



# UN GEMS / Water PE Study Number 5

## Performance Evaluation

---

National Water Quality Laboratory

APG Customer Code: 99999



Fictional Contact  
National Water Quality Laboratory  
Organization  
Somewhere City  
Country

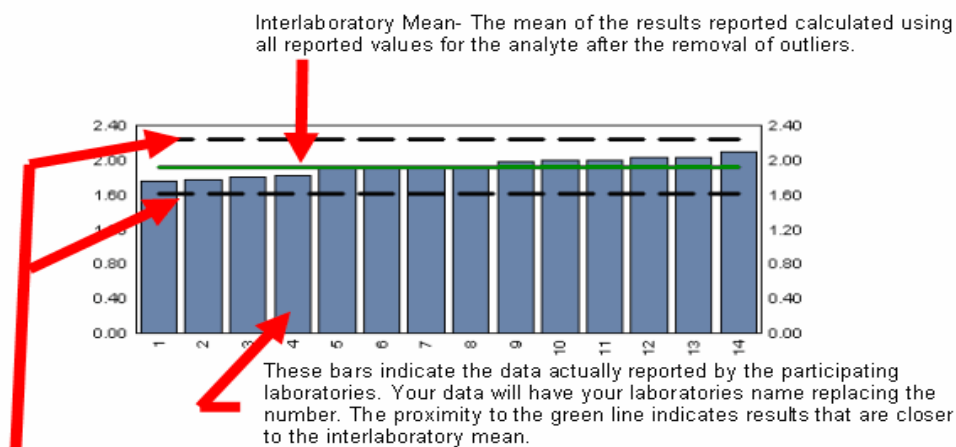


Dear Participant,

Thank you for participating in the United Nations (UN) GEMS/Water Performance Evaluation (PE) Program. This booklet is your individual Performance Evaluation Report for GEMS/Water PE Study Number 5. The Final Study Summary Report (as a UNEP report) will be sent to you in late August.

This performance evaluation for each analyte in each sample has two sections. The top of each page is a summary of your data which includes the reported value, an indication of your relative performance, the certified value and the assigned value. Your relative performance was evaluated as a "Point of Excellence", "Good", "Satisfactory", "Point of Concern", or "Point of Immediate Concern". These levels were based on your performance as compared to the other laboratories that participated in the study and are defined in the "Terms and Definitions" Section at the end of this report. The certified value is the value obtained by APG's quality control testing. The assigned value is the calculated value based on actual composition.

On the graph, the green line represents the interlaboratory mean and the black lines represent the upper and lower limits of the evaluation range. The closer your results are to the green line, the closer your results are to the average performance of the participating laboratories. Relative performance declines as the data points move away from the green line.



Performance Range- The upper and lower range based on three standard deviations from the interlaboratory mean. Please note this is not an acceptance range, it indicates each data points relationship to the entire data set. It illustrates the variance from the study mean.

The final section is the percent recovery for each analyte. Percent recovery is the percentage of the target analyte that your analysis identified. A percent recovery less than 100% indicates that you did not detect all the analyte in the sample. A percent recovery greater than 100% indicates that your detection exceeded what was actually in the sample.

The samples for GEMS/Water PE Study Number 5 were carefully prepared by Analytical Products Group, Inc. (APG). APG is accredited by the National Institute of Standards and Technology (NIST) as a proficiency testing provider. The samples are compliant with ISO/REMCO Harmonized Protocol for Proficiency Testing of Analytical Laboratories for homogeneity and stability. Additionally, the APG Quality System is registered with DNV Certification to meet the ISO 9001 standard to design, manufacture and distribute chemical reference materials and operate proficiency testing programs.

Your laboratory's contribution to the GEMS/Water PE Program is greatly appreciated. If you have any questions regarding the enclosed report, please contact me at the coordinates below.

Sincerely,

Yvonne Stokker  
Quality Assurance Specialist  
GEMS/Water Programme

Telephone: 1-905-336-4869  
Fax: 1-905-336-4582  
Email: Yvonne.Stokker@ec.gc.ca

Listed below are the analytes which were evaluated as a "Point of Concern" or a "Point of Immediate Concern".

### Points of Concern

Product Name	Analyte Name	Reported Value	Assigned Value	Mean	Performance Range	ZScore	Relative Performance
PE pH	pH	9.68	9.51	9.50	9.19-9.81	1.75	Point of Concern

Listed below is a summary of the data that you submitted for GEMS / Water PE Study No.5.

### PE Demand

Lot Number: 38044

Units: mg/L

Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Biochemical Oxygen Demand		96.4	89.9	19.4	31.7-148		Not Reported
Chemical Oxygen Demand	149	156	152	13.2	112-192	0.23	Good
Total Organic Carbon		61.6	59.0	5.07	43.8-74.2		Not Reported
Carbonaceous BOD		82.9	89.8	10.3	59.1-121		Not Reported

### QC Demand

Lot Number: 38290

Units: mg/L

Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Biochemical Oxygen Demand	81.0	66.9	64.0	13.4	23.8-104	1.27	Satisfactory
Chemical Oxygen Demand	104	108	109	10.9	76.0-141	0.13	Point of Excellence
Total Organic Carbon		42.7	42.6	1.88	37.0-48.2		Not Reported
Carbonaceous BOD		57.6	62.1	8.33	37.1-87.1		Not Reported

### PE Nutrients

Lot Number: 38045-38046

Units: mg/L

Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Ammonia Nitrogen as N	7.03	8.38	8.19	1.41	3.97-12.4	0.82	Satisfactory
Nitrate Nitrogen as N	14.0	16.9	16.0	3.81	4.61-27.5	0.53	Satisfactory
Orthophosphate as P	3.77	3.86	3.89	0.179	3.35-4.42	0.67	Satisfactory
Total Kjeldahl Nitrogen		6.57	6.59	1.03	3.49-9.68		Not Reported
Total Phosphorus as P	4.10	4.13	4.09	0.209	3.46-4.72	0.05	Point of Excellence

**QC Nutrients**

Lot Number: 38291-38292

Units: mg/L

Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Ammonia Nitrogen as N	2.25	2.26	2.29	0.203	1.68-2.90	0.05	Point of Excellence
Nitrate Nitrogen as N	1.01	0.970	0.964	0.0621	0.778-1.15	0.61	Satisfactory
Orthophosphate as P	3.40	3.40	3.43	0.146	2.99-3.87	0.12	Point of Excellence
Total Kjeldahl Nitrogen		18.2	18.1	0.585	16.4-19.9		Not Reported
Total Phosphorus as P	2.28	2.22	2.26	0.0845	2.00-2.51	0.76	Satisfactory

**PE Minerals**

Lot Number: 38047-38048

Units: mg/L

Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Alkalinity as CaCO <sub>3</sub>	26.6	21.5	23.6	2.91	14.9-32.3	1.03	Satisfactory
Calcium	8.02	5.96	6.58	0.900	3.88-9.28	1.60	Satisfactory
Chloride	72.3	78.1	77.1	4.26	64.3-89.9	1.13	Satisfactory
Conductivity	345	353	338	19.6	280-397	0.36	Satisfactory
Magnesium	18.0	19.4	18.5	1.12	15.2-21.9	0.45	Satisfactory
Potassium		7.97	7.93	1.03	4.83-11.0		Not Reported
Sodium		20.0	21.0	2.01	15.0-27.0		Not Reported
Sulfate		15.8	15.8	2.91	7.06-24.5		Not Reported
Total Hardness as CaCO <sub>3</sub>	94.2	94.7	94.9	9.38	66.8-123	0.07	Point of Excellence
Total Dissolved Solids	237	213	204	43.0	75.1-333	0.77	Satisfactory

**QC Minerals**

Lot Number: 38293-38294

Units: mg/L

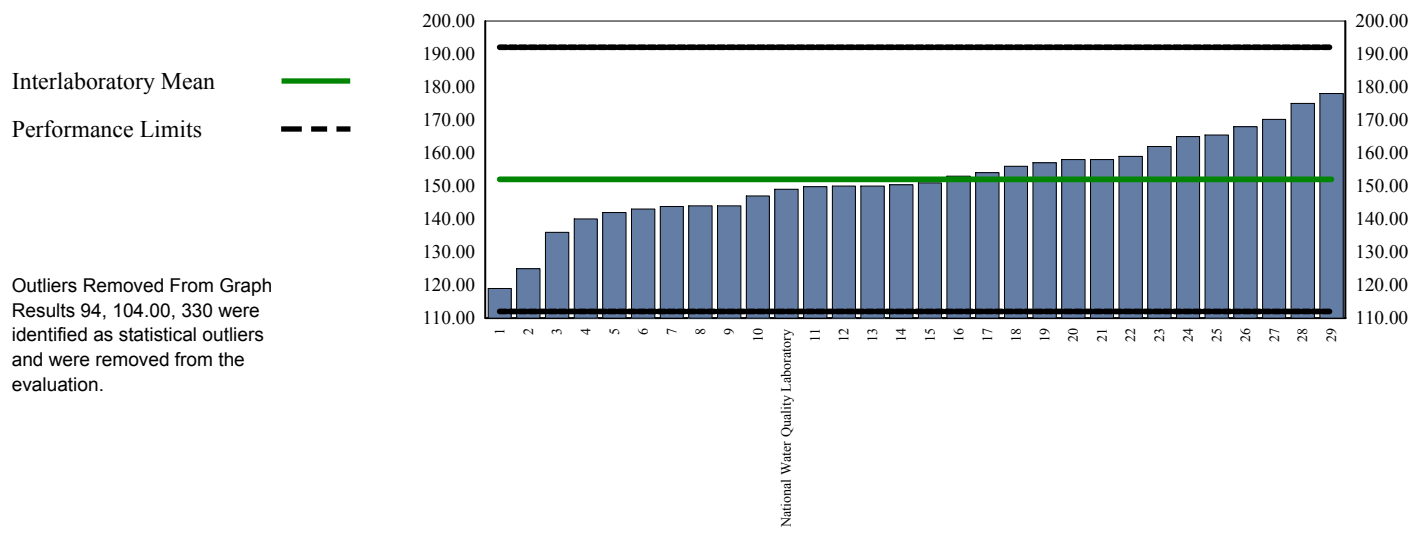
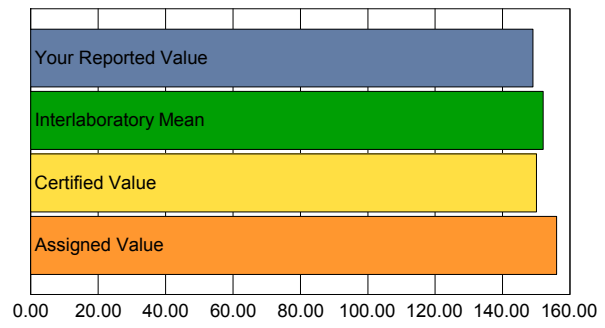
Analyte Name	Reported Value	Assigned Value	Mean	Standard Deviation	Performance Range	ZScore	Relative Performance
Alkalinity as CaCO <sub>3</sub>	19.0	18.0	19.4	2.24	12.7-26.1	0.29	Good
Calcium	25.6	25.5	25.9	0.922	23.1-28.6	0.18	Point of Excellence
Chloride	120	120	122	3.70	111-134	0.00	Point of Excellence
Conductivity	478	476	469	20.8	407-531	0.40	Good
Magnesium	15.6	14.5	14.6	0.835	12.1-17.1	1.81	Satisfactory
Potassium		18.2	18.0	0.952	15.2-20.9		Not Reported
Sodium		22.4	22.8	1.34	18.7-26.8		Not Reported
Sulfate		7.11	7.09	0.659	5.12-9.07		Not Reported
Total Hardness as CaCO <sub>3</sub>	128	124	125	4.47	112-139	0.98	Satisfactory
Total Dissolved Solids	310	281	291	41.0	168-415	1.89	Satisfactory

<b>PE pH</b>		<b>Lot Number: 38049</b>				<b>Units: Units</b>	
<b>Analyte Name</b>	<b>Reported Value</b>	<b>Assigned Value</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Performance Range</b>	<b>ZScore</b>	<b>Relative Performance</b>
pH	9.68	9.51	9.50	0.103	9.19-9.81	1.75	Point of Concern

<b>QC pH</b>		<b>Lot Number: 38295</b>				<b>Units: Units</b>	
<b>Analyte Name</b>	<b>Reported Value</b>	<b>Assigned Value</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Performance Range</b>	<b>ZScore</b>	<b>Relative Performance</b>
pH	5.84	5.87	5.83	0.0337	5.73-5.94	0.67	Satisfactory

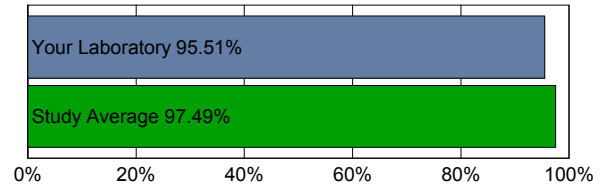
**PE Demand      Chemical Oxygen Demand      Units: mg/L**

Your Reported Value: 149  
 Assigned Value: 156  
 Certified Value: 150 ± 1.05  
 Interlaboratory Mean: 152  
 Standard Deviation: 13.2  
 Performance Range: 112-192  
 Interlaboratory ZScore: 0.23  
 Valid Data (Outliers Removed): 33  
 Your Rank: 5 of 25  
 Relative Performance: Good  
 Method Description: OPENREFLUXMETHO



