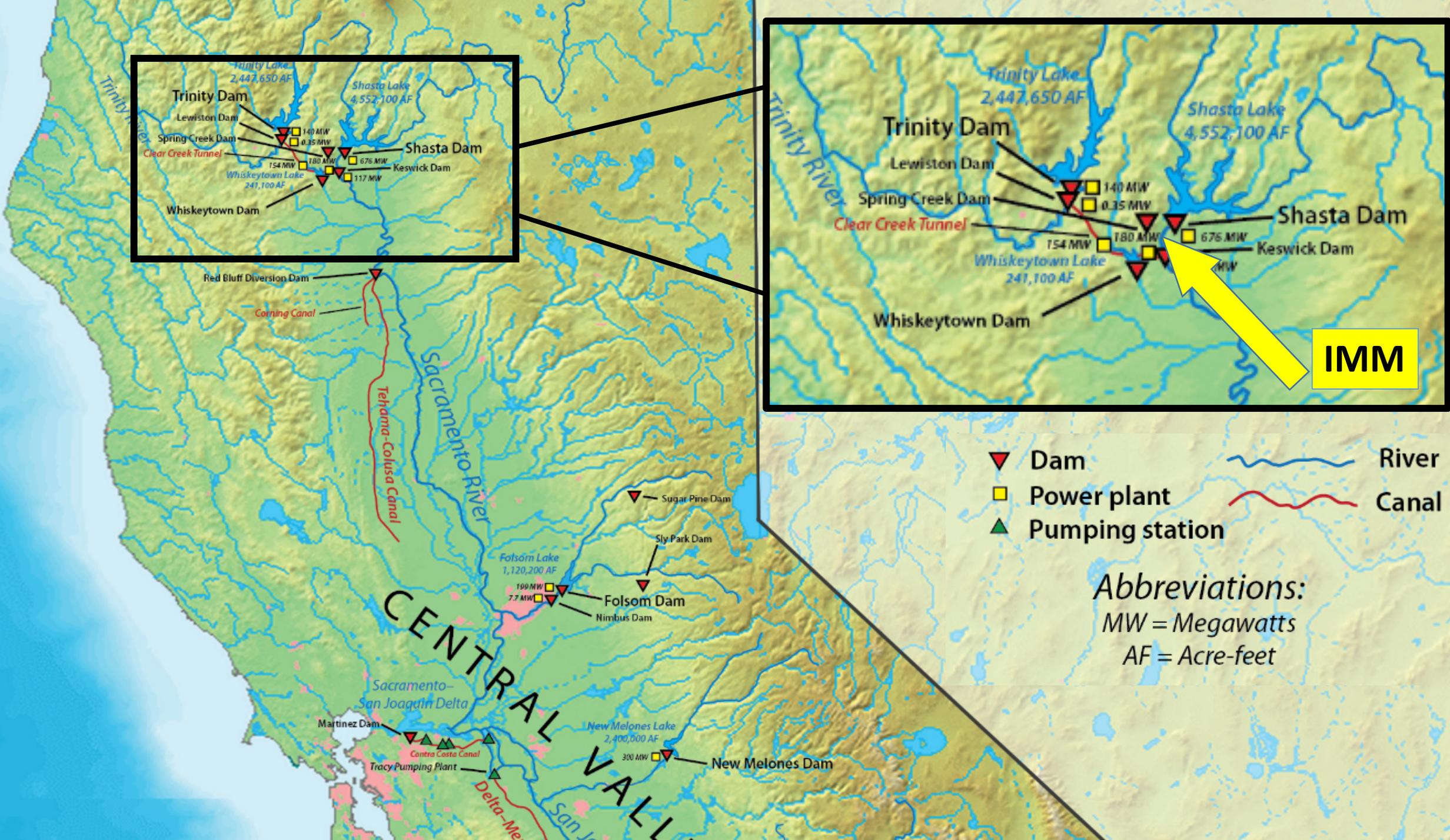


Iron Mountain Mine Superfund Site Emergency Planning and Remedy Resiliency



Lily Tavassoli, Superfund Project Manager, US EPA Region 9



Site Remediation

- Mined 1890-1963 for copper, zinc, gold, silver, and pyrite
- Site flows into the Sacramento River
 - Most critical spawning habitat for salmon in CA
 - 20% of California's water supply
 - Major source of hydroelectric power, ag water
- Historic discharges into Sacramento River: 6 tons of metals per day
- >30 documented large-scale fish kills
- Site listed on National Priorities List in 1983



Golden state mine recorded as worst water

Staff, wire reports

REDDING — Researchers working in the abandoned Iron Mountain copper mine knew they faced radical conditions.

Shovels left overnight in puddles deep in the mine dissolved where the water touched them. Rock hammers dipped in the water came up copper-plated after a few minutes.

When droplets dripped on the scientists from translucent green stalactites deep within the mine, they had to dab them with baking soda to neutralize the liquid before it burned them.

Even wearing hazardous-material "moon suits" with masks, goggles and gloves, those working in the Superfund site's hot, humid upper chamber had a sour, gritty taste in their mouths.

"Basically, your teeth are dissolving," says Charlie Alpers of Davis, a U.S. Geological Survey scientist and UC Davis research associate.

