Negotiated Rulemaking
Docket No. 58-0102-1502

# Update to Copper Criteria for Aquatic Life Use

December 11, 2015

Idaho Department of Environmental Quality

# Outline

- Review of questions posed during last meeting
- Review of comments received
- Compliance
- Default criteria
- Comparison of different approaches
- Recommendations

# Questions Posed

- Should we stick with BLM or pursue multiple linear regression approach?
- What do we use for compliance? (FMB? 10$^{th}$ percentile?)
- How do we handle missing data? (Default values? Require monitoring?)
- How do we transition: Keep hardness-based, use it until data are available?

# Review of Comments Received

- Two commentors:
  - Idaho Conservation League (ICL)
  - Copper Development Association (CDA)

# Review of Comments Received

- Both CDA and ICL support BLM over MLR
- CDA commented on reference values in rule, be clear that they are examples only and do not represent criteria to apply at a location

# Review of Comments Received

- CDA prefers that we cite the EPA 2007 guidance rather than the particular version of the model in order to provide flexibility to adopt model revisions without rulemaking

# Review of Comments Received

- ICL wants a discussion of the implications of using the BLM without the full complement of data
- ICL would like DEQ and EPA to require dischargers to begin collecting BLM input data now

# Review of Comments Received

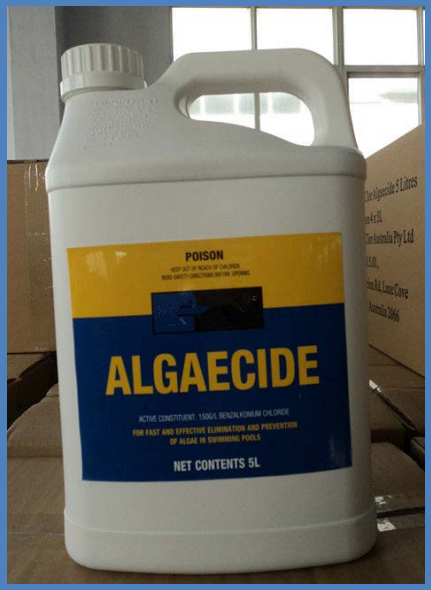
- ICL does not support continuing to use hardness-based WQC until BLM input data are available
- ICL requests discussions about how BLM criteria will be integrated into permits, issues related to compliance and issues related to implementation (such as mixing zones); as well as a discussion on timeline for guidance development

# Questions Posed

- Should we stick with BLM or pursue multiple linear regression approach?
- What do we use for compliance? (FMB? 10$^{th}$ percentile?)
- How do we handle missing data? (Default values? Require monitoring?)
- Keep hardness-based, use it until data are available?

# BLM or MLR?

- BLM
  - Specific version and year cited in rule, will need to remain static
  - BLM Version 2.2.3, June 2007.



