

Prepared for:  
**Tronox Henderson**  
**Henderson Nevada**

# Appendix F

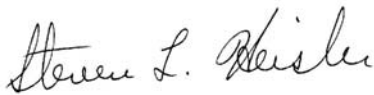
## Statistical Evaluation Backup Data

ENSR Corporation  
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Prepared for:  
**Tronox Henderson**  
**Henderson, Nevada**

# Appendix F

## Statistical Evaluation Backup Data



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Prepared By



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## 1.0 INTRODUCTION

This appendix provides detailed results of the statistical tests that were conducted to evaluate the Tronox upgradient investigation results for metals, radionuclides and perchlorate in soil samples. This section describes the detailed results that are presented in the subsequent sections and summarizes the results from each statistical test. Section 2 contains results from tests of the Tronox upgradient data for metals and perchlorate in soil, Section 3 contains the results from comparisons between the Tronox upgradient data and the City of Henderson (COH) background data for metals and perchlorate in soil, and Section 4 contains the results from comparisons between the Tronox upgradient data and the BRC/TIMET background data for metals and perchlorate in soil. Section 5 contains the results from tests of the Tronox upgradient data for radionuclides in soil, Section 6 contains the results from comparisons between the Tronox upgradient data and the COH background data for radionuclides in soil, and Section 4 contains the results from comparisons between the Tronox upgradient data and the BRC/TIMET background data for radionuclides in soil.

The statistical tests, except for the Gehan modification to the Wilcoxon Rank Sum Test, were conducted using the Statgraphics® Centurion XV software. The Gehan modification to the Wilcoxon Rank Sum Test was implemented in Microsoft® Office 2003 Excel.

### 1.1 Description of Results for Tests of Tronox Upgradient Data for Metals and Perchlorate in Soil

The results of the tests of the Tronox upgradient data for metals and perchlorate in soil are organized by chemical. The test results for each chemical include the following:

1. The results from an Analysis of Variance (ANOVA) to compare the mean concentrations of the chemical by soil boring and the results from a Kruskal-Wallis test to compare the median concentrations by soil boring. The results from these tests were used to decide if differences in the mean or median concentrations by boring are statistically significant at the 95 percent confidence level. The null hypothesis for the ANOVA was that the means of the data from each boring are equal, and the alternate hypothesis was that that the means are not all equal. The null hypothesis was rejected if the p-value was less than 0.05. The null hypothesis for the Kruskal-Wallis Test was that the medians of the data from each boring are equal, and the alternate hypothesis was that that the means are not all equal. The null hypothesis was rejected if the p-value was less than 0.05.
2. The results from fitting a normal probability distribution to all of the data for the chemical and the p value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
3. The results from fitting a normal probability distribution to the logarithms of all of the data for the chemical and the p-value from the Shapiro-Wilk test for the normality of the logarithms of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.

4. The results from fitting normal probability distributions to the data and to the logarithms of the data for samples collected at a depth of 20 feet or less for the chemical and the p-values from the Shapiro-Wilk tests for the normality of the data and the logarithms of the data. The results from the Shapiro-Wilk tests were used to decide if the data from samples collected at 20 feet or less can be considered to follow a normal or a lognormal distribution.
5. The results from fitting normal probability distributions to the data and to the logarithms of the data for samples collected at a depth of 30 feet or more for the chemical and the p-values from the Shapiro-Wilk tests for the normality of the data and the logarithms of the data. The results from the Shapiro-Wilk tests were used to decide if the data from samples collected at 30 feet or more can be considered to follow a normal or a lognormal distribution at the 95 percent confidence level.
6. The results of a test to compare either the means or the medians of the concentrations in samples collected at depths of 20 feet or less with the concentrations in samples collected at depths of 30 feet or more. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.
  - b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
  - c. If the two sets of data were not considered to follow the same distribution, and if all of the data were above detection limits, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level.
  - d. If the two sets of data were not considered to follow the same distribution, and if some of the data were below detection limits, the Gehan modification to the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Gehan modification to the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level. Although the Wilcoxon Rank Sum Test can be applied when some of the data are below a constant detection limit, detection limits for the Tronox upgradient data were not constant. Therefore, the Gehan modification was always used when any of the data were below detection limits. The chemicals with some of the concentrations below detection limits were antimony, boron, molybdenum, platinum, selenium, silver, thallium, tungsten and perchlorate.

7. The same results as in 4, 5 and 6, but with the data categorized by geological formation (Alluvium or Muddy Creek) instead of by depth range.

The results from these tests are summarized in **Tables F-1 and F-2**.

## **1.2 Description of Results for Tests to Compare Tronox Upgradient Data with City of Henderson Background Data for Metals and Perchlorate in Soil**

The results of the tests of the comparisons between the Tronox upgradient data and the COH background data for metals and perchlorate in soil are organized by chemical. The test results for each chemical include the following:

1. The results from fitting a normal probability distribution to all of the COH background data for the chemical and the p-value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
2. The results from fitting a normal probability distribution to the logarithms of all of the COH background data for the chemical and the p-value from the Shapiro-Wilk test for the normality of the logarithms of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.
3. The results of a test to compare either the means or the medians of the concentrations from the Tronox upgradient data in samples collected at depths of 20 feet or less with the concentrations from the COH background data. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.
  - b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
  - c. If the two sets of data were not considered to follow the same distribution, and if all of the data were above detection limits, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05,

and the difference between the medians was statistically significant at the 95 percent confidence level.

- d. If the two sets of data were not considered to follow the same distribution, and if some of the data were below detection limits, the Gehan modification to the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Gehan modification to the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level. Although the Wilcoxon Rank Sum Test can be applied when some of the data are below a constant detection limit, detection limits for the Tronox upgradient data were not constant. Therefore, the Gehan modification was always used when any of the data were below detection limits. The chemicals with some of the concentrations below detection limits were antimony, boron, molybdenum, platinum, selenium, silver, thallium, tungsten and perchlorate.

The results from these tests are summarized in **Table F-3**.

### **1.3 Description of Results for Tests to Compare Tronox Upgradient Data with BRC/TIMET Background Data for Metals and Perchlorate in Soil**

The results of the tests of the comparisons between the Tronox upgradient data and the BRC/TIMET background data for metals and perchlorate in soil are organized by chemical. The test results for each chemical include the following:

1. The results from fitting a normal probability distribution to all of the BRC/TIMET background data for the chemical and the p-value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
2. The results from fitting a normal probability distribution to the logarithms of all of the BRC/TIMET background data for the chemical and the p-value from the Shapiro-Wilk test for the normality of the logarithms of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.
3. The results of a test to compare either the means or the medians of the concentrations from the Tronox upgradient data in samples collected at depths of 20 feet or less with the concentrations from the BRC/TIMET background data. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-

value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.

- b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
- c. If the two sets of data were not considered to follow the same distribution, and if all of the data were above detection limits, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level.
- d. If the two sets of data were not considered to follow the same distribution, and if some of the data were below detection limits, the Gehan modification to the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Gehan modification to the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level. Although the Wilcoxon Rank Sum Test can be applied when some of the data are below a constant detection limit, detection limits for the Tronox upgradient data were not constant. Therefore, the Gehan modification was always used when any of the data were below detection limits. The chemicals with some of the concentrations below detection limits were antimony, boron, molybdenum, platinum, selenium, silver, thallium, tungsten and perchlorate.

The results from these tests are summarized in **Table F-3**.

#### **1.4 Description of Results for Tests of Tronox Upgradient Data for Radionuclides in Soil**

The results of the tests of the Tronox upgradient data for radionuclides in soil are organized by radionuclide. The test results for each chemical include the following:

1. The results from fitting a normal probability distribution to all of the data collected at depths of five feet or less for the radionuclide and the p-value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
2. The results from fitting a normal probability distribution to the logarithms of all of the data in samples collected at depths of five feet or less for the radionuclide and the p-value from the Shapiro-Wilk test for the normality of the logarithms of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.
3. The results from fitting normal probability distributions to the data and to the logarithms of the data for samples collected at a depth of zero feet for the radionuclide and the p-values from the Shapiro-Wilk

tests for the normality of the data and the logarithms of the data. The results from the Shapiro-Wilk tests were used to decide if the data from samples collected at zero feet or less can be considered to follow a normal or a lognormal distribution.

4. The results from fitting normal probability distributions to the data and to the logarithms of the data for samples collected at a depth of five feet for the radionuclide and the p-values from the Shapiro-Wilk tests for the normality of the data and the logarithms of the data. The results from the Shapiro-Wilk tests were used to decide if the data from samples collected at five feet can be considered to follow a normal or a lognormal distribution.
5. The results of a test to compare either the means or the medians of the activities in samples collected at depths of zero feet with the activities in samples collected at depths five feet. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.
  - b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
  - c. If the two sets of data were not considered to follow the same distribution, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level.

The results from these tests are summarized in **Table F-4**.

## 1.5 Description of Results for Tests to Compare Tronox Upgradient Data with City of Henderson Background Data for Radionuclides in Soil

The results of the tests of the comparisons between the Tronox upgradient data and the City of Henderson background data for radionuclides in soil are organized by radionuclide. The test results for each chemical include the following:

1. The results from fitting a normal probability distribution to all of the City of Henderson background data for the radionuclide and the p-value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
2. The results from fitting a normal probability distribution to the logarithms of all of the City of Henderson background data for the radionuclide and the p-value from the Shapiro-Wilk test for the normality of

the logarithms of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.

3. The results of a test to compare either the means or the medians of the activities from the Tronox upgradient data in samples collected at depths of five feet or less with the activities from the City of Henderson background data. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.
  - b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
  - c. If the two sets of data were not considered to follow the same distribution, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level.

The results from these tests are summarized in **Table F-5**.

## 1.6 Description of Results for Tests to Compare Tronox Upgradient Data with BRC/TIMET Background Data for Radionuclides in Soil

The results of the tests of the comparisons between the Tronox upgradient data and the BRC/TIMET background data for radionuclides in soil are organized by radionuclide. The test results for each chemical include the following:

1. The results from fitting a normal probability distribution to all of the BRC/TIMET background data for the radionuclide in samples collected at five feet or less and the p-value from the Shapiro-Wilk Test for the normality of the data. The null hypothesis from the Shapiro-Wilk Tests was that the data are from a normal distribution, and the alternate hypothesis was that the data are not from a normal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or above, the data were considered to come from a normal distribution.
2. The results from fitting a normal probability distribution to the logarithms of all of the BRC/TIMET background data for the radionuclide in samples collected at five feet or less and the p-value from the Shapiro-Wilk test for the normality of the logarithms of the data. The null hypothesis from the Shapiro-

Wilk Tests was that the data are from a lognormal distribution, and the alternate hypothesis was that the data are not from a lognormal distribution. The null hypothesis was rejected if the p-value from the Shapiro Wilk Test was less than 0.05. If the p-value was 0.05 or greater, the data were considered to come from a lognormal distribution. If the p-values from the Shapiro-Wilk Tests for both the data and the logarithms of the data were 0.05 or above, the data were assumed to follow the distribution that resulted in the higher p-value from the Shapiro-Wilk Test.

3. The results of a test to compare either the means or the medians of the activities from the Tronox upgradient data in samples collected at depths of five feet or less with the activities from the BRC/TIMET data for samples collected at depths of five feet or less. The tests that were conducted depended on the results from fitting the normal distributions to the data and to the logarithms of the data:
  - a. If both sets of data were considered to follow normal distributions, a t-test was performed on the data to compare the means of the data. The null hypothesis for the t-test was that the means of the two sets of data are equal, and the alternate hypothesis was that the means are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the means was statistically significant at the 95 percent confidence level. An F-test was also performed to determine if the standard deviations of the two sets of data could be considered equal when performing the t-test. The null hypothesis for the F-test was that the standard deviations of the two sets of data are equal, and the alternate hypothesis was that the standard deviations are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the standard deviations was statistically significant at the 95 percent confidence level.
  - b. If both sets of data were considered to follow lognormal normal distributions, a t-test was performed on the logarithms of the data to compare the means of the logarithms of the data. An F-test was also performed to determine if the standard deviations of the logarithms of the two sets of data could be considered equal when performing the t-test.
  - c. If the two sets of data were not considered to follow the same distribution, the Wilcoxon Rank Sum Test was conducted to compare the medians of the two sets of data. The null hypothesis for the Wilcoxon Rank Sum Test was that the medians of the two sets of data are equal, and the alternate hypothesis was that the medians are not equal. The null hypothesis was rejected if the p-value was less than 0.05, and the difference between the medians was statistically significant at the 95 percent confidence level.

The results from these tests are summarized in **Table F-5**.



DRAFT

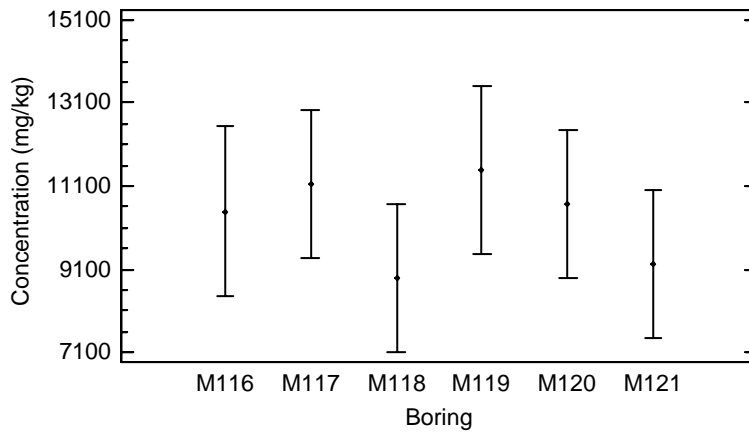
## 2.0 ANALYSIS OF TRONOX UPGRADIENT DATA FOR METALS AND PERCHLORATE IN SOIL

### 2.1 Aluminum

ANOVA Table for Aluminum by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	4.57621E7	5	9.15242E6	1.42	0.2362
Within groups	2.83761E8	44	6.44912E6		
Total (Corr.)	3.29524E8	49			

Means and 95.0 Percent Tukey HSD Intervals for Aluminum



Kruskal-Wallis Test for Aluminum by Location ID

Location ID	Sample Size	Average Rank
M116	7	28.8571
M117	9	32.0556
M118	9	16.5556
M119	7	33.7143
M120	9	27.3889
M121	9	17.0

Test statistic = 11.0157 P-Value = 0.0510701

**DRAFT**

**Uncensored Data - Aluminum (Data Set = "Tronox")**

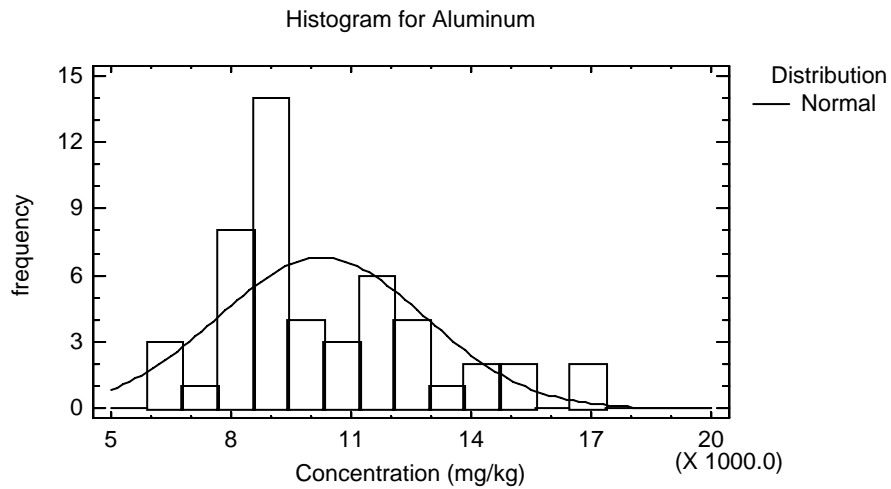
Data variable: Aluminum

Selection variable: Data Set = "Tronox"

50 values ranging from 6230.0 to 17000.0

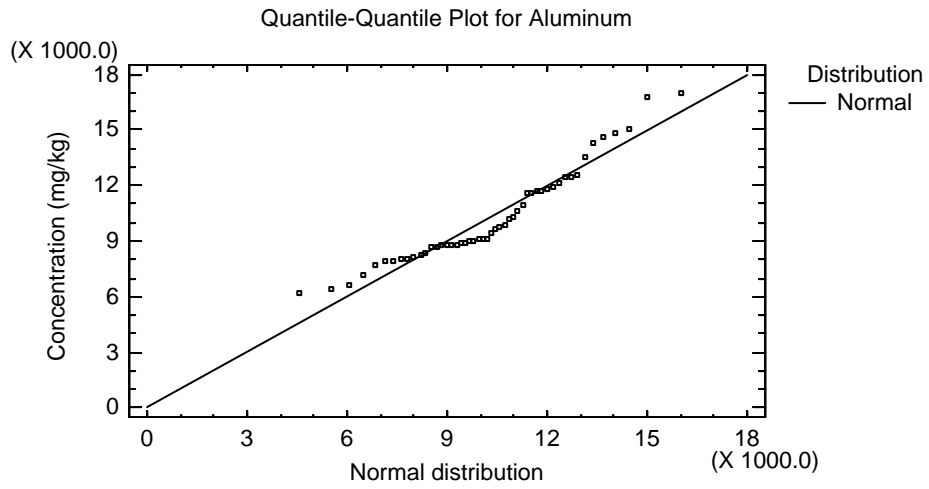
Fitted Distributions

Normal
mean = 10263.5
standard deviation = 2593.25



Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.921322	0.00267833



**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set = "Tronox")**

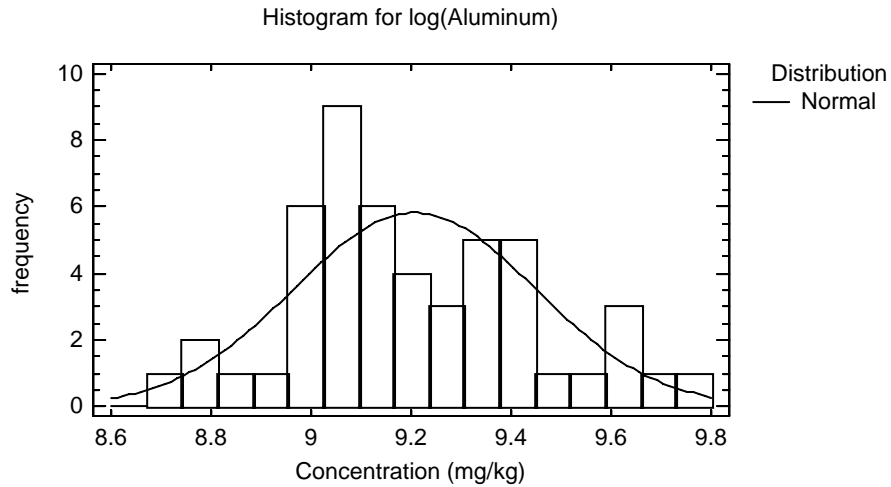
Data variable: log(Aluminum)

Selection variable: Data Set = "Tronox"

50 values ranging from 8.73713 to 9.74097

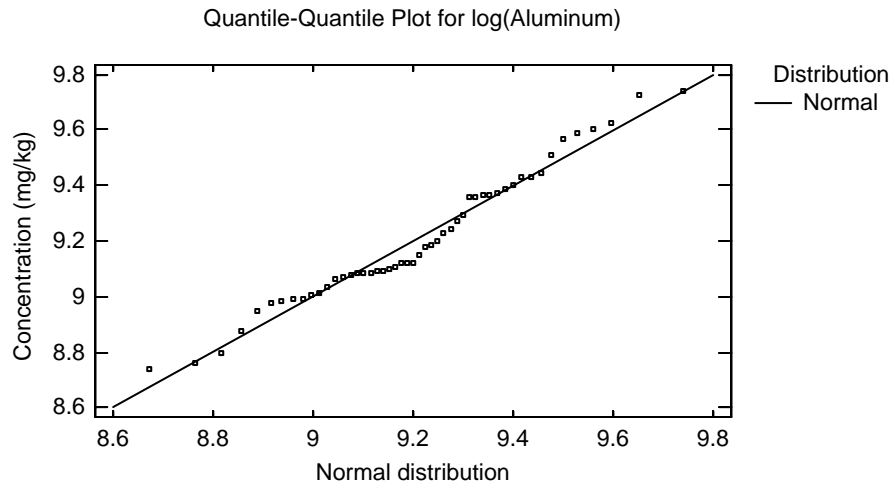
Fitted Distributions

Normal
mean = 9.20701
standard deviation = 0.241827



Tests for Normality for log(Aluminum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.960428	0.16293



**DRAFT**

**Uncensored Data - Aluminum (Data Set = "Tronox"&Depth Value<=20)**

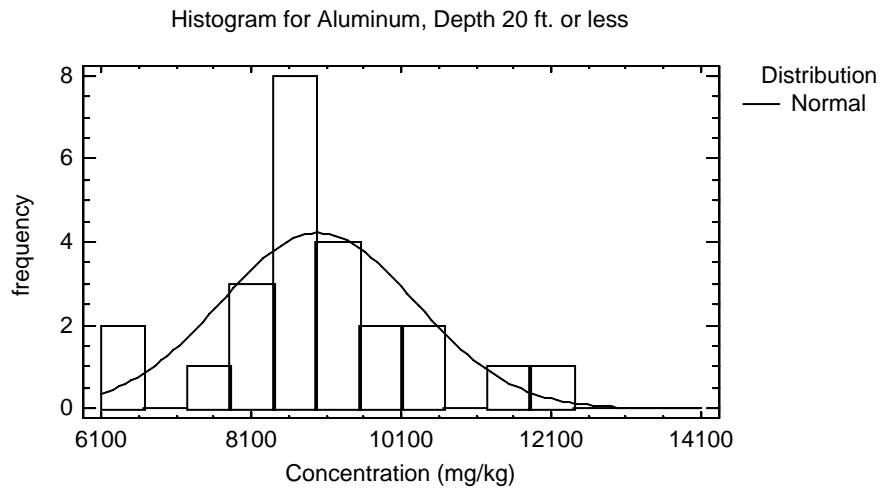
Data variable: Aluminum

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 6390.0 to 12100.0

Fitted Distributions

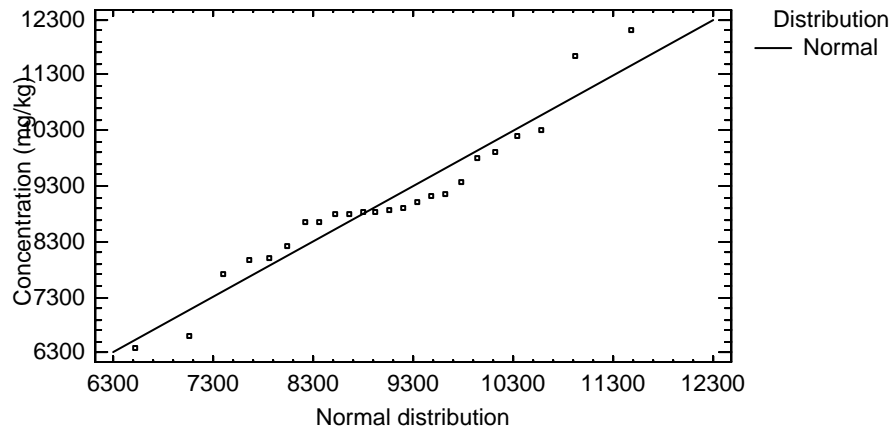
Normal
mean = 8992.71
standard deviation = 1297.13



Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.940929	0.175977

Quantile-Quantile Plot for Aluminum, Depth 20 ft. or less



**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set = "Tronox"&Depth Value<=20)**

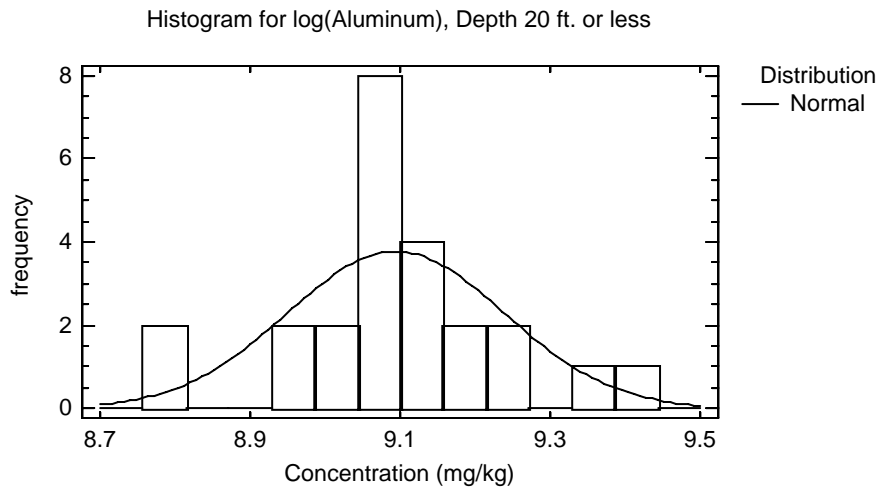
Data variable: log(Aluminum)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 8.76249 to 9.40096

Fitted Distributions

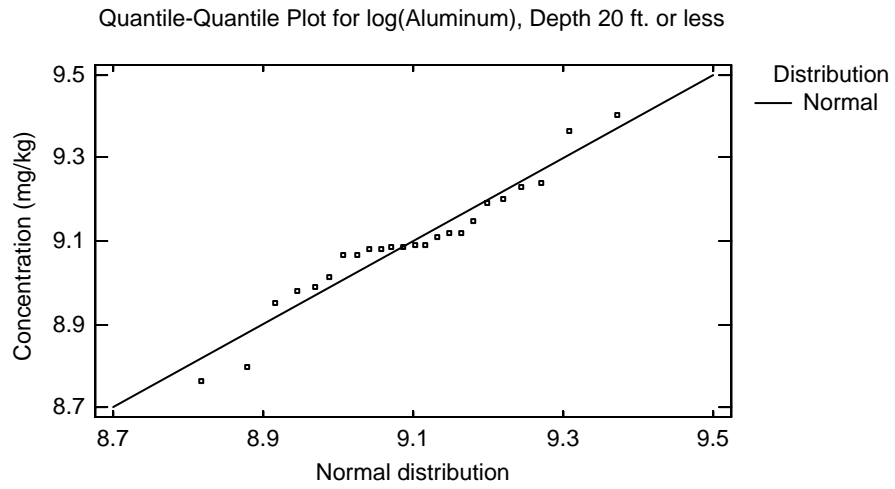
Normal
mean = 9.09419
standard deviation = 0.144901



Tests for Normality for log(Aluminum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.943885	0.20469





**DRAFT**

**Uncensored Data - Aluminum (Data Set = "Tronox"&Depth Value>=30)**

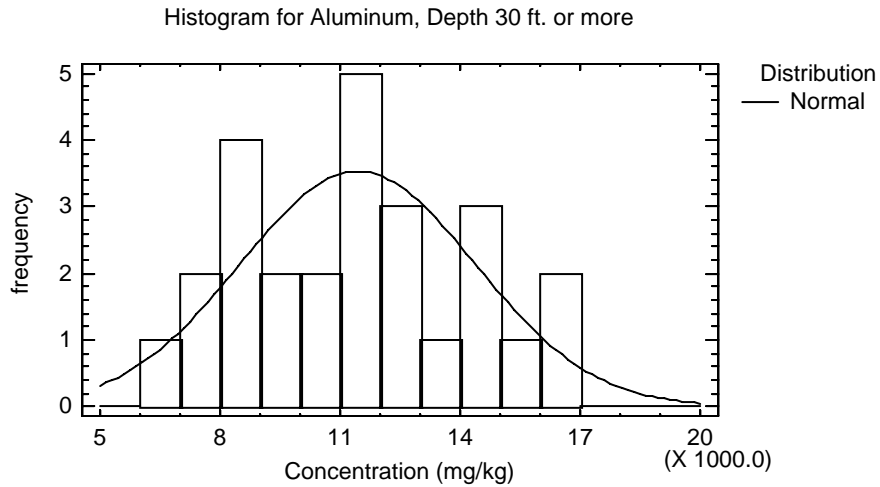
Data variable: Aluminum

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 6230.0 to 17000.0

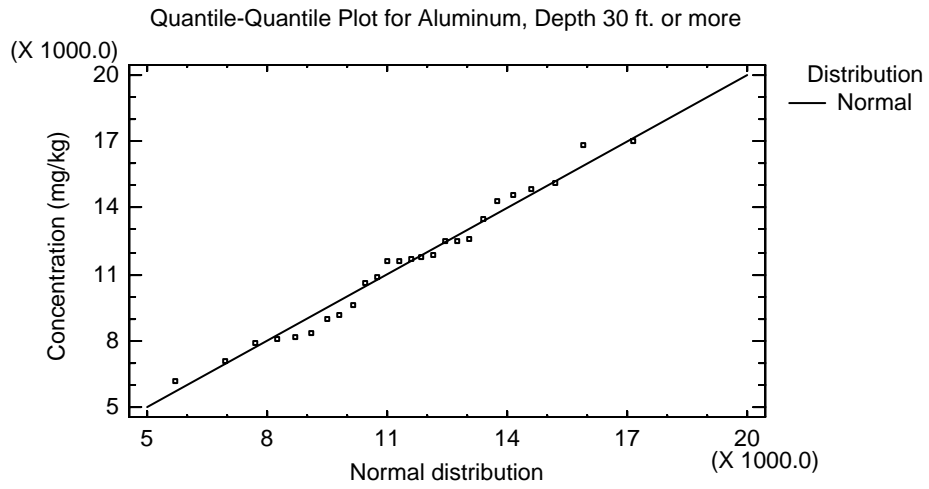
Fitted Distributions

Normal
mean = 11436.5
standard deviation = 2941.36



Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.969313	0.620271



**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set = "Tronox"&Depth Value>=30)**

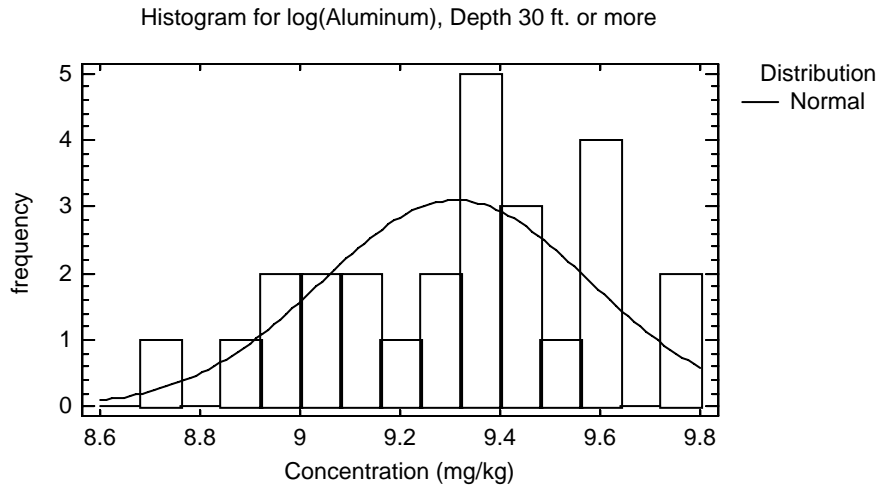
Data variable: log(Aluminum)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.73713 to 9.74097