The result of that 1990 trip, recently published: Alpers and colleague Kirk Nordstrom discovered the most acidic water found in nature. And there's more. Other scientists recently announced the discovery of an acid-producing microbe that thrives in the harsh conditions, exacerbating



Inside a toxic hellhole, Iron Mountain Mine

ENVIRONMENT Iron Mountain's runoff polluted rivers for century

By Peter Fimrite Published 4:00 am, Sunday, August 29, 2010



World's 'Worst Water' Found Near Redding

Acidity at Iron Mountain mine stuns scientists

By Carl T. Hall
CHRONICLE SCIENCE WRITER

IN NATION

Site Remediation

- Extensive EPA investment: \$500M spent so far over 5 interim RODs
- Successful enforcement: Site operator implements \$5M/year remedy, settlement value ~\$1B
- >250M gallons treated per year
- Treatment plant effectiveness: influent contains 300,000 ppb Cu-T, effluent contains ~3 ppb
- 97% reduction of metals leaving site



AMD Treatment and Disposal

Minnesota Flats Treatment Plant



Sludge Drying Ponds

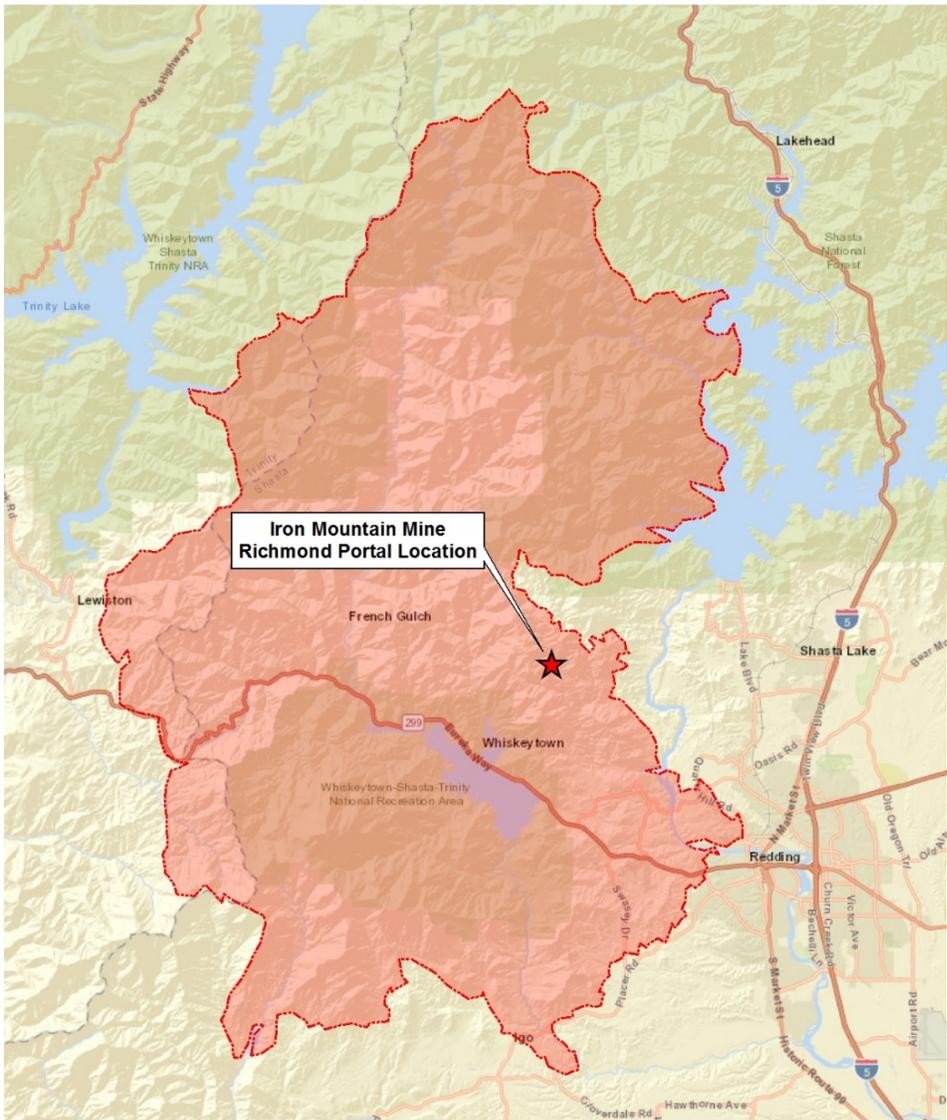


Brick Flat Pit



Extreme Weather Events

- 1997 Flood
- 2008 Fire
- 2017 Flood
- 2018 Carr Fire
- 2019 Flood



Threat to Treatment Plant & Site Infrastructure



Fire Impacts and Emergency Response



Lessons Learned – Responding During an Emergency

- Relationships are our resources
 - Cast a wide net, call every single person/organization that could assist
- Use every and all options
 - Mobilize resources as soon as possible
 - Bring more than needed – alternatives and amounts
- Use resources as they arrive
- Logistics are critical
- Everyone wants to know what's going on and help, but the focus needs to be on the mission
 - Daily emails to all interested parties

What does success look like?

- No loss of capture and collection of AMD throughout fire
 - Treatment was held for one week until power was restored
- Infrastructure loss was minimal and rebuilding was done quickly
 - Important relationships with vendors
 - Rebuilding pipes: choosing different materials

Tools for Effective Emergency Planning

- Adaptive Management
 - Each emergency should be used to strengthen site infrastructure
- Emergency Preparedness Plan
 - Key site document that outlines specific emergency scenarios
 - Update as needed
 - Keep copies everywhere
- Emergency Responders Meetings
 - Getting key external players to understand site infrastructure
 - 2008 fire: site operators evacuated from area
- Asset Management Planning
 - Multi-year process, large resource investment
 - Not used frequently at SFD sites
 - Many benefits, extremely useful for emergency planning and recovery



Questions?

