

Development of Colorado's Water Quality Standard for Molybdenum

February 20, 2024







Agenda



- Introductions
- Background
- Development of Colorado Water Quality Standards
- Proposed Revisions to the Molybdenum Standard
- Molybdenum Removal Water Treatment Plant Construction Progress
- Hearing Schedule and Next Steps



Background







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Background on Molybdenum Standard and Temporary Modification



- 2010: WQCC adopts 210 ug/L in Reg. #31 based on Fungwe, but recognized uncertainty with Fungwe, that better science was being developed, and the standard should be revised
- 2014: WQCC adopts standard in Reg. #33 along with temp mod for portion of Tenmile Creek (Blue River Segment 14)
- 2017: Molybdenum standards hearing (continued and then later postponed pending ATSDR Mo tox profile)
- 2018-2022: WQCC extends temp mod to accommodate delay in ATSDR profile and changes to WQCC hearing schedule; defines "current condition" at Outfall 001A as 1,610 ug/L (95th percentile)
- 2023: Blue River Segment 14 temp mod expired 12/31/2023



Progress under Temporary Modification



- Climax continues to maintain current condition (defined as 1,610 ug/L at Outfall 001A) despite expiration of temporary modification
 - Achieving current conditions by temporarily modifying mine plan
 - Began construction of molybdenum removal water treatment plant (MRWTP) to maintain current conditions and have mine plan flexibility
- Climax continues to monitor water quality
 - Worked with local stakeholders to identify locations to sample Mo concentrations
 - Data made available to the public on ClimaxMoinCO.com



Scientific Developments since 2017



- Publication of 3 state-of-the art molybdenum studies
- Independent review, including by ATSDR
- ATSDR profile published in May 2020
- New study completed 2022 and published in 2023



Development of Colorado Water Quality Standards







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Considerations in Adopting Water Quality THE POWER OF Standards

- Colorado Water Quality Control Act and WQCC Regulation 31 require the following be considered:
 - The need for standards which regulate specified pollutants
 - Technical and economic feasibility of treatment techniques
 - Whether the pollutant arises from natural sources
 - Beneficial uses of the water
 - The economic reasonableness of the action, including an "evaluation of the benefits derived from achieving the goal of this article and the economic, environmental, public health, and energy impacts to the public and affected persons." C.R.S. 25-8-102(5)
- WQCC intends standards to be based on the best available knowledge
- Human health-based standards are calculated using Policy 96-2

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Policy 96-2 Human Health Based Water Quality Criteria and Standards



- Addresses WQCC methodology and rationale for establishing human health-based water quality criteria for Colorado surface and ground waters
- Provides equations for calculating chronic human health criteria and standards
 - EPA's National Primary Drinking Water Regulations equation for calculation of maximum contaminant level goals (MCLGs)
 - MCLGs are the concentrations of a contaminant in water at which no known or anticipated adverse effects on the health of persons occur, and which allows an adequate margin of safety

Policy 96-2 Policy Equation



Equation 1-1: DWS/MCLG, μg/I = <u>RfD x 70 x 1000 μg/mg x RSC</u> 2 x UF

where:

| RfD ² | = | verified reference dose for non-carcinogens, mg/kg-day |
|------------------|---|---|
| 70 | = | weight of an average adult, kg |
| 2 | = | daily drinking water consumption, liters/day |
| RSC ³ | = | relative source contribution (0.2 is default value) |
| UF | = | Uncertainty Factor (1.0 for most chemicals, 10 for certain Group C chemicals) |



Proposed Revisions to the Molybdenum Standard







Reference Dose (RfD)



- Reference dose is calculated by applying uncertainty factors (UFs) and modifying factors (MFs) (as appropriate) to the No-observed-adverse-effect-level (NOAEL)
- ATSDR (2020) chose NOAEL of 17 mg Mo/kg/day, based on Murray et al. (2014a), which ATSDR deemed a highquality study
 - ATSDR applied total UF of 300
 - UF = 100 (10 intraspecies, 10 interspecies)
 - MF = 3 (based on Fungwe et al. (1990))
 - Calculated MRL (or RfD) of 0.06 mg Mo/kg/day

Recommendation for Reference Dose



• RfD = 0.06 mg Mo/kg-day

- Uses ATSDR recommended NOAEL of 17 mg Mo/kg/day
- Applies ATSDR's recommended UFs of 100 (10 for intraspecies, 10 for interspecies)
- Applies ATSDR's recommended MF of 3, despite concerns with its scientific basis

Relative Source Contribution (RSC)