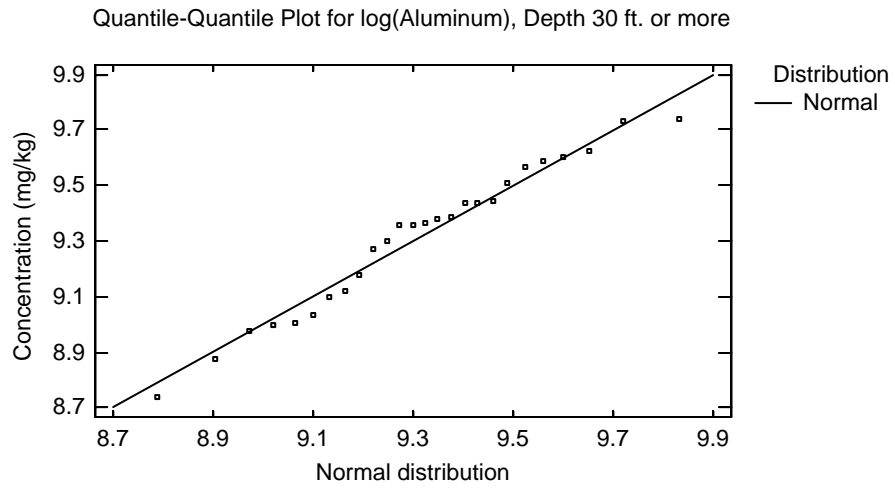
Fitted Distributions

Normal
mean = 9.31115
standard deviation = 0.267967



Tests for Normality for log(Aluminum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.96492	0.515836



**DRAFT**

**Two-Sample Comparison - Aluminum & Depth Range (Data Set="Tronox") for Aluminum**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 6390.0 to 12100.0  
 Sample 2: 26 values ranging from 6230.0 to 17000.0

Comparison of Means for Aluminum

95.0% confidence interval for mean of Depth Range=20 ft. or less: 8992.71 +/- 547.731 [8444.98, 9540.44]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 11436.5 +/- 1188.05 [10248.5, 12624.6]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -2443.83 +/- 1288.6 [-3732.43, -1155.23]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -3.85029 P-value = 0.000481334  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Aluminum

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	1297.13	2941.36
Variance	1.68255E6	8.65162E6
Df	23	25

Ratio of Variances = 0.194477

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [1008.15, 1819.56]  
 Standard deviation of Depth Range=30 ft. or more: [2306.79, 4060.28]  
 Ratio of Variances: [0.08624, 0.444789]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.194477 P-value = 0.000189768  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Aluminum (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

Data variable: Aluminum

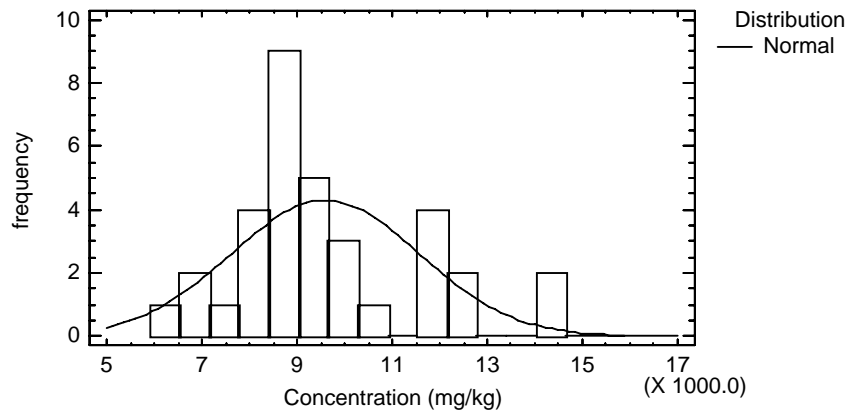
Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 6390.0 to 14600.0

Fitted Distributions

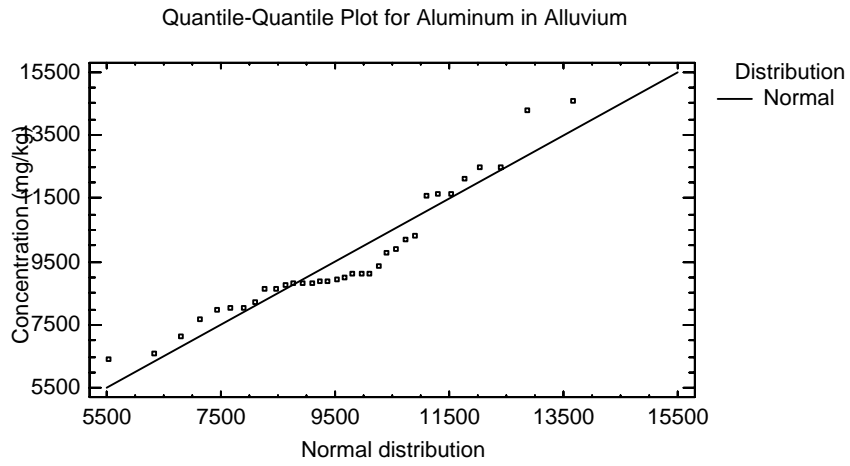
Normal
mean = 9596.32
standard deviation = 1974.92

Histogram for Aluminum in Alluvium

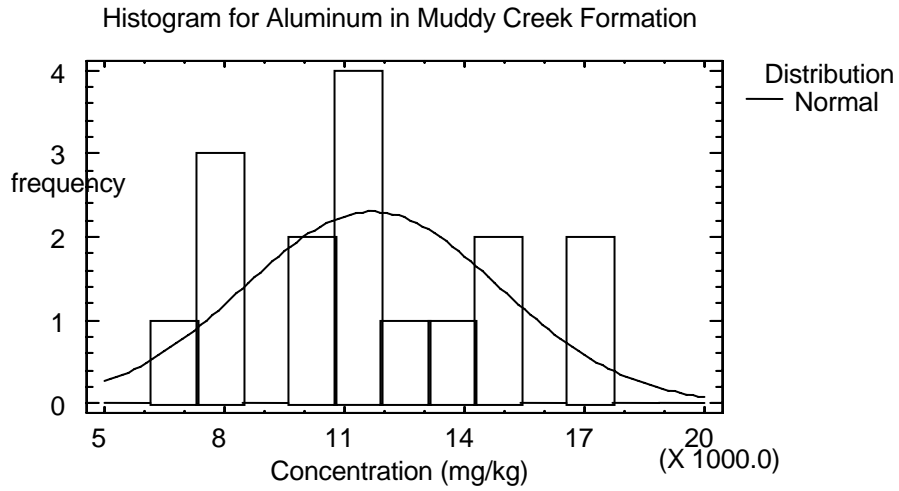
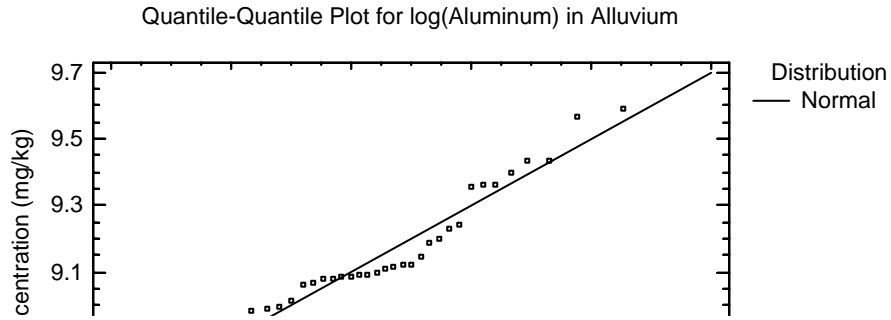
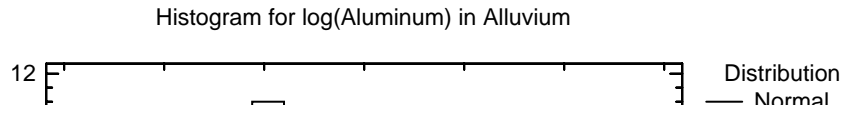


Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.911888	0.0105604

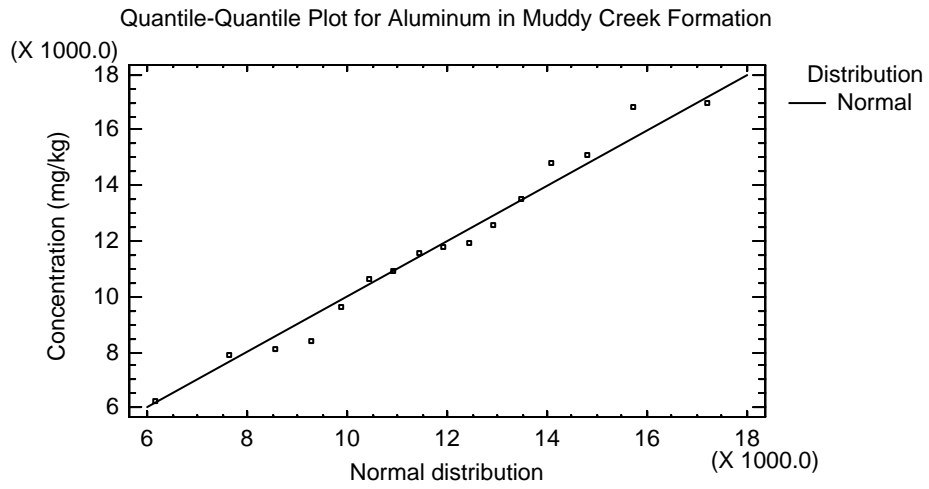






Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.969848	0.805167



**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

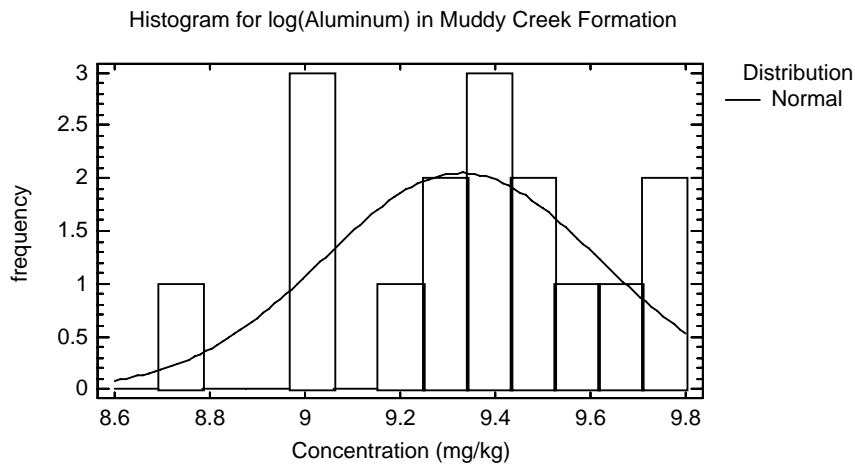
Data variable: log(Aluminum)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 8.73713 to 9.74097

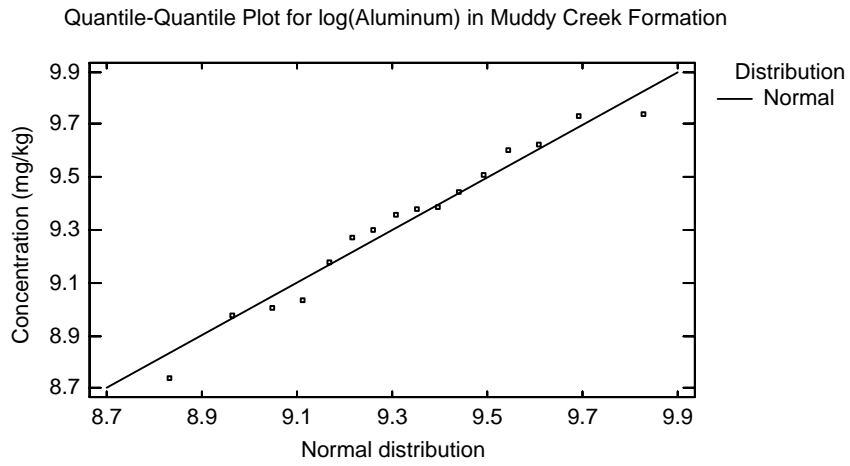
Fitted Distributions

Normal
mean = 9.32845
standard deviation = 0.287505



Tests for Normality for log(Aluminum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.965348	0.730054



**DRAFT**

**Two-Sample Comparison - log(Aluminum) & Geological Formation 1 (Data Set="Tronox") for log(Aluminum)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 8.76249 to 9.58878  
 Sample 2: 16 values ranging from 8.73713 to 9.74097

Comparison of Means for log(Aluminum)

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 9.14986 +/- 0.0686806 [9.08118, 9.21854]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 9.32845 +/- 0.153201 [9.17525, 9.48165]

95.0% confidence interval for the difference between the means  
 assuming equal variances: -0.178597 +/- 0.139627 [-0.318224, -0.0389695]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -2.5718 P-value = 0.0132688  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Aluminum)

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	0.196839	0.287505
Variance	0.0387456	0.0826593
Df	33	15

Ratio of Variances = 0.468739

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.158766, 0.259095]  
 Standard deviation of Geological Formation 1=Muddy Creek: [0.212382, 0.44497]  
 Ratio of Variances: [0.178731, 1.05984]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.468739 P-value = 0.0686199  
 Do not reject the null hypothesis for alpha = 0.05.

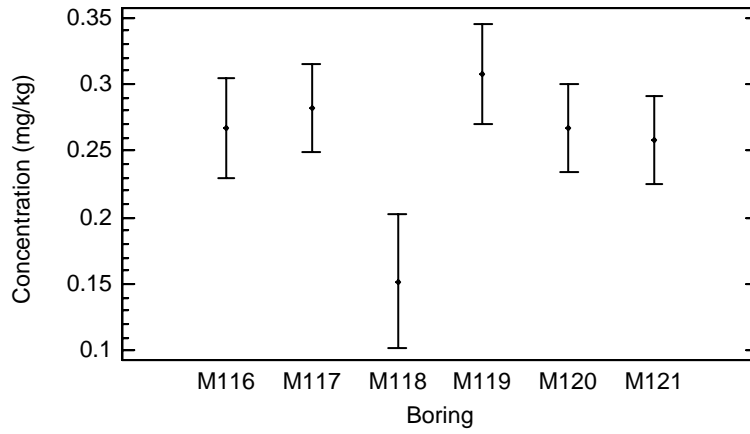
DRAFT

## 2.2 Antimony

ANOVA Table for Antimony by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.0665471	5	0.0133094	6.10	0.0003
Within groups	0.0851609	39	0.00218361		
Total (Corr.)	0.151708	44			

Means and 95.0 Percent Tukey HSD Intervals for Antimony



Kruskal-Wallis Test for Antimony by Location ID

Location ID	Sample Size	Average Rank
M116	7	24.2143
M117	9	26.6667
M118	4	4.0
M119	7	30.3571
M120	9	23.0
M121	9	21.1111

Test statistic = 11.5172 P-Value = 0.0420367

**DRAFT**

**Uncensored Data - Antimony (Data Set = "Tronox")**

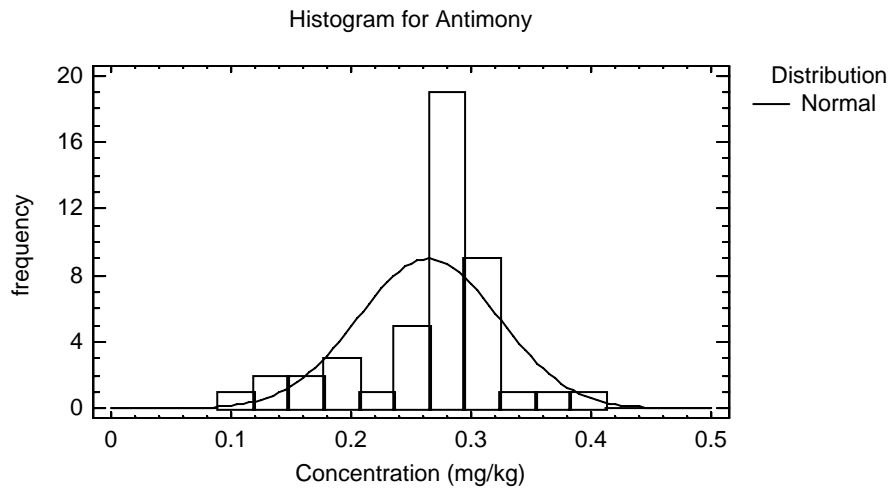
Data variable: Antimony

Selection variable: Data Set = "Tronox"

45 values ranging from 0.11 to 0.4105

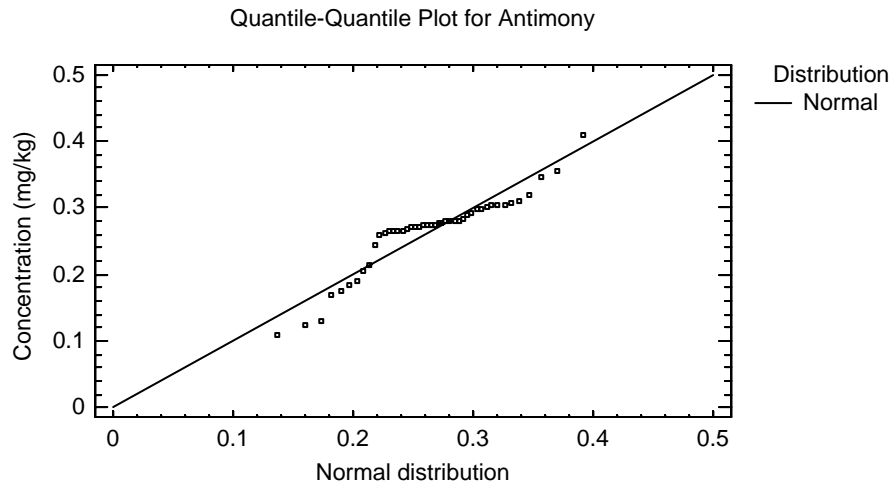
Fitted Distributions

Normal
mean = 0.26435
standard deviation = 0.0587189



Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.894558	0.000395949





**DRAFT**

**Uncensored Data - log(Antimony) (Data Set = "Tronox")**

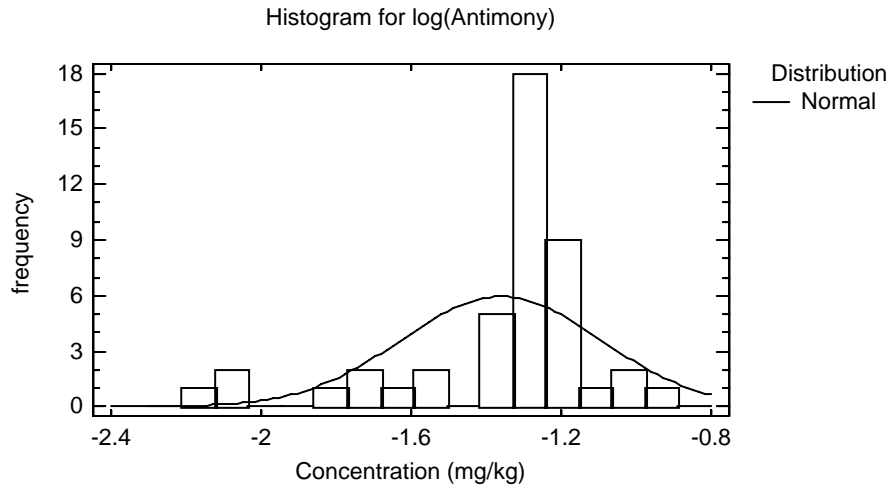
Data variable: log(Antimony)

Selection variable: Data Set = "Tronox"

45 values ranging from -2.20727 to -0.890379

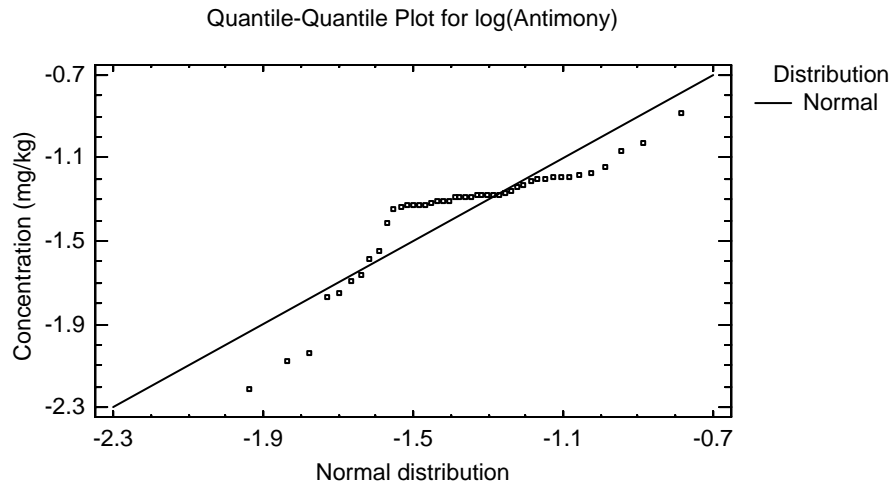
Fitted Distributions

Normal
mean = -1.36073
standard deviation = 0.265649



Tests for Normality for log(Antimony)

Test	Statistic	P-Value
Shapiro-Wilk W	0.810731	2.31003E-7



**DRAFT**

**Uncensored Data - Antimony (Data Set = "Tronox"&Depth Value<=20)**

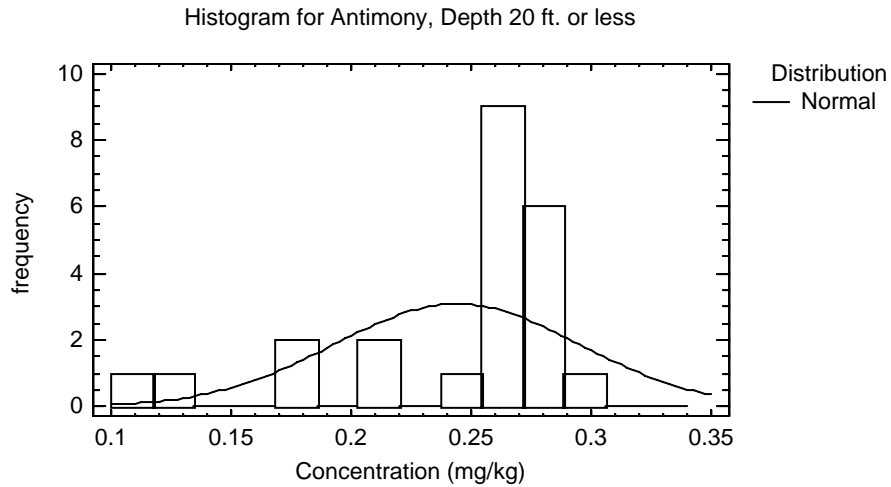
Data variable: Antimony

Selection variable: Data Set = "Tronox"&Depth Value<=20

23 values ranging from 0.11 to 0.30325

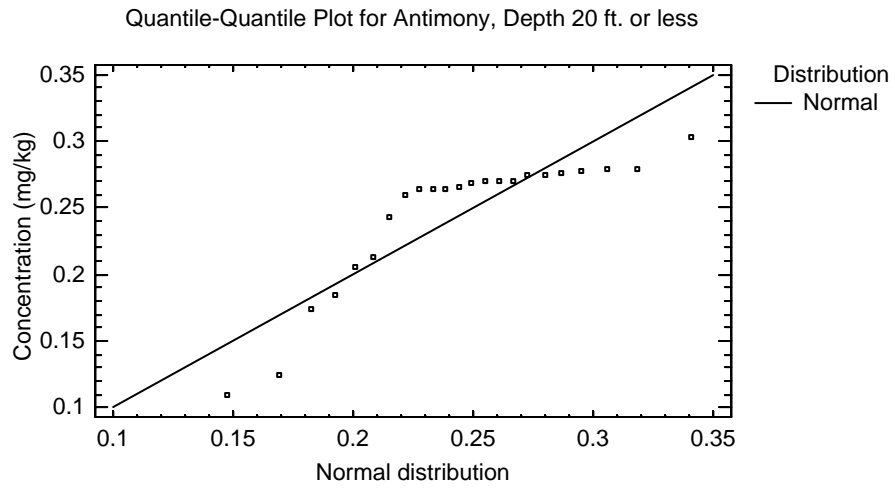
Fitted Distributions

Normal
mean = 0.244033
standard deviation = 0.0511107



Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.766457	0.0000558471



**DRAFT**

**Uncensored Data - log(Antimony) (Data Set = "Tronox"&Depth Value<=20)**

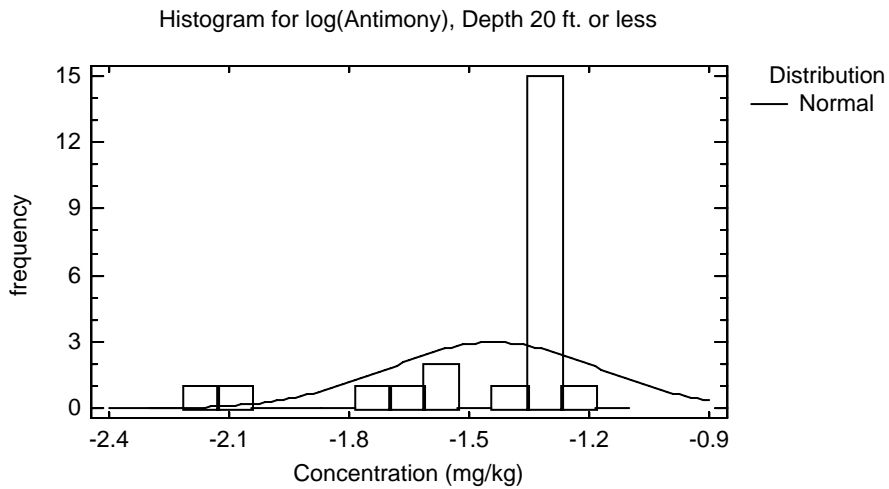
Data variable: log(Antimony)

Selection variable: Data Set = "Tronox"&Depth Value<=20

23 values ranging from -2.20727 to -1.1932

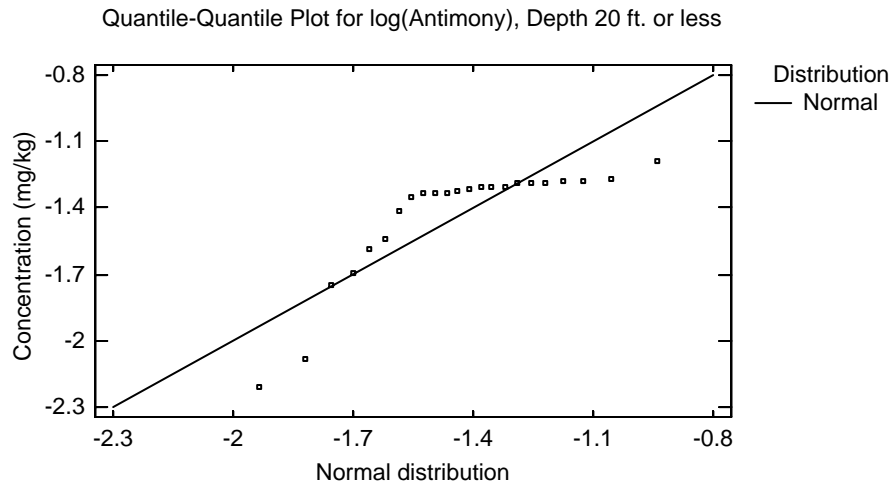
Fitted Distributions

Normal
mean = -1.43869
standard deviation = 0.262577



Tests for Normality for log(Antimony)

Test	Statistic	P-Value
Shapiro-Wilk W	0.701166	0.00000459914



**DRAFT**

**Uncensored Data - Antimony (Data Set = "Tronox"&Depth Value>=30)**

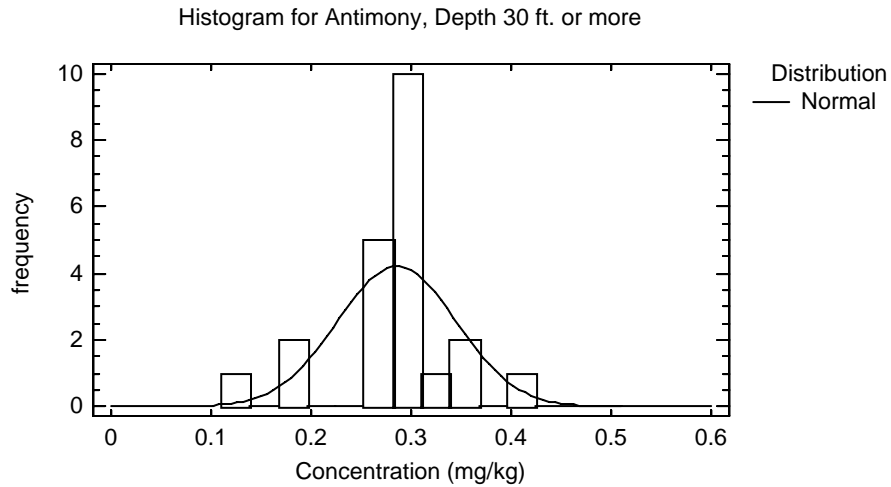
Data variable: Antimony

Selection variable: Data Set = "Tronox"&Depth Value>=30

22 values ranging from 0.13 to 0.4105

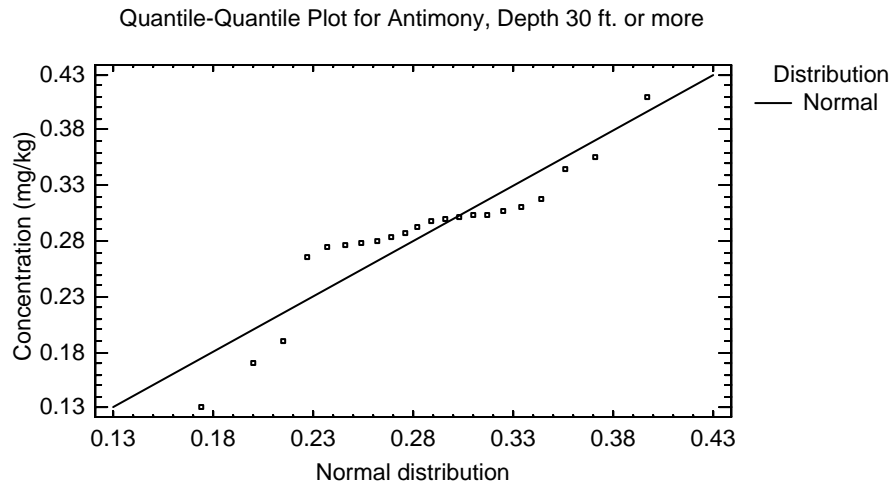
Fitted Distributions

Normal
mean = 0.285591
standard deviation = 0.0596886



Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.87118	0.00688716





**DRAFT**

**Uncensored Data - log(Antimony) (Data Set = "Tronox"&Depth Value>=30)**

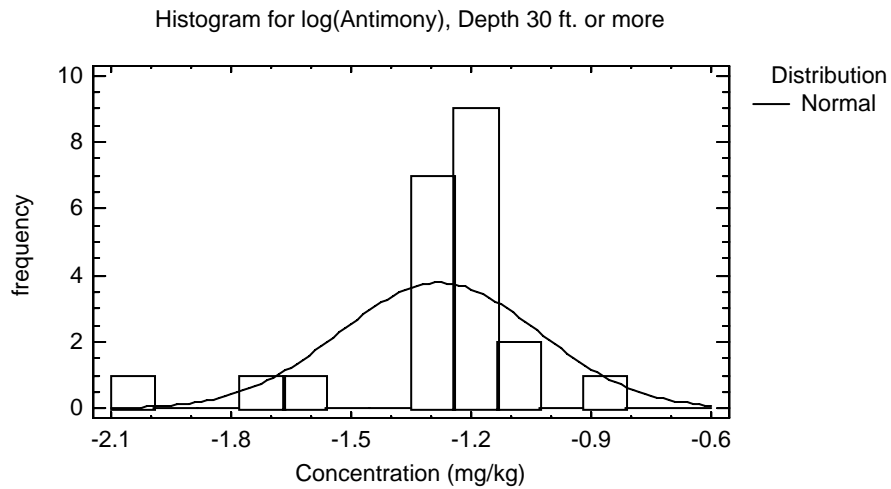
Data variable: log(Antimony)

