



July 10, 2014

Jim Harris, Program Manager  
Utah Division of Water Quality  
PO Box 144870  
195 North 1950 West  
Salt Lake City, Utah 84114-4870



Re: Comments on the 2014 Integrated Report

Dear Mr. Harris:

Included are comments provided by the Jordan River Farmington Bay Water Quality Council relating to the 2014 Integrated Report. We believe these comments will assist you in making the report more accurate and insuring the environment is protected as required by state code and rules. Should you have questions relating to these comments, please contact either Theron Miller, Dal Wayment or Leland Myers.

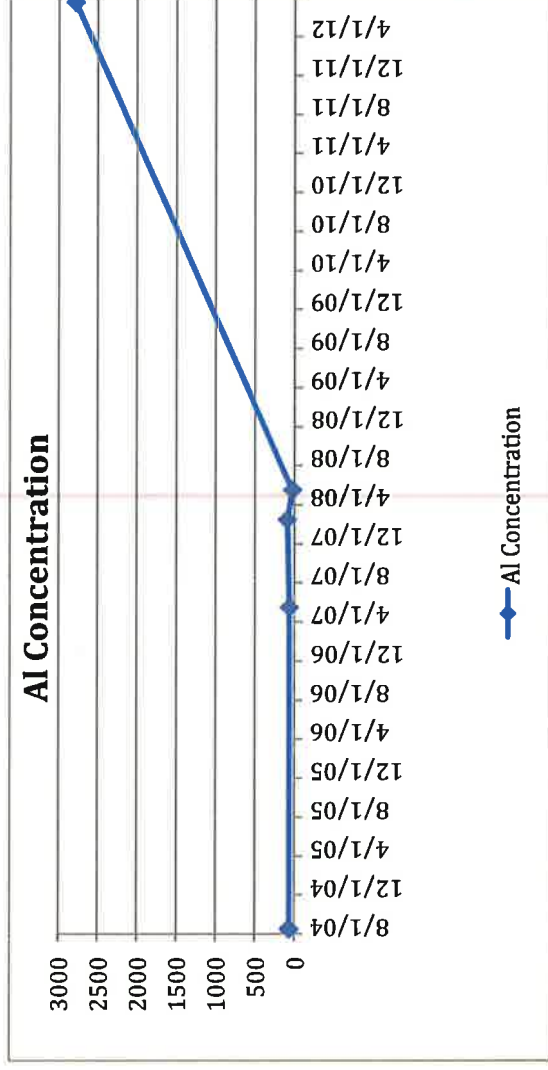
### **Iron & Single Acute or Chronic Violations**

One of the most problematic issues associated with the IR is the use of one acute or chronic criteria exceedance to place a site on the 303(d) list. This lack of confirmation data is inconsistent with prior listing determinations. Specifically, when a monitoring location has less than 10 samples an acute or chronic violation may be just an outlier and not representative of any water quality problem. Below is a graph of monitoring site 5994790 – Thompson Creek.

