MANGANESE IN DRINKING WATER

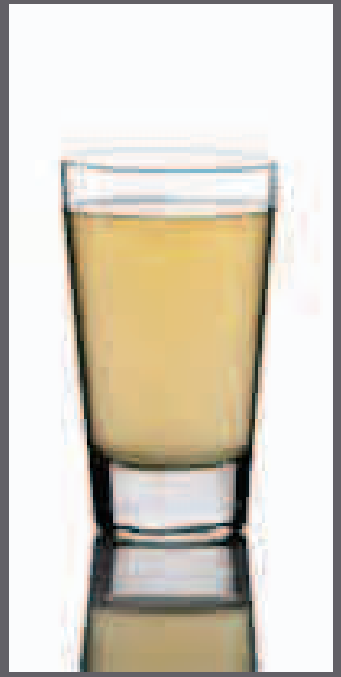
Regulatory Aspects

Massachusetts Department of Environmental Protection
Drinking Water Program
April 2013

Existing Regulation of Manganese in Drinking Water

EPA National Primary Drinking Water Regulations

- Secondary Maximum Contaminant Level (SMCL) of 0.05 mg/L (For Mass. See 310 CMR 22.07D)
- Aesthetics: taste, odor, color or staining laundry
- MassDEP may require PWS to take action on SMCL per 310 CMR 22.07D if warranted by health concerns
- MassDEP process for SMCL - Drinking Water Policy #88-14



Summary Table of Existing Mn Health Advisory (HA) Values based on EPA 2004 HA

Target Population	Exposure Period	Health Advisory
General population	Lifetime	0.3 mg/L
General population	10-day	1 mg/L
Infants and children less than 3 years of age	< 10 days	0.3 mg/L
	(Address within 10 days; sooner if possible).	

Note: At Mn concentrations greater than 0.3 mg/L, parents are advised to use bottled or treated water for their children, in particular to make formula .

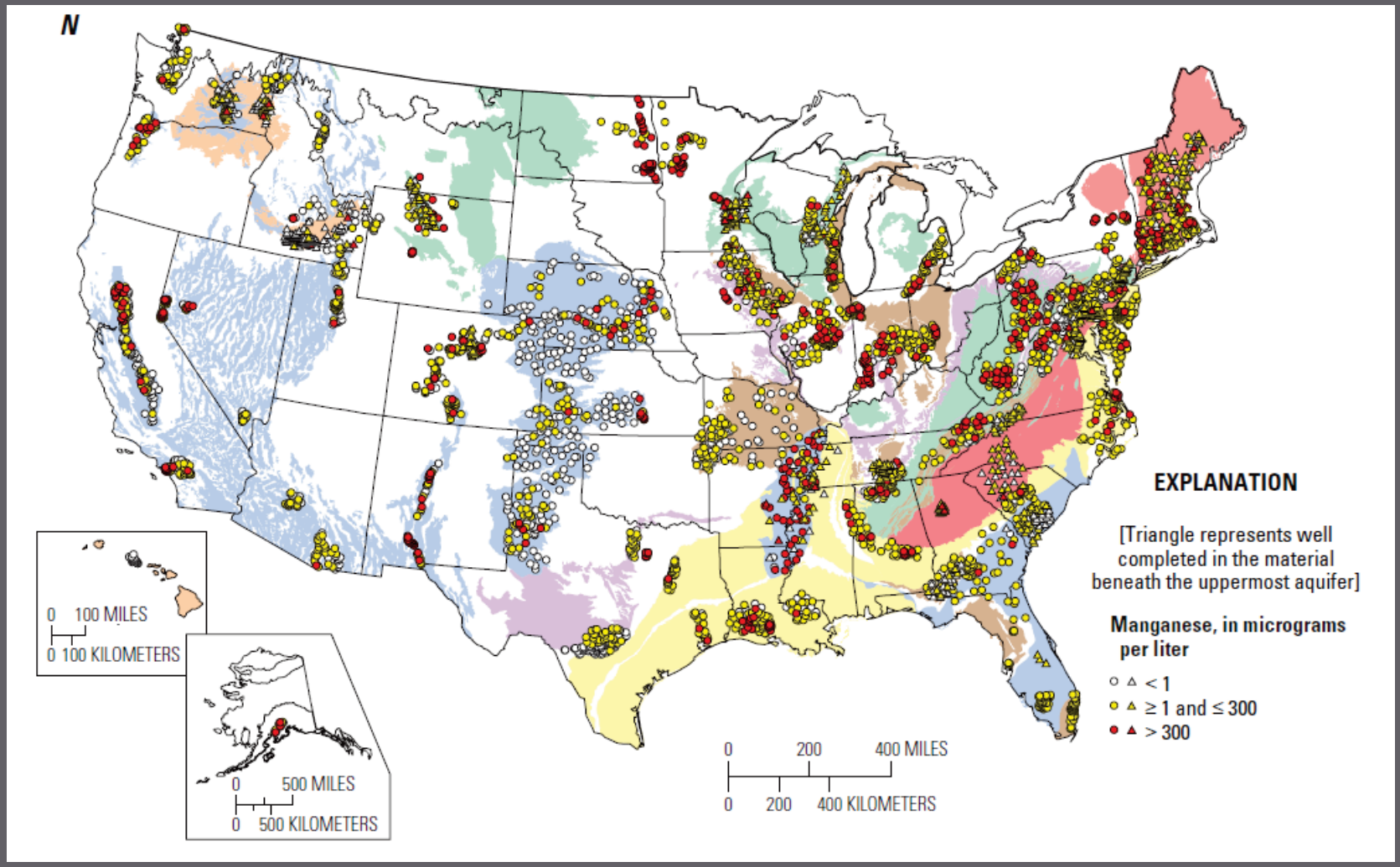
MassDEP Regulations for SMCL 310 CMR 22.07D

