

## TECHNICAL MEMORANDUM

**DATE** June 15, 2021 19-116257.01

**TO** Justin Gostnell, Senior Environmental Coordinator  
Seminole Electric Cooperative, Inc.

**FROM** Samuel F. Stafford, PE **EMAIL** sstafford@golder.com

**RE: BACKGROUND GROUNDWATER QUALITY STATISTICS UPDATE  
INCREMENT 1 – SEMINOLE GENERATING STATION  
PALATKA, FLORIDA**

The Increment 1 buildout at Seminole Generating Station (SGS) is an active disposal unit that is subject to the CCR Rule<sup>1</sup>. Under the CCR Rule, groundwater monitoring is conducted in a phased approach. The first phase is detection monitoring which included the collection of a minimum of eight background and detection well samples by October 2017. Background groundwater quality was established based on these initial background events (Golder 2018<sup>2</sup>). The Statistical Analysis Plan<sup>3</sup> (Golder 2017) prescribes that the background groundwater quality limits should be updated when 4 to 8 additional samples are available. This Technical Memorandum summarizes the statistical analysis and establishes updated background quality limits for Appendix III parameters.

### BACKGROUND GROUNDWATER QUALITY

In accordance with the Statistical Analysis Plan (Golder 2017), Appendix III groundwater quality data is evaluated using the interwell prediction limit approach. Recent groundwater sampling results from semi-annual detection monitoring event results will be compared to previous background data to determine if there are any statistically significant differences. If there are no differences, the recently collected data will be added to the historical dataset. Appendix III background and detection monitoring sampling results from the background wells is shown in Table 1.

### COMPARISON OF NEWER DETECTION MONITORING RESULTS TO PRIOR BACKGROUND PERIOD RESULTS

The first step in updating the background groundwater quality with more recent events is to compare the newer results with the prior results for each constituent at each well. An analysis of variance (ANOVA) test was performed to determine if the means between the background period results and the detection monitoring results were statistically different. The newer detection monitoring results for each Appendix III constituent at each background well were not statistically significantly ( $\alpha = 0.01$ ) different from the background period results. ANOVA results are provided in **Attachment 1**.

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<sup>1</sup> 40 CFR 257, Subpart D – Standards for Disposal

<sup>2</sup> Golder, 2018. Detection Monitoring Statistical Analysis – October 2017 Sampling Event, Seminole Generating Station – Increment 1, Palatka, Florida. Golder Associates Inc., dated January 19, 2018.

<sup>3</sup> Golder, 2017. Statistical Analysis Plan, Increment 1 CCR Groundwater Monitoring, Seminole Electric Generating Station, Palatka, Florida. Golder Associates Inc., dated October 2017.

## BACKGROUND DATA SELECTION

If the background groundwater data could not be pooled, the monitoring well that afforded the highest prediction limit was selected consistent with the Statistical Analysis Plan and previous calculations. Statistical worksheets including ANOVA analysis, outlier evaluation, trend evaluation, and distributing fitting are provided in **Attachment 2**.

### Boron

The prediction limit for boron was calculated using the groundwater data from MW-41AR (consistent with past calculations). Boron results from MW-3A, MW-5A and MW-41AR exhibited significant spatial variability and therefore were not able to be pooled into a common dataset. The updated background limit for boron is 150 micrograms per liter ( $\mu\text{g/L}$ ). The previously calculated limit of boron was 139  $\mu\text{g/L}$ . The data evaluation summary and background concentration limit for boron at MW-41AR is presented below:

Boron – MW-41AR	
Non-Detect Percentage	5%
Trend	Increasing
Outlier	None
Distribution	Lognormal
Mean (log-mean)	86.9 $\mu\text{g/L}$ (4.422)
Standard Deviation (log-standard deviation)	26.91 $\mu\text{g/L}$ (0.298)
k (w=4, n=20)	1.98
Upper Prediction Limit	150 $\mu\text{g/L}$

### Calcium

The background concentration limit for calcium was calculated from MW-5A results (consistent with past calculations). Calcium results from MW-3A, MW-5A and MW-41AR exhibited significant spatial variability and therefore were not pooled into a common dataset. An upper outlier was identified in the MW-5A dataset; however, it was not removed as the dataset was lognormally distributed and there was no further justification for its removal. The updated background calcium limit is 45.2 milligrams per liter ( $\text{mg/L}$ ) based on the result from MW-5A. The previously calculated background limit for calcium was 60.2  $\text{mg/L}$ . The data evaluation summary and background concentration limit for calcium at MW-5A is presented below:

Calcium – MW-5A	
Non-Detect Percentage	0%
Trend	Decreasing
Outlier	Upper (51.2 $\text{mg/L}$ )
Distribution	Lognormal
Mean (log-mean)	16.8 $\text{mg/L}$ (2.63)
Standard Deviation (log-standard deviation)	12.29 $\text{mg/L}$ (0.597)
k (w=4, n=20)	1.98
Upper Prediction Limit	45.2 $\text{mg/L}$

## Chloride

The background concentration limit for chloride was calculated from MW-5A results (consistent with past calculations). The chloride results from MW-3A, MW-5A and MW-41AR exhibited significant spatial variability and therefore were not pooled into a common dataset. An upper outlier was identified in the MW-5A chloride dataset. The full dataset did not fit a normal or lognormal distribution; therefore, the outlier was removed, and the distribution was re-evaluated. The chloride dataset from MW-5A with the outlier removed fit a normal distribution. The mean and standard deviation of the chloride concentrations from MW-5A was calculated with the outlier removed. The updated chloride background limit is calculated at 23.5 mg/L (same as previous limit). The data evaluation summary and background concentration limit for chloride at MW-5A is presented below:

Chloride – MW-5A	
Non-Detect Percentage	0%
Trend	None
Outlier	Upper (110 mg/L)
Distribution*	Normal
Mean*	20.52 mg/L
Standard Deviation*	1.466 mg/L
k (w=4, n=19)	2.00
Upper Prediction Limit	23.5 mg/L

\* - Outlier removed

## Fluoride

The upper prediction limit for fluoride was calculated from MW-5A results (consistent with past calculations). The fluoride results from MW-3A and MW-41AR both have large non-detect percentages in the datasets and therefore were not pooled into a common dataset. An upper outlier was identified in the MW-5A fluoride dataset. The full dataset did not fit a normal or lognormal distribution; therefore, the outlier was removed, and the distribution was reevaluated. The fluoride dataset from MW-5A with the outlier removed fit a lognormal distribution. The mean and standard deviation of the fluoride concentrations from MW-5A was calculated with the outlier removed. The updated background limit for fluoride is 0.30 mg/L. The previously calculated fluoride background limit was 0.24 mg/L. The data evaluation summary and background concentration limit for fluoride at MW-5A is presented below:

Fluoride – MW-5A	
Non-Detect Percentage	10%
Trend	None
Outlier	Upper (1.03 mg/L)
Distribution*	Lognormal
Mean* (log-mean)	0.126 mg/L (-2.178)
Standard Deviation* (log-standard deviation)	0.0644 mg/L (0.48)
k (w=4, n=19)	2.00
Upper Prediction Limit	0.30 mg/L

\* - Outlier removed

## pH

The lower background limit for pH was calculated from MW-41AR results (consistent with past calculations). An upper outlier was identified in the MW-41AR pH dataset. The full dataset did not fit a normal or lognormal distribution; therefore, the outlier was removed, and the distribution was re-evaluated. The pH dataset from MW-41AR with the outlier removed fit a lognormal distribution. The mean and standard deviation of the pH from MW-41AR was calculated with the outlier removed. The updated lower background limit of pH is 3.95 standard units (SU). The previously calculated lower background limit for pH was 4.01 SU. The data evaluation summary and lower limit background concentration limit for pH at MW-41AR is presented below:

pH – MW-41AR (Lower Limit)	
Non-Detect Percentage	0%
Trend	Increasing
Outlier	Upper (5.28 mg/L)
Distribution*	Lognormal
Mean* (log-mean)	4.344 SU (1.468)
Standard Deviation* (log-standard deviation)	0.216 SU (0.0476)
k (w=4, n=19)	2.00
Lower Prediction Limit	3.95 SU

\* - Outlier removed

The upper background limit for pH was calculated from MW-5A results (consistent with past calculations). The MW-5A pH dataset had a lognormal distribution. The updated upper background limit for pH is calculated at 6.49 SU. The previously calculated upper limit was 6.68 SU. The data evaluation summary and lower limit background concentration limit for pH at MW-5A is presented below:

pH – MW-5A (Upper Limit)	
Non-Detect Percentage	0%
Trend	Decreasing
Outlier	None
Distribution	Lognormal
Mean (log-mean)	5.729 SU (1.743)
Standard Deviation (log-standard deviation)	0.375 SU (0.064)
k (w=4, n=20)	1.98
Upper Prediction Limit	6.49 SU

## Sulfate

The background limit for sulfate was calculated from MW-41AR results (consistent with past calculations). The sulfate results from MW-3A, MW-5A and MW-41AR exhibited significant spatial variability and therefore were not pooled into a common dataset. An upper outlier was identified in the MW-41AR sulfate dataset. The full dataset did not fit a normal or lognormal distribution; therefore, the outlier was removed, and the distribution was

re-evaluated. The sulfate dataset from MW-41AR with the outlier removed fit a lognormal distribution. The mean and standard deviation of the sulfate concentrations from MW-41AR was calculated with the outlier removed. The updated calculated background limit for sulfate is 52 mg/L. The previously calculated background limit for sulfate was 34.3 mg/L. The data evaluation summary and background concentration limit for sulfate at MW-41AR is presented below:

Sulfate – MW-41AR	
Non-Detect Percentage	5%
Trend	None
Outlier	Upper (111 mg/L)
Distribution*	Lognormal (outlier removed)
Mean* (log-mean)	27.72 mg/L (3.263)
Standard Deviation* (log-standard deviation)	10.74 mg/L (0.341)
k (w=4, n=19)	2.00
Upper Prediction Limit	52 mg/L

\* - Outlier removed

### Total Dissolved Solids

The background limit for total dissolved solids (TDS) was calculated from MW-5A results (consistent with past calculations). The TDS results from MW-3A, MW-5A and MW-41AR exhibited significant spatial variability and therefore were not pooled into a common dataset. Upper and lower outliers were identified in the MW-5A TDS dataset. The full dataset did not fit a normal or lognormal distribution; therefore, the outliers were removed, and the distribution was re-evaluated. The TDS dataset from MW-5A with the outliers removed fit a lognormal distribution. The mean and standard deviation of the TDS concentrations from MW-5A were calculated with the outliers removed. The updated calculated background limit for TDS is 150 mg/L. The previously calculated background limit for TDS was 201 mg/L. The data evaluation summary and background concentration limit for TDS at MW-5A is presented below:

Total Dissolved Solids – MW-5A	
Non-Detect Percentage	0%
Trend	Decreasing
Outlier	Upper (194 mg/L) Lower (28 mg/L)
Distribution*	Lognormal
Mean* (log-mean)	99.06 mg/L (4.572)
Standard Deviation* (log-standard deviation)	24.08 mg/L (0.215)
k (w=4, n=18)	2.04
Upper Prediction Limit	150 mg/L

\* - Outliers removed

## SUMMARY OF APPENDIX III BACKGROUND LIMITS

The updated Appendix III background limits are presented in the table below:

Appendix III Parameter	Basis	Established Background Limit
Boron	MW-41AR	150 µg/L
Calcium	MW-5A	45.2 mg/L
Chloride	MW-5A	23.5 mg/L
Fluoride	MW-5A	0.30 mg/L
pH	MW-41AR, MW-5A	3.95 – 6.49 SU
Sulfate	MW-41AR	52 mg/L
Total Dissolved Solids	MW-5A	150 mg/L

These updated background limits should be used in future detection monitoring statistical evaluations to determine if there is a statistically significant increase (SSI) over background levels. The statistical evaluation will continue utilize the 1-of-2 prediction limit scheme as outlined in the Statistical Analysis Plan. If a semi-annual downgradient groundwater observation is higher than the background limit above (or lower for pH), then verification sampling is warranted. An SSI has occurred if both the initial and verification concentrations are greater than the established background limit (or less for pH).

Sincerely,

**Golder Associates Inc.**



Samuel F. Stafford, PE  
Senior Engineer



Donald J. Miller  
Principal and Practice Leader

SFS/DJM/ams

Attachments: Table 1 – Appendix III Background and Detection Monitoring Results, Background Monitoring Wells  
Attachment 1 – ANOVA Test Results for Updating Background  
Attachment 2 – Statistical Worksheets

[https://golderassociates.sharepoint.com/sites/103451/Deliverables/Background/TM\\_Background Stats Update\\_06152021.docx](https://golderassociates.sharepoint.com/sites/103451/Deliverables/Background/TM_Background Stats Update_06152021.docx)

TABLE

**TABLE 1**  
**APPENDIX III BACKGROUND AND DETECTION MONITORING RESULTS**  
**BACKGROUND MONITORING WELLS**

**Increment 1 - Seminole Generating Station**

Monitoring Well	Sampling Date	Boron µg/L	Calcium mg/L	Chloride mg/L	Fluoride mg/L	pH SU	Sulfate mg/L	Total Dissolved Solids mg/L
MW-3A	5/26/2016	37 I	8.96	11.8	0.05 U	5.7	8	73
	6/9/2016	56	4.27	11.7	0.63	5.25	7.8	79
	7/22/2016	19 I	2.07	11.5	0.14 I	5.04	8.5	55
	8/25/2016	25 I	1.5	11.5	0.05 U	4.93	13.4	65
	9/26/2016	29 I	1.57	13.9	0.05 U	4.73	13	66
	10/24/2016	32 I	1.31	11.9	0.05 U	4.63	12.8	64
	11/11/2016	69	1.42	12.6	0.05 U	4.67	11.8	71
	12/2/2016	44 I	1.3	11.1	0.05 U	4.72	11.1	141
	1/16/2017	77	3.33	11.3	0.05 U	4.64	17.6	87
	3/21/2017	41 I	1.43	10.8	0.05 U	4.31	12	53
	4/24/2017	59	1.22	10.7	0.05 U	4.75	9.1	51
	5/22/2017	49 I	1.11	10.7	0.05 U	4.84	8.6	40
	6/20/2017	64	1.31 V	10.5	0.05 U	4.43	9.2	69
	10/13/2017	44 I	1.07	10	0.01 I	4.59	7.7	78
	3/15/2018	40 I	1.18	11.5	0.02U	4.06	10	38
	7/31/2018	31 I	1.08	11.9	0.02 U	4.78	7.2	58
	2/11/2019	29 I	1.3	110	0.13 I	4.32	6.3	63
	8/13/2019	24 I	1.1	11	0.076 I	4.4	7.4	63
4/19/2020	100 U	1.5	9.8	0.05 U	4.69	11	81	
10/5/2020	100 U	1.1	9.2	0.20 U	4.51	8.2	54	
MW-5A	5/26/2016	21 I	51.2	18.8	0.05 U	6.5	3.6	194
	6/10/2016	39 I	43.4	19.9	1.03	6.56	4 V	174
	7/22/2016	10 U	30.8	21.5	0.16 I	6.23	4.6	123
	8/25/2016	19 I	22	22.6	0.21	6	3.9	104
	9/26/2016	13 I	22.6	21.3	0.23	6.01	5.4	120
	10/24/2016	18 I	18.4	22.7	0.13 I	5.67	5.3	122
	11/11/2016	52	20.5	20.8	0.13 I	5.83	5.7	102
	12/2/2016	32 I	14.4	21.8	0.12 I	5.77	6.7	69
	1/16/2017	52	12	22.3	0.13 I	5.7	6.8	95
	3/21/2017	30 I	11.3	21.2	0.1 I	5.29	7.7	97
	4/24/2017	35 I	10.3	20.7	0.1 I	5.58	6.8	83
	5/22/2017	32 I	9.33	20.5	0.13 I	5.69	6.8	86
	6/20/2017	50	13.4	21	0.11 I	5.57	6.2	94
	10/13/2017	33 I	8.88	17.9	0.08 I	5.54	6.4	88
	3/15/2018	25 U	7.72	17.3	0.05 I	5.13	8.3	28
	7/31/2018	25 U	8.73	19.5	0.08 I	5.66	8.2	86
	2/11/2019	17 U	7.4	110	0.077 I	5.45	3.9 I	76
	8/13/2019	20 U	8	20	0.11 I	5.58	5.8	96
4/19/2020	100 U	8.4	20	0.31 I	5.6	7.2	83	
10/5/2020	100 U	7.2	20	0.20 U	5.48	6.8 I	85	

**TABLE 1**  
**APPENDIX III BACKGROUND AND DETECTION MONITORING RESULTS**  
**BACKGROUND MONITORING WELLS**

**Increment 1 - Seminole Generating Station**

Monitoring Well	Sampling Date	Boron µg/L	Calcium mg/L	Chloride mg/L	Fluoride mg/L	pH SU	Sulfate mg/L	Total Dissolved Solids mg/L
MW-41AR	5/26/2016	84	12.4	9.2	0.05 U	4.3	43	80
	6/10/2016	147	21.9	12.5	0.05 U	4.39	58.8	120
	7/22/2016	49 I	6.33	8.8	0.05 U	4.23	24.7	56
	8/25/2016	60	7.11	8	0.05 U	4.28	35.9	250
	9/26/2016	61	5.95	8.5	0.05 U	4.24	22.8	52
	10/24/2016	66	5.54	8.5	0.05 U	4.18	20.8	67
	11/11/2016	81	6.14	9.1	0.05 U	4.27	25.3	58
	12/2/2016	75	5.88	8.5	0.05 U	4.31	22.1	56
	1/16/2017	94	6.34	7.3	0.05 U	4.35	21.5	47
	3/21/2017	87	5.89	8.3	0.05 U	3.99	19.5	42
	4/24/2017	86	5.7	7.8	0.07 I	4.54	19.5	38
	5/22/2017	94	5.71	8.3	0.3 U	4.4	22.2	71
	6/20/2017	111	6.68	13	0.05 U	4.42	26.6	77
	10/13/2017	77	7.43	6.6	0.03 I	4.46	23.1	64
	2/23/2018	98	6.81	12.1	0.03 I	4.23	28.5	55
	8/3/2018	97	5.8	13.9	0.03 I	4.33	25.3	46
	2/11/2019	69	5.7	0.50 U	0.050 U	4.17	0.50 U	74
	8/13/2019	52 I	6.2	8.8	0.11 I	4.37	24	67
4/19/2020	150 I	23	22	0.091 I	6.12	44	100	
10/5/2020	100 U	10	8.3	0.20 U	5.08	28	63	

