

Montana's Temporary Water Quality Standards—New World Mining District

Abstract

Complexity: Complex

Type of Action: Temporary standards for multiple uses during remediation

Region: 8

131.10(g) Factors: 3

Montana's Water Quality Act allows for application of temporary modification of water quality standards where a waterbody is not meeting its designated use. The ultimate goal of the temporary modification is to improve water quality to the point where designated uses are fully supported. As such, temporary standards play a key role in the remediation of damaged water resources, because the underlying designated uses and criteria are established as goals which drive water quality improvements. The duration of temporary standards is set based on an estimate of the time needed for remediation at a specific site, and because the clean up of legacy pollutants often takes time, temporary standards can be and are issued for multiple years. The state uses 20 years as its time horizon for estimating future watershed remediation opportunities, and therefore, temporary standards could be issued for as much as 20 years. The New World Mining District is an example of a well-funded and successful project. The waters were classified as suitable for a number of uses, including drinking water, recreational, and aquatic life uses.

Background

In the Water Quality Act, Montana has adopted a provision for temporary water quality standards (75-5-312, Montana Code Annotated, MCA). The standards allow the Board of Environmental Review (the Board) to temporarily modify a water quality standard for a specific waterbody or segment on a parameter-by-parameter basis. The goal of this tool is to "improve water quality to the point at which all the beneficial uses designated for that waterbody or segment are supported."

Establishment of Temporary Water Quality Standards

To obtain a temporary modification of the water quality standards, a petitioner must submit supporting documentation that shows that the waterbody or segment is not supporting its designated use. This documentation must consider (1) the chemical, biological, and physical condition of the waterbody; (2) the specific water quality-limiting factors affecting the waterbody; (3) the existing water quality standards that are not being met; (4) the temporary modifications of the existing water quality standards being requested; (5) the existing beneficial uses; and (6) the designated uses considered attainable in the absence of the water quality-limiting factors.

In addition, the petitioner must provide a preliminary implementation plan that outlines what the petitioner will do to return the waterbody back to full support of the original water quality standards. The implementation plan must contain (1) a description of the proposed actions that will eliminate the water quality-limiting factors identified to the extent achievable and (2) a schedule for implementing the proposed actions that ensures that the current water quality standards for the parameter or parameters at issue are met as soon as reasonably practicable.

After the petition is submitted, the Board goes through a public process and decides whether to move forward and the appropriate length of time the new standards will be in effect. If the Board adopts the temporary water quality standards, then the petitioner must modify the preliminary

implementation plan as instructed by the Board and develop a detailed work plan each year until remediation is complete. The statute sets a maximum of 20 years for the temporary standards. The Board reviews the temporary standards and implementation plan—including progress made toward water quality improvements—at least every 3 years until the waterbody reaches full support of the designated use or the standards expire.

Temporary standards may be terminated if the values for the modified parameter or parameters improve to conditions that support all designated uses for the classification, the water for which the temporary standards were adopted is reclassified, or the plan submitted in support of the temporary water quality standards is not being implemented according to the plan's schedule or modifications to that plan or schedule made by the Board or by the Montana Department of Environmental Quality (DEQ).

Example: The New World Mining District

One example of temporary standards in Montana is for the New World Mining District, approximately 4 miles northeast of Yellowstone Park (Figure 1). Three rivers flow through this area—the Clarks Fork of the Yellowstone, the Stillwater, and the Lamar. The site covers approximately 40 square miles. This area has hard rock mining wastes and acidic discharges that contain elevated levels of heavy metals. U.S. Department of Agriculture's Forest Service is conducting remediation with oversight by the Montana Department of Environmental Quality (DEQ).

