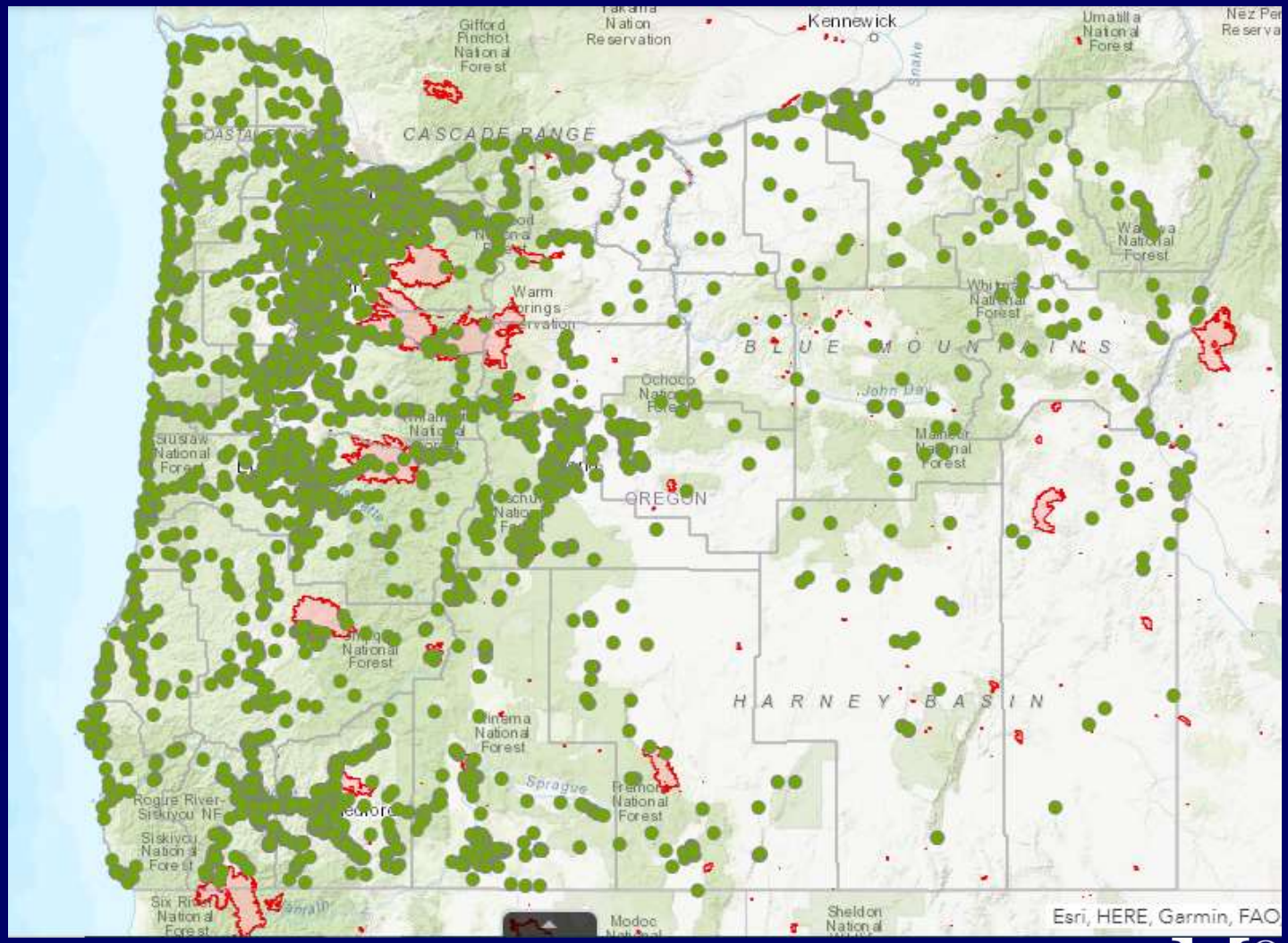
Hazardous air quality

Satellite photo, 4:30 p.m. Sept 11, 2020. GOES 17, NASA.

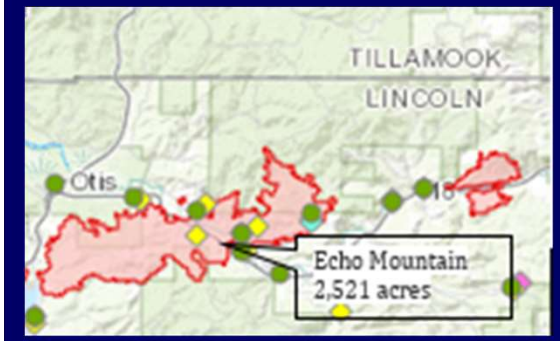


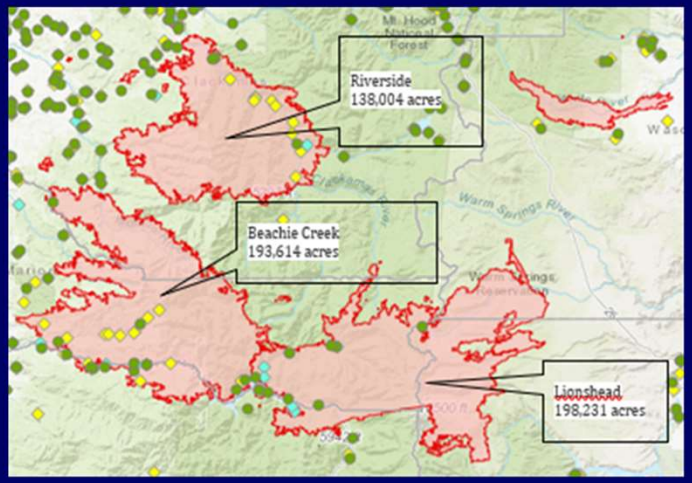
Smoke forecast 5 a.m. PDT Sept. 12, 2020.