Document Date 7/10/2014

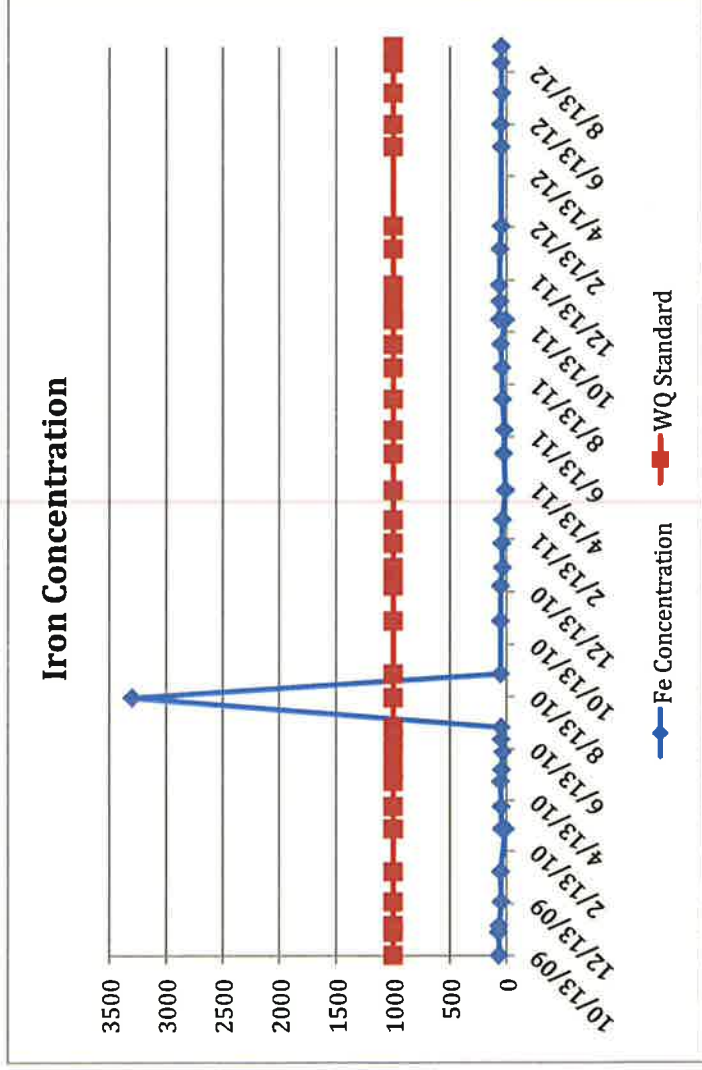


DWQ-2014-009819



As can be seen, there are five data points, with four below the aluminum chronic criteria and one over 30 times greater than the next highest value. This outlier may be a true value, but likely is a sampling or laboratory error. It is our opinion that with a small data set (less than ten samples) one chronic or acute exceedance should not be a cause for inclusion in the 303(d) list but may rather be included in one of the Category 3 brackets.

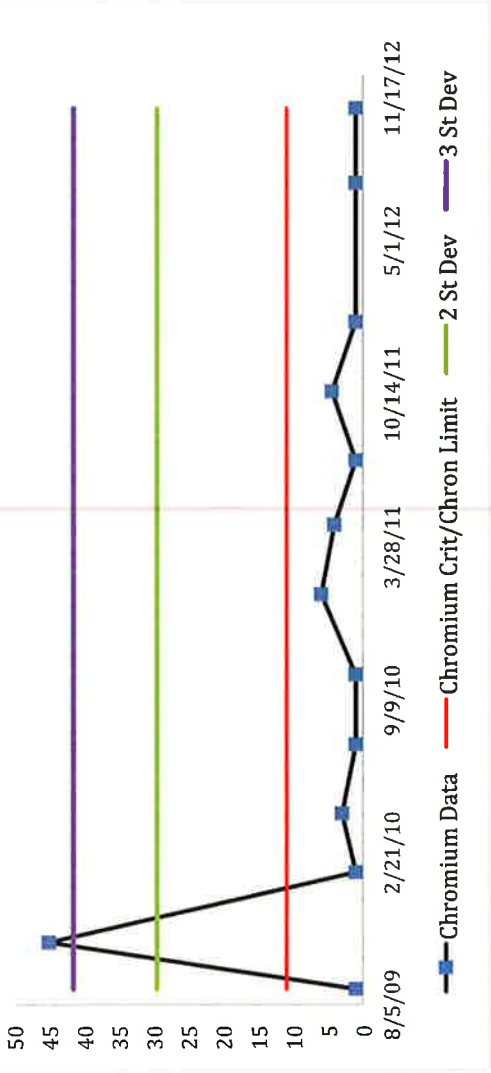
When a larger data set is present with greater than 10 total samples the use of one acute violation may still be simply an outlier and an error in data collection or sample analysis. The sample could be a real value, but the infrequency the acute violation occurs would make it practically impossible to determine a source for the high value. As can be seen from the following graph, there is only one exceedance in about 37 samples. This high number of samples with just one sample greater than 75 times the average of all other samples lends suspect to the one exceedance.



The above data is from monitoring location 4992480 – Mill Creek above the confluence with the Jordan River at the USGS Gage Station. Again, it is our opinion that such a single exceedance should not be a cause for listing on the 303(d) list.

Confirming this opinion that a single exceedance is insufficient for listing, below is a graph from Monitoring Location ID 4990987 – North Canyon Creek in Legacy Nature Preserve. This data set has one significant exceedance that is inconsistent and much higher than all the other samples in the data set. This again confirms that 303(d) listing is inappropriate with outliers that are likely inaccurate. While we would rather see all such monitoring locations indicated as Category 1 waters as fully supporting for this pollutant at this location, we understand that it may be necessary to include them in Category 3 as lacking sufficient data.