**Notes:**

Shaded results indicate background sampling results

mg/L - milligrams per liter

µg/L - micrograms per liter

SU - standard units

U - Result less than method detection limit

I - Reported value is between method detection limit and practical quantification limit

V - Constituent was detected in both the sample and associated method blank

**ATTACHMENT 1**

## **ANOVA Test Results for Updating Background**

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_3A

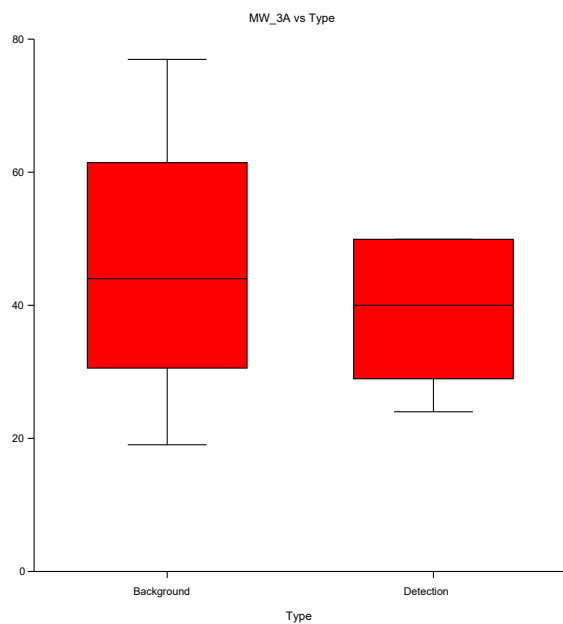
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	0.3373	0.73588	No
Kurtosis	-0.5670	0.57072	No
Skewness and Kurtosis (Omnibus)	0.4353	0.80442	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	2.4076	0.13815	No
Levene (Data - Means)	2.7393	0.11524	No
Conover (Ranks of Deviations)	2.8671	0.09041	No
Bartlett (Likelihood Ratio)	1.8892	0.16929	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	287.2137	287.2137	1.1464	0.29846	No	0.05501
Within (Error)	18	4509.736	250.5409				
Adjusted Total	19	4796.95					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.8305	0.36214	No
Corrected for Ties	1	0.8323	0.36160	No
Number Sets of Ties	3			
Multiplicity Factor	18			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	148.00	11.38	0.9113	44
Detection	7	62.00	8.86	-0.9113	40

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

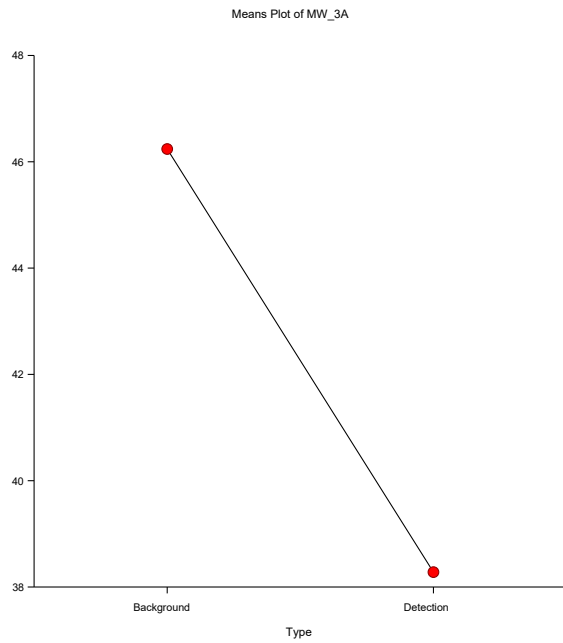
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.8143	0.36685	No
Van der Waerden - Normal Quantiles	1	0.8325	0.36154	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=250.5409 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	46.23077	
Detection	7	38.28571	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_5A

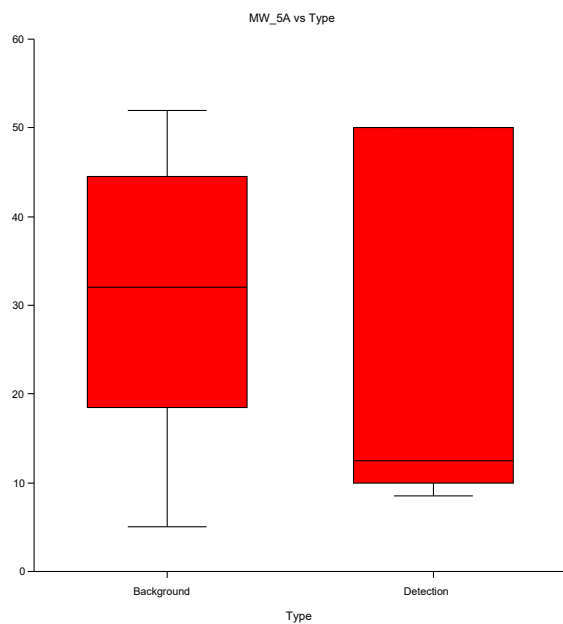
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	0.5720	0.56731	No
Kurtosis	-1.7966	0.07240	No
Skewness and Kurtosis (Omnibus)	3.5549	0.16907	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.2248	0.64114	No
Levene (Data - Means)	1.4341	0.24663	No
Conover (Ranks of Deviations)	0.7727	0.37938	No
Bartlett (Likelihood Ratio)	0.3779	0.53871	No

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_5A

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	132.732	132.732	0.4915	0.49220	No	0.02707
Within (Error)	18	4860.505	270.0281				
Adjusted Total	19	4993.237					
Total	20						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.9812	0.32191	No
Corrected for Ties	1	0.9864	0.32064	No
Number Sets of Ties	4			
Multiplicity Factor	42			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	149.00	11.46	0.9905	32
Detection	7	61.00	8.71	-0.9905	12.5

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

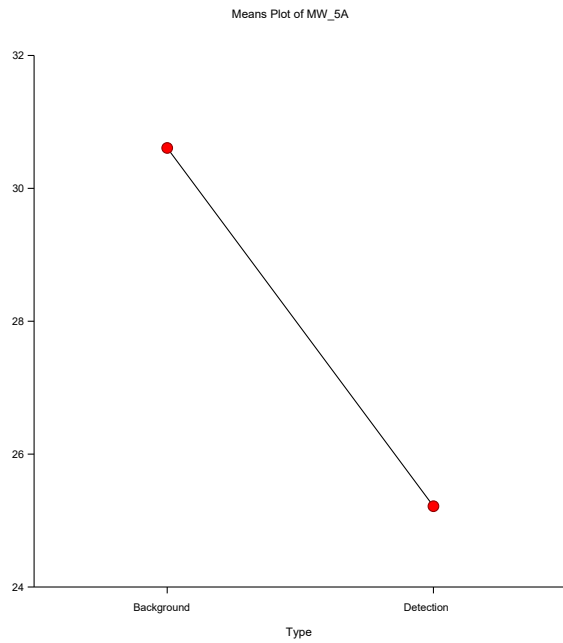
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.9800	0.32220	No
Van der Waerden - Normal Quantiles	1	0.9999	0.31735	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=270.0281 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	30.61539	
Detection	7	25.21428	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_41AR

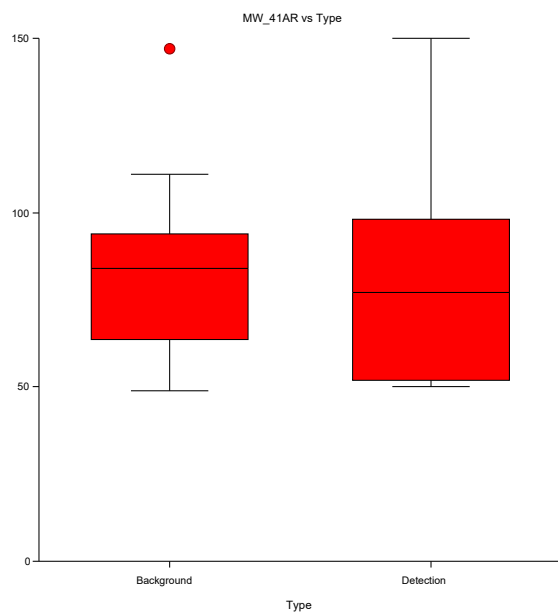
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	2.0169	0.04371	Yes
Kurtosis	1.1970	0.23132	No
Skewness and Kurtosis (Omnibus)	5.5005	0.06391	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.6442	0.43268	No
Levene (Data - Means)	0.9597	0.34025	No
Conover (Ranks of Deviations)	0.9627	0.32651	No
Bartlett (Likelihood Ratio)	0.7827	0.37631	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	1.063736	1.063736	0.0013	0.97173	No	0.01004
Within (Error)	18	14825.74	823.652				
Adjusted Total	19	14826.8					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.0016	0.96839	No
Corrected for Ties	1	0.0016	0.96838	No
Number Sets of Ties	1			
Multiplicity Factor	6			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	136.00	10.46	-0.0396	84
Detection	7	74.00	10.57	0.0396	77

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

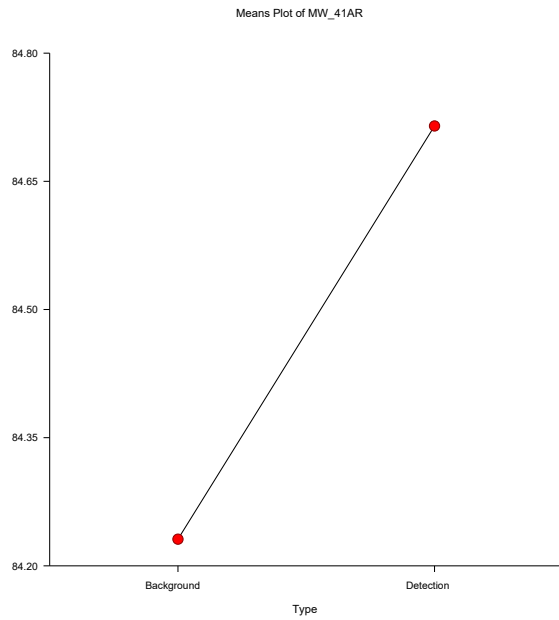
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.0306	0.86107	No
Van der Waerden - Normal Quantiles	1	0.0201	0.88724	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=823.652 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	84.23077	
Detection	7	84.71429	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

## One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_3A

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( =0.01)	Power ( =0.01)
Between (Type)	1	287.2137	287.2137	1.1464	0.29846	No	0.05501
Within (Error)	18	4509.736	250.5409				
Adjusted Total	19	4796.95					
Total	20						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( =0.01)
Not Corrected for Ties	1	0.8305	0.36214	No
Corrected for Ties	1	0.8323	0.36160	No
Number Sets of Ties	3			
Multiplicity Factor	18			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	148.00	11.38	0.9113	44
Detection	7	62.00	8.86	-0.9113	40

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

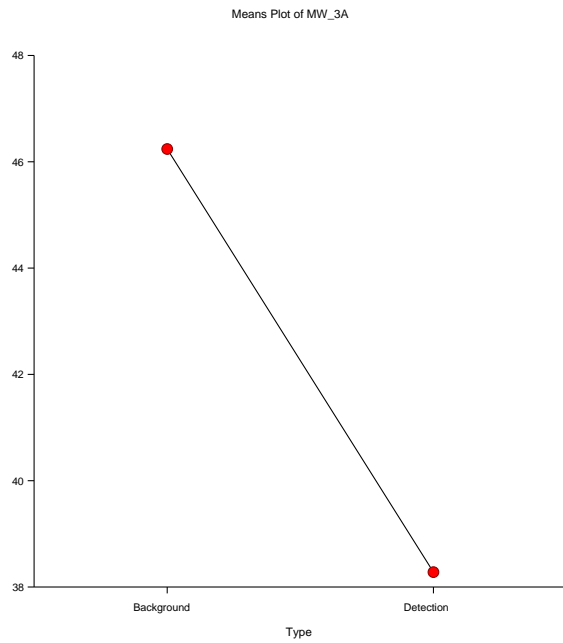
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( =0.05)
Terry-Hoeffding - Expected Normal Scores	1	0.8143	0.36685	No
Van der Waerden - Normal Quantiles	1	0.8325	0.36154	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=250.5409 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	46.23077	
Detection	7	38.28571	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_5A

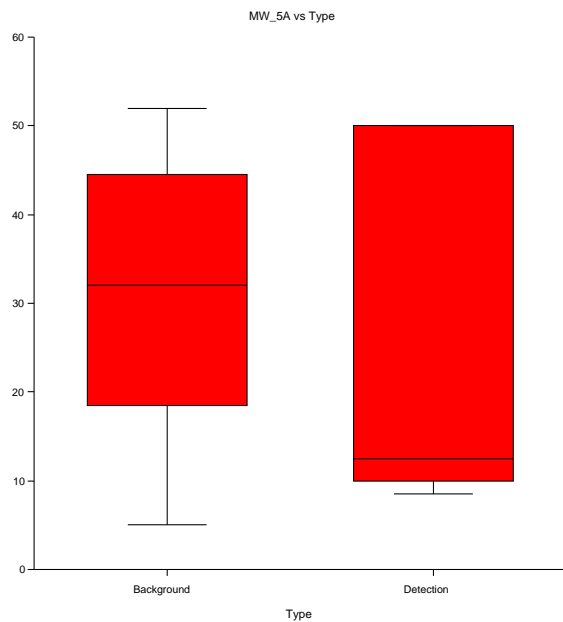
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( =0.05)
Skewness	0.5720	0.56731	No
Kurtosis	-1.7966	0.07240	No
Skewness and Kurtosis (Omnibus)	3.5549	0.16907	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( =0.05)
Brown-Forsythe (Data - Medians)	0.2248	0.64114	No
Levene (Data - Means)	1.4341	0.24663	No
Conover (Ranks of Deviations)	0.7727	0.37938	No
Bartlett (Likelihood Ratio)	0.3779	0.53871	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Boron\_ND.NCSS  
 Response MW\_5A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( =0.01)	Power ( =0.01)
Between (Type)	1	132.732	132.732	0.4915	0.49220	No	0.02707
Within (Error)	18	4860.505	270.0281				
Adjusted Total	19	4993.237					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( =0.01)
Not Corrected for Ties	1	0.9812	0.32191	No
Corrected for Ties	1	0.9864	0.32064	No
Number Sets of Ties	4			
Multiplicity Factor	42			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	149.00	11.46	0.9905	32
Detection	7	61.00	8.71	-0.9905	12.5

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( =0.05)
Terry-Hoeffding - Expected Normal Scores	1	0.9800	0.32220	No
Van der Waerden - Normal Quantiles	1	0.9999	0.31735	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Calcium.NCSS  
 Response MW\_3A

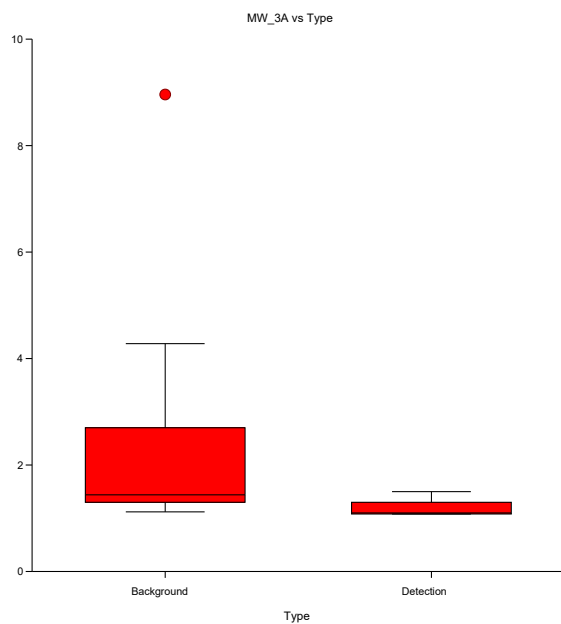
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.4863	0.00001	Yes
Kurtosis	3.9613	0.00007	Yes
Skewness and Kurtosis (Omnibus)	35.8191	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	1.4418	0.24541	No
Levene (Data - Means)	4.8445	0.04103	Yes
Conover (Ranks of Deviations)	9.7100	0.00183	Yes
Bartlett (Likelihood Ratio)	22.7712	0.00000	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	6.327163	6.327163	1.9743	0.17702	No	0.09756
Within (Error)	18	57.68589	3.204772				
Adjusted Total	19	64.01305					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	7.4741	0.00626	Yes
Corrected for Ties	1	7.4966	0.00618	Yes
Number Sets of Ties	4			
Multiplicity Factor	24			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	171.00	13.15	2.7339	1.43
Detection	7	39.00	5.57	-2.7339	1.1

