



ARSENIC, BORON AND MANGANESE WATER GUIDANCE

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WHAT IS “HEALTH-BASED WATER GUIDANCE”?

- Water values that are based on health effects only, not on treatment technology or economic feasibility
- HBG: the concentration of a chemical in drinking water that is likely to pose little or no health risk to humans, including vulnerable subpopulations
 - HBV: Health Based Value
 - HRL: Health Risk Limit
 - RAA: Risk Assessment Advice

RAA, HBV, HRL: WHAT'S THE DIFFERENCE?

- HRL and HBV: Both use standard toxicological methods (our published SONAR from 2008-9)
 - Our standard methods are the rules by which we derive a water guidance value, the equations and standard assumptions we use
 - HBVs are developed first. If they meet the requirements, we promulgate them into rule, making them an HRL.
 - High level of confidence in the values derived
 - Found in groundwater
 - If a cancer slope factor is used, it must be from EPA
 - Chemical fits into a nice “box”
 - Standard chemical, increasing toxicity with increasing dose
 - Good animal data and human data if possible
 - Standard risk assessment methods will adequately quantify the risk from exposure

HOW IS RAA DIFFERENT FROM HBV AND HRA?

- RAA: Departs in some way from the HBV and HRL formula
 - Is not a standard chemical
 - Lacks good animal and human data
 - And/or cannot be addressed with standard risk assessment methods
- Is not necessarily a lesser quality value, may just be developed using non-standard methods (equations, assumptions)
- Examples

EXAMPLE: BORON AND MANGANESE

- Beneficial elements
 - Helpful in small doses, toxic at larger ones
 - May have a narrow therapeutic range
 - Not much difference in dose between what is helpful and what is harmful
- Most of people's exposure is likely to happen through food, but water can play a large role depending on the concentration of contaminant in the water.

EXAMPLE: BORON

- Health effects from exposure to boron levels above the risk assessment advice include male reproductive effects (damage to testis) in adults, and developmental effect in infants and children
- Current RAA is 1000 ug/L, previous HRL of 600 ug/L
 - RAA was developed in place of the HRL due to new toxicity information from EPA
 - Was meant to be a short term change until a full review could be completed
- Why RAA? Based entirely on EPA data, not a complete review by MDH, designed to be a short term solution, uneasy consensus that the value is protective for infants
 - Not a “bad” value, just a value derived in a nonstandard way

EXAMPLE: MANGANESE

- Whether the exposure is through inhalation or through drinking water, adults and children can develop neurological problems
 - Infants/Children: Loss of IQ points
 - Adults: A suite of symptoms that look similar to Parkinsonism
- Currently have RAA of 100 and 300 ug/L, also have an older HRL of 100 ug/L
 - RAA was developed to address the new research showing that infants and children are more sensitive to manganese than adults
 - RAA values went through a review that included toxicologists from other states, and some reviewers from Canada
 - Very strong value, strong scientific consensus
- Why RAA? Our standard methods do not allow for the development of tiered advice (infants/children vs. adults)
 - Not a lesser quality value, just different methods

ARSENIC

- Current guidance: MCL of 10 ug/L
 - Not HBG, MCLs take into account both cost and feasibility of treatment and health effects
 - Current research shows that a review now would likely lower the value
 - EPA IRIS program is currently reviewing it
 - Began their review with 44,000 studies (several years ago)
 - Health effects associated with arsenic at low doses include cancer, cardiovascular damage, immune system disruption, possible IQ loss in children, etc.
- MDH has no plans currently to open an arsenic review. Will wait for guidance from IRIS to come out
 - Enormous undertaking
 - Will review when the IRIS report is finished

Generally Recognized Risk Levels for Long Term Exposure to iArsenic in drinking water

