



## Climax Molybdenum Standards Update to Stakeholders March 2019

The Climax Molybdenum Company (Climax) remains committed to maintaining regular, transparent communication with Colorado communities. This update is part of a larger series of communications that Climax is providing to local and regional water quality stakeholders in the state concerning proposed revisions to the state's domestic water supply molybdenum standard.

In our August 2017 update to stakeholders, Climax described the latest scientific research regarding water supply molybdenum standards and included a schedule of important events leading to the establishment of protective levels of molybdenum in Colorado's classified waters.

The following outlines the significant progress made since that time and contains information on Climax's efforts to advance the independent review of this scientific research and other information concerning the Climax operation.

### **Regulatory Background**

The Colorado Water Quality Control Commission (Commission) rulemaking on molybdenum standards hearing is scheduled for November 2019. This hearing will consider Climax's proposed revision to the water supply standard for molybdenum based on three new studies investigating molybdenum's effect on human health.

Included is the most recently conducted study, the Two-Generation (One Litter per Generation) Reproduction Study of Sodium Molybdate Dihydrate in Rats (Two-Generation Study). Through written comments on Climax's proposal as part of the previous molybdenum rulemaking in 2017–2018, the U.S. Environmental Protection Agency (EPA) agrees that these three studies replace and supersede the graduate student study from 1990 that forms the basis of Colorado's current water supply standard for molybdenum of 210 µg/L.

The Water Quality Control Division (Division) also reviewed these studies as part of the previous rulemaking and informed the Commission that they would like the Two-Generation Study to be peer reviewed and published. The Division also informed the Commission that, because the federal Agency for Toxic Substances and Disease Registry (ATSDR) was in the process of updating its toxicological profile for molybdenum, the Commission should wait for that process to be completed.

In addition to ATSDR's updates to its Toxicological Profile for molybdenum, the EPA may consider revising its 1993 draft health advisory for molybdenum. The Commission scheduled the hearing in November 2019 to provide time for this independent peer review to take place.

In the 2017–2018 hearing, the Commission informed Climax that it would like to have information on the following investigations for molybdenum: identification of sources; influent control measures; investigation of potential treatment alternatives; treatment optimization and available blending. In conducting these investigations, the Commission informed Climax it would like it to identify treatment options; source control; water management alternatives; expected effluent quantity and quality that could be achieved with each alternative; and estimated cost of each alternative. An update on these investigations is included in this update.

### **Scientific Research**

Below are additional details regarding the status of the Two-Generation Study, the ATSDR Toxicological Profile and the 1993 EPA Draft Health Advisory.

- **Two-Generation Study**

In April 2017, a full laboratory report of the most recent molybdenum human-health study, the Two-Generation Study, was available for early review. This study was conducted by Charles River Laboratories and sponsored by the International Molybdenum Association (IMOA). The full report was distributed in May 2017 to the Division, EPA and molybdenum stakeholders. Since that time, an article was prepared and underwent independent peer review for the Journal of

Reproductive Toxicology and Pharmacology. The article was published online in November 2018 and is published in the Journal's March 2019 hard-copy publication. The online version of the article is available at <https://doi.org/10.1016/j.reprotox.2018.11.004>.

- **ATSDR Toxicological Profile for Molybdenum**

In April 2017, ATSDR issued a Draft Toxicological Profile for Molybdenum for public comment. The draft profile did not consider the recently completed Two-Generation Study or the more than 2,100-page report that IMOA provided ATSDR for in-depth review and incorporation into the final version of the Toxicological Profile.

IMOA submitted comments on the draft Toxicological Profile, noting, among other things, that ATSDR should consider the Two-Generation Study prior to issuance of a final draft. Climax anticipates that ATSDR will review IMOA's comments and revise its draft profile, with a revised version issued sometime in 2019.

Climax, the Colorado Department of Public Health and Environment (CDPHE) and the Commission have sent letters to ATSDR urging completion of the final toxicological profile.

- **EPA Revision of its 1993 Draft Health Advisory for Molybdenum**

The EPA's draft health advisory for molybdenum has not been updated since 1993 and relies on a discredited nearly 60-year-old study that the Commission rejected in adopting Colorado's current molybdenum standard. During the 2017–2018 rulemaking, it was suggested the EPA update its health advisory as another possible way to support revisions to Colorado's standard for molybdenum. In 2018, Climax sent a letter to the EPA asking that they prioritize updating the draft 1993 health advisory.

### ***Climax Water Quality Monitoring***

For many years, Climax has been consistently and voluntarily monitoring molybdenum concentrations at its permitted outfall and downstream in Tenmile Creek to characterize seasonal water quality trends and document long-term conditions. These locations include the following:

- Climax Mine CDPS Permit Outfall 001A
- Tenmile Creek at Copper Mountain, Blue River Segment 13 above the confluence with West Tenmile Creek, Blue River Segment 14
- Tenmile Creek at the Copper Mountain Bike Path, near the beginning of Blue River Segment 14
- Tenmile Creek in the Town of Frisco, upstream of where Tenmile Creek flows into Dillon Reservoir
- Blue River below the Dillon Reservoir

This monitoring continues to show a consistent pattern of variability in molybdenum concentrations based on seasonal snowmelt conditions, with no statistical trend of increasing concentrations over time.