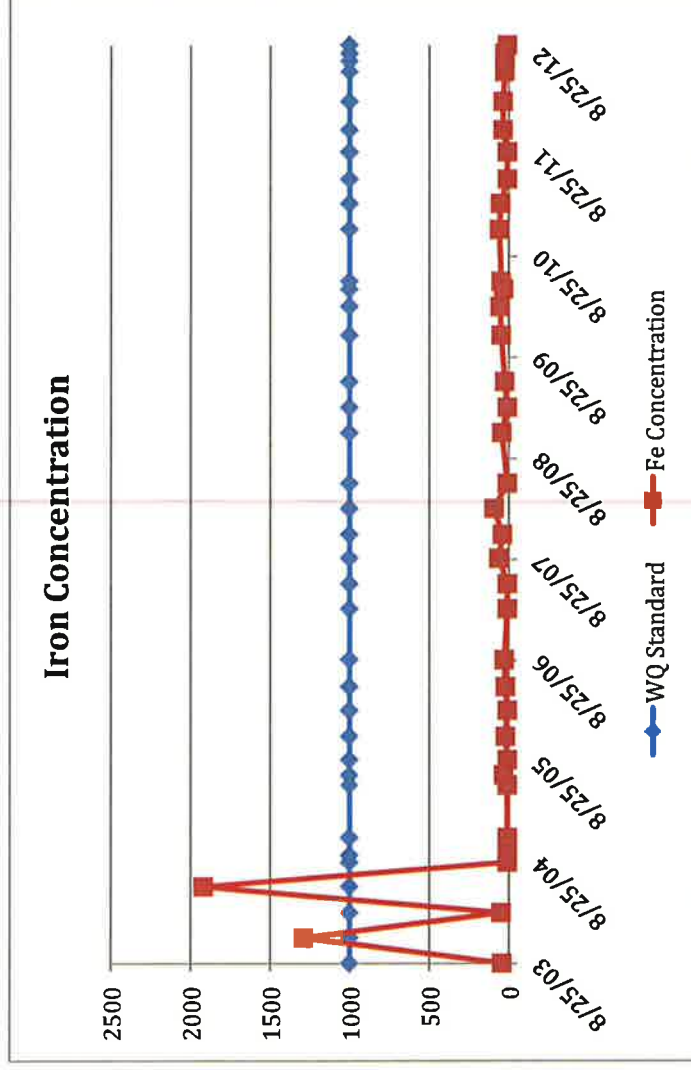
## Chromium Concentration



Finally, the entire assessment of iron exhibits a significant level of problems relating to the accuracy of all iron analysis. Below is a table extracted from the provided data set.

Sample Date	Monitoring Location ID	Location Name	Sample Value	Units
8/11/10	4992390	DECKER POND OUTFLOW AB JORDAN R	3320	ug/l
8/11/10	4992480	MILL CREEK ABOVE CNFL / JORDAN RIVER AT USGS GAGE STATION	3300	ug/l
8/11/10	4992970	BIG COTTONWOOD CK AB JORDAN R @ 500 W 4200 S	3280	ug/l
8/11/10	4993580	LITTLE COTTONWOOD CK 4900S 600W SLC	3300	ug/l

As can be seen, all of the above samples were collected on the same date. In addition, all of the samples were significantly higher than all other samples at their individual monitoring site. The samples above were the only samples above the criteria at each location. In this case either laboratory error occurred, the samples were reported in the wrong units, there was a continuous field sampling bias or there was a significant release of iron in each creek on the very same day. Besides the Columbus-Rexall Mine outfall, all of the other iron acute violations should probably be included in one of the Category 3 brackets. This conclusion is supported by the information from monitoring location ID 5994410 – Johnson Canyon. Below is a graph of the data from this location.



While two samples exceeded the criteria, the age of the two exceedances is such that to place it on the 303(d) list is inappropriate in our opinion. Again, this sample belongs in category 3 with insufficient data to make a determination.

In conclusion, we recommend two amendments to the Integrated Report relating to single exceedances or iron analysis:

1. At least two exceedances must occur before being placed on the 303(d) list. Single exceedances may be placed in Category 3 indicating insufficient data.
2. All iron listings, except the Columbus – Rexall Outfall, should be placed in Category 3 until an outlier analysis is done and the vast difference between the typical value and the outlier is explained or validated with additional sampling.