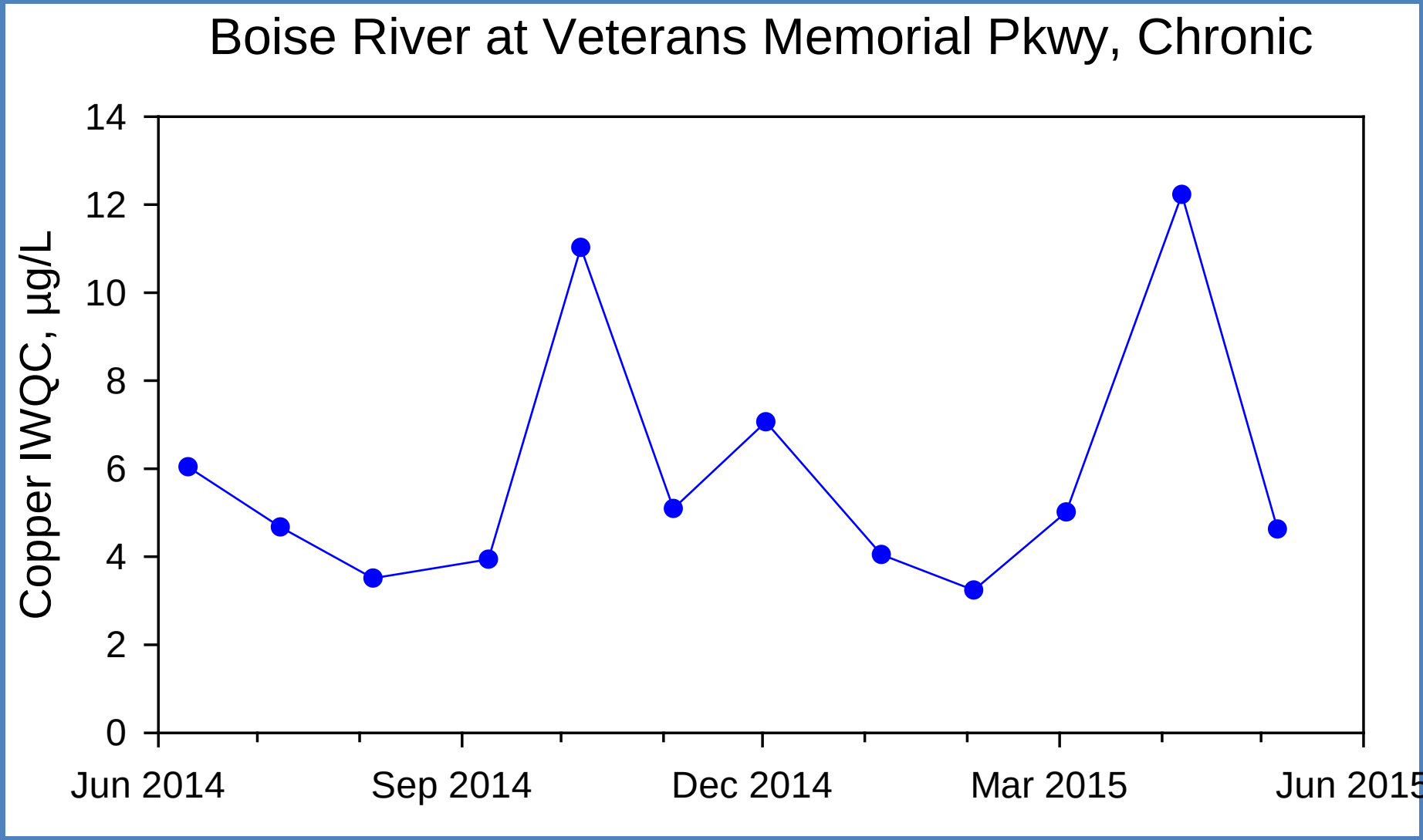

http://www.alibaba.com/product-detail/swimming-pool-chemicals-copper-algaecide_827054558.html?spm=a2700.7724857.29.10.Nykuq3

# More on MLR

# Questions Posed

- Should we stick with BLM or pursue multiple linear regression approach?
- What do we use for compliance? (FMB? 10$^{th}$ percentile?)
- How do we handle missing data? (Default values? Require monitoring?)
- Keep hardness-based, use it until data are available?

# Instantaneous Water Quality Criteria (IWQC)



# What to use for compliance?

- Can be achieved by taking low number from distribution of IWQC, using Fixed Monitoring Benchmark (FMB)

# Distribution of IWQC

- Requires time series dataset for a site, or multiple sites to represent a larger area
- Select low or minimum IWQC value as compliance value, based on assumption this would (nearly) always be protective

# South Fork Coeur d'Alene River

| Date | Acute BLM (Cu, µg/L) | Chronic BLM (Cu, µg/L) |
|---|---|---|
| 11/4/1998 | 2.27 | 1.41 |
| 2/3/1999 | 1.41 | 0.87 |
| 3/17/1999 | 1.44 | 0.89 |
| 3/23/1999 | 2.08 | 1.29 |
| 4/20/1999 | 1.85 | 1.15 |
| 5/25/1999 | 1.41 | 0.88 |
| 5/27/1999 | 1.04 | 0.65 |
| 6/29/1999 | 0.93 | 0.58 |
| 7/26/1999 | 0.89 | 0.55 |
| 10/19/1999 | 2.06 | 1.28 |
| 12/2/1999 | 1.46 | 0.91 |
| 1/11/2000 | 1.60 | 0.99 |
| 2/28/2000 | 1.63 | 1.01 |

# South Fork Coeur d'Alene River

| Date | Acute BLM (Cu, µg/L) | Chronic BLM (Cu, µg/L) |
|---|---|---|
| 11/4/1998 | 2.27 | 1.41 |
| 2/3/1999 | 1.41 | 0.87 |
| 3/17/1999 | 1.44 | 0.89 |
| 3/23/1999 | 2.08 | 1.29 |
| 4/20/1999 | 1.85 | 1.15 |
| 5/25/1999 | 1.41 | 0.88 |
| 5/27/1999 | 1.04 | 0.65 |
| 6/29/1999 | 0.93 | 0.58 |
| 7/26/1999 | 0.89 | 0.55 |
| 10/19/1999 | 2.06 | 1.28 |
| 12/2/1999 | 1.46 | 0.91 |
| 1/11/2000 | 1.60 | 0.99 |
| 2/28/2000 | 1.63 | 1.01 |

| Date | Acute BLM (Cu, µg/L) | Chronic BLM (Cu, µg/L) | |
|---|---|---|---|
| 7/26/1999 | 0.89 | 0.55 | Minimum |
| 6/29/1999 | 0.93 | 0.58 | |
| | 0.95 | 0.59 | 10th Percentile |
| 5/27/1999 | 1.04 | 0.65 | |
| 2/3/1999 | 1.41 | 0.87 | |
| 5/25/1999 | 1.41 | 0.88 | |
| 3/17/1999 | 1.44 | 0.89 | |
| 12/2/1999 | 1.46 | 0.91 | |
| 1/11/2000 | 1.60 | 0.99 | |
| 2/28/2000 | 1.63 | 1.01 | |
| 4/20/1999 | 1.85 | 1.15 | |
| 10/19/1999 | 2.06 | 1.28 | |
| 3/23/1999 | 2.08 | 1.29 | |
| 11/4/1998 | 2.27 | 1.41 | |

# Distribution of IWQC

- Can be over- or under-protective
- Requires data (at least a year?)
- Lose benefit of site- and time-specificity of BLM