Selection variable: Data Set = "Tronox"&Depth Value>=30

22 values ranging from -2.04022 to -0.890379

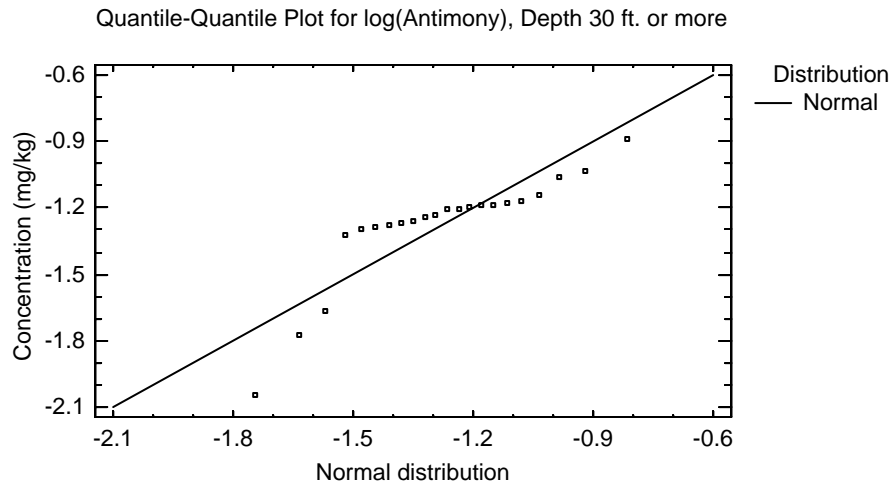
Fitted Distributions

Normal
mean = -1.27922
standard deviation = 0.249026



Tests for Normality for log(Antimony)

Test	Statistic	P-Value
Shapiro-Wilk W	0.784063	0.000154054



**DRAFT**

## Tronox Antimony by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.255376959$   $p = 0.798431965$

Do not reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

**Uncensored Data - Antimony (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

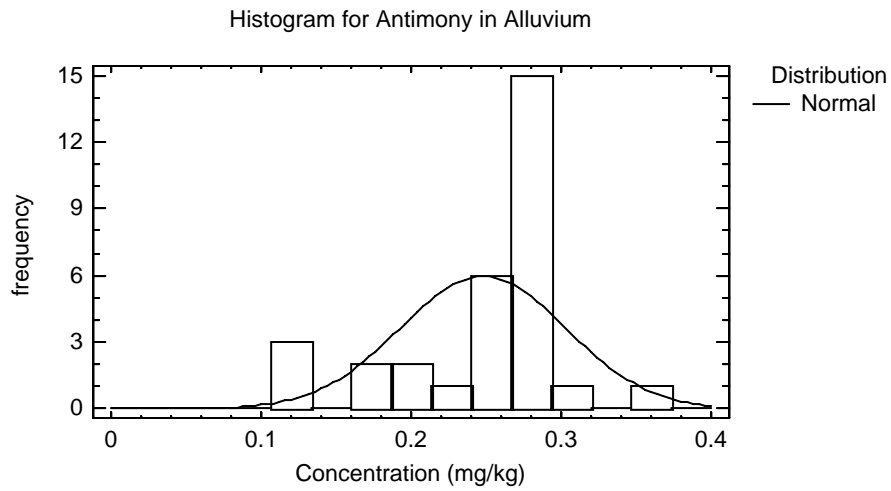
Data variable: Antimony

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

31 values ranging from 0.11 to 0.356

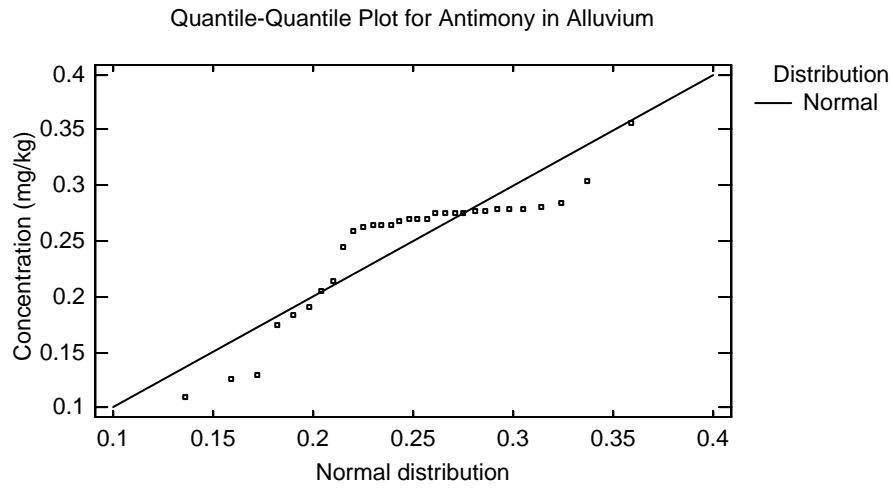
Fitted Distributions

Normal
mean = 0.247855
standard deviation = 0.0552639



Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.823771	0.0000785667



**DRAFT**

**Uncensored Data - log(Antimony) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

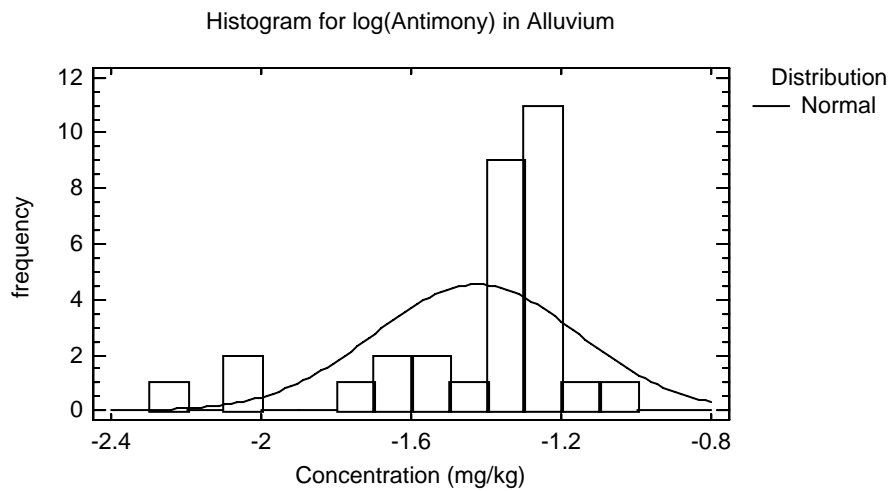
Data variable: log(Antimony)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

31 values ranging from -2.20727 to -1.03282

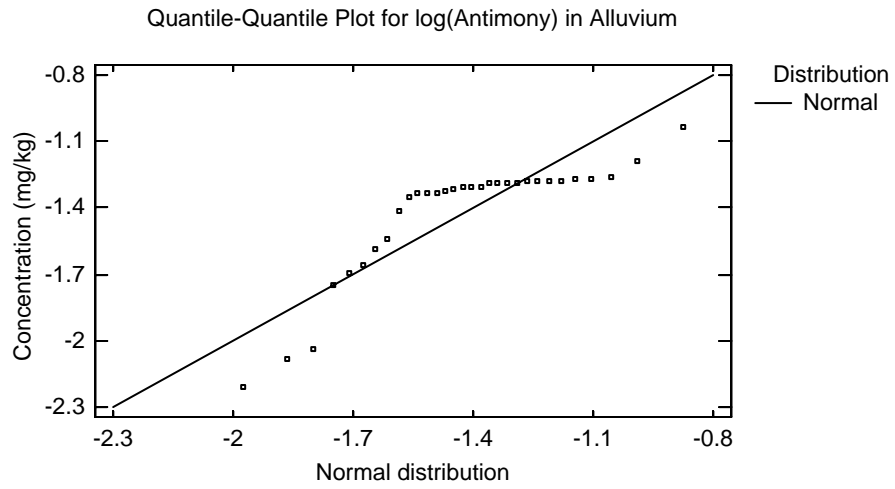
Fitted Distributions

Normal
mean = -1.42605
standard deviation = 0.271995



Tests for Normality for log(Antimony)

Test	Statistic	P-Value
Shapiro-Wilk W	0.75489	0.00000214308



**DRAFT**

**Uncensored Data - Antimony (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

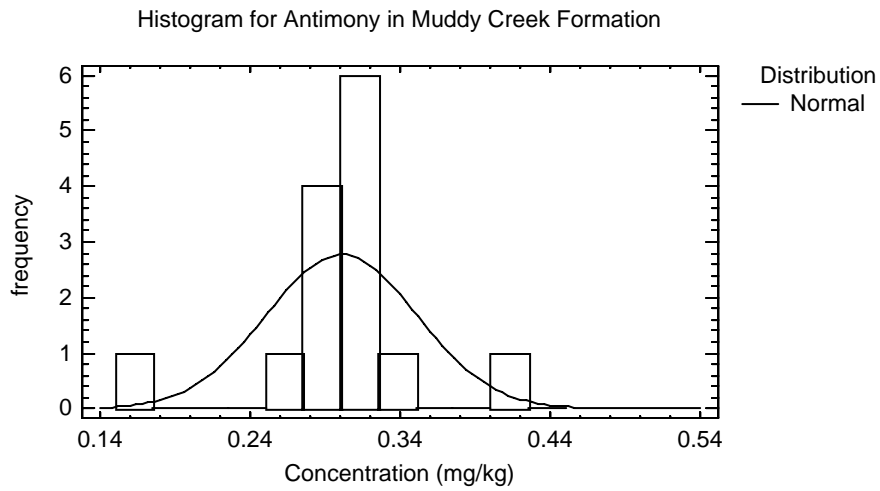
Data variable: Antimony

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

14 values ranging from 0.17 to 0.4105

Fitted Distributions

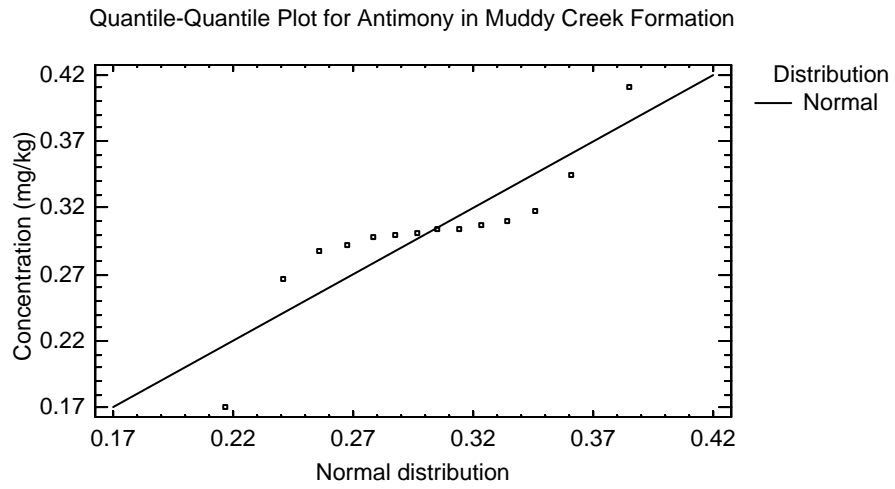
Normal
mean = 0.300875
standard deviation = 0.0503628



Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.813967	0.00686717





**DRAFT**

**Uncensored Data - log(Antimony) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

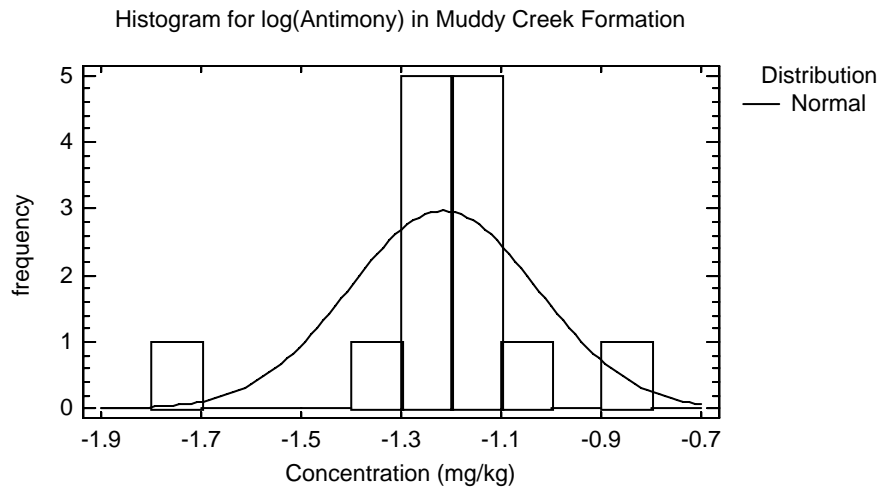
Data variable: log(Antimony)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

14 values ranging from -1.77196 to -0.890379

Fitted Distributions

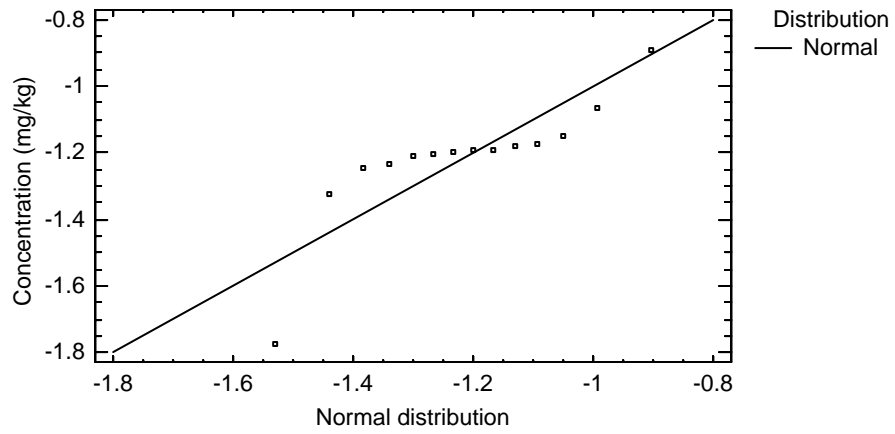
Normal
mean = -1.21608
standard deviation = 0.188198



Tests for Normality for log(Antimony)

Test	Statistic	P-Value
Shapiro-Wilk W	0.74683	0.000911631

Quantile-Quantile Plot for log(Antimony) in Muddy Creek Formation



**DRAFT**

## Tronox Antimony by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.275747831$   $p = 0.782741755$

Do not reject the null hypothesis for  $\alpha = 0.05$

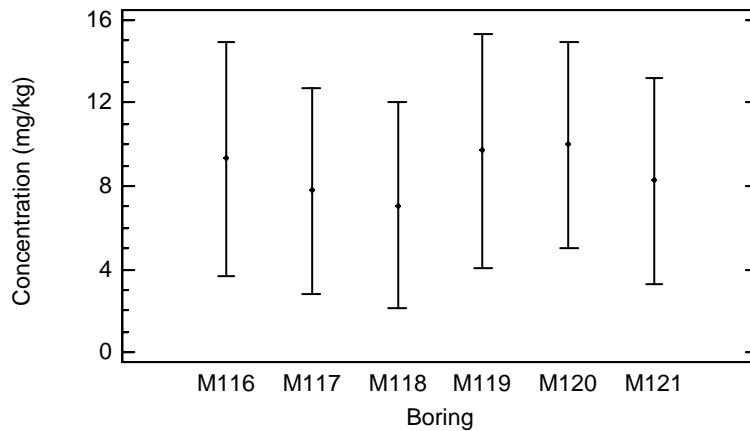
DRAFT

### 2.3 Arsenic

ANOVA Table for Arsenic by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	57.3594	5	11.4719	0.23	0.9469
Within groups	2184.03	44	49.6371		
Total (Corr.)	2241.39	49			

Means and 95.0 Percent Tukey HSD Intervals for Arsenic



Kruskal-Wallis Test for Arsenic by Location ID

Location ID	Sample Size	Average Rank
M116	7	24.0
M117	9	24.1111
M118	9	23.6667
M119	7	28.8571
M120	9	27.8889
M121	9	24.8889

Test statistic = 0.926947 P-Value = 0.96824

**DRAFT**

**Uncensored Data - Arsenic (Data Set = "Tronox")**

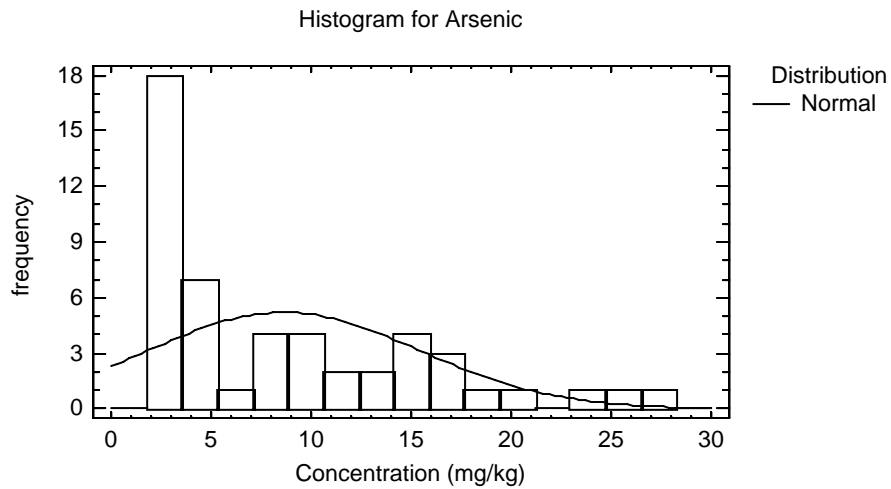
Data variable: Arsenic

Selection variable: Data Set = "Tronox"

50 values ranging from 2.11 to 26.6

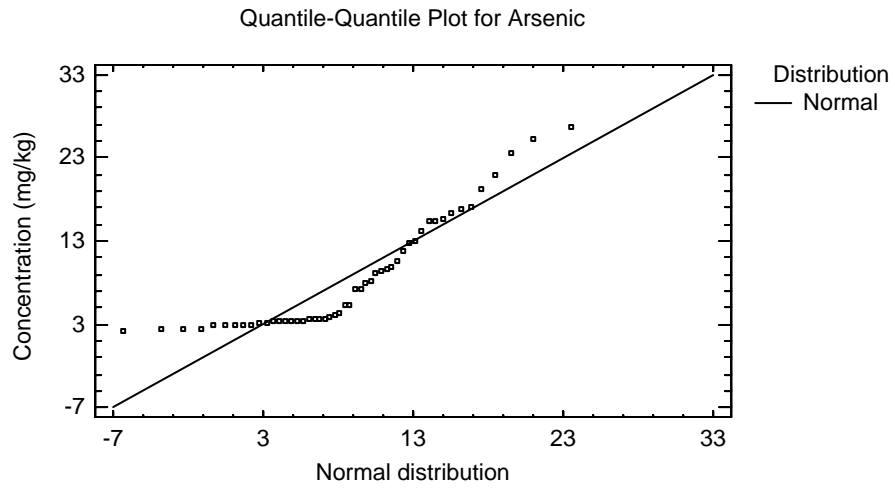
Fitted Distributions

Normal
mean = 8.6295
standard deviation = 6.76333



Tests for Normality for Arsenic

Test	Statistic	P-Value
Shapiro-Wilk W	0.826829	1.41441E-7



**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set = "Tronox")**

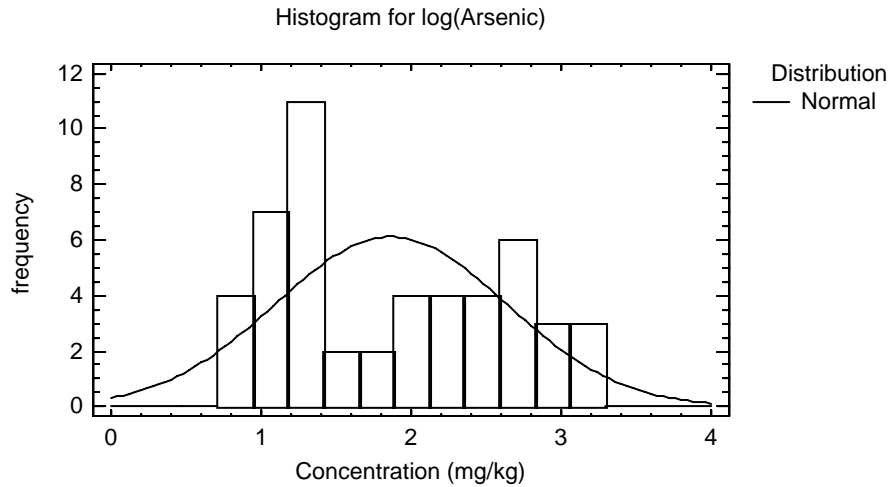
Data variable: log(Arsenic)

Selection variable: Data Set = "Tronox"

50 values ranging from 0.746688 to 3.28091

Fitted Distributions

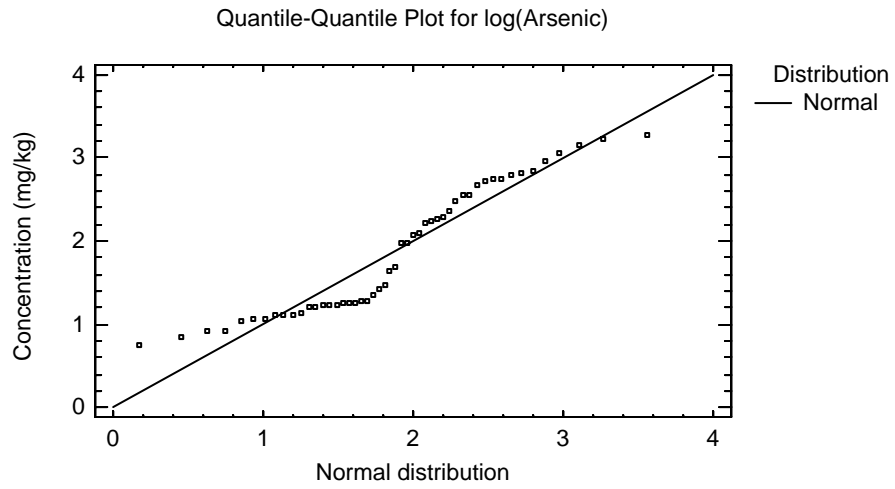
Normal
mean = 1.86435
standard deviation = 0.767109



Tests for Normality for log(Arsenic)

Test	Statistic	P-Value
Shapiro-Wilk W	0.891513	0.00010641





**DRAFT**

**Uncensored Data - Arsenic (Data Set = "Tronox"&Depth Value<=20)**

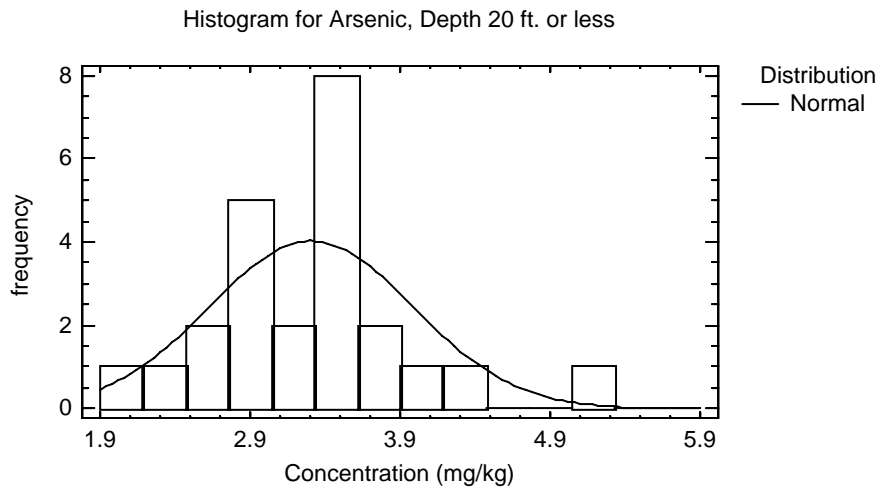
Data variable: Arsenic

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 2.11 to 5.2

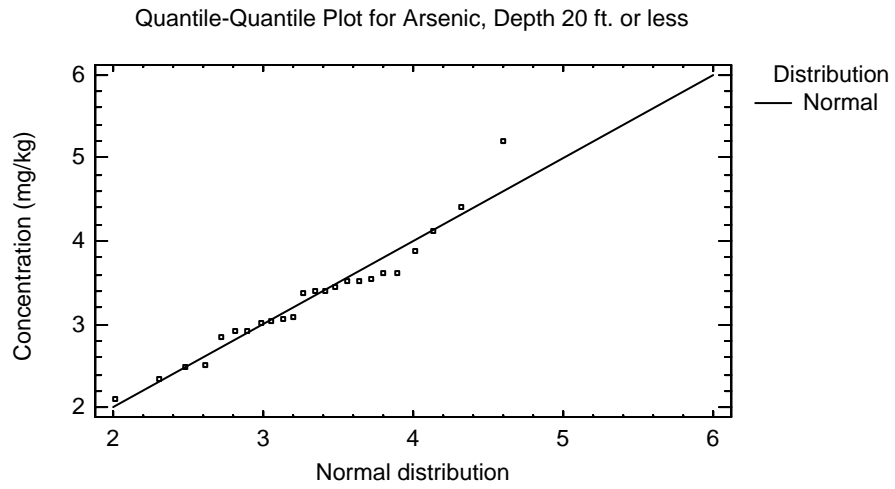
Fitted Distributions

Normal
mean = 3.30729
standard deviation = 0.679083



Tests for Normality for Arsenic

Test	Statistic	P-Value
Shapiro-Wilk W	0.952893	0.320023



**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set = "Tronox"&Depth Value<=20)**

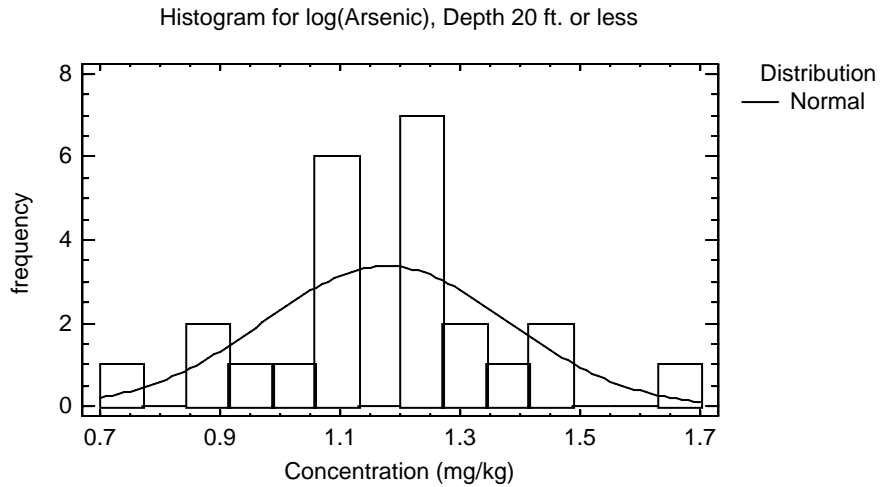
Data variable: log(Arsenic)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.746688 to 1.64866

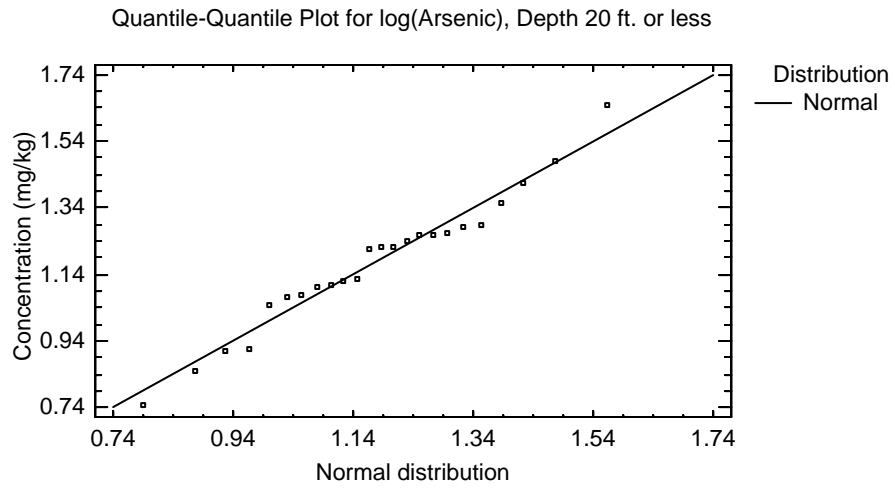
Fitted Distributions

Normal
mean = 1.17645
standard deviation = 0.202481



Tests for Normality for log(Arsenic)

