

Preliminary Results: Challenges and Solutions for Small Drinking Water Systems and Private Well Owners Impacted by the Marshall Fire



April 13, 2022

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2214580 RAPID: Drinking Water System
Contamination Response & Recovery
Following the 2021 Colorado Fires

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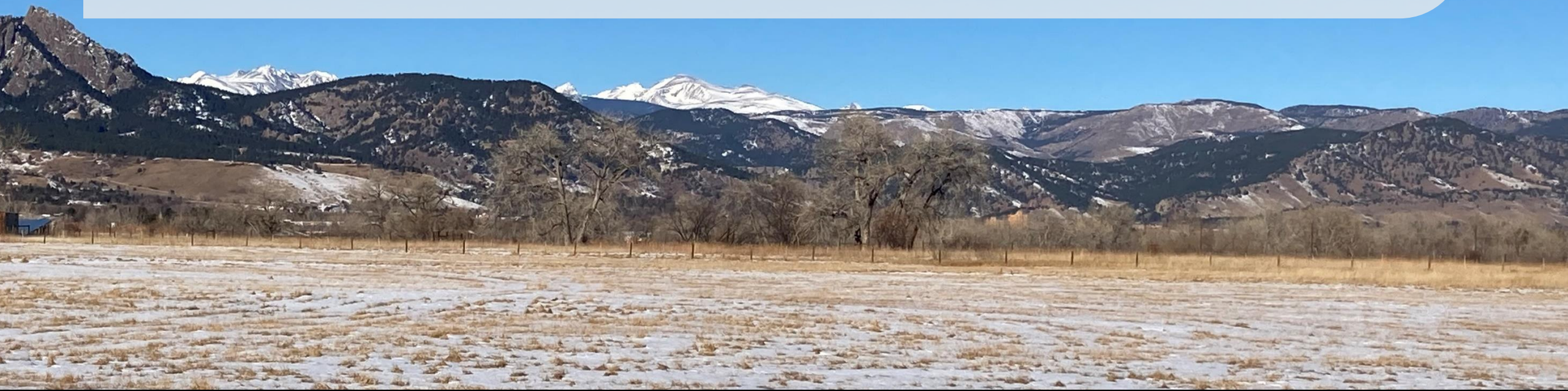


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A PWS supplies >25 of the same people >6 months/year