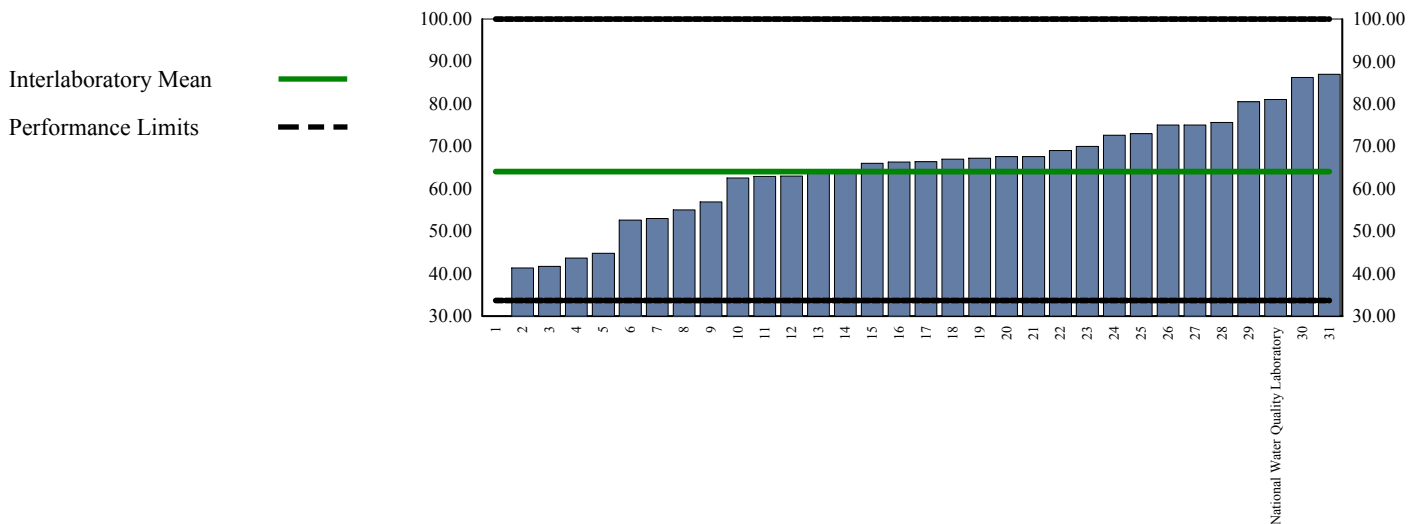
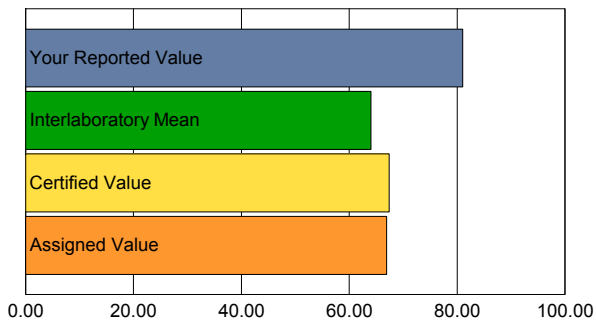
**Percent Recovery**

Your Laboratory: 95.51%  
 Interlaboratory Average: 97.49%



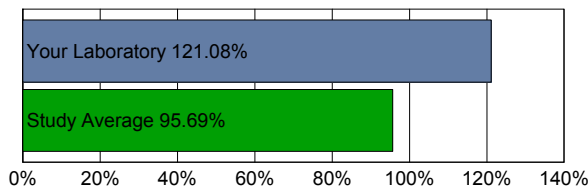
**QC Demand Biochemical Oxygen Demand Units: mg/L**

Your Reported Value: 81.0  
 Assigned Value: 66.9  
 Certified Value: 67.4 ± 0.838  
 Interlaboratory Mean: 64.0  
 Standard Deviation: 13.4  
 Performance Range: 23.8-104  
 Interlaboratory ZScore: 1.27  
 Valid Data (Outliers Removed): 32  
 Your Rank: 23 of 31  
 Relative Performance: Satisfactory  
 Method Description: INCUBATEFOR5DAY



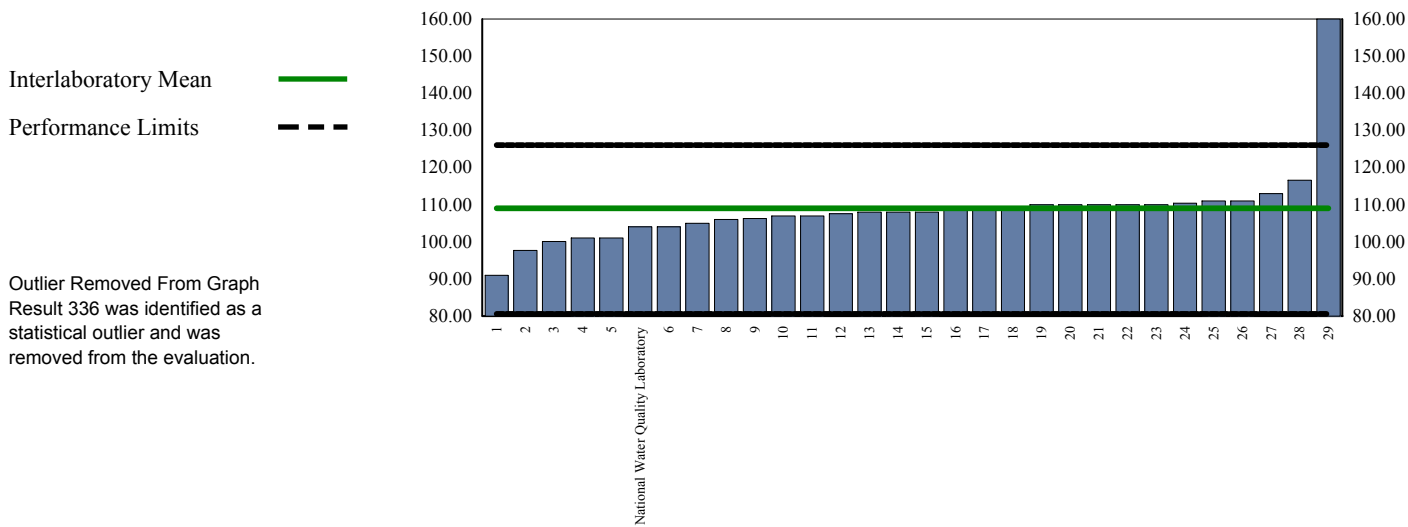
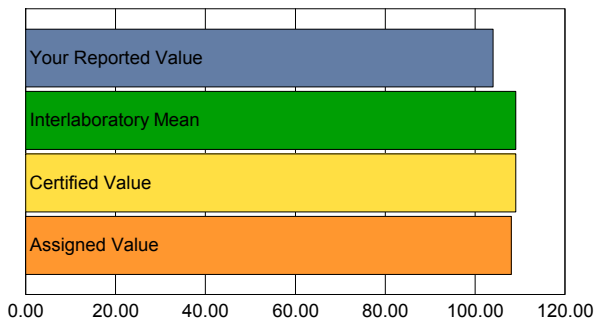
**Percent Recovery**

Your Laboratory: 121.08%  
 Interlaboratory Average: 95.69%



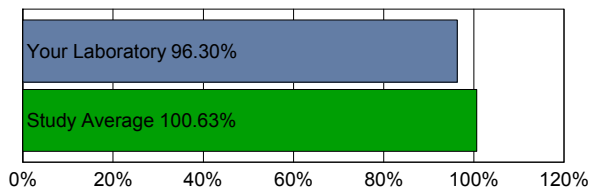
**QC Demand      Chemical Oxygen Demand      Units: mg/L**

Your Reported Value: 104  
 Assigned Value: 108  
 Certified Value: 109 ± 1.35  
 Interlaboratory Mean: 109  
 Standard Deviation: 10.9  
 Performance Range: 76.0-141  
 Interlaboratory ZScore: 0.13  
 Valid Data (Outliers Removed): 31  
 Your Rank: 1 of 18  
 Relative Performance: Point of Excellence  
 Method Description: OPENREFLUXMETHO



**Percent Recovery**

Your Laboratory: 96.30%  
 Interlaboratory Average: 100.63%

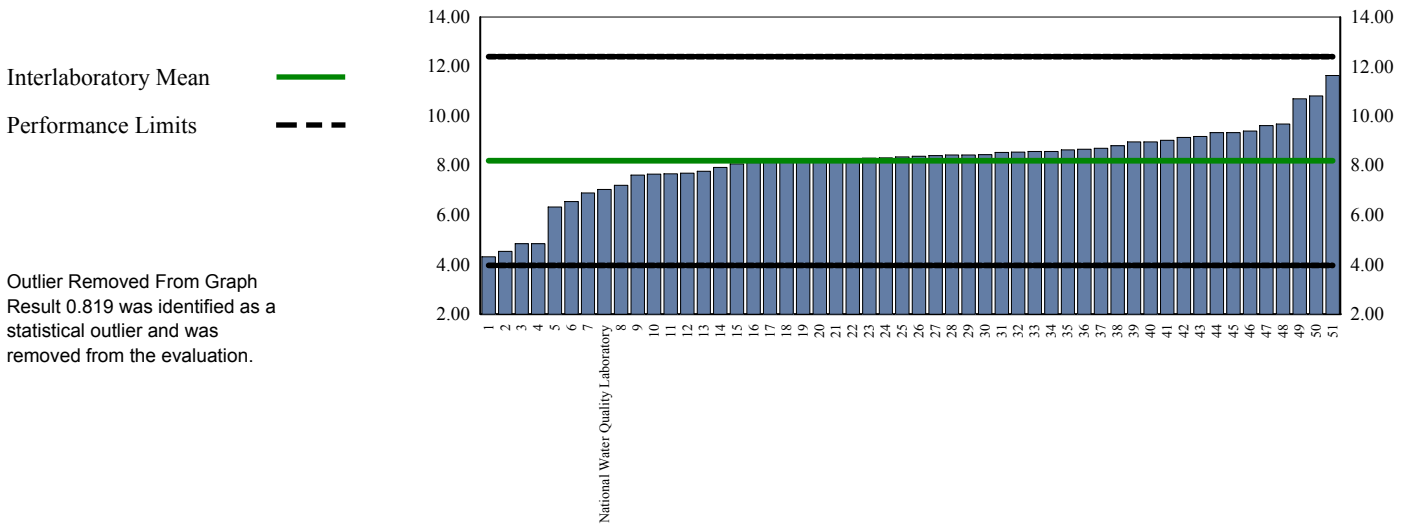
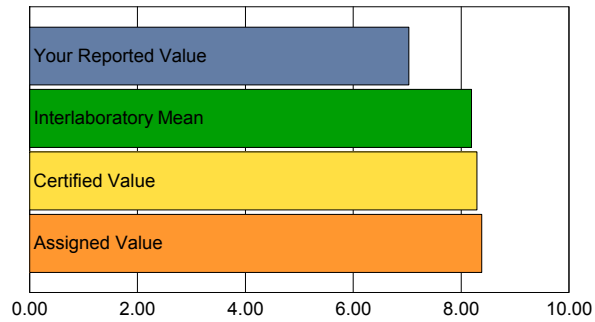


PE Nutrients

Ammonia Nitrogen as N

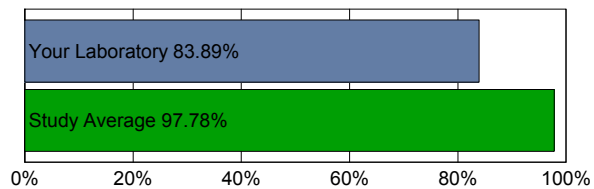
Units: mg/L

Your Reported Value: 7.03  
 Assigned Value: 8.38  
 Certified Value: 8.29 ± 0.0225  
 Interlaboratory Mean: 8.19  
 Standard Deviation: 1.41  
 Performance Range: 3.97-12.4  
 Interlaboratory ZScore: 0.82  
 Valid Data (Outliers Removed): 53  
 Your Rank: 36 of 49  
 Relative Performance: Satisfactory  
 Method Description: PHENATEMETHOD



Percent Recovery

Your Laboratory: 83.89%  
 Interlaboratory Average: 97.78%

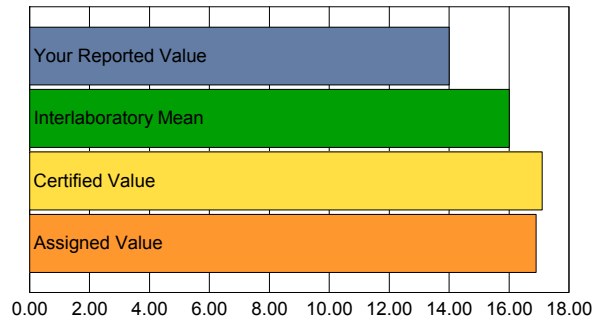


PE Nutrients

Nitrate Nitrogen as N

Units: mg/L

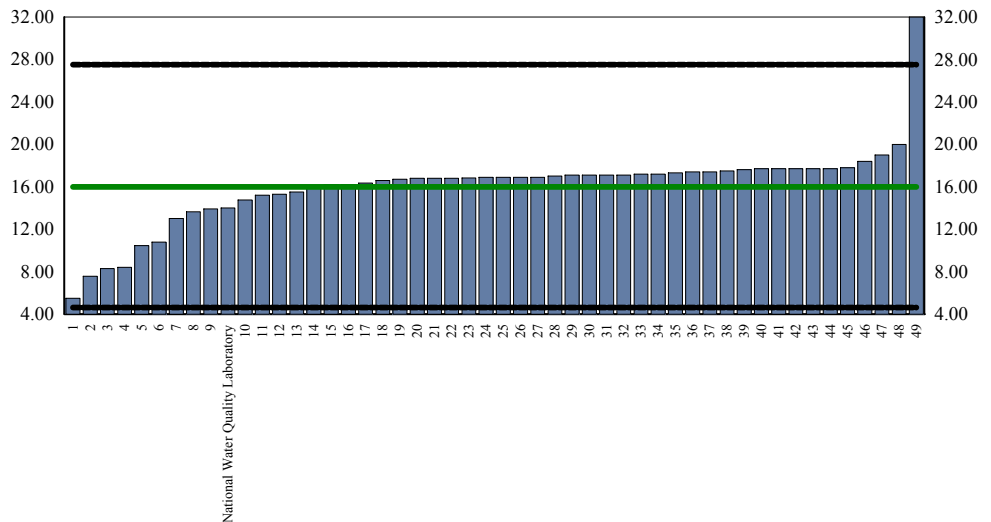
Your Reported Value: 14.0  
 Assigned Value: 16.9  
 Certified Value: 17.1 ± 0.0552  
 Interlaboratory Mean: 16.0  
 Standard Deviation: 3.81  
 Performance Range: 4.61-27.5  
 Interlaboratory ZScore: 0.53  
 Valid Data (Outliers Removed): 51  
 Your Rank: 22 of 35  
 Relative Performance: Satisfactory  
 Method Description: CADMIUMREDUCTIO



Interlaboratory Mean

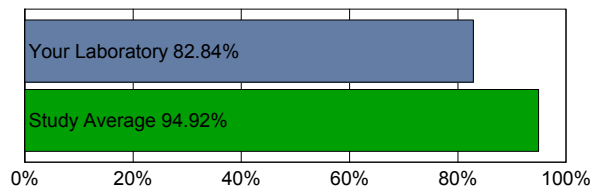
Performance Limits

Outlier Removed From Graph  
 Result 3.30 was identified as a  
 statistical outlier and was  
 removed from the evaluation.