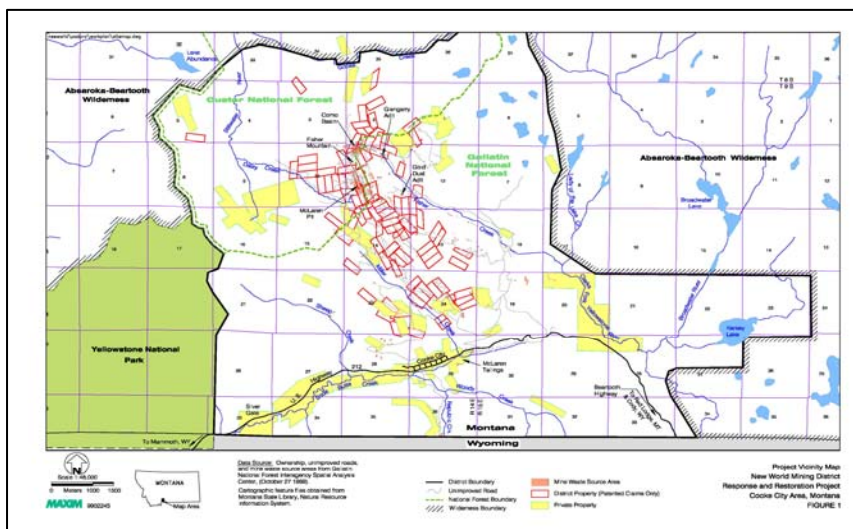


Figure 1. New World Mining District (USDA, 2002).

Data Collection and Analysis

Streams in the District have been classified B-1, with the following designated uses: the water quality is to be maintained suitable for drinking, culinary and food processing (after conventional treatment), bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. For class B-1 waters, standards have been set for *Escherichia coli* (*E. coli*) bacteria, dissolved oxygen, pH, turbidity, temperature, sediment or floating solids, color, and toxic, carcinogenic, or harmful parameters. Some stream segments in the mining district have not been able to achieve some designated uses due, in part, to historical mining activities.

The major sources of water quality impairment at the site include heavy metals present in mine waste pits, acidic water discharging from mine openings, and underground sulfide ore deposits that have been exposed to the atmosphere. Metal-laden mine wastes are transported to surface

waters through mechanisms such as erosion, infiltration, dissolution of contaminants in runoff, and groundwater discharge. Since 1977 state and federal agencies have conducted several investigations to determine the nature and extent of metal impacts on surface waters in the District. Earlier studies have shown that metal loadings in streams are derived from groundwater inflow, adit (a nearly horizontal passage from the surface in a mine) discharges, tributary inputs, and leachate from waste dumps. Waste sources, however, are widely scattered throughout the District, and contributions from individual sources are difficult to quantify.

In 1996 the United States and Crown Butte Mining, Inc. (CBMI) signed a Settlement Agreement under which the United States would purchase the company's holdings in the District. Under the agreement, all proposed mining operations were ended, and \$22.5 million was provided to clean up the historical mining impacts. A consent decree was signed in 1998 by all interested parties to finalize the terms of the Agreement and make the funds for cleanup activities available. Of the total amount provided, \$2.5 million was earmarked for remediation of natural resource damage in this area. The consent decree specified that "performance of response and restoration actions will initially address release of hazardous substances, natural resources lost, and conditions affecting water quality and natural resources that are related to District Property." The Forest Service was designated as the lead agency in charge of administering the cleanup.

The Forest Service and CBMI completed supporting documentation and petitioned for temporary standards for Fisher Creek, Daisy Creek, and a portion of the upper Stillwater River on January 22, 1999. The accompanying support document provided the necessary information required by the Montana Water Quality Act. The Board approved and adopted the temporary standards for the petitioned stream segments following public comment in July 1999. These standards are in effect for 15 years. The goal of using the temporary standards is to allow remediation activities to have time to yield water quality improvements that will result in all waters supporting B-1 uses. Modified criteria were established for aluminum, cadmium, copper, iron, manganese, zinc, and pH for Daisy Creek and for aluminum, copper, iron, lead, manganese, zinc, and pH for Fisher Creek and a portion of the upper Stillwater River (Table 1).

Table 1. Original and Modified Numeric Criteria (Montana DEQ, 2005)

Waterbody	Original criteria								Modified criteria ^a							
	Al	Cd	Cu	Fe	Mn	Pb	Zn	pH	Al	Cd	Cu	Fe	Mn	Pb	Zn	pH
Daisy Creek									9510	4	3530	6830	1710	n/a	540	>4.6
Stillwater River	750	1.05 ^b	7.3 ^b	1000	--	82 ^c	67 ^b	d	670	n/a	200	1320	86	13	49	>5.5
Fisher Creek									470	n/a	110	750	82	2	44	>5.7

^a All criteria except pH are shown as micrograms per liter (µg/L); pH is measured in standard units (su).

^b At 50 mg/L hardness.

^c At 100 mg/L hardness.

^d Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

As required by the Board for approval of temporary standards, a work plan was developed and approved under the direction of the Forest Service. The work plan described existing conditions at the site, set forth the goals and objectives of cleanup activities, and established an 8-year schedule under which activities would be completed.