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

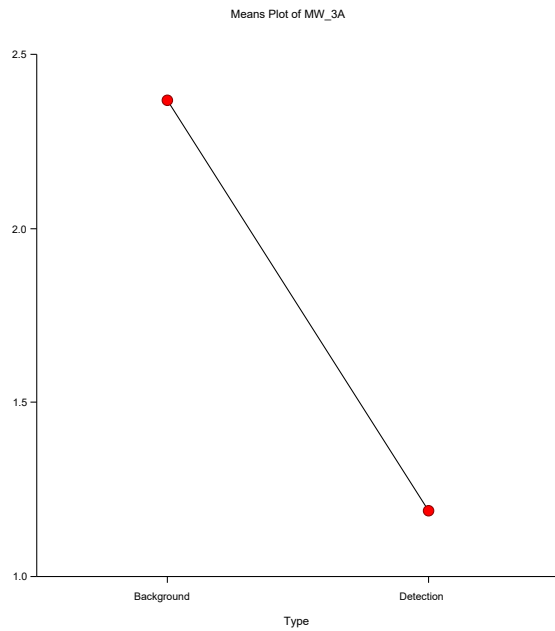
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	7.5582	0.00597	Yes
Van der Waerden - Normal Quantiles	1	7.5907	0.00587	Yes

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=3.204772 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	2.369231	
Detection	7	1.19	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Calcium.NCSS  
 Response MW\_5A

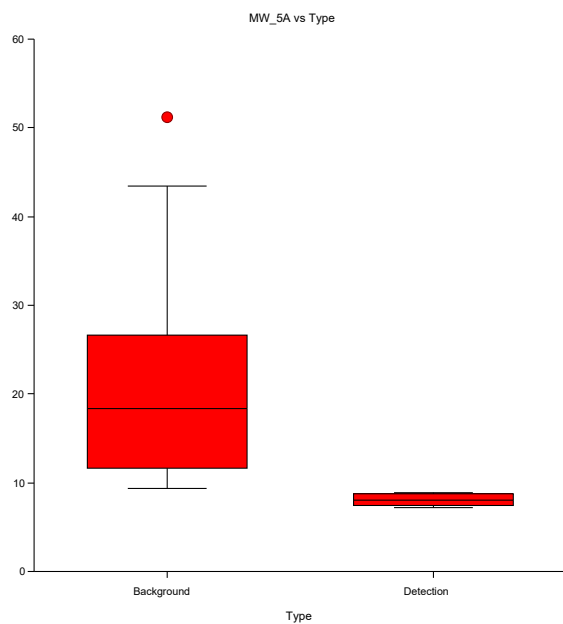
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	2.8983	0.00375	Yes
Kurtosis	2.2465	0.02467	Yes
Skewness and Kurtosis (Omnibus)	13.4473	0.00120	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	5.7910	0.02707	Yes
Levene (Data - Means)	7.9834	0.01121	Yes
Conover (Ranks of Deviations)	8.9566	0.00276	Yes
Bartlett (Likelihood Ratio)	26.9828	0.00000	Yes

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_5A

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	824.6808	824.6808	7.2530	0.01487	No	0.44859
Within (Error)	18	2046.648	113.7027				
Adjusted Total	19	2871.329					
Total	20						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	13.0000	0.00031	Yes
Corrected for Ties	1	13.0000	0.00031	Yes
Number Sets of Ties	0			
Multiplicity Factor	0			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	182.00	14.00	3.6056	18.4
Detection	7	28.00	4.00	-3.6056	8

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

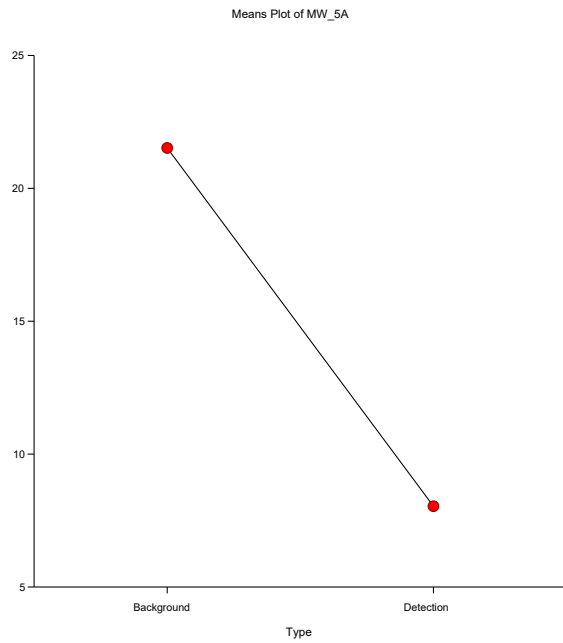
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	11.9445	0.00055	Yes
Van der Waerden - Normal Quantiles	1	12.1640	0.00049	Yes

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=113.7027 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	21.51	Detection
Detection	7	8.047143	Background

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_41AR

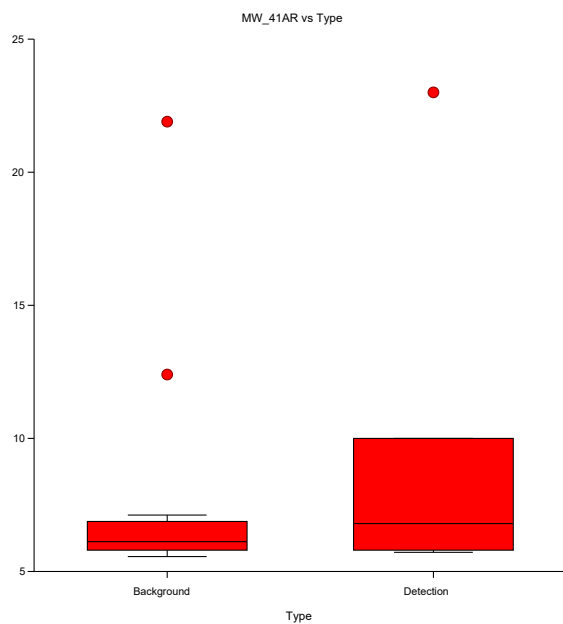
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	3.7767	0.00016	Yes
Kurtosis	2.7859	0.00534	Yes
Skewness and Kurtosis (Omnibus)	22.0251	0.00002	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.2870	0.59870	No
Levene (Data - Means)	0.4966	0.49003	No
Conover (Ranks of Deviations)	1.8943	0.16872	No
Bartlett (Likelihood Ratio)	0.7326	0.39203	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	9.752875	9.752875	0.3612	0.55536	No	0.02219
Within (Error)	18	486.0824	27.00458				
Adjusted Total	19	495.8353					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.7598	0.38339	No
Corrected for Ties	1	0.7604	0.38321	No
Number Sets of Ties	1			
Multiplicity Factor	6			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	125.50	9.65	-0.8717	6.14
Detection	7	84.50	12.07	0.8717	6.81

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

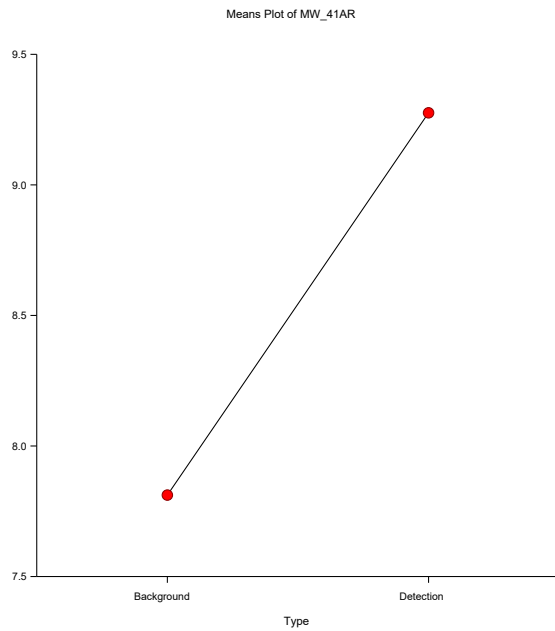
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.8595	0.35386	No
Van der Waerden - Normal Quantiles	1	0.8270	0.36314	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Calcium.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=27.00458 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	7.813077	
Detection	7	9.277143	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Chloride.NCSS  
 Response MW\_3A

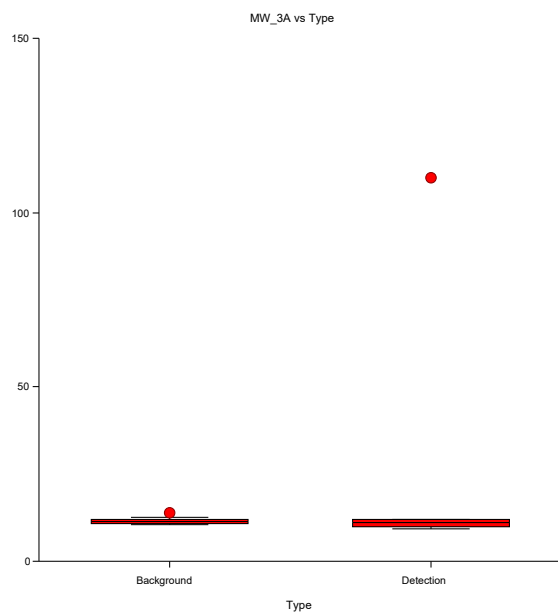
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.9430	0.00000	Yes
Kurtosis	4.3783	0.00001	Yes
Skewness and Kurtosis (Omnibus)	43.6029	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	2.0218	0.17215	No
Levene (Data - Means)	10.6173	0.00436	Yes
Conover (Ranks of Deviations)	14.7227	0.00012	Yes
Bartlett (Likelihood Ratio)	65.0150	0.00000	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Chloride.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	796.757	796.757	1.6892	0.21011	No	0.08210
Within (Error)	18	8490.385	471.688				
Adjusted Total	19	9287.142					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.7598	0.38339	No
Corrected for Ties	1	0.7633	0.38231	No
Number Sets of Ties	3			
Multiplicity Factor	36			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	147.50	11.35	0.8717	11.5
Detection	7	62.50	8.93	-0.8717	11

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

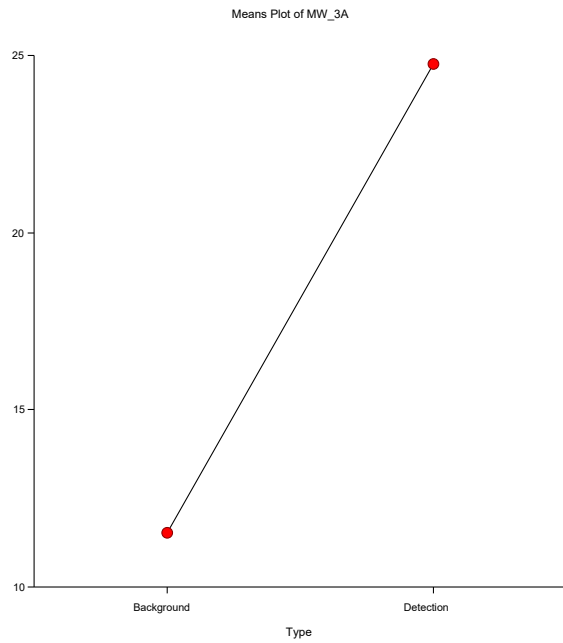
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.7958	0.37237	No
Van der Waerden - Normal Quantiles	1	0.8068	0.36907	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Chloride.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=471.688 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	11.53846	
Detection	7	24.77143	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Chloride.NCSS  
 Response MW\_5A

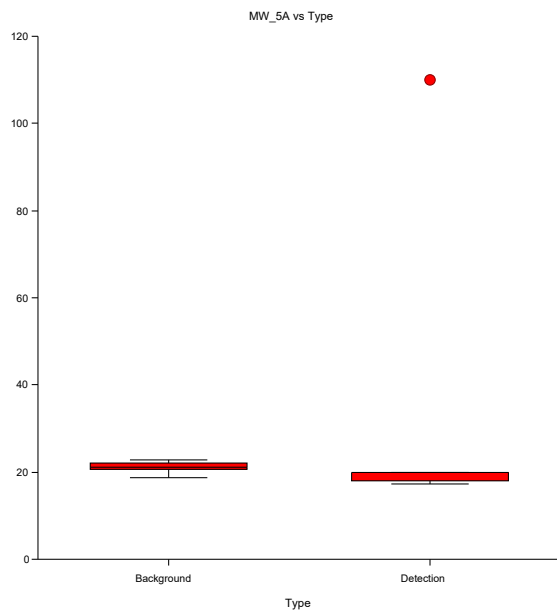
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.9376	0.00000	Yes
Kurtosis	4.3746	0.00001	Yes
Skewness and Kurtosis (Omnibus)	43.5171	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	1.9695	0.17752	No
Levene (Data - Means)	10.3914	0.00471	Yes
Conover (Ranks of Deviations)	14.7780	0.00012	Yes
Bartlett (Likelihood Ratio)	59.2493	0.00000	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Chloride.NCSS  
 Response MW\_5A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	544.4072	544.4072	1.3799	0.25542	No	0.06626
Within (Error)	18	7101.331	394.5184				
Adjusted Total	19	7645.738					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	4.0832	0.04331	No
Corrected for Ties	1	4.0955	0.04300	No
Number Sets of Ties	1			
Multiplicity Factor	24			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	162.00	12.46	2.0207	21.2
Detection	7	48.00	6.86	-2.0207	20

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

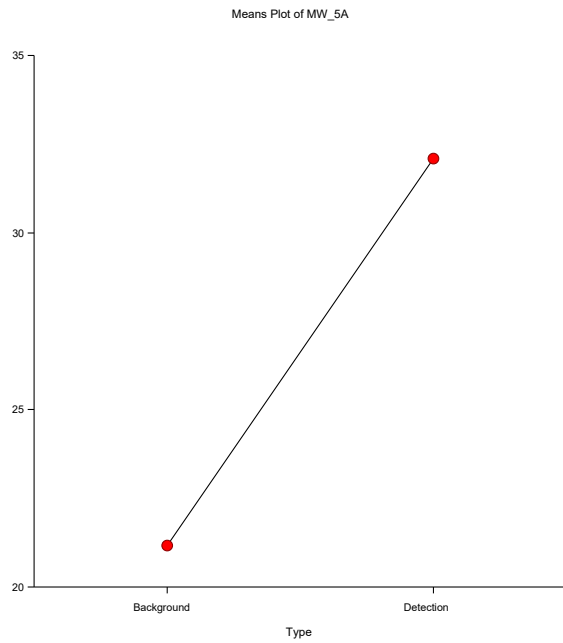
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	3.2095	0.07321	No
Van der Waerden - Normal Quantiles	1	3.3682	0.06647	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC1\Chloride.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=394.5184 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	21.16154	
Detection	7	32.1	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Chloride.NCSS  
 Response MW\_41AR

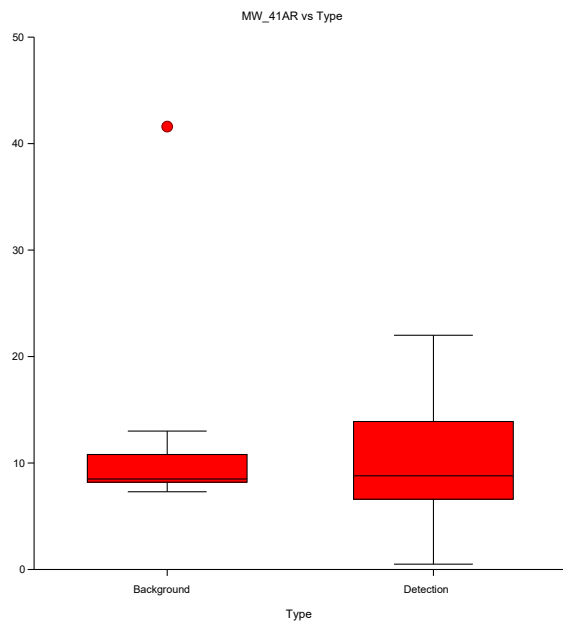
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.2661	0.00002	Yes
Kurtosis	3.7563	0.00017	Yes
Skewness and Kurtosis (Omnibus)	32.3091	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.0952	0.76127	No
Levene (Data - Means)	0.0007	0.97846	No
Conover (Ranks of Deviations)	0.2110	0.64597	No
Bartlett (Likelihood Ratio)	0.6823	0.40878	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Chloride.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	7.793852	7.793852	0.1098	0.74416	No	0.01350
Within (Error)	18	1277.292	70.96065				
Adjusted Total	19	1285.085					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.0016	0.96839	No
Corrected for Ties	1	0.0016	0.96832	No
Number Sets of Ties	3			
Multiplicity Factor	36			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	137.00	10.54	0.0396	8.5
Detection	7	73.00	10.43	-0.0396	8.8

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

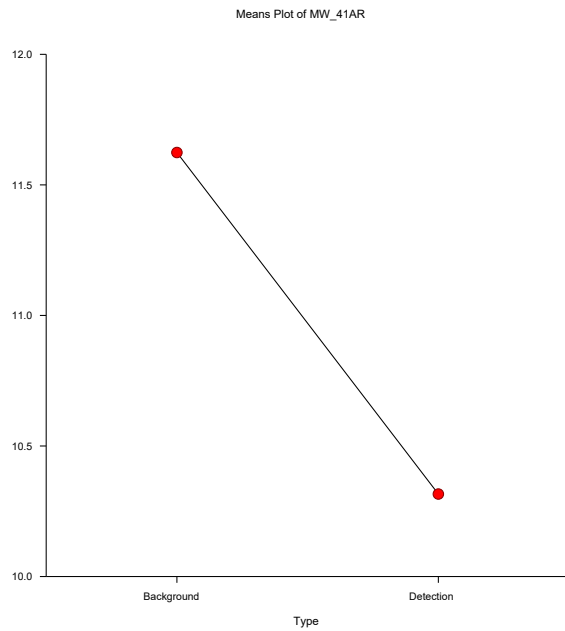
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.0693	0.79229	No
Van der Waerden - Normal Quantiles	1	0.0474	0.82762	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\Chloride.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=70.96065 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	11.62308	
Detection	7	10.31429	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_3A