Percent Recovery

Your Laboratory: 82.84%  
 Interlaboratory Average: 94.92%



**PE Nutrients Orthophosphate as P**

**Units: mg/L**

Your Reported Value: 3.77

Assigned Value: 3.86

Certified Value: 3.98 ± 0.0197

Interlaboratory Mean: 3.89

Standard Deviation: 0.179

Performance Range: 3.35-4.42

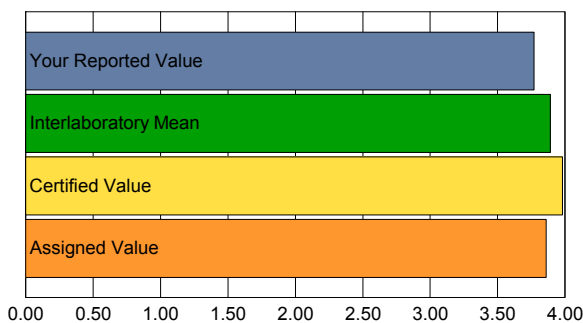
Interlaboratory ZScore: 0.67

Valid Data (Outliers Removed): 45

Your Rank: 13 of 33

Relative Performance: Satisfactory

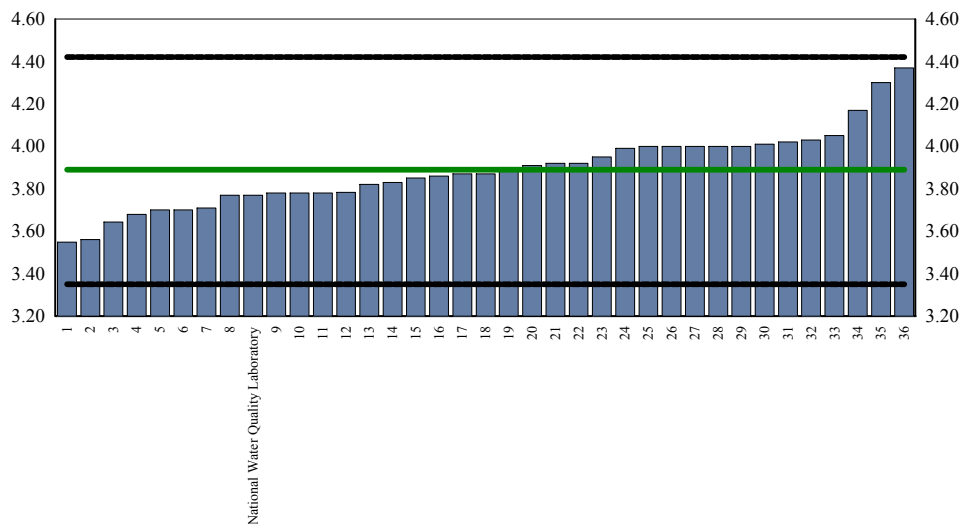
Method Description: ASCORBICACIDMET



Interlaboratory Mean

Performance Limits

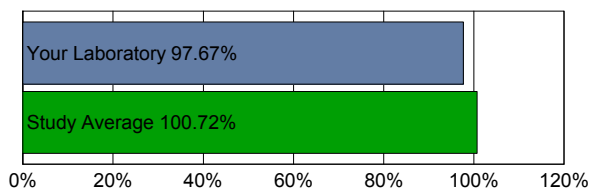
Outliers Removed From Graph Results 2.8, 2.99, 3.02, 3.16, 10.8, 12.75, 14.3, 24 were identified as statistical outliers and were removed from the evaluation.



**Percent Recovery**

Your Laboratory: 97.67%

Interlaboratory Average: 100.72%

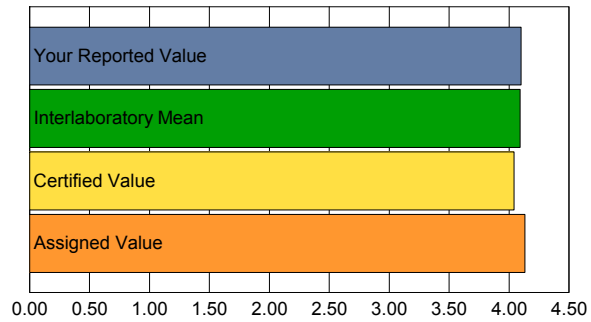


PE Nutrients

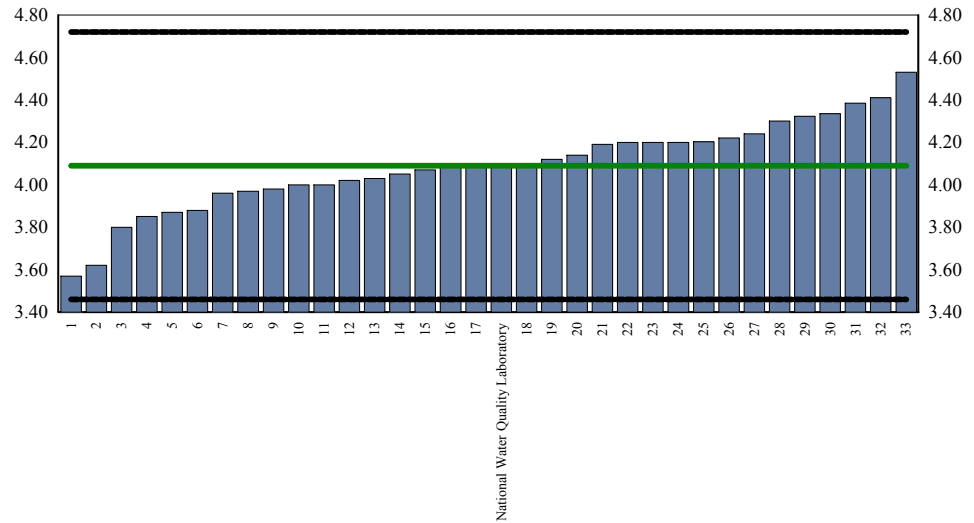
Total Phosphorus as P

Units: mg/L

Your Reported Value: 4.10  
 Assigned Value: 4.13  
 Certified Value: 4.04 ± 0.0384  
 Interlaboratory Mean: 4.09  
 Standard Deviation: 0.209  
 Performance Range: 3.46-4.72  
 Interlaboratory ZScore: 0.05  
 Valid Data (Outliers Removed): 37  
 Your Rank: 1 of 29  
 Relative Performance: Point of Excellence  
 Method Description: PERSULFATEDIGES

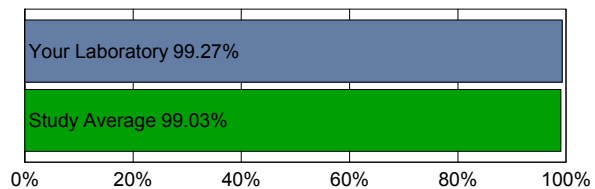


Interlaboratory Mean  
 Performance Limits



Percent Recovery

Your Laboratory: 99.27%  
 Interlaboratory Average: 99.03%

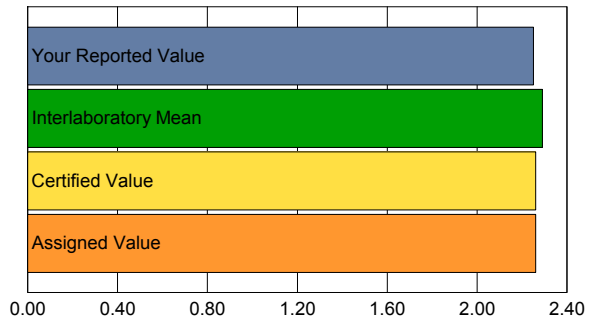


QC Nutrients

Ammonia Nitrogen as N

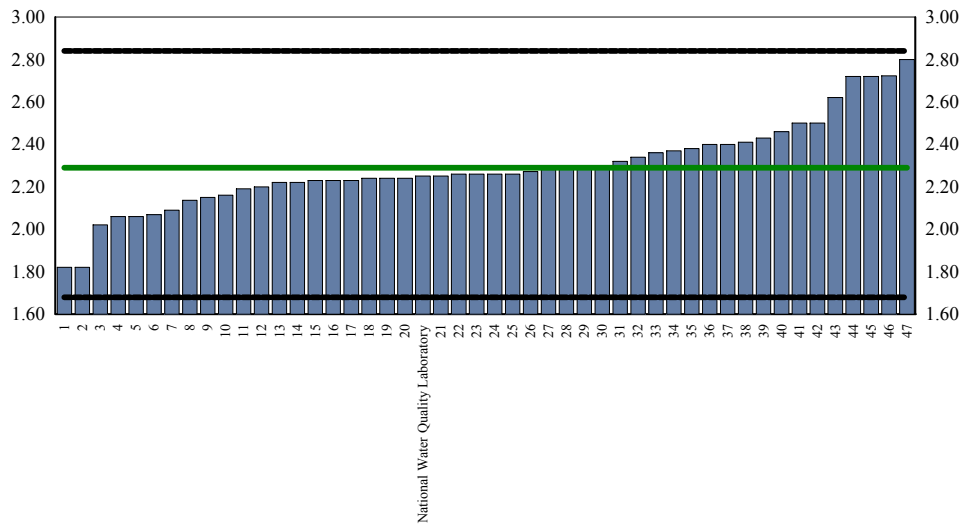
Units: mg/L

Your Reported Value: 2.25  
 Assigned Value: 2.26  
 Certified Value: 2.26 ± 0.00409  
 Interlaboratory Mean: 2.29  
 Standard Deviation: 0.203  
 Performance Range: 1.68-2.90  
 Interlaboratory ZScore: 0.05  
 Valid Data (Outliers Removed): 51  
 Your Rank: 1 of 35  
 Relative Performance: Point of Excellence  
 Method Description: PHENATEMETHOD



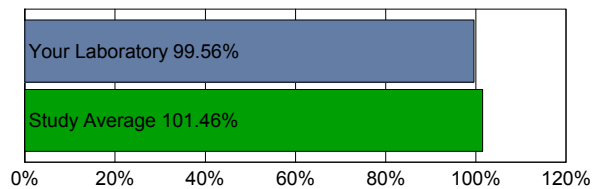
Interlaboratory Mean ———  
 Performance Limits - - -

Outliers Removed From Graph  
 Results 1.32, 1.60, 5.00 were  
 identified as statistical outliers  
 and were removed from the  
 evaluation.



Percent Recovery

Your Laboratory: 99.56%  
 Interlaboratory Average: 101.46%

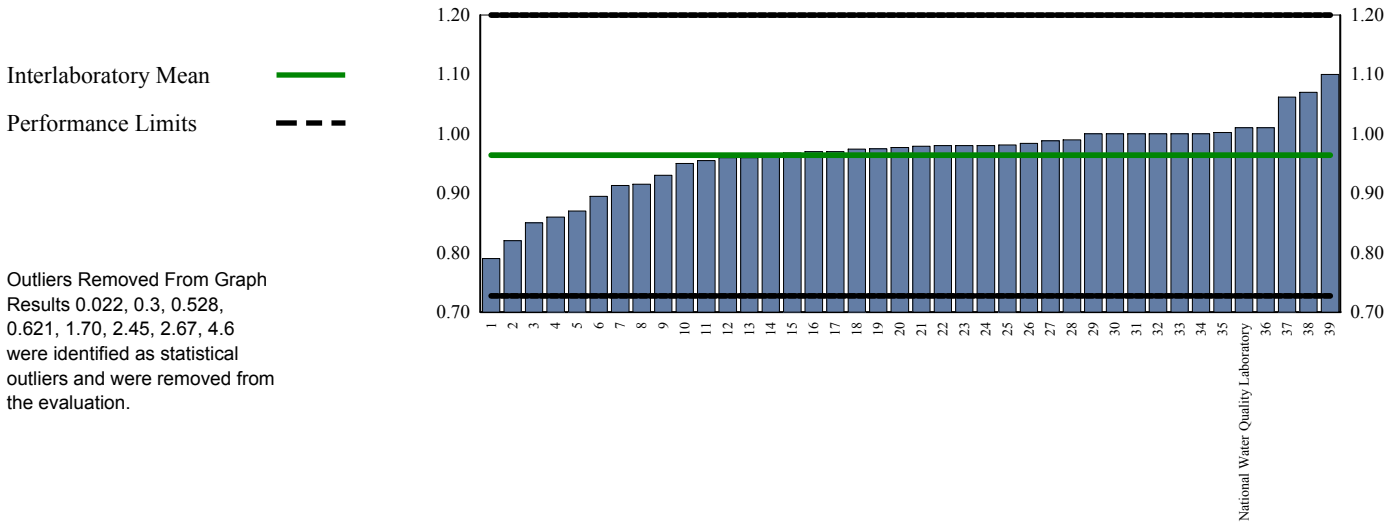
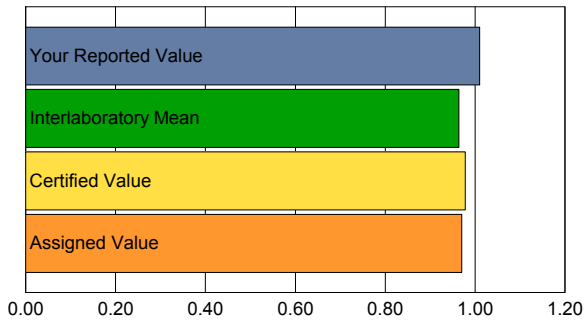


