

# Natural Fluoride in Drinking Water

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ASTDD “Coffee Break” – September 14, 2016



## General Reminders



- This “coffee break” will be recorded and archived on the ASTDD website;
- Questions will be addressed after the speakers are finished. Please type your question into the “chatbox” that will appear at the end of the “coffee break” and then click on the bubble to the right of where you type your question to send it to the moderator;
- Please respond to the polling questions at the conclusion of the “coffee break.”



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# Natural Fluoride in Drinking Water: ASTDD Fact Sheet



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This coffee break webinar accompanies a *fact sheet* prepared for State and Territorial Dental Directors to assist in providing answers to common questions about fluoride occurring naturally in private wells and groundwater.

<http://www.astdd.org/fluoridation-and-fluorides-committee/>

# Webinar Objectives

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- *Describe the variation of fluoride concentration found naturally in drinking water sources.*
- *Identify the responsibility for monitoring fluoride found naturally in public and private water systems.*
- *Name the government agencies responsible for making recommendations for levels for fluoride in drinking water.*
- *Provide information sources for water filtration systems that reduce or remove excessive fluoride from drinking water.*
- *How do I find the level of fluoride in my water?*

# Natural Fluoride in Water

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- Fluoride is the 13th most abundant element in the earth's crust.
- Fluoride is present in all water sources at concentrations ranging from minimally detectable to more than 10 parts per million (ppm) (mg/L).
- Fluoride in ocean water (96.5 percent of Earth's water) is typically in the range of 1.2 to 1.4 ppm
- Surface water: fluoride level in rivers and lakes varies widely reflecting rainwater contact with windblown soils and other elements in the environment.
- Well water (groundwater): fluoride levels vary depending on the minerals in the rock and ores that the water passes through.

# High Natural Fluoride in Water in the USA

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- Water samples contained between 2 to 13.7 ppm fluoride in Colorado, Idaho, North Dakota, South Dakota and Arkansas when first studied in 1931, but were not detectable east of the Appalachians.
- Churchill, HV. Occurrence of Fluorides in Some Waters of the United States. Industrial and Engineering Chemistry. Sept 1931. 23(9)996-8.

# High Natural Fluoride in Water

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- Water sources with high fluoride concentrations affect up to 60% of populations of the African continent, China and Pakistan.
- Of the US population served by community water systems:
  - <0.5% exceeds 2 ppm fluoride
  - <0.1% exceeds 4 ppm fluoride
- World Health Organization. [\*Fluoride in Drinking-water\*](#). pp: 5-8. 2006.
- Petersen PE, Lennon MA. [Effective use of fluorides for the prevention of dental caries in the 21st century: the WHO approach](#). Community Dent Oral Epidemiol. 2004;32:319–21.
- National Academies Press. [Fluoride in Drinking Water: A Scientific Review of EPA's Standards](#). 2006;2:25.



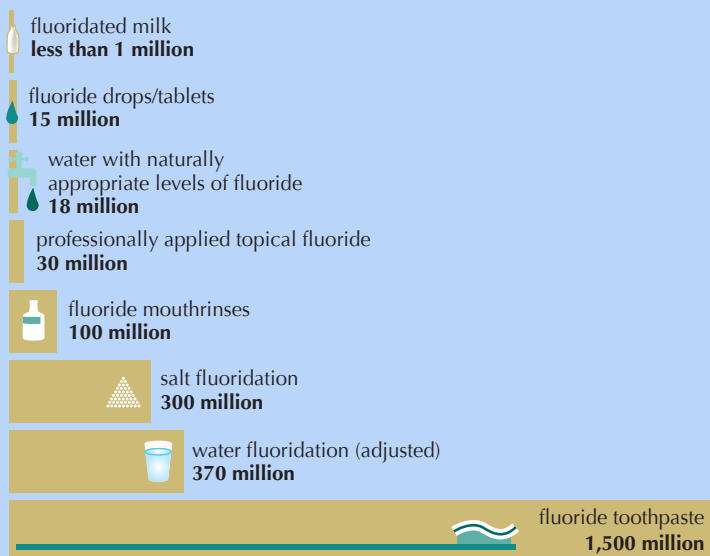
# Uses of Fluoride

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## Global Fluoride Use for Oral Health

### FLUORIDE USE

Estimated number of people worldwide using different sources of fluoride 2001  
salt 2013  
water 2012