Test	Statistic	P-Value
Shapiro-Wilk W	0.976706	0.821057



**DRAFT**

**Uncensored Data - Arsenic (Data Set = "Tronox"&Depth Value>=30)**

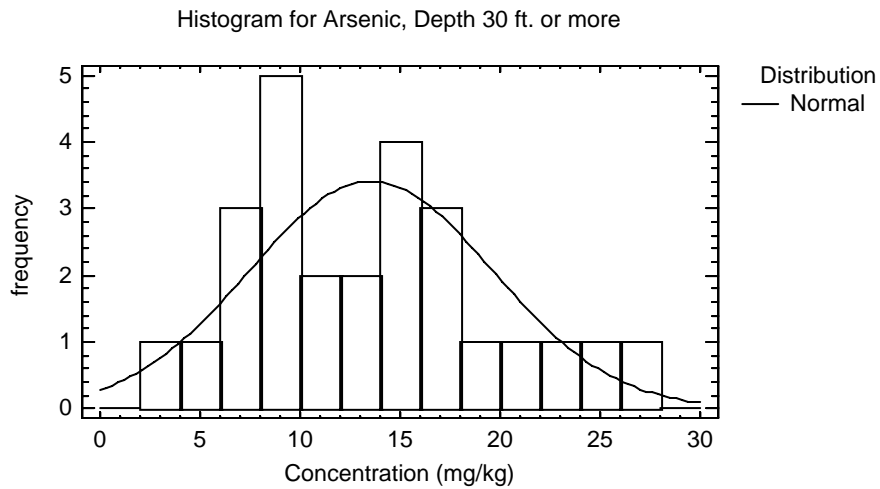
Data variable: Arsenic

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 3.37 to 26.6

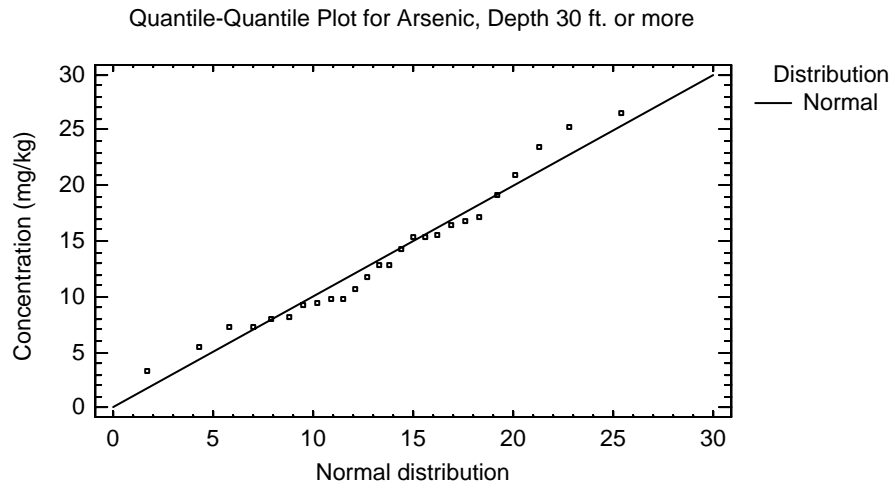
Fitted Distributions

Normal
mean = 13.5423
standard deviation = 6.07761



Tests for Normality for Arsenic

Test	Statistic	P-Value
Shapiro-Wilk W	0.960323	0.41749



**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set = "Tronox"&Depth Value>=30)**

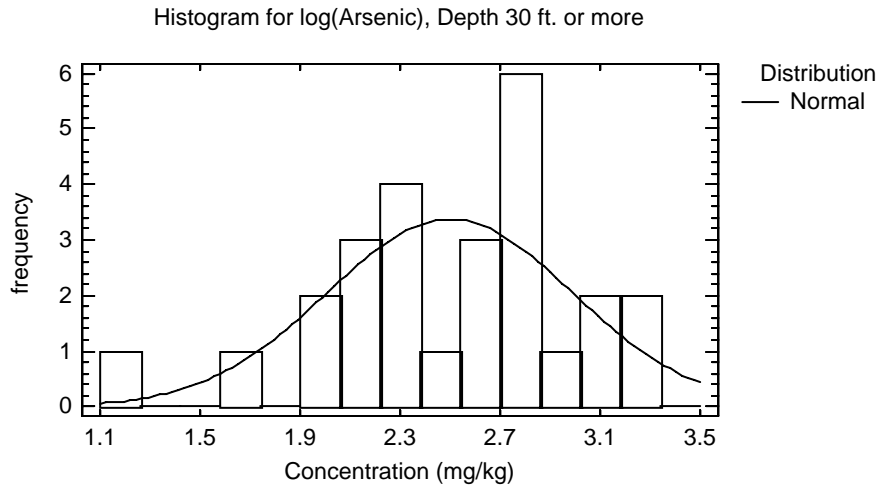
Data variable: log(Arsenic)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 1.21491 to 3.28091

Fitted Distributions

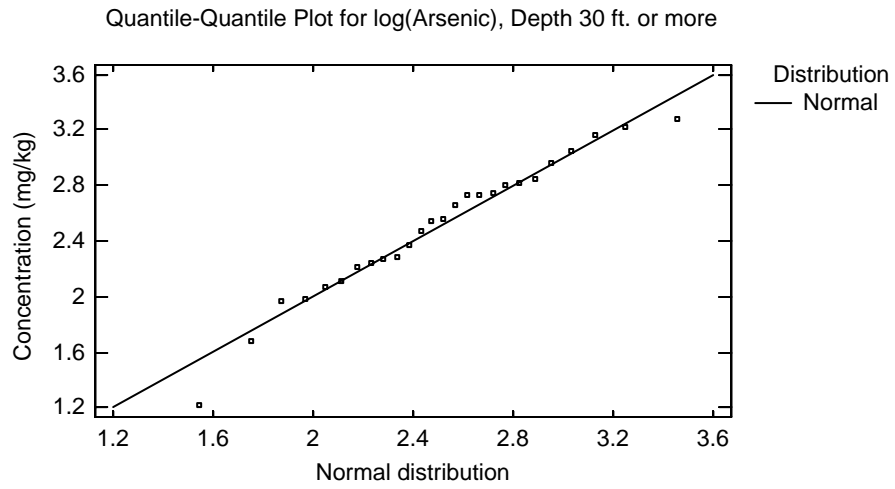
Normal
mean = 2.49933
standard deviation = 0.491987



Tests for Normality for log(Arsenic)

Test	Statistic	P-Value
Shapiro-Wilk W	0.968899	0.610106





**DRAFT**

**Two-Sample Comparison - Arsenic & Depth Range (Data Set="Tronox") for Arsenic**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 2.11 to 5.2  
 Sample 2: 26 values ranging from 3.37 to 26.6

Comparison of Means for Arsenic

95.0% confidence interval for mean of Depth Range=20 ft. or less: 3.30729 +/- 0.286752 [3.02054, 3.59404]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 13.5423 +/- 2.45481 [11.0875, 15.9971]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -10.235 +/- 2.46806 [-12.7031, -7.76696]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -8.52953 P-value = 5.76829E-9  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Arsenic

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.679083	6.07761
Variance	0.461154	36.9374
Df	23	25

Ratio of Variances = 0.0124848

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.527793, 0.952591]  
 Standard deviation of Depth Range=30 ft. or more: [4.76641, 8.38959]  
 Ratio of Variances: [0.0055363, 0.0285539]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.0124848 P-value = 0.0  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Arsenic (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

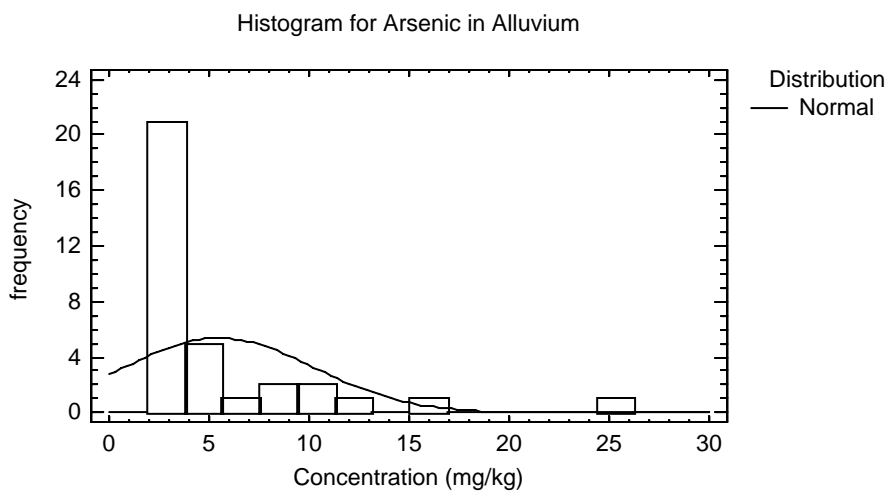
Data variable: Arsenic

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2.11 to 25.2

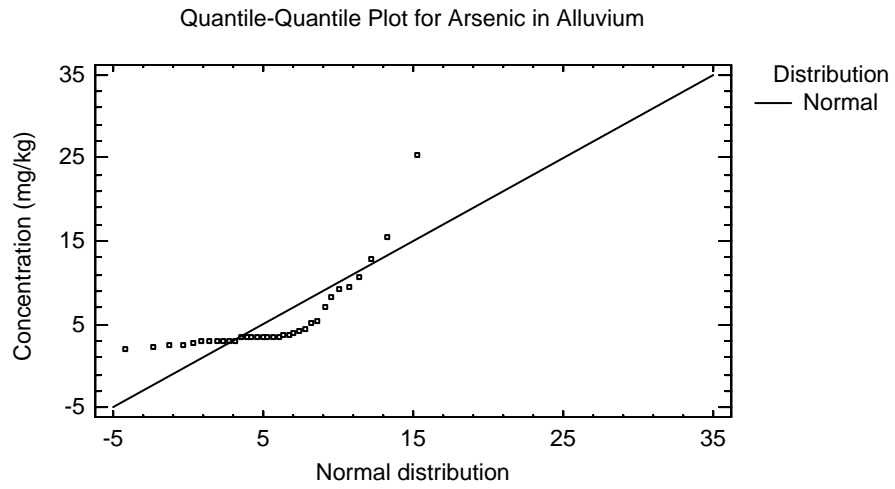
Fitted Distributions

Normal
mean = 5.48206
standard deviation = 4.73375



Tests for Normality for Arsenic

Test	Statistic	P-Value
Shapiro-Wilk W	0.646066	2.57223E-9



**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

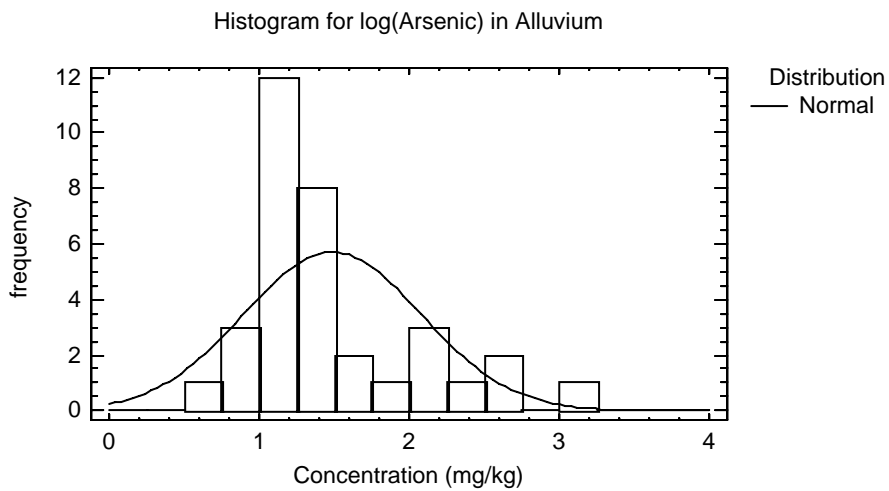
Data variable: log(Arsenic)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.746688 to 3.22684

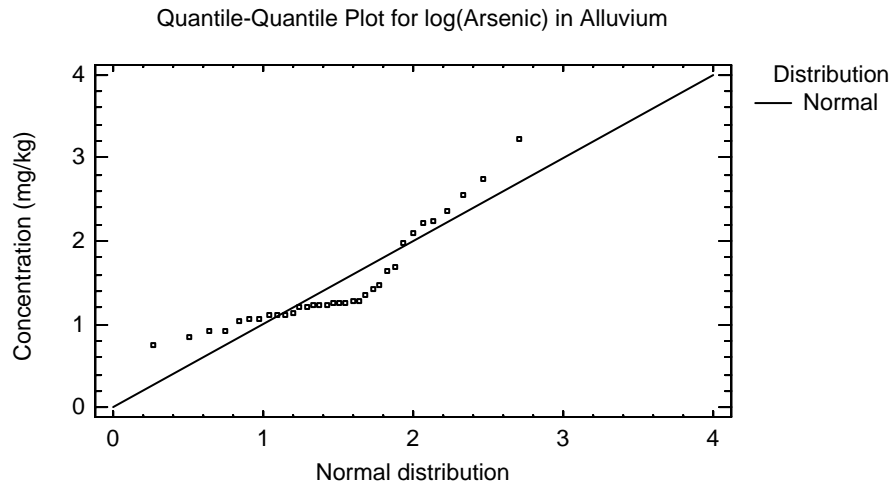
Fitted Distributions

Normal
mean = 1.48711
standard deviation = 0.593158



Tests for Normality for log(Arsenic)

Test	Statistic	P-Value
Shapiro-Wilk W	0.84358	0.000107248



**DRAFT**

**Uncensored Data - Arsenic (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

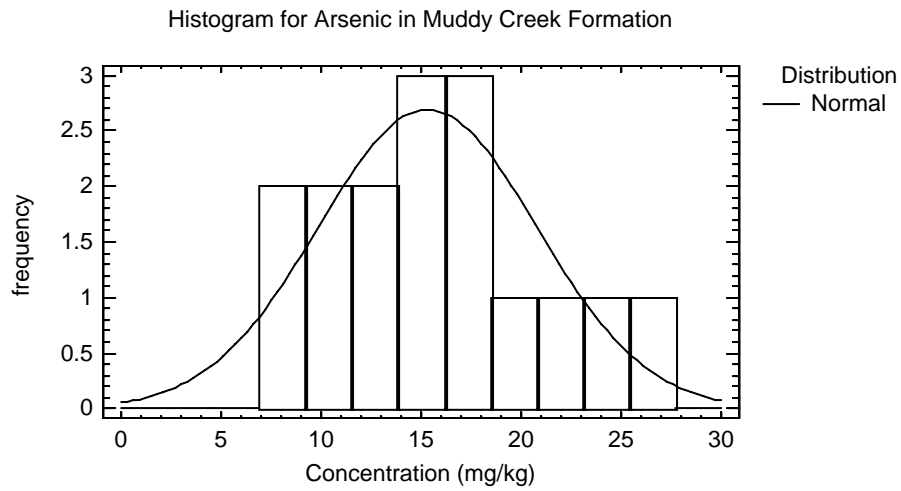
Data variable: Arsenic

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 7.27 to 26.6

Fitted Distributions

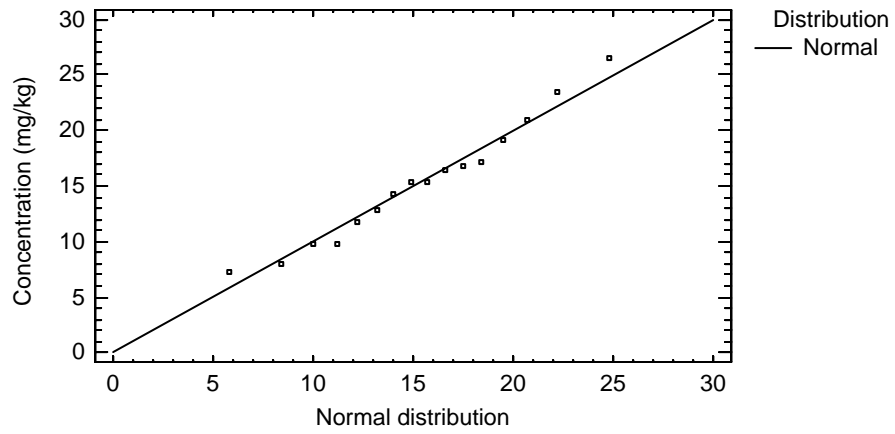
Normal
mean = 15.3178
standard deviation = 5.47333



Tests for Normality for Arsenic

Test	Statistic	P-Value
Shapiro-Wilk W	0.969892	0.805866

Quantile-Quantile Plot for Arsenic in Muddy Creek Formation





**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

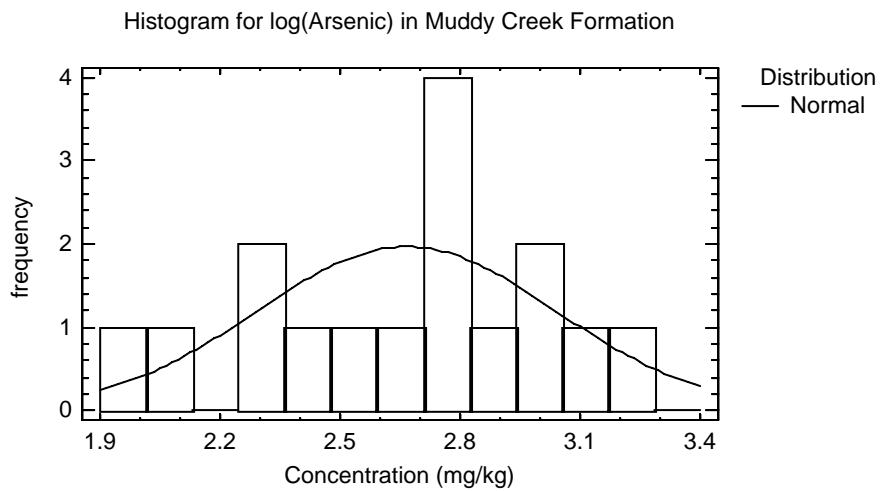
Data variable: log(Arsenic)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 1.98376 to 3.28091

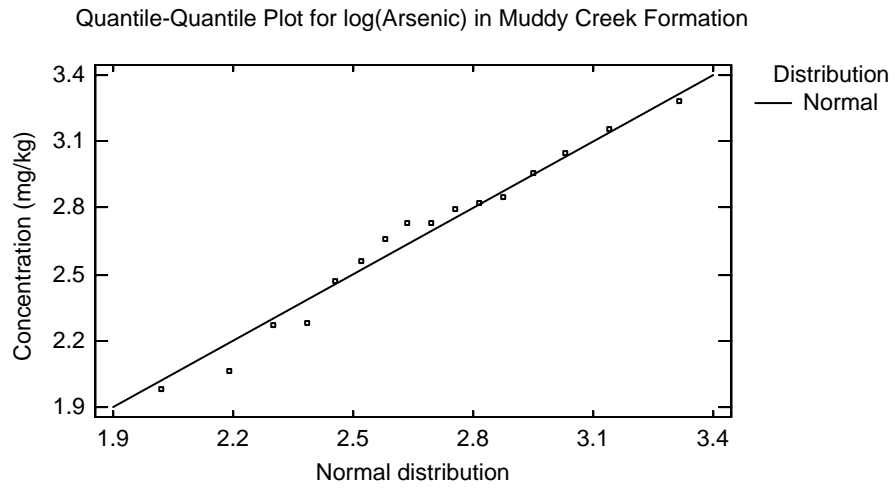
Fitted Distributions

Normal
mean = 2.66598
standard deviation = 0.37449



Tests for Normality for log(Arsenic)

Test	Statistic	P-Value
Shapiro-Wilk W	0.970382	0.813721



**DRAFT****Two-Sample Comparison - Arsenic & Geological Formation 1 (Data Set="Tronox") for Arsenic**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 2.11 to 25.2

Sample 2: 16 values ranging from 7.27 to 26.6

Comparison of Medians for Arsenic

Median of sample 1: 3.515

Median of sample 2: 15.35

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 18.6471

Average rank of sample 2: 40.0625

W = 233.0 P-value = 0.00000133081

Reject the null hypothesis for alpha = 0.05.

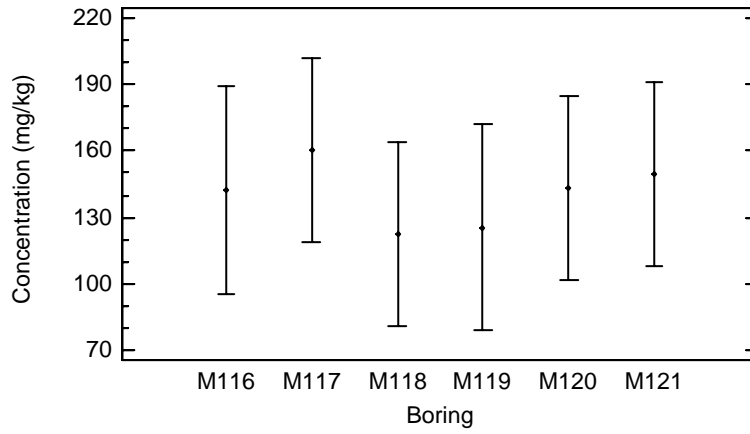
DRAFT

## 2.4 Barium

ANOVA Table for Barium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	8816.02	5	1763.2	0.51	0.7662
Within groups	151753.	44	3448.92		
Total (Corr.)	160569.	49			

Means and 95.0 Percent Tukey HSD Intervals for Barium



Kruskal-Wallis Test for Barium by Location ID

Location ID	Sample Size	Average Rank
M116	7	25.0
M117	9	30.0
M118	9	21.1667
M119	7	22.2857
M120	9	25.8889
M121	9	27.8333

Test statistic = 2.23926 P-Value = 0.815145

**DRAFT**

**Uncensored Data - Barium (Data Set = "Tronox")**

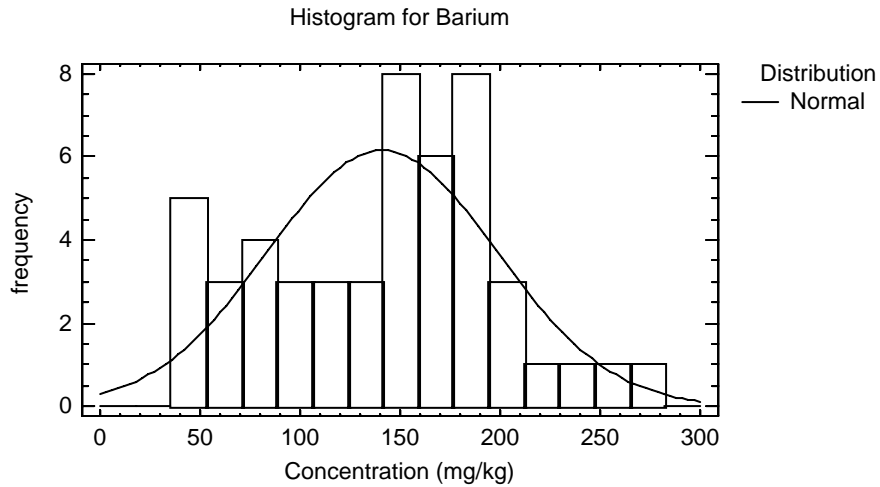
Data variable: Barium

Selection variable: Data Set = "Tronox"

50 values ranging from 46.0 to 272.0

Fitted Distributions

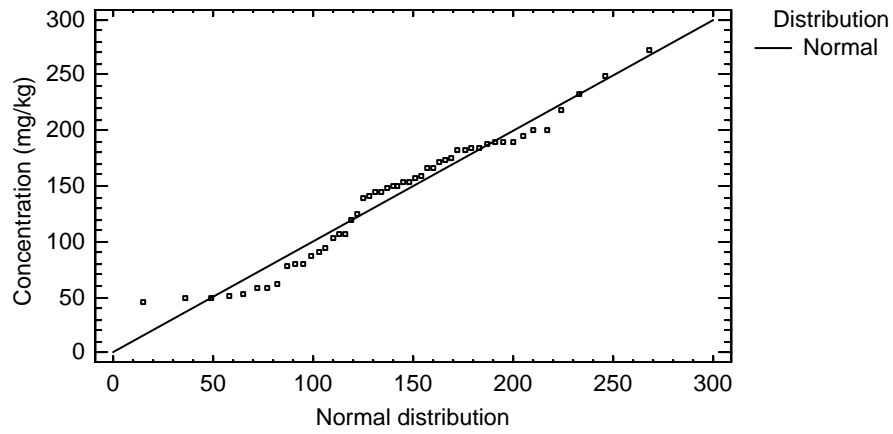
Normal
mean = 141.036
standard deviation = 57.2443



Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.948876	0.0516171

Quantile-Quantile Plot for Barium



**DRAFT**

**Uncensored Data - log(Barium) (Data Set = "Tronox")**

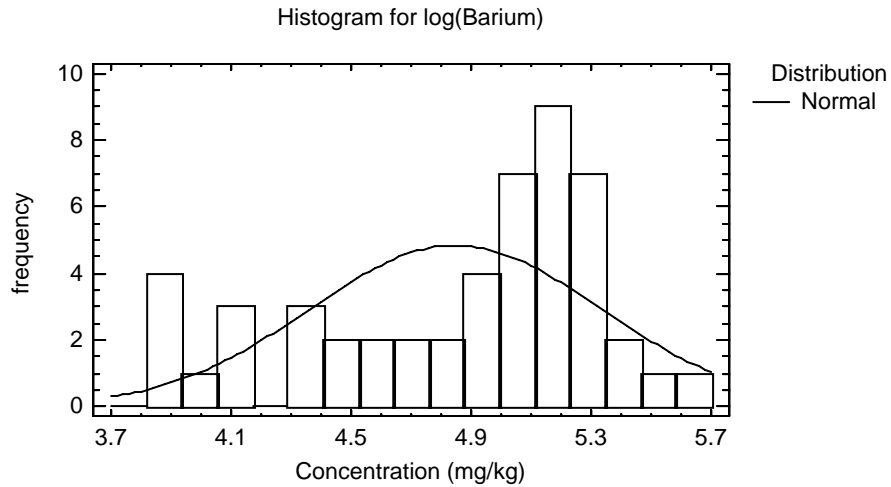
Data variable: log(Barium)

Selection variable: Data Set = "Tronox"

50 values ranging from 3.82864 to 5.6058

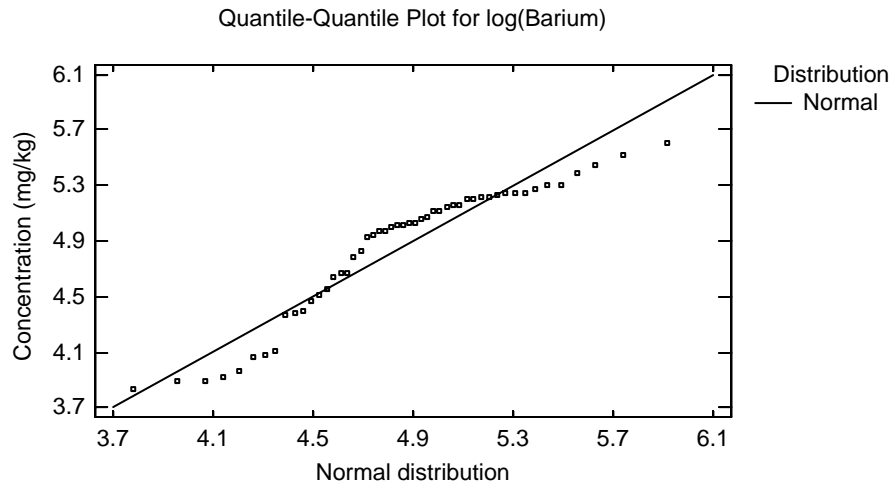
Fitted Distributions

Normal
mean = 4.84807
standard deviation = 0.484692



Tests for Normality for log(Barium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.892294	0.000115666





**DRAFT**

**Uncensored Data - Barium (Data Set = "Tronox"&Depth Value<=20)**

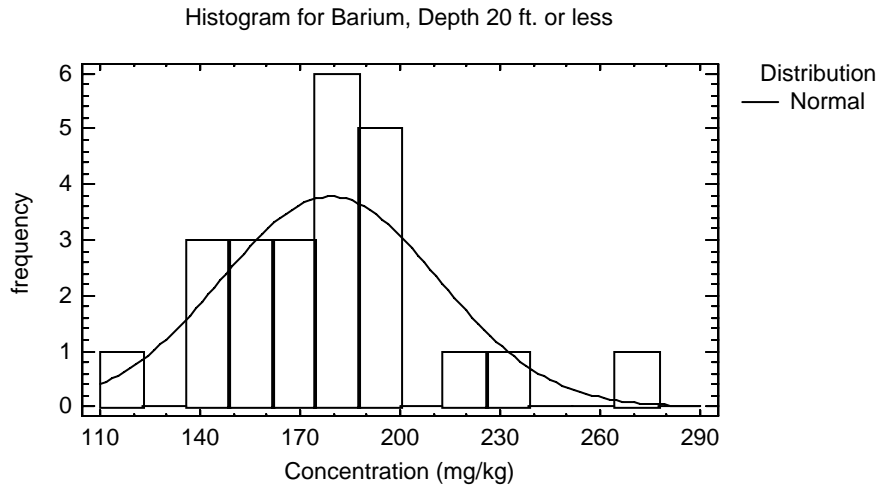
Data variable: Barium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 120.0 to 272.0