QC Nutrients

Nitrate Nitrogen as N

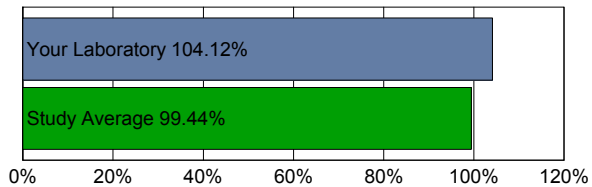
Units: mg/L

Your Reported Value: 1.01  
 Assigned Value: 0.970  
 Certified Value: 0.978 ± 0.00417  
 Interlaboratory Mean: 0.964  
 Standard Deviation: 0.0621  
 Performance Range: 0.778-1.15  
 Interlaboratory ZScore: 0.61  
 Valid Data (Outliers Removed): 48  
 Your Rank: 19 of 37  
 Relative Performance: Satisfactory  
 Method Description: CADMIUMREDUCTIO



Percent Recovery

Your Laboratory: 104.12%  
 Interlaboratory Average: 99.44%

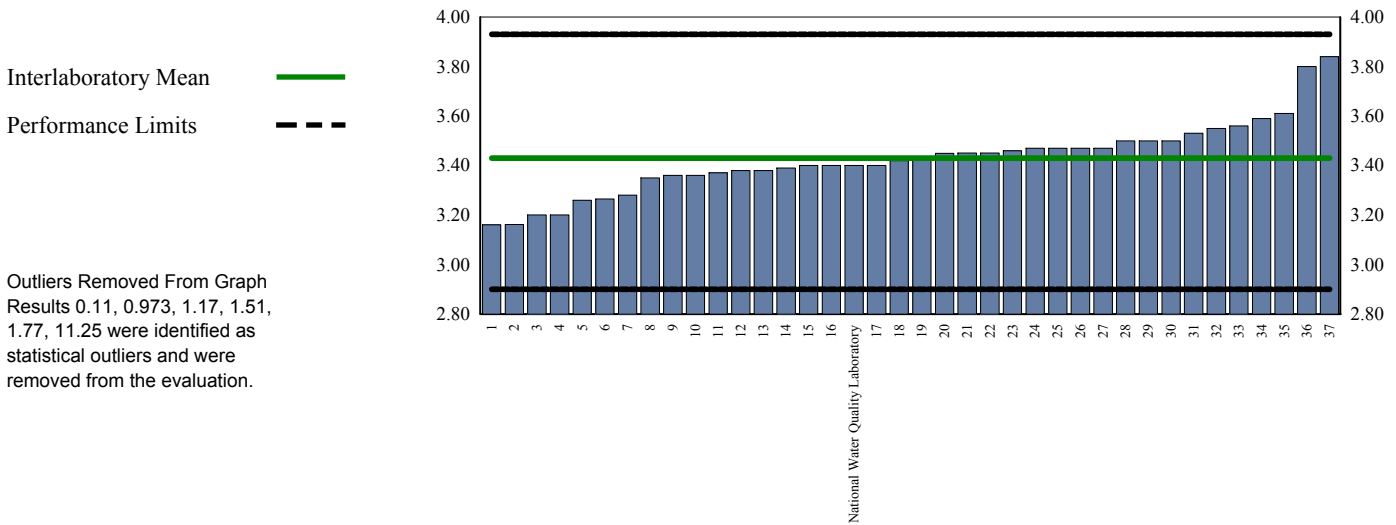
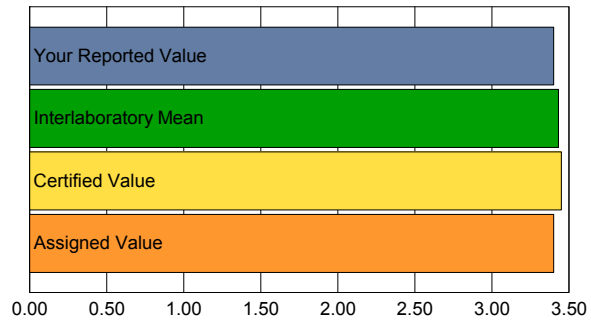


QC Nutrients

Orthophosphate as P

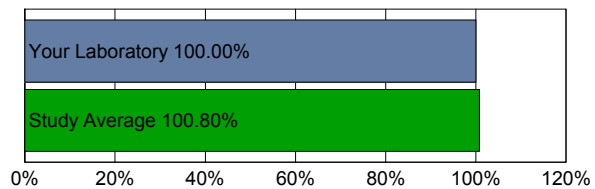
Units: mg/L

Your Reported Value: 3.40  
 Assigned Value: 3.40  
 Certified Value: 3.45 ± 0.0105  
 Interlaboratory Mean: 3.43  
 Standard Deviation: 0.146  
 Performance Range: 2.99-3.87  
 Interlaboratory ZScore: 0.12  
 Valid Data (Outliers Removed): 44  
 Your Rank: 2 of 30  
 Relative Performance: Point of Excellence  
 Method Description: ASCORBICACIDMET



Percent Recovery

Your Laboratory: 100.00%  
 Interlaboratory Average: 100.80%

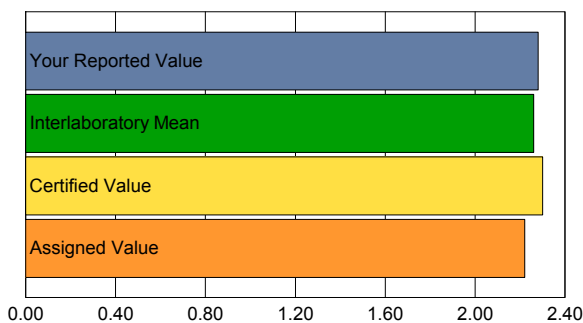


**QC Nutrients**

**Total Phosphorus as P**

**Units: mg/L**

Your Reported Value: 2.28  
 Assigned Value: 2.22  
 Certified Value: 2.30 ± 0.0102  
 Interlaboratory Mean: 2.26  
 Standard Deviation: 0.0845  
 Performance Range: 2.00-2.51  
 Interlaboratory ZScore: 0.76



Valid Data (Outliers Removed): 37

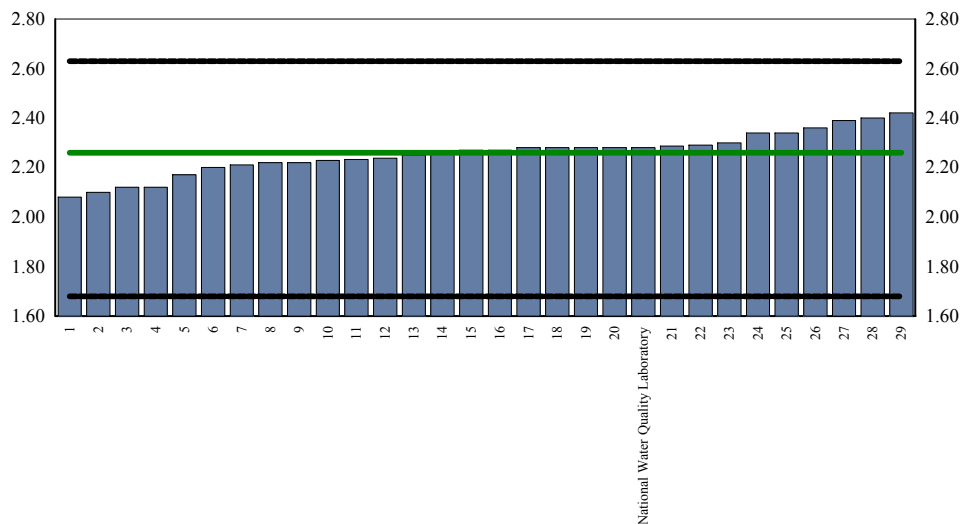
Your Rank: 12 of 27

Relative Performance: Satisfactory

Method Description: PERSULFATEDIGES

Interlaboratory Mean

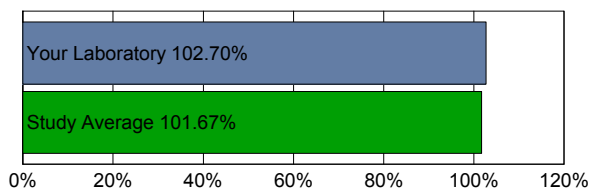
Performance Limits



Outliers Removed From Graph Results 1.31, 1.75, 1.96, 2.641, 2.78, 3.40, 3.65 were identified as statistical outliers and were removed from the evaluation.

**Percent Recovery**

Your Laboratory: 102.70%  
 Interlaboratory Average: 101.67%

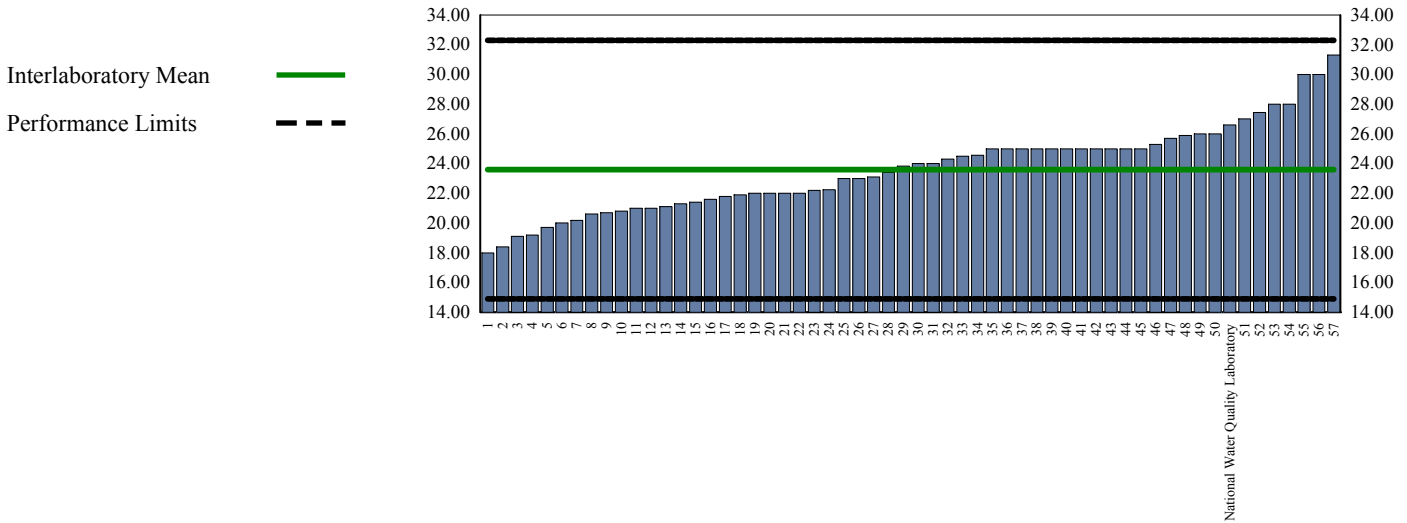
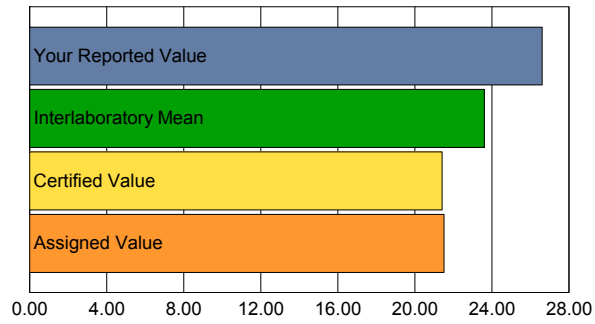


PE Minerals

Alkalinity as CaCO<sub>3</sub>

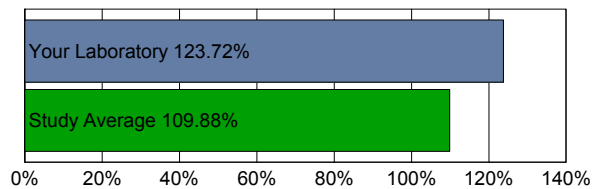
Units: mg/L

Your Reported Value: 26.6  
 Assigned Value: 21.5  
 Certified Value: 21.4 ± 0.0158  
 Interlaboratory Mean: 23.6  
 Standard Deviation: 2.91  
 Performance Range: 14.9-32.3  
 Interlaboratory ZScore: 1.03  
 Valid Data (Outliers Removed): 58  
 Your Rank: 26 of 38  
 Relative Performance: Satisfactory  
 Method Description: TITRIMETRIC



Percent Recovery

Your Laboratory: 123.72%  
 Interlaboratory Average: 109.88%

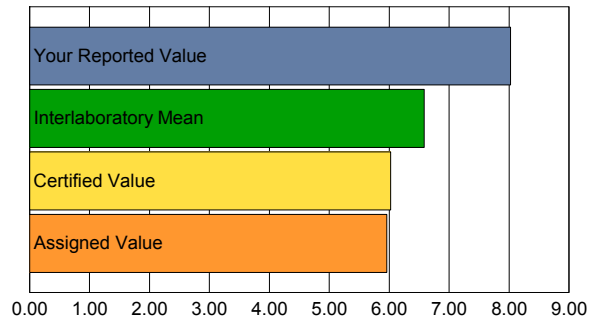


PE Minerals

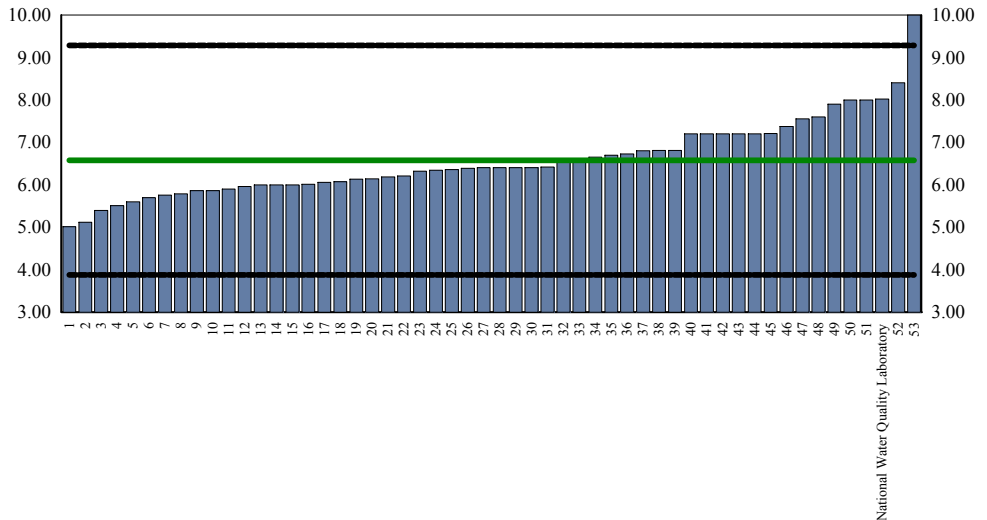
Calcium

Units: mg/L

Your Reported Value: 8.02  
 Assigned Value: 5.96  
 Certified Value: 6.02 ± 0.0457  
 Interlaboratory Mean: 6.58  
 Standard Deviation: 0.900  
 Performance Range: 3.88-9.28  
 Interlaboratory ZScore: 1.60  
 Valid Data (Outliers Removed): 59  
 Your Rank: 35 of 44  
 Relative Performance: Satisfactory  
 Method Description: TITRIMETRIC