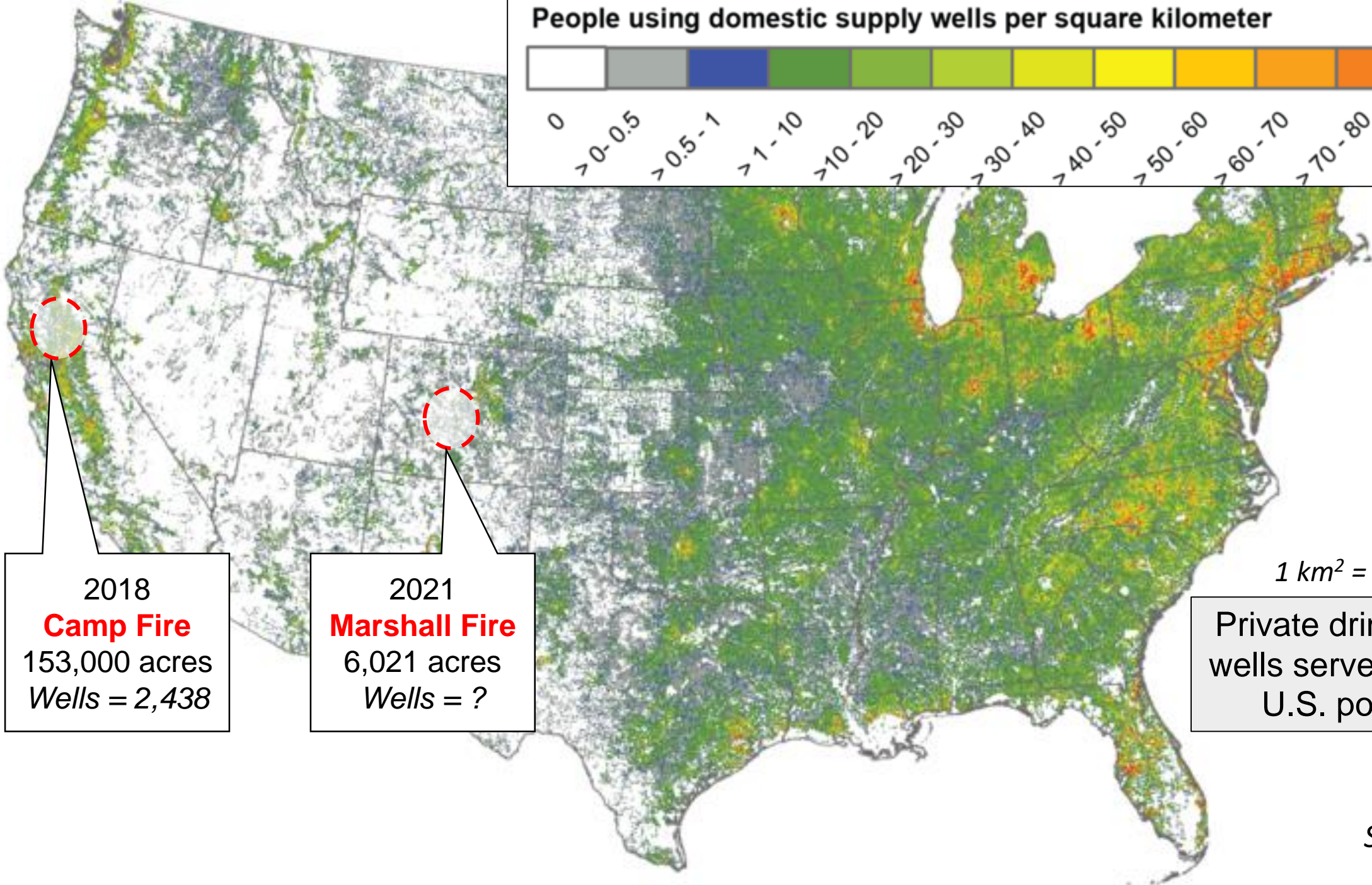
A '*small*' PWS serves <10,000 people

Small systems serve 78% of the U.S. population



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People using domestic supply wells per square kilometer



2018
Camp Fire
153,000 acres
Wells = 2,438

2021
Marshall Fire
6,021 acres
Wells = ?

1 km² = 0.38 mi²
Private drinking water
wells serve 15% of the
U.S. population

Source: USGS

Purpose

Support owners and users of small water systems and private drinking water wells in Boulder County after the Marshall Fire.

Goal

To better understand water infrastructure system damage and water contamination potential for small water systems and private well owners.

Objectives

- (1) Document experiences of the small water systems and review system data
- (2) Inspect private wells and conduct water testing to determine if *gross* volatile organic compound (VOC), semi-volatile organic compound (SVOC), or heavy metal contamination was present
- (3) Identify scientific and policy-gaps that inhibit better public health protection

Audience

Small water system and well owners and government sectors for improving their decision-making processes during incident response and recovery

| Name (population) | D/D Properties | Power Loss? | Chemical Contamination? | Mains, miles | Hydrants | Finished Water Storage, MG | Raw Water |
|-----------------------------|----------------|-------------|-------------------------|--------------|----------|----------------------------|-----------|
| EBCWD (300) | 72 of 137 | Yes | Yes | 8 | 40 | 0.1 | Lafayette |
| S.S. Mobile Home Park (150) | 3, wind | Yes | No | <1 | 0 | None | 1 Well |