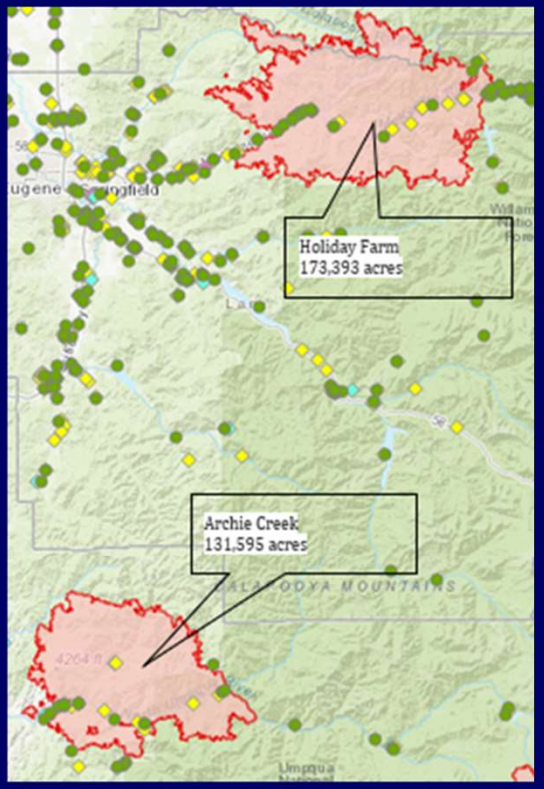
PWS and Fire Perimeter

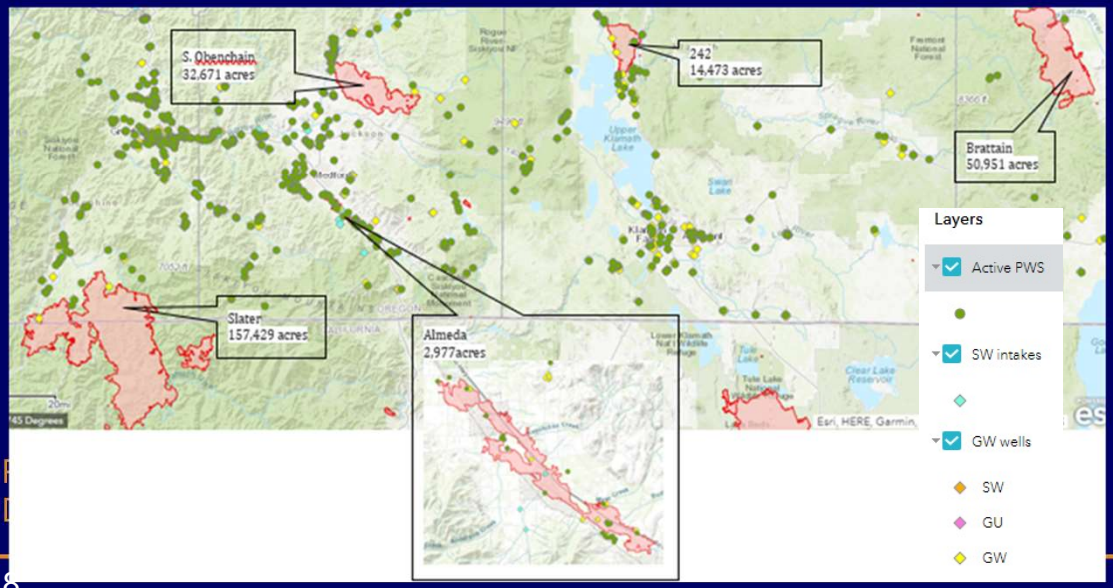


Fire Perimeter Inventory of PWS









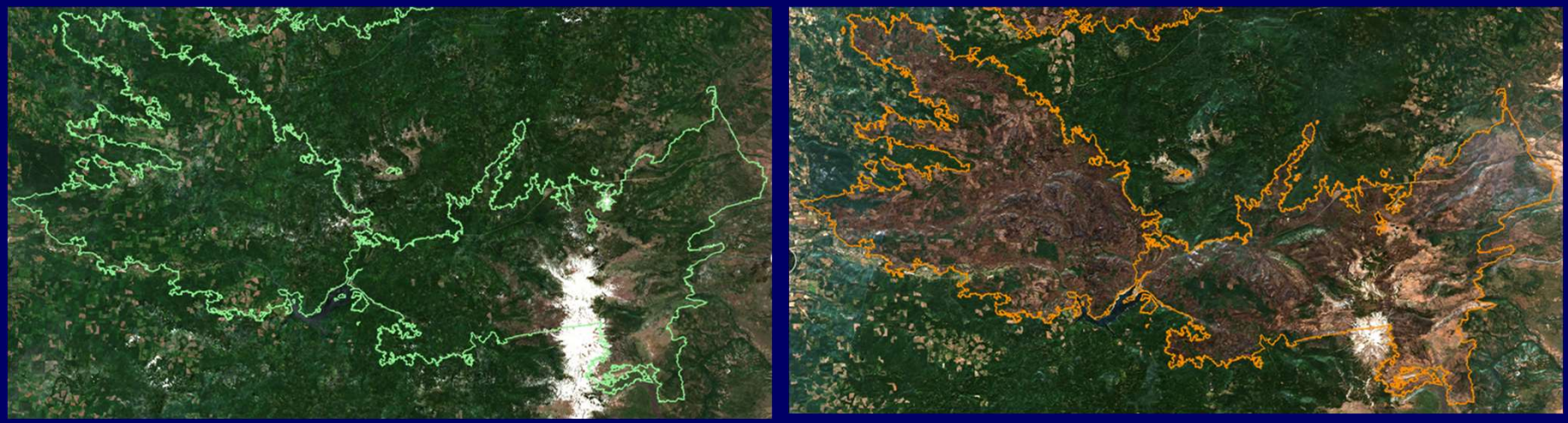
Oregon Health Authority

Wildfire Impacts

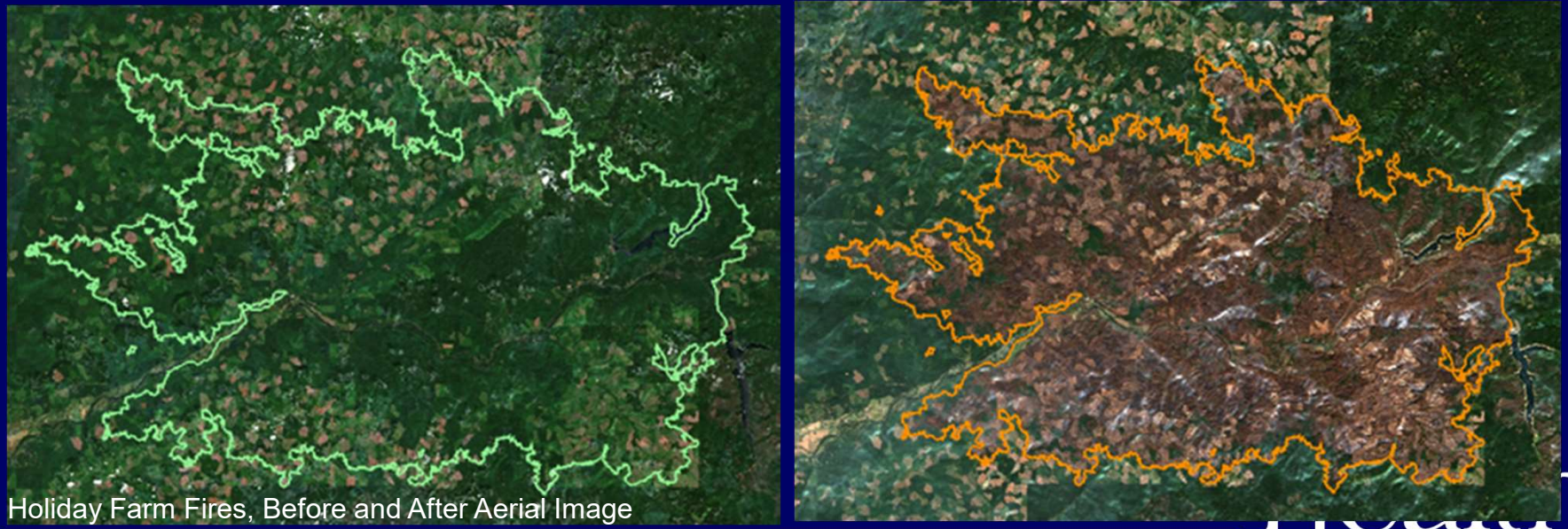
- Oregon 2020 Wildfire Impacts Viewer
  - https://mbgfpeg.users.earthengine.app/view/orfireimpactsviewervx0aonsvxq1hqbox7yhmsu3fq6wy7hpttjyjunvsnjef
  - Does not include Almeda Fire

Riverside Fire, Before and After Aerial Image

Wildfire Impacts



Beachie and Lionshead Fires, Before and After Aerial Image



Holiday Farm Fires, Before and After Aerial Image

Unprecedented Damage

3,336 Public Water Systems in our Inventory

- 248 systems within fire perimeter boundaries
- 37 systems with known infrastructure damage


Blue River WD, Well 1 and Backup Generator


Hiland WC - Echo Mountain, Main Well


Detroit Water System, Pumps


Panther Creek WD, Treatment System

Potential for VOC Contamination

After Wildfires Stop Burning, a Danger in the Drinking Water

Experts are warning that existing water safety rules are not suitable to a world where wildfires destroy more residential areas than in the past.

Water flows from a pipe amid the charred remains of a building in Gates, Oregon, in September. Kathryn Elsesser/Agence France-Presse — Getty Images

Source: New York Times, 10/02/2020

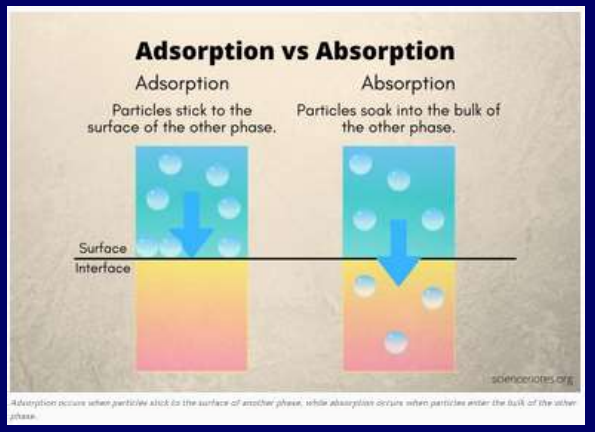
- Emerging issue, no prior experience in Oregon
- Guidance received from CA, adapted to Oregon
- 27 systems lost pressure and had structures burn; 10 inactive
- Emergency funding from Legislature for small system lab costs
  - Funding for Domestic Well analysis
- Initial distribution sampling at 13 Community systems, no results > MCLs
- Follow-up sampling ongoing
- Require PWS sampling at burned service connection prior to restoring service

Sources for VOC Contamination

- Heating of plastic pipe and components (in situ plastic pyrolysis)
- Depressurization and back siphonage of VOC contaminated gasses, ash, melted plastic, etc. into distribution system piping
  - Absorption into porous material (PVC, Rubber, PEX, etc.)
    - Slow release, difficult to flush
  - Adsorption onto non-porous pipe walls (copper, steel, and galvanized)
    - Receptive to flushing


City of Gates, 2020


City of Detroit, 2020



Initial VOC Monitoring Project

- Initial screening (3 samples) conducted at 13 systems on a "Do Not Drink" advisory due to pressure loss
- No detections for VOCs
- Lifted "Do Not Drink" for systems that could provide water
  - City of Detroit out of water until April 2021

DATE:

UNSAFE WATER ALERT

WATER SYSTEM NAME water may be contaminated with unknown substances.

DO NOT DRINK-
Failure to follow this advisory could result in illness.

Due to the NAME OF FIRE, some structures in the WATER SYSTEM NAME were destroyed by the fire, and some areas in the water system lost pressure. These conditions may have caused harmful contaminants, including benzene and other volatile organic chemicals (VOCs), to enter the water system. As a precaution, the Oregon Health Authority Drinking Water Services, COUNTY NAME County Health Department, and the WATER SYSTEM NAME are advising residents of the affected area to NOT USE THE TAP WATER FOR DRINKING AND COOKING UNTIL FURTHER NOTICE.

In addition, residents are advised to:
- **Limit use of hot water**
- **Limit shower time (use lukewarm water and ventilate area)**
- **Use a dishwasher to wash dishes and use air dry setting**
- **Wash clothing in cold water**
- **Do not take baths**
- **Do not use hot tubs or swimming pools**

What should I do?

- DO NOT DRINK YOUR TAP WATER—USE ONLY BOTTLED WATER. Bottled water should be used for all drinking (including baby formula and juice), brushing teeth, and making ice and food preparation **until further notice**.
- DO NOT TRY AND TREAT THE WATER YOURSELF. Boiling, freezing, filtering, adding chlorine or other disinfectants, or letting water stand will not make the water safe.
- [OPTIONAL:] Potable and/or bottled water is available at the following locations: [LIST OF LOCATIONS]. Please bring a clean water container (5 gallons maximum capacity).