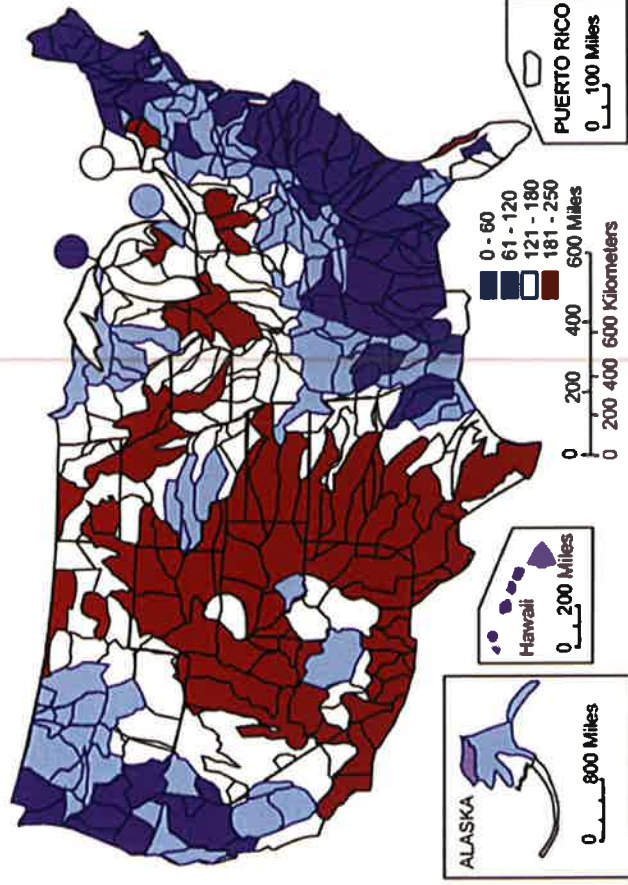
### Aluminum & Hardness Dependant Criteria

From the spreadsheets with the data for the integrated report it appears that calcium and magnesium concentrations were used to calculate an applicable hardness for each monitoring event at each location. While we accept that calcium and magnesium hardness (Ca/Mg hardness) normally is a significant portion of the total hardness, other cations such as iron or manganese may also add to the total hardness of water. For pollutants where the toxic concentration is hardness dependent the calculated hardness may be adequate to approximate the hardness for purposes of IR listing. This assumption is inappropriate for



aluminum when assessing for chronic violations. As can be seen from the USGS hardness map below, water in Utah is generally considered hard.

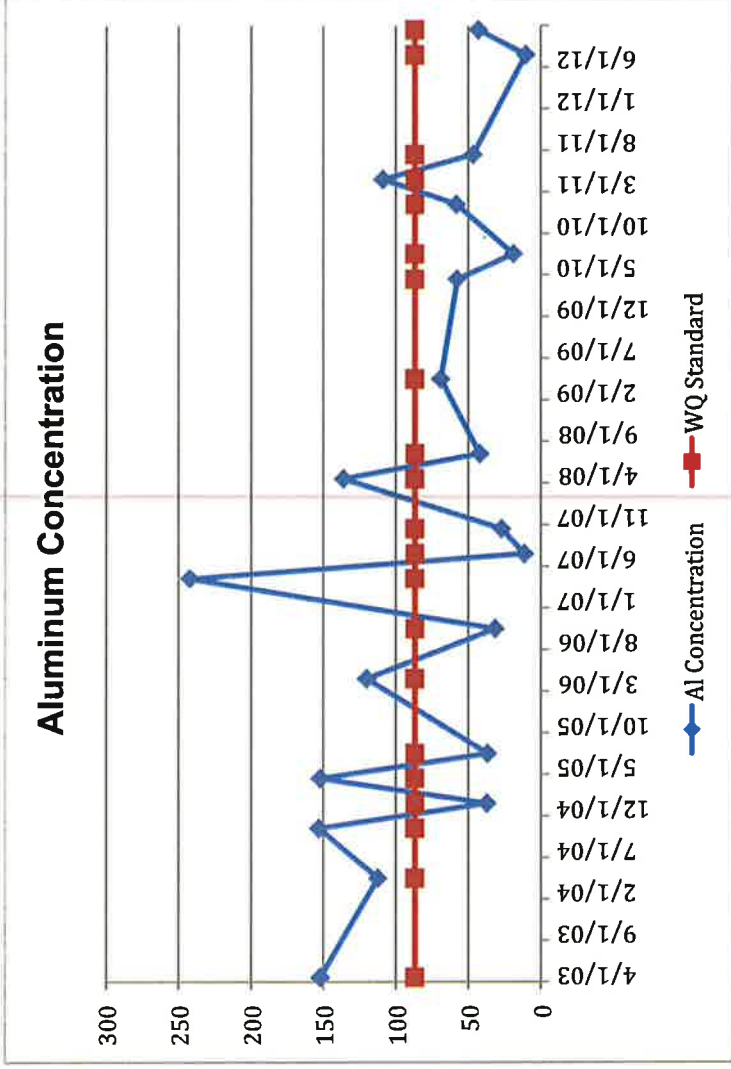
CONCENTRATION OF HARDNESS AS CALCIUM CARBONATE,  
IN MILLIGRAMS PER LITER



The Utah Administrative Code in R317-2-14 has a footnote for the chronic criteria for aluminum, which states that

Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO<sub>3</sub> in the receiving water after mixing, the 87 ug/l chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/l acute aluminum criterion (expressed as total recoverable).