- RSC is fraction of acceptable Mo exposure allocated to drinking water as opposed to diet
 - EPA uses range of 0.2 0.8 RSC
 - Because dietary exposure to Mo is generally very low, in 2017 EPA recommended RSC of 0.8 (80% of exposure to Mo in drinking water)
- Analysis of RSC using EPA's Exposure Decision Tree
- Climax conducted produce study in Summit County in 2021

Recommendation for Relative Source Contribution

• RSC = 0.8

- Based on analysis using EPA guidance
- Uses national data on low dietary exposure to Mo
- Protective of Summit County residents in addition to residents statewide
- Not necessary to have a site-specific RSC applied for Summit County

Recommendation for Body Weight & Drinking Water Intake



Body weight = 80 kg; Drinking water intake = 2.4 L

- EPA values (updated in 2015) should apply as the Policy 96-2 factors are out of date and based on outdated science
- Consistent with WQCC determinations in April 2020 Regulations 41, 42, and 31 rulemaking hearing
- Consistent with WQCD position in December 2021 Policy 96-2 Administrative Action Hearing

Factors based on best available science



• RfD = 0.06 mg/kg/day

Applies ATSDR's chosen NOAEL, uncertainty factors, and modifying factor

• RSC = 0.8

 Applies EPA's recommended RSC from 2017, as further confirmed by the Produce Study and analysis under EPA guidance

Body weight = 80 kg; Drinking water intake = 2.4 L

Based on updated science, and approved by WQCC and WQCD

Calculation of Revised Standard



DWS/MCLG, μ g/L = 0.06 x 80 x 1000 μ g/L x 0.8 = 1600 μ g/L (chronic) 2.4 x 1

Where:

- 0.06 = Calculated RfD from ATSDR, in mg/kg/day
- 80 = weight of an average adult in kg
- 2.4 = daily drinking water consumption in liters/day

0.8 = RSC

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Proposed Revisions to the Molybdenum Standard



- Best available science supports adoption of a revised human health standard of 1,600 ug/L for molybdenum in Regulation 31, Section 31.16, Table III
 - This standard is based on the best available scientific information, adopts ATSDR's recommendations, and incorporates very conservative UFs/MFs (10x the current standard)
 - Represents a reduction in molybdenum concentration from current conditions
- Revised standard should also be adopted on one water quality segment, Blue River Segment 14 in Regulation 33
 - Protective of the water supply use in this segment and in downstream waters
- No other changes proposed
 - Most segments have the agriculture use based standard of 150 ug/L, which would continue to apply as it is more restrictive
 - Only a handful of segments statewide have the 210 ug/L standard, but no revisions to these segments are being proposed at this time



Construction Progress







Molybdenum Removal Water Treatment Plant Construction Progress



Climax initiated construction on the Molybdenum Removal Water Treatment Plant (MRWTP) in July 2022.

- The MRWTP will ensure Climax can continue to meet the temporary modification current conditions criteria (despite expiration of temp mod)
- Initial construction activities focused primarily on Moly Removal Building (MRB) sub-grade concrete including column support slabs, sumps, wall footings and walls, and underground piping. As of early June 2023, MRB sub-grade concrete was approximately 80% complete. The focus then shifted to above grade concrete including floors, trench drains, and equipment pads with final placements September 2023. Building steel installation began in early October 2023 and was substantially completed by year end.
- Construction completion and plant commissioning is anticipated for Q1 2025





Rendition of site upon completion

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MRWTP Construction Progress





MRB Siding Installation





South Thickener Walls and Center Column





Reactor Tanks, Moly Mix Tank, and Splitter Box





North Thickener Wall Forms



Hearing Schedule & Next Steps







Rulemaking hearing process



- Climax's proponent prehearing statement due March 6
 - Will include technical support for revised standard
- Anticipated deadlines (*please refer to hearing notice)
 - March 20: Party status requests due to WQCC
 - April 3: Responsive prehearing statements due
 - May 1: Rebuttal statements due
 - June 10-12 (exact date TBD): Rulemaking in Pueblo, Colorado (hybrid option available)
- Rulemaking hearing website available at <u>https://cdphe.colorado.gov/wqcc-rulemaking-proceedings</u>

Upcoming Stakeholder Meetings



- March 19, 2024, 3:30 p.m.
 - Review of proposed standard and prehearing statement
 - Opportunity to ask questions ahead of responsive statement deadline
- April 22, 2024, 2:30 p.m.
 - Review of responsive prehearing statements
 - Opportunity to ask questions and discuss outstanding issues ahead of rebuttal statement deadline
- May 6, 2024, 2:00 p.m.
 - Review of rebuttal statements
 - Opportunity to discuss any outstanding issues ahead of prehearing conference and negotiations cut-off



Questions?