# Fixed Monitoring Benchmark

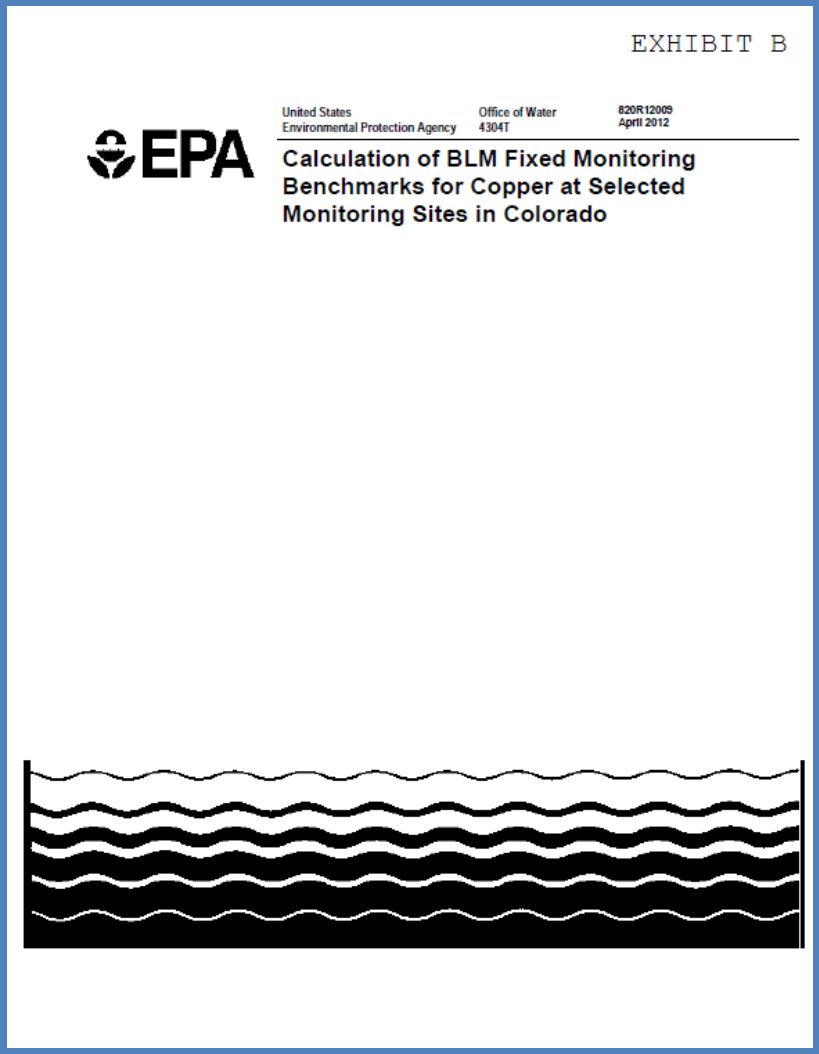


EXHIBIT B

EPA

United States Environmental Protection Agency | Office of Water 4304T | 820R12009 April 2012

**Calculation of BLM Fixed Monitoring Benchmarks for Copper at Selected Monitoring Sites in Colorado**

ftp://ft.dphe.state.co.us/wqc/wqcc/TemporaryModificationsRMH_2014/ProponentsPrehearingStatements/UTSDexB.pdf

# Fixed Monitoring Benchmark

- FMB is probabilistic
- Relies on the distribution of Toxic Units, Cu, and IWQC at a given site