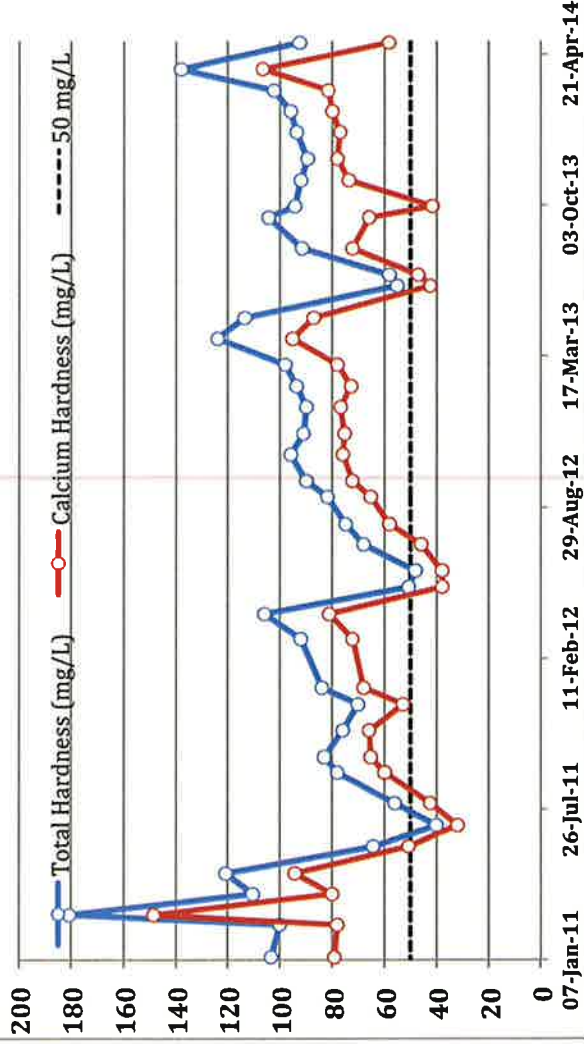
It is our contention that the use of a calculated hardness or the lack of hardness data to determine applicability of the 87 ug/L is inappropriate. We suggest that if actual hardness measurements do not exist demonstrating a true hardness of the over 50 ppm the water be included in Category 3 awaiting confirmation of the accurate hardness measurement. This is especially true when the aluminum concentrations just exceed the criteria. Following is a graph of aluminum concentration at monitoring location ID 4990340 – Farmington Creek at USGS Gage Station.



Calculated hardness values at this location range from 27 ppm to 461 ppm. Because of the sensitivity to hardness for applicability of the standard, we suggest that before inclusion on the 303(d) list this site be sampled and actual hardness measurements taken. As a comparison, below is a graph of hardness measured at the intake of the Little Cottonwood Treatment plant owned by the Metropolitan Water District of Salt Lake and Sandy located on Little Cottonwood Creek. This would be a snow fed mountain creek similar to Farmington Creek.

## Calcium and Total Hardness of Little Cottonwood Creek at the Influent to the Water Treatment Plant

Hardness values decrease sharply during the runoff period. Then, after run off, hardness increases reaching a peak in the spring.



As can be seen, measured total hardness rarely falls below 50 ppm.

EPA recognized the infrequent times when the 87 µg/L standard should be applied in the footnote to the criteria in the National Recommended Water Quality Criteria (<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>). This footnote states:

### Footnote S

There are three major reasons why the use of Water-Effect Ratios might be appropriate.

1. The value of 87 µg/l is based on a toxicity test with the striped bass in water with pH = 6.5–6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time.
2. In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily



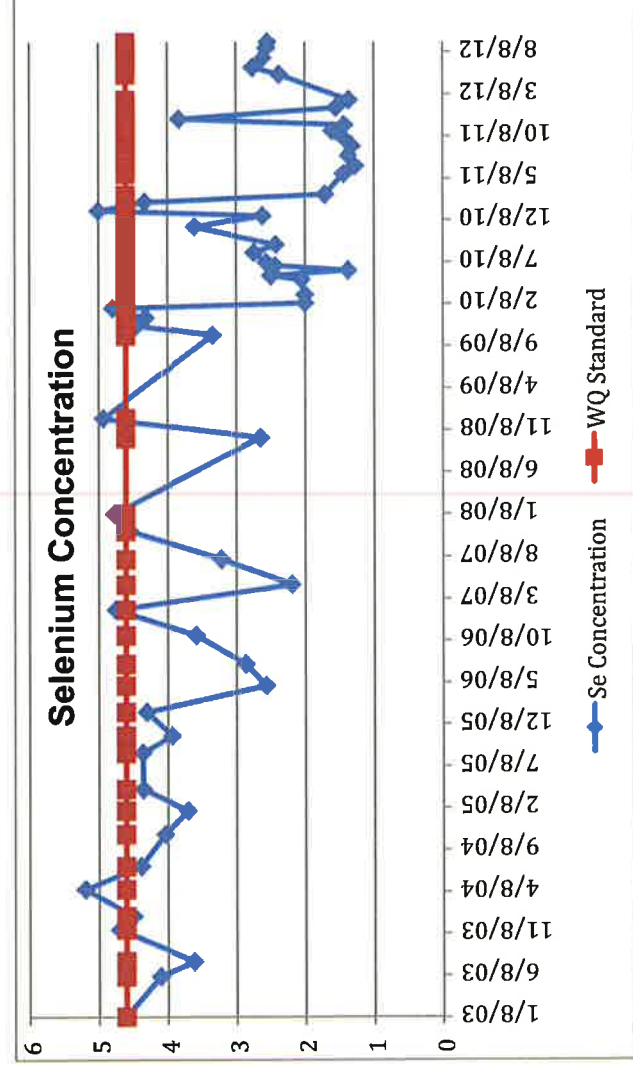
aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide.

3. EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 µg aluminum/L, when either total recoverable or dissolved is measured.

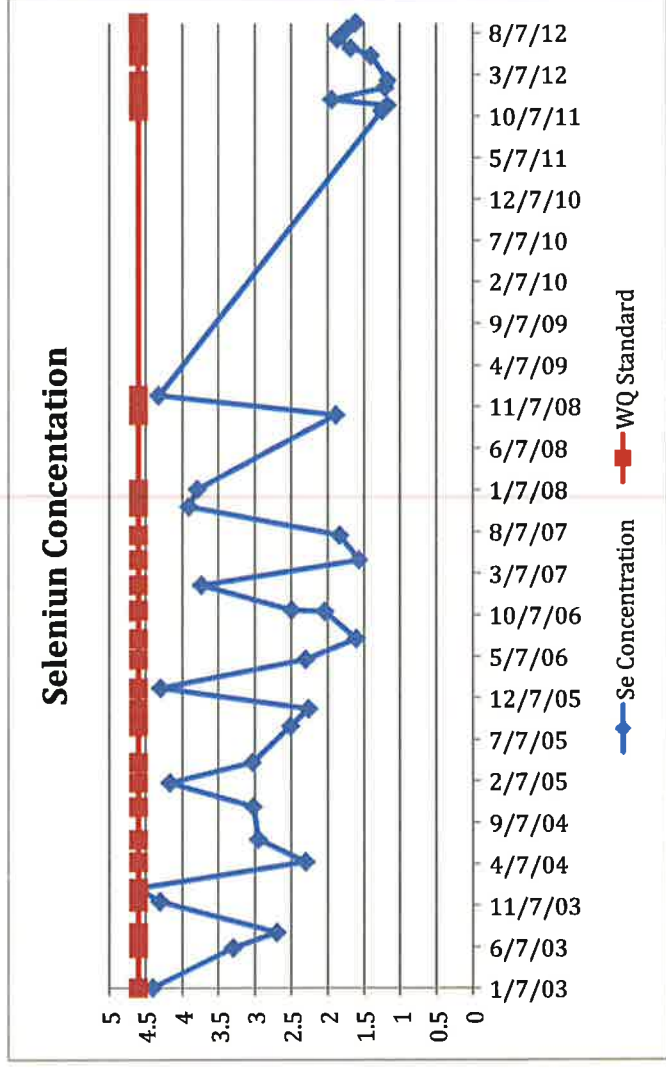
Based on the lack of actual hardness measurements, the sharp cutoff of the criteria at 50 ppm hardness for applicability, and EPA's recommendation on the appropriate use of the water effects ratio for aluminum, we again state that all monitoring locations where hardness was calculated or not available or where hardness values were close to the 87 µg/l concentration be included in Category 3 waters rather than being placed on the 303(d) list at the present time.