From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.  
Maps and graphics © Myriad Editions 2015

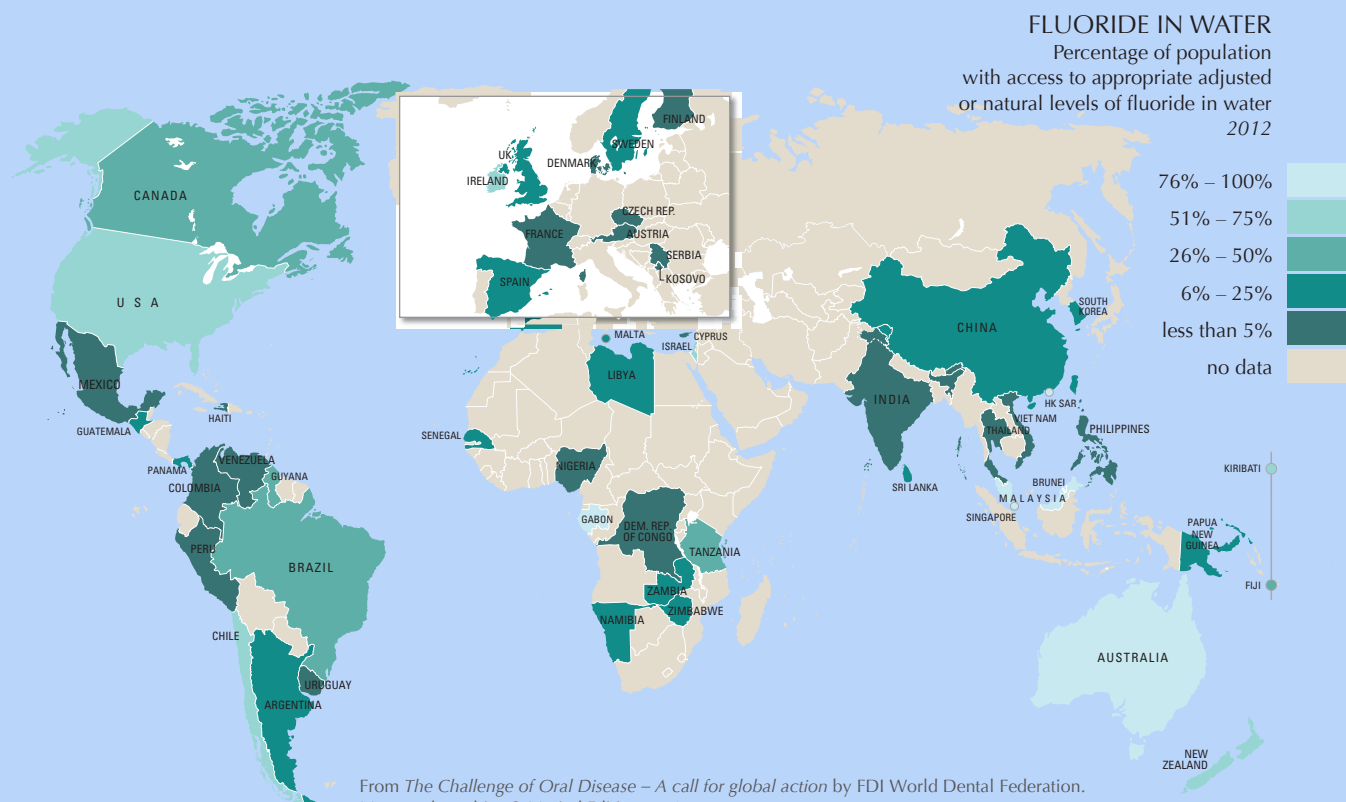
## Other uses of fluoride

- Fluoride salts and hydrofluoric acid are the main fluorides of industrial value
- The main uses of fluoride, in terms of volume, are in the production of cryolite,  $\text{Na}_3\text{AlF}_6$ . It is used in aluminum smelting.
- Fluorite  $\text{CaF}_2$  is used on a large scale to separate slag in steel-making
- Hydrofluoric acid, HF, and its anhydrous form, hydrogen fluoride, is also used in the production of fluorocarbons for refrigerants, solvents, and anesthetics and contrast-enhanced ultrasound.
- Organofluorine chemistry for oil and water repellents to pharmaceuticals, refrigerants and reagents in catalysis
- Hydrofluoric acid has a variety of specialized applications, including its ability to dissolve glass

# Fluoride in Water – World Map 2012

## Appropriate adjusted or natural level

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# Who is responsible for monitoring fluoride found naturally in *public/community* water systems?