$$TU = \frac{Cu}{IWQC}$$

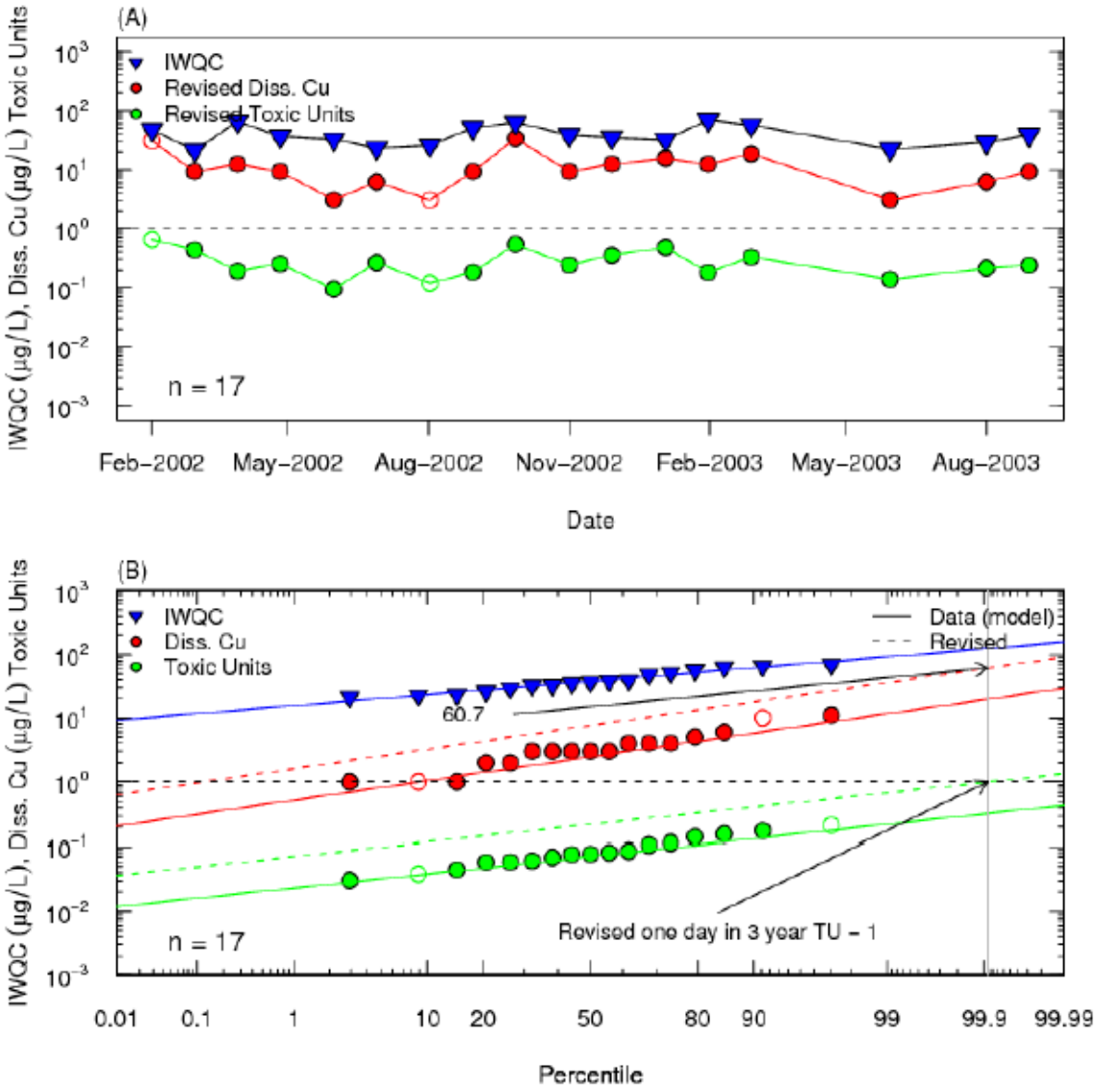



**Figure 14. Time series (A) and probability plot (B) showing revised in-stream Cu (Diss. Cu), IWQC and revised TU from JEH-N14 from the South Platte River. The horizontal dashed line represents a TU = 1, and the grey vertical line represents the exceedence frequency (EF) of once every three years. Unfilled symbols represent values that were reported as a detection limit value (red series) or TU values that were calculated with detection limit in-stream Cu values (green series). The upper arrow indicates the FMBa, and the lower arrow indicates that the TUEF = 1.**