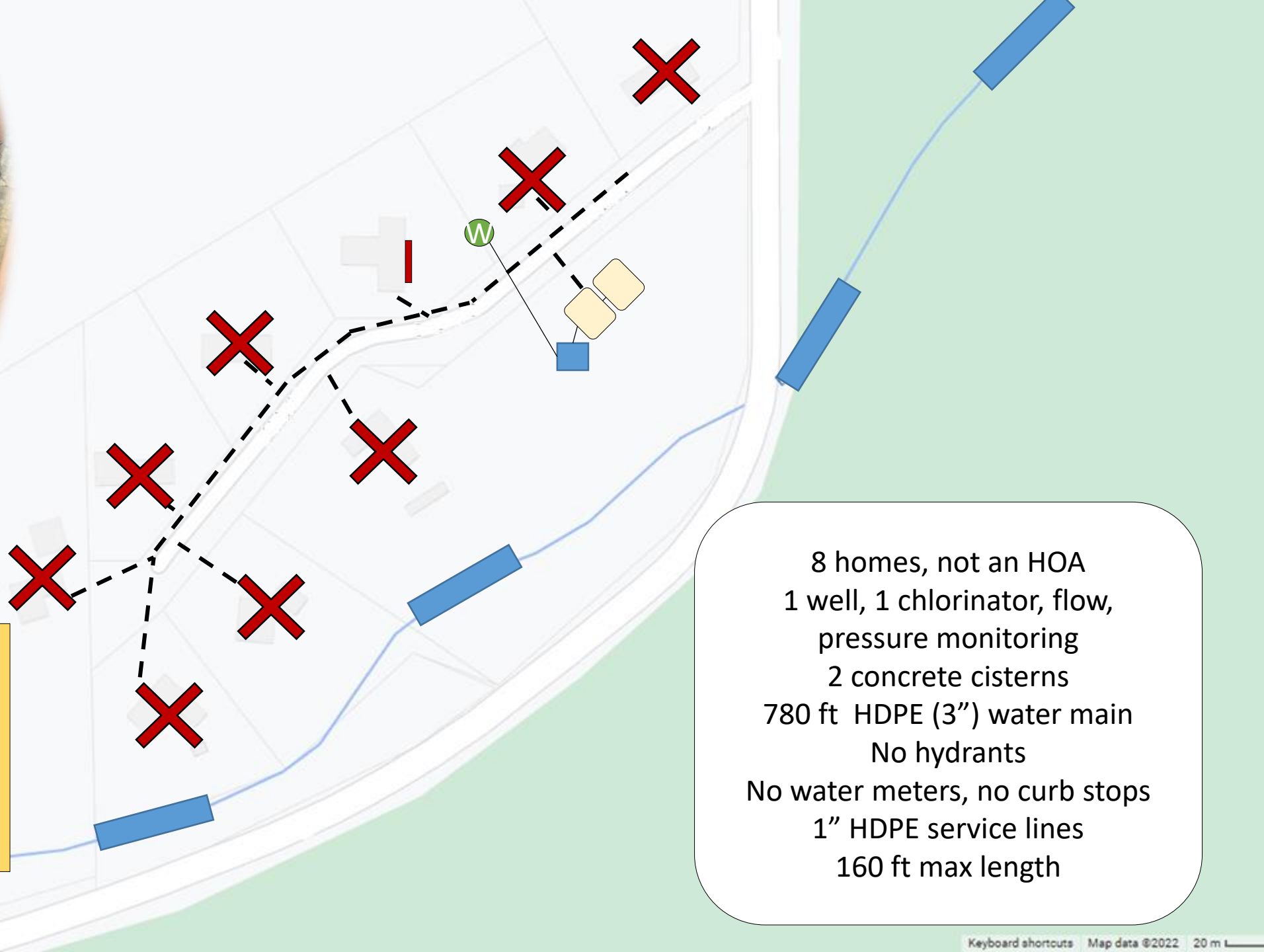




PWS until early 2000s

Post-fire:

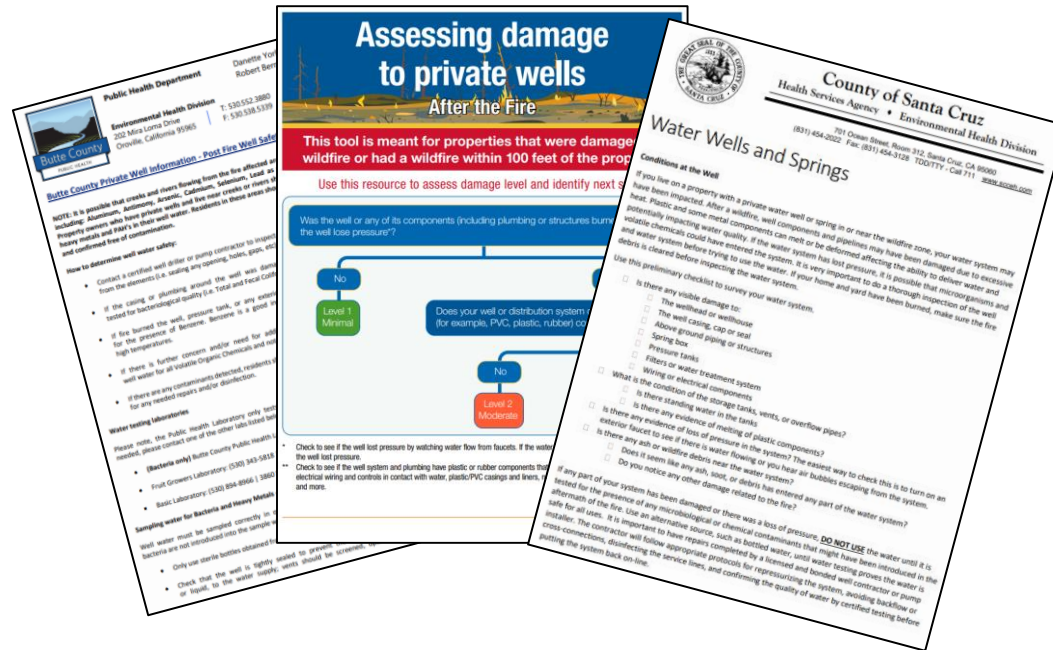
- ❖ Inoperable since Dec 30
- ❖ FEMA denied funding



8 homes, not an HOA
1 well, 1 chlorinator, flow,
pressure monitoring
2 concrete cisterns
780 ft HDPE (3") water main
No hydrants
No water meters, no curb stops
1" HDPE service lines
160 ft max length



Private drinking water wells and the buildings they supply can be damaged by fire



BCHD: Bacteria, Al, As, Cd, Pb, Sb, Se, PAH's

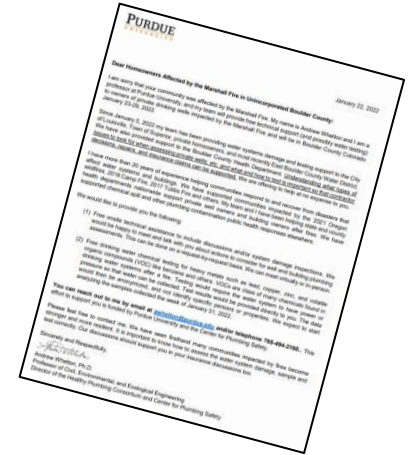
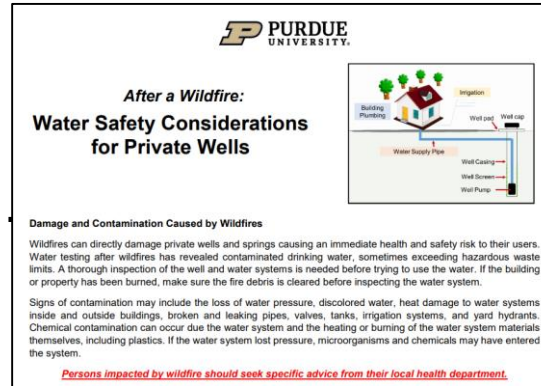
CDC: Bacteria, NO_3^- ; BTEX; local contaminants