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- The Safe Drinking Water Act (SDWA) designated the Environmental Protection Agency (EPA) as the lead agency responsible for safe levels of substances in drinking water.
- The EPA is responsible for setting regulatory standards for the quality of public (community) drinking water systems defined as water systems with 15 or more service connections or serving 25 or more persons for 60 days in a year (for example, parks and recreational areas).

# Who is responsible for monitoring fluoride found naturally in *private* water systems?



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- 15% of U.S. residents rely on private wells that are not regulated by the EPA.
- Private groundwater wells serving fewer than 15 connections or fewer than 25 persons for no more than 60 days in a year are not regulated.
- It is the responsibility of the well owner to know the quality of the water and if is suitable for human consumption.
- The EPA recommends wells used for drinking water be tested once every 3 years since water quality can change over time.
- ASTDD recommends that private well owners test their wells for drinking water contaminants that are of significant health concern

- The SDWA defines any physical, chemical, biological or radiological substances or matter in water found in drinking water as “contaminants” regardless of the effect or level of the substance on human health.
- Drinking water contains small amounts of many different contaminants below the identified regulatory safe level.
- EPA considers scientific literature on health effects of all regulated substances and establishes a maximum level in drinking water to protect against adverse health effects.

## National Water-Quality Assessment (NAWQA) Program

# Quality of Water from Private Wells in the United States

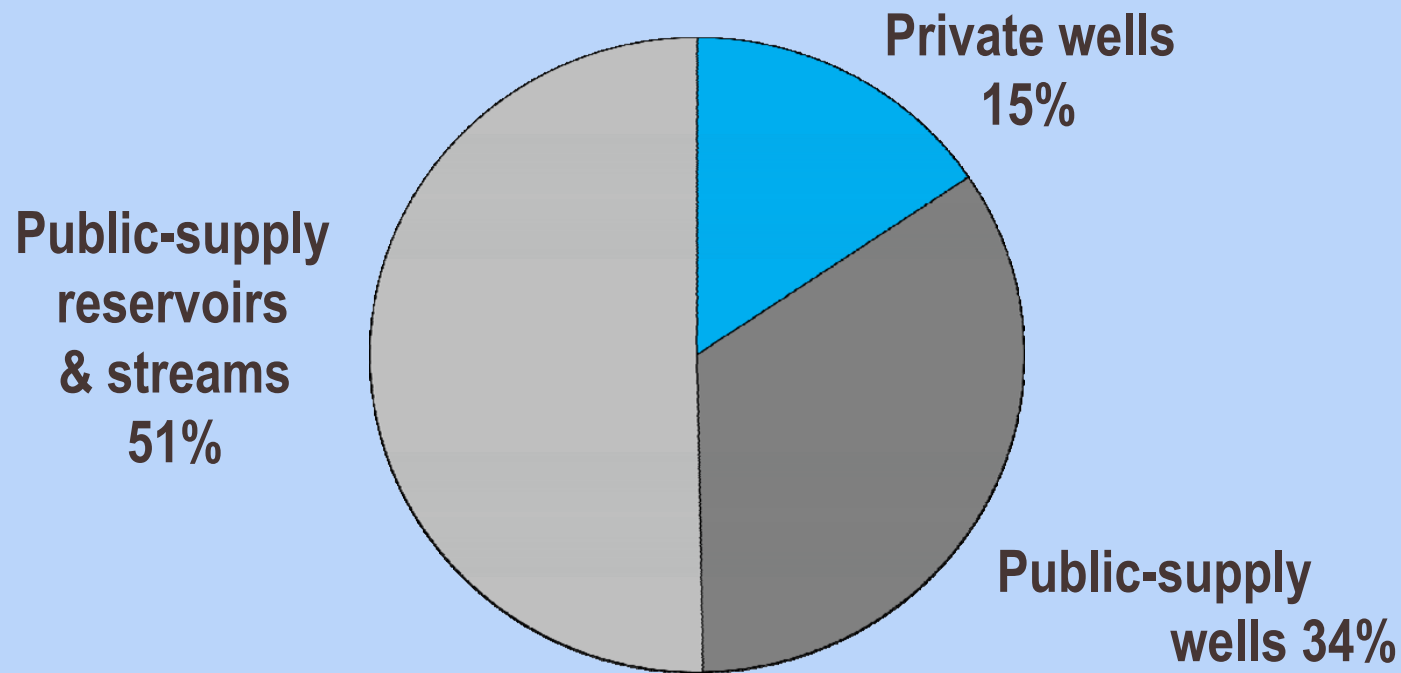


- For more information:

[http://water.usgs.gov/nawqa/domestic\\_wells](http://water.usgs.gov/nawqa/domestic_wells)

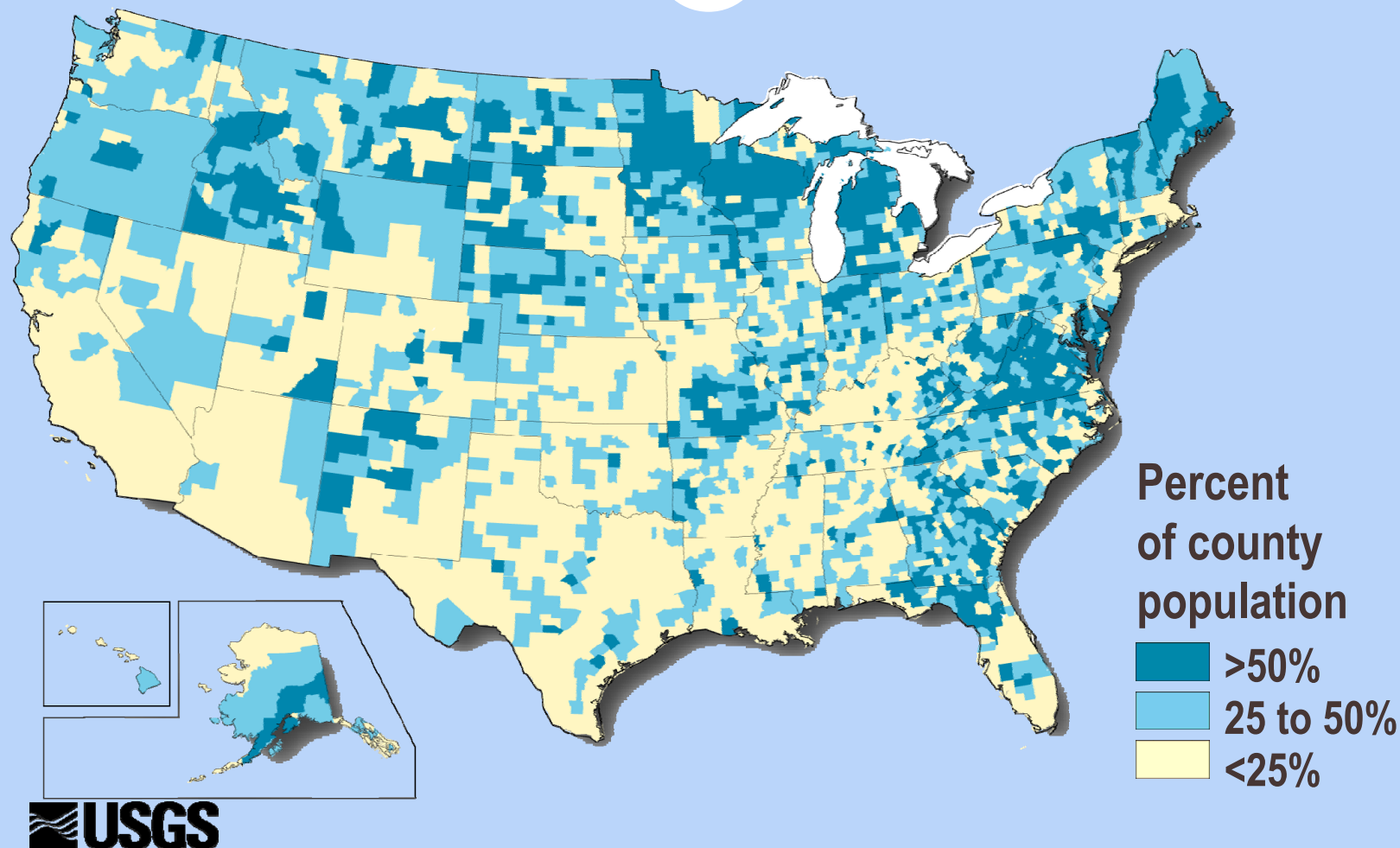
# Drinking-Water Sources Serving the U.S. Population