We will inform you when tests show that the water is safe again. We expect to resolve the problem within [ESTIMATED TIME FRAME].

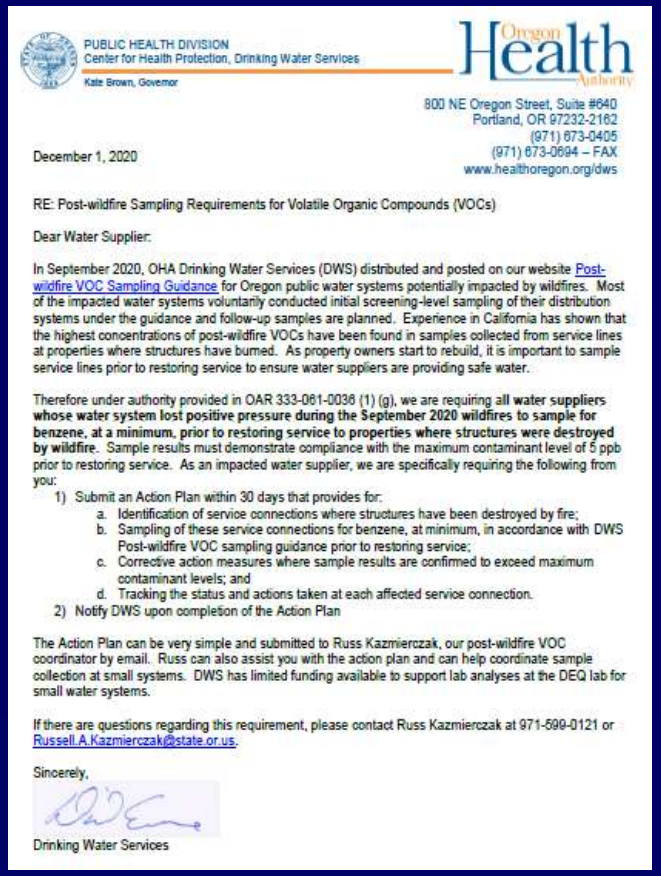
For more information, call:
Water Utility contact: CONTACT NAME, POSITION, WATER SYSTEM NAME, tel: (XXX) XXX-XXXX, ADDRESS
This notice is being sent to you by the WATER SYSTEM NAME, Oregon Public Water System ID # WATER SYSTEM NUMBER. Date Distributed: DATE OF ISSUANCE.
Please share this information with all other people who receive this water, especially those who may not have received this notice directly (ex., people in apartments, nursing homes, schools, and businesses). This can be done by posting in a public place or distributing copies by hand.

Expanded VOC Monitoring Project

- Nominated on October 14, 2020, to help with VOC issue
- Gather more facts from impacted PWSs
  - How many service connections were burned?
  - What flushing has been done?
  - Where were samples taken, mains or at service connections?
  - Were they stagnation samples?
- Assist PWS with design of follow-up sampling
  - Determine number of samples based on number of burned connections, e.g. 10% of # of burned structures, and distribution system layout
  - Collect samples from locations near burned connections, stagnation samples if possible
- Develop public messaging for homeowners
  - Adapt CA guidance for homeowners to OR and provide to PWSs
  - Recommend PWS inform customers of steps taken by PWS to flush system and sample, and that they provide them the guidance doc
  - Recommend PWS offers to collect samples for homeowners

Post Wildfire Sampling Requirement

- Requested that Community water systems develop sampling plan
  - Initially requested systems collect stagnation (72 hours if possible) samples representing 10% of burned service connections at mainline and service connection locations
- Changed course and required the sampling of all burned service connections prior restoring water
- OHA-DWS covered sample analysis costs for systems under a population of 3,330
  - Cities of Ashland, Talent, Phoenix, and Medford/Charlotte Ann Water District used a local private lab
  - Smaller systems used the DEQ Lab



PUBLIC HEALTH DIVISION
Center for Health Protection, Drinking Water Services
Kate Brown, Governor

Oregon Health Authority

800 NE Oregon Street, Suite #640
Portland, OR 97232-2162
(971) 673-0405
(971) 673-0694 – FAX
www.healthoregon.org/dws

December 1, 2020

RE: Post-wildfire Sampling Requirements for Volatile Organic Compounds (VOCs)

Dear Water Supplier:

In September 2020, OHA Drinking Water Services (DWS) distributed and posted on our website Post-wildfire VOC Sampling Guidance for Oregon public water systems potentially impacted by wildfires. Most of the impacted water systems voluntarily conducted initial screening-level sampling of their distribution systems under the guidance and follow-up samples are planned. Experience in California has shown that the highest concentrations of post-wildfire VOCs have been found in samples collected from service lines at properties where structures have burned. As property owners start to rebuild, it is important to sample service lines prior to restoring service to ensure water suppliers are providing safe water.

Therefore under authority provided in OAR 333-061-0036 (1) (g), we are requiring **all water suppliers whose water system lost positive pressure during the September 2020 wildfires to sample for benzene, at a minimum, prior to restoring service to properties where structures were destroyed by wildfire.** Sample results must demonstrate compliance with the maximum contaminant level of 5 ppb prior to restoring service. As an impacted water supplier, we are specifically requiring the following from you:

1) Submit an Action Plan within 30 days that provides for:
   a. Identification of service connections where structures have been destroyed by fire;
   b. Sampling of these service connections for benzene, at minimum, in accordance with DWS Post-wildfire VOC sampling guidance prior to restoring service;
   c. Corrective action measures where sample results are confirmed to exceed maximum contaminant levels; and
   d. Tracking the status and actions taken at each affected service connection.
2) Notify DWS upon completion of the Action Plan

The Action Plan can be very simple and submitted to Russ Kazmierczak, our post-wildfire VOC coordinator by email. Russ can also assist you with the action plan and can help coordinate sample collection at small systems. DWS has limited funding available to support lab analyses at the DEQ lab for small water systems.

If there are questions regarding this requirement, please contact Russ Kazmierczak at 971-599-0121 or Russell.A.Kazmierczak@state.or.us.

Sincerely,

Drinking Water Services

Sample Collection and Reporting

- Water systems would request bottles and DEQ would send sample kits
- DEQ would return sample report and Electronic Data Delivery (EDD) file
- EDD uploaded to Post-wildfire VOC site on Data Online
  - http://go.usa.gov/xHgyk
- Samples collected by the water system or private contractor
  - Talent required private contractor
  - OAWU, RCAC, ORWARN assisted some systems

DEQ Sample Collection Instructions

Drinking Water Volatile Organic Compounds

Please read all instructions before collecting samples.

Sample Collection Supplies:

- Two 40 ml labeled Trip Blanks (prefilled)
- Chain of Custody (COC)
- Ice Packs/Ice
- Bubble wrap/plastic bag
- Temperature blank
- Each sample will include:
  - 125 ml Amber bottle containing 75 mg of Ascorbic Acid (de-chlorinator)
  - Three 40 ml vials containing 0.5 ml 1:1 HCL acid (preservative)

PPE:

Please wear appropriate protective gear. Wear gloves and eye protection when handling acids and other preservatives and while collecting samples.

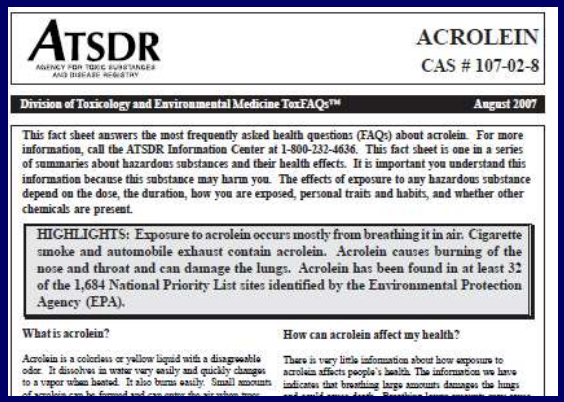
Procedure:

Do not rinse any bottles, as they should contain the preservatives before filled.

1. Please contact Russell Kazmierczak, OHA-DWS Natural Resources Specialist (P: 971-599-0121 or email: Russell.a.kazmierczak@state.or) if you have questions prior to collecting VOC samples.
2. Review OHA-DWS Post-Wildfire VOC sampling guidance before collecting samples and please note that mainline distribution samples are collected differently than service lateral/connection samples.
   a. Mainline Sample Collection: When collecting a sample to determine if VOC contamination has entered the mainline distribution system, flush the sample point for a few minutes until the water becomes cold or reaches a steady temperature prior to collecting the sample so that it represents water from the mainline distribution system piping.