$$TU = \frac{Cu}{IWQC}$$

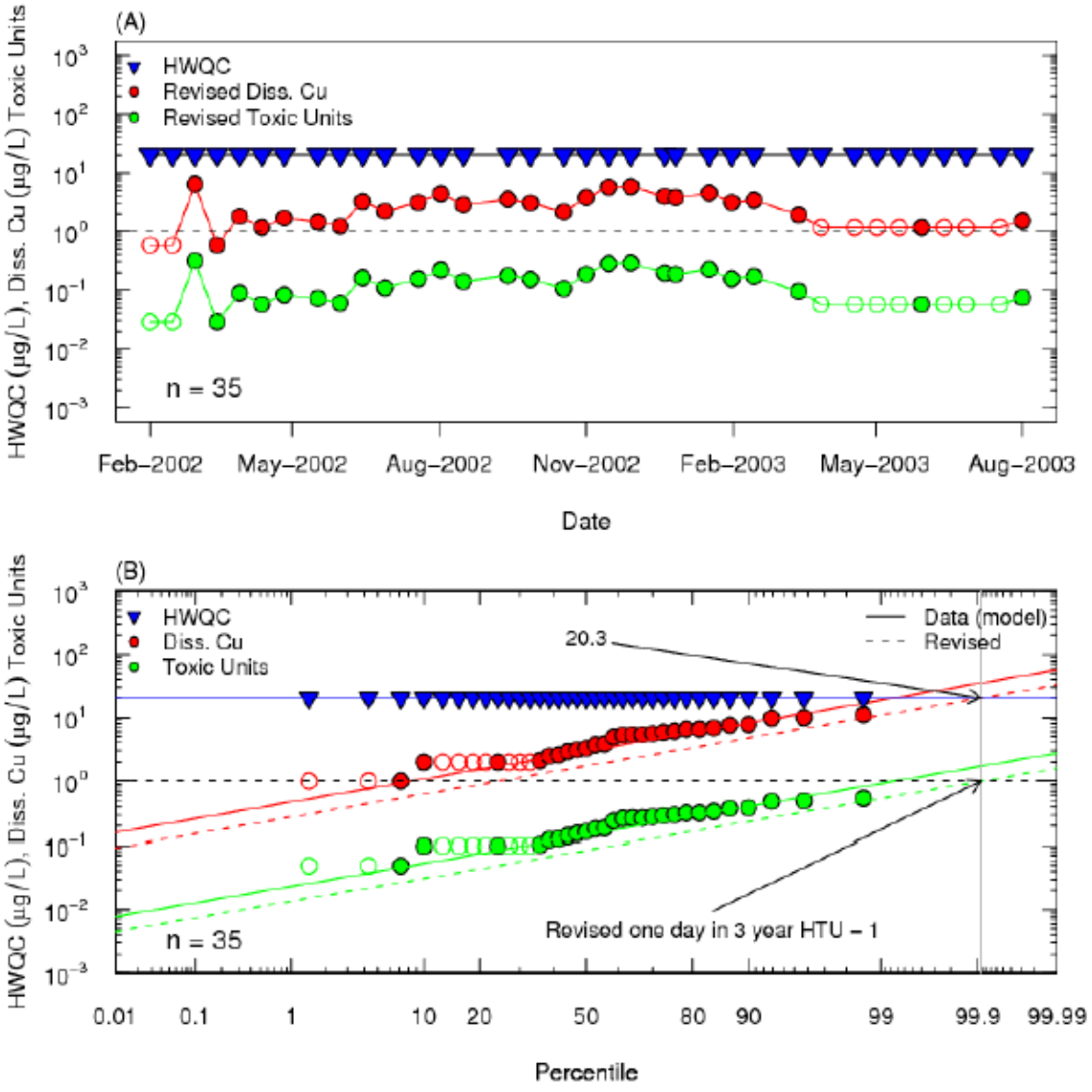


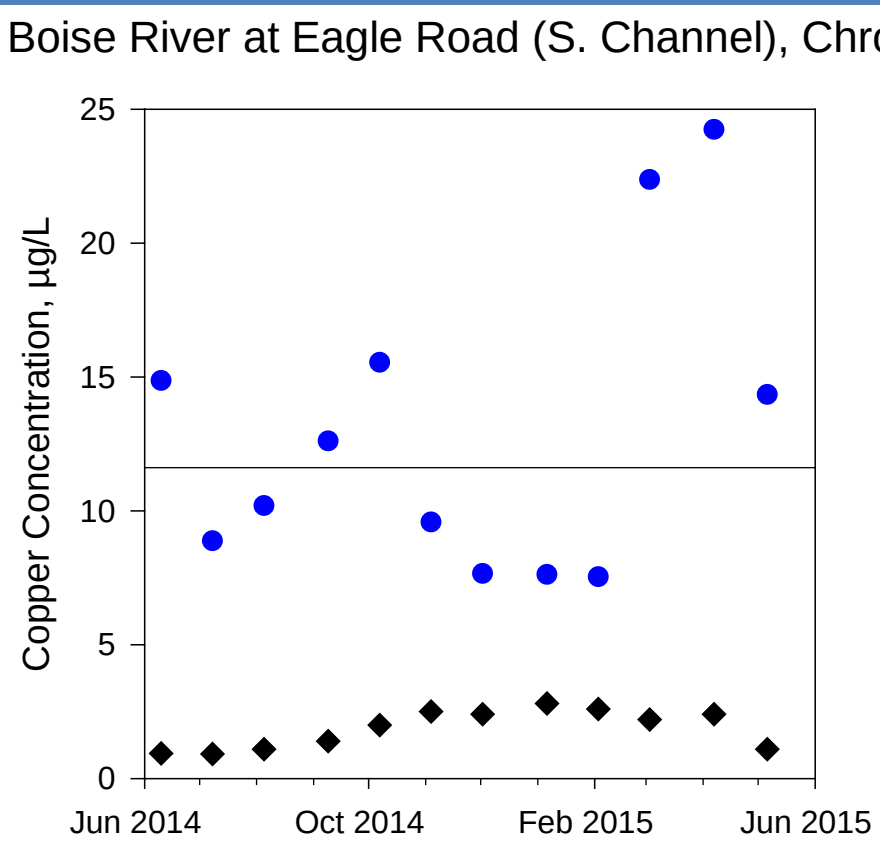

**Figure 16. Time series (A) and probability plot (B) showing revised in-stream Cu (Diss. Cu), HWQC and revised TU from Cent_Min_Ave from the South Platte River. The horizontal dashed line represents a TU = 1, and the grey vertical line represents the exceedence frequency (EF) of once every three years. Unfilled symbols represent values that were reported as a detection limit value (red series) or TU values that were calculated with detection limit in-stream Cu values (green series). The upper arrow indicates the FMBa, and the lower arrow indicates that the TUEF = 1.**

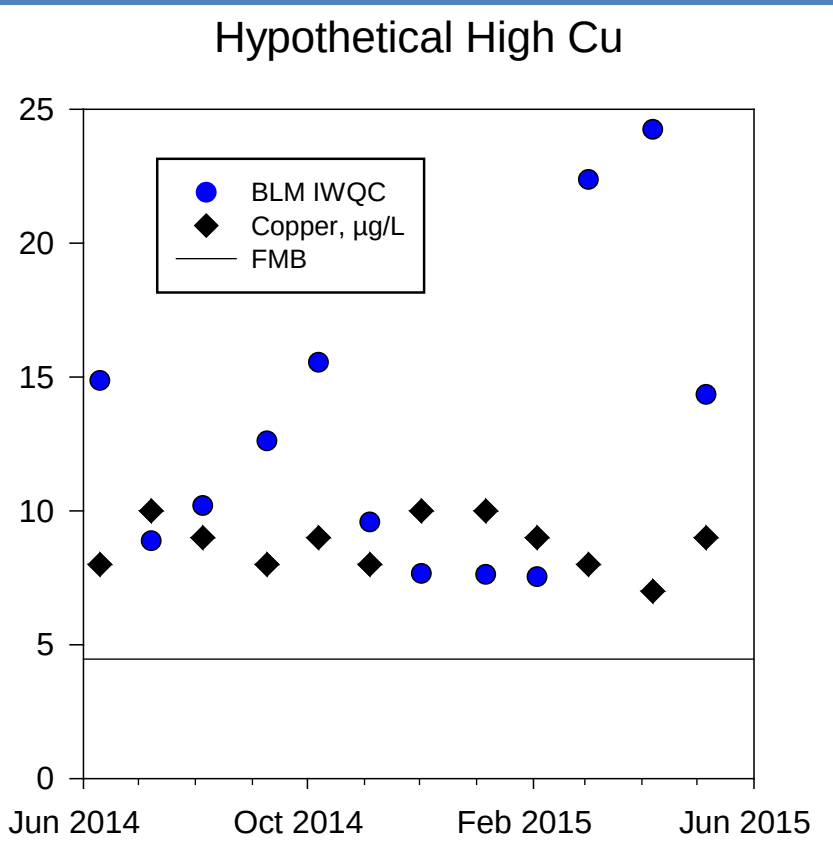
$$TU = \frac{Cu}{IWQC}$$

# Fixed Monitoring Benchmark

- The more likely Cu concentrations are to exceed IWQC's, the lower the FMB
  - Higher probability that Cu will exceed IWQC