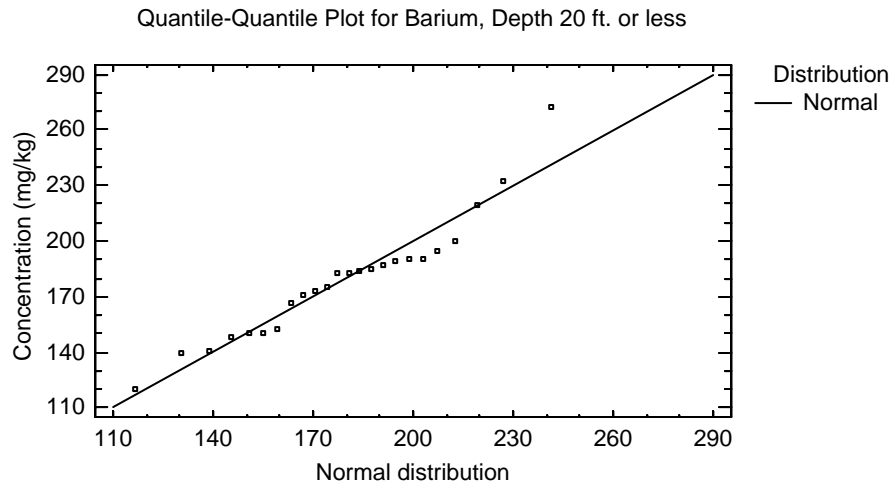
Fitted Distributions

Normal
mean = 178.979
standard deviation = 32.5722



Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.940519	0.172305



**DRAFT**

**Uncensored Data - log(Barium) (Data Set = "Tronox"&Depth Value<=20)**

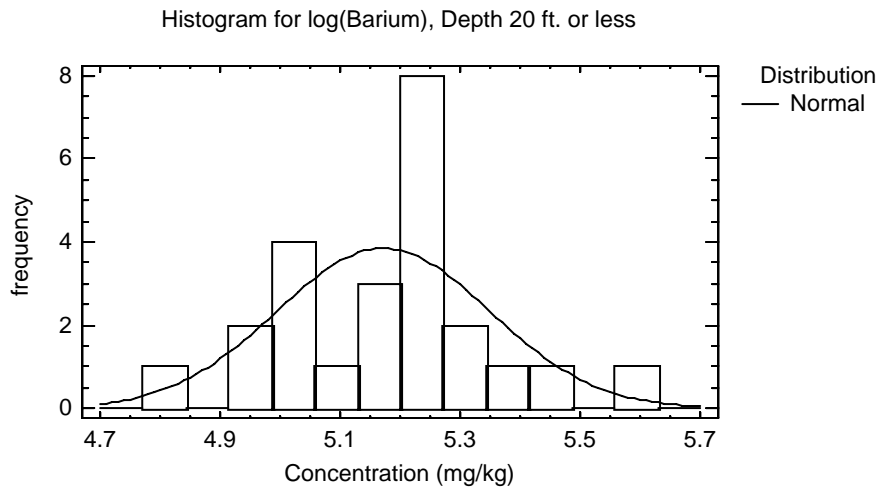
Data variable: log(Barium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 4.78749 to 5.6058

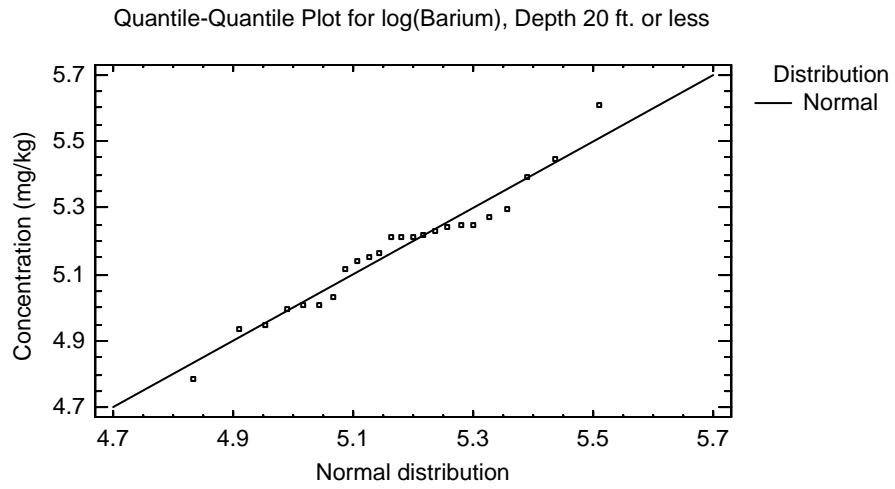
Fitted Distributions

Normal
mean = 5.17199
standard deviation = 0.177703



Tests for Normality for log(Barium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.969362	0.651438



**DRAFT**

**Uncensored Data - Barium (Data Set = "Tronox"&Depth Value>=30)**

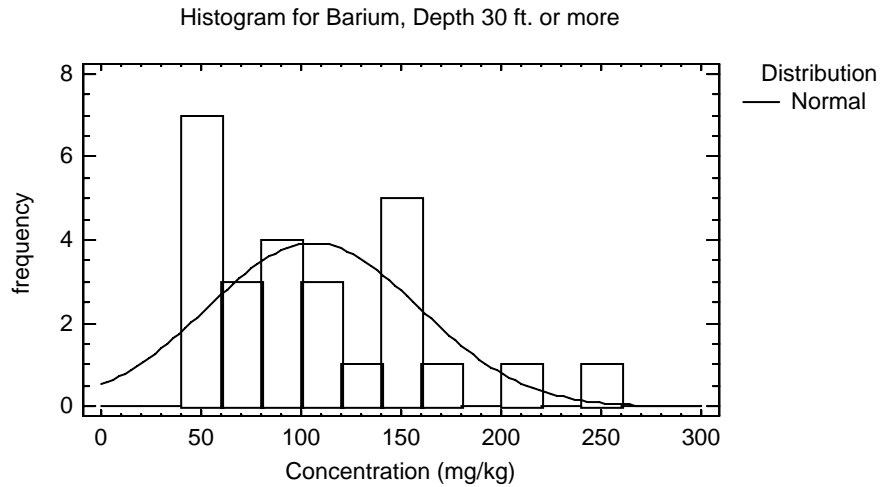
Data variable: Barium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 46.0 to 249.0

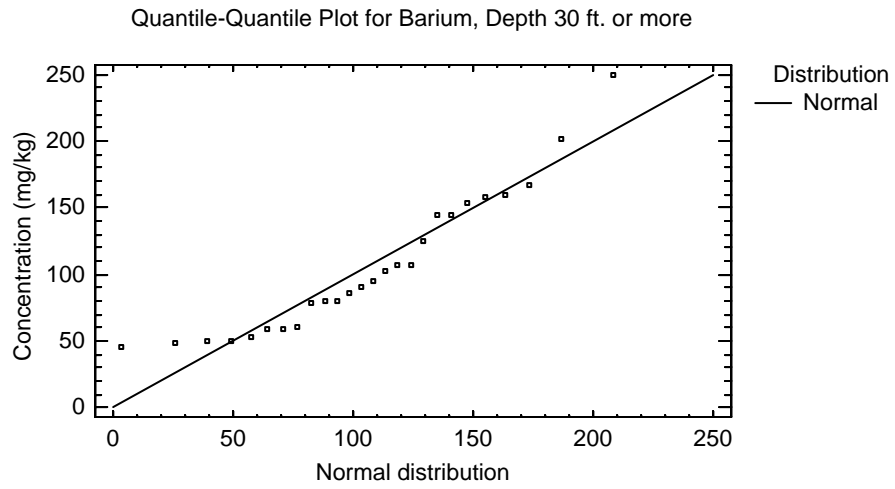
Fitted Distributions

Normal
mean = 106.012
standard deviation = 52.8091



Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.905781	0.0213957



**DRAFT**

**Uncensored Data - log(Barium) (Data Set = "Tronox"&Depth Value>=30)**

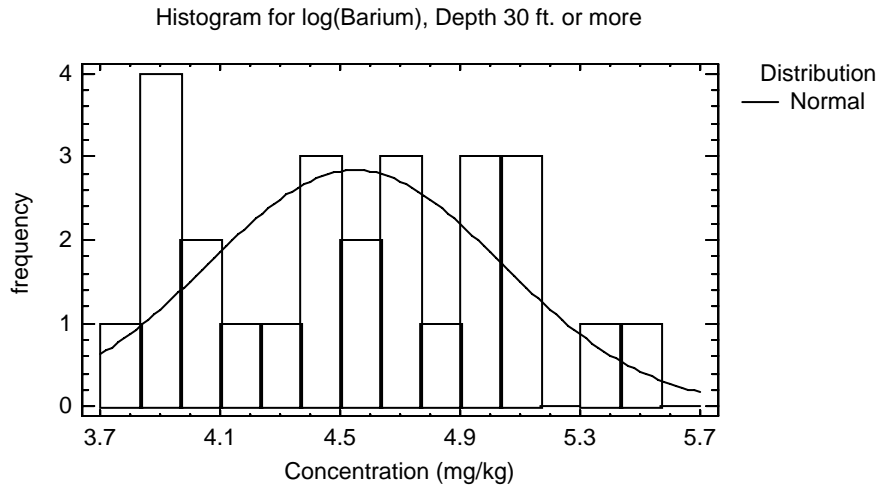
Data variable: log(Barium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 3.82864 to 5.51745

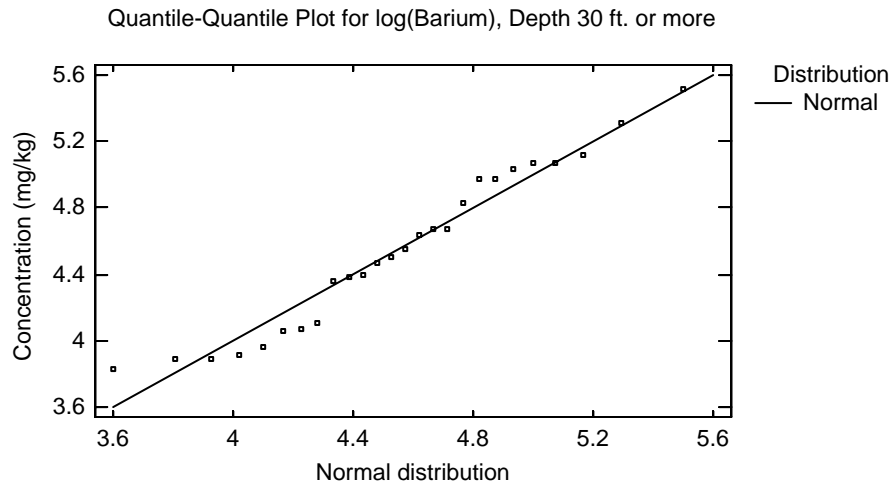
Fitted Distributions

Normal
mean = 4.54907
standard deviation = 0.487541



Tests for Normality for log(Barium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.949632	0.243123





**DRAFT**

**Two-Sample Comparison - log(Barium) & Depth Range (Data Set="Tronox") for log(Barium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 4.78749 to 5.6058  
 Sample 2: 26 values ranging from 3.82864 to 5.51745

Comparison of Means for log(Barium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 5.17199 +/- 0.0750377 [5.09696, 5.24703]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 4.54907 +/- 0.196922 [4.35215, 4.74599]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: 0.622925 +/- 0.208307 [0.414618, 0.831232]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = 6.09134 P-value = 8.34129E-7  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Barium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.177703	0.487541
Variance	0.0315785	0.237696
Df	23	25

Ratio of Variances = 0.132853

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.138114, 0.249275]  
 Standard deviation of Depth Range=30 ft. or more: [0.382357, 0.673005]  
 Ratio of Variances: [0.0589128, 0.303847]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.132853 P-value = 0.00000695578  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Barium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

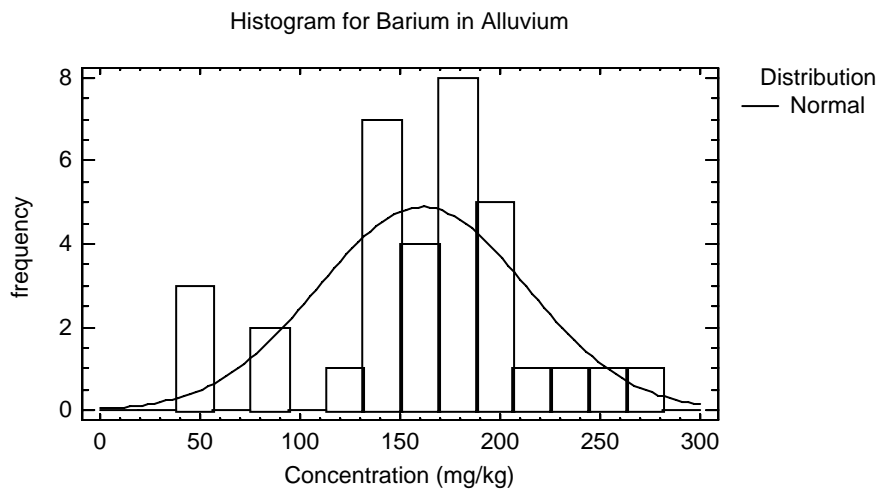
Data variable: Barium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 49.3 to 272.0

Fitted Distributions

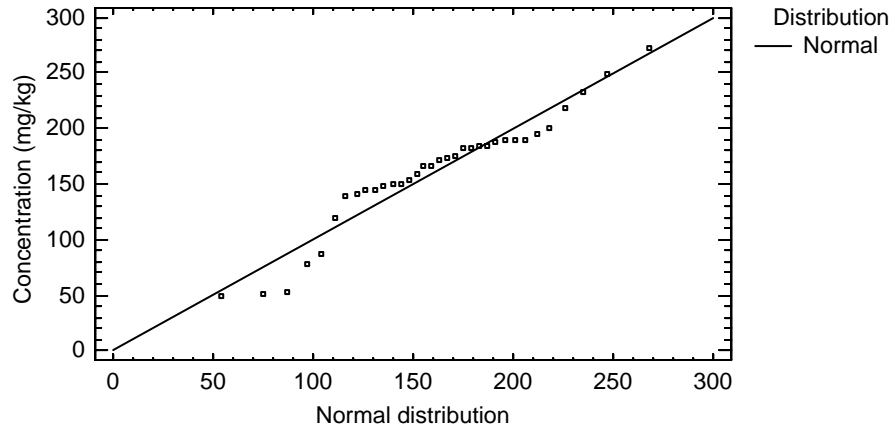
Normal
mean = 161.135
standard deviation = 51.9974



Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.933415	0.0488986

Quantile-Quantile Plot for Barium in Alluvium



**DRAFT**

**Uncensored Data - log(Barium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

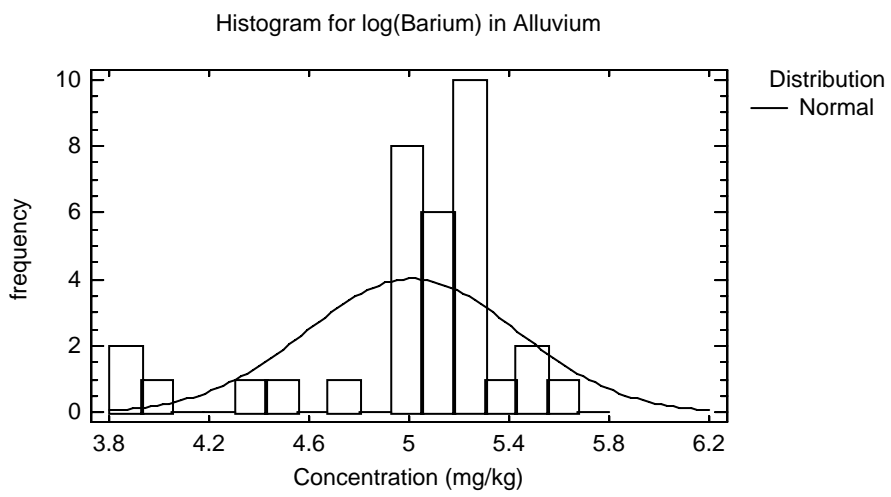
Data variable: log(Barium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 3.89792 to 5.6058

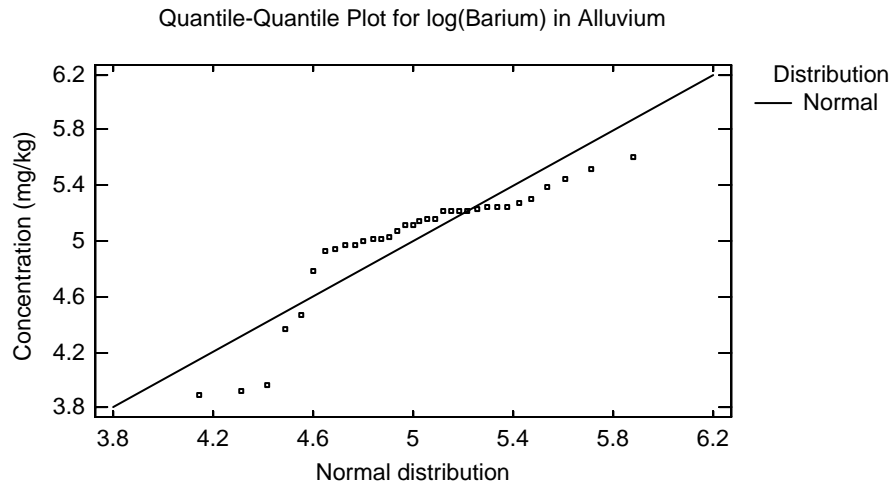
Fitted Distributions

Normal
mean = 5.01166
standard deviation = 0.421728



Tests for Normality for log(Barium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.806916	0.0000114036



**DRAFT**

**Uncensored Data - Barium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

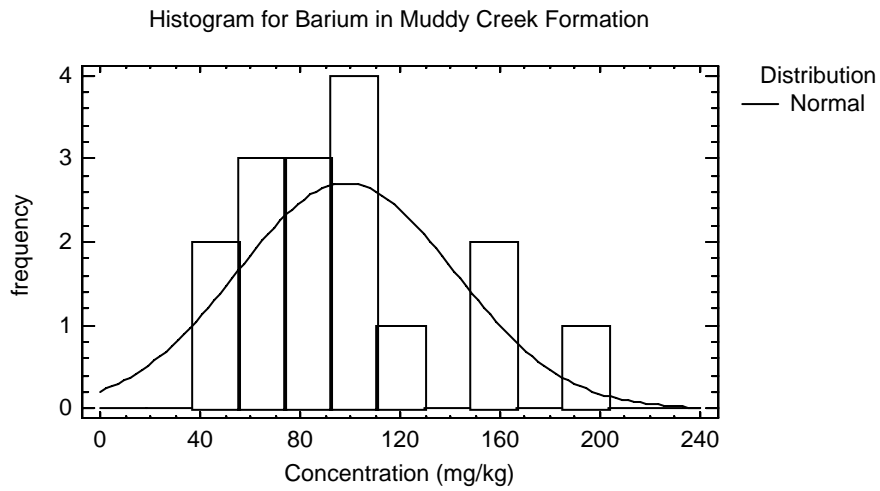
Data variable: Barium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 46.0 to 201.0

Fitted Distributions

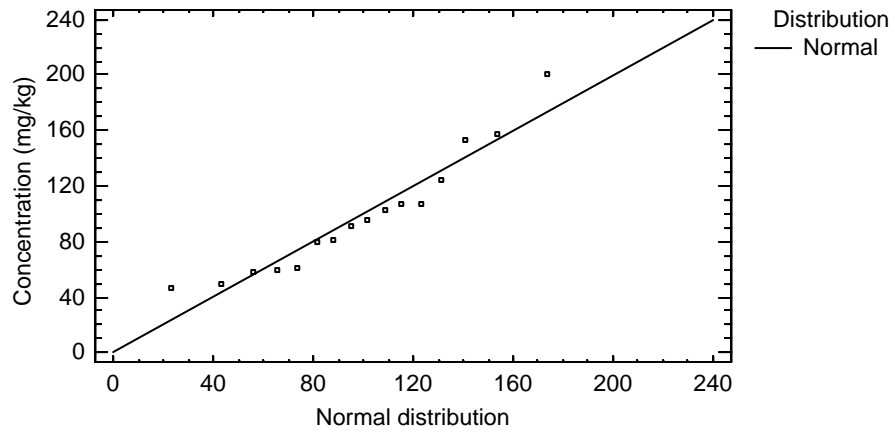
Normal
mean = 98.325
standard deviation = 43.5297



Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.920593	0.173957

Quantile-Quantile Plot for Barium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Barium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

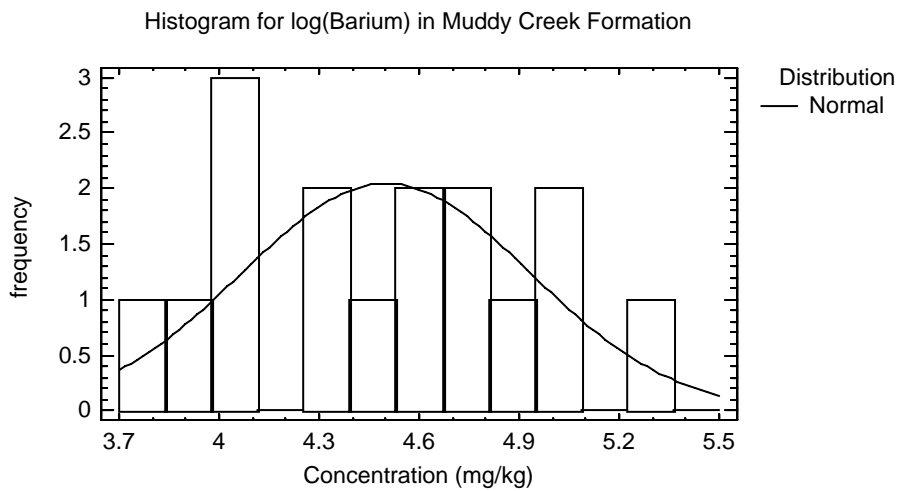
Data variable: log(Barium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 3.82864 to 5.3033

Fitted Distributions

Normal
mean = 4.50046
standard deviation = 0.431968

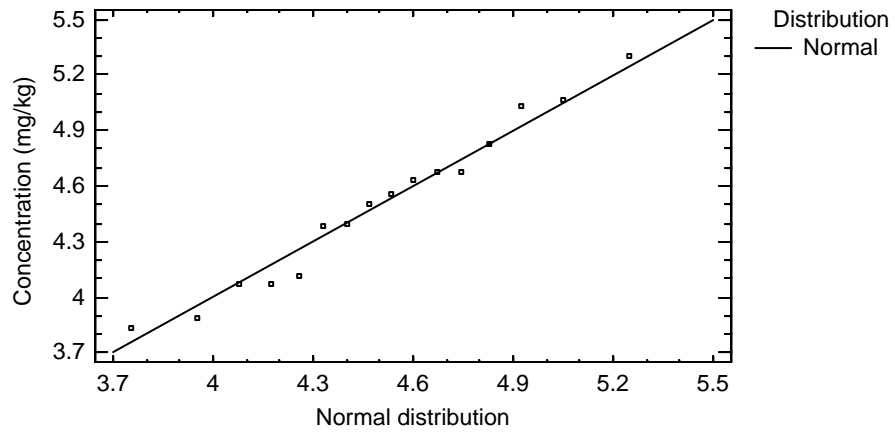


Tests for Normality for log(Barium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.969113	0.793217



Quantile-Quantile Plot for log(Barium) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Barium & Geological Formation 1 (Data Set="Tronox") for Barium**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 49.3 to 272.0

Sample 2: 16 values ranging from 46.0 to 201.0

Comparison of Medians for Barium

Median of sample 1: 169.0

Median of sample 2: 92.75

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 30.3971

Average rank of sample 2: 15.0938

W = -166.5 P-value = 0.000554637

Reject the null hypothesis for alpha = 0.05.

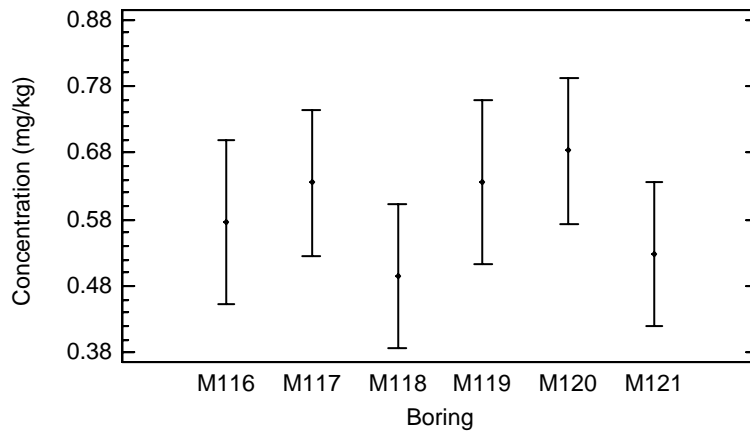
DRAFT

## 2.5 Beryllium

ANOVA Table for Beryllium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.228139	5	0.0456278	1.90	0.1138
Within groups	1.05693	44	0.024021		
Total (Corr.)	1.28506	49			

Means and 95.0 Percent Tukey HSD Intervals for Beryllium



Kruskal-Wallis Test for Beryllium by Location ID

Location ID	Sample Size	Average Rank
M116	7	24.5714
M117	9	31.0556
M118	9	16.0
M119	7	32.7857
M120	9	31.3889
M121	9	18.6111

Test statistic = 10.3862 P-Value = 0.0650032

**DRAFT**

**Uncensored Data - Beryllium (Data Set = "Tronox")**

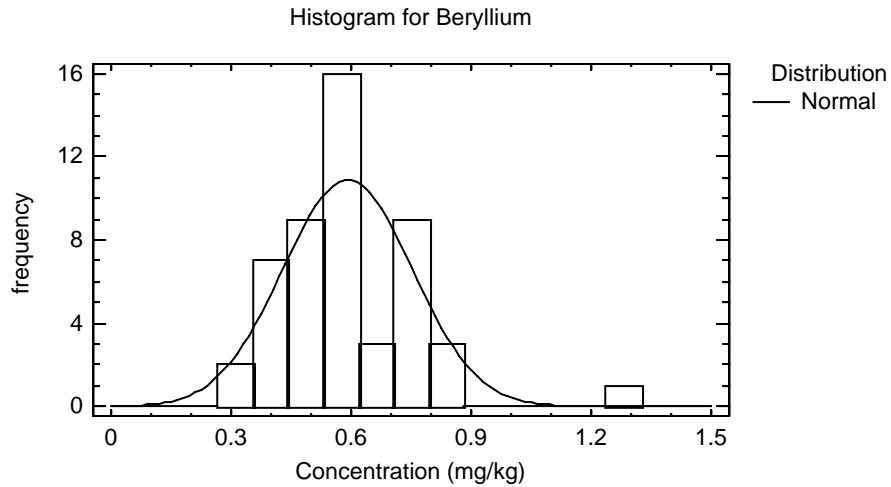
Data variable: Beryllium

Selection variable: Data Set = "Tronox"

50 values ranging from 0.317 to 1.27

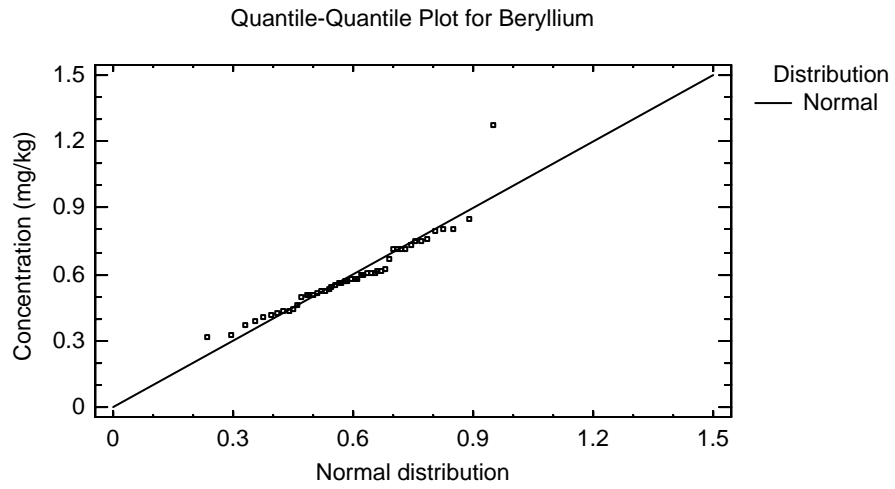
Fitted Distributions

Normal
mean = 0.59092
standard deviation = 0.161944



Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.913157	0.00110051



**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set = "Tronox")**

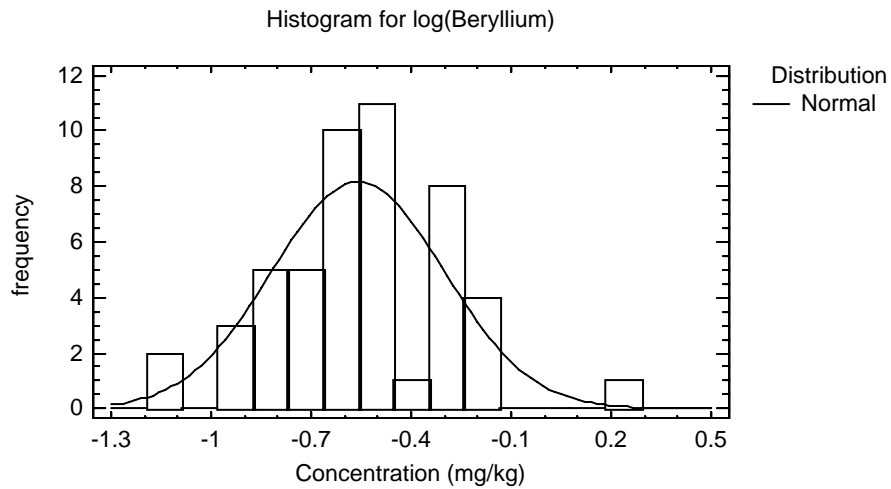
Data variable: log(Beryllium)

Selection variable: Data Set = "Tronox"

50 values ranging from -1.14885 to 0.239017

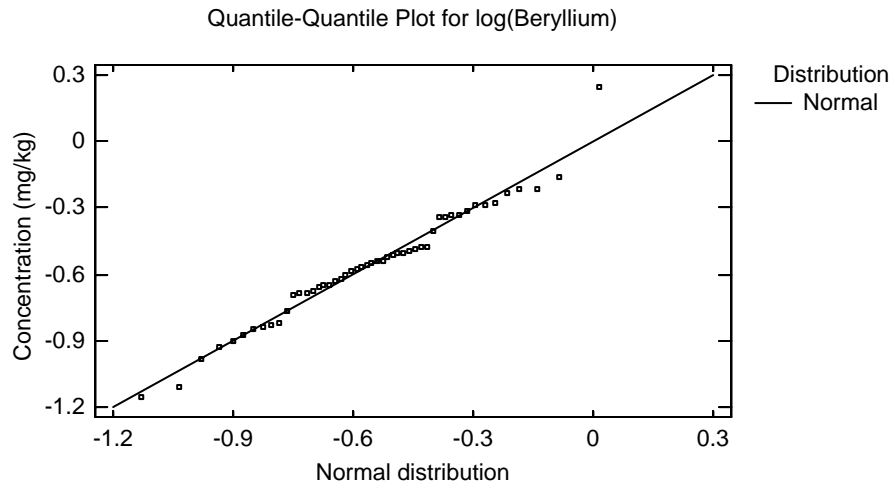
Fitted Distributions

Normal
mean = -0.559594
standard deviation = 0.259035



Tests for Normality for log(Beryllium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.980447	0.744507