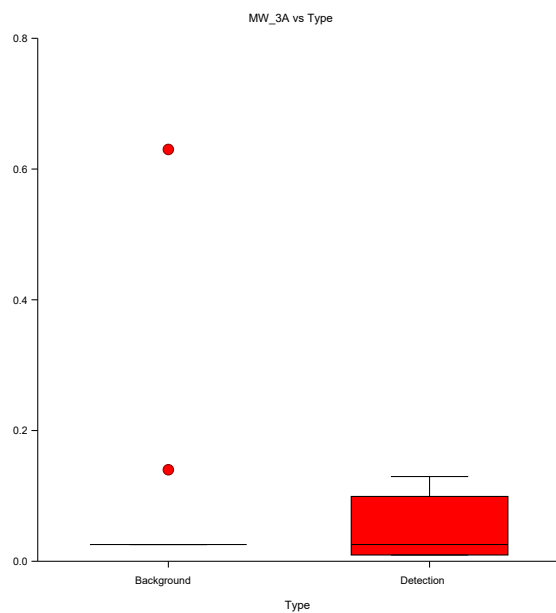
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.9848	0.00000	Yes
Kurtosis	4.3620	0.00001	Yes
Skewness and Kurtosis (Omnibus)	43.8750	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.0598	0.80951	No
Levene (Data - Means)	0.9199	0.35020	No
Conover (Ranks of Deviations)	4.5231	0.03344	Yes
Bartlett (Likelihood Ratio)	7.5518	0.00600	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.003777409	0.003777409	0.1919	0.66657	No	0.01624
Within (Error)	18	0.3543568	0.01968649				
Adjusted Total	19	0.3581342					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.3077	0.57910	No
Corrected for Ties	1	0.3935	0.53047	No
Number Sets of Ties	2			
Multiplicity Factor	1740			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	143.50	11.04	0.5547	0.025
Detection	7	66.50	9.50	-0.5547	0.025

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

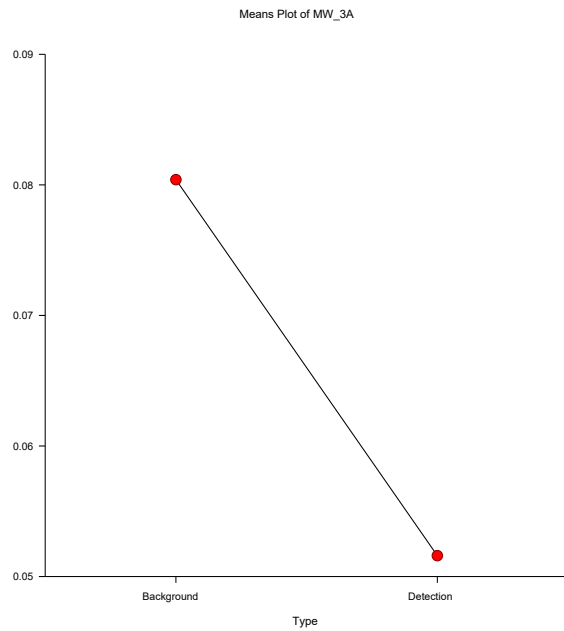
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.8586	0.35414	No
Van der Waerden - Normal Quantiles	1	0.7685	0.38069	No

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.01968649 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	0.08038461	
Detection	7	0.05157143	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_5A

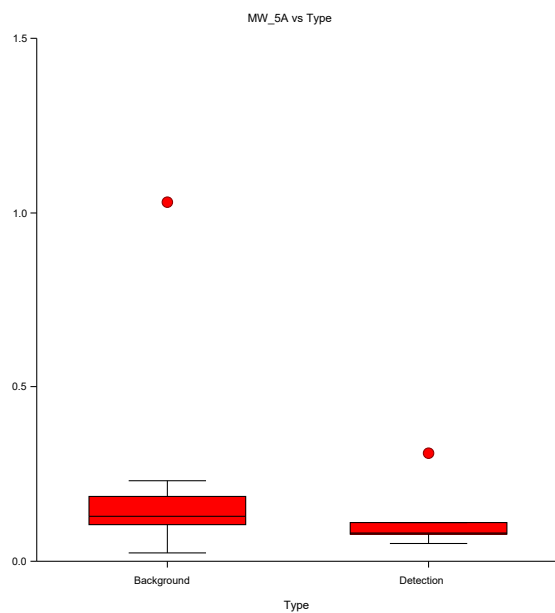
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.9148	0.00000	Yes
Kurtosis	4.3080	0.00002	Yes
Skewness and Kurtosis (Omnibus)	42.7139	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.3381	0.56814	No
Levene (Data - Means)	0.8770	0.36142	No
Conover (Ranks of Deviations)	2.6385	0.10430	No
Bartlett (Likelihood Ratio)	6.0962	0.01355	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_5A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.03295029	0.03295029	0.7210	0.40697	No	0.03622
Within (Error)	18	0.8226165	0.04570092				
Adjusted Total	19	0.8555668					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	3.6170	0.05719	No
Corrected for Ties	1	3.6610	0.05570	No
Number Sets of Ties	4			
Multiplicity Factor	96			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	160.50	12.35	1.9018	0.13
Detection	7	49.50	7.07	-1.9018	0.08

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

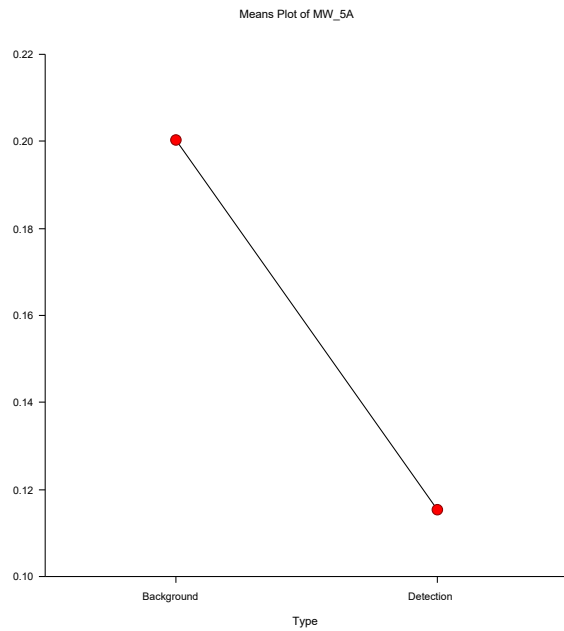
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	2.7106	0.09968	No
Van der Waerden - Normal Quantiles	1	2.8760	0.08991	No

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.04570092 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	0.2003846	
Detection	7	0.1152857	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_41AR

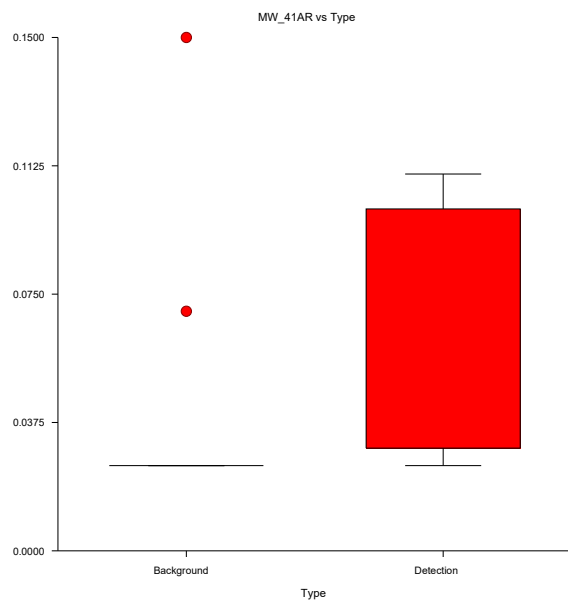
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	3.2662	0.00109	Yes
Kurtosis	2.5366	0.01119	Yes
Skewness and Kurtosis (Omnibus)	17.1025	0.00019	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	1.0875	0.31082	No
Levene (Data - Means)	1.4509	0.24399	No
Conover (Ranks of Deviations)	7.2825	0.00696	Yes
Bartlett (Likelihood Ratio)	0.0444	0.83318	No

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_41AR

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.002074313	0.002074313	1.5296	0.23207	No	0.07380
Within (Error)	18	0.02441064	0.001356147				
Adjusted Total	19	0.02648495					
Total	20						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	5.2810	0.02156	No
Corrected for Ties	1	6.7536	0.00936	Yes
Number Sets of Ties	2			
Multiplicity Factor	1740			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	107.50	8.27	-2.2980	0.025
Detection	7	102.50	14.64	2.2980	0.03

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

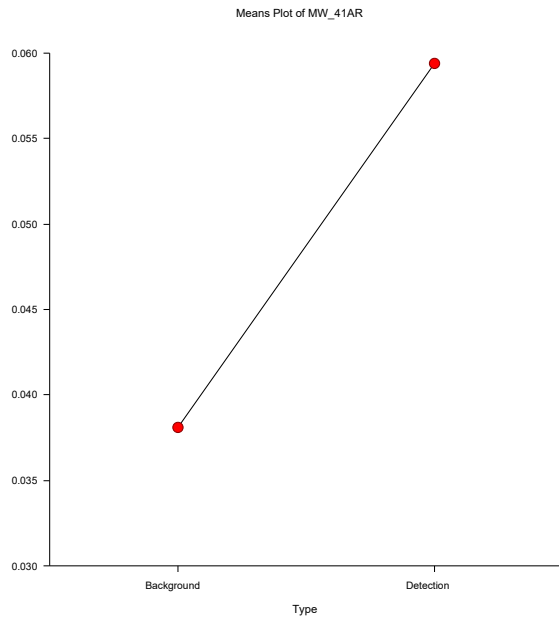
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	5.4995	0.01902	No
Van der Waerden - Normal Quantiles	1	5.7461	0.01653	No

### One-Way Analysis of Variance Report

Dataset C:\...\Documents\NCSS 11\Data\SECI\Fluoride\_ND.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.001356147 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	0.03807692	
Detection	7	0.05942857	

#### Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_3A

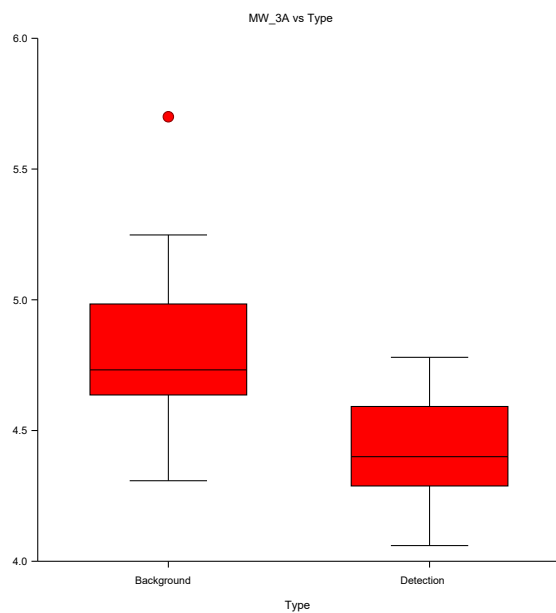
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	2.0649	0.03893	Yes
Kurtosis	1.8218	0.06849	No
Skewness and Kurtosis (Omnibus)	7.5828	0.02256	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.3532	0.55972	No
Levene (Data - Means)	0.6680	0.42444	No
Conover (Ranks of Deviations)	0.8163	0.36626	No
Bartlett (Likelihood Ratio)	1.2668	0.26036	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.71724	0.71724	6.9045	0.01708	No	0.42528
Within (Error)	18	1.869855	0.1038808				
Adjusted Total	19	2.587095					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	6.2308	0.01255	No
Corrected for Ties	1	6.2308	0.01255	No
Number Sets of Ties	0			
Multiplicity Factor	0			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	168.00	12.92	2.4962	4.73
Detection	7	42.00	6.00	-2.4962	4.4

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

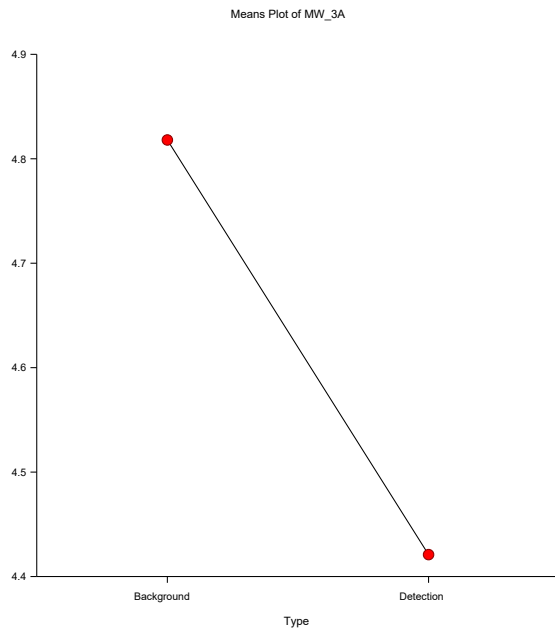
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	6.1787	0.01293	No
Van der Waerden - Normal Quantiles	1	6.2007	0.01277	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.1038808 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	4.818461	Detection
Detection	7	4.421429	Background

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_5A

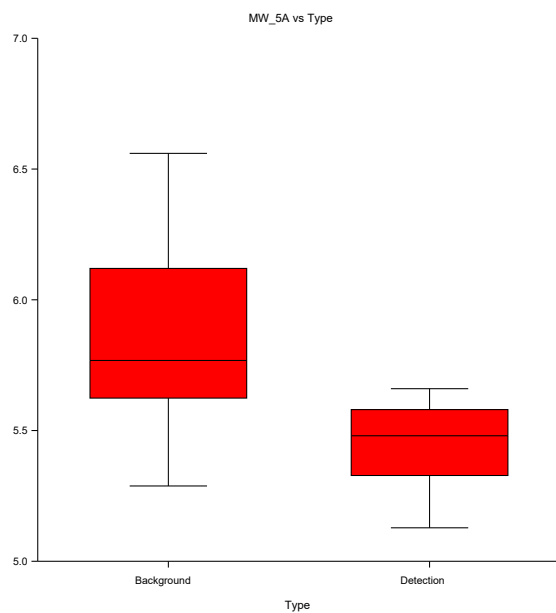
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	1.1879	0.23486	No
Kurtosis	0.7734	0.43928	No
Skewness and Kurtosis (Omnibus)	2.0093	0.36617	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	2.2327	0.15244	No
Levene (Data - Means)	3.7545	0.06852	No
Conover (Ranks of Deviations)	2.8243	0.09285	No
Bartlett (Likelihood Ratio)	3.3578	0.06689	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_5A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.8182352	0.8182352	7.9672	0.01128	No	0.49510
Within (Error)	18	1.84862	0.1027011				
Adjusted Total	19	2.666855					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	8.1381	0.00433	Yes
Corrected for Ties	1	8.1443	0.00432	Yes
Number Sets of Ties	1			
Multiplicity Factor	6			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	172.50	13.27	2.8527	5.77
Detection	7	37.50	5.36	-2.8527	5.48

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

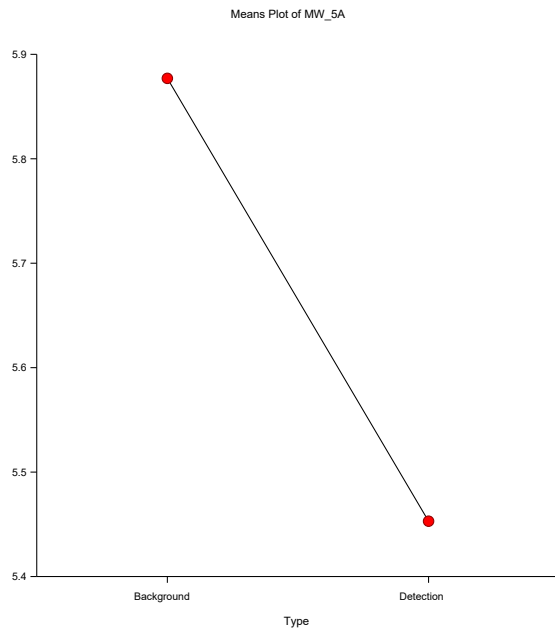
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	7.3267	0.00679	Yes
Van der Waerden - Normal Quantiles	1	7.4617	0.00630	Yes

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.1027011 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	5.876923	Detection
Detection	7	5.452857	Background

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_41AR

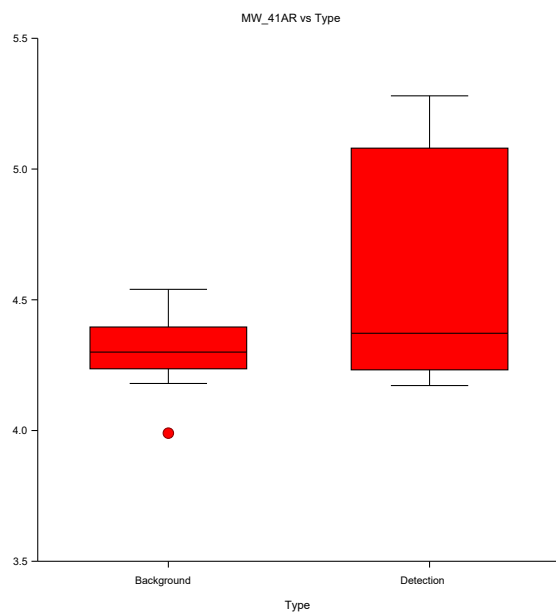
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	2.2074	0.02729	Yes
Kurtosis	1.7265	0.08426	No
Skewness and Kurtosis (Omnibus)	7.8532	0.01971	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	3.9186	0.06326	No
Levene (Data - Means)	15.0678	0.00109	Yes
Conover (Ranks of Deviations)	9.3559	0.00222	Yes
Bartlett (Likelihood Ratio)	11.1067	0.00086	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	0.30758	0.30758	4.0655	0.05894	No	0.22921
Within (Error)	18	1.3618	0.07565556				
Adjusted Total	19	1.66938					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	1.0612	0.30294	No
Corrected for Ties	1	1.0620	0.30275	No
Number Sets of Ties	1			
Multiplicity Factor	6			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	123.50	9.50	-1.0302	4.3
Detection	7	86.50	12.36	1.0302	4.37