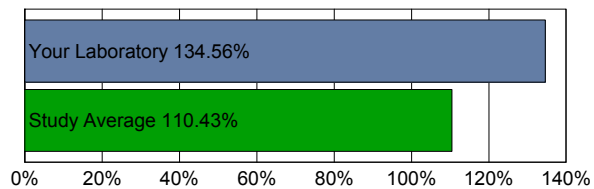


Interlaboratory Mean  
 Performance Limits



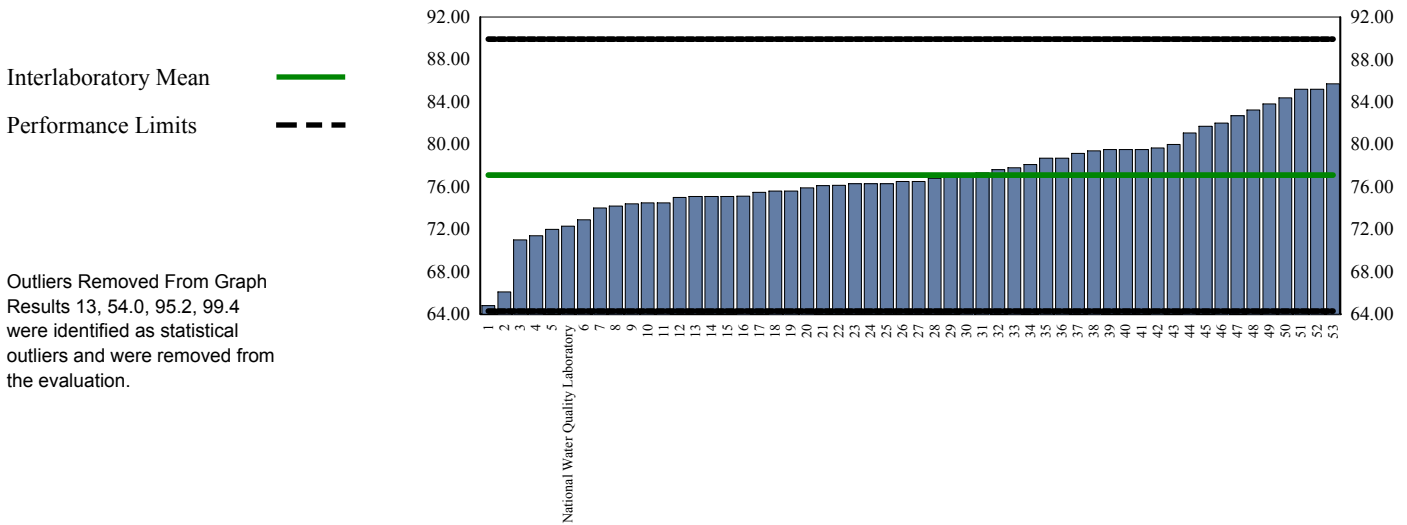
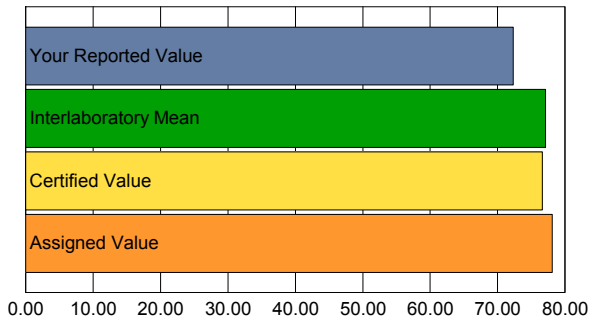
Percent Recovery

Your Laboratory: 134.56%  
 Interlaboratory Average: 110.43%



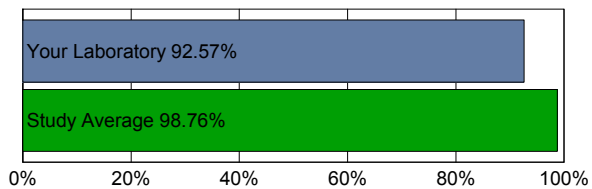
**PE Minerals Chloride Units: mg/L**

Your Reported Value: 72.3  
 Assigned Value: 78.1  
 Certified Value: 76.6 ± 0.0814  
 Interlaboratory Mean: 77.1  
 Standard Deviation: 4.26  
 Performance Range: 64.3-89.9  
 Interlaboratory ZScore: 1.13  
 Valid Data (Outliers Removed): 58  
 Your Rank: 31 of 47  
 Relative Performance: Satisfactory  
 Method Description: TITRIMETRIC



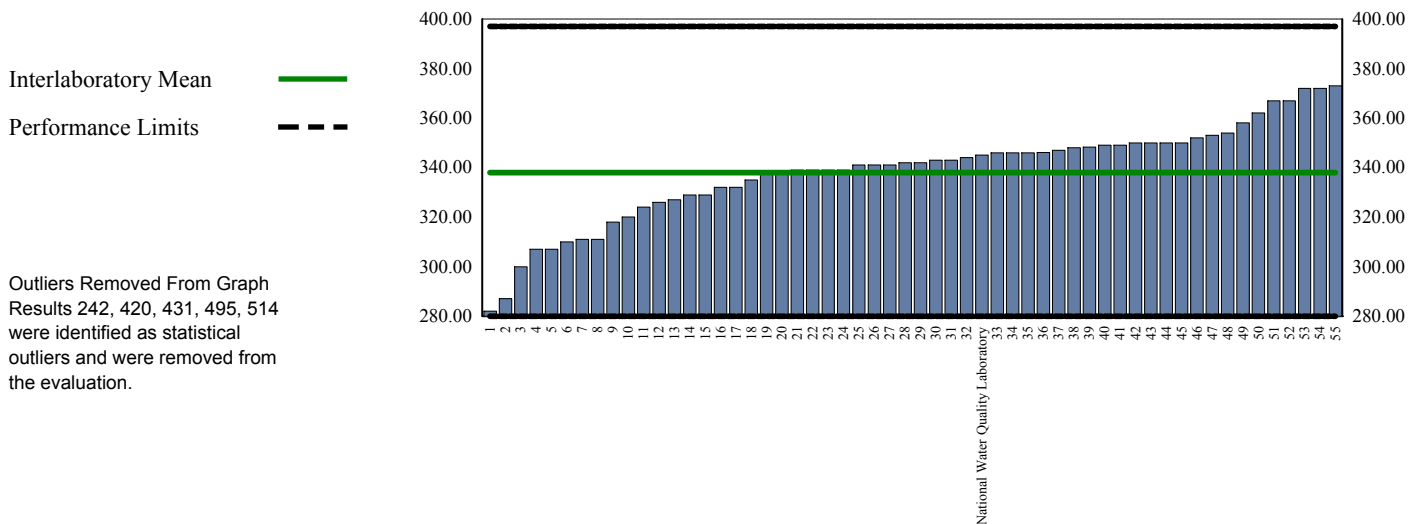
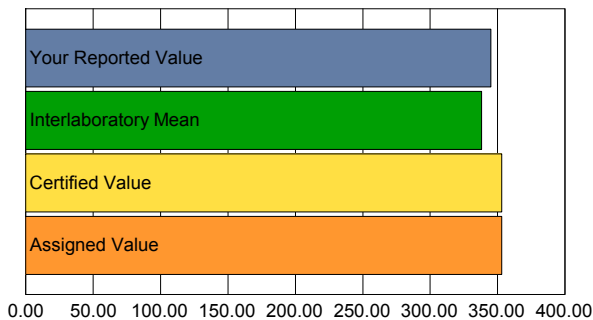
**Percent Recovery**

Your Laboratory: 92.57%  
 Interlaboratory Average: 98.76%



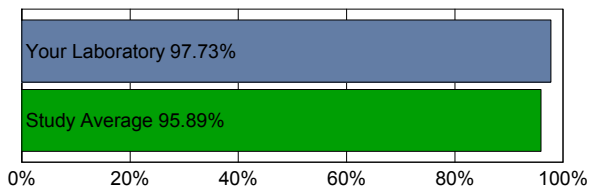
**PE Minerals Conductivity** Units: umhos/cm

Your Reported Value: 345  
 Assigned Value: 353  
 Certified Value: 353 ± 0.521  
 Interlaboratory Mean: 338  
 Standard Deviation: 19.6  
 Performance Range: 280-397  
 Interlaboratory ZScore: 0.36  
 Valid Data (Outliers Removed): 61  
 Your Rank: 6 of 33  
 Relative Performance: Satisfactory  
 Method Description: CONDUCTIVITYMET



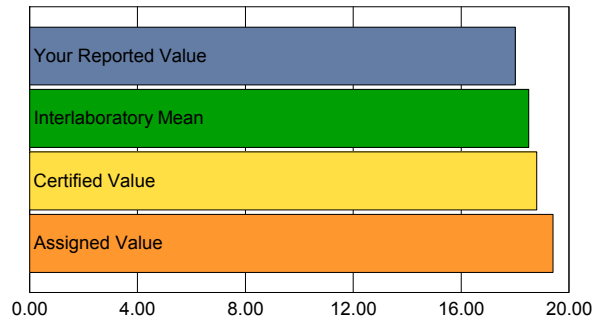
**Percent Recovery**

Your Laboratory: 97.73%  
 Interlaboratory Average: 95.89%

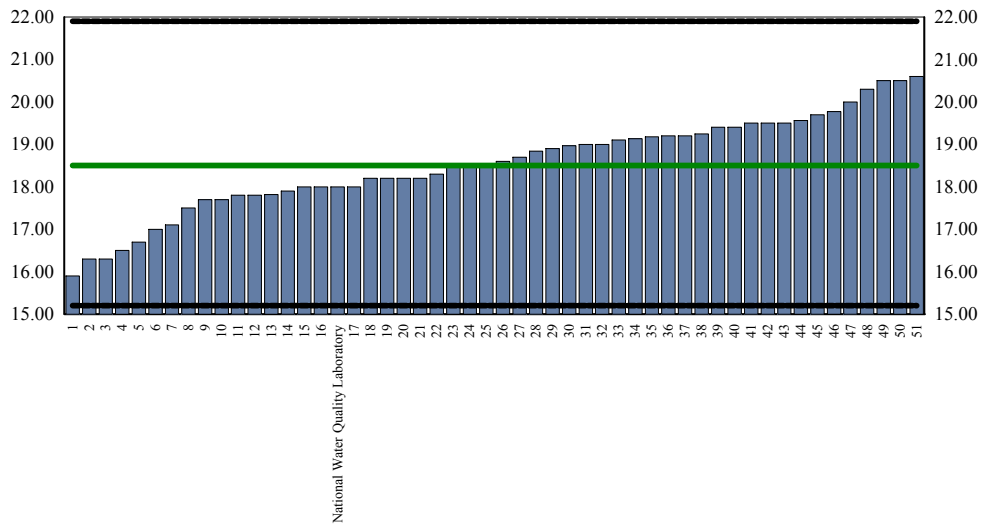


**PE Minerals Magnesium Units: mg/L**

Your Reported Value: 18.0  
 Assigned Value: 19.4  
 Certified Value: 18.8 ± 0.172  
 Interlaboratory Mean: 18.5  
 Standard Deviation: 1.12  
 Performance Range: 15.2-21.9  
 Interlaboratory ZScore: 0.45  
 Valid Data (Outliers Removed): 59  
 Your Rank: 8 of 34  
 Relative Performance: Satisfactory  
 Method Description: CALCULATION