**DRAFT**

**Uncensored Data - Beryllium (Data Set = "Tronox"&Depth Value<=20)**

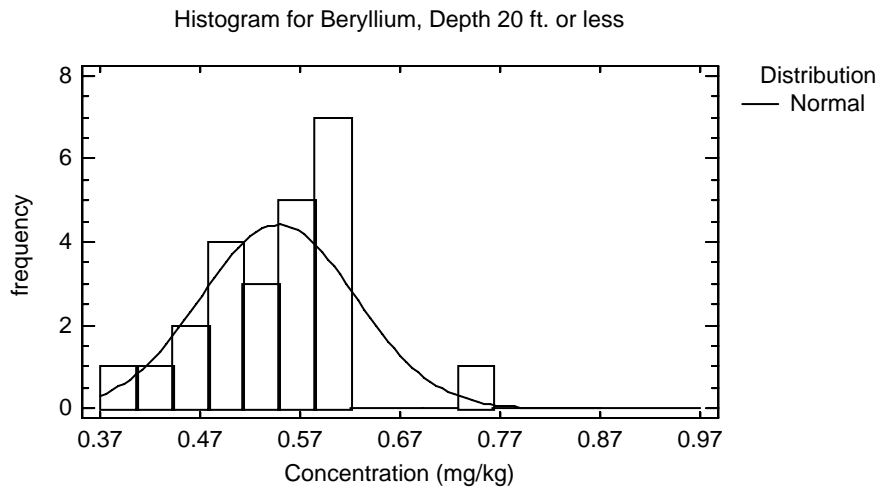
Data variable: Beryllium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.394 to 0.758

Fitted Distributions

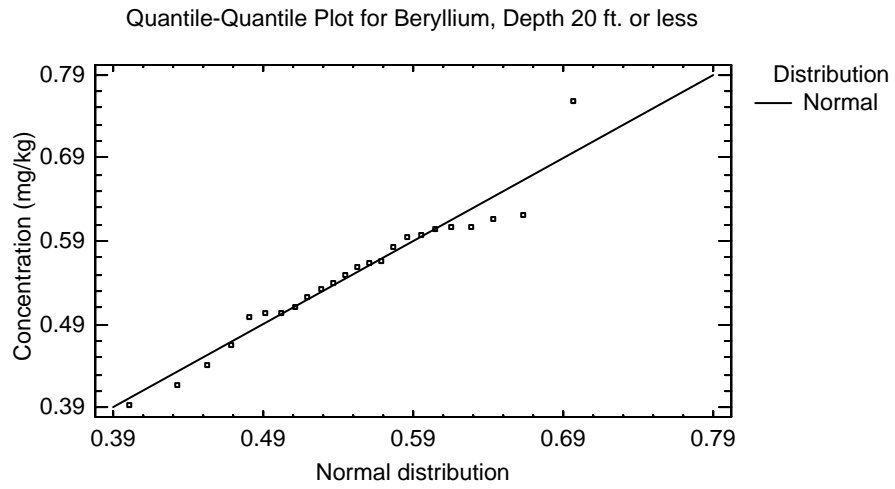
Normal
mean = 0.548208
standard deviation = 0.077471



Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.955279	0.358498





**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set = "Tronox"&Depth Value<=20)**

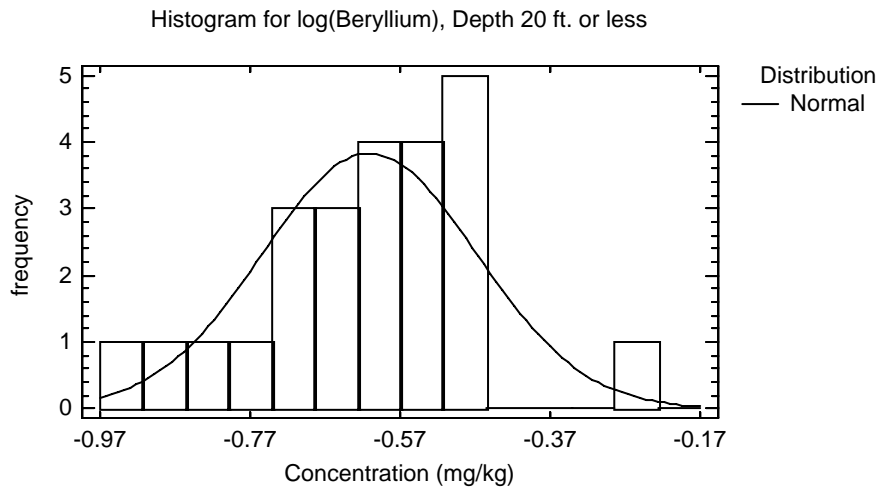
Data variable: log(Beryllium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -0.931404 to -0.277072

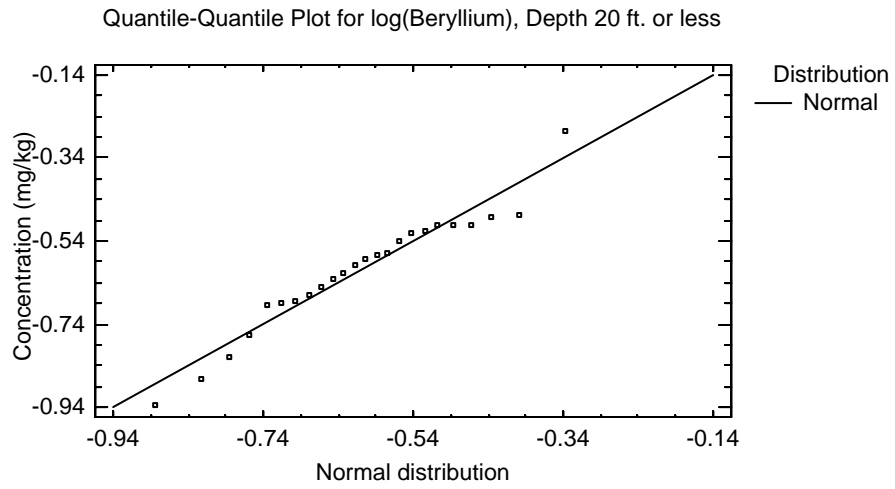
Fitted Distributions

Normal
mean = -0.610769
standard deviation = 0.142875



Tests for Normality for log(Beryllium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.95814	0.409275



**DRAFT**

**Uncensored Data - Beryllium (Data Set = "Tronox"&Depth Value>=30)**

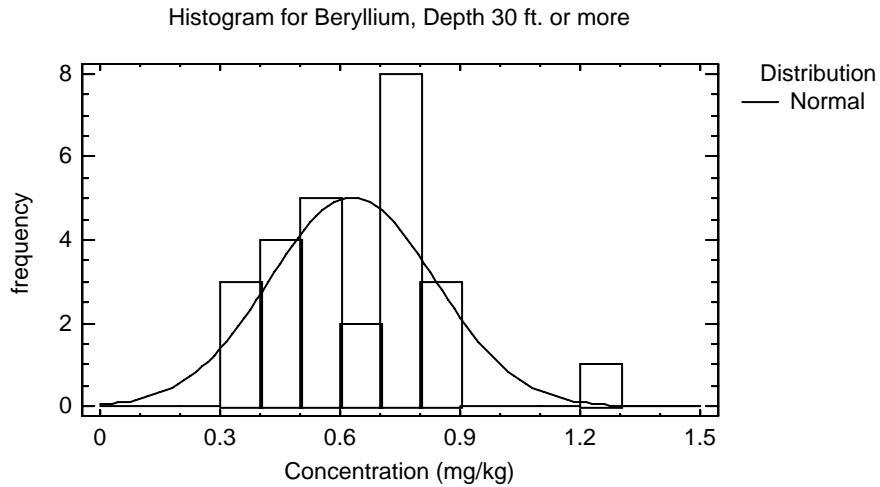
Data variable: Beryllium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.317 to 1.27

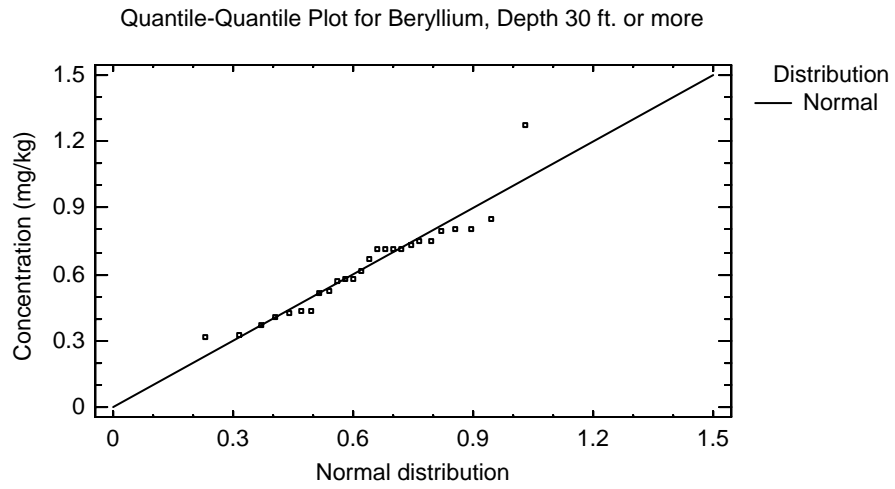
Fitted Distributions

Normal
mean = 0.630346
standard deviation = 0.206187



Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.920527	0.0487266



**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set = "Tronox"&Depth Value>=30)**

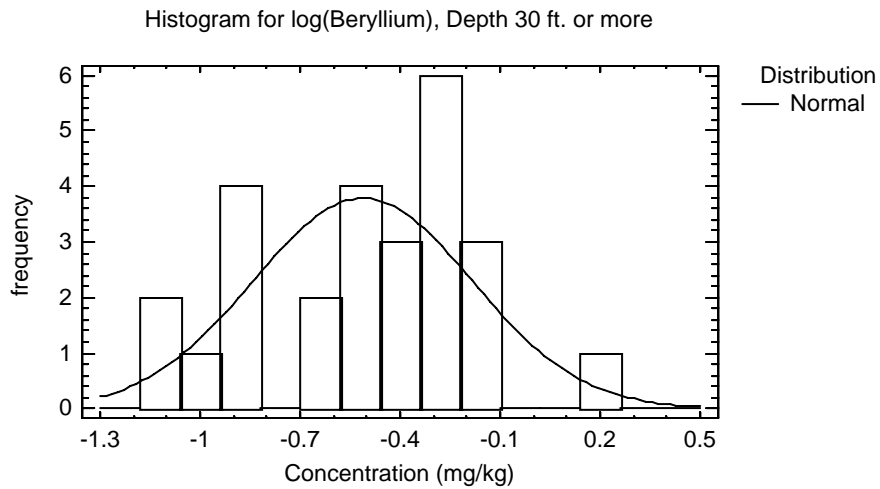
Data variable: log(Beryllium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -1.14885 to 0.239017

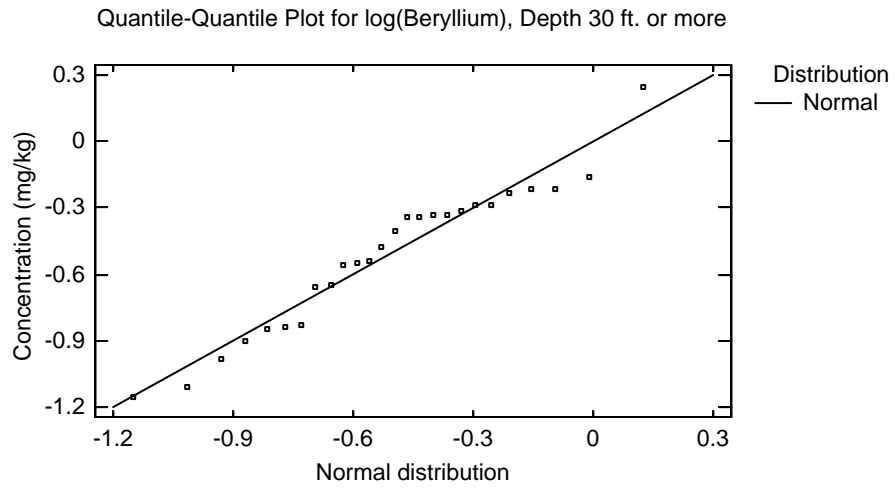
Fitted Distributions

Normal
mean = -0.512356
standard deviation = 0.32848



Tests for Normality for log(Beryllium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.953541	0.298088



**DRAFT**

**Two-Sample Comparison - log(Beryllium) & Depth Range (Data Set="Tronox") for log(Beryllium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from -0.931404 to -0.277072  
 Sample 2: 26 values ranging from -1.14885 to 0.239017

Comparison of Means for log(Beryllium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: -0.610769 +/- 0.0603311 [-0.6711, -0.550438]

95.0% confidence interval for mean of Depth Range=30 ft. or more: -0.512356 +/- 0.132676 [-0.645032, -0.379679]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.098413 +/- 0.143601 [-0.242014, 0.0451876]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -1.3917 P-value = 0.172868

Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Beryllium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.142875	0.32848
Variance	0.0204134	0.107899
Df	23	25

Ratio of Variances = 0.189189

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.111045, 0.20042]

Standard deviation of Depth Range=30 ft. or more: [0.257613, 0.453437]

Ratio of Variances: [0.083895, 0.432694]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.189189 P-value = 0.00015124

Reject the null hypothesis for alpha = 0.05.



**DRAFT**

**Uncensored Data - Beryllium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

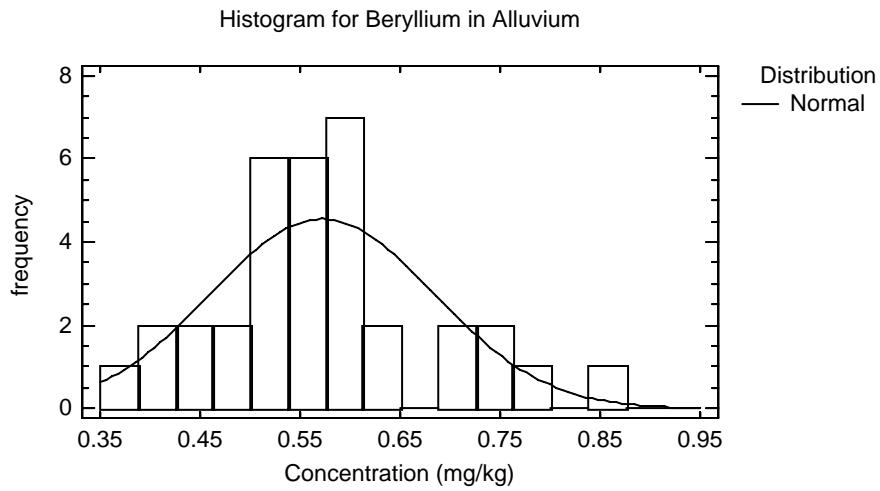
Data variable: Beryllium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.375 to 0.848

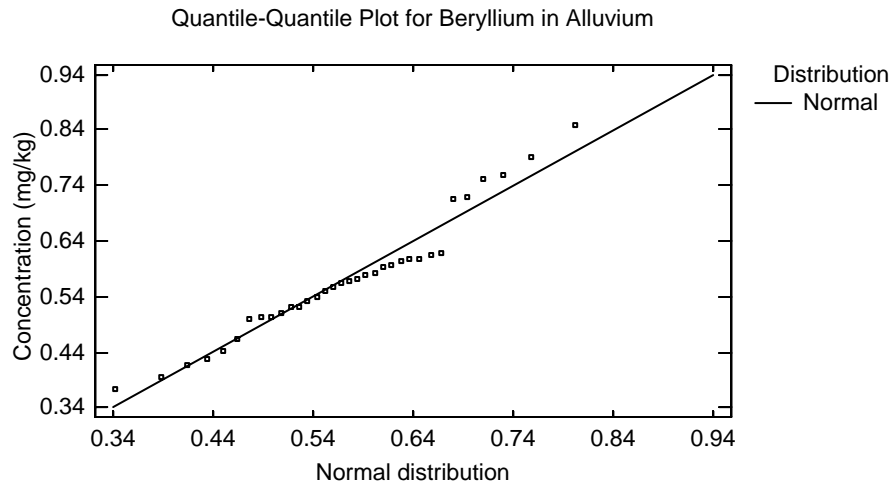
Fitted Distributions

Normal
mean = 0.57225
standard deviation = 0.111638



Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.953511	0.197618



**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

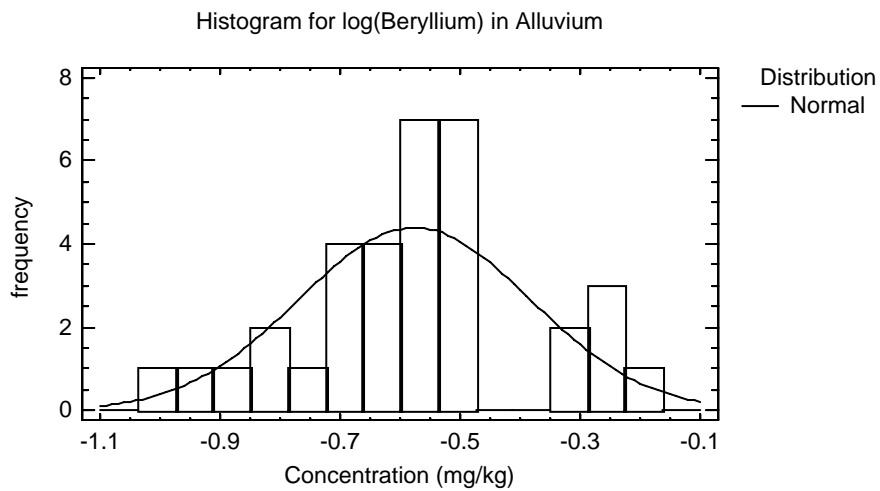
Data variable: log(Beryllium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -0.980829 to -0.164875

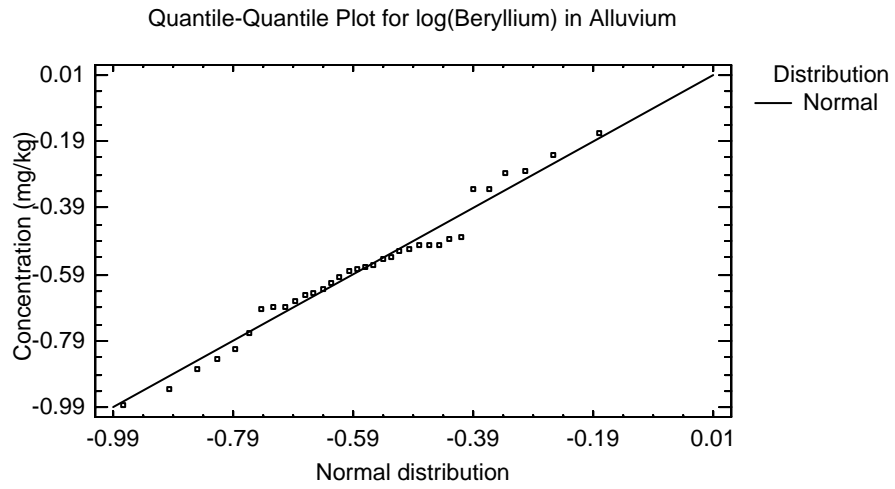
Fitted Distributions

Normal
mean = -0.576289
standard deviation = 0.192979



Tests for Normality for log(Beryllium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.97233	0.602197



**DRAFT**

**Uncensored Data - Beryllium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

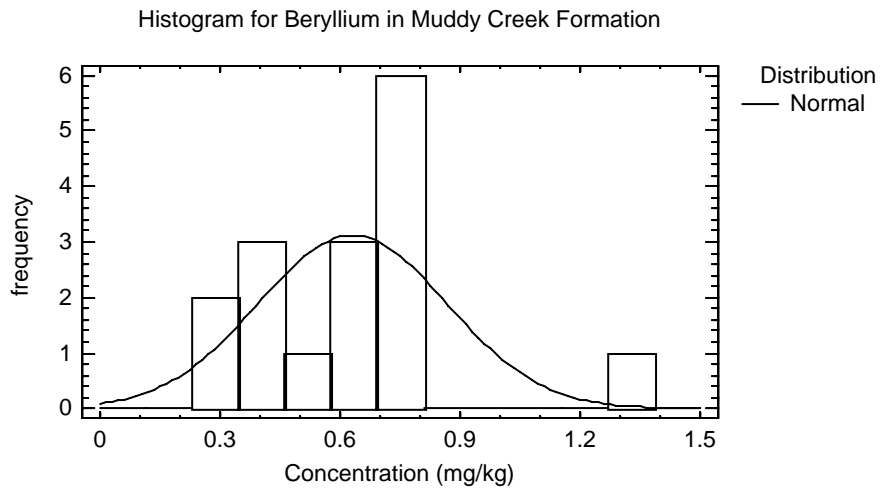
Data variable: Beryllium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.317 to 1.27

Fitted Distributions

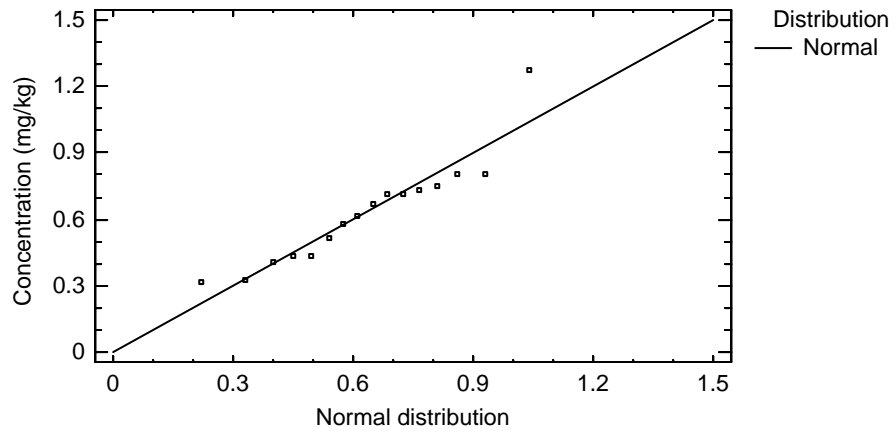
Normal
mean = 0.630594
standard deviation = 0.236184



Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.903074	0.0913731

Quantile-Quantile Plot for Beryllium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

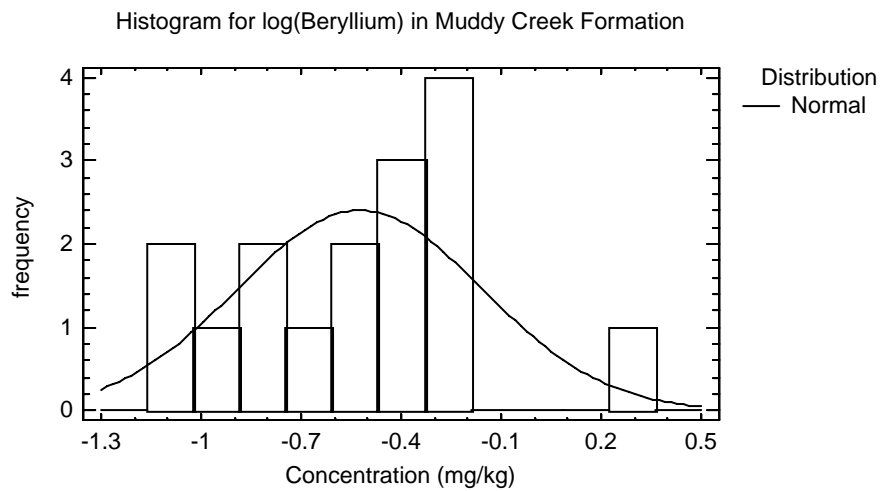
Data variable: log(Beryllium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -1.14885 to 0.239017

Fitted Distributions

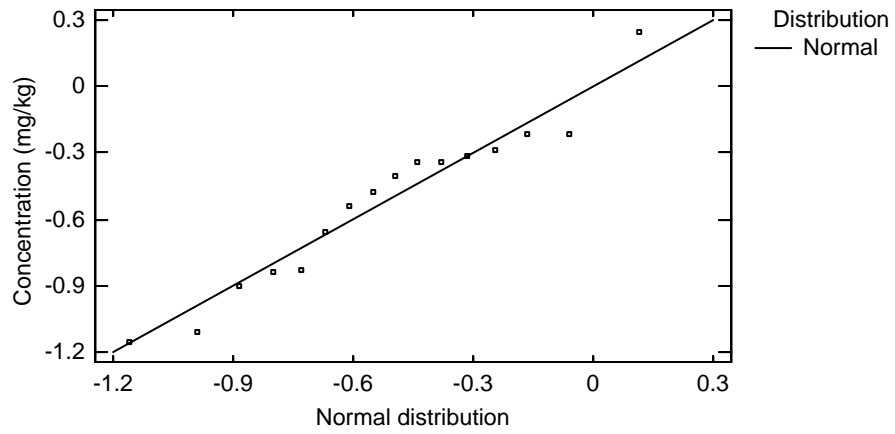
Normal
mean = -0.524116
standard deviation = 0.367812



Tests for Normality for log(Beryllium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.954348	0.544628

Quantile-Quantile Plot for log(Beryllium) in Muddy Creek Formation





**DRAFT**

**Two-Sample Comparison - log(Beryllium) & Geological Formation 1 (Data Set="Tronox") for log(Beryllium)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from -0.980829 to -0.164875  
 Sample 2: 16 values ranging from -1.14885 to 0.239017

Comparison of Means for log(Beryllium)

95.0% confidence interval for mean of Geological Formation 1=Alluvium: -0.576289 +/- 0.0673339 [-0.643623, -0.508956]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: -0.524116 +/- 0.195994 [-0.72011, -0.328122]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.0521735 +/- 0.204552 [-0.256725, 0.152378]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -0.533866 P-value = 0.599627

Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Beryllium)

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	0.192979	0.367812
Variance	0.0372411	0.135286
Df	33	15

Ratio of Variances = 0.275277

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.155653, 0.254015]

Standard deviation of Geological Formation 1=Muddy Creek: [0.271705, 0.569259]

Ratio of Variances: [0.104963, 0.622415]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.275277 P-value = 0.00194805

Reject the null hypothesis for alpha = 0.05.

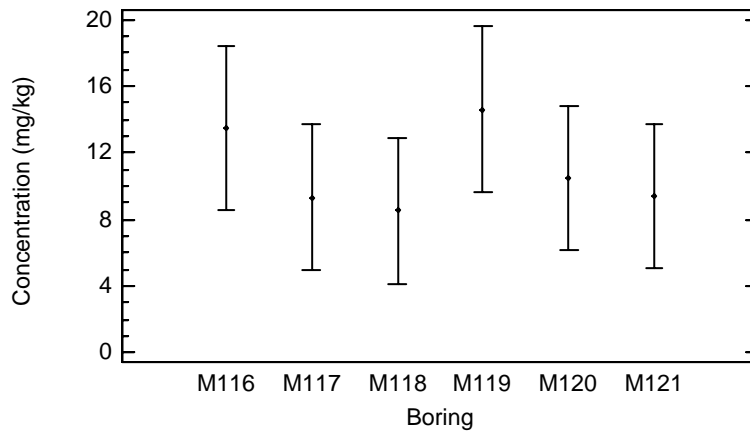
DRAFT

## 2.6 Boron

ANOVA Table for Boron by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	236.563	5	47.3126	1.23	0.3117
Within groups	1693.61	44	38.4911		
Total (Corr.)	1930.17	49			

Means and 95.0 Percent Tukey HSD Intervals for Boron



Kruskal-Wallis Test for Boron by Location ID

Location ID	Sample Size	Average Rank
M116	7	31.7143
M117	9	24.0
M118	9	21.6667
M119	7	33.8571
M120	9	23.9444
M121	9	21.0556

Test statistic = 5.23327 P-Value = 0.388079

**DRAFT**

**Uncensored Data - Boron (Data Set = "Tronox")**

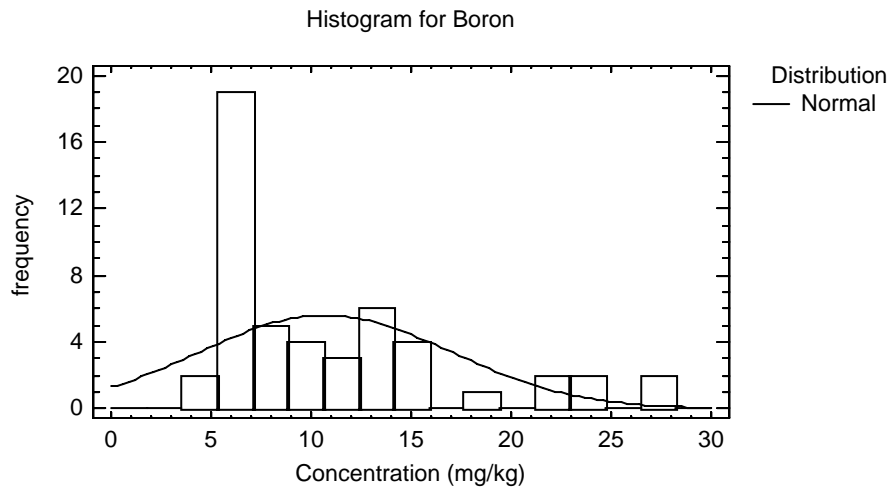
Data variable: Boron

Selection variable: Data Set = "Tronox"

50 values ranging from 5.2 to 27.4

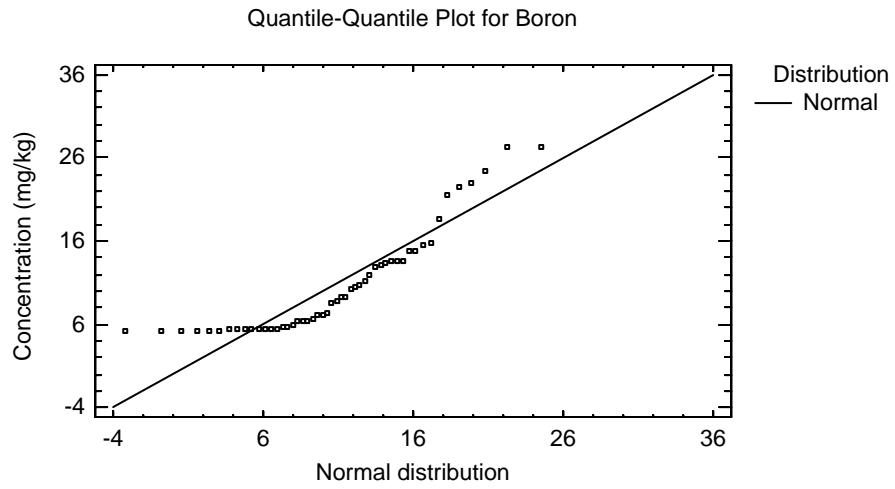
Fitted Distributions

Normal
mean = 10.7205
standard deviation = 6.27625



Tests for Normality for Boron

Test	Statistic	P-Value
Shapiro-Wilk W	0.813169	3.76748E-8



**DRAFT**

**Uncensored Data - log(Boron) (Data Set = "Tronox")**

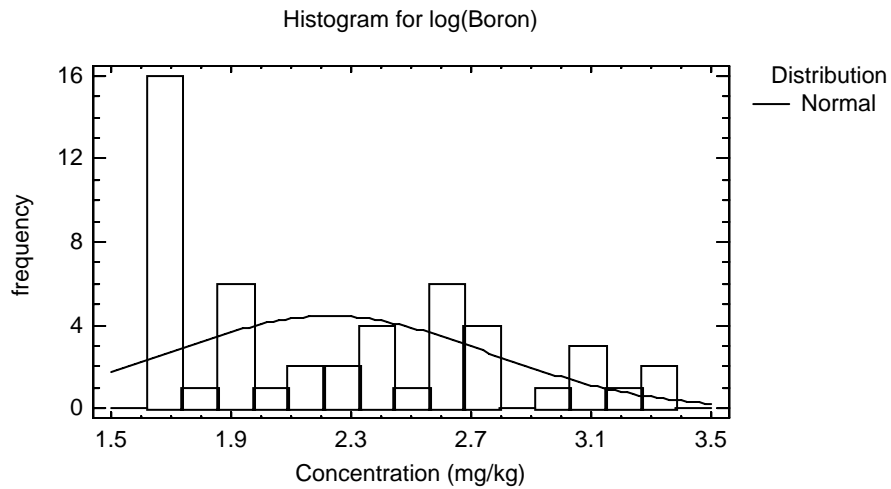
Data variable: log(Boron)