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# Private Wells are the Primary Source of Drinking Water in Many Counties

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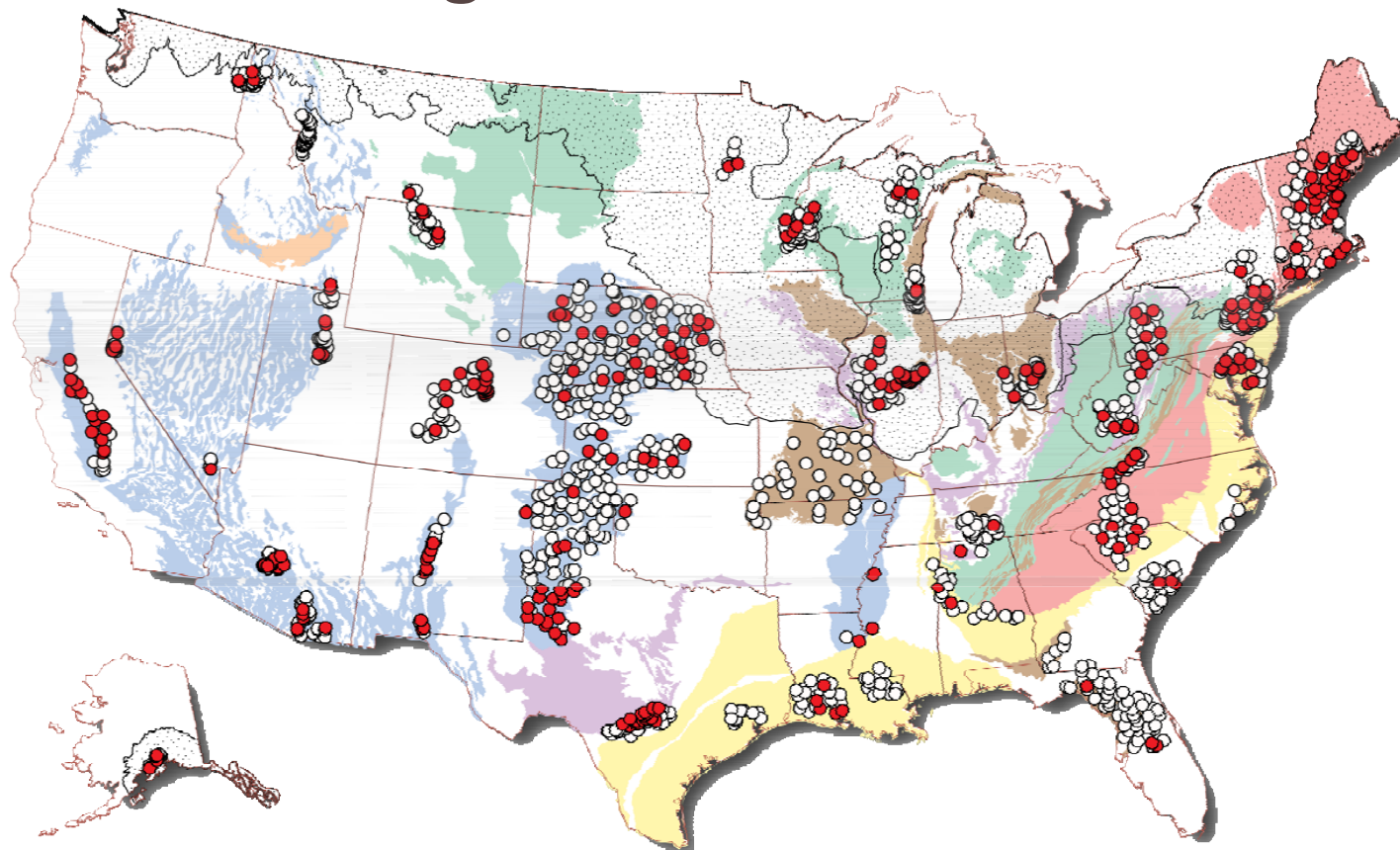
# Fluoride as a Contaminant in Water

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- How often are contaminants a potential human-health concern in private wells?
- What contaminants are primary concerns and where do they occur?
- Do these contaminants occur alone or together with other contaminants as mixtures?