- 22.07 D (1) - SMCL apply to all PWS
- 22.07 D (2) - Monitoring is at the discretion of MassDEP
- 22.07 D (3) – If MassDEP determines that the water poses a risk to public health the PWS must take all actions necessary to reduce to levels deemed safe by the department
  - MassDEP Drinking Water program, and Office of Research and Standards (ORS)in consultation with the Mass Department of Public Health make this determination.
  - Actions include monitoring, reporting to DEP, public notice , reducing levels

What is Manganese?

- Naturally-occurring mineral in water, soil and air
- Present in many common foods including infant formula
- Essential nutrient in our diets
- Found in both surface water and groundwater
- Found in proximity to iron
- Highly variable by location, not as variable seasonally
- Found throughout Massachusetts and the US

USGS Map of Manganese in Groundwater US



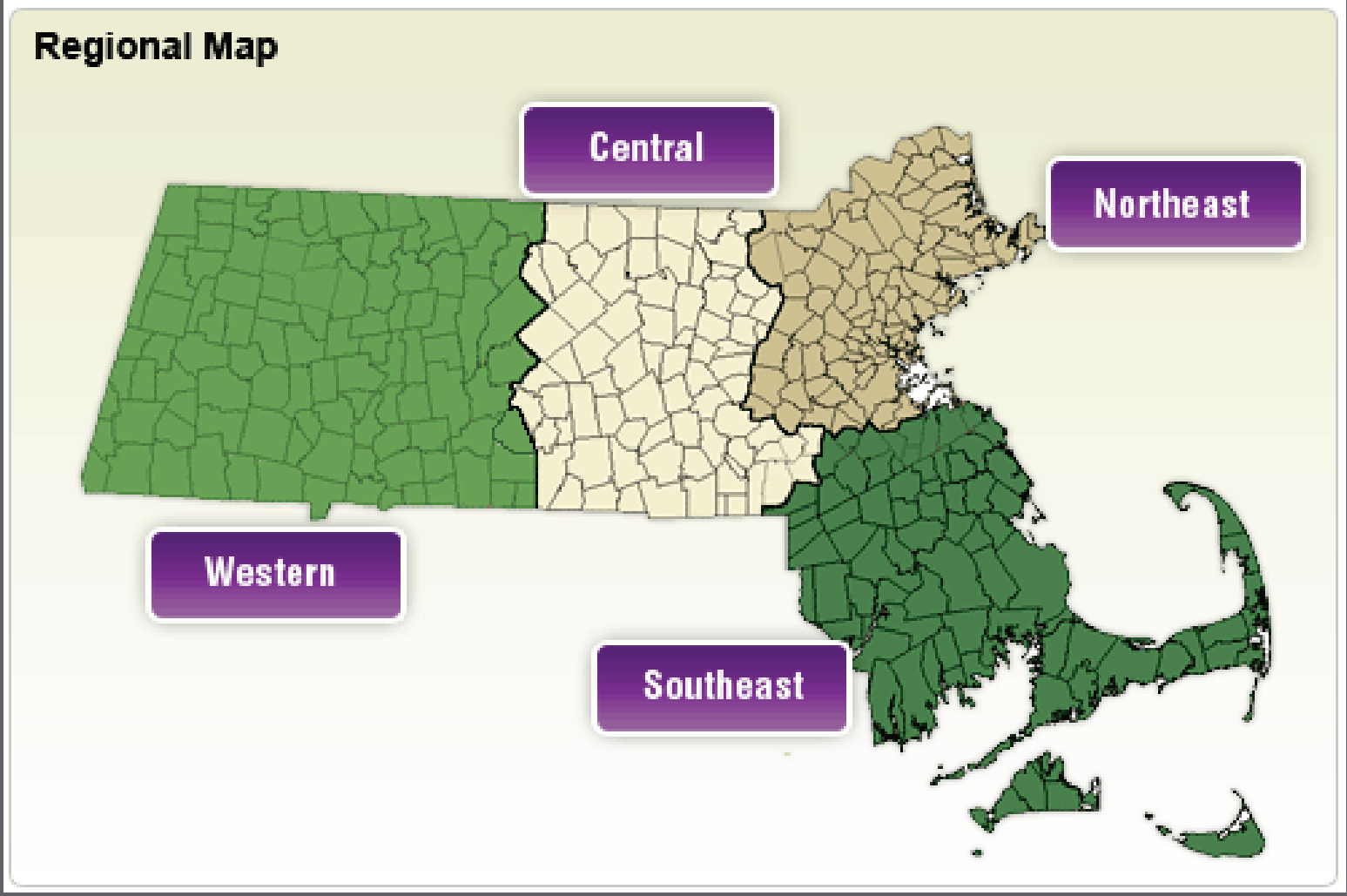
What are Other States Doing to Address Manganese?

Some States are requiring notifications to consumers and/or treatment. For example:

New York has an MCL of 0.3 mg/L. If iron and manganese total concentration of both should not exceed 0.5 mg/L. Higher levels may be allowed by the State when justified by the supplier of water. (NY does not distinguish between primary and secondary MCLs.)

California has a notification level of 0.5 mg/L. PWS must notify local agencies; they recommend consumer notification.

MassDEP Manganese Pilot Project Central Regional Office



Regional PWS Sources

- Central Region (CERO) 809 sources
- Western Region (WERO) 809 sources
- Northeast Region (NERO) 388 sources
- Southeast Region (SERO) 1195 sources

Beginning in 2005, CERO began to phase in iron and manganese testing for all sources to gather data to address consumer SMCL complaints as well as baseline information on manganese occurrence.

To date, all sources in CERO have conducted some form of baseline monitoring with most conducting ongoing assessment monitoring for iron and manganese.

CERO Actions

After release of ORS public health recommendations regarding manganese, CERO initially provided outreach to large community PWSs with finished water history of manganese levels > 300 ppb, requesting cooperation with the following activities:

- Provision of ORS manganese health advisory language in their CCR
- Distribution sampling for manganese at TCR sites
- Provision of corrective action plan indicating how the system plans to reduce the manganese levels below the SMCL.