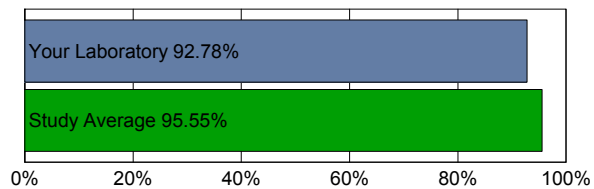


Interlaboratory Mean  
 Performance Limits



**Percent Recovery**

Your Laboratory: 92.78%  
 Interlaboratory Average: 95.55%



PE Minerals

Total Dissolved Solids

Units: mg/L

Your Reported Value: 237

Assigned Value: 213

Certified Value: 213 ± 0.893

Interlaboratory Mean: 204

Standard Deviation: 43.0

Performance Range: 75.1-333

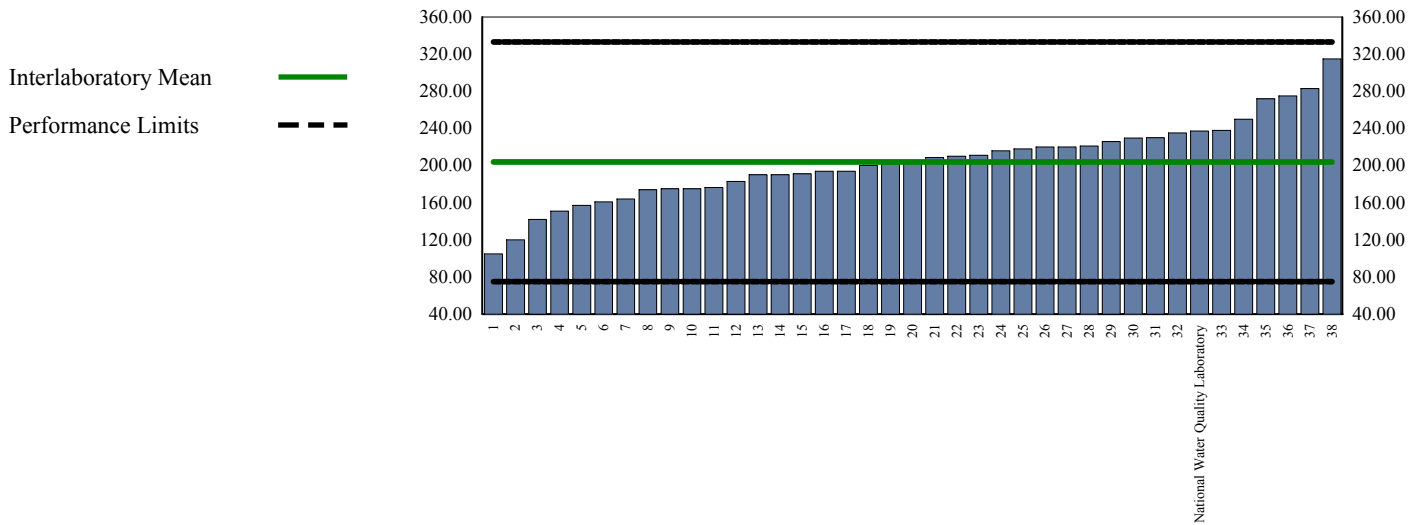
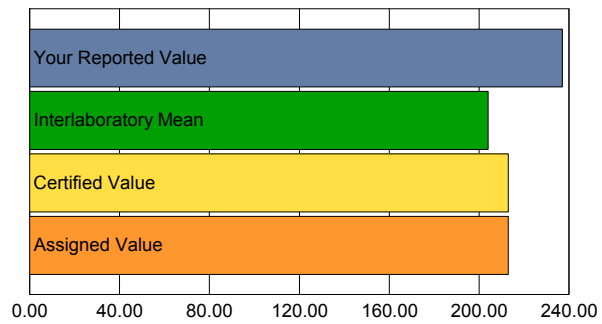
Interlaboratory ZScore: 0.77

Valid Data (Outliers Removed): 39

Your Rank: 22 of 35

Relative Performance: Satisfactory

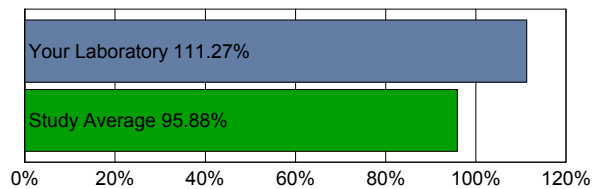
Method Description: CONDUCTIVITYMET



Percent Recovery

Your Laboratory: 111.27%

Interlaboratory Average: 95.88%

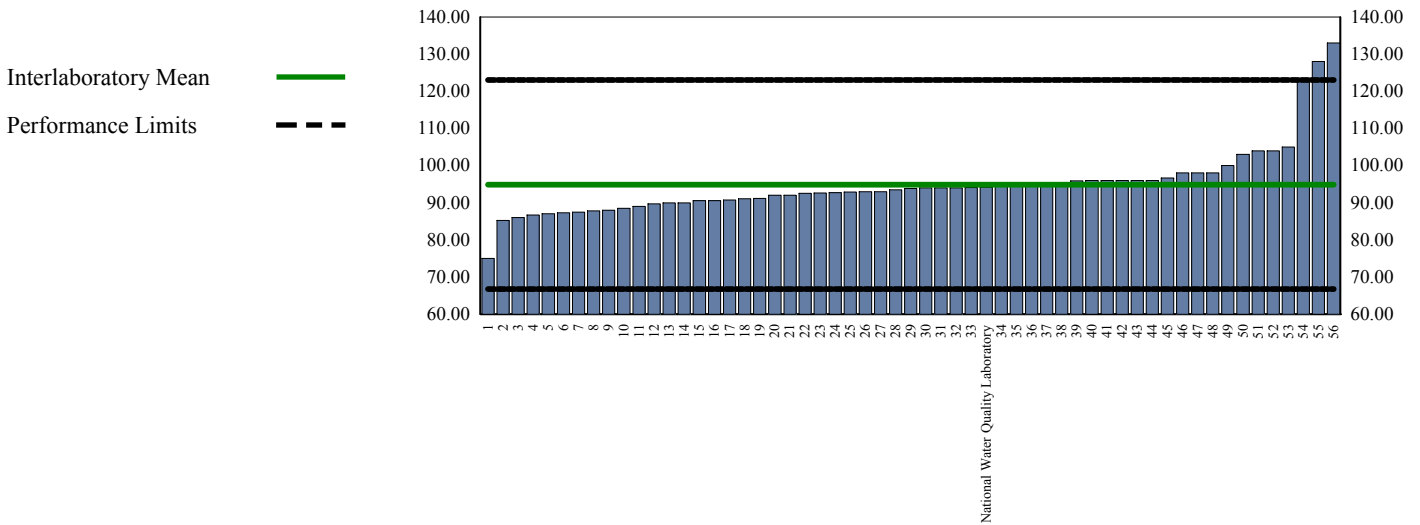
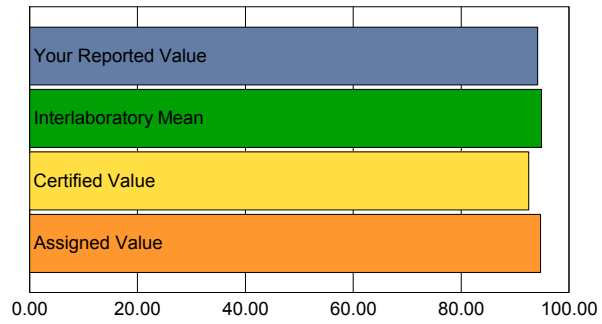


PE Minerals

Total Hardness as CaCO<sub>3</sub>

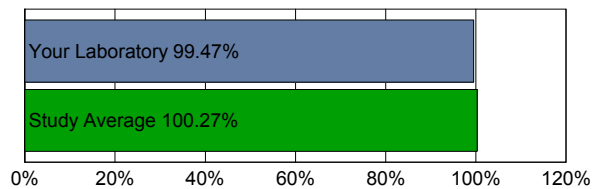
Units: mg/L

Your Reported Value: 94.2  
 Assigned Value: 94.7  
 Certified Value: 92.5 ± 0.675  
 Interlaboratory Mean: 94.9  
 Standard Deviation: 9.38  
 Performance Range: 66.8-123  
 Interlaboratory ZScore: 0.07  
 Valid Data (Outliers Removed): 57  
 Your Rank: 5 of 43  
 Relative Performance: Point of Excellence  
 Method Description: TITRIMETRIC



Percent Recovery

Your Laboratory: 99.47%  
 Interlaboratory Average: 100.27%

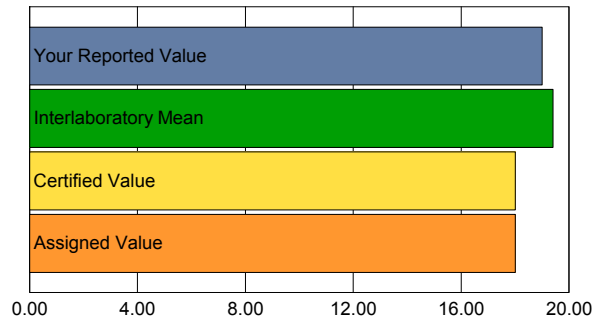


QC Minerals

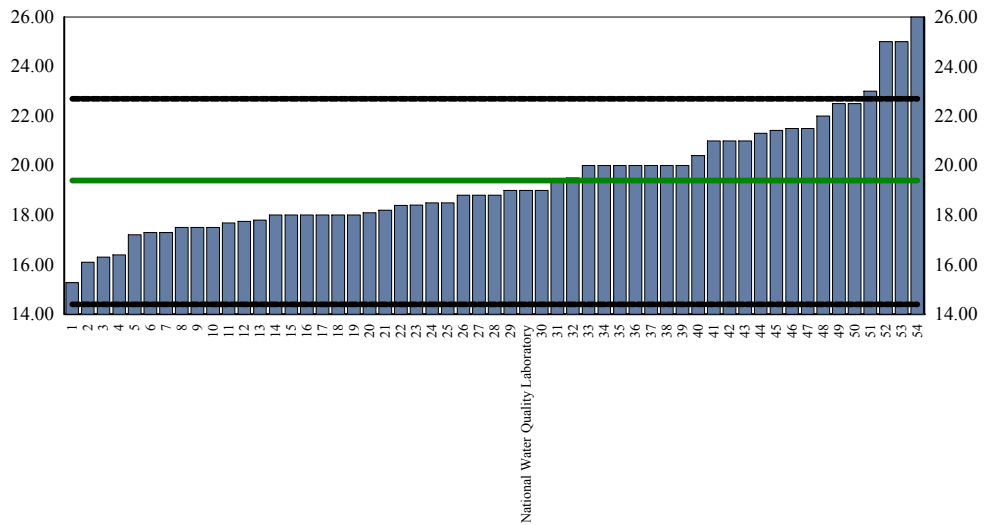
Alkalinity as CaCO3

Units: mg/L

Your Reported Value: 19.0  
 Assigned Value: 18.0  
 Certified Value: 18.0 ± 0.0132  
 Interlaboratory Mean: 19.4  
 Standard Deviation: 2.24  
 Performance Range: 12.7-26.1  
 Interlaboratory ZScore: 0.29  
 Valid Data (Outliers Removed): 57  
 Your Rank: 5 of 33  
 Relative Performance: Good  
 Method Description: TITRIMETRIC



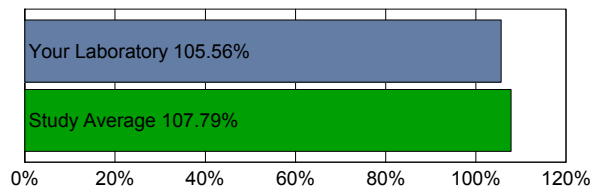
Interlaboratory Mean  
 Performance Limits



Outliers Removed From Graph  
 Results 30, 45 were identified  
 as statistical outliers and were  
 removed from the evaluation.

Percent Recovery

Your Laboratory: 105.56%  
 Interlaboratory Average: 107.79%

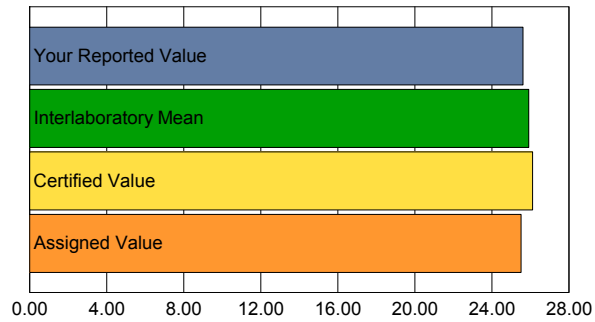


QC Minerals

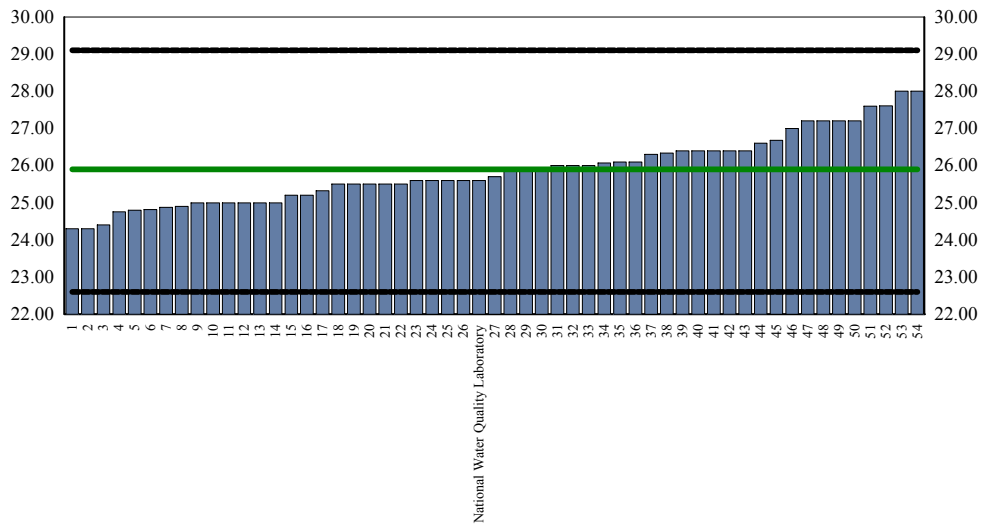
Calcium

Units: mg/L

Your Reported Value: 25.6  
 Assigned Value: 25.5  
 Certified Value: 26.1 ± 0.0880  
 Interlaboratory Mean: 25.9  
 Standard Deviation: 0.922  
 Performance Range: 23.1-28.6  
 Interlaboratory ZScore: 0.18  
 Valid Data (Outliers Removed): 57  
 Your Rank: 3 of 26  
 Relative Performance: Point of Excellence  
 Method Description: TITRIMETRIC

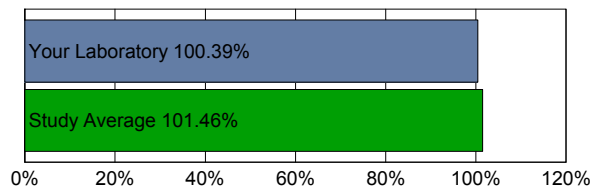


Interlaboratory Mean  
 Performance Limits



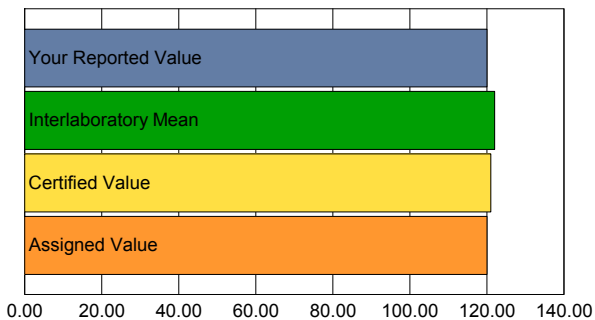
Percent Recovery

Your Laboratory: 100.39%  
 Interlaboratory Average: 101.46%



**QC Minerals Chloride** **Units: mg/L**

Your Reported Value: 120  
 Assigned Value: 120  
 Certified Value: 121 ± 0.106  
 Interlaboratory Mean: 122  
 Standard Deviation: 3.70  
 Performance Range: 111-134  
 Interlaboratory ZScore: 0.00