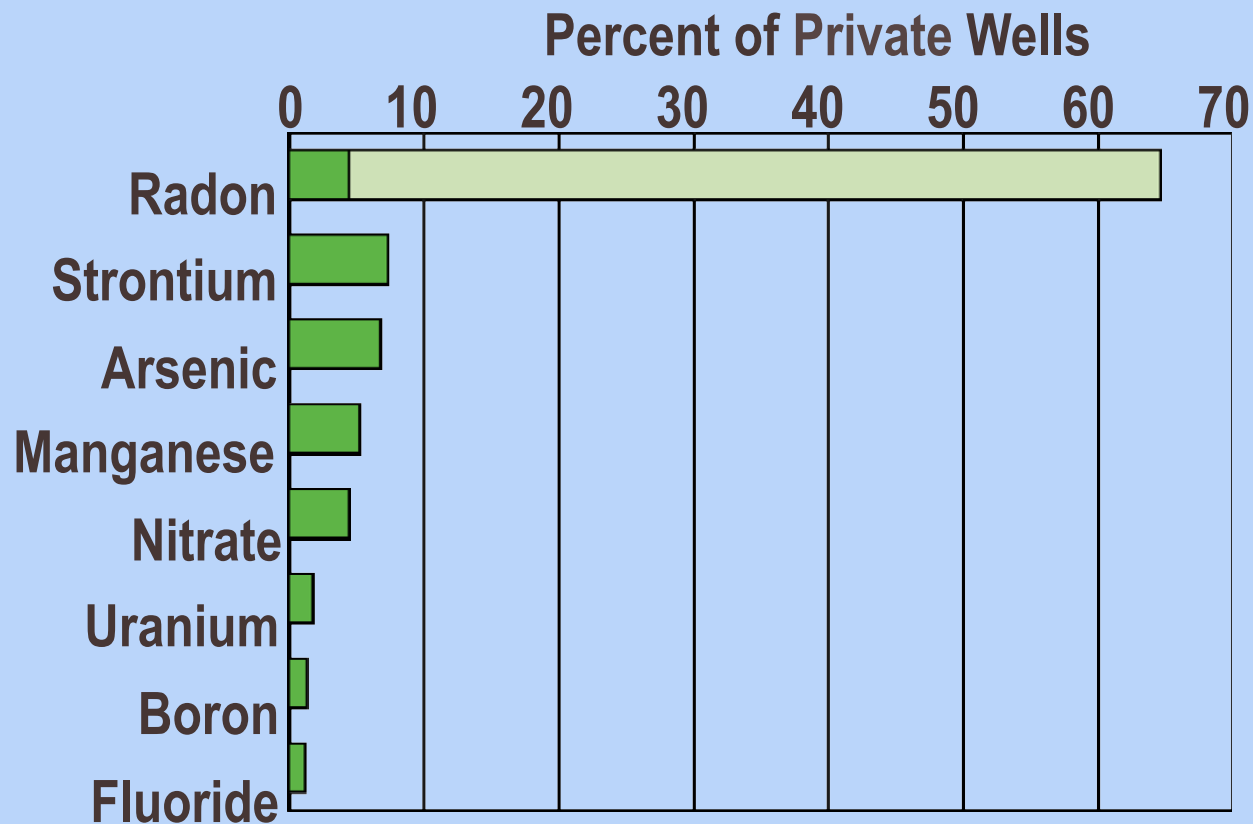


## 23% of Wells had One or More Contaminants Exceeding Health Benchmarks



# Most Contaminants that Exceeded Benchmarks are Naturally Occurring

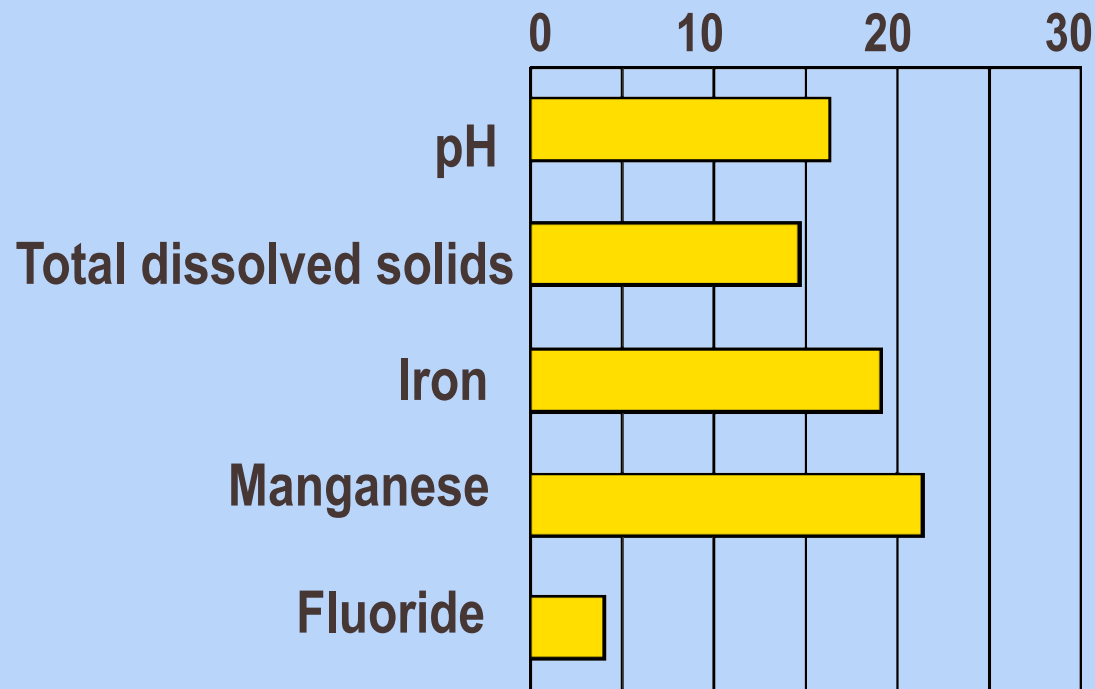
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# 'Secondary Contaminants' Outside of Recommended Ranges in 50% of Wells

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## Percent of Private Wells



# What are the recommended levels for fluoride in drinking water sources?

- Water is the main source of fluoride exposure.
- The EPA has set maximum allowable concentrations (MCL) of fluoride in drinking water
  - at 2 ppm to prevent severe enamel fluorosis (secondary MCL)
  - at 4 ppm to prevent skeletal fluorosis (primary MCL)
- Primary MCL is enforceable by the EPA considering it unusable as a *routine* drinking water source.
- SWDA requires public notification when the level is greater than 2 ppm
- States may set their own standard for the lower MCL.
- EPA. Questions and Answers on Fluoride. (2011)  
[https://www.epa.gov/sites/production/files/2015-10/documents/2011\\_fluoride\\_questionsanswers.pdf](https://www.epa.gov/sites/production/files/2015-10/documents/2011_fluoride_questionsanswers.pdf)
- EPA. Drinking Water Regulatory Information.  
<https://www.epa.gov/dwreginfo/drinking-water-regulatory-information>

# What are the recommended levels for fluoride in drinking water sources?

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- The USPHS recommends 0.7 ppm as the optimum level of fluoride in drinking water for reducing the risk of tooth decay, while at the same time remaining low enough to reduce the risk of enamel fluorosis, a staining of the teeth.
- At the USPHS recommended level of 0.7 ppm, there are no adverse health effects.
- Over 117 organizations, including the USPHS, Centers for Disease Control and Prevention (CDC), American Dental Association (ADA) and ASTDD, encourage the adjustment of the naturally occurring fluoride level to meet the optimal concentration for preventing dental decay.

# What are the recommended levels for fluoride in drinking water sources?

- If the naturally occurring level of fluoride in a source of drinking water is not adequate, and the water supply cannot be fluoridated, fluoride supplements are recommended for children at risk for tooth decay.
- Health professionals need to know when the fluoride level in drinking water is less than the recommended level to safely and effectively prescribe fluoride supplements for children, thus making testing of individual private wells necessary.
- ASTDD. Fluoride Supplement Policy Statement.  
<http://www.astdd.org/docs/fluoride-supplement-policy-statement-january-28-2013.pdf>