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

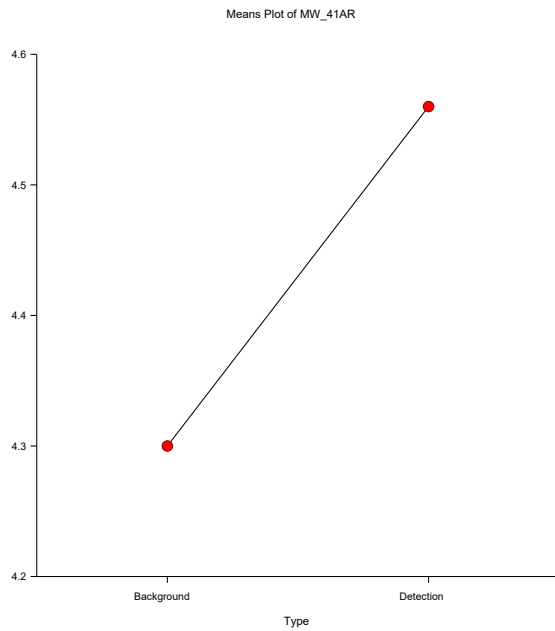
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	1.2859	0.25680	No
Van der Waerden - Normal Quantiles	1	1.2364	0.26617	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\pH.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.07565556 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	4.3	
Detection	7	4.56	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_3A

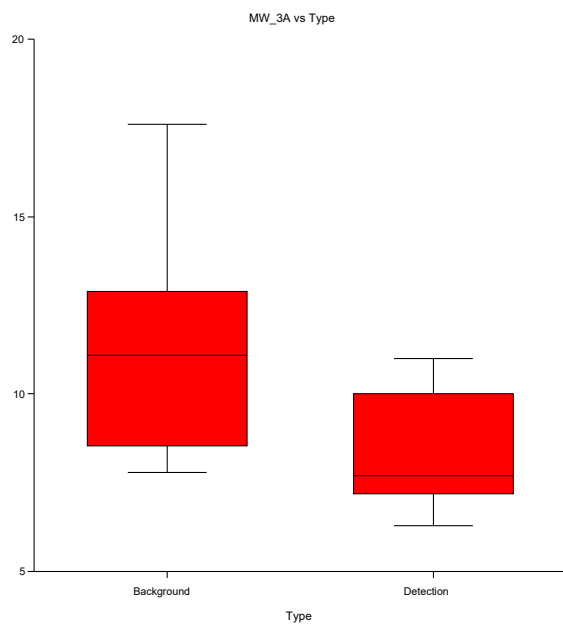
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	1.8319	0.06697	No
Kurtosis	1.2735	0.20285	No
Skewness and Kurtosis (Omnibus)	4.9775	0.08301	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	2.4393	0.13574	No
Levene (Data - Means)	2.3255	0.14465	No
Conover (Ranks of Deviations)	2.4096	0.12060	No
Bartlett (Likelihood Ratio)	1.8433	0.17457	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	34.03913	34.03913	5.4286	0.03165	No	0.32363
Within (Error)	18	112.8664	6.270354				
Adjusted Total	19	146.9055					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	6.2308	0.01255	No
Corrected for Ties	1	6.2308	0.01255	No
Number Sets of Ties	0			
Multiplicity Factor	0			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	168.00	12.92	2.4962	11.1
Detection	7	42.00	6.00	-2.4962	7.7

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

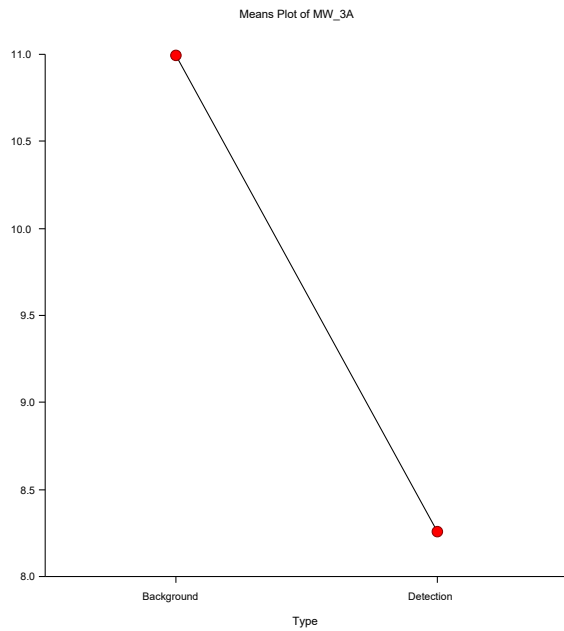
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	6.5689	0.01038	No
Van der Waerden - Normal Quantiles	1	6.5596	0.01043	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=6.270354 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	10.99231	Detection
Detection	7	8.257143	Background

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_5A

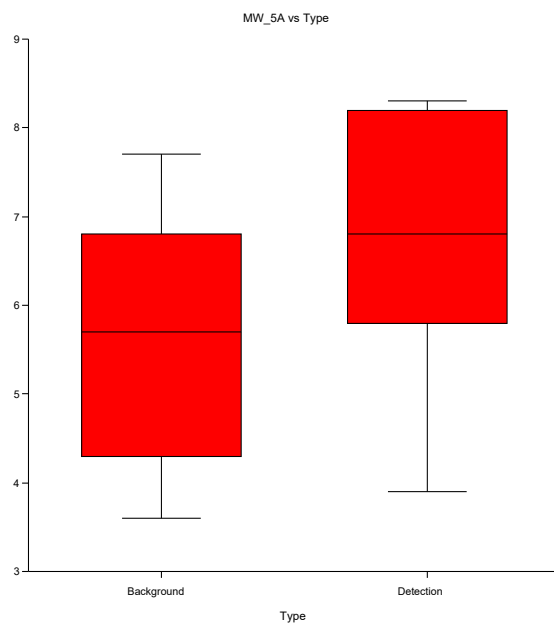
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	-0.9095	0.36310	No
Kurtosis	-0.6821	0.49516	No
Skewness and Kurtosis (Omnibus)	1.2925	0.52402	No

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.0003	0.98588	No
Levene (Data - Means)	0.0008	0.97742	No
Conover (Ranks of Deviations)	0.0532	0.81762	No
Bartlett (Likelihood Ratio)	0.1516	0.69697	No

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_5A

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	4.58005	4.58005	2.3793	0.14035	No	0.12080
Within (Error)	18	34.64945	1.924969				
Adjusted Total	19	39.2295					
Total	20						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	2.3878	0.12229	No
Corrected for Ties	1	2.4077	0.12074	No
Number Sets of Ties	2			
Multiplicity Factor	66			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	117.00	9.00	-1.5452	5.7
Detection	7	93.00	13.29	1.5452	6.8

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

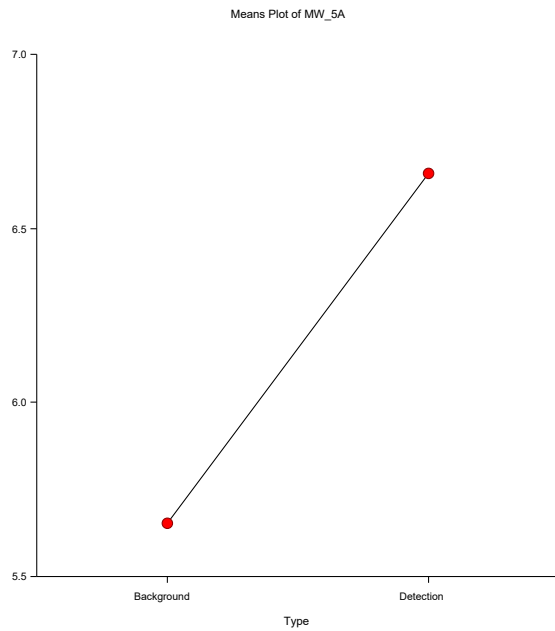
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	2.6350	0.10453	No
Van der Waerden - Normal Quantiles	1	2.5917	0.10743	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=1.924969 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	5.653846	
Detection	7	6.657143	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_41AR

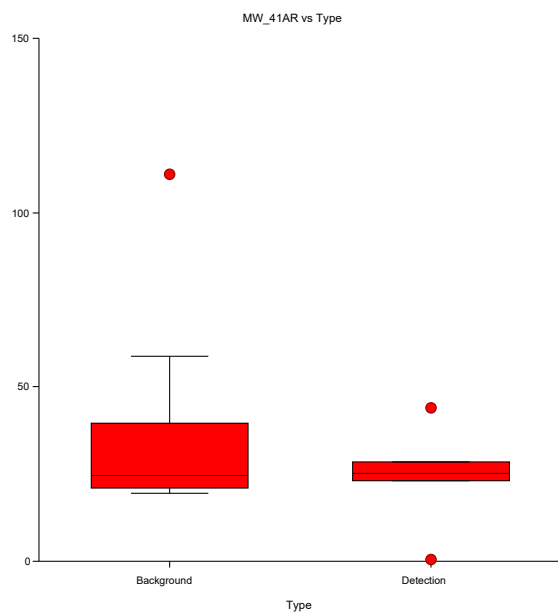
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	3.9176	0.00009	Yes
Kurtosis	3.4888	0.00049	Yes
Skewness and Kurtosis (Omnibus)	27.5194	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.3791	0.54579	No
Levene (Data - Means)	1.4842	0.23885	No
Conover (Ranks of Deviations)	0.9982	0.31775	No
Bartlett (Likelihood Ratio)	2.9303	0.08693	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	451.3075	451.3075	0.9186	0.35054	No	0.04466
Within (Error)	18	8843.522	491.3068				
Adjusted Total	19	9294.829					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.0565	0.81209	No
Corrected for Ties	1	0.0566	0.81195	No
Number Sets of Ties	2			
Multiplicity Factor	12			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	133.50	10.27	-0.2377	24.7
Detection	7	76.50	10.93	0.2377	25.3

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

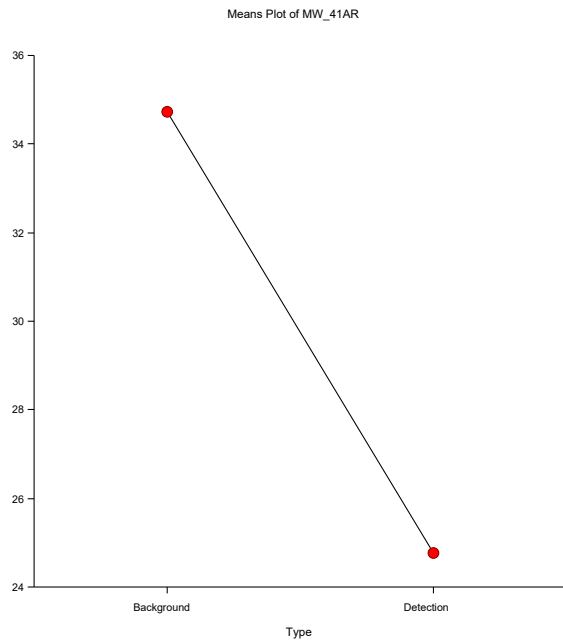
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.0013	0.97076	No
Van der Waerden - Normal Quantiles	1	0.0003	0.98625	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SECI\Sulfate.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=491.3068 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	34.73077	
Detection	7	24.77143	

#### Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_3A

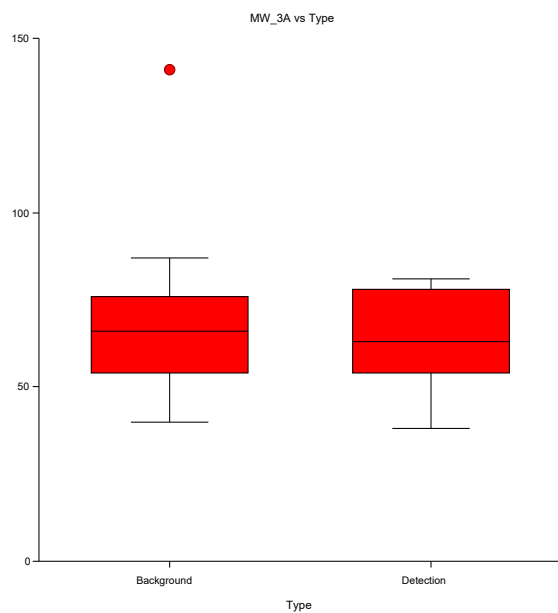
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	3.2311	0.00123	Yes
Kurtosis	3.0769	0.00209	Yes
Skewness and Kurtosis (Omnibus)	19.9079	0.00005	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.3155	0.58123	No
Levene (Data - Means)	0.4133	0.52840	No
Conover (Ranks of Deviations)	0.1533	0.69545	No
Bartlett (Likelihood Ratio)	1.7823	0.18186	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_3A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	303.3236	303.3236	0.6388	0.43458	No	0.03285
Within (Error)	18	8547.626	474.8681				
Adjusted Total	19	8850.95					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.5667	0.45157	No
Corrected for Ties	1	0.5671	0.45140	No
Number Sets of Ties	1			
Multiplicity Factor	6			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	146.00	11.23	0.7528	66
Detection	7	64.00	9.14	-0.7528	63

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

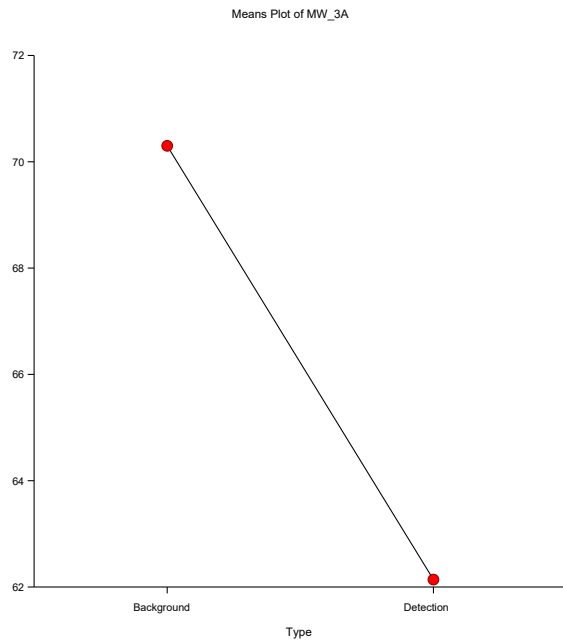
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.6724	0.41223	No
Van der Waerden - Normal Quantiles	1	0.6350	0.42553	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_3A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_3A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=474.8681 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	70.30769	
Detection	7	62.14286	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_5A

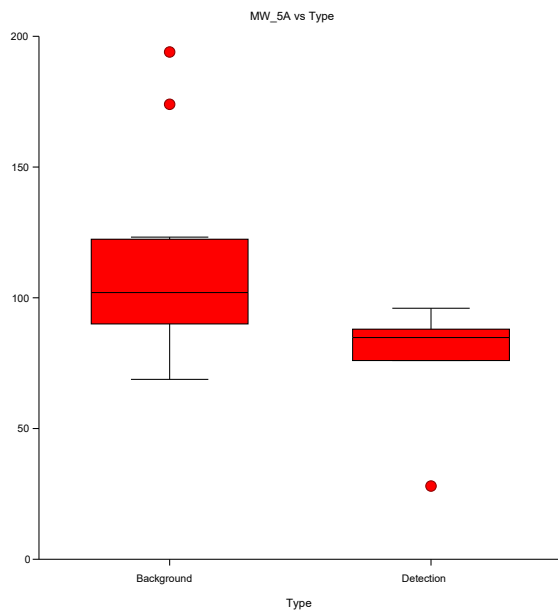
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	1.9574	0.05030	No
Kurtosis	1.6663	0.09565	No
Skewness and Kurtosis (Omnibus)	6.6080	0.03674	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	1.0537	0.31824	No
Levene (Data - Means)	1.4159	0.24954	No
Conover (Ranks of Deviations)	1.4410	0.22998	No
Bartlett (Likelihood Ratio)	1.3724	0.24141	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_5A

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	5608.805	5608.805	5.5226	0.03038	No	0.33019
Within (Error)	18	18280.95	1015.608				
Adjusted Total	19	23889.75					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	5.8414	0.01565	No
Corrected for Ties	1	5.8502	0.01557	No
Number Sets of Ties	2			
Multiplicity Factor	12			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	167.00	12.85	2.4169	102
Detection	7	43.00	6.14	-2.4169	85

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

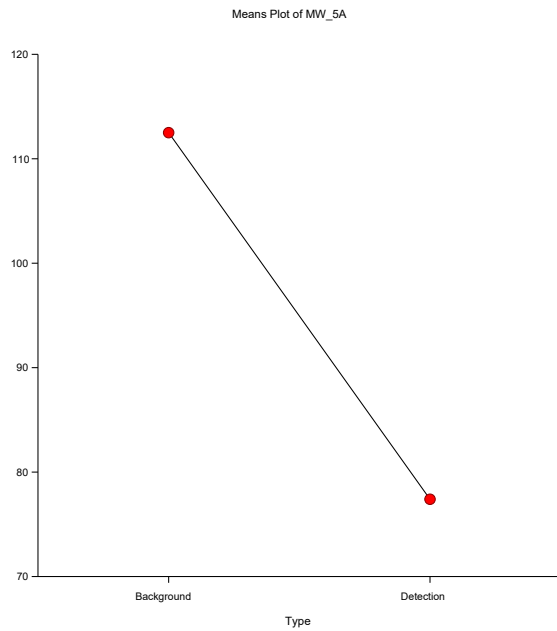
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	5.4579	0.01948	No
Van der Waerden - Normal Quantiles	1	5.5193	0.01881	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_5A

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_5A  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=1015.608 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	112.5385	Detection
Detection	7	77.42857	Background

#### Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_41AR

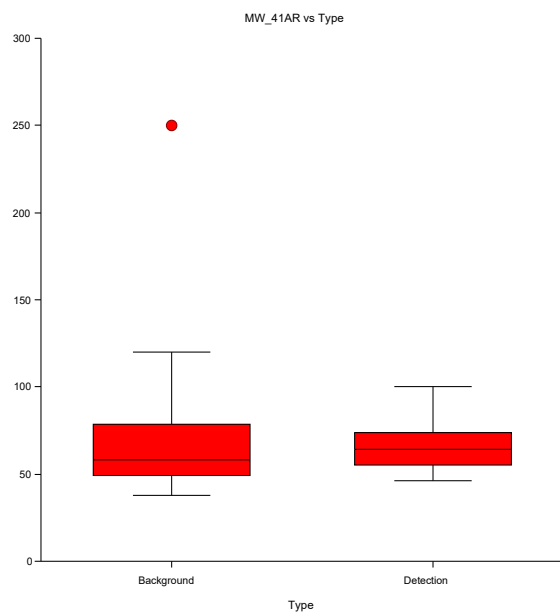
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.05$ )
Skewness	4.4715	0.00001	Yes
Kurtosis	3.9705	0.00007	Yes
Skewness and Kurtosis (Omnibus)	35.7592	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.05$ )
Brown-Forsythe (Data - Medians)	0.7877	0.38650	No
Levene (Data - Means)	1.6287	0.21810	No
Conover (Ranks of Deviations)	2.8692	0.09029	No
Bartlett (Likelihood Ratio)	7.2759	0.00699	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_41AR

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.01$ )	Power ( $\alpha=0.01$ )
Between (Type)	1	550.55	550.55	0.2530	0.62108	No	0.01834
Within (Error)	18	39172	2176.222				
Adjusted Total	19	39722.55					
Total	20						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.01$ )
Not Corrected for Ties	1	0.0251	0.87407	No
Corrected for Ties	1	0.0252	0.87398	No
Number Sets of Ties	2			
Multiplicity Factor	12			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Background	13	134.50	10.35	-0.1585	58
Detection	7	75.50	10.79	0.1585	64

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

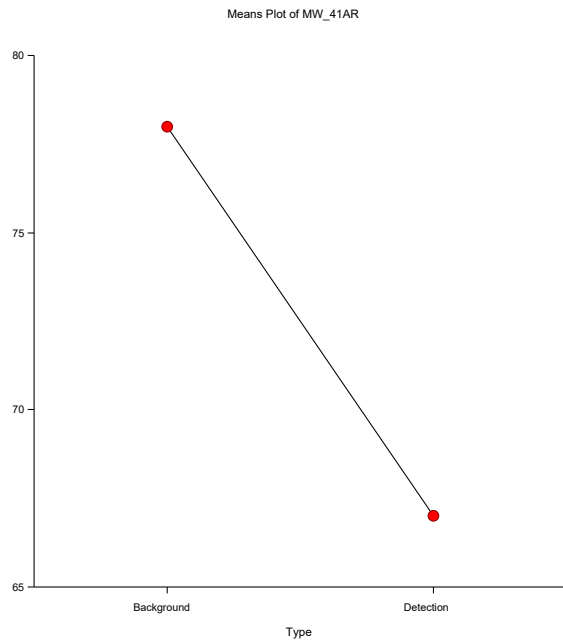
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Terry-Hoeffding - Expected Normal Scores	1	0.0149	0.90288	No
Van der Waerden - Normal Quantiles	1	0.0162	0.89886	No

### One-Way Analysis of Variance Report

Dataset C:\Users\sstafford\Documents\NCSS 11\Data\SEC\TDS.NCSS  
 Response MW\_41AR

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: MW\_41AR  
 Term A: Type

Alpha=0.050 Error Term=S(A) DF=18 MSE=2176.222 Critical Value=2.9792

Group	Count	Mean	Different From Groups
Background	13	78	
Detection	7	67	

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

**ATTACHMENT 2**

## **Statistical Worksheets**

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Boron

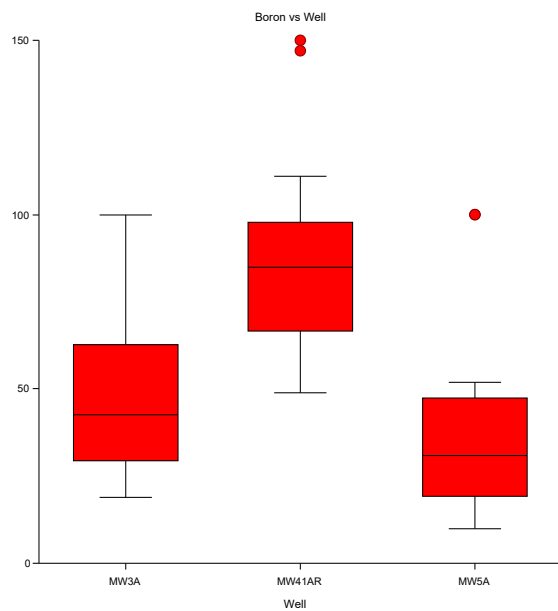
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	3.4269	0.00061	Yes
Kurtosis	1.6129	0.10677	Yes
Skewness and Kurtosis (Omnibus)	14.3447	0.00077	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	0.1550	0.85674	No
Levene (Data - Means)	0.0724	0.93020	No
Conover (Ranks of Deviations)	0.4883	0.78337	No
Bartlett (Likelihood Ratio)	0.3175	0.85319	No

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
Response Boron

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	28035.03	14017.52	22.0369	0.00000	Yes	0.99998
Within (Error)	57	36257.3	636.093				
Adjusted Total	59	64292.33					
Total	60						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	25.7302	0.00000	Yes
Corrected for Ties	2	25.7582	0.00000	Yes
Number Sets of Ties	11			
Multiplicity Factor	234			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	540.00	27.00	-1.0977	42.5
MW41AR	20	918.50	45.93	4.8377	85
MW5A	20	371.50	18.58	-3.7400	31

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

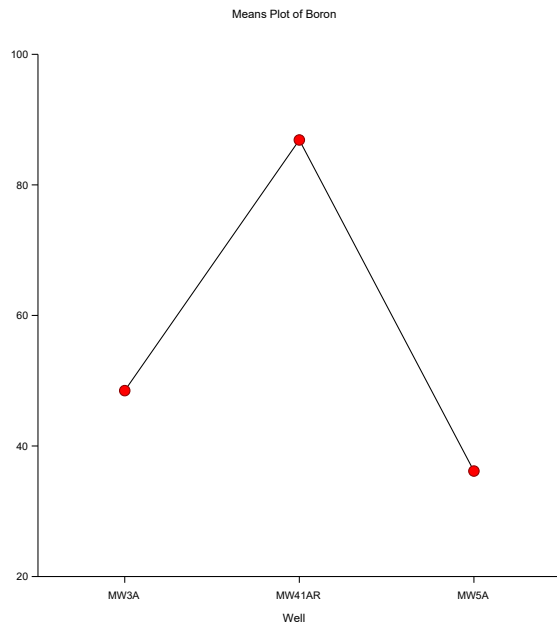
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	23.5436	0.00001	Yes
Van der Waerden - Normal Quantiles	2	23.7423	0.00001	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Boron

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: Boron  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=636.093 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	48.45	MW41AR
MW41AR	20	86.9	MW3A, MW5A
MW5A	20	36.15	MW41AR

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response Calcium

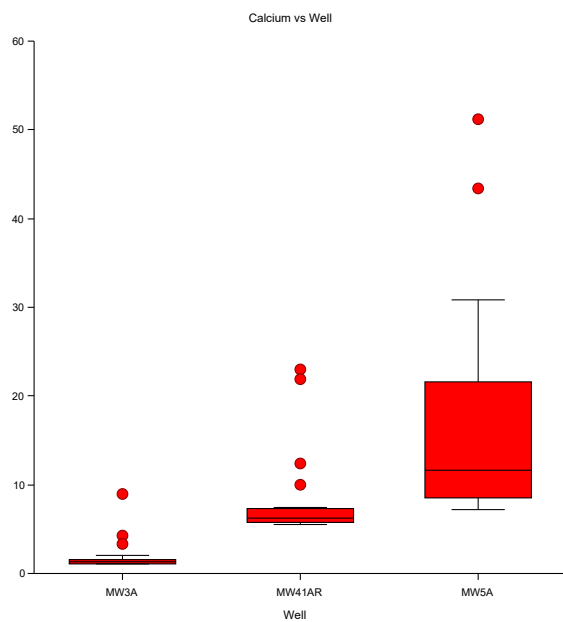
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	5.5390	0.00000	Yes
Kurtosis	4.4042	0.00001	Yes
Skewness and Kurtosis (Omnibus)	50.0774	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	6.3450	0.00325	Yes
Levene (Data - Means)	12.9750	0.00002	Yes
Conover (Ranks of Deviations)	34.3521	0.00000	Yes
Bartlett (Likelihood Ratio)	51.9520	0.00000	Yes

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response Calcium

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	2217.45	1108.725	18.4186	0.00000	Yes	0.99983
Within (Error)	57	3431.177	60.19609				
Adjusted Total	59	5648.627					
Total	60						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	42.4751	0.00000	Yes
Corrected for Ties	2	42.4810	0.00000	Yes
Number Sets of Ties	5			
Multiplicity Factor	30			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	233.00	11.65	-5.9118	1.31
MW41AR	20	647.00	32.35	0.5802	6.265
MW5A	20	950.00	47.50	5.3316	11.65

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

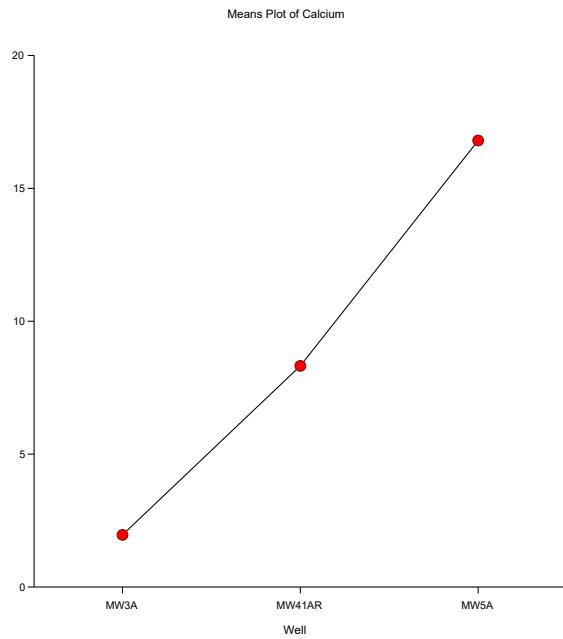
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	38.9146	0.00000	Yes
Van der Waerden - Normal Quantiles	2	39.3964	0.00000	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Calcium

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: Calcium  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=60.19609 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	1.9565	MW41AR, MW5A
MW41AR	20	8.3255	MW3A, MW5A
MW5A	20	16.798	MW3A, MW41AR

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response Chloride

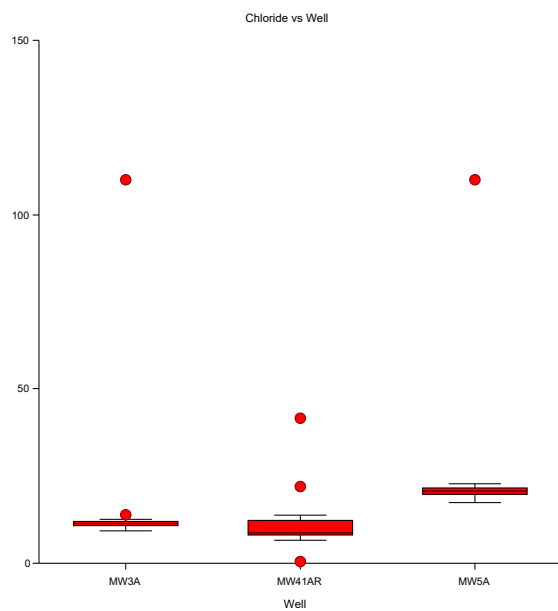
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	7.6130	0.00000	Yes
Kurtosis	5.7717	0.00000	Yes
Skewness and Kurtosis (Omnibus)	91.2707	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	0.0598	0.94203	No
Levene (Data - Means)	0.4610	0.63301	No
Conover (Ranks of Deviations)	8.4275	0.01479	Yes
Bartlett (Likelihood Ratio)	16.6680	0.00024	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
Response Chloride

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	1959.82	979.9102	3.0659	0.05437	No	0.56995
Within (Error)	57	18217.96	319.6134				
Adjusted Total	59	20177.79					
Total	60						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	31.6257	0.00000	Yes
Corrected for Ties	2	31.6424	0.00000	Yes
Number Sets of Ties	10			
Multiplicity Factor	114			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	520.50	26.03	-1.4035	11.4
MW41AR	20	354.00	17.70	-4.0144	8.65
MW5A	20	955.50	47.78	5.4179	20.75

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

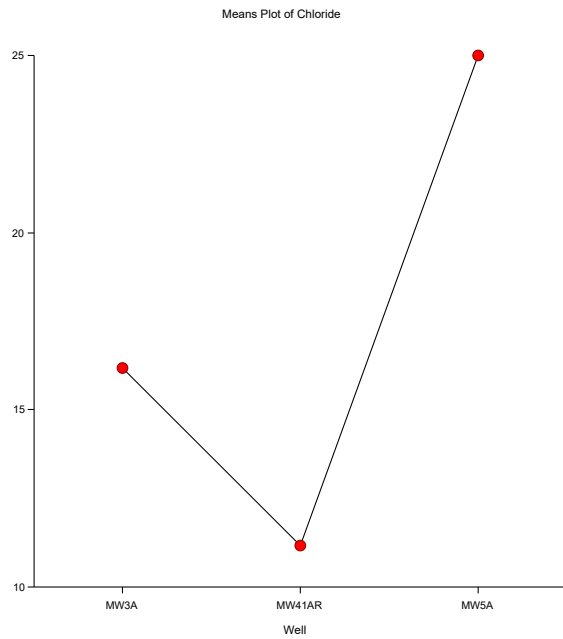
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	27.1224	0.00000	Yes
Van der Waerden - Normal Quantiles	2	27.6216	0.00000	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Chloride

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: Chloride  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=319.6134 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	16.17	
MW41AR	20	11.165	MW5A
MW5A	20	24.99	MW41AR

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Fluoride

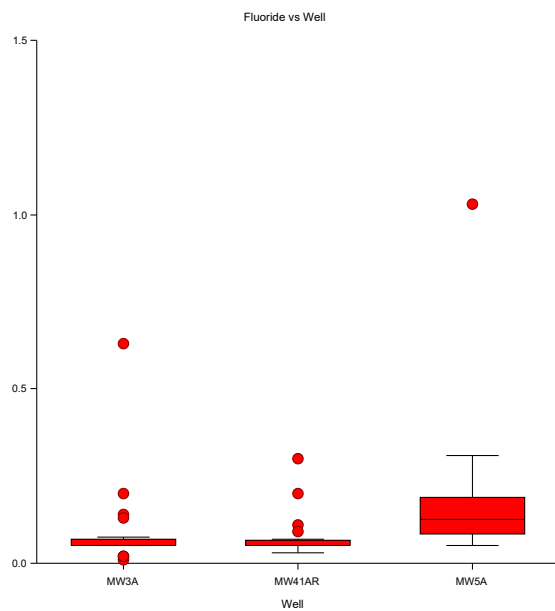
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	7.3444	0.00000	Yes
Kurtosis	5.7373	0.00000	Yes
Skewness and Kurtosis (Omnibus)	86.8574	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	0.9244	0.40265	No
Levene (Data - Means)	1.5174	0.22800	No
Conover (Ranks of Deviations)	15.1011	0.00053	Yes
Bartlett (Likelihood Ratio)	21.6605	0.00002	Yes

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response Fluoride

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	0.122842	0.06142102	2.7597	0.07178	No	0.52338
Within (Error)	57	1.268628	0.02225663				
Adjusted Total	59	1.39147					
Total	60						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	17.2784	0.00018	Yes
Corrected for Ties	2	18.8268	0.00008	Yes
Number Sets of Ties	8			
Multiplicity Factor	17760			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	483.00	24.15	-1.9915	0.05
MW41AR	20	472.00	23.60	-2.1640	0.05
MW5A	20	875.00	43.75	4.1555	0.125

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

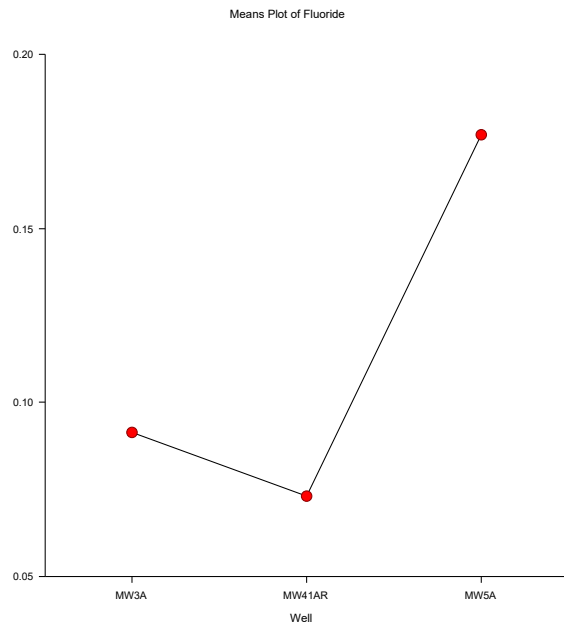
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	16.1384	0.00031	Yes
Van der Waerden - Normal Quantiles	2	16.3850	0.00028	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Fluoride

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: Fluoride  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=0.02225663 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	0.0913	
MW41AR	20	0.07305	
MW5A	20	0.17685	