# Fixed Monitoring Benchmark



# Fixed Monitoring Benchmark

- May better account for variability at a site – site specific
- Can occur at any point in the IWQC distribution
- May allow for frequent future exceedances of IWQC if used as criteria

# Fixed Monitoring Benchmark

- Not simple to calculate
- Requires input and copper data
- Need to characterize variability in IWQC and Cu

# Compliance-Monitoring Requirements

- How many samples are required to characterize variability in IWQC and copper?
- Suggest 12 monthly samples may be adequate

# Questions Posed

- Should we stick with BLM or pursue multiple linear regression approach?
- What do we use for compliance? (FMB? 10$^{th}$ percentile?)
- How do we handle missing data? (Default values? Require monitoring?)
- Keep hardness-based, use it until data are available?

# What to do when you don't have sufficient data

1. NOAA BiOp provided default criteria values that would be protective
   - Conservative, based on surrogate waters where data were available
2. Follow interim measures from NOAA and USFWS BiOp

# Default criteria

- From NOAA BiOp
- Specific to waters
- Expand to other basins?

*Table 3. Ranges of chronic copper criterion concentrations estimated for critical late summer/fall baseflow conditions in subbasins within the range of anadromous salmonids in the Snake River basin, Idaho.*

| Subbasin | Common subbasin geologic characteristics | Critical late-summer Cu benchmark concentration (µg/L) | Based upon EPA's 2007 Cu chronic criterion (CCC) using data collected or estimated using: |
|---|---|---|---|
| Selway, Lochsa, MF Clearwater R | Granitic or intrusive rocks from Idaho Batholith or Precambrian metamorphic rocks | 0.6 | St Joe River at Red Ives, 9/14/2007; SF Coeur d'Alene R at Pinehurst, 9/10/2007; NFCDA Fig 25 |
| SF Clearwater River | Idaho Batholith | 1 | SF Clearwater at Stites |
| MF and SF Salmon and tributaries | Idaho Batholith | 1 | Extrapolated using low conductivity measured in undisturbed streams in the Salmon R basin (Ott and Maret 2003), ~30 µs/cm, pH 6.9, using DOC of 1 mg/L and then estimating major ions with regression equations from streams in Coeur d'Alene R with similarly low conductivity |
| Upper Salmon R | Idaho Batholith and Challis volcanics | 3 | Snake River (Fig. 24); Johnson Creek at Yellow Pine, 10/10/2007 |
| Upper Salmon R tributaries | Challis volcanics | 3 | Assumed similar to Panther Creek |
| Panther Creek | Challis volcanics and Idaho Batholith | 3 | Minimum BLM=CCC calculated for low-flow, low DOC conditions from a 1994 dataset (Maest *et al.* 1995) |
| Lemhi and Pahsimeroi Rivers | Tertiary sediments from ancient lake bottoms | 6 | Pahsimeroi at Ellis, 9/18/2007 |
| Lower Salmon (downstream of SF Salmon) | Diverse | 3 | Salmon River at White Bird, 9/27/2007 |
| Snake River | Diverse | 6 | Minimum BLM calculated for Snake River at mouth (Burbank, WA) |