# What water filtration systems reduce or remove excessive fluoride from drinking water?

- Removal of fluoride from water is difficult and expensive for community water systems or for private wells. Reverse osmosis devices and water distillation can effectively remove fluoride.
- [NSF Standard 58](#) recommends that defluoridation devices achieve at least an 80 percent fluoride removal rate to be considered adequate. Activated carbon filtration units sold for home use do not remove fluoride.
- A copy of the NSF/ANSI Standard 58 can be ordered from the website, <http://www.nsf.org/regulatory/regulator-nsf-standards>
- Founded in 1944 as the National Sanitation Foundation and now known as NSF International, NSF follows the American National Standards Institute (ANSI) standards development process to develop standards and to test and certify products and systems that help protect the world's food, water, consumer products and environment.
- California has more information on water treatment devices at [http://www.waterboards.ca.gov/drinking\\_water/certlic/device/watertreatmentdevices.shtml](http://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.shtml)



## An example of a community dealing with excessive fluoride from drinking water.

- Ranchos De Taos, New Mexico
- Llano Quemado Water System, serving 800 people
- Since 2012 fluoride levels between 3.16 and 5.85 mg/L.
- Drilled a new well a mile away with 0.8 mg/L fluoride to blend with existing water
- Cost of >\$2 million
- [http://www.taosnews.com/news/reducing-fluoride-levels-in-water-part-of-larger-effort-in/article\\_5ce86f74-6def-11e6-bef9-cb248c29c832.html](http://www.taosnews.com/news/reducing-fluoride-levels-in-water-part-of-larger-effort-in/article_5ce86f74-6def-11e6-bef9-cb248c29c832.html)

# Reliable, credible sources of information - 1

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- As with many subjects, there are scientifically accepted, evidence-based facts as well as sources of erroneous information concerning fluoride in drinking water.
- Recognized and reliable sources for scientifically accepted information include:

Centers for Disease Control and Prevention <http://www.cdc.gov/oralhealth/>

- *Private Well Water and Fluoride*  
<http://www.cdc.gov/fluoridation/faqs/wellwater.htm#q6>
- *Community Water Fluoridation*  
<http://www.cdc.gov/fluoridation/>  
<http://www.cdc.gov/fluoridation/safety/nas.htm/> \_

American Dental Association [www.ada.org](http://www.ada.org)

- *Fluoridation Facts*  
<http://www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation/fluoridation-facts>
- *Fluoride Supplements*  
<http://www.ada.org/en/member-center/oral-health-topics/fluoride-supplements>

# Reliable, credible sources of information - 2

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- As with many subjects, there are scientifically accepted, evidence-based facts as well as sources of erroneous information concerning fluoride in drinking water. Recognized and reliable sources for scientifically accepted information include:
- Water Systems Council - WSC is a national nonprofit organization dedicated to promoting the wider use of wells as modern and affordable safe drinking water systems and to protecting ground water resources nationwide. There are more than 60 available fact sheets available to be downloaded free.  
Fluoride and Well Water and Well Water and Fluoride  
<https://www.watersystemscouncil.org/well-owners/wellcare-info-sheets/Wellcare> hotline at 1-888-395-1033 or visit [www.wellcarehotline.org](http://www.wellcarehotline.org)
- National Groundwater Association at <http://www.ngwa.org/Pages/default.aspx>
- Consumer Fact Sheet Sample:  
Addressing Safety Concerns, New York Community Water Fluoridation at <https://www.health.ny.gov/prevention/dental/fluoridation/docs/safety.pdf>

# How do I find the level of fluoride in my water?

## Water Quality Reports - Consumer Confidence Reports



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- The fluoride content of the local public or community water supply can be obtained by contacting the local water supplier or the local/county/state health department.
- In 1999, the U.S. Environmental Protection Agency (EPA) began requiring water suppliers to put annual drinking water quality reports into the hands of its customers.
- Typically available around July 1st each year, these Water Quality Reports, or Consumer Confidence Reports (CCRs), may be mailed to your home, placed in the local newspaper or made available through the Internet.
- To obtain a copy of the report, contact the local water supplier. (or Search the Internet)
- The name of the water system (often not the name of the city) can be found on the water bill. If the name of the public water system is unknown, contact the local health dept.

There are two sites on the Internet that *may* supply information on water quality.

- EPA web site at <https://www.epa.gov/ccr>
- CDC web site “My Water’s Fluoride” [http://nccd.cdc.gov/DOH\\_MWF/Default/Default.aspx](http://nccd.cdc.gov/DOH_MWF/Default/Default.aspx)

# Questions

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