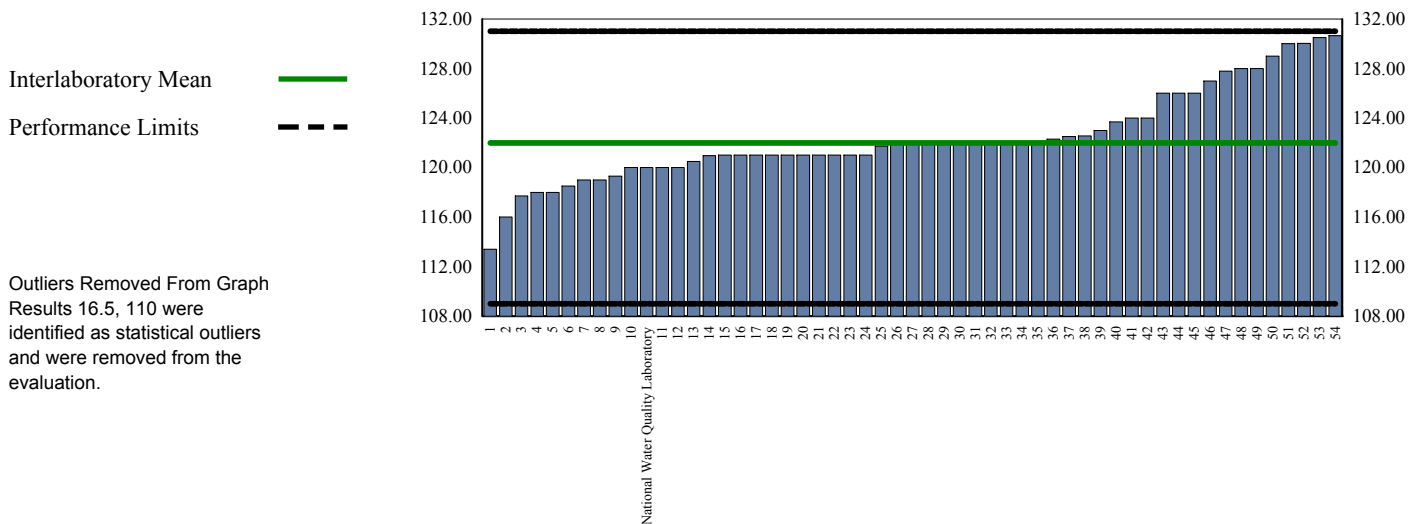


Valid Data (Outliers Removed): 57

Your Rank: 1 of 25

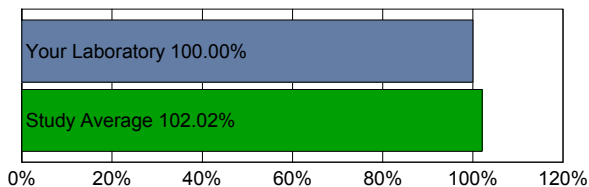
Relative Performance: Point of Excellence

Method Description: TITRIMETRIC



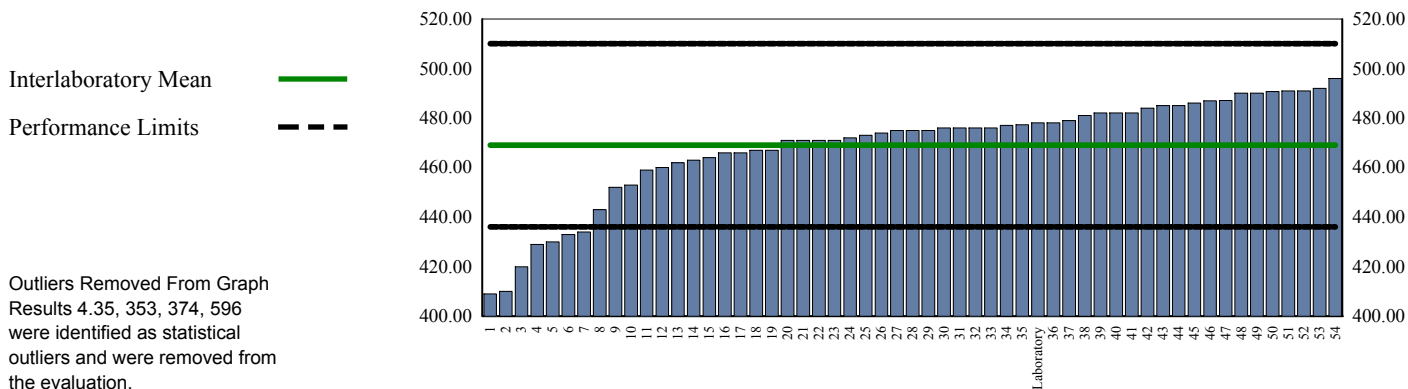
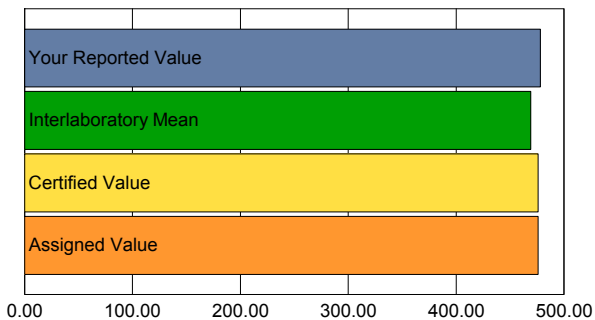
**Percent Recovery**

Your Laboratory: 100.00%  
 Interlaboratory Average: 102.02%



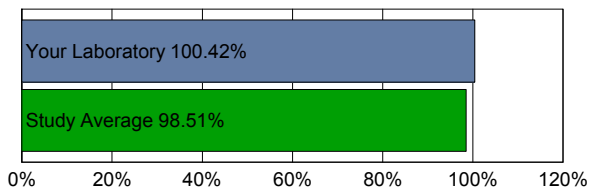
**QC Minerals Conductivity** Units: umhos/cm

Your Reported Value: 478  
 Assigned Value: 476  
 Certified Value: 476 ± 0.447  
 Interlaboratory Mean: 469  
 Standard Deviation: 20.8  
 Performance Range: 407-531  
 Interlaboratory ZScore: 0.40  
 Valid Data (Outliers Removed): 59  
 Your Rank: 6 of 35  
 Relative Performance: Good  
 Method Description: CONDUCTIVITYMET



**Percent Recovery**

Your Laboratory: 100.42%  
 Interlaboratory Average: 98.51%

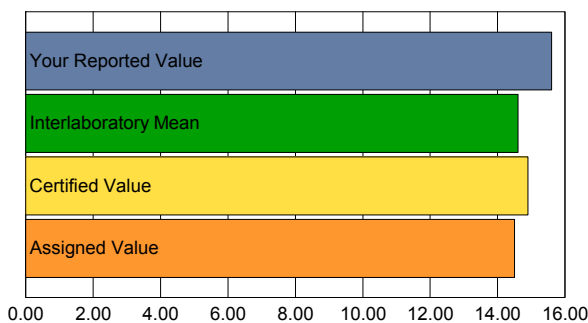


QC Minerals

Magnesium

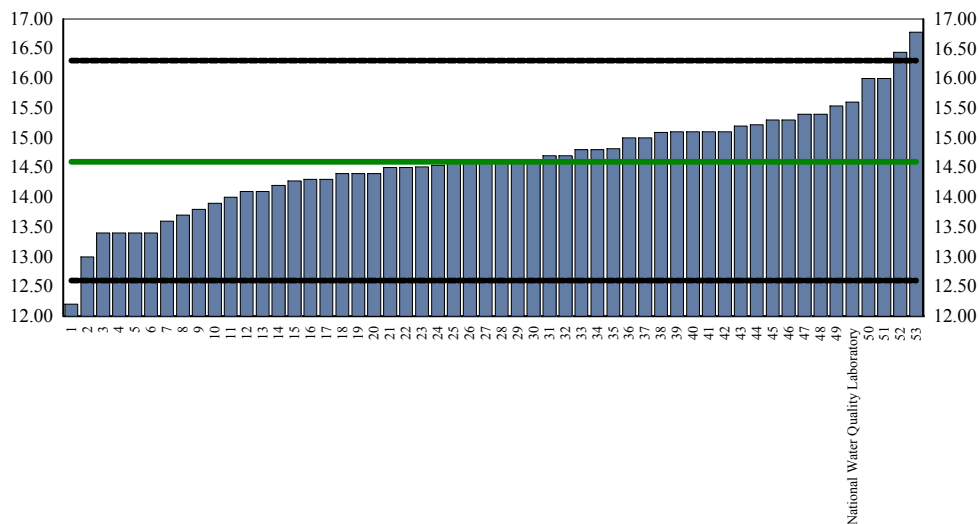
Units: mg/L

Your Reported Value: 15.6  
 Assigned Value: 14.5  
 Certified Value: 14.9 ± 0.0330  
 Interlaboratory Mean: 14.6  
 Standard Deviation: 0.835  
 Performance Range: 12.1-17.1  
 Interlaboratory ZScore: 1.81  
 Valid Data (Outliers Removed): 57  
 Your Rank: 18 of 25  
 Relative Performance: Satisfactory  
 Method Description: CALCULATION



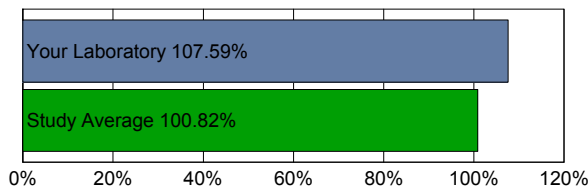
Interlaboratory Mean

Performance Limits



Percent Recovery

Your Laboratory: 107.59%  
 Interlaboratory Average: 100.82%

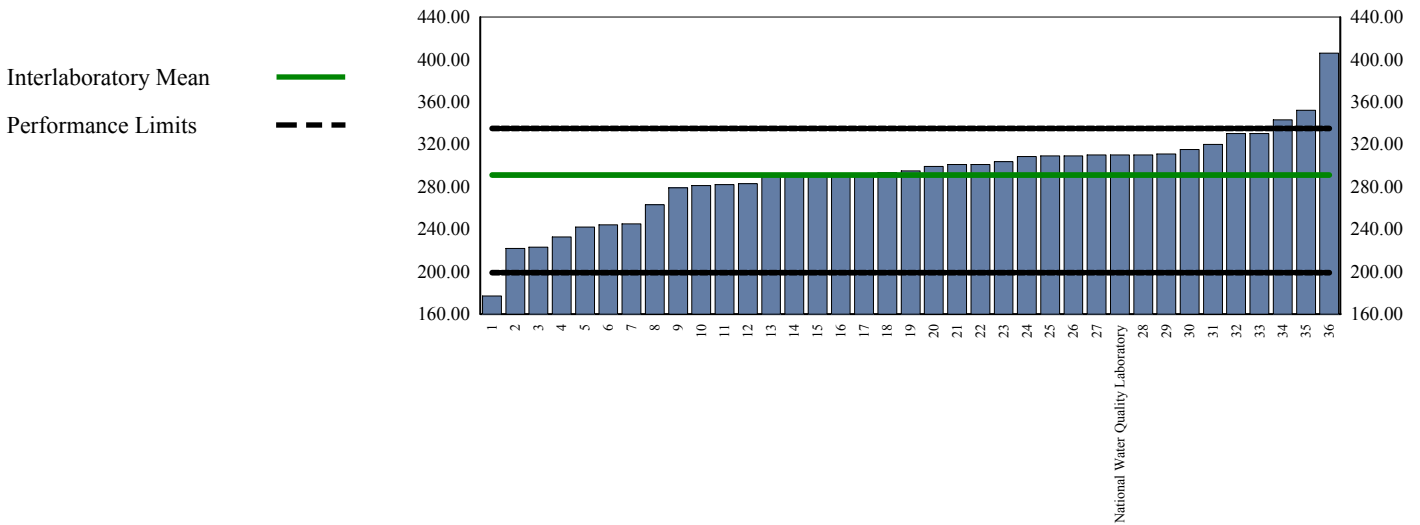
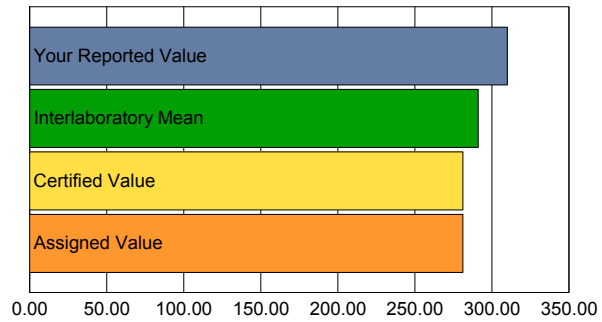


**QC Minerals**

**Total Dissolved Solids**

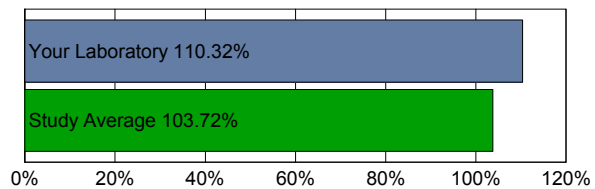
**Units: mg/L**

Your Reported Value: 310  
 Assigned Value: 281  
 Certified Value: 281 ± 1.04  
 Interlaboratory Mean: 291  
 Standard Deviation: 41.0  
 Performance Range: 168-415  
 Interlaboratory ZScore: 1.89  
 Valid Data (Outliers Removed): 37  
 Your Rank: 17 of 26  
 Relative Performance: Satisfactory  
 Method Description: CONDUCTIVITYMET