WaDOH: Coliform bacteria

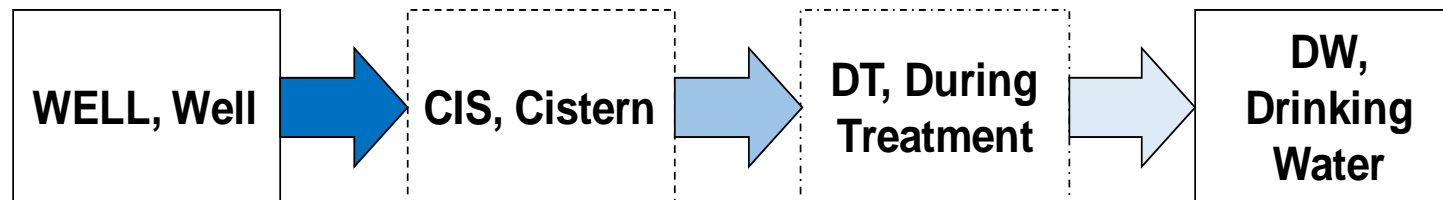
SCCHD: Coliform bacteria, turbidity, pH, conductivity, color, NO_3^- ; VOCs, SVOCs

OHA: Coliform bacteria, As, Pb, NO_3^- ; BTEX

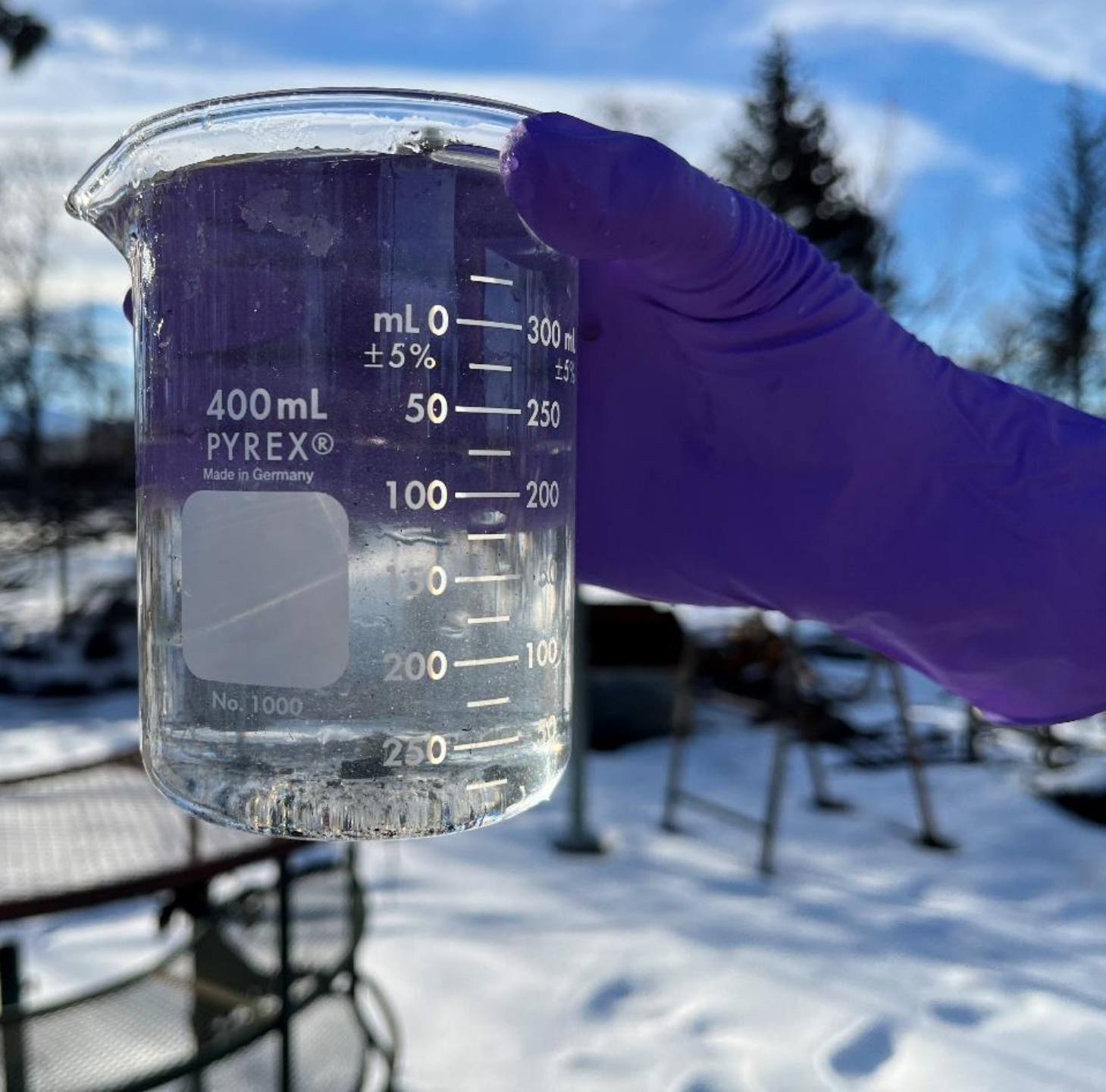
We Provided Support and Worked with the Boulder County Community and the Health Department