Sample Collection and Reporting

- Gregg Baird would review results and provide a data summary
  - Compare results against MCLs/HALs
  - – Forwarded lab results, data summary and contaminate fact sheets, if applicable
- MCL exceedances - Requested systems inform customers near burned connections
  - – System complete corrective action as outlined in sampling plan



ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ACROLEIN
CAS # 107-02-8

Division of Toxicology and Environmental Medicine ToxFAQs™ August 2007

This fact sheet answers the most frequently asked health questions (FAQs) about acrolein. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

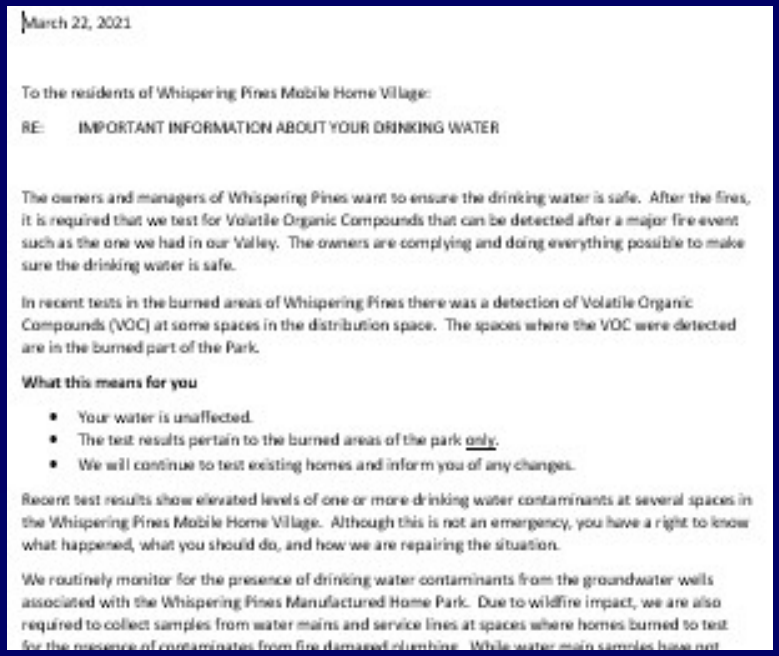
HIGHLIGHTS: Exposure to acrolein occurs mostly from breathing it in air. Cigarette smoke and automobile exhaust contain acrolein. Acrolein causes burning of the nose and throat and can damage the lungs. Acrolein has been found in at least 32 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is acrolein?

Acrolein is a colorless or yellow liquid with a disagreeable odor. It dissolves in water very easily and quickly changes to a vapor when heated. It also burns easily. Small amounts

How can acrolein affect my health?

There is very little information about how exposure to acrolein affects people's health. The information we have indicates that breathing large amounts damages the lungs



March 22, 2021

To the residents of Whispering Pines Mobile Home Village:

RE: IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

The owners and managers of Whispering Pines want to ensure the drinking water is safe. After the fires, it is required that we test for Volatile Organic Compounds that can be detected after a major fire event such as the one we had in our Valley. The owners are complying and doing everything possible to make sure the drinking water is safe.

In recent tests in the burned areas of Whispering Pines there was a detection of Volatile Organic Compounds (VOC) at some spaces in the distribution space. The spaces where the VOC were detected are in the burned part of the Park.

What this means for you

- Your water is unaffected.
- The test results pertain to the burned areas of the park only.
- We will continue to test existing homes and inform you of any changes.

Recent test results show elevated levels of one or more drinking water contaminants at several spaces in the Whispering Pines Mobile Home Village. Although this is not an emergency, you have a right to know what happened, what you should do, and how we are repairing the situation.

We routinely monitor for the presence of drinking water contaminants from the groundwater wells associated with the Whispering Pines Manufactured Home Park. Due to wildfire impact, we are also required to collect samples from water mains and service lines at spaces where homes burned to test

Systems Required to Collect VOCs

- 19 Systems required to collect samples for VOCs
- 24 entities collected samples for VOCs
  - Includes several Mobile Home Parks (counted as a customer) and TNCs

County	Classification	Water System Name	County	Classification	Water System Name
Clackamas	Community	Cedarhurst Improvement Club	Lane	Community	McKenzie Palisades Water Board
Jackson	Community	Bear Creek Mobile Home Park	Lincoln	Community	Hiland WC - Echo Mountain
Jackson	Community	Whispering Pines Mobile Home Village	Lincoln	Community	Hiland WC - Riverbend
Jackson	Purchasing	Medford Water Commission/Charlotte Ann WD	Lincoln	Community	Panther Creek Water District
Jackson	Community	Phoenix, City of	Lincoln	Community	Salmon River Mobile Village
Jackson	Community	Talent, City of	Linn	Community	Lyons Mehama Water District
Klamath	Non-EPA (State)	ODFW Klamath Fish Hatchery	Marion	Community	Breitenbush Hot Springs
Lane	Community	Blue River Water District	Marion	Community	Gates, City of
Lane	Non-EPA (State)	Finn Ranch WD	Marion	Community	Taylors Grove Water Works
			Marion	Community	Detroit Water System

VOC Samples by County

County	Number of Systems with Burned Structures and Lost Pressure*	Burned Structures and Lost Pressure*	Number of Samples - Analysis Complete	Lines Replaced or Proposed to be Replaced	Approximate Number of Samples Remaining	MCL Exceedances	
Jackson	4	853	375	70	411	5	
Marion	4	414	394	112	0	18	
Klamath	1	1	1	0	0	0	
Lane	4	74	20	1**	53	0	
Lincoln	4	248	194	60	0	5	
Linn	1	13	12	1	0	0	
Note:							
*Number only includes Public Water Systems and does not include some mobile and manufactured home parks which are counted as one service connection.							
**Blue River in process of determining how many service connections need to be replaced.							

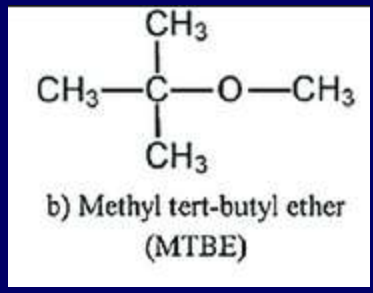
VOC Samples by System

Water Systems Required to Sample for VOCs								
County	Classification	Water System Name	Connections	Served Structures and Last Pres	Number of Samples Analysis Compl	Lines Replaced or Proposed to be Replac	Approx. Number of Samples Remai q	>MCL
Clackamas	Community	Cedarhurst Improvement Club	30	0	6	0	0	0
Jackson	Community	Bear Creek Mobile Home Park	70	68	5	63	0	0
Jackson	Community	Whispering Pines	63	46	46	0	0	2
Klamath	Non-EPA (State)	ODFW Klamath Fish Hatchery	6	1	1	0	0	0
Lane	Community	Blue River Water District	96	70	17		53	0
Lane	Non-EPA (State)	Finn Ranch WD	7	3	1	1	1	0
Lane	Community	McKenzie Palisades Water Board	33	1	1	0	0	0
Lincoln	Community	Hiland WC - Echo Mountain	140	103	83	26	-6	5
Lincoln	Community	Hiland WC - Riverbend	80	2	1		1	0
Lincoln	Community	Panther Creek Water District	355	107	107		0	0
Lincoln	Community	Salmon River Mobile Village	38	36	2	34	0	0
Linn	Community	Lyons Mehama Water District	890	13	12	1	0	0
Marion	Community	Breitenbush Hot Springs	90	24	4	20	0	0
Marion	Community	Gates, City of	240	90	68	0	22	1
Marion	Community	Taylors Grove Water Works	15	5	5	0	0	0
			DEQ Total	**569**	**359**	**145**	**71**	
Marion	Community	xDetroit Water System	400	295	295	92	0	17
Jackson	Purchasing	xMedford Water Commission/Charlotte Ann WD	192	111	61	2	48	0
Jackson	Community	xxPhoenix, City of	1627	210	63		147	0
Jackson	Community	xxTalent, City of	2200	430	158		272	7
			Grand Total	**1615**	**936**		**538**	**32**
Note:								
xSmall System Using Private Lab								
xxLarge System Using Private Lab								

VOC Sample Summary

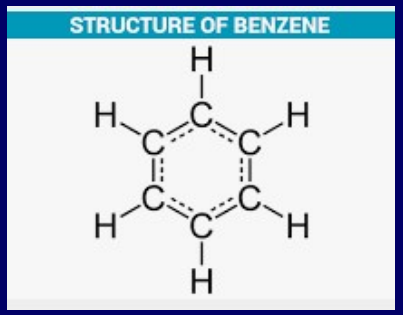
- 5 water systems with MCL Exceedances
  - Detroit Water System (~17 locations)
  - City of Gates (1 location)
  - Hiland WC – Echo Mountain (5 locations)
  - City of Talent (3 locations)
  - Whispering Pines MH Village (2 locations)
- Systems replacing service lines
  - Panther Creek (107 locations?)
  - Detroit Water System (92 locations)
  - Bear Creek Mobile Home Village (68 locations)
  - Salmon River Mobile Village (34 locations)
  - Hiland WC - Echo Mountain (26 locations)
  - Breitenbush Hot Springs (20 locations)
  - Medford/CAWD (2 locations)
  - Finn Ranch (1 location)
  - Lyons Mehama Water District (1 location)
  - Blue River (# TBD)
- 219 VOC monitoring summaries

Types of Contaminates Detected

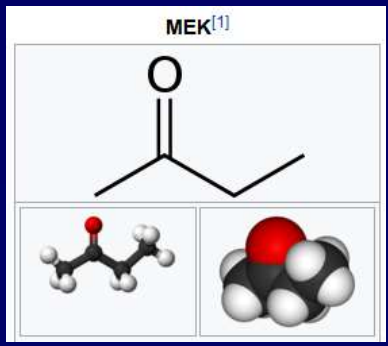


b) Methyl tert-butyl ether (MTBE)

- Bromodichloromethane
- Dibromochloromethane
- Chloroform
- Methyl-tert-butyl ether
- Benzene
- Toluene
- Xylenes, Total
- Styrene
- Vinyl chloride
- Naphthalene
- 2-Butanone (MEK)