Notes:  
 This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response pH

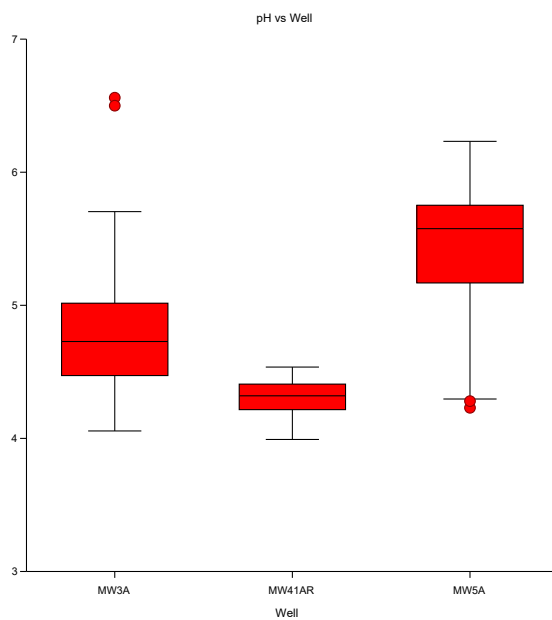
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	1.5327	0.12536	Yes
Kurtosis	2.3723	0.01768	Yes
Skewness and Kurtosis (Omnibus)	7.9768	0.01853	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	2.6081	0.08348	Yes
Levene (Data - Means)	5.1354	0.00929	Yes
Conover (Ranks of Deviations)	13.6410	0.00109	Yes
Bartlett (Likelihood Ratio)	24.8141	0.00000	Yes

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response pH

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	9.833065	4.916533	15.9573	0.00000	Yes	0.99923
Within (Error)	51	15.71342	0.3081062				
Adjusted Total	53	25.54648					
Total	54						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	21.0959	0.00003	Yes
Corrected for Ties	2	21.0999	0.00003	Yes
Number Sets of Ties	5			
Multiplicity Factor	30			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	574.50	28.73	0.4389	4.725
MW41AR	14	168.50	12.04	-4.2734	4.32
MW5A	20	742.00	37.10	3.4392	5.58

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

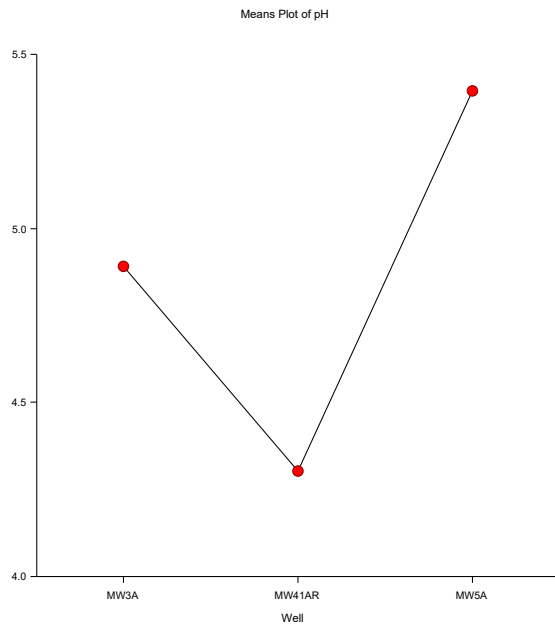
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	18.5074	0.00010	Yes
Van der Waerden - Normal Quantiles	2	18.8213	0.00008	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response pH

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: pH  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=51 MSE=0.3081062 Critical Value=3.4213

Group	Count	Mean	Different From Groups
MW3A	20	4.8925	MW41AR, MW5A
MW41AR	14	4.304286	MW3A, MW5A
MW5A	20	5.395	MW3A, MW41AR

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Sulfate

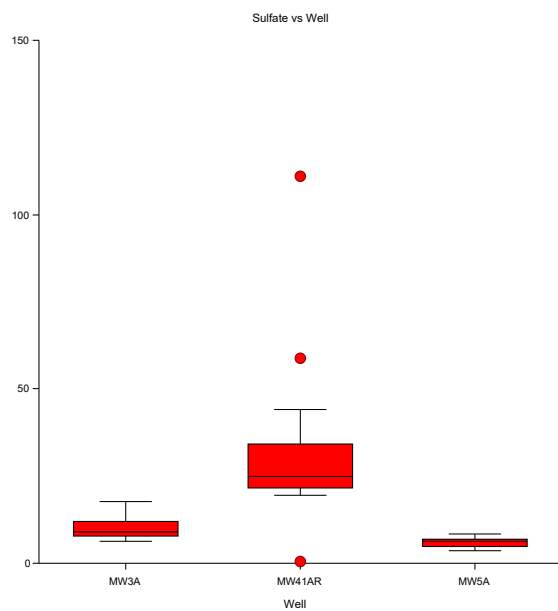
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	7.2701	0.00000	Yes
Kurtosis	6.0091	0.00000	Yes
Skewness and Kurtosis (Omnibus)	88.9640	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	4.7996	0.01185	Yes
Levene (Data - Means)	9.6744	0.00024	Yes
Conover (Ranks of Deviations)	43.4580	0.00000	Yes
Bartlett (Likelihood Ratio)	118.4280	0.00000	Yes

#### Box Plot Section



### One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
Response Sulfate

#### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	7354.417	3677.209	22.1075	0.00000	Yes	0.99998
Within (Error)	57	9480.965	166.3327				
Adjusted Total	59	16835.38					
Total	60						

#### Kruskal-Wallis One-Way ANOVA on Ranks

##### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

##### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	41.9673	0.00000	Yes
Corrected for Ties	2	41.9860	0.00000	Yes
Number Sets of Ties	7			
Multiplicity Factor	96			

##### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	605.50	30.28	-0.0706	9.15
MW41AR	20	970.00	48.50	5.6453	25
MW5A	20	254.50	12.73	-5.5747	6.3

#### Normal Scores Tests

##### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

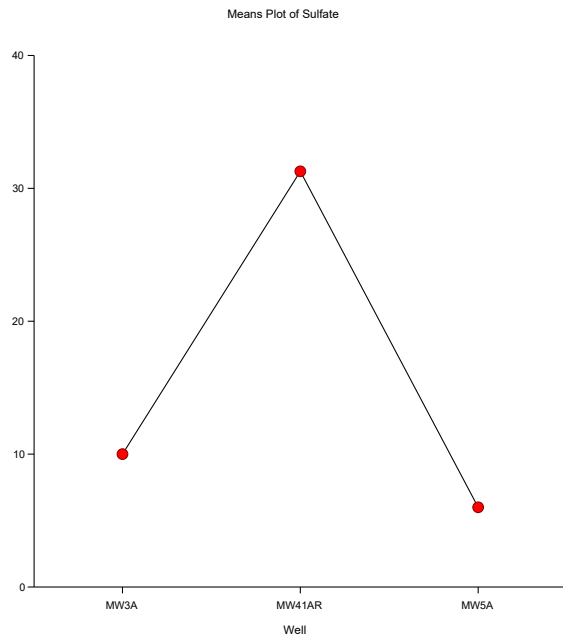
##### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	35.6102	0.00000	Yes
Van der Waerden - Normal Quantiles	2	36.5360	0.00000	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response Sulfate

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: Sulfate  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=166.3327 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	10.035	MW41AR
MW41AR	20	31.245	MW3A, MW5A
MW5A	20	6.005	MW41AR

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response TDS

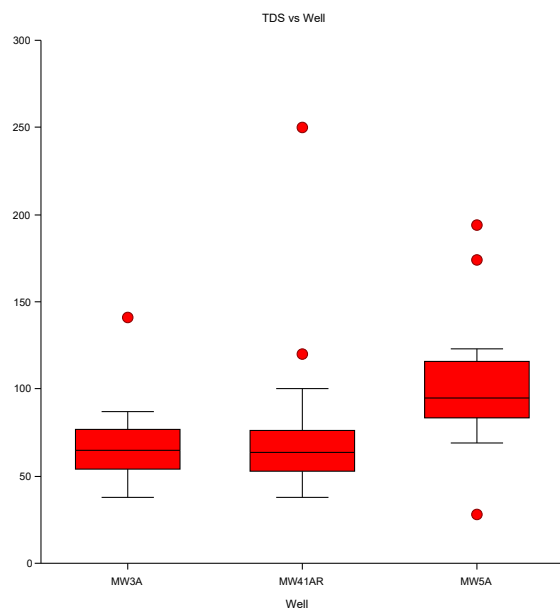
#### Tests of the Normality of Residuals Assumption

Normality Attributes	Test Value	Prob Level	Reject Normality? ( $\alpha=0.20$ )
Skewness	5.7665	0.00000	Yes
Kurtosis	4.7980	0.00000	Yes
Skewness and Kurtosis (Omnibus)	56.2734	0.00000	Yes

#### Tests of the Equality of Group Variances Assumption

Test Name	Test Value	Prob Level	Reject Equal Variances? ( $\alpha=0.20$ )
Brown-Forsythe (Data - Medians)	0.6134	0.54503	No
Levene (Data - Means)	1.0143	0.36909	No
Conover (Ranks of Deviations)	3.6700	0.15961	Yes
Bartlett (Likelihood Ratio)	9.6079	0.00820	Yes

#### Box Plot Section



## One-Way Analysis of Variance Report

Dataset C:\...\Stats\ApplIII\_Background\_Oct2020.NCSS  
 Response TDS

### Analysis of Variance Table and F-Test

Model Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Reject Equal Means? ( $\alpha=0.05$ )	Power ( $\alpha=0.05$ )
Between (Well)	2	12012.93	6006.467	4.7247	0.01263	Yes	0.76881
Within (Error)	57	72463.25	1271.285				
Adjusted Total	59	84476.18					
Total	60						

### Kruskal-Wallis One-Way ANOVA on Ranks

#### Hypotheses

H0: All medians are equal.

H1: At least two medians are different.

#### Test Results

Method	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.05$ )
Not Corrected for Ties	2	18.7348	0.00009	Yes
Corrected for Ties	2	18.7426	0.00009	Yes
Number Sets of Ties	12			
Multiplicity Factor	90			

#### Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
MW3A	20	469.00	23.45	-2.2111	64.5
MW41AR	20	475.00	23.75	-2.1170	63.5
MW5A	20	886.00	44.30	4.3280	94.5

### Normal Scores Tests

#### Hypotheses

H0: All group data distributions are the same.

H1: At least one group has observations that tend to be greater than those of the other groups.

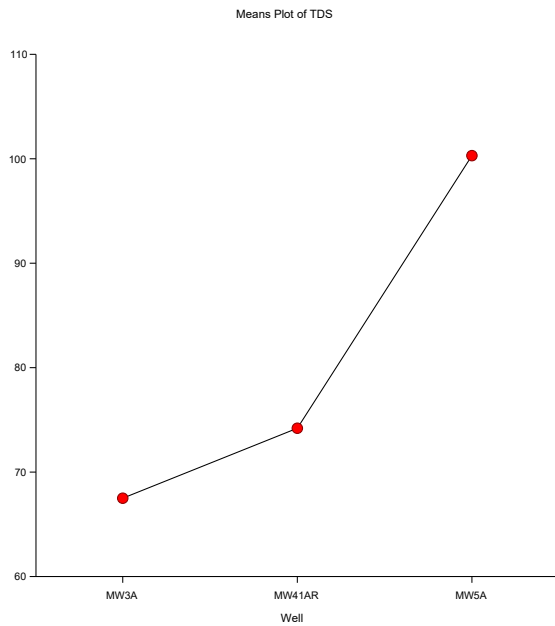
#### Results

Test	DF	Chi-Squared (H)	Prob Level	Reject H0? ( $\alpha=0.20$ )
Terry-Hoeffding - Expected Normal Scores	2	13.7828	0.00102	Yes
Van der Waerden - Normal Quantiles	2	14.4243	0.00074	Yes

### One-Way Analysis of Variance Report

Dataset C:\...\Stats\AppIII\_Background\_Oct2020.NCSS  
 Response TDS

#### Plots of Means Section



#### Tukey-Kramer Multiple-Comparison Test

Response: TDS  
 Term A: Well

Alpha=0.050 Error Term=S(A) DF=57 MSE=1271.285 Critical Value=3.4106

Group	Count	Mean	Different From Groups
MW3A	20	67.45	MW5A
MW41AR	20	74.15	
MW5A	20	100.25	MW3A

**Notes:**

This report provides multiple comparison tests for all pairwise differences between the means.

### Mann-Kendall Trend Test Analysis

Date/Time of Computation ProUCL 5.16/7/2021 10:03:19 AM  
From File Background AppIII.xls  
Confidence Coefficient 0.95  
Level of Significance 0.05

#### Boron-MW41AR

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##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	49
Maximum	150
Mean	86.9
Geometric Mean	83.27
Median	85
Standard Deviation	26.91
Coefficient of Variation	0.31

##### Mann-Kendall Test

M-K Test Value (S)	59
Tabulated p-value	0.032
Standard Deviation of S	30.81
Standardized Value of S	1.883
Approximate p-value	0.0299

Statistically significant evidence of an increasing trend at the specified level of significance.

#### Calcium-MW5A

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##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	7.2
Maximum	51.2
Mean	16.8
Geometric Mean	13.87
Median	11.65
Standard Deviation	12.29
Coefficient of Variation	0.732

##### Mann-Kendall Test

M-K Test Value (S)	-166
Tabulated p-value	0
Standard Deviation of S	30.82
Standardized Value of S	-5.353
Approximate p-value	4.3181E-8

Statistically significant evidence of a decreasing trend at the specified level of significance.

### Mann-Kendall Trend Test Analysis

Date/Time of Computation ProUCL 5.16/7/2021 10:03:19 AM  
From File Background AppIII.xls  
Confidence Coefficient 0.95  
Level of Significance 0.05

#### Chloride-MW5A

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##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	17.3
Maximum	110
Mean	24.99
Geometric Mean	22.26
Median	20.75
Standard Deviation	20.06
Coefficient of Variation	0.803

##### Mann-Kendall Test

M-K Test Value (S)	-43
Tabulated p-value	0.093
Standard Deviation of S	30.76
Standardized Value of S	-1.365
Approximate p-value	0.0861

**Insufficient evidence to identify a significant trend at the specified level of significance.**

#### Fluoride-MW5A

---

##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	0.05
Maximum	1.03
Mean	0.177
Geometric Mean	0.132
Median	0.125
Standard Deviation	0.211
Coefficient of Variation	1.192

##### Mann-Kendall Test

M-K Test Value (S)	-50
Tabulated p-value	0.056
Standard Deviation of S	30.62
Standardized Value of S	-1.6
Approximate p-value	0.0547

**Insufficient evidence to identify a significant trend at the specified level of significance.**

### Mann-Kendall Trend Test Analysis

Date/Time of Computation ProUCL 5.16/7/2021 10:03:19 AM  
From File Background AppIII.xls  
Confidence Coefficient 0.95  
Level of Significance 0.05

#### pH-MW41AR

---

##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	3.99
Maximum	5.28
Mean	4.391
Geometric Mean	4.382
Median	4.32
Standard Deviation	0.296
Coefficient of Variation	0.0675

##### Mann-Kendall Test

M-K Test Value (S)	55
Tabulated p-value	0.043
Standard Deviation of S	30.81
Standardized Value of S	1.753
Approximate p-value	0.0398

Statistically significant evidence of an increasing trend at the specified level of significance.

#### pH-MW5A

---

##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	5.13
Maximum	6.56
Mean	5.729
Geometric Mean	5.717
Median	5.665
Standard Deviation	0.375
Coefficient of Variation	0.0654

##### Mann-Kendall Test

M-K Test Value (S)	-131
Tabulated p-value	0
Standard Deviation of S	30.81
Standardized Value of S	-4.22
Approximate p-value	1.2216E-5

Statistically significant evidence of a decreasing trend at the specified level of significance.

### Mann-Kendall Trend Test Analysis

Date/Time of Computation ProUCL 5.16/7/2021 10:03:19 AM  
From File Background AppIII.xls  
Confidence Coefficient 0.95  
Level of Significance 0.05

#### Sulfate-MW41AR

---

##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	0.5
Maximum	111
Mean	31.25
Geometric Mean	23.85
Median	25
Standard Deviation	22.12
Coefficient of Variation	0.708

##### Mann-Kendall Test

M-K Test Value (S)	-14
Tabulated p-value	0.339
Standard Deviation of S	30.79
Standardized Value of S	-0.422
Approximate p-value	0.336

**Insufficient evidence to identify a significant trend at the specified level of significance.**

#### TDS-MW5A

---

##### General Statistics

Number of Events Reported (m)	20
Number of Missing Events	0
Number of Reported Events Used	20
Number Values Reported (n)	20
Minimum	28
Maximum	194
Mean	100.3
Geometric Mean	94.16
Median	94.5
Standard Deviation	35.46
Coefficient of Variation	0.354

##### Mann-Kendall Test

M-K Test Value (S)	-114
Tabulated p-value	0
Standard Deviation of S	30.79
Standardized Value of S	-3.67
Approximate p-value	1.2124E-4

**Statistically significant evidence of a decreasing trend at the specified level of significance.**

**Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit**

Date/Time of Computation ProUCL 5.16/1/2021 12:03:35 PM

From File Background ApplII.xls

**Dixon's Outlier Test for Boron-MW41AR**

---

Total N = 20

Number NDs = 1

Number Detects = 19

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 150 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.398

For 5% significance level, 150 is not an outlier.

**2. Data Value 49 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.048

For 5% significance level, 49 is not an outlier.

**Dixon's Outlier Test for Calcium-MW5A**

---

Total N = 20

Number NDs = 0

Number Detects = 20

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 51.2 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.469

For 5% significance level, 51.2 is an outlier.

**2. Data Value 7.2 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.022

For 5% significance level, 7.2 is not an outlier.

**Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit**

Date/Time of Computation ProUCL 5.16/1/2021 12:03:35 PM

From File Background ApplII.xls

**Dixon's Outlier Test for Chloride-MW5A**

---

Total N = 20

Number NDs = 0

Number Detects = 20

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 110 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.958

For 5% significance level, 110 is an outlier.

**2. Data Value 17.3 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.283

For 5% significance level, 17.3 is not an outlier.