January 26 to 31, 2022 visits: 17 property contacts
Limitations discovered while onsite: Lack of power, sampling faucet, access, component condition
Complexity of in-home treatment was wide ranging









Other wells had
structures that
were destroyed,
debris was blown
into them for
more than 12 hr



SVOCs

| Contaminant | W7 (surface) | W7 (3-4 ft) | W13 | W5 |
|------------------------------|-----------------|----------------|------|-----|
| Azobenzene | - | - | - | 0.3 |
| 2-Nitrophenol | 0.15 | 0.11 | - | - |
| 1,2,3-Trichlorobenzene | 0.14 | 0.16 | - | - |
| Naphthalene | 0.15 | 0.19 | - | - |
| 2-Methylnaphthalene | 0.10 | 0.08 | - | - |
| 1-Methylnaphthalene | 0.16 | 0.18 | - | - |
| 2-Nitroaniline | - | 0.10 | - | - |
| Acenaphthylene | 0.19 | 0.23 | - | - |
| 1,2-Dinitrobenzene | 0.14 | 0.11 | - | - |
| Fluorene | 0.10 | 0.13 | - | - |
| 4-Nitroaniline | 0.10 | - | - | - |
| Phenanthrene | 0.14 | 0.25 | - | - |
| Di- <i>n</i> -butylphthalate | 5.9 | 0.48 | - | - |
| Fluoranthene | 0.13 | 1.0 | 0.19 | - |
| Pyrene | 0.14 | 0.19 | - | - |
| Bis(2-ethylhexyl)adipate | 9.3 | 4.9 | - | - |
| Chrysene | 0.12 | 0.12 | - | - |
| Bis(2-ethylhexyl)phthalate | 3.6 | 3.0 | - | - |
| Anthracene | - | - | 0.11 | - |

Inorganics

| Data Description | Min | Max | Mean \pm Stdev |
|--|------|-------|------------------|
| Wells & Cisterns – Marshall Fire (14) | 12.4 | 105 | 42 \pm 26 |
| Faucet – Marshall Fire (8) | 4.2 | 89.3 | 34.8 \pm 25.1 |
| PWS UCMR3 – Colorado (108) | 0.9 | 1,700 | 20.3 \pm 54.1 |
| PWS UCMR3 – Marshall Fire area (108) | 1.6 | 131 | 25.8 \pm 23.7 |

USEPA Li Screening Level: 10 ppb

| Data Description | Min | Max | Mean \pm Stdev |
|--|------|------|------------------|
| Wells & Cisterns – Marshall Fire (14) | 9.3 | 243 | 69.4 \pm 73 |
| Faucet – Marshall Fire (8) | 15.5 | 86.5 | 59.3 \pm 30.4 |
| PWS UCMR5 – ongoing | tbd | tbd | tbd |