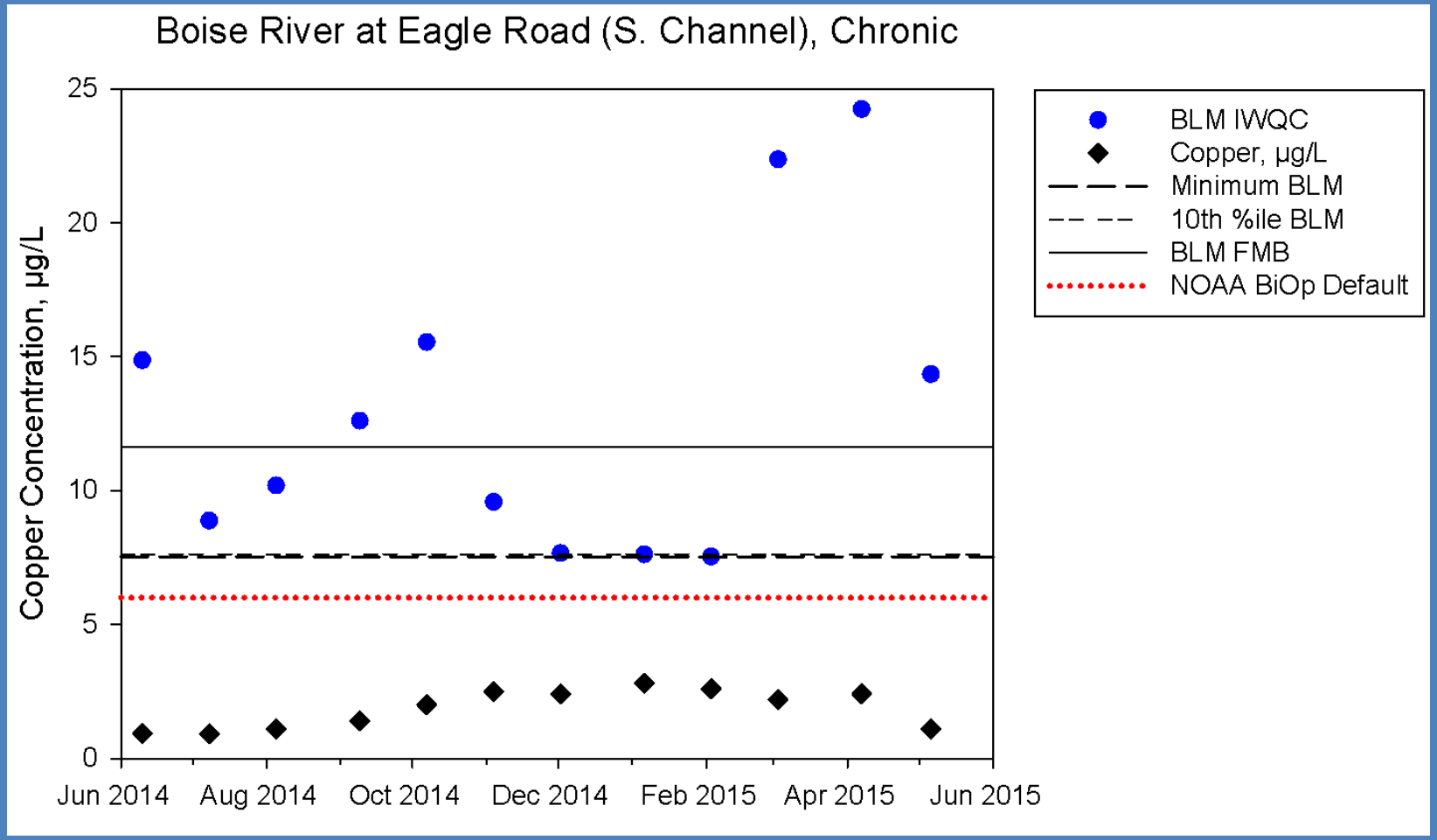
# Interim Measures

| Species | Measure | Source |
|---|---|---|
| Listed Snake River Snails | No mixing zone allowed for copper (unless BLM criteria are met beyond the mixing zone) | USFWS BiOp, 2015 |
| Bull Trout and Kootenai River White Sturgeon | Zone of passage around mixing zone (<25% of volume) | USFWS BiOp, 2015 |
| Listed anadromous fish | Zone of passage around mixing zone (<25% of volume) | NOAA BiOp, 2014 |

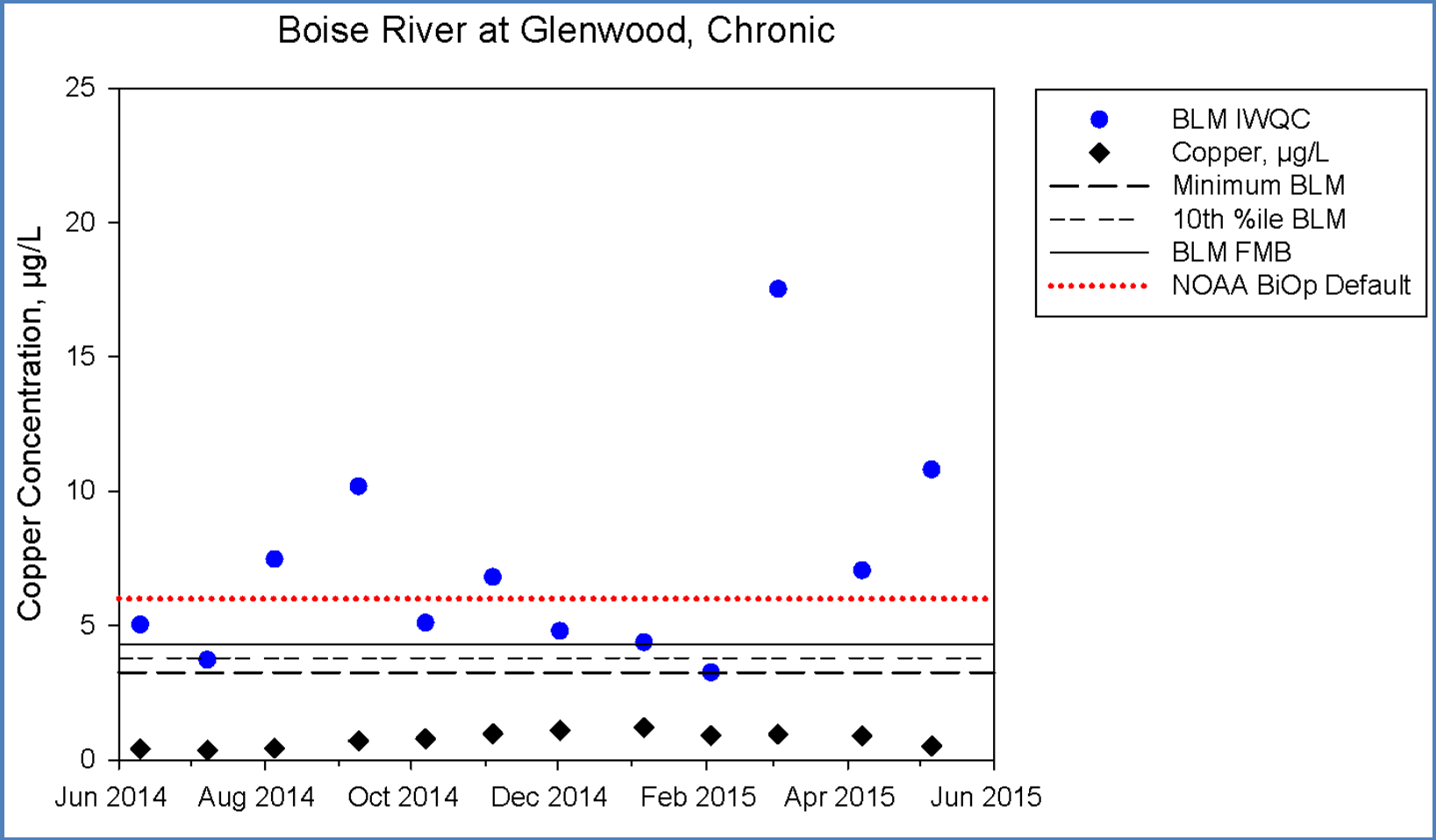
# Interim Measures

- Provide for transition until adequate BLM input data are available
- Protective of Aquatic Life

