UPDATE: Drinking Water System Damage and Recovery from the 2021 Marshall Fire, Colorado

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Impacted area is unlike the national U.S. average for demographics, income, and education

<table>
<thead>
<tr>
<th>Parameter</th>
<th>National</th>
<th>Community</th>
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<tbody>
<tr>
<td>Median household income</td>
<td>$62,843</td>
<td>$127,292</td>
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<tr>
<td>B.S. degree or higher</td>
<td>32.1%</td>
<td>76.3%</td>
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<tr>
<td>Mean home value</td>
<td>$217,500</td>
<td>$576,800</td>
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Most destructive fire in Colorado’s history, >$1B damage
Started at 12 Tribes property, Louisville (under investigation)
70 mph sustained winds, 100 mph gusts for many hours
>1,000 homes and many commercial buildings destroyed
Timeline (in progress)

Dec 30
  At 11:00 am, fire began
  At 12:00 pm, > 35,000 people evacuation order
  By 5 pm the fire was 1,600 acres

Dec 31
  Fire was 6,021 acres
  During evening, snowfall and fire containment occurred for region
  But, pipes froze and broke for buildings in the affected area

Jan 2-4, I was talking with CDPHE, a few utilities impacted, and some community members reached out

Jan 5, 1:30 pm Town of Louisville called for help, 5:00 pm on plane to Colorado

Jan 6, Water system response and recovery meeting: CDPHE, USEPA R8, R9, Louisville, Superior, Purdue, Corona, CU-Boulder, OSU

Jan 7-8, Repressurization, bacteria + chlorine disinfectant testing

Jan 9-Present, More focused VOC testing of open and closed areas; smoky drinking water taste and odor being reported and investigation in Superior
Snowfall helped extinguish the fire and hotspots.
Fire fighters had low or lost water pressure

Louisville water plant powerlines caught fire, took out water production

Superior emergency water plant generator caught fire and blew up

Louisville operators drove into the fire zone and opened the Superior interconnection to help neighbor

Louisville only had 1-2 ft of water in storage tanks upon inspection

Louisville sent untreated lake water into the distribution system to provide firefighters a chance to protect life and property

Liquified NG driven into fire zone to restore water treatment plant, Louisville

Utilities isolated damaged neighborhoods and shutoff curb stops to damaged properties in rest of systems

Cows on fire

More to come...
5 public water systems issued boil water advisories serving 38,000

Customers had damaged or destroyed properties

Properties with private wells also damaged and destroyed
Chemical drinking water testing ongoing

USEPA Methods 524.2, 524.4, 8260C for VOCs applied so far

Multiple commercial laboratories used, but challenges

- Sometimes labs can look for certain chemicals and not others
- Lab capacity for samples and rapid turn around times

Following best practice compiled from all prior wildfire water distribution system contamination studies by Purdue (stagnation, specific chemicals, etc.)

Testing water mains first, then service lines
Mutual aide from communities was critical Boulder, Fort Collins, Erie, Westminster, and more...
Plastic and metal plumbing exists in standing homes.
No contamination found yet.
Continued testing underway.

Continue to provide technical support and advice

Plan to return in January for support and learning lessons for utilities and communities

CDPHE has been supportive to the utilities

Residents have been tremendously helpful. It’s a community recovery.
Properties still covered in disaster debris and require cleanup. Some residents urgently want to rebuild.
Private well and building water testing guidance from Purdue

https://engineering.purdue.edu/PlumbingSafety/resources/wildfire-response
Thank You & God Bless
EMERGENCY RESPONDERS
Because of the public works and other staff, communities will be able to have confidence in water safety when their system are repaired.

Water is the foundation of community health, safety, and economic prosperity.
Friends are the family we choose.
More details and studies to come from several people and orgs. Stay tuned.

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Response and Recovery to Wildfire Caused Drinking Water Contamination

Wildfires can damage buried drinking water systems as well as private drinking water wells and building plumbing, making them unsafe to use. Since 2017, a growing number of wildfires have prompted chemical drinking water contamination in the United States. Levels found in some water systems have exceeded hazardous waste limits and posed an immediate health risk. To help households and building owners understand key wildfire drinking water contamination public safety issues, resources were compiled below. These resources will also be of interest to public health officials, water providers, municipalities, emergency management, insurance companies, nonprofit agencies, elected officials, and consultants.

- Questions can be directed to Dr. Andrew Whelton at awhelton@purdue.edu.

https://engineering.purdue.edu/PlumbingSafety/resources/wildfire-response