**Dixon's Outlier Test for Fluoride-MW5A**

---

Total N = 20

Number NDs = 2

Number Detects = 18

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 1.03 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.839

For 5% significance level, 1.03 is an outlier.

**2. Data Value 0.025 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.254

For 5% significance level, 0.025 is not an outlier.

**Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit**

Date/Time of Computation ProUCL 5.16/1/2021 12:03:35 PM

From File Background ApplII.xls

**Dixon's Outlier Test for pH-MW41AR**

---

Total N = 20

Number NDs = 0

Number Detects = 20

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 5.28 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.673

For 5% significance level, 5.28 is an outlier.

**2. Data Value 3.99 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.345

For 5% significance level, 3.99 is not an outlier.

**Dixon's Outlier Test for pH-MW5A**

---

Total N = 20

Number NDs = 0

Number Detects = 20

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 6.56 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.268

For 5% significance level, 6.56 is not an outlier.

**2. Data Value 5.13 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.182

For 5% significance level, 5.13 is not an outlier.

**Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit**

Date/Time of Computation ProUCL 5.16/1/2021 12:03:35 PM

From File Background ApplII.xls

**Dixon's Outlier Test for Sulfate-MW41AR**

---

Total N = 20

Number NDs = 1

Number Detects = 19

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 111 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.732

For 5% significance level, 111 is an outlier.

**2. Data Value 0.25 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.440

For 5% significance level, 0.25 is not an outlier.

**Dixon's Outlier Test for TDS-MW5A**

---

Total N = 20

Number NDs = 0

Number Detects = 20

Number Data (n) = 20

10% critical value: 0.401

5% critical value: 0.45

1% critical value: 0.535

Note: NDs replaced by DL/2 in Outlier Test

**1. Data Value 194 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.602

For 5% significance level, 194 is an outlier.

**2. Data Value 28 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.505

For 5% significance level, 28 is an outlier.

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation      ProUCL 5.16/1/2021 12:13:42 PM  
 From File                              Background ApplIII.xls  
 Confidence Coefficient              0.95

**Boron-MW41AR**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	20	0	20	19	1	5.00%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	1	100	100	100	100	N/A
Statistics (Non-Detects Only)	19	49	150	86.21	84	27.47
Statistics (All: NDs treated as DL value)	20	49	150	86.9	85	26.91
Statistics (All: NDs treated as DL/2 value)	20	49	150	84.4	82.5	27.93
Statistics (Normal ROS Imputed Data)	20	49	150	85.91	82.5	26.77
Statistics (Lognormal ROS Imputed Data)	20	49	150	85.75	82.5	26.82
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	11.43	9.66	7.543	4.412	0.302	0.0686
Statistics (NDs = DL)	11.87	10.12	7.321	4.422	0.298	0.0673
Statistics (NDs = DL/2)	10.54	8.994	8.006	4.387	0.315	0.0718
Statistics (Lognormal ROS Estimates)	--	--	--	4.409	0.295	0.0669

**Normal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.951	0.956	0.951	0.948
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.903	0.901	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.913	0.905	Data Appear Normal	
Shapiro-Wilk (NDs = DL/2)	0.902	0.905	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.898	0.905	Data Not Normal	

**Lognormal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.985	0.986	0.984	0.984
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.967	0.901	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.969	0.905	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.96	0.905	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.966	0.905	Data Appear Lognormal	

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:13:42 PM  
From File Background AppIII.xls  
Confidence Coefficient 0.95

**Calcium-MW5A**

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**Raw Statistics**

Number of Valid Observations	20
Number of Distinct Observations	20
Minimum	7.2
Maximum	51.2
Mean of Raw Data	16.8
Standard Deviation of Raw Data	12.29
Khat	2.763
Theta hat	6.079
Kstar	2.382
Theta star	7.052
Mean of Log Transformed Data	2.63
Standard Deviation of Log Transformed Data	0.597

**Normal GOF Test Results**

Correlation Coefficient R	0.87
Shapiro Wilk Test Statistic	0.759
Shapiro Wilk Critical (0.05) Value	0.905
Approximate Shapiro Wilk P Value	1.0738E-4
Lilliefors Test Statistic	0.227
Lilliefors Critical (0.05) Value	0.192

**Data not Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.951
Shapiro Wilk Test Statistic	0.894
Shapiro Wilk Critical (0.05) Value	0.905
Approximate Shapiro Wilk P Value	0.0351
Lilliefors Test Statistic	0.147
Lilliefors Critical (0.05) Value	0.192

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:13:42 PM  
From File Background AppIII.xls  
Confidence Coefficient 0.95

**Chloride-MW5A**

---

**Raw Statistics**

Number of Valid Observations 20  
Number of Distinct Observations 18  
Minimum 17.3  
Maximum 110  
Mean of Raw Data 24.99  
Standard Deviation of Raw Data 20.06  
Khat 4.482  
Theta hat 5.576  
Kstar 3.843  
Theta star 6.503  
Mean of Log Transformed Data 3.103  
Standard Deviation of Log Transformed Data 0.383

**Normal GOF Test Results**

Correlation Coefficient R 0.518  
Shapiro Wilk Test Statistic 0.298  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 7.864E-11  
Lilliefors Test Statistic 0.495  
Lilliefors Critical (0.05) Value 0.192

**Data not Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.611  
Shapiro Wilk Test Statistic 0.407  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 1.2845E-9  
Lilliefors Test Statistic 0.43  
Lilliefors Critical (0.05) Value 0.192

**Data not Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation      ProUCL 5.16/1/2021 12:13:42 PM  
 From File                              Background AppIII.xls  
 Confidence Coefficient              0.95

**Fluoride-MW5A**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	20	0	20	18	2	10.00%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.05	0.2	0.125	0.125	0.106
Statistics (Non-Detects Only)	18	0.05	1.03	0.183	0.125	0.221
Statistics (All: NDs treated as DL value)	20	0.05	1.03	0.177	0.125	0.211
Statistics (All: NDs treated as DL/2 value)	20	0.025	1.03	0.171	0.115	0.212
Statistics (Normal ROS Imputed Data)	20	-0.182	1.03	0.161	0.118	0.224
Statistics (Lognormal ROS Imputed Data)	20	0.0315	1.03	0.171	0.115	0.212
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	1.844	1.574	0.099	-1.995	0.662	-0.332
Statistics (NDs = DL)	1.852	1.608	0.0955	-2.026	0.672	-0.332
Statistics (NDs = DL/2)	1.677	1.458	0.102	-2.095	0.734	-0.35
Statistics (Lognormal ROS Estimates)	--	--	--	-2.082	0.708	-0.34

**Normal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.676	0.683	0.679	0.737
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.488	0.897	Data Not Normal	
Shapiro-Wilk (NDs = DL)	0.497	0.905	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.493	0.905	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.584	0.905	Data Not Normal	

**Lognormal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.912	0.934	0.934	0.933
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.855	0.897	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.889	0.905	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.9	0.905	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.896	0.905	Data Not Lognormal	

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:13:42 PM  
From File Background AppIII.xls  
Confidence Coefficient 0.95

**pH-MW41AR**

---

**Raw Statistics**

Number of Valid Observations 20  
Number of Distinct Observations 19  
Minimum 3.99  
Maximum 5.28  
Mean of Raw Data 4.391  
Standard Deviation of Raw Data 0.296  
Khat 249.3  
Theta hat 0.0176  
Kstar 211.9  
Theta star 0.0207  
Mean of Log Transformed Data 1.478  
Standard Deviation of Log Transformed Data 0.0638

**Normal GOF Test Results**

Correlation Coefficient R 0.854  
Shapiro Wilk Test Statistic 0.748  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 6.4084E-5  
Lilliefors Test Statistic 0.261  
Lilliefors Critical (0.05) Value 0.192

**Data not Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.872  
Shapiro Wilk Test Statistic 0.779  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 2.0799E-4  
Lilliefors Test Statistic 0.246  
Lilliefors Critical (0.05) Value 0.192

**Data not Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:13:42 PM  
From File Background AppIII.xls  
Confidence Coefficient 0.95

**pH-MW5A**

---

**Raw Statistics**

Number of Valid Observations 20  
Number of Distinct Observations 19  
Minimum 5.13  
Maximum 6.56  
Mean of Raw Data 5.729  
Standard Deviation of Raw Data 0.375  
Khat 253.5  
Theta hat 0.0226  
Kstar 215.5  
Theta star 0.0266  
Mean of Log Transformed Data 1.743  
Standard Deviation of Log Transformed Data 0.064

**Normal GOF Test Results**

Correlation Coefficient R 0.963  
Shapiro Wilk Test Statistic 0.928  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 0.146  
Lilliefors Test Statistic 0.18  
Lilliefors Critical (0.05) Value 0.192

**Data appear Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.971  
Shapiro Wilk Test Statistic 0.943  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 0.281  
Lilliefors Test Statistic 0.169  
Lilliefors Critical (0.05) Value 0.192

**Data appear Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation      ProUCL 5.16/1/2021 12:13:42 PM  
 From File                              Background ApplIII.xls  
 Confidence Coefficient              0.95

**Sulfate-MW41AR**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	20	0	20	19	1	5.00%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	1	0.5	0.5	0.5	0.5	N/A
Statistics (Non-Detects Only)	19	19.5	111	32.86	25.3	21.47
Statistics (All: NDs treated as DL value)	20	0.5	111	31.25	25	22.12
Statistics (All: NDs treated as DL/2 value)	20	0.25	111	31.23	25	22.14
Statistics (Normal ROS Imputed Data)	20	-8.626	111	30.79	25	22.87
Statistics (Lognormal ROS Imputed Data)	20	10.89	111	31.76	25	21.47
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	4.421	3.758	7.433	3.375	0.44	0.13
Statistics (NDs = DL)	2.001	1.734	15.62	3.172	1.005	0.317
Statistics (NDs = DL/2)	1.791	1.555	17.44	3.137	1.147	0.366
Statistics (Lognormal ROS Estimates)	--	--	--	3.326	0.482	0.145

**Normal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.761	0.81	0.81	0.824
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.602	0.901	Data Not Normal	
Shapiro-Wilk (NDs = DL)	0.688	0.905	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.689	0.905	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.715	0.905	Data Not Normal	

**Lognormal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.884	0.756	0.724	0.925
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.792	0.901	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.611	0.905	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.563	0.905	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.878	0.905	Data Not Lognormal	

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:13:42 PM  
From File Background AppIII.xls  
Confidence Coefficient 0.95

TDS-MW5A

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**Raw Statistics**

Number of Valid Observations 20  
Number of Distinct Observations 18  
Minimum 28  
Maximum 194  
Mean of Raw Data 100.3  
Standard Deviation of Raw Data 35.46  
Khat 8.139  
Theta hat 12.32  
Kstar 6.952  
Theta star 14.42  
Mean of Log Transformed Data 4.545  
Standard Deviation of Log Transformed Data 0.383

**Normal GOF Test Results**

Correlation Coefficient R 0.92  
Shapiro Wilk Test Statistic 0.868  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 0.00877  
Lilliefors Test Statistic 0.208  
Lilliefors Critical (0.05) Value 0.192

**Data not Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.903  
Shapiro Wilk Test Statistic 0.845  
Shapiro Wilk Critical (0.05) Value 0.905  
Approximate Shapiro Wilk P Value 0.00311  
Lilliefors Test Statistic 0.221  
Lilliefors Critical (0.05) Value 0.192

**Data not Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:31:32 PM  
From File Background AppIII-outs.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Chloride-MW5A**

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**Raw Statistics**

Number of Valid Observations	19
Number of Missing Observations	1
Number of Distinct Observations	17
Minimum	17.3
Maximum	22.7
Mean of Raw Data	20.52
Standard Deviation of Raw Data	1.466
Khat	200.6
Theta hat	0.102
Kstar	169
Theta star	0.121
Mean of Log Transformed Data	3.019
Standard Deviation of Log Transformed Data	0.0732

**Normal GOF Test Results**

Correlation Coefficient R	0.982
Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical (0.05) Value	0.901
Approximate Shapiro Wilk P Value	0.59
Lilliefors Test Statistic	0.127
Lilliefors Critical (0.05) Value	0.197

Data appear Normal at (0.05) Significance Level

**Lognormal GOF Test Results**

Correlation Coefficient R	0.975
Shapiro Wilk Test Statistic	0.948
Shapiro Wilk Critical (0.05) Value	0.901
Approximate Shapiro Wilk P Value	0.373
Lilliefors Test Statistic	0.141
Lilliefors Critical (0.05) Value	0.197

Data appear Lognormal at (0.05) Significance Level

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:31:32 PM  
 From File Background ApplIII-outs.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Fluoride-MW5A**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	20	1	19	17	2	10.53%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.05	0.2	0.125	0.125	0.106
Statistics (Non-Detects Only)	17	0.05	0.31	0.133	0.12	0.0645
Statistics (All: NDs treated as DL value)	19	0.05	0.31	0.132	0.12	0.0658
Statistics (All: NDs treated as DL/2 value)	19	0.025	0.31	0.125	0.11	0.0659
Statistics (Normal ROS Imputed Data)	19	-0.0121	0.31	0.124	0.11	0.0693
Statistics (Lognormal ROS Imputed Data)	19	0.0429	0.31	0.126	0.11	0.0644
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	5.408	4.493	0.0246	-2.114	0.441	-0.209
Statistics (NDs = DL)	4.751	4.036	0.0278	-2.134	0.48	-0.225
Statistics (NDs = DL/2)	3.983	3.39	0.0315	-2.207	0.551	-0.25
Statistics (Lognormal ROS Estimates)	--	--	--	-2.178	0.48	-0.22

**Normal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.917	0.942	0.932	0.941
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.854	0.892	Data Not Normal	
Shapiro-Wilk (NDs = DL)	0.892	0.901	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.883	0.901	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.906	0.901	Data Appear Normal	

**Lognormal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.985	0.957	0.979
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.965	0.892	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.968	0.901	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.933	0.901	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.965	0.901	Data Appear Lognormal	

### Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

Date/Time of Computation ProUCL 5.16/1/2021 12:31:32 PM  
From File Background AppIII-outs.xls  
Full Precision OFF  
Confidence Coefficient 0.95

pH-MW41AR

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#### Raw Statistics

Number of Valid Observations	19
Number of Missing Observations	1
Number of Distinct Observations	18
Minimum	3.99
Maximum	5.08
Mean of Raw Data	4.344
Standard Deviation of Raw Data	0.216
Khat	453.3
Theta hat	0.00958
Kstar	381.8
Theta star	0.0114
Mean of Log Transformed Data	1.468
Standard Deviation of Log Transformed Data	0.0476

#### Normal GOF Test Results

Correlation Coefficient R	0.873
Shapiro Wilk Test Statistic	0.795
Shapiro Wilk Critical (0.05) Value	0.901
Approximate Shapiro Wilk P Value	4.9487E-4
Lilliefors Test Statistic	0.205
Lilliefors Critical (0.05) Value	0.197

**Data not Normal at (0.05) Significance Level**

#### Lognormal GOF Test Results

Correlation Coefficient R	0.89
Shapiro Wilk Test Statistic	0.825
Shapiro Wilk Critical (0.05) Value	0.901
Approximate Shapiro Wilk P Value	0.00164
Lilliefors Test Statistic	0.192
Lilliefors Critical (0.05) Value	0.197

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:31:32 PM  
 From File Background ApplIII-outs.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Sulfate-MW41AR**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	20	1	19	18	1	5.26%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	1	0.5	0.5	0.5	0.5	N/A
Statistics (Non-Detects Only)	18	19.5	58.8	28.52	25	10.45
Statistics (All: NDs treated as DL value)	19	0.5	58.8	27.05	24.7	12.02
Statistics (All: NDs treated as DL/2 value)	19	0.25	58.8	27.03	24.7	12.05
Statistics (Normal ROS Imputed Data)	19	5.381	58.8	27.3	24.7	11.46
Statistics (Lognormal ROS Imputed Data)	19	13.2	58.8	27.72	24.7	10.74
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	10.2	8.539	2.796	3.301	0.307	0.093
Statistics (NDs = DL)	2.571	2.2	10.52	3.091	0.964	0.312
Statistics (NDs = DL/2)	2.211	1.897	12.23	3.054	1.116	0.365
Statistics (Lognormal ROS Estimates)	--	--	--	3.263	0.341	0.105

**Normal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.872	0.917	0.917	0.917
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.769	0.897	Data Not Normal	
Shapiro-Wilk (NDs = DL)	0.868	0.901	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.868	0.901	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.863	0.901	Data Not Normal	

**Lognormal GOF Test Results**

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.927	0.701	0.671	0.957
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.86	0.897	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.527	0.901	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.486	0.901	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.929	0.901	Data Appear Lognormal	

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

Date/Time of Computation ProUCL 5.16/1/2021 12:31:32 PM  
From File Background ApplIII-outs.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**TDS-MW5A**

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**Raw Statistics**

Number of Valid Observations	18
Number of Missing Observations	2
Number of Distinct Observations	16
Minimum	69
Maximum	174
Mean of Raw Data	99.06
Standard Deviation of Raw Data	24.08
Khat	21.46
Theta hat	4.617
Kstar	17.92
Theta star	5.528
Mean of Log Transformed Data	4.572
Standard Deviation of Log Transformed Data	0.215

**Normal GOF Test Results**

Correlation Coefficient R	0.899
Shapiro Wilk Test Statistic	0.828
Shapiro Wilk Critical (0.05) Value	0.897
Approximate Shapiro Wilk P Value	0.00265
Lilliefors Test Statistic	0.201
Lilliefors Critical (0.05) Value	0.202

**Data appear Approximate Normal at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.951
Shapiro Wilk Test Statistic	0.918
Shapiro Wilk Critical (0.05) Value	0.897
Approximate Shapiro Wilk P Value	0.108
Lilliefors Test Statistic	0.162
Lilliefors Critical (0.05) Value	0.202

**Data appear Lognormal at (0.05) Significance Level**