Selection variable: Data Set = "Tronox"

50 values ranging from 1.64866 to 3.31054

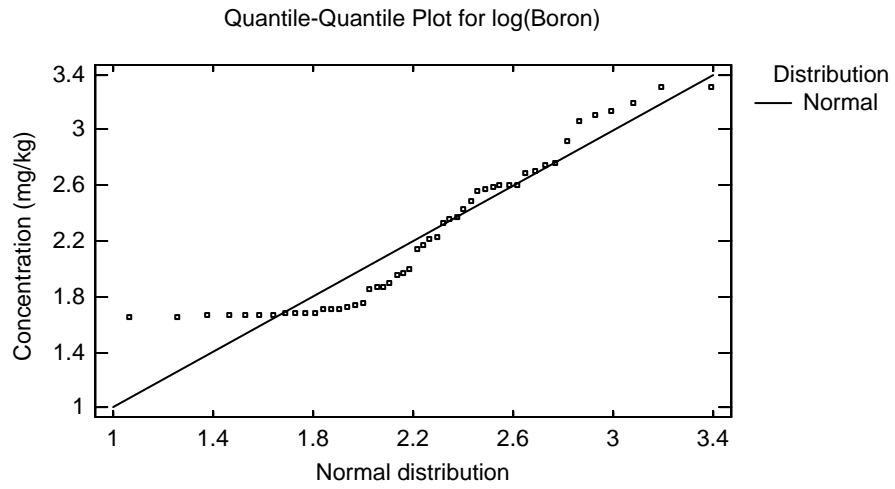
Fitted Distributions

Normal
mean = 2.22708
standard deviation = 0.527688



Tests for Normality for log(Boron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.872597	0.0000144316



**DRAFT**

**Uncensored Data - Boron (Data Set = "Tronox"&Depth Value<=20)**

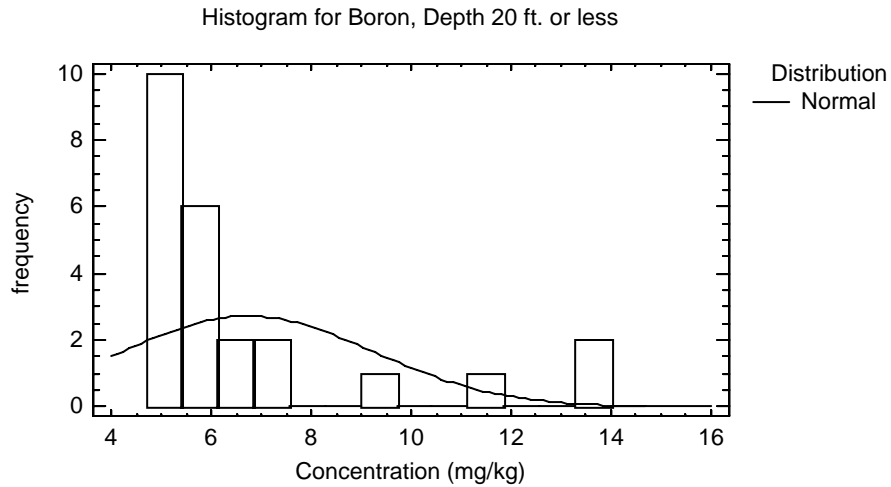
Data variable: Boron

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.2 to 13.6

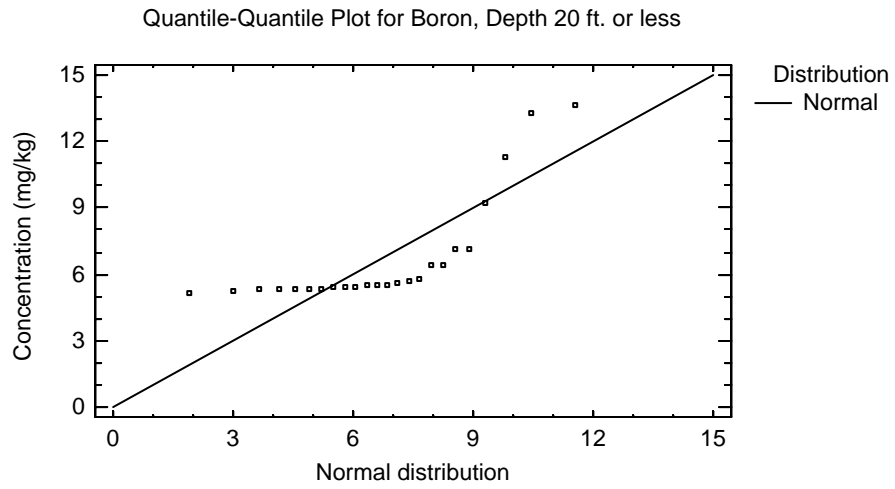
Fitted Distributions

Normal
mean = 6.72396
standard deviation = 2.5127



Tests for Normality for Boron

Test	Statistic	P-Value
Shapiro-Wilk W	0.624672	2.12976E-7





**DRAFT**

**Uncensored Data - log(Boron) (Data Set = "Tronox"&Depth Value<=20)**

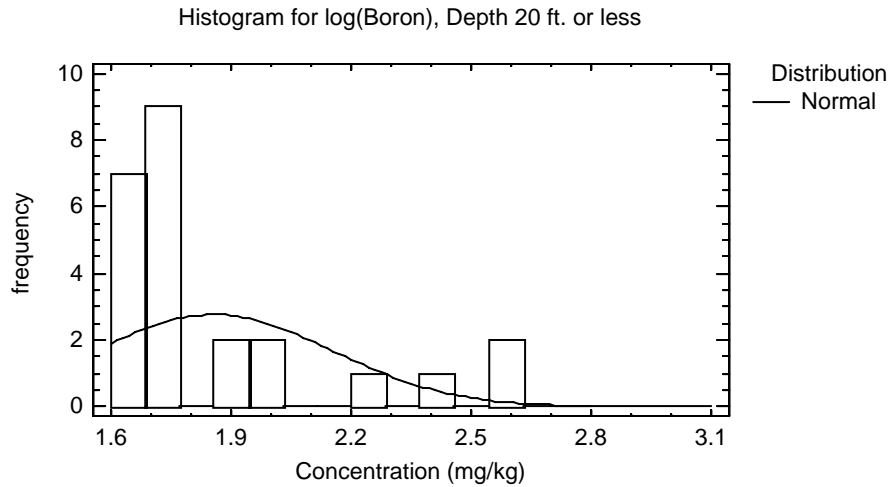
Data variable: log(Boron)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 1.64866 to 2.61007

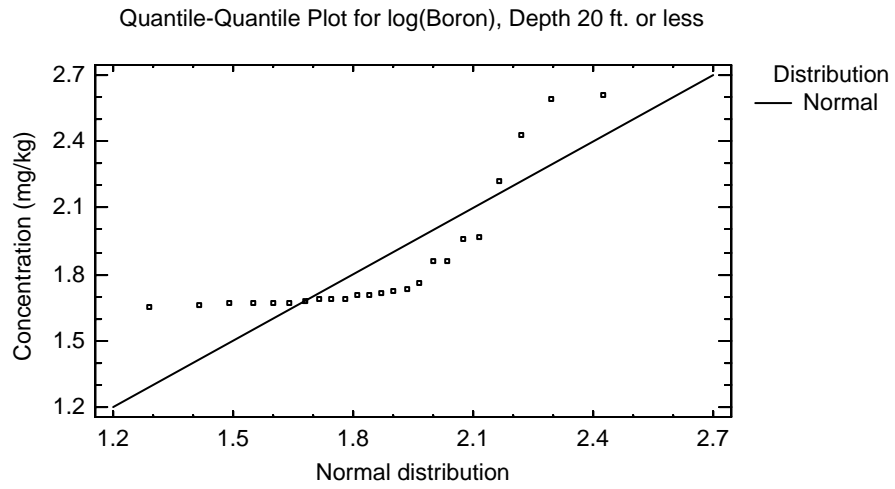
Fitted Distributions

Normal
mean = 1.85639
standard deviation = 0.296975



Tests for Normality for log(Boron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.684306	0.00000171141



**DRAFT**

**Uncensored Data - Boron (Data Set = "Tronox"&Depth Value>=30)**

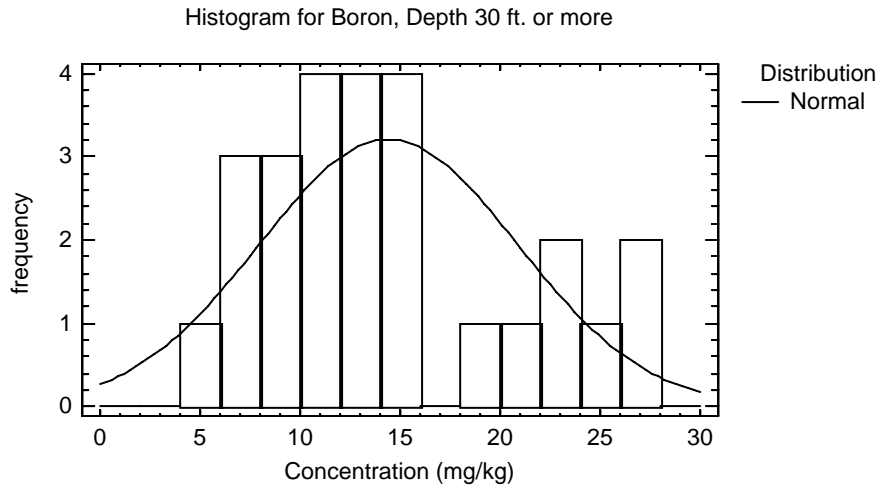
Data variable: Boron

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 5.3 to 27.4

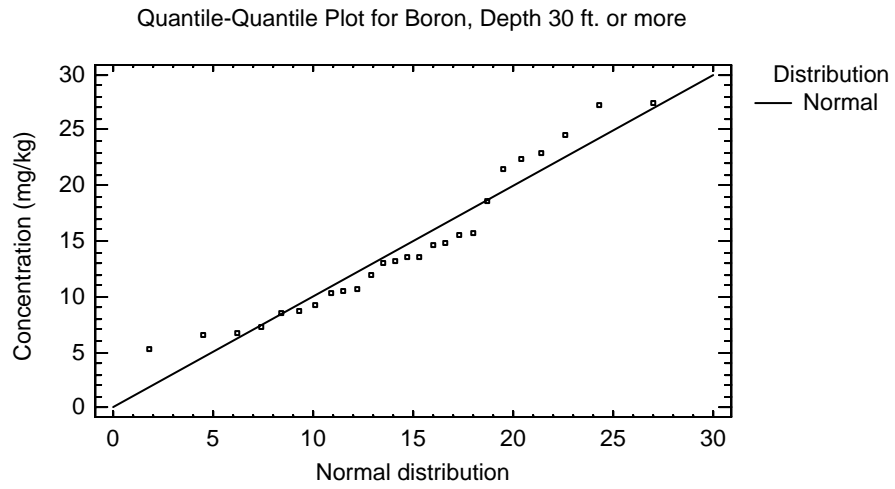
Fitted Distributions

Normal
mean = 14.4096
standard deviation = 6.47386



Tests for Normality for Boron

Test	Statistic	P-Value
Shapiro-Wilk W	0.927332	0.0713625



**DRAFT**

**Uncensored Data - log(Boron) (Data Set = "Tronox"&Depth Value>=30)**

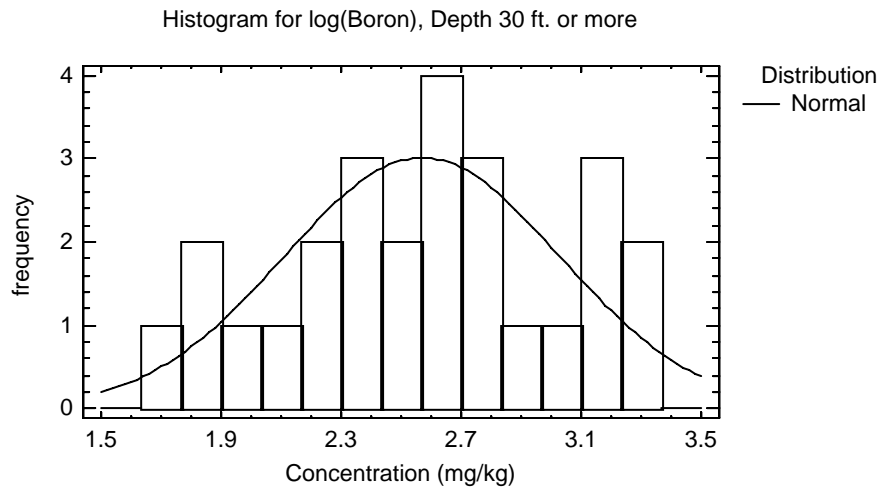
Data variable: log(Boron)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 1.66771 to 3.31054

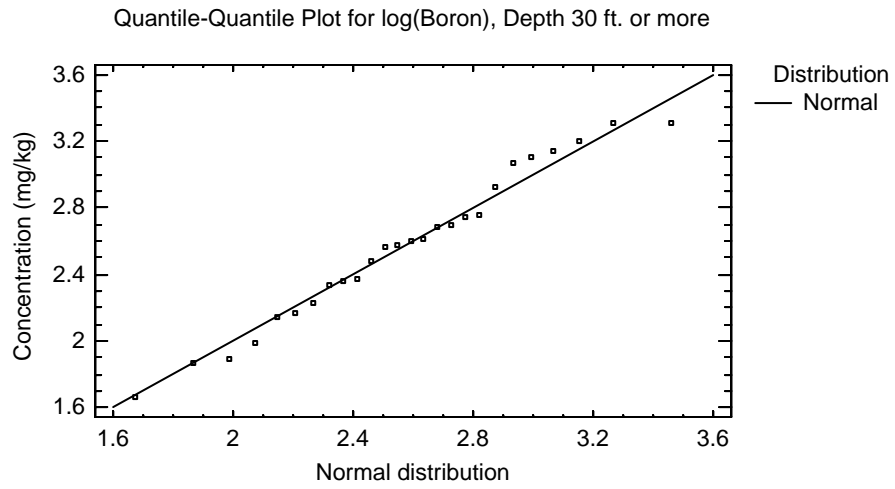
Fitted Distributions

Normal
mean = 2.56926
standard deviation = 0.45929



Tests for Normality for log(Boron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.96962	0.627827



**DRAFT**

## Tronox Boron by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = 4.073376546$   $p = 4.63364E-05$

Reject the null hypothesis for  $\alpha=0.05$

**DRAFT**

**Uncensored Data - Boron (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

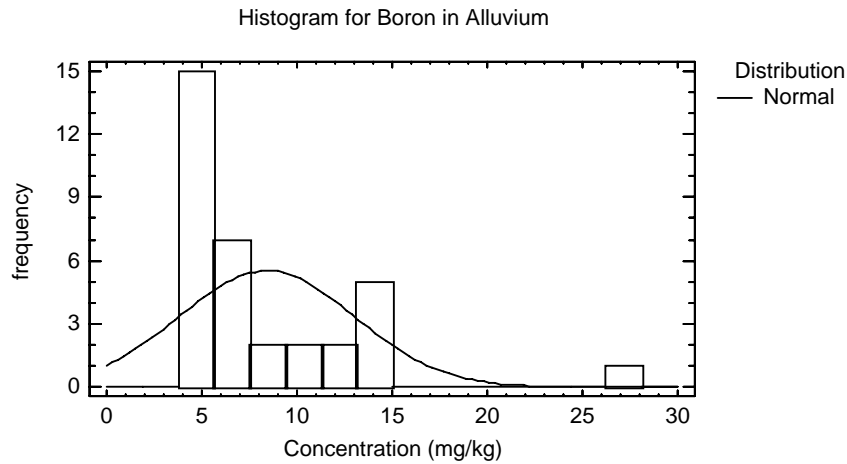
Data variable: Boron

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 5.2 to 27.2

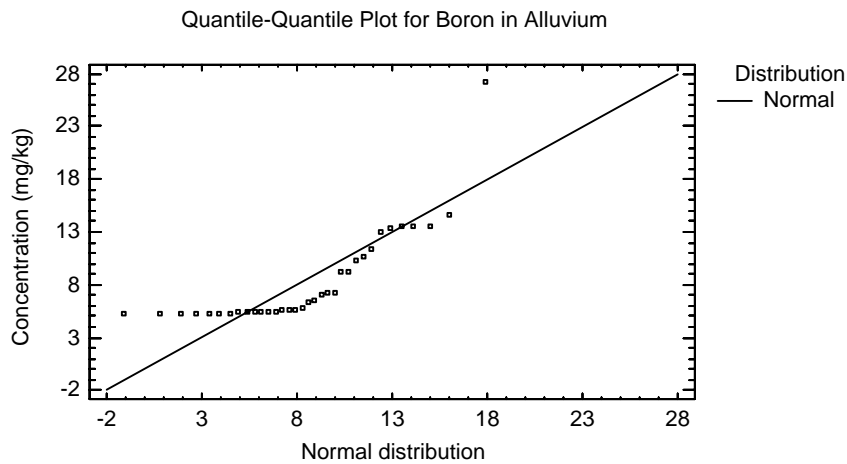
Fitted Distributions

Normal
mean = 8.42044
standard deviation = 4.60727



Tests for Normality for Boron

Test	Statistic	P-Value
Shapiro-Wilk W	0.707898	5.13743E-8





**DRAFT**

**Uncensored Data - log(Boron) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

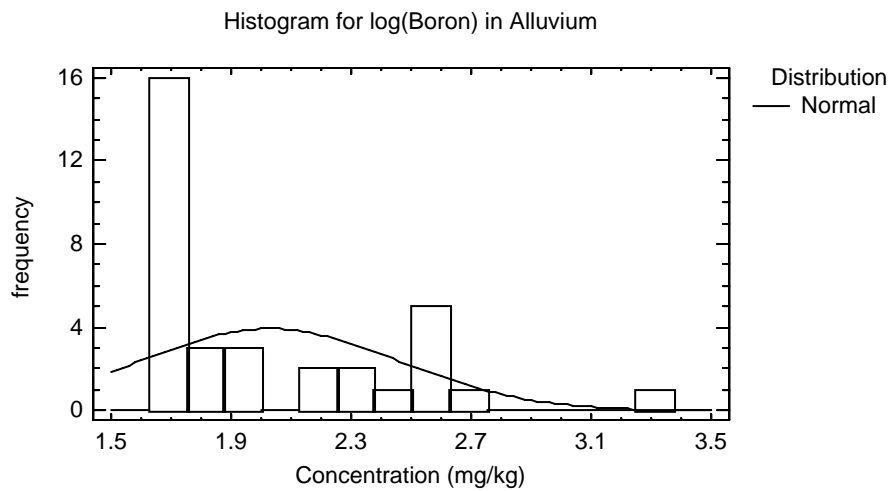
Data variable: log(Boron)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 1.64866 to 3.30322

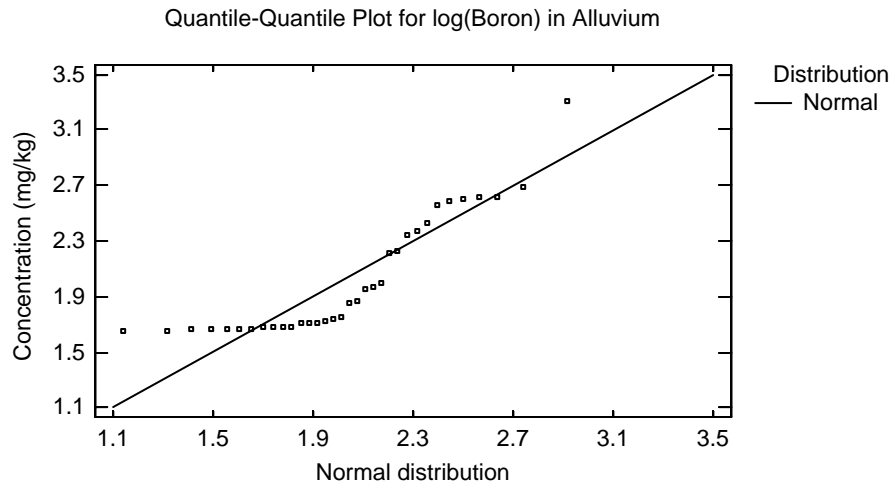
Fitted Distributions

Normal
mean = 2.02685
standard deviation = 0.431205



Tests for Normality for log(Boron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.808421	0.0000124665



**DRAFT**

**Uncensored Data - Boron (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

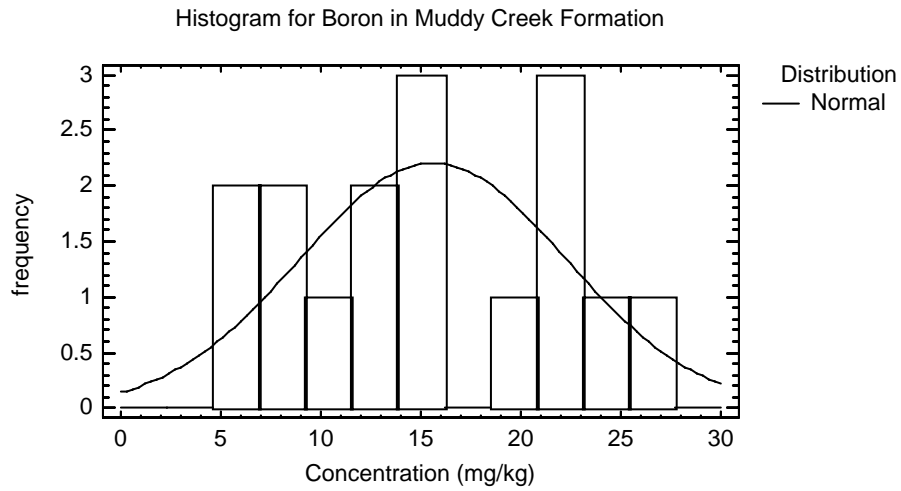
Data variable: Boron

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 6.46 to 27.4

Fitted Distributions

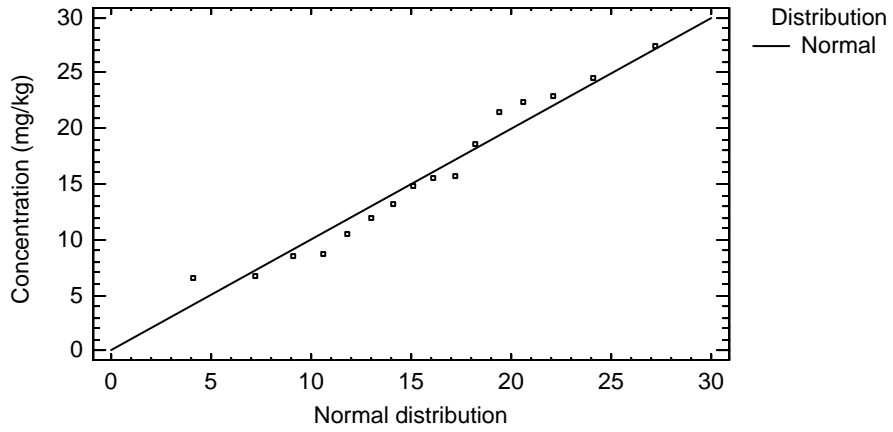
Normal
mean = 15.6081
standard deviation = 6.67129



Tests for Normality for Boron

Test	Statistic	P-Value
Shapiro-Wilk W	0.949945	0.476692

Quantile-Quantile Plot for Boron in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Boron) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

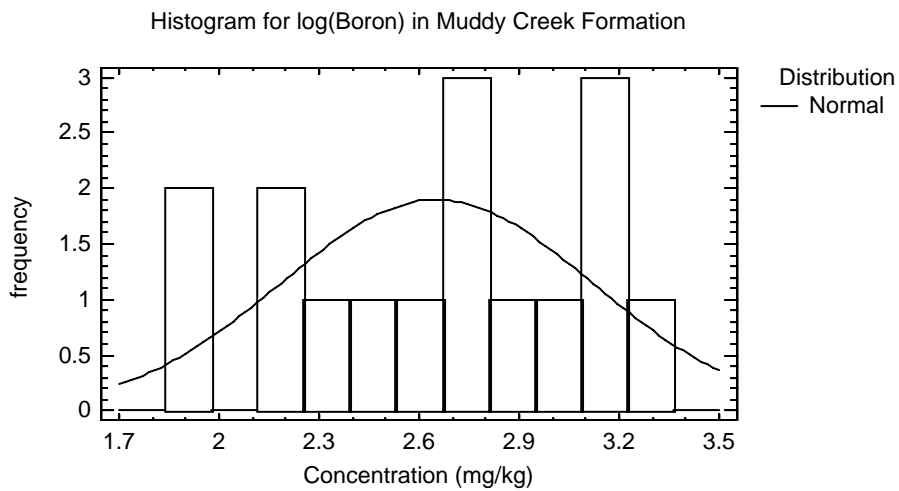
Data variable: log(Boron)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 1.86563 to 3.31054

Fitted Distributions

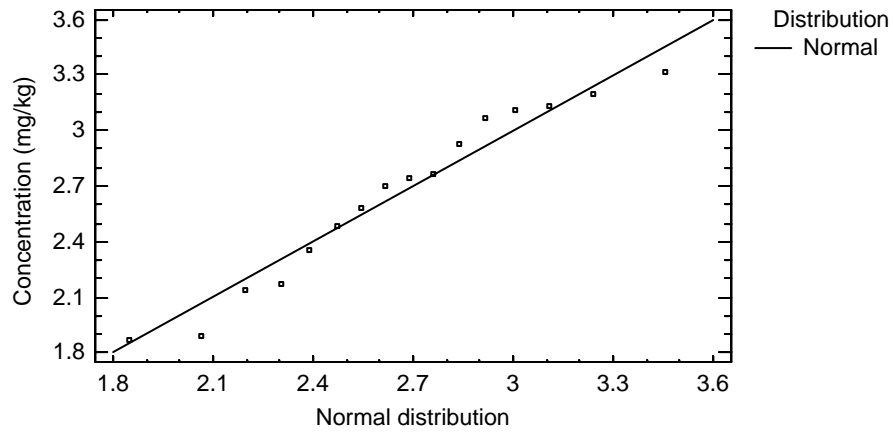
Normal
mean = 2.65259
standard deviation = 0.465345



Tests for Normality for log(Boron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.945039	0.407745

Quantile-Quantile Plot for log(Boron) in Muddy Creek Formation



**DRAFT**

## Tronox Boron by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = 3.424422288   p= 0.000616108

Reject the null hypothesis for alpha=0.05

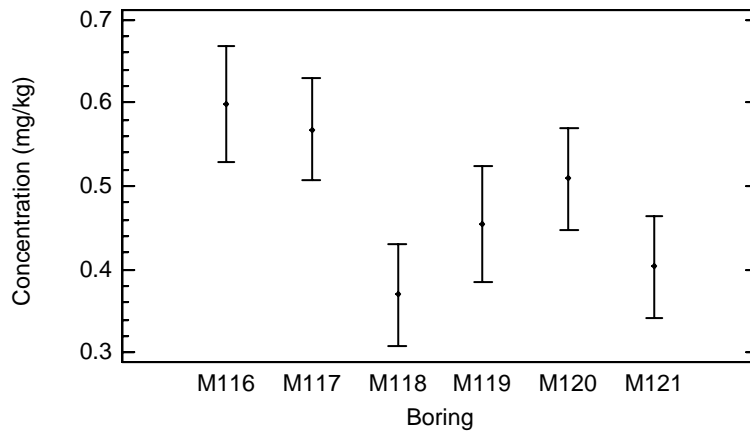
**DRAFT**

## 2.7 Cadmium

ANOVA Table for Cadmium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.338975	5	0.067795	8.87	0.0000
Within groups	0.336272	44	0.00764255		
Total (Corr.)	0.675247	49			

Means and 95.0 Percent Tukey HSD Intervals for Cadmium



Kruskal-Wallis Test for Cadmium by Location ID

Location ID	Sample Size	Average Rank
M116	7	38.5714
M117	9	37.3333
M118	9	11.1667
M119	7	23.0
M120	9	29.2778
M121	9	16.0

Test statistic = 24.8964 P-Value = 0.000145899



**DRAFT**

**Uncensored Data - Cadmium (Data Set = "Tronox")**

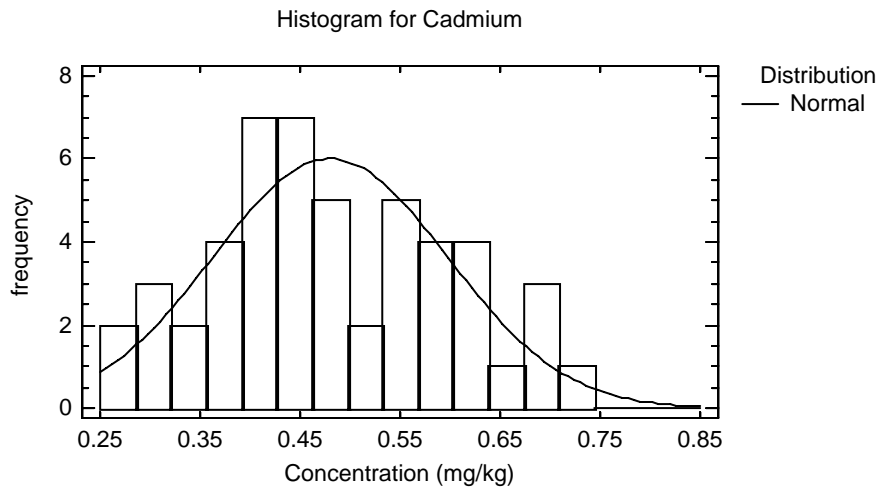
Data variable: Cadmium

Selection variable: Data Set = "Tronox"