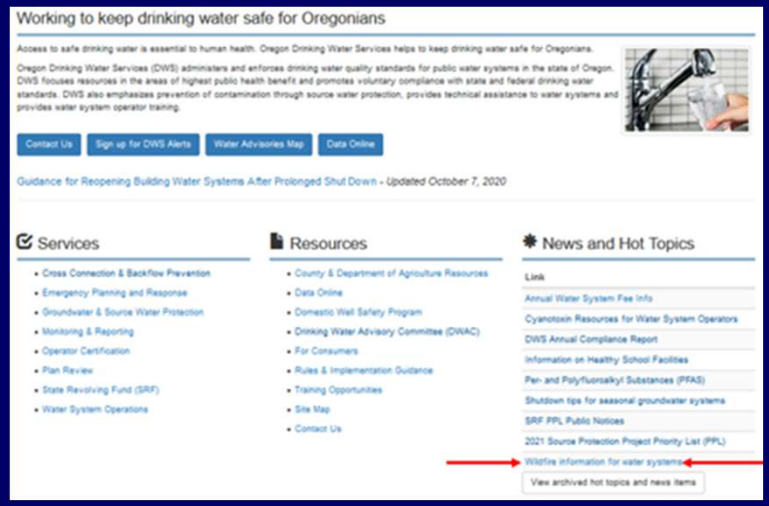
- Acetone
- Tetrahydrofuran
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1,2,4-Trichlorobenzene
- Chlorobenzene
- Chloromethane
- 4-Isopropyltoluene
- Acrolein
- Carbon disulfide
- Cyclohexanone

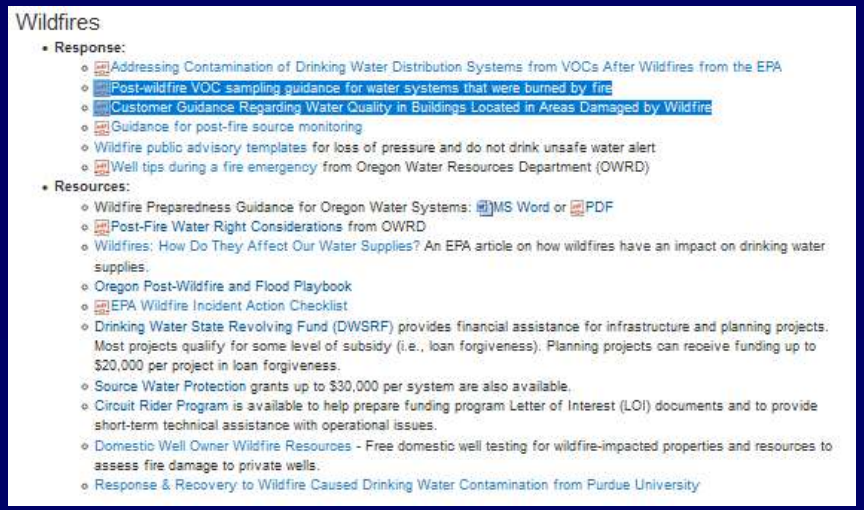


Oregon Health Authority

Wildfire Response Resources

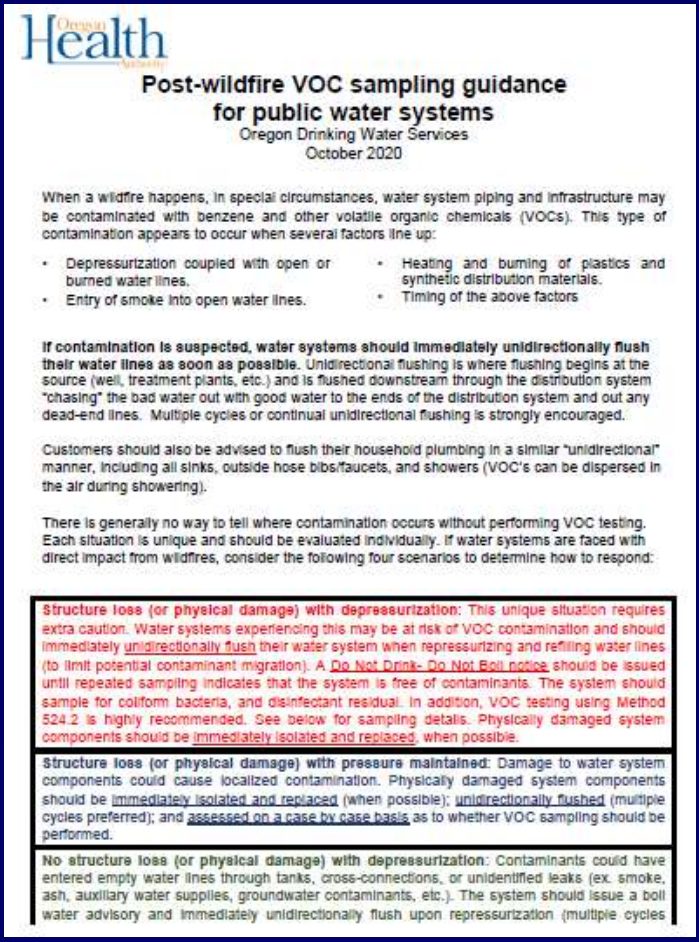
- Developed wildfire resources and guidance for water systems https://go.usa.gov/xexGS
- Post Wildfire VOC Sampling Guidance for Water Systems
  - https://go.usa.gov/xex7q
- Customer Guidance Regarding Water Quality in Buildings…
  - https://go.usa.gov/xex7p





Wildfire Resources

- Water System VOC Guidance



Oregon Health Authority

Post-wildfire VOC sampling guidance for public water systems

Oregon Drinking Water Services
October 2020

When a wildfire happens, in special circumstances, water system piping and infrastructure may be contaminated with benzene and other volatile organic chemicals (VOCs). This type of contamination appears to occur when several factors line up:

- Depressurization coupled with open or burned water lines.
- Entry of smoke into open water lines.
- Heating and burning of plastics and synthetic distribution materials.
- Timing of the above factors

If contamination is suspected, water systems should immediately unidirectionally flush their water lines as soon as possible. Unidirectional flushing is where flushing begins at the source (well, treatment plants, etc.) and is flushed downstream through the distribution system "chasing" the bad water out with good water to the ends of the distribution system and out any dead-end lines. Multiple cycles or continual unidirectional flushing is strongly encouraged.

Customers should also be advised to flush their household plumbing in a similar "unidirectional" manner, including all sinks, outside hose bibs/faucets, and showers (VOC's can be dispersed in the air during showering).

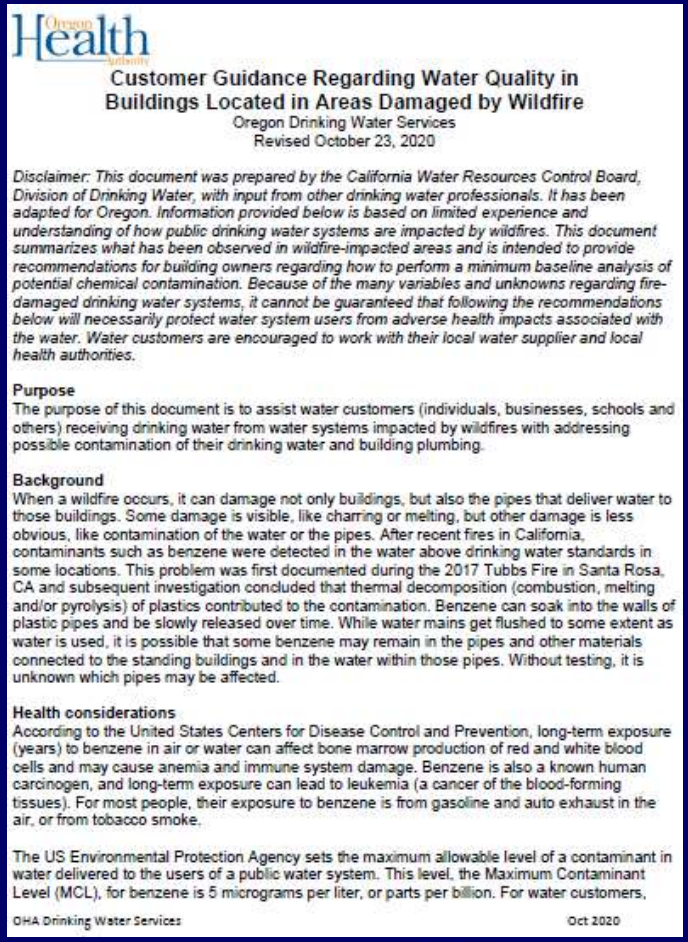
There is generally no way to tell where contamination occurs without performing VOC testing. Each situation is unique and should be evaluated individually. If water systems are faced with direct impact from wildfires, consider the following four scenarios to determine how to respond:

Structure loss (or physical damage) with depressurization: This unique situation requires extra caution. Water systems experiencing this may be at risk of VOC contamination and should immediately unidirectionally flush their water system when repressurizing and refilling water lines (to limit potential contaminant migration). A Do Not Drink- Do Not Boil notice should be issued until repeated sampling indicates that the system is free of contaminants. The system should sample for coliform bacteria, and disinfectant residual. In addition, VOC testing using Method 524.2 is highly recommended. See below for sampling details. Physically damaged system components should be immediately isolated and replaced, when possible.

Structure loss (or physical damage) with pressure maintained: Damage to water system components could cause localized contamination. Physically damaged system components should be immediately isolated and replaced (when possible); unidirectionally flushed (multiple cycles preferred); and assessed on a case by case basis as to whether VOC sampling should be performed.