USEPA V Screening Level: 86 ppb

Property Search
Jobs
Volunteer
Elections
County Government
Departments
Contact
Select Language

FAMILIES & ADULTS
OPEN SPACE & RECREATION
PROPERTY & LAND
ROADS & TRANSPORTATION
ENVIRONMENT & SUSTAINABILITY
SAFETY & LAW
LICENSES, PERMITS & RECORDS

Marshall Fire Information
Información sobre el Incendio Marshall

COVID Information
Información sobre COVID
COVID Vaccine Providers
Proveedores de Vacunas Contra COVID

WELLS & WASTEWATER AFTER A FIRE
Safety & Law / Fire / Wells & Wastewater After a Fire

Wells & Wastewater After a Fire

En Español

Your well or septic system could be adversely affected by the fire, power outages, equipment failure from fire damage, or contamination of water supplies. Be prepared, and have plenty of bottled water available for drinking and cooking when you return home.

Have your water tested before using for drinking, brushing teeth, or cooking purposes and for washing dishes or other cooking utensils. Bacteria and volatile and semi-volatile organic compounds could have contaminated drinking water from pressure loss due to power outages or heat and fire damage to the well, plumbing or structures connected to the well.

Wells

- Visually inspect your well and other components of your water system for damage including melted wiring for pumps and the well head.
- If the well head has been damaged, temporarily cap or cover the well with a 5 gallon bucket to prevent contaminants from entering. If you find damage to your well or water system, contact an appropriate contractor to repair the damage and test the water.
- Thoroughly flush your water lines and be sure to change any water filters in your house and appliances.
- Have your water tested for bacteria, volatile organic compounds (VOC's) and Semi-volatile Organic Compounds (SVOC's).
 - Allow the water to sit undisturbed (stagnate) for 72 hours prior to testing.
 - For more information on [Water Testing](#).

Water Use While Awaiting Test Results

While awaiting results of water testing, plan to use bottled water for cooking, drinking and brushing your teeth. You can use the water for flushing toilets.

Related Links

- Fire & Food Safety
- Fire Recovery
- Potential Hazards in a Wildfire Area
- Safe Cleanup after a Fire
- Wells & Wastewater after a Fire
- Wildfire & Mental Health
- Wildfire & Tetanus Risk

THE ENVIRONMENT AND YOUR HEALTH
Lithium in drinking water

Lithium is one of Earth's naturally occurring metals. It is found throughout the environment.

Lithium occurs naturally in some ground and surface water used for drinking. Lithium in our diet comes mostly from the foods we eat such as grains and vegetables. Manufacturers use lithium in batteries, renewable energy systems, medicine, and more.

Benefits and risks

Research suggests lithium has positive effects on the human brain, but too much lithium can cause health impacts.

Some people take lithium to treat conditions such as bipolar illness or major depression.

People who take lithium as a medication typically have their blood levels checked routinely to ensure the level of lithium isn't toxic.

Symptoms of too much lithium include nausea, diarrhea, dizziness, muscle weakness, fatigue, and neurological effects.

Too much lithium over longer time periods can cause thyroid or kidney problems.

Lithium in drinking water: Rules and guidelines

Lithium is not regulated in drinking water in the U.S.

Starting in January 2023, public water systems serving more than 3,300 people and 800 smaller public water systems nationwide will be required to monitor for lithium as part of the Environmental Protection Agency's (EPA) Unregulated Contaminant Monitoring Rule (UCMR). EPA uses the UCMR to collect data on contaminants in drinking water that have health-based standards. This data may lead to future regulations.

The EPA has a Health-Based Screening Level for lithium in drinking water of 10 parts per billion. This health-based guideline could change as we learn more about the potential health impacts of lithium.

Actions you can take

Test your water to find out how much lithium is in it. Visit cdphe.colorado.gov/laboratory-services/water-testing/homeowner-water-testing to find out more.

If you are concerned about the level of lithium in your water, you may want to consider a treatment system. Reverse osmosis and ion exchange are effective at removing lithium from drinking water.

