2018 Animas River Water Quality Monitoring

• Rotary Park, Durango, CO

• Weekly sampling in May 2018 during spring runoff

• Expedited lab analysis to deliver results to public as quickly as possible

Please keep in mind these results are from one location along the Durango stretch of the Animas River and may not be representative of other reaches of the Animas River.
Monitoring results should be viewed in context of the drought conditions and historically low Animas River levels so far in 2018.

>100 years of data from USGS – Animas at Durango

1912 to 2017
1977 (historic drought)
2018
2002 (year of Missionary Ridge fire)
EXPLORE MONITORING RESULTS:

Guide to graph interpretation (click here)

OR

Graphs with data and summary (click here)

Latest data point = 5/30/18
We will start by using an example of one metal, total aluminum, from the Animas River at Rotary Park in Durango, Colorado.
Years from 2015 to 2018 are along the horizontal axis.

*The recreational screening level represents the level at which no adverse health effects are expected to occur in humans consuming 2L of water per day, from the Animas River, for 30 days each year for a total of 30 years.

**Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 21 and 34. Standards vary with water hardness and are plotted here using an average water hardness of the Animas River at this location, 200 mg/L.
Metal concentration in micrograms per liter (ug/L), log scale, is on the vertical axis.
Blue line = Animas River discharge observed in cubic feet per second (cfs) at the USGS Durango gauge.
Orange diamonds = Samples collected during the Gold King Mine release (August 6 to August 9, 2015)
Green diamonds = Samples collected in 2015 after the Gold King Mine release (August 10 to October 26, 2015)

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*Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34. Standards vary with water hardness and are plotted here using an average water hardness of the Animas River at this location, 208 mg/L.
Red diamonds = Samples collected in 2016 from February through November

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Yellow diamonds = Samples collected in 2017 from March to August
Yellow diamonds = Samples collected so far in 2018

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* Colorado Department of Public Health and Environment (CDPHE) standards based on Colorado surface water quality classifications and Regs. 32 and 34. Standards vary with water hardness and are plotted here using an average water hardness of the Animas River at this location, 208 mg/L.
Most recent sample
May 30, 2018

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Questions we will be asking as the season unfolds:
How do metal concentrations during the drought conditions of 2018 compare to previous years?
We will also be comparing 2018 concentrations to water quality benchmarks:
Environmental Protection Agency – Recreational Screening Level

Set to protect use of the Animas River for recreation

Protective of users who accidentally swallow river water (swimmers, rafters, tubers) or users who intentionally ingest river water (backpackers, overnight river users)

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**Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34.
Colorado Department of Public Health and Environment (CDPHE)
Drinking Water Supply Standard

Set to protect use of the Animas River for domestic drinking water supply

- EPA Surface Water Recreational Screening Level (6,700 μg/L)*
- CDPHE Domestic Water Supply Maximum Contaminant Level 30-Day Exposure (1,000 μg/L)**
- CDPHE Agriculture Standard 30-Day Exposure (200 μg/L)**

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** Colorado Department of Public Health and Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34.
Total Copper, Animas River at Durango, CO: 2015-2018

Colorado Department of Public Health and Environment (CDPHE) Agriculture Standard

Set to protect agricultural use of the Animas River – irrigation and livestock watering

- EPA Surface Water Recreational Screening Level (6,700 µg/L)*
- CDPHE Domestic Water Supply Maximum Contaminant Level 30-Day Exposure (1,000 µg/L)*
- CDPHE Agriculture Standard 30-Day Exposure (200 µg/L)*

* The recreational screening level represents the level at which no adverse health effects are expected to occur in humans consuming 32L of water per day, from the Animas, orally, for 64 days each year for a total of 30 years.

*Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Regs. 31 and 34.
Colorado Department of Public Health and Environment (CDPHE)

Acute Aquatic Life Standard

*Set to protect aquatic life in the Animas River from brief, short term exposure to contaminants*

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Colorado Department of Public Health and Environment (CDPHE)

Chronic Aquatic Life Standard

Set to protect aquatic life in the Animas River from persistent, long term exposure to contaminants

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2018 Animas River
Water Quality Monitoring

The following graphs depict metal concentrations from 2015 to 2018 in context of water quality benchmarks that are set to protect use of the Animas River for agriculture, recreation, and aquatic life.

For additional interpretation of Animas River water quality and aquatic life, please visit [www.mountainstudies.org/AnimasRiver](http://www.mountainstudies.org/AnimasRiver)

*Latest data point = 5/30/18*
MSI Rotary Park monitoring program includes analysis of:

- aluminum (Al)
- copper (Cu)
- iron (Fe)
- lead (Pb)
- zinc (Zn)

Total and dissolved metals

MSI analyzed for the total and dissolved fraction of metals. Why?

The pH of water is the main driver of whether a metal is present in a dissolved state or a solid particulate state. This is important because metals are generally more bioavailable and toxic to aquatic life in a dissolved state.
The recreational screening level represents the level at which no adverse health effects are expected to occur in humans consuming 2L of water per day, from the Animas, orally, for 64 days each year for a total of 30 years.

Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34. Standards vary with water hardness and are plotted here using an average water hardness of the Animas River at this location, 2018 mg/L.
Dissolved Aluminum, Animas River at Durango, CO: 2015-2018

- **EPA Surface Water Recreational Screening Level (170,000 μg/L)**
- **2015 Gold King Mine release samples (8/6/15 - 8/9/15)**
- **2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)**
- **2016 samples (Feb-Nov)**
- **2017 samples**
- **2018 samples (March-May)**
- **Samples with concentrations below Method Detection Limit**
- **Animas River Discharge in Durango (cfs)**

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Total Copper, Animas River at Durango, CO: 2015-2018

- **EPA Surface Water Recreational Screening Level (6,700 µg/L)**
- **CDPHE Domestic Water Supply Maximum Contaminant Level 30-Day Exposure (1,000 µg/L)**
- **CDPHE Agriculture Standard 30-Day Exposure (200 µg/L)**

- **2015 Gold King Mine release samples (8/6/15 - 8/9/15)**
- **2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)**
- **2016 samples (Feb-Nov)**
- **2017 samples**
- **2018 samples (March-May)**

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*Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34.
Dissolved Copper, Animas River at Durango, CO: 2015-2018

- EPA Surface Water Recreational Screening Level (6,700 µg/L) *
- CDPHE Acute Standard for Aquatic Life, based on average hardness ~
- CDPHE Chronic Standard for Aquatic Life, based on average hardness ~

- 2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)
- 2016 samples (Feb-Nov)
- 2017 samples
- 2018 samples (March-May)

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*Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Regs. 21 and 34.
Dissolved Iron, Animas River at Durango, CO: 2015-2018

- EPA Surface Water Recreational Screening Level (120,000 μg/L)*
- CDPHE Domestic Water Supply Maximum Contaminant Level 30-Day Exposure (300 μg/L, Disolved)**
- 2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)
- 2016 samples (Feb-Nov)
- 2017 samples (March-Aug)
- 2018 samples (March-May)
- Samples with concentrations below Method Detection Limit
- Animas River Discharge in Durango (cfs)

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**Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34.
Dissolved Lead, Animas River at Durango, CO: 2015-2018

- **EPA Surface Water Recreational Screening Level (200 µg/L)**
- **CDPHE Acute Standard for Aquatic Life, based on average hardness**
- **CDPHE Chronic Standard for Aquatic Life, based on average hardness**
- **2015 Gold King Mine release samples (8/6/15 - 8/9/15)**
- **2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)**
- **2016 samples (Feb-Nov)**
- **2018 samples (March-May)**
- **2018 samples (March-May)**
- **Samples with concentrations below Method Detection Limit**

*The recreational screening level represents the level at which no adverse health effects are expected to occur in humans consuming 2L of water per day, from the Animas, orally, for 64 days each year for a total of 30 years.*

**Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 22 and 34."
Total Zinc, Animas River at Durango, CO: 2015-2018

- **EPA Surface Water Recreational Screening Level (50,000 µg/L)**
- **CDPHE Domestic Water Supply Maximum Contaminant Level 30-Day Exposure (5,000 µg/L)**
- **CDPHE Agriculture Standard 30-Day Exposure (2,000 µg/L)**

- 2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)
- 2016 samples (Feb-Nov)
- 2017 samples (March-Aug)
- 2018 samples (March-May)

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*Colorado Department of Public Health and the Environment (CDPHE) standards based on Colorado surface water quality classifications and Reg. 31 and 34.*
Dissolved Zinc, Animas River at Durango, CO: 2015-2018

- **EPA Surface Water Recreational Screening Level (50,000 µg/L)**
- **CDPHE Acute Standard for Aquatic Life, based on average hardness**
- **CDPHE Chronic Standard for Aquatic Life, based on average hardness**

- 2015 Post-Gold King Mine release samples (8/10/15 - 10/26/15)
- 2016 samples (Feb-Nov)
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So far, did metal concentrations in 2018 at Rotary Park surpass water quality benchmarks?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Acute</th>
<th>Chronic</th>
</tr>
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<td>Recreation</td>
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<tr>
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<td>Domestic Water Supply</td>
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<td>No</td>
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<tr>
<td>Aquatic Life</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Safe Levels:
- Al\(\text{t+d}\)
- Cu\(\text{t+d}\)
- Fe\(\text{t+d}\)
- Pb\(\text{t+d}\)
- Zn\(\text{t+d}\)

\(t=\text{total};\ d=\text{dissolved}\)
In 2016, 2017, and 2018, concentrations of aluminum and iron approached levels that could be harmful to aquatic life. These elevated levels occurred during spring runoff and were lower in late summer. High levels of aluminum and iron are not unprecedented, and are consistent with levels observed in previous years.

It is important to note that there are large natural sources of aluminum and iron in the Animas River watershed that are not related to mining activities.

Mountain Studies Institute, Colorado Parks and Wildlife, Southern Ute Indian Tribe, and other organizations will continue to monitor aquatic life to assess overall river health.