**Percent Recovery**

Your Laboratory: 110.32%  
 Interlaboratory Average: 103.72%

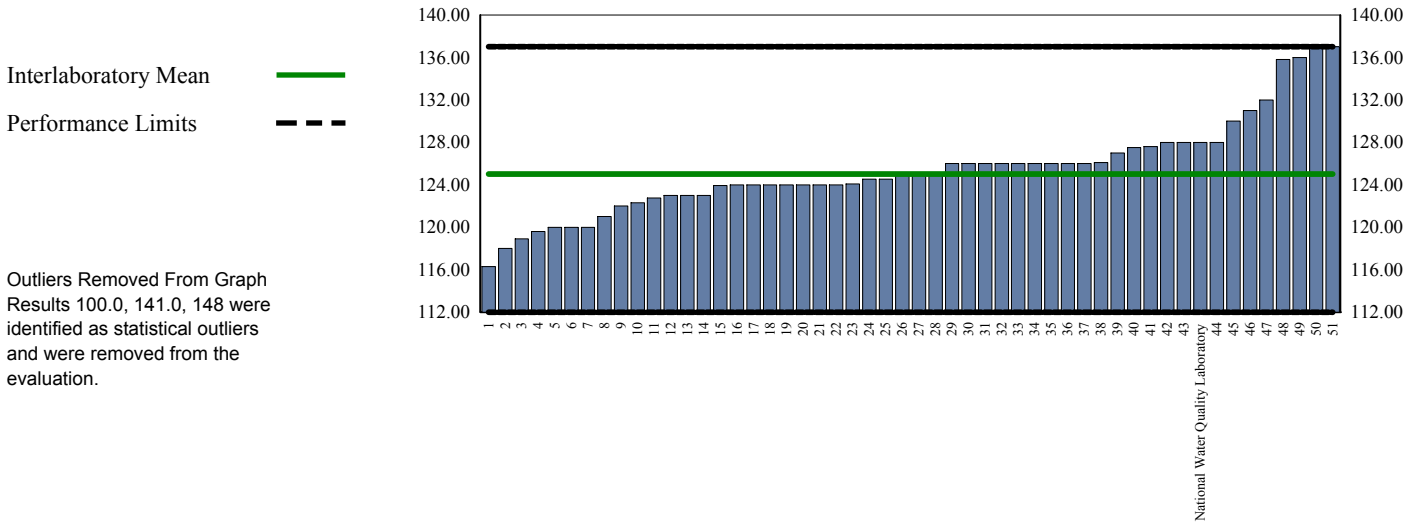
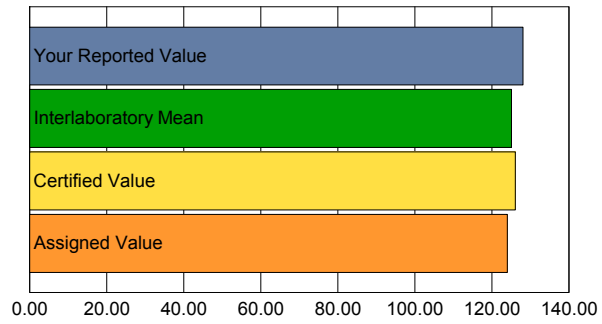


QC Minerals

Total Hardness as CaCO3

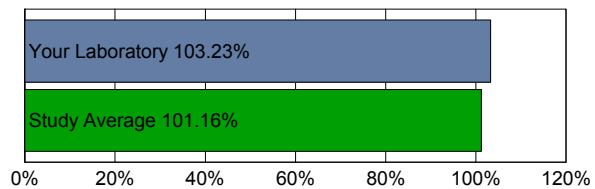
Units: mg/L

Your Reported Value: 128  
 Assigned Value: 124  
 Certified Value: 126 ± 0.290  
 Interlaboratory Mean: 125  
 Standard Deviation: 4.47  
 Performance Range: 112-139  
 Interlaboratory ZScore: 0.98  
 Valid Data (Outliers Removed): 55  
 Your Rank: 13 of 24  
 Relative Performance: Satisfactory  
 Method Description: TITRIMETRIC



Percent Recovery

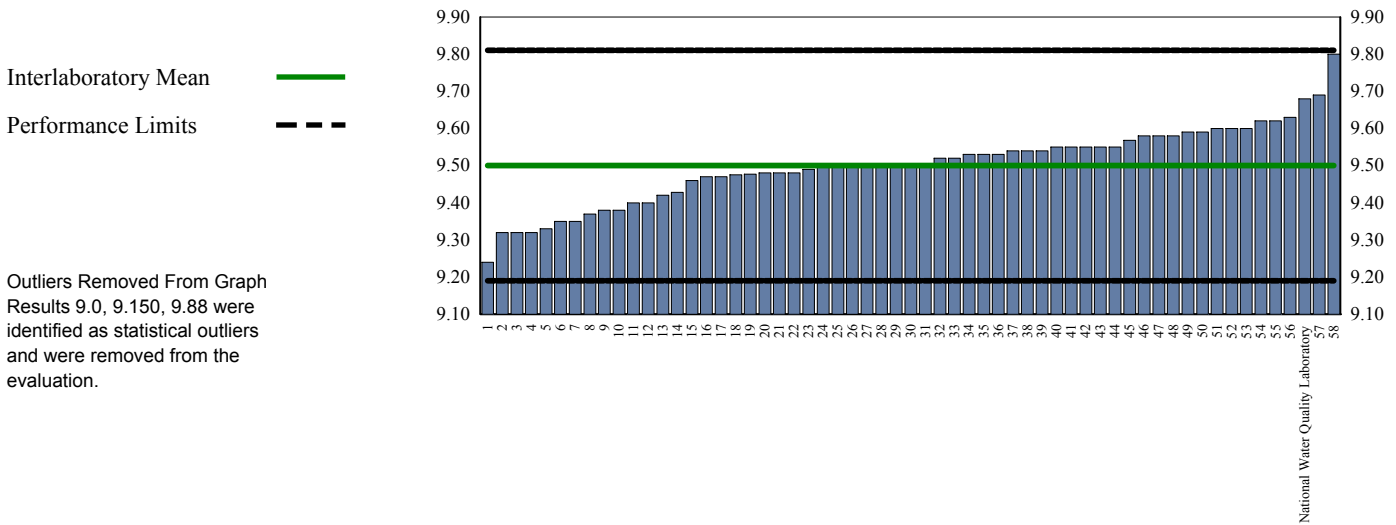
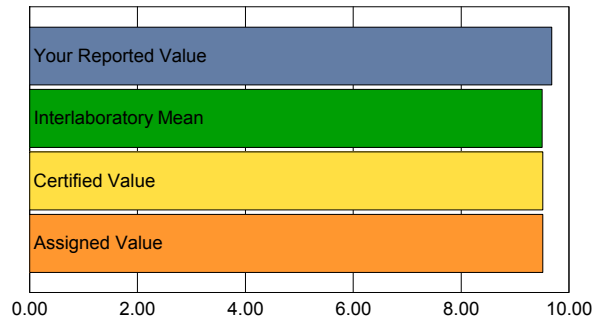
Your Laboratory: 103.23%  
 Interlaboratory Average: 101.16%



**PE pH      pH**

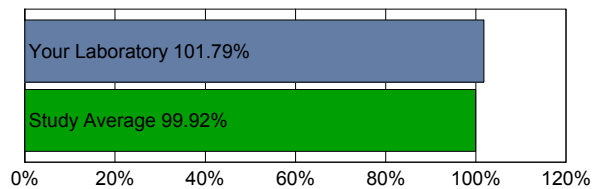
**Units: Units**

Your Reported Value: 9.68  
 Assigned Value: 9.51  
 Certified Value: 9.51 ± 0.00336  
 Interlaboratory Mean: 9.50  
 Standard Deviation: 0.103  
 Performance Range: 9.19-9.81  
 Interlaboratory ZScore: 1.75  
 Valid Data (Outliers Removed): 62  
 Your Rank: 17 of 23  
 Relative Performance: Point of Concern  
 Method Description: PHMETER

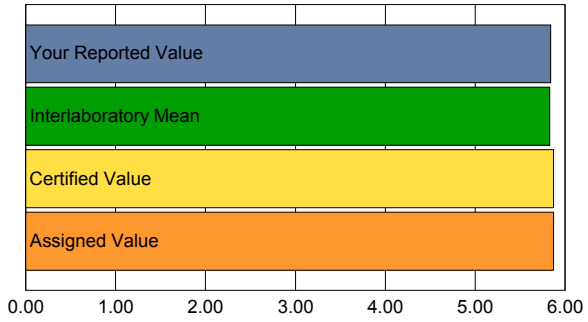


**Percent Recovery**

Your Laboratory: 101.79%  
 Interlaboratory Average: 99.92%

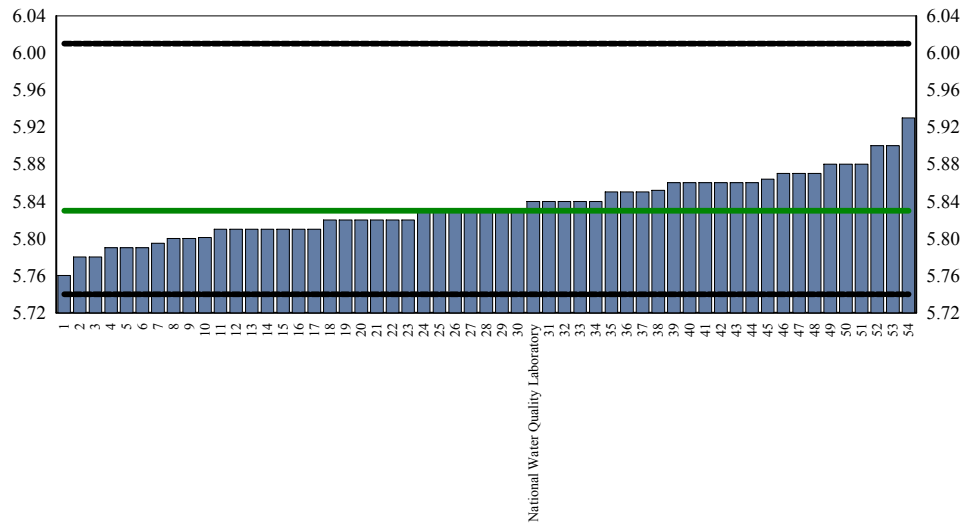


Your Reported Value: 5.84  
 Assigned Value: 5.87  
 Certified Value: 5.87 ± 0.00257  
 Interlaboratory Mean: 5.83  
 Standard Deviation: 0.0337  
 Performance Range: 5.73-5.94  
 Interlaboratory ZScore: 0.67  
 Valid Data (Outliers Removed): 60  
 Your Rank: 5 of 19  
 Relative Performance: Satisfactory  
 Method Description: PHMETER



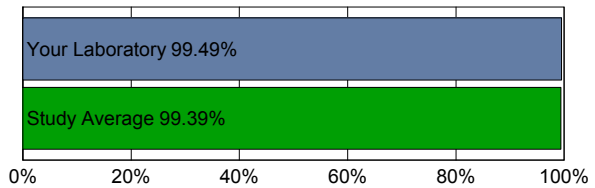
Interlaboratory Mean ———  
 Performance Limits - - - -

Outliers Removed From Graph  
 Results 5.69, 5.7, 5.95, 6.10,  
 7.49 were identified as  
 statistical outliers and were  
 removed from the evaluation.



Percent Recovery

Your Laboratory: 99.49%  
 Interlaboratory Average: 99.39%



**Analyte**

Name of the test/parameter of interest.

**Assigned Value**

This value is the calculated True Value of the standard based upon the actual composition of the standard.

**Certified Value**

This value is the result of the quality control testing performed on the sample by Analytical Products Group before the sample is shipped to the customer. Through this testing, the samples are traced against a NIST Standard Reference Material where available or an external standard if a NIST Standard Reference Material is not available. The reported uncertainty of this value is expressed as two times the standard deviation (s) divided by the square root of the number of samples (n) tested (i.e.  $2s/\sqrt{n}$ ).

**Outliers**

Data points that fall outside the boundaries enclosing most other data in the data set that could lead to misleading statistical results. Outliers were removed using the Grubbs t Test.

**Interlaboratory Mean**

Calculated using all reported values after the removal of outliers, which are removed using standard statistical methods.

**Standard Deviation**

Calculated using all reported values after the removal of outliers, which are removed using standard statistical methods.

**Percent Recovery**

Calculated as the interlaboratory mean divided by the assigned value.

**Performance Range**

Calculated based upon  $\pm$  three (3) Standard Deviations from the interlaboratory mean.

**Your Rank**

Your ranking for the analyte based upon the distance your Reported Value was from the Interlaboratory Mean. It is important to note that several laboratories can achieve the same rank.

**Interlaboratory Statistics**

Summary of the data from all study participants for the analyte of interest.

**Reported Value**

The result that was reported by your organization for the particular analyte. Every effort has been made to ensure correct data entry. Should you find a data entry error, please notify Analytical Products Group, Inc. and we will correct the error and re-issue the report. Any other non-numeric value (e.g. BDL, ND, >10, etc.) cannot be evaluated and will return an Evaluation result of "Unusable."

**Relative Performance**

Determined by the Reported Value's deviation from the interlaboratory mean. Evaluation may have one of following values:

**Point of Excellence**

Performance at this level was exceptional when compared to the average performance of all laboratories for the specified analyte. Approximately 12% of results have a relative performance of Point of Excellence.

**Good**

Performance at this level was above average when compared to the performance of all laboratories for the specified analyte. Approximately 13% of results have a relative performance of Good.

**Satisfactory**

Performance at this level was average when compared to the performance of all laboratories for the specified analyte. Satisfactory performance provides a solid foundation for quality improvement. Approximately 65% of results have a relative performance of Satisfactory.

**Point of Concern**

Performance at this level is considered marginally consistent when compared to the performance of laboratories in the same study running the same analyte. If normally distributed, there is less than a 5% chance that the laboratory's result was consistent with the mean of the other laboratories. Approximately 10% of results are Points of Concern.

**Point of Immediate Concern**

Performance at this level is inconsistent with the performance of laboratories in the same study running the same analyte and tends to indicate systematic issue(s). There is less than a 1% chance that the result was consistent with the performance of other laboratories in the same study.

**99% Confidence Interval**

<b>Relative Performance</b>	<b>ZScore</b>
Point of Excellence	0 to 0.15
Good	Between 0.15 to 0.32
Satisfactory	Between 0.32 to 1.645
Point of Concern	Between 1.645 to 2.58
Point of Immediate Concern	Greater than 2.58