Beginning in early 2018, Climax expanded its downstream molybdenum-monitoring program to characterize the occurrence of molybdenum in municipal drinking water in Summit County. In consultation with the Summit County Environmental Health Department and other Summit County officials, the following locations were identified for monitoring:

- Copper Mountain Conference Center
- Frisco Nordic Center/Frisco Walmart
- Breckenridge Recreation Center
- Keystone Conference Center
- Summit County Library/Silverthorne Recreational Center
- North Fork of the South Platte River below the Roberts Tunnel

Monitoring results from these locations consistently show levels of molybdenum well below the current statewide standard of 210 µg/L.

Climax also conducted a one-time sampling event in the summer of 2018 in adjacent tributaries to Tenmile Creek to verify if there were other sources of molybdenum to Tenmile Creek. These included the following:

- Humbug Creek
- Mayflower Creek
- Tucker Creek
- Copper Creek
- Wheeler Creek
- West Tenmile above Copper Mountain
- North Tenmile above Frisco

These results showed very low levels of molybdenum, between 1 µg/L and 10 µg/L, indicating there are no significant molybdenum sources outside of Climax's operations that contribute to molybdenum levels in Tenmile Creek.

### ***Molybdenum Data Sharing***

Climax shares its monitoring data with stakeholders during Summit Water Quality Committee (SWQC) meetings. The SWQC includes Summit County officials and representatives from municipalities (Frisco, Dillon, Silverthorne, Keystone, and Breckenridge), Copper Mountain Metro District, and Denver Water, as well as other interested parties such as the University of Colorado. In 2018, Climax presented its molybdenum data during meetings on March 21, August 8 and December 3.

In addition to making data publicly available during SWQC meetings, Climax is launching a new website (discussed below), where water quality data will be available for review. Lastly, Climax continues to extend its open invitation for any interested downstream stakeholder to participate in or observe the sampling events on Tenmile Creek and municipal locations to see how Climax collects its data.

### ***Investigations to Identify Sources, Source Control and Treatment Options***

In 2018, Climax retained Stantec Consulting Services, Inc. (Stantec) to conduct studies and evaluate the issues raised in the Commission's January 2018 hearing and included in their Statement of Basis and Purpose. Stantec began its investigations in a two-phased approach to 1) further investigate and identify sources of molybdenum in Climax's discharge and 2) investigate influent control measures and potential water treatment options. Thus far, Stantec's work confirmed that, in addition to molybdenum from historical mine drainage sources, concentrations of molybdenum in the water system and observed in the discharge at Climax Outfall 001A also are related to the ore type being mined by Climax.

Stantec also found that control and/or management of molybdenum at Climax could potentially occur at three points in the mine operation: 1) in the mining/milling process, 2) within the mine water management system after oxidized ore tailing has been deposited or 3) at the outlet of the mine water management system. Within the context of these three points of control, Stantec initially identified 15 potential options that involve water management, optimization of water treatment, maximizing available blending and water treatment influent control. Stantec evaluated this initial list of potential options to consider effectiveness of meeting molybdenum reduction objectives and technical feasibility in light of physical and operational constraints at Climax. Stantec initially has narrowed its evaluation to four options, including a number of sub-options, to evaluate the options in more detail and to determine effectiveness for managing the concentration of molybdenum in water leaving Climax's property, as well as to evaluate the approximate costs for implementing the options. The current concentrations of molybdenum still are well below peer-reviewed, scientific-recommended standards.

Stantec prepared a draft report on the investigations and evaluations that Climax shared with the Division in mid-February 2019 to solicit technical feedback and recommendations. Based on these conversations, Stantec is working to determine if additional options should be considered, either in the initial stage or in more detail. Stantec and Climax plan to work with the Division on its recommendations. Depending on how long these discussions take, Climax expects to share an updated draft report with the Division, EPA and all other interested stakeholders in the second quarter 2019. Stantec will incorporate stakeholder feedback into the final report due in July 2019.

### ***Agriculture Standard***

Climax continues to make progress on issues associated with the separate agriculture standard for molybdenum. A separate update on the agriculture standard is forthcoming.

### ***Climax Website***

To stay connected with regulators, lawmakers, local and regional water quality stakeholders, and the communities we serve, Climax has an interactive website that includes background on the history and legacy of Climax in Colorado, information on molybdenum and water standards research, access to up-to-date water sampling data, and more.

You can access the website at [www.ClimaxMOinCO.com](http://www.ClimaxMOinCO.com).