If you have symptoms of too much lithium, talk to a health care provider.

If you take lithium as medication, do not stop taking it without talking to a health care provider.

Questions? Contact ToxCall | 303-692-2606 | cdphe_toxcall@state.co.us

Division of Environmental Health and Sustainability
Toxicology and Environmental Epidemiology Office

COLORADO
Department of Public Health & Environment

THE ENVIRONMENT AND YOUR HEALTH
Vanadium

Vanadium is one of Earth's naturally occurring metals. It is found in rocks and is naturally released into water and soil through erosion. It also can be in the air we breathe.

Vanadium is present in food and drinking water. Manufacturers use vanadium metal to strengthen steel. Other forms of vanadium are used in ceramics, magnets, and dietary supplements.

Health impacts of vanadium

Vanadium is found in many foods, locally in small amounts. It cannot be directly contacted with vanadium, but levels that are only present in food and water are not considered to be harmful.

Most people come into contact with vanadium in food, but breathing high levels of vanadium compounds may cause lung damage. People are most likely to be exposed to high levels of vanadium compounds in air in workplace settings.

Swallowing large amounts of vanadium may cause nausea, mild diarrhea, and stomach cramps.

The International Agency for Research on Cancer has determined that the form of vanadium that moves through the air, is possibly carcinogenic to humans. The determination is based on evidence of lung cancer in exposed mice.

Vanadium in drinking water

Vanadium is not regulated in drinking water in the U.S.

Between 2013 and 2015, the U.S. Environmental Protection Agency required public water systems serving more than 10,000 people and 800 smaller public water systems nationwide to monitor for vanadium as part of the Unregulated Contaminant Monitoring Rule (UCMR). EPA uses the UCMR to collect data on contaminants they may regulate in the future.

All of Colorado's public water systems tested as part of the UCMR found levels of vanadium below 86 parts per billion, which is a health-based screening level. Levels may be higher in private well water.

Actions you can take

Test your water to find out how much vanadium is in it. Visit cdphe.colorado.gov/laboratory-services/water-testing/homeowner-water-testing to find out more.

If you are concerned about the level of vanadium in your water, you may want to consider a treatment system. Reverse osmosis and ion exchange systems have been shown to remove vanadium.

Talk to a health care provider before taking supplements containing vanadium to find out if they are right for you.

Vanadium is in tobacco smoke. Don't smoke, or avoid smoking in enclosed spaces to limit exposure among children and others.

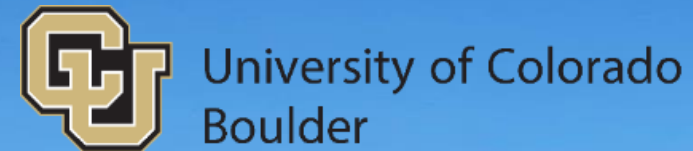
Questions? Contact ToxCall | 303-692-2606 | cdphe_toxcall@state.co.us

Division of Environmental Health and Sustainability
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Department of Public Health & Environment

1. Assessing well damage
2. Permit requirements for well repair
3. Water testing
4. CDPHE Factsheets: Lithium and vanadium
5. Testing laboratories for VOCs, SVOC, and heavy metals
6. Home water filtration systems
7. Resources for well owners
8. Resources for onsite wastewater treatment system owners


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| | |
|-------------|--|
| 1958 | Subdivision founded |
| 1960 | Well drilled and 3 houses constructed |
| 1960s/1970s | 6 lots more developed, cistern and water mains installed |
| 1970s | Classified as a regulated PWS |
| 1974 | House fire destroyed all records |
| Early 2000s | Homeowner disconnected water system (drops below legal PWS definition) |
| 2009 | Realized not legally in possession of water rights assumed since 1960. Through law, property owners transferred water rights to the system |



3.5 Months Post-wildfire

FEMA says they do not qualify for support

CDHPE says their well is inactive and they were an HOA

Depressurized since December 30, 2022

Unclear if there's mechanical damage or chemical contamination

Waiting for debris removal before fixing the water system