No structure loss (or physical damage) with depressurization: Contaminants could have entered empty water lines through tanks, cross-connections, or unidentified leaks (ex. smoke, ash, auxiliary water supplies, groundwater contaminants, etc.). The system should issue a boil water advisory and immediately unidirectionally flush upon repressurization (multiple cycles

- Customer VOC Guidance



Oregon Health Authority

Customer Guidance Regarding Water Quality in Buildings Located in Areas Damaged by Wildfire

Oregon Drinking Water Services
Revised October 23, 2020

Disclaimer: This document was prepared by the California Water Resources Control Board, Division of Drinking Water, with input from other drinking water professionals. It has been adapted for Oregon. Information provided below is based on limited experience and understanding of how public drinking water systems are impacted by wildfires. This document summarizes what has been observed in wildfire-impacted areas and is intended to provide recommendations for building owners regarding how to perform a minimum baseline analysis of potential chemical contamination. Because of the many variables and unknowns regarding fire-damaged drinking water systems, it cannot be guaranteed that following the recommendations below will necessarily protect water system users from adverse health impacts associated with the water. Water customers are encouraged to work with their local water supplier and local health authorities.

Purpose
The purpose of this document is to assist water customers (individuals, businesses, schools and others) receiving drinking water from water systems impacted by wildfires with addressing possible contamination of their drinking water and building plumbing.

Background
When a wildfire occurs, it can damage not only buildings, but also the pipes that deliver water to those buildings. Some damage is visible, like charring or melting, but other damage is less obvious, like contamination of the water or the pipes. After recent fires in California, contaminants such as benzene were detected in the water above drinking water standards in some locations. This problem was first documented during the 2017 Tubbs Fire in Santa Rosa, CA and subsequent investigation concluded that thermal decomposition (combustion, melting and/or pyrolysis) of plastics contributed to the contamination. Benzene can soak into the walls of plastic pipes and be slowly released over time. While water mains get flushed to some extent as water is used, it is possible that some benzene may remain in the pipes and other materials connected to the standing buildings and in the water within those pipes. Without testing, it is unknown which pipes may be affected.

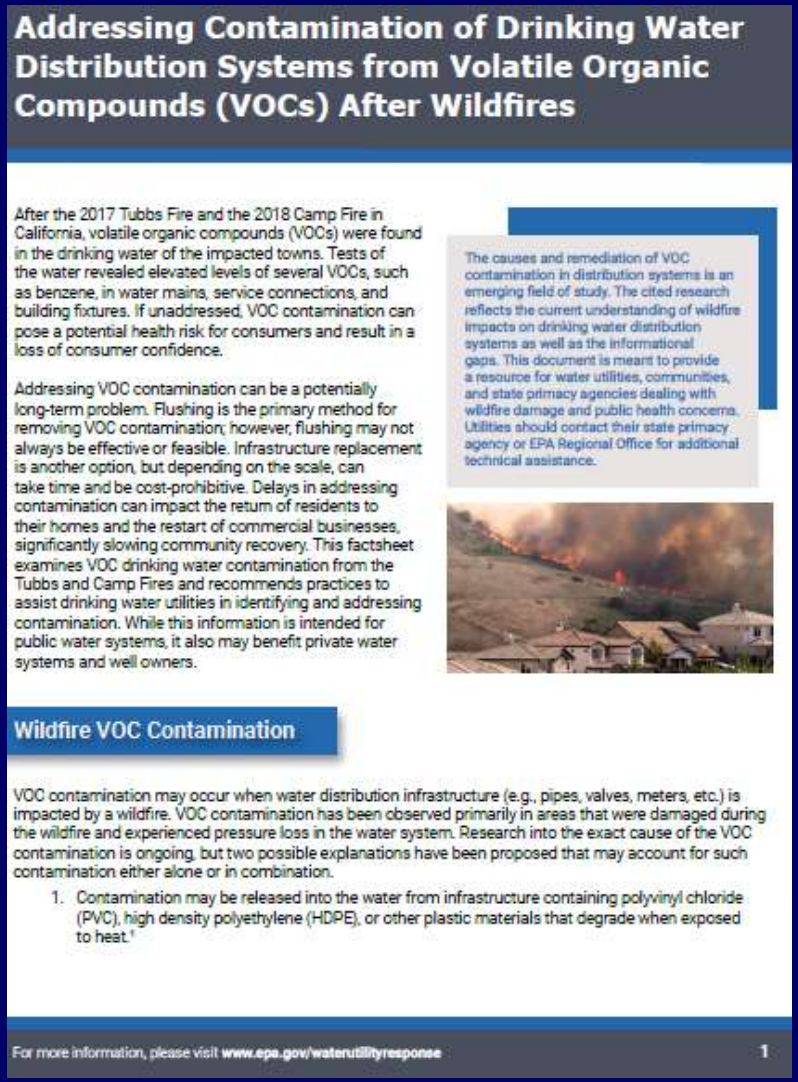
Health considerations
According to the United States Centers for Disease Control and Prevention, long-term exposure (years) to benzene in air or water can affect bone marrow production of red and white blood cells and may cause anemia and immune system damage. Benzene is also a known human carcinogen, and long-term exposure can lead to leukemia (a cancer of the blood-forming tissues). For most people, their exposure to benzene is from gasoline and auto exhaust in the air, or from tobacco smoke.

The US Environmental Protection Agency sets the maximum allowable level of a contaminant in water delivered to the users of a public water system. This level, the Maximum Contaminant Level (MCL), for benzene is 5 micrograms per liter, or parts per billion. For water customers,

OHA Drinking Water Services Oct 2020

New EPA Guidance

- Addressing Contamination of Drinking Water Distribution Systems from Volatile Organic Compounds (VOCs) After Wildfires
  - https://go.usa.gov/xexAp
- Released September 2021
- Developed with input from states, including Oregon, impacted by recent wildfires
- Topics Include
  - Wildfire VOC Contamination
  - Testing for Contamination, Sampling and Analysis
  - Addressing the VOC Issue
  - Mutual Aid and Funding for VOC Sampling, Analysis, and Remedies



Addressing Contamination of Drinking Water Distribution Systems from Volatile Organic Compounds (VOCs) After Wildfires

After the 2017 Tubbs Fire and the 2018 Camp Fire in California, volatile organic compounds (VOCs) were found in the drinking water of the impacted towns. Tests of the water revealed elevated levels of several VOCs, such as benzene, in water mains, service connections, and building fixtures. If unaddressed, VOC contamination can pose a potential health risk for consumers and result in a loss of consumer confidence.

Addressing VOC contamination can be a potentially long-term problem. Flushing is the primary method for removing VOC contamination; however, flushing may not always be effective or feasible. Infrastructure replacement is another option, but depending on the scale, can take time and be cost-prohibitive. Delays in addressing contamination can impact the return of residents to their homes and the restart of commercial businesses, significantly slowing community recovery. This factsheet examines VOC drinking water contamination from the Tubbs and Camp Fires and recommends practices to assist drinking water utilities in identifying and addressing contamination. While this information is intended for public water systems, it also may benefit private water systems and well owners.

The causes and remediation of VOC contamination in distribution systems is an emerging field of study. The cited research reflects the current understanding of wildfire impacts on drinking water distribution systems as well as the informational gaps. This document is meant to provide a resource for water utilities, communities, and state primacy agencies dealing with wildfire damage and public health concerns. Utilities should contact their state primacy agency or EPA Regional Office for additional technical assistance.

Wildfire VOC Contamination

VOC contamination may occur when water distribution infrastructure (e.g., pipes, valves, meters, etc.) is impacted by a wildfire. VOC contamination has been observed primarily in areas that were damaged during the wildfire and experienced pressure loss in the water system. Research into the exact cause of the VOC contamination is ongoing, but two possible explanations have been proposed that may account for such contamination either alone or in combination.

1. Contamination may be released into the water from infrastructure containing polyvinyl chloride (PVC), high density polyethylene (HDPE), or other plastic materials that degrade when exposed to heat.[1]

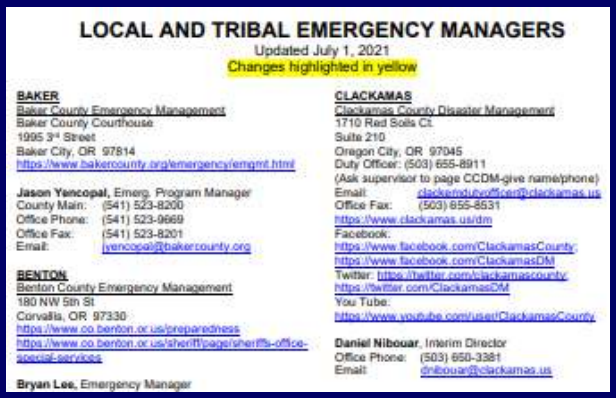
For more information, please visit **www.epa.gov/waterutilityresponse** 1

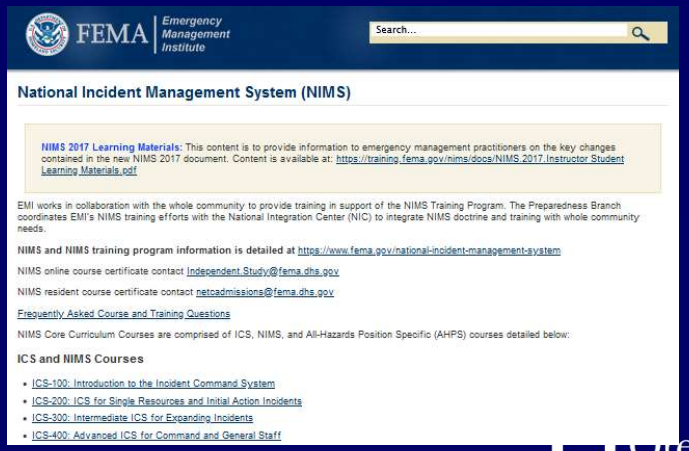
Who Can Help?