### Stream Continuum Issues

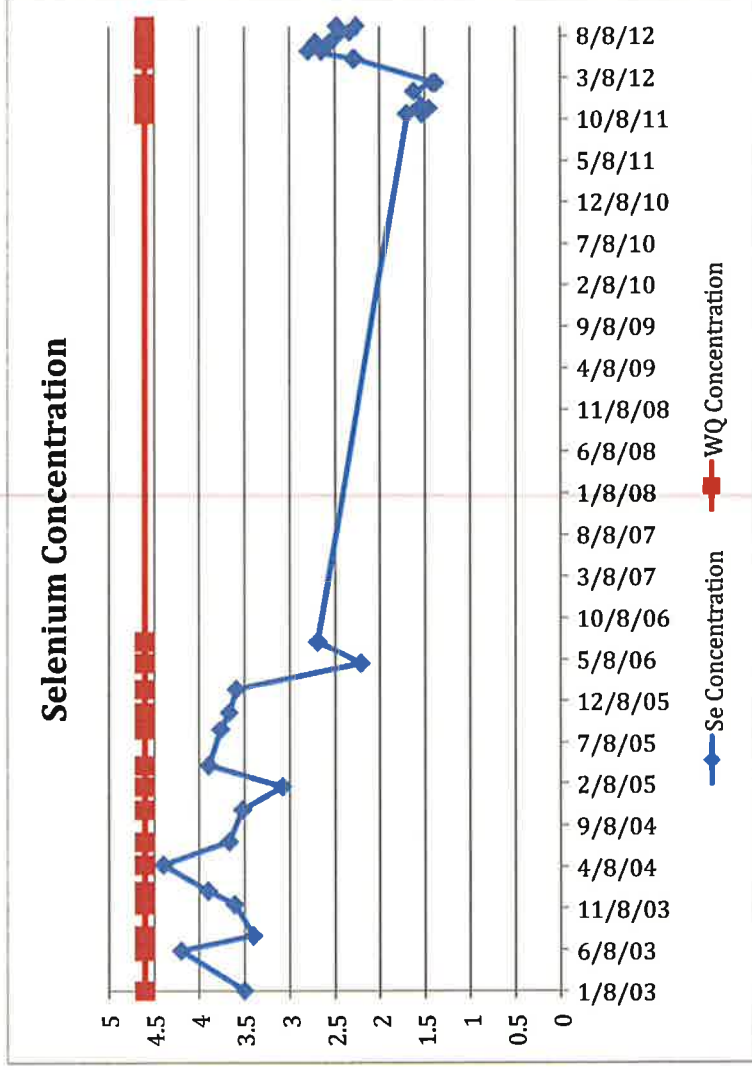
It is understood that streams and rivers are affected by multiple factors when a pollutant in-stream concentration is compared to a water quality criteria. We are aware that headwater areas may be impacted by mine drainage, that lower areas are impacted from storm water drainage and point source discharges and that natural occurring pollutants may enter a stream or river at any location. From the standpoint of 303(d) listing what concerns us are locations where a small segment of a river or stream is identified with a impairment when up stream and downstream locations do not show the same increased concentrations. Below is a graph of monitoring location ID 4994170 – Jordan River at 7800 South.



As can be seen, there are about 7 occurrences where the concentration exceeds the chronic criteria by a relatively small amount. Normally this frequency of exceedances would be justification for concern and probably a rationale for listing. However in this case, the upstream and downstream concentrations do not support this conclusion. Below is a graph of the upstream concentration at monitoring location ID 4994600 – Jordan River at Bluffdale Road.



While some of the measured selenium concentrations come close to the water quality chronic criteria, none of them exceed the 4.6 µm/L standard. Thus, for an increase to occur in the stream or river in this section only, some additional source would have to be located between Bluffdale Road (and 90<sup>th</sup> South for that matter although this site had much fewer measurements) and 7800 South. By monitoring location ID 4994090 – Jordan River at 5400 South the in stream concentration is again well below the chronic criteria concentration as shown on the graph following.



Although not as robust a data set, there again are no exceedances demonstrated in the river. These three locations are not that far apart and the velocity of the stream is such that any fish, at least, would be through the area of concern well within the four day averaging period for a chronic exceedance. We accept the values at 7800 South as being accurate, we question if, given the lack of exceedances up and down stream this segment should be listed as impaired for selenium. Our opinion is that, at least for selenium, this reach of river should be included in Category 3 until additional monitoring demonstrates a source of the increase or continued exceedances show harm may be occurring.