PWS Response Actions

Interim and long term actions included:

- Source replacement, source removal, limiting use of source, installation of treatment.
- Distribution system flushing and additional testing.
- Comprehensive water quality evaluation of PWS system, and subsequent updating of operations and master plans
- Improving efficiency in existing treatment operations (backwash, media changes, chemical applications, blending etc.) to lower levels and reduce risk of breakthroughs.
- Routine iron and manganese monitoring to document changes in source water conditions over time, evaluate pumping configurations and treatment efficiencies.

Results

To date, approximately 130 sources (16%) located in CERO use treatment technologies capable of removing manganese. In many cases, water treatment plays dual roles, addressing both SMCLs (iron, manganese) and primary MCLs such as arsenic, uranium, nitrate etc.

4% of sources remain with manganese levels above 300 ppb and 1.5% with levels above 1000 ppb.

CERO continues to work cooperatively with PWSs to address manganese and SMCLs in their drinking water.

MassDEP Strategy - Timeline

- May, 2013 letters to medical professionals in conjunction with the Mass Dept of Public Health
- June, 2013 letters to PWS recommending they start sampling for manganese, if not doing so already
- June, 2013 letters to Boards of Health, information relevant for private well owners also
- Ongoing, work with the Department of Early Education and Care (DEEC) to address day care centers who are not PWS
- July 2013, training sessions for PWS by MRWA
- December 2013, add manganese to sampling schedules for the 2014-2016 cycle
- MassDEP Regional Offices follow up with PWS

What steps to follow if you detected Mn over the HA today?

- Contact your regional office
- Collect sample(s) to confirm result. Distribution system samples may be needed.
- If confirmed , plan to provide information for consumer use.
- Work with MassDEP to develop a monitoring schedule, a plan to reduce levels below the SMCL and other reporting and notification actions.

Addressing Elevated Manganese

Blending, treatment or taking a well offline

Alternative water supply for sensitive consumers

- Bottled Water
- Treated water
  - *Also pitcher filters (some brands)*

Bottled Water

Regulated by the Massachusetts Department of Public Health (MDPH)

- Water Quality Standard for manganese of 0.05 mg/L
- All In-state and Out-of-State bottled water sold in Mass must meet Water Quality Standard
- Data on each brand is available on MDPH website
- A few Mineral Waters are above 0.05 mg/L
  - Note: Mineral waters are held to a different standard

Guidance for PWS

- **Initial manganese baseline monitoring should include sampling of finished (treated) water at each entrance point to your distribution system.**
- **Please note that all sample results, whether required or voluntary, are reportable to the Department pursuant to 310 CMR 22.03(10).**
- **Use the same sampling containers to collect the samples for manganese analysis that you normally use for other inorganic (*i.e.,* metals) analyses.**
- **MassDEP does not specifically certify laboratories for manganese. Use a lab certified for the analysis of other inorganic metals (cadmium, chromium, lead, etc.)**
- **Request Methods 200.8, 200.9; Standard Method3120B or equivalent.**
- **Report all results on the MassDEP Secondary Contaminant Report Form (SEC).**
- **Community Systems must report manganese above the SMCL in their Community Confidence Reports (CCRs)**

Additional Recommendations from CERO

- If sources are manifolded/blended, sampling should be conducted to determine the water quality of each source.
- Iron is commonly found with manganese and can interfere with manganese removal. Knowing the background concentration of iron is necessary to ascertain appropriate corrective action for water quality treatment/management considerations.
- Concentrations of manganese entering the distribution system as low as 0.1 mg/L can contribute to excessive concentrations in areas of the distribution system, especially when disturbed by a hydraulic event (main break, flushing, fire etc.). Generally, areas of discolored water may contain elevated contaminant levels above SMCLs. In individual cases, MassDEP may require distribution system sampling.

Questions?

MassDEP Contacts

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