- ORWARN
  - http://www.orwarn.org/about.aspx
- OAWU
  - https://oawu.net/
- RCAC
  - https://www.rcac.org/
- Oregon Local and Tribal Emergency Managers
  - https://www.oregon.gov/oem/Documents/locals_list.pdf
- OHA-DWS Circuit Rider Program
  - https://go.usa.gov/xexHs
- FEMA
  - https://www.fema.gov/locations/oregon

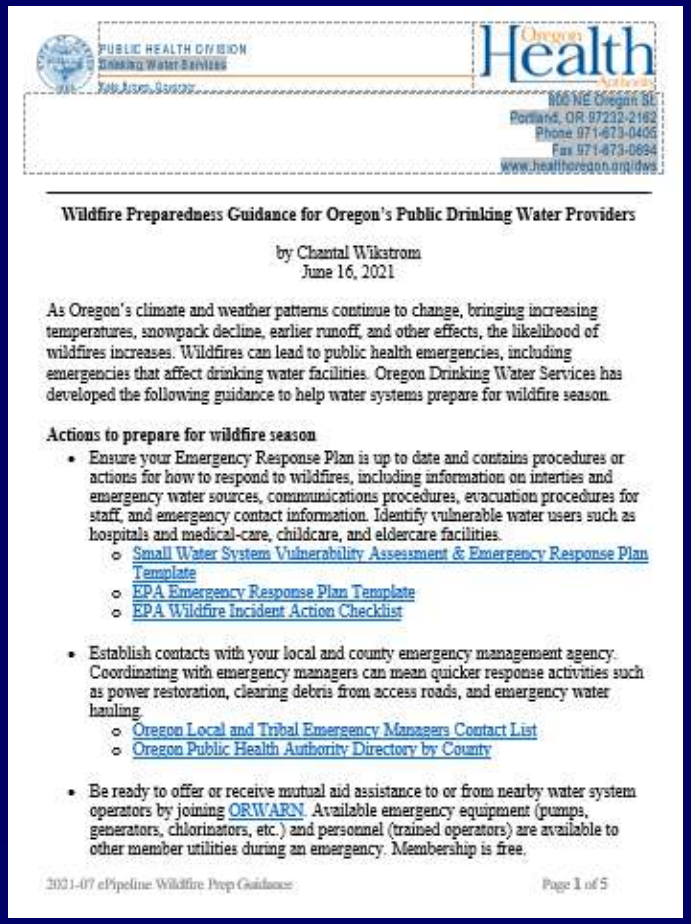
How can I prepare?

- Review Emergency Response Plan during the survey and recommend updates as needed
  - New ERP Template https://go.usa.gov/xex6F
  - Wildfire Preparedness Guidance https://go.usa.gov/xersz
  - Educate system about ORWARN and other sources of assistance
- Know who the emergency manager is for your county
  - https://go.usa.gov/xerH6
- Become familiar with the National Incident Management System(NIMS)/Incident Command System (ICS)
  - https://training.fema.gov/nims/





Other Wildfire Planning Resources



PUBLIC HEALTH DIVISION
Drinking Water Services

Oregon Health Authority

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Portland, OR 97232-2162
Phone 971-673-0405
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www.healthoregon.org/dws

Wildfire Preparedness Guidance for Oregon's Public Drinking Water Providers

by Chantal Wikstrom
June 16, 2021

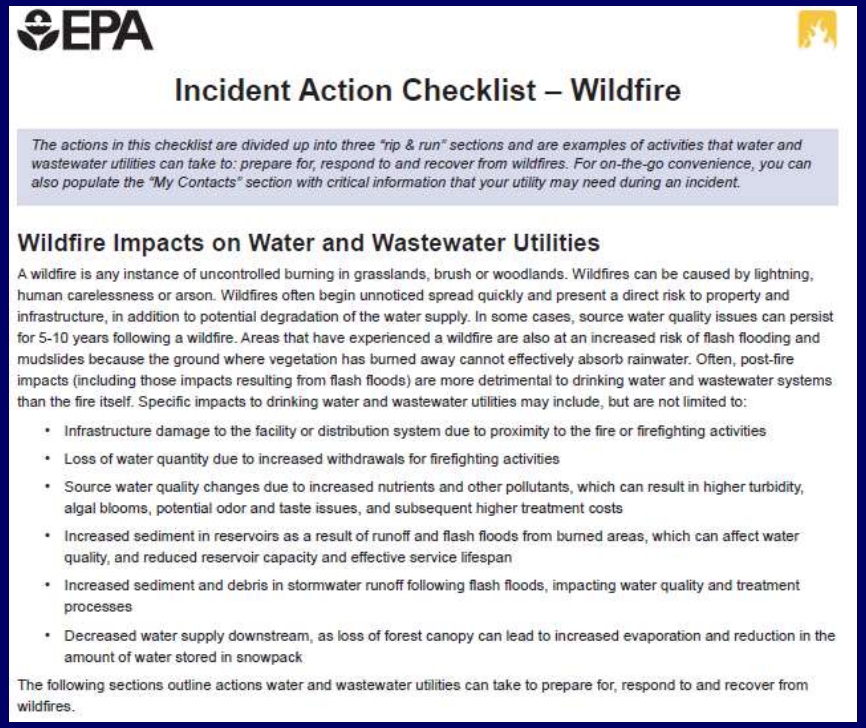
As Oregon's climate and weather patterns continue to change, bringing increasing temperatures, snowpack decline, earlier runoff, and other effects, the likelihood of wildfires increases. Wildfires can lead to public health emergencies, including emergencies that affect drinking water facilities. Oregon Drinking Water Services has developed the following guidance to help water systems prepare for wildfire season.

Actions to prepare for wildfire season

- Ensure your Emergency Response Plan is up to date and contains procedures or actions for how to respond to wildfires, including information on interties and emergency water sources, communications procedures, evacuation procedures for staff, and emergency contact information. Identify vulnerable water users such as hospitals and medical-care, childcare, and eldercare facilities.
  - Small Water System Vulnerability Assessment & Emergency Response Plan Template
  - EPA Emergency Response Plan Template
  - EPA Wildfire Incident Action Checklist
- Establish contacts with your local and county emergency management agency. Coordinating with emergency managers can mean quicker response activities such as power restoration, clearing debris from access roads, and emergency water hauling.
  - Oregon Local and Tribal Emergency Managers Contact List
  - Oregon Public Health Authority Directory by County
- Be ready to offer or receive mutual aid assistance to or from nearby water system operators by joining ORWARN. Available emergency equipment (pumps, generators, chlorinators, etc.) and personnel (trained operators) are available to other member utilities during an emergency. Membership is free.

2021-07 ePipeline Wildfire Prep Guidance Page 1 of 5

– https://go.usa.gov/xersz



EPA

Incident Action Checklist – Wildfire

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from wildfires. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Wildfire Impacts on Water and Wastewater Utilities

A wildfire is any instance of uncontrolled burning in grasslands, brush or woodlands. Wildfires can be caused by lightning, human carelessness or arson. Wildfires often begin unnoticed spread quickly and present a direct risk to property and infrastructure, in addition to potential degradation of the water supply. In some cases, source water quality issues can persist for 5-10 years following a wildfire. Areas that have experienced a wildfire are also at an increased risk of flash flooding and mudslides because the ground where vegetation has burned away cannot effectively absorb rainwater. Often, post-fire impacts (including those impacts resulting from flash floods) are more detrimental to drinking water and wastewater systems than the fire itself. Specific impacts to drinking water and wastewater utilities may include, but are not limited to:

- Infrastructure damage to the facility or distribution system due to proximity to the fire or firefighting activities
- Loss of water quantity due to increased withdrawals for firefighting activities
- Source water quality changes due to increased nutrients and other pollutants, which can result in higher turbidity, algal blooms, potential odor and taste issues, and subsequent higher treatment costs
- Increased sediment in reservoirs as a result of runoff and flash floods from burned areas, which can affect water quality, and reduced reservoir capacity and effective service lifespan
- Increased sediment and debris in stormwater runoff following flash floods, impacting water quality and treatment processes
- Decreased water supply downstream, as loss of forest canopy can lead to increased evaporation and reduction in the amount of water stored in snowpack

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from wildfires.

– https://go.usa.gov/xer6j

After the Wildfire

- Maintaining Your Well After the Fire
  - https://go.usa.gov/xer6V

OREGON WATER RESOURCES DEPARTMENT

Maintaining Your Well After Wildfire

Water Well Issues After Wildfire

This handout identifies a number of issues that may occur with water well systems following a wildfire and provides a list of contacts and resources.

Electrical Hazards

Exposed electrical wiring to the well poses a significant safety hazard due to the potential for electric shock. There is the potential for an electrical short to the metal casing or other infrastructure at the wellhead.

Fix damaged or exposed wires and other electrical issues prior to restoring power to the site, attempting well repair, or touching the well or wiring. Contact a licensed contractor authorized to work on water pumps or electrical to inspect or repair the wires. Flag the area at a safe distance as a warning to others until repairs are made.