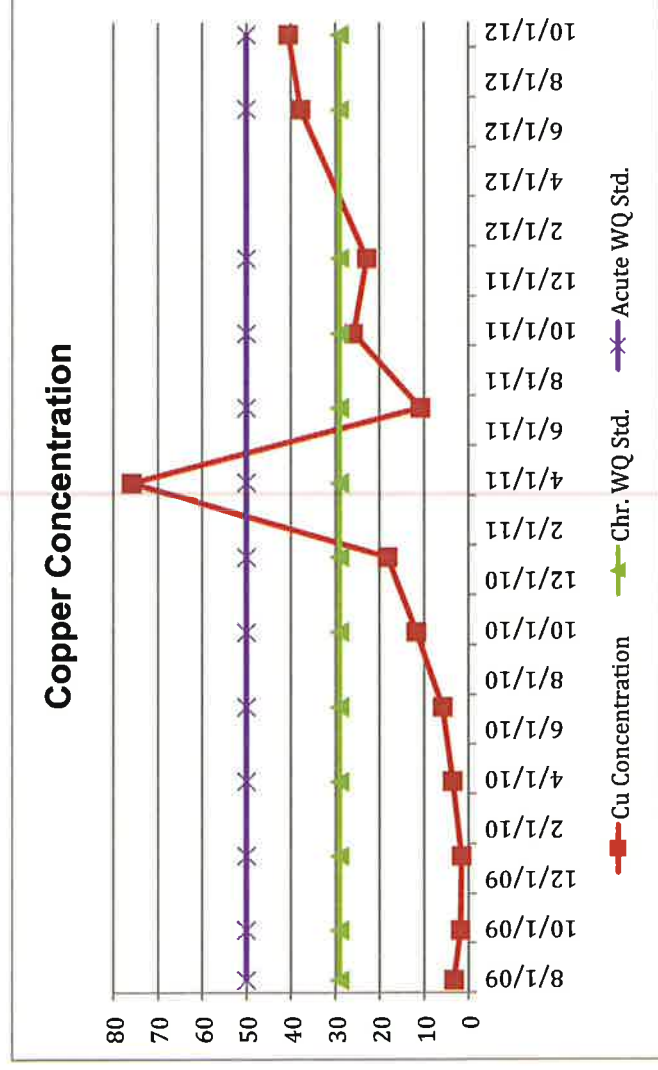
### Application of Ammonia Criteria

From the spreadsheets we were unable to ascertain if the individual pH and temperature were used when assessing a data set for ammonia compliance. Specifically we looked at monitoring location ID's 4990790 and 4990880 both on the State Canal. Our continuous monitoring of the State Canal shows an average pH of 8.1. In addition, the November 2013 to February 2014 time frame averages a pH of 7.9. These pH averages would not produce a chronic or acute violation at a temperature less than 18-degrees C. We recommend that all 303(d) listings for ammonia have the exceedances compared to the criteria based on actual pH and temperature for that specific sample. In addition, we also recommend that this data set be evaluated for outliers. If only one combination of pH temperature, and ammonia exceeds the acute or chronic water quality standard this data point should be treated as an outlier and the site

not listed. At least for the State Canal, we believe this water body should not be included on the 303(d) for ammonia.

### Copper Near Point Source Discharges and The Use of the Water Effects Ratio

Frequently copper is found in many locations throughout the USA to exceed the hardness adjusted criteria. However, copper exceedances are often mitigated through the use of the water effects ratio tool EPA has provided. We have seen in reports found on the internet that the use of a water effects ratio study has increased the copper toxicity concentration by as much as a factor of thirteen times the original hardness adjusted. We recommend that before a stream or river which is near a point source be listed for copper, the affected point source be given one IR cycle to produce the water effects ratio study. During that one IR cycle the site would be shown as Category 3 water. Following is a graph from monitoring location ID 4990987 – North Canyon Creek in the Legacy Nature Preserve.



Even a water effects ratio of two would cause all the exceedances to be within acceptable limits for this sampling location. This action would prevent listing the site for copper and a possible TMDL for this pollutant. We recommend this as a prudent step in the IR process.

## **O/E Analysis and Jordan River DO**

We have included with this letter two additional reports commenting on the O/E analysis and on Jordan River impairments for DO. The first report written by Dr. David Richards outlines problems associated with using O/E in listing sites as impaired. The second report written by Dr. Theron Miller outlines problems with the DO assessment of the Jordan River. We concur with their findings.

### **Summary**

We have provided several recommendations that we think are necessary to insure the integrity of the Integrated Report for 2014. We have also provided recommendations that we believe should be given consideration for adjustment of listed sites. We thank the staff at DWQ for their significant effort in making this report accessible and for the work they have performed to produce this product. We believe our recommendations will make the final report stronger and more justifiable when declaring a site impaired and that site being placed on the 303(d) list. We believe not making these adjustments will make the report less defensible and may open it to significant challenges.

Thank you for your efforts.

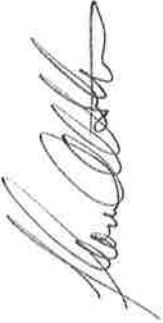
Sincerely,

**Jordan River Farmington Bay Water Quality Council**



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Leland Myers  
Central Davis Sewer District



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Tom Holstorm  
Central Valley Water Reclamation Facility



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Garland Mayne  
Jordan Basin Water Reclamation Facility



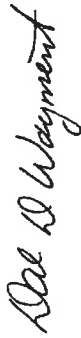
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Kevin Cowan  
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Salt Lake City Public Utilities



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South Davis Sewer District



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