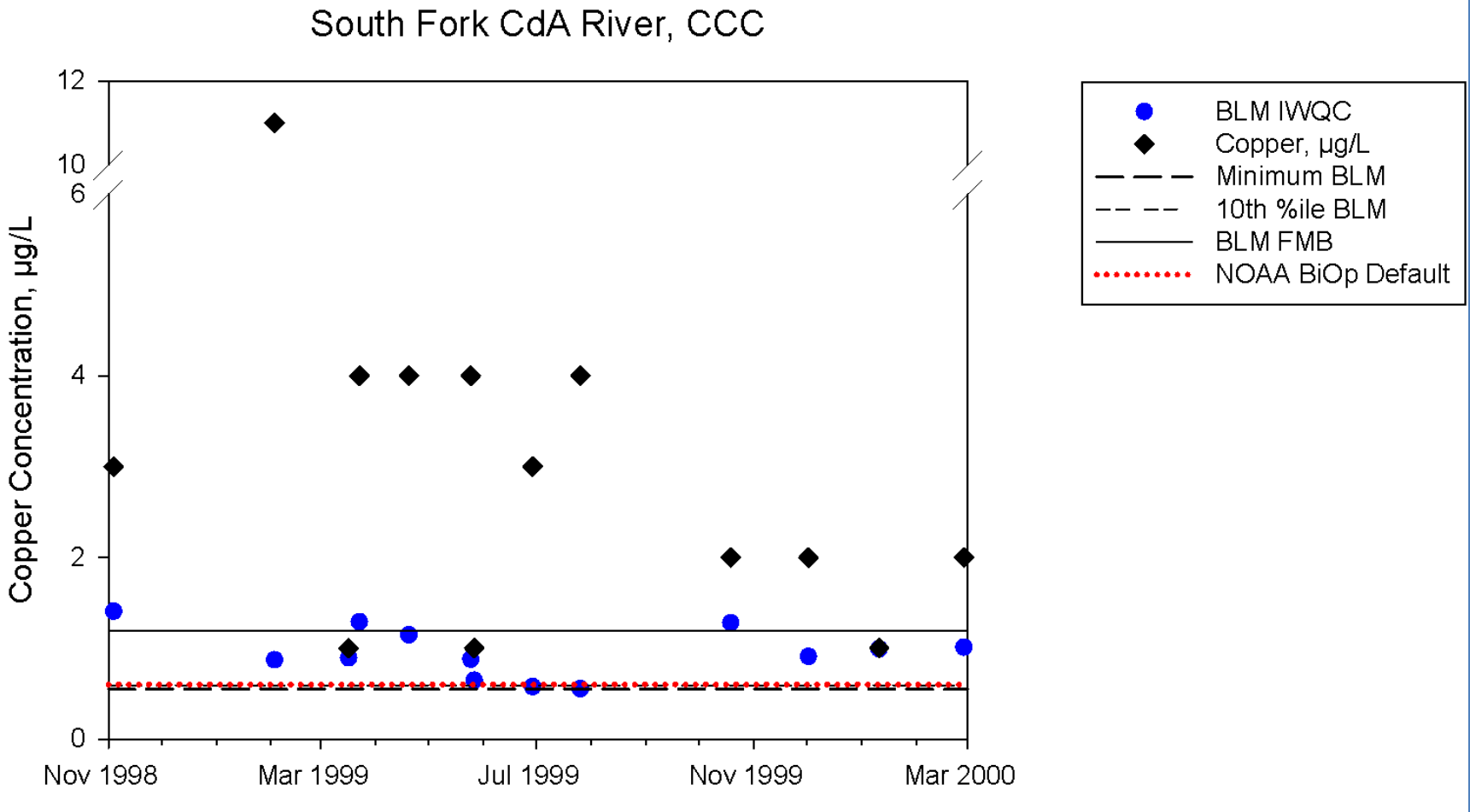
# Comparison of approaches



# Comparison of approaches



# Comparison of approaches



# Recommendations

- Use BLM, reference model version 2.2.3,
- Until discharger/site has sufficient data to produce BLM criteria, we will implement BiOp interim measures to provide protection of aquatic life
- Compliance, monitoring requirements, and default criteria are implementation issues that will be addressed through guidance

# Draft Rule unchanged

**Aquatic life criteria for copper are derived from the Biotic Ligand Model, Version 2.2.3 (June 2007).**

For comparative purposes only, the example values displayed in this table correspond to the model output based on the following inputs: temperature = 15.2°C, pH = 7.9, dissolved organic carbon = 1.9 mg/L, humic acid fraction = 10%, Calcium = 689 mg/L, Magnesium = 4.2 mg/L, Sodium = 65.5 mg/L, Potassium = 1.9 mg/L, Sulfate = 72.6 mg/L, Chlorine = 54.5 mg/L, and alkalinity = 280 mg/L $CaCO_3$.

# Questions?

# Next Meeting?

- Tentatively scheduled for April 20, 2016