Project activities in the District began in 1999 under the direction of the Forest Service. The general schedule was to finalize the site characterization work in 1999, begin cleanup activities in 2000 and 2001, and complete active cleanup activities by 2002. Years five through eight were dedicated to monitoring surface water quality, groundwater quality, and revegetation at the reclaimed sites and to performing any necessary maintenance. Annual work plans have been developed to reflect changing remediation activities.

Triennial Review of Temporary Standards

Water quality monitoring is ongoing and is conducted several times each year at numerous monitoring stations. The monitoring is done to detect and measure improvements that result from cleanup actions and to comply with the rules in place for water quality standards related to the project. The 2002 Progress Report results include the following:

1. Monitoring on Fisher Creek showed that water quality had been in compliance with the temporary standards since 1999 and several criteria associated with the B-1 standards were being met. Zinc concentrations were below the chronic and acute aquatic standards for B-1, and copper concentrations had fallen below chronic aquatic standards during winter base flow conditions since 1999 at one monitoring location. However, copper exceeded acute and chronic aquatic standards during spring runoff at this station, when flows increase and scoured sediments with high metals concentrations significantly affect water quality. During base flow conditions in the fall, only copper exceeded acute or chronic aquatic standards. Aluminum exceeded chronic aquatic standards during high-flow conditions in 1999 but did not exceed these standards in 2000 or 2001. Zinc exceeded the narrative standard on only two occasions since the standard was established; both exceedences occurred during low-flow periods (May 1999 and October 2000). Water quality in Fisher Creek generally improved downstream, as shown in the lower concentrations measured at several downstream monitoring locations.
2. No temporary standards have been exceeded at the monitoring station on the Stillwater River since the standards became effective in 1999. For the B-1 standards, copper exceeded chronic and acute aquatic standards at this station during each of the three high-flow events monitored since 1999. Copper fell below the chronic aquatic standard generally during low-flow conditions. Aluminum exceeded the chronic aquatic standard during each of the high-flow events and one of the winter base flow events. Zinc concentrations were lower than the acute/chronic aquatic standard at this station since monitoring began in 1990, and iron concentrations were lower than the chronic aquatic standard since the early 1990s. During fall base flow at this station, there were no exceedences of aquatic criteria.
3. Monitoring at two locations on Daisy Creek showed that all metal concentrations measured since 1999 were below both temporary and narrative water quality standards for the majority of the sampling events conducted and the parameters analyzed, with only two exceptions. In terms of the B-1 standards, aluminum, copper, and zinc exceeded the acute and chronic aquatic standards during all monitoring events (except zinc in April 2000) since 1999. Iron exceeded the chronic aquatic standard consistently at one location, and lead exceeded the chronic aquatic standard on one occasion in the past 3 years. At one location, copper exceeded aquatic standards for all events. Iron exceeded the chronic aquatic standard all the time, and lead exceeded the chronic aquatic standard on most sampling events. Metal concentrations at both stations have declined since 1996.

As of the 2005 project summary, water quality monitoring results show that improvements are beginning to be realized at the farthest downstream stations on Fisher Creek and the Stillwater River, and additional water quality improvements are expected to be measured in the near future

as the major cleanup projects are completed. Some improvements are also beginning to be realized in the most upstream stations in the headwaters of Fisher Creek and Daisy Creek. The full impact of this comprehensive cleanup project on water quality will not be evident for several years.

Conclusion

The Montana Department of Environmental Quality has found the use of temporary modifications of water quality standards and the associated implementation plan to be a very useful tool to restore water quality. The requirement for an implementation plan with progress reports is an important incentive to attaining the goals initially set out. The cleanup activities were initially scheduled to be completed in 8 years, but this process is iterative. Once remediation activities outlined in the project work plan are completed, analysis and monitoring will determine whether Fisher Creek, Daisy Creek, and the portion of the upper Stillwater River meet the B-1 classification. The 2005 project summary prepared by the Forest Service indicates that work will be completed in 2007, with additional monitoring in 2008. After monitoring, USFS and Montana DEQ will decide what further work needs to be done to complete the cleanup within the 15 year timeline set forth in the temporary standards.

Use of temporary standards for the New World Mining District has been successful, in part, because adequate funding was available for remediation efforts. Resource availability and jurisdictional complexities associated with the Upper Blackfoot Mining Complex have lessened the effectiveness of using temporary water quality standards in that case.

References

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