Dug Wells: Falling and Drowning Hazards

Wells that are dug into the ground (instead of drilled) tend to be old and landowners may be unaware that such a well exists on their property. Well covers can be damaged by fire. People and animals can become trapped or injured by walking on a weakened well cover that collapses, or by accidentally falling into an uncovered well. Some dug wells also contain water and may be a drowning hazard.

The Oregon Water Resources Department (OWRD) can provide technical assistance to help abandon dug wells to prevent safety hazards and groundwater contamination. If the well is still in use, inspect and replace the well cover if damaged. Until the cover is repaired, place barricades around it to prevent animals and people from falling in.

Similarly, if you discover what appears to be a sinkhole or an open hole, barricade the area around it, as it may be a dug well. Do not push debris into the hole, as this can lead to groundwater contamination. Contact your local OWRD well inspector as soon as possible.

Drilled Wells and Water System Damage

Some drilled wells may be damaged by wildfire. For example, most domestic wells have steel casing that rises at least one-foot above land surface. Within the well, PVC liners, a sanitary seal with rubber gasket, or PVC pipes may be melted or damaged. Outside of the well casing is the well seal. The seal may be damaged by the fire and could allow surface contaminants to flow into the groundwater. Well houses, pipes, pressure tanks, and storage tanks should also be inspected for damage.

If a well was burned or damaged by fire, contact an Oregon licensed well constructor or licensed contractor authorized to work on water pumps to assess the damage.

Water wells drilled since 1996 have stainless steel ID labels attached to the well casing. If the label is not attached, re-attach it to the well casing using a steel band. If the label cannot be read, request a new label from OWRD.

Water Treatment Damage

Water treatment systems such as filters, tanks, and treatment systems may be damaged. Contact a water treatment professional to inspect and repair the system.

Contaminants and Water Testing

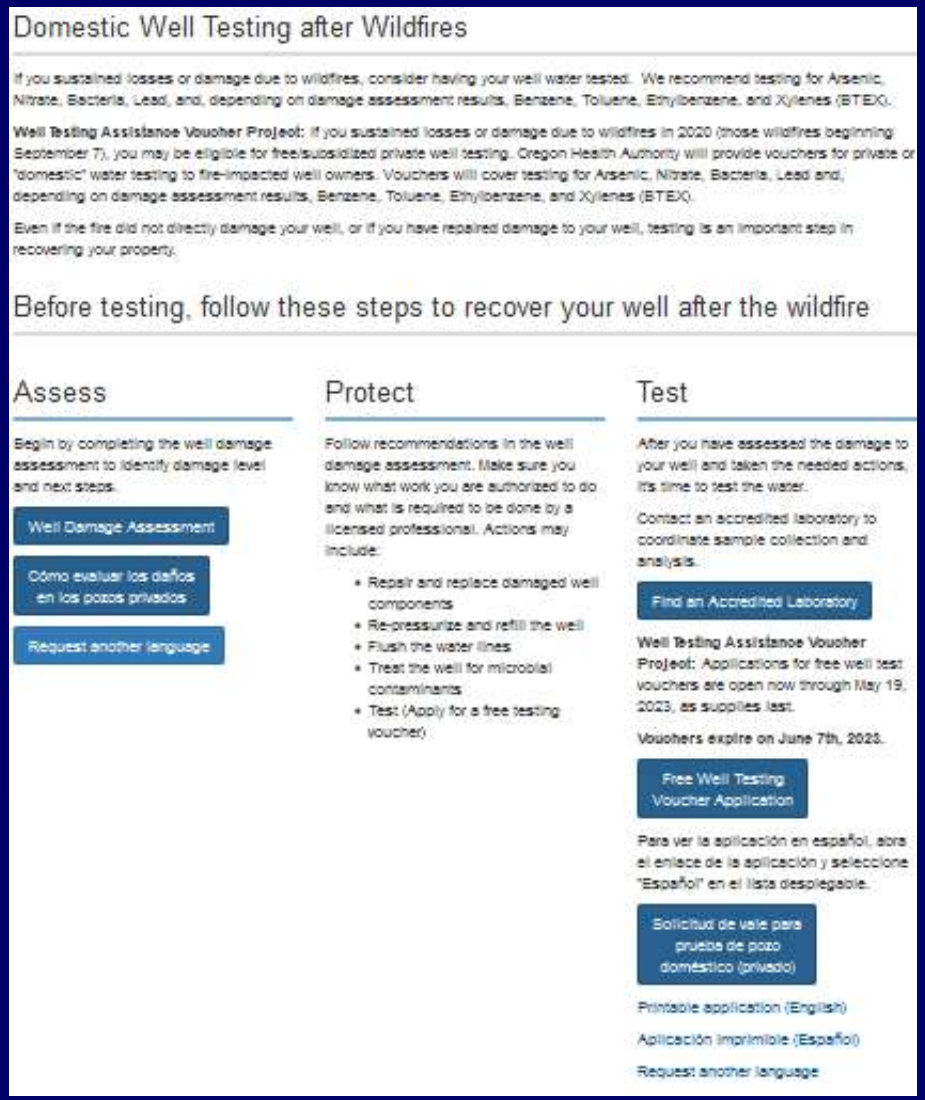
Chemicals can get into the water if the well, piping or water system is damaged, or if chemicals and contaminants from above ground seep into the ground and into the groundwater. In some instances, chemicals may also be a problem when a system is depressurized. Dug wells that are uncovered may also be contaminated with debris or ash. Visit the Oregon Health Authority's website for more information on potential contaminants: https://go.usa.gov/xGue7

It is recommended that you have your water tested before use. Contact a water treatment professional, licensed contractor authorized to work on water pumps, or licensed well constructor to investigate treatment options. In addition, if you use water from a dug well, have a professional clean out your well before use.

- Oregon Post-Wildfire and Flood Playbook
  - https://silverjackets.nfrmp.us/portals/0/doc/Oregon/PostFireFloodPlaybook_2018-09-30.pdf

Domestic Well Testing

- https://go.usa.gov/xerF2



Domestic Well Testing after Wildfires

If you sustained losses or damage due to wildfires, consider having your well water tested. We recommend testing for Arsenic, Nitrate, Bacteria, Lead, and, depending on damage assessment results, Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX).

Well Testing Assistance Voucher Project: If you sustained losses or damage due to wildfires in 2020 (those wildfires beginning September 7), you may be eligible for free/subsidized private well testing. Oregon Health Authority will provide vouchers for private or "domestic" water testing to fire-impacted well owners. Vouchers will cover testing for Arsenic, Nitrate, Bacteria, Lead and, depending on damage assessment results, Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX).

Even if the fire did not directly damage your well, or if you have repaired damage to your well, testing is an important step in recovering your property.

Before testing, follow these steps to recover your well after the wildfire

Assess

Begin by completing the well damage assessment to identify damage level and next steps.

Well Damage Assessment

Cómo evaluar los daños en los pozos privados

Request another language

Protect

Follow recommendations in the well damage assessment. Make sure you know what work you are authorized to do and what is required to be done by a licensed professional. Actions may include:

- Repair and replace damaged well components
- Re-pressurize and refill the well
- Flush the water lines
- Treat the well for microbial contaminants
- Test (Apply for a free testing voucher)

Test

After you have assessed the damage to your well and taken the needed actions, it's time to test the water.

Contact an accredited laboratory to coordinate sample collection and analysis.

Find an Accredited Laboratory

Well Testing Assistance Voucher Project: Applications for free well test vouchers are open now through May 19, 2023, as supplies last.

Vouchers expire on June 7th, 2023.

Free Well Testing Voucher Application

Para ver la aplicación en español, abra el enlace de la aplicación y seleccione "Español" en el lista desplegable.

Solicitud de vale para prueba de pozo doméstico (privado)

Printable application (English)

Aplicación imprimible (Español)

Request another language

Future of Wildfire Planning

- Senate Bill 762 - OSU to develop risk classes and risk mapping
  - Map available though Oregon Wildfire Risk Explorer
  - https://go.usa.gov/xeYqD
  - Plan to increase fire-adapted communities
    - Changes in building codes

Senate Bill 762 is comprehensive legislation passed with bipartisan support that will provide more than $220 million to help Oregon modernize and improve wildfire preparedness through three key strategies: creating fire-adapted communities, developing safe and effective response, and increasing the resiliency of Oregon's landscapes. The bill is the product of years of hard work by the Governor's Wildfire Council, the Legislature, and state agencies.

The legislation provides direction and investment to many state agencies. For the Board of Forestry and the Department of Forestry the bill, among other things, provides legislative direction regarding the wildland-urban interface; statewide fire risk mapping; prescribed fire; directed the Department to review and clarify the enforcement of rules pertaining to forestland; baseline standards for unprotected and under-protected lands in Oregon; and establishes grant programs to improve forest restoration and resiliency.

Below is more detailed information about programs and work related to implementing Senate Bill 762:

- Wildland-urban interface including risk map committees
- Prescribed fire
- Forest Restoration and Resiliency Investment Program
- Small Forestland Grant Program

- 20+ Water System Operators
  - Sample coordination and collection
- Sarah Rockwell, DEQ Lab Data Coordinator
  - Sample coordination and Lab Reports
- Greg Baird, OHA-DWS
  - Data Summaries
- Chantal Wikstrom, OHA-DWS
  - Wildfire and other Emergency Response Resources
- Bianca Dolan, OHA-DWS
  - GIS Fire Maps
- DWS-OHA Managers (Dave , Casey and Kari)
  - Guidance

Questions?

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