50 values ranging from 0.274 to 0.729

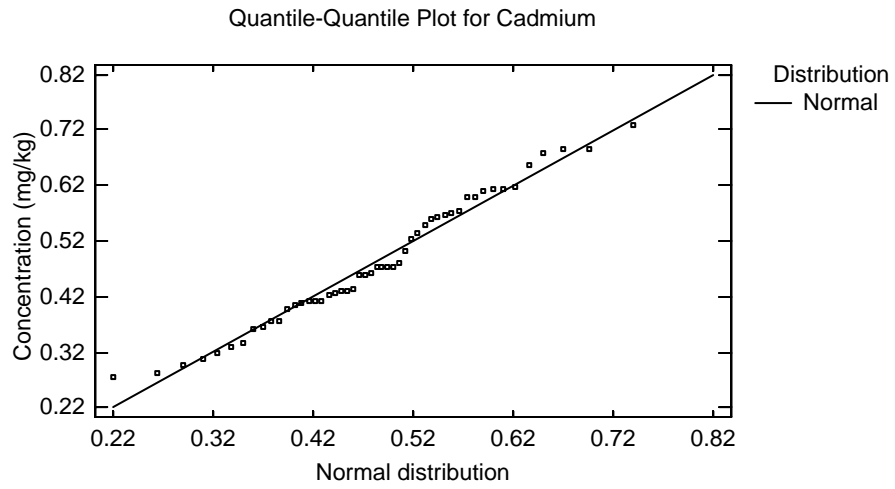
Fitted Distributions

Normal
mean = 0.48008
standard deviation = 0.117391



Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.961695	0.183436



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set = "Tronox")**

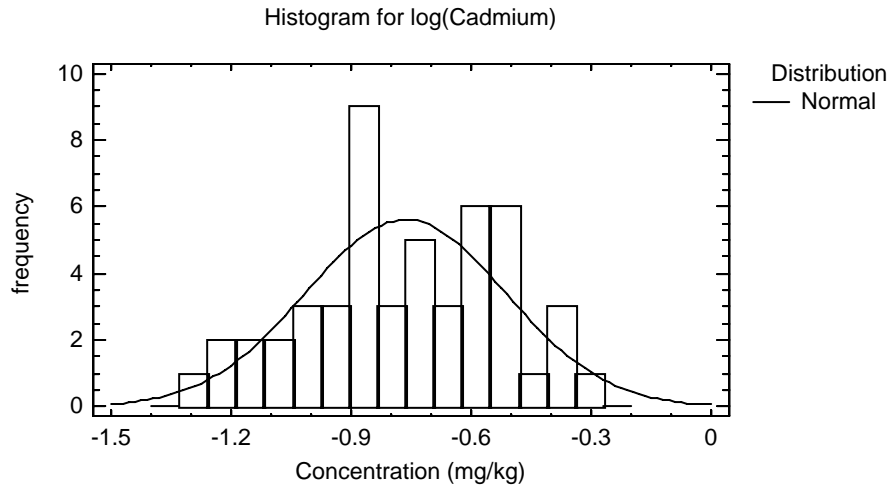
Data variable: log(Cadmium)

Selection variable: Data Set = "Tronox"

50 values ranging from -1.29463 to -0.316082

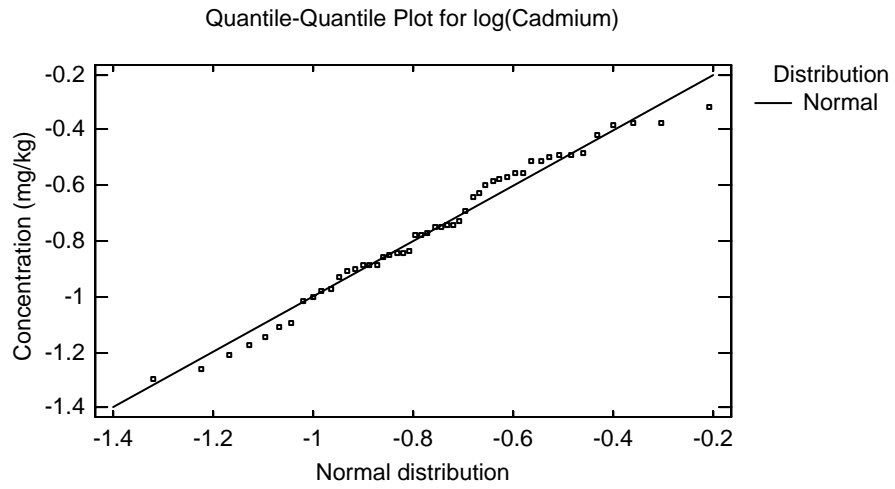
Fitted Distributions

Normal
mean = -0.763989
standard deviation = 0.250945



Tests for Normality for log(Cadmium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.963807	0.222522



**DRAFT**

**Uncensored Data - Cadmium (Data Set = "Tronox"&Depth Value<=20)**

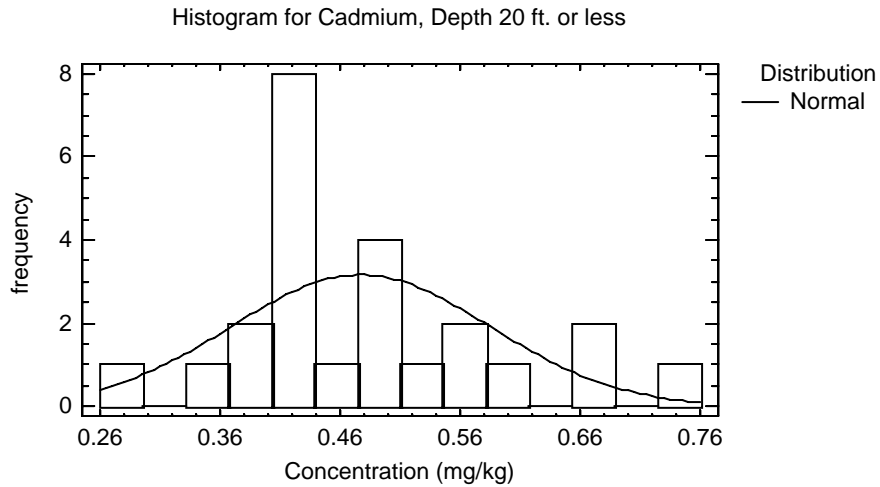
Data variable: Cadmium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.284 to 0.729

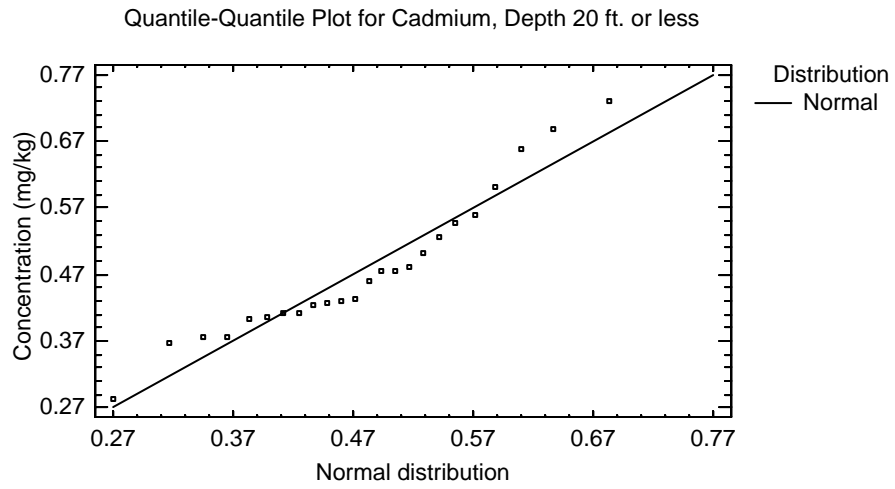
Fitted Distributions

Normal
mean = 0.477083
standard deviation = 0.108087



Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.93274	0.114987



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set = "Tronox"&Depth Value<=20)**

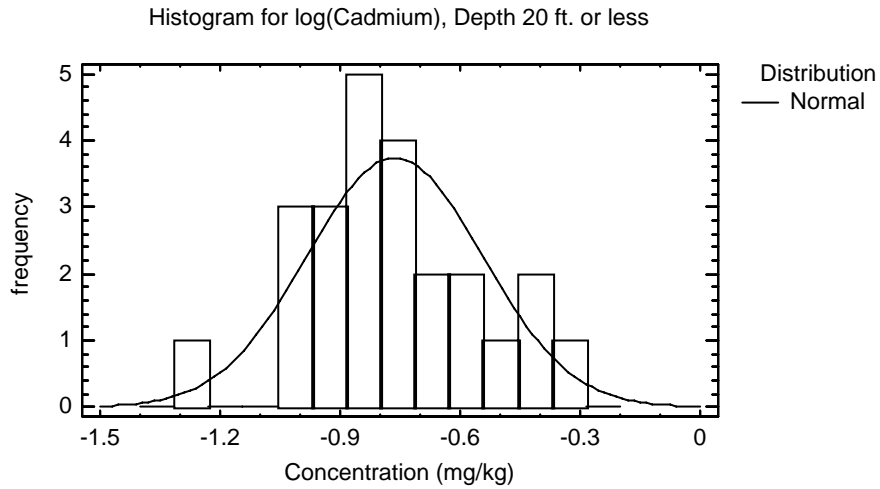
Data variable: log(Cadmium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -1.25878 to -0.316082

Fitted Distributions

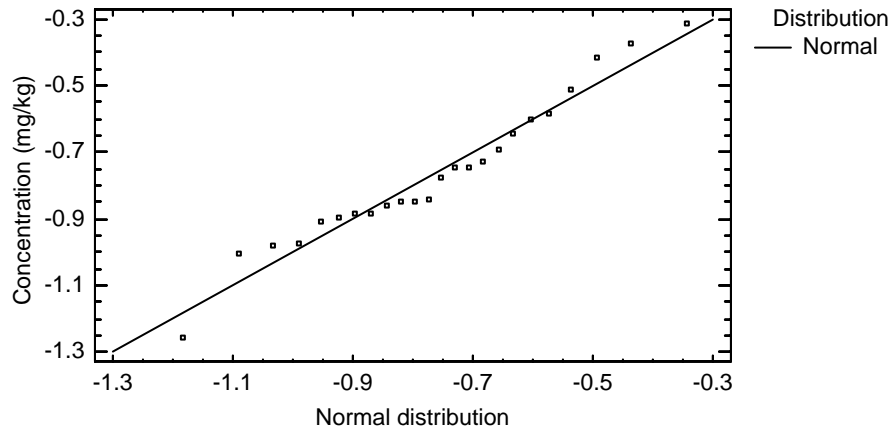
Normal
mean = -0.763496
standard deviation = 0.219513



Tests for Normality for log(Cadmium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.966182	0.577385

Quantile-Quantile Plot for log(Cadmium), Depth 20 ft. or less





**DRAFT**

**Uncensored Data - Cadmium (Data Set = "Tronox"&Depth Value>=30)**

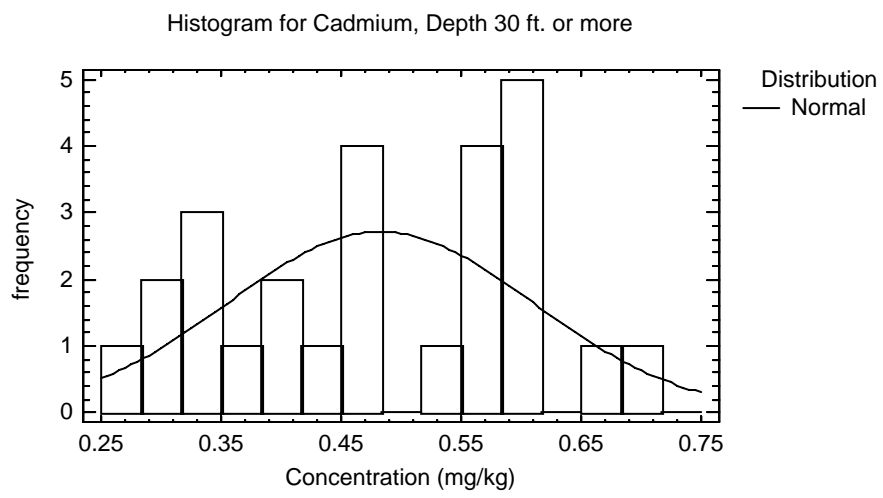
Data variable: Cadmium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.274 to 0.686

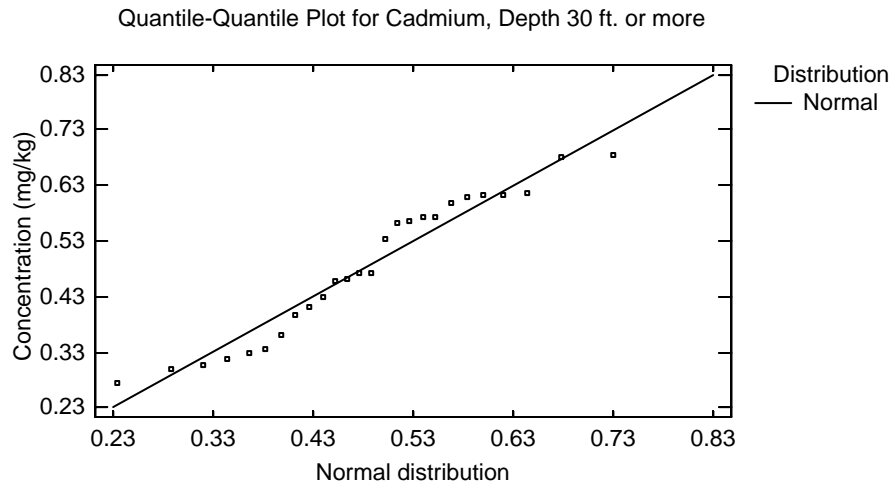
Fitted Distributions

Normal
mean = 0.482846
standard deviation = 0.127456



Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.932449	0.0950152



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set = "Tronox"&Depth Value>=30)**

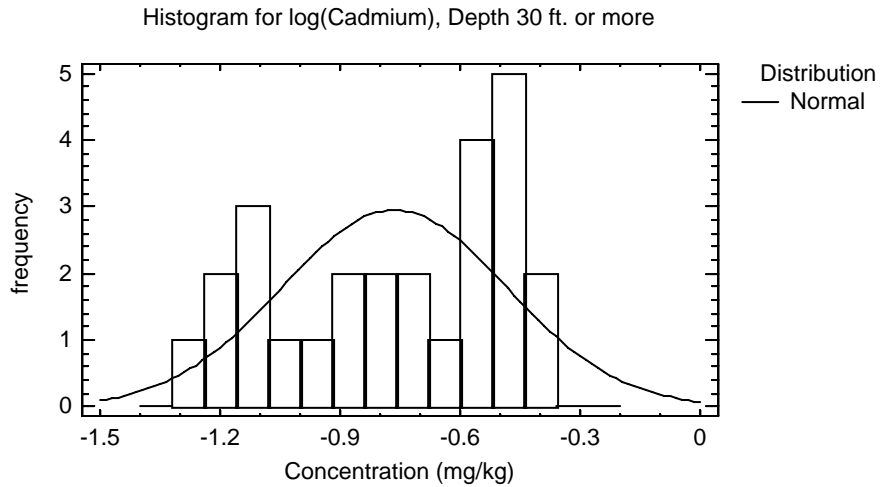
Data variable: log(Cadmium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -1.29463 to -0.376878

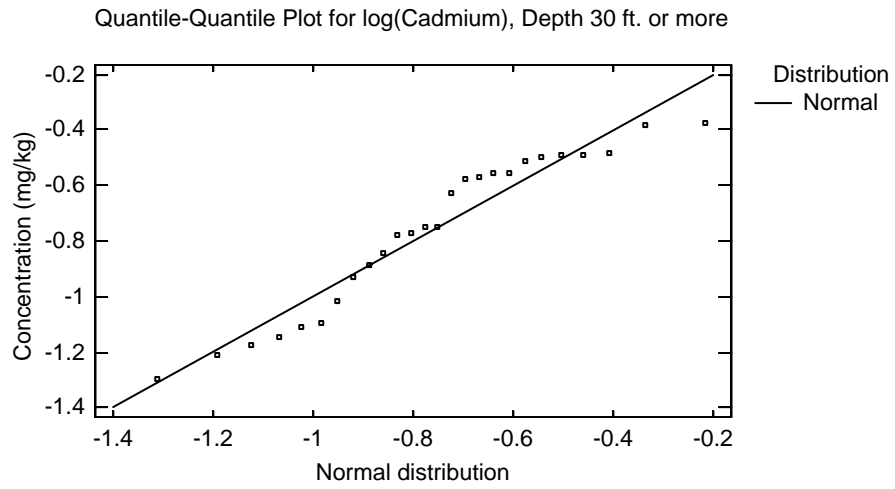
Fitted Distributions

Normal
mean = -0.764444
standard deviation = 0.281241



Tests for Normality for log(Cadmium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.919636	0.0463526



**DRAFT**

**Two-Sample Comparison - Cadmium & Depth Range (Data Set="Tronox") for Cadmium**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 0.284 to 0.729  
 Sample 2: 26 values ranging from 0.274 to 0.686

Comparison of Means for Cadmium

95.0% confidence interval for mean of Depth Range=20 ft. or less: 0.477083 +/- 0.0456414 [0.431442, 0.522725]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 0.482846 +/- 0.0514808 [0.431365, 0.534327]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: -0.00576282 +/- 0.0674845 [-0.0732473, 0.0617217]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -0.171698 P-value = 0.864397  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Cadmium

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.108087	0.127456
Variance	0.0116829	0.0162451
Df	23	25

Ratio of Variances = 0.719163

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.0840069, 0.151621]  
 Standard deviation of Depth Range=30 ft. or more: [0.0999584, 0.175942]  
 Ratio of Variances: [0.318909, 1.6448]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.719163 P-value = 0.430015  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Cadmium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

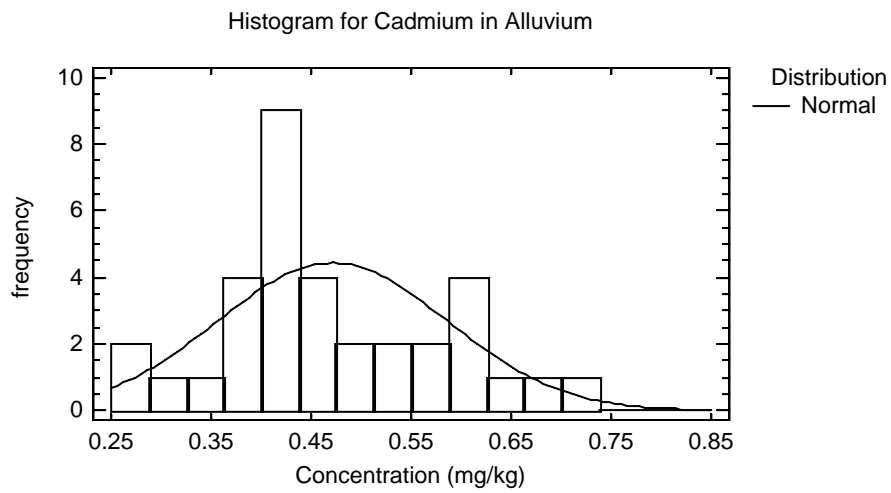
Data variable: Cadmium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.274 to 0.729

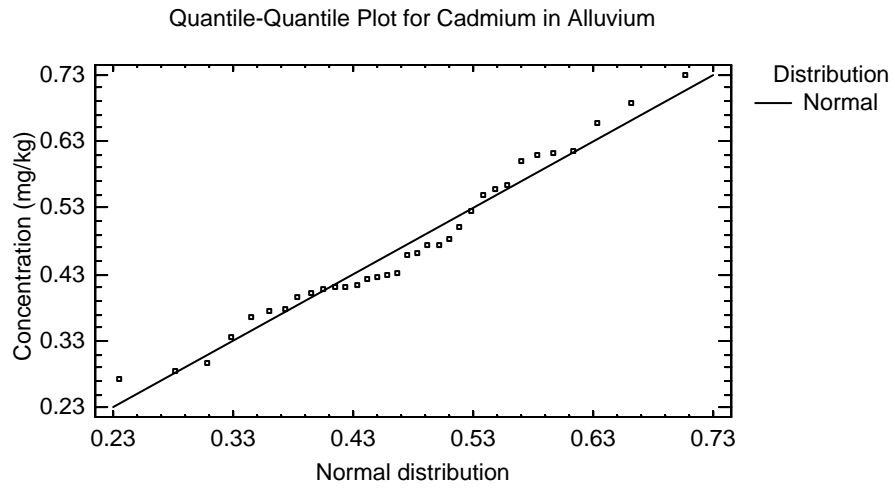
Fitted Distributions

Normal
mean = 0.471338
standard deviation = 0.114712



Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.961657	0.333215



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

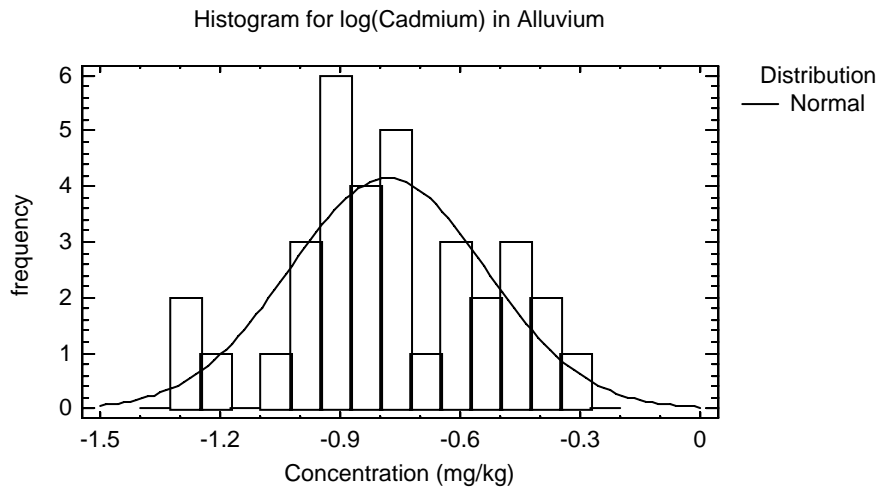
Data variable: log(Cadmium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -1.29463 to -0.316082

Fitted Distributions

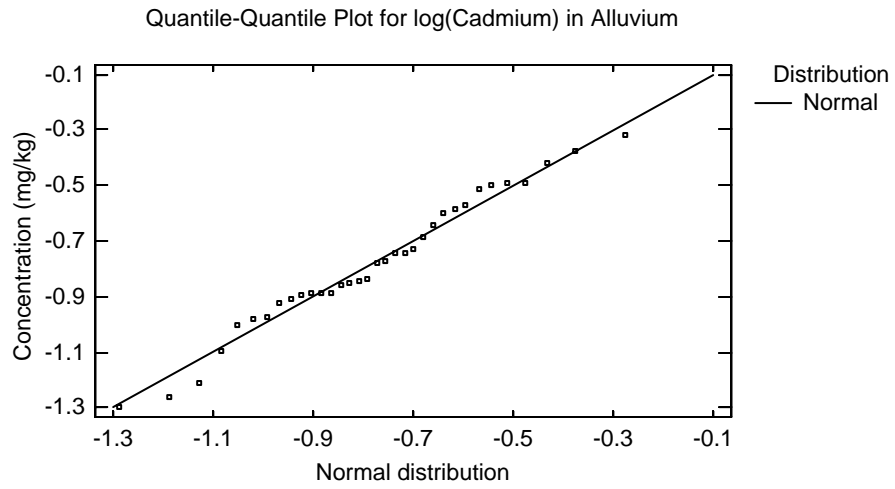
Normal
mean = -0.781086
standard deviation = 0.245532



Tests for Normality for log(Cadmium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.97164	0.582299





**DRAFT**

**Uncensored Data - Cadmium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

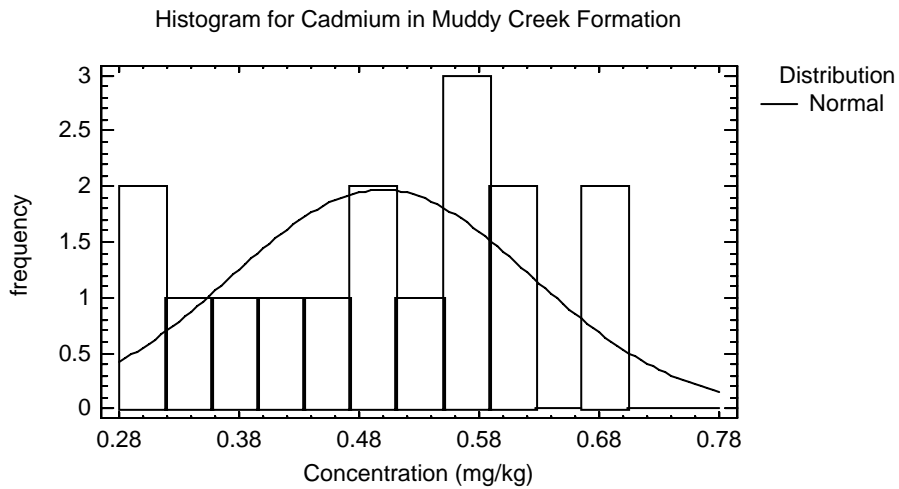
Data variable: Cadmium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.308 to 0.686

Fitted Distributions

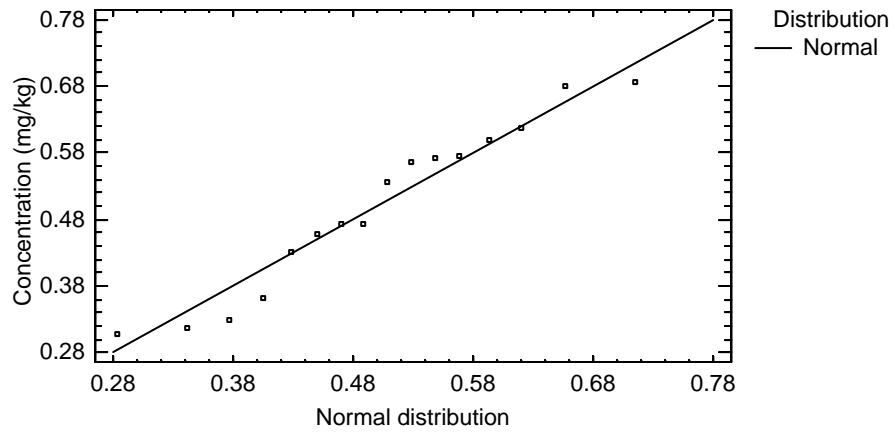
Normal
mean = 0.498656
standard deviation = 0.124602



Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.940018	0.345151

Quantile-Quantile Plot for Cadmium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

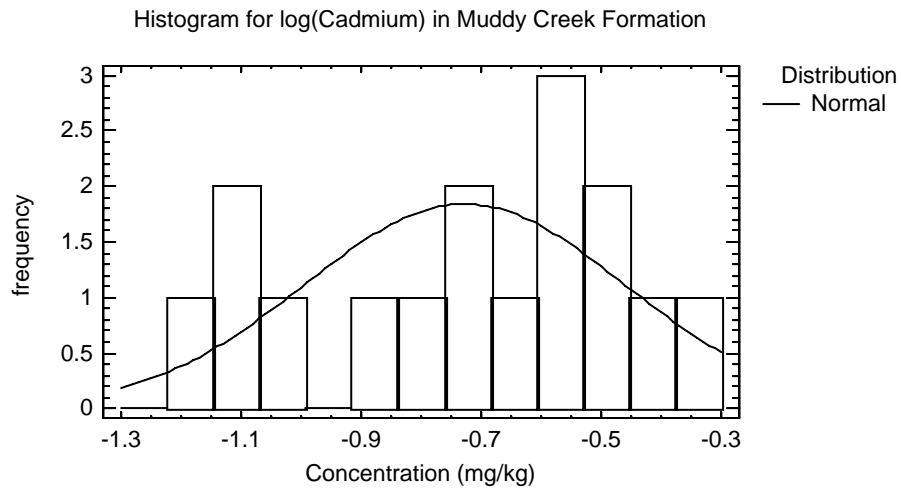
Data variable: log(Cadmium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -1.17766 to -0.376878

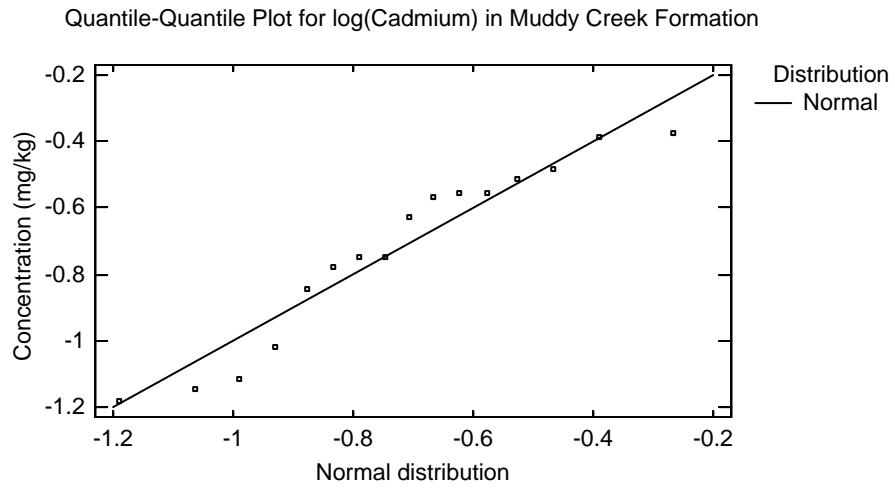
Fitted Distributions

Normal
mean = -0.727658
standard deviation = 0.266483



Tests for Normality for log(Cadmium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.917738	0.156777



**DRAFT**

**Two-Sample Comparison - Cadmium & Geological Formation 1 (Data Set="Tronox") for Cadmium**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 0.274 to 0.729  
 Sample 2: 16 values ranging from 0.308 to 0.686

Comparison of Means for Cadmium

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 0.471338 +/- 0.0400251 [0.431313, 0.511363]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 0.498656 +/- 0.0663958 [0.43226, 0.565052]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.027318 +/- 0.0718627 [-0.0991807, 0.0445447]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -0.764328 P-value = 0.448413

Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Cadmium

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	0.114712	0.124602
Variance	0.0131589	0.0155256
Df	33	15

Ratio of Variances = 0.847559

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.0925242, 0.150993]

Standard deviation of Geological Formation 1=Muddy Creek: [0.092044, 0.192845]

Ratio of Variances: [0.323175, 1.91637]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.847559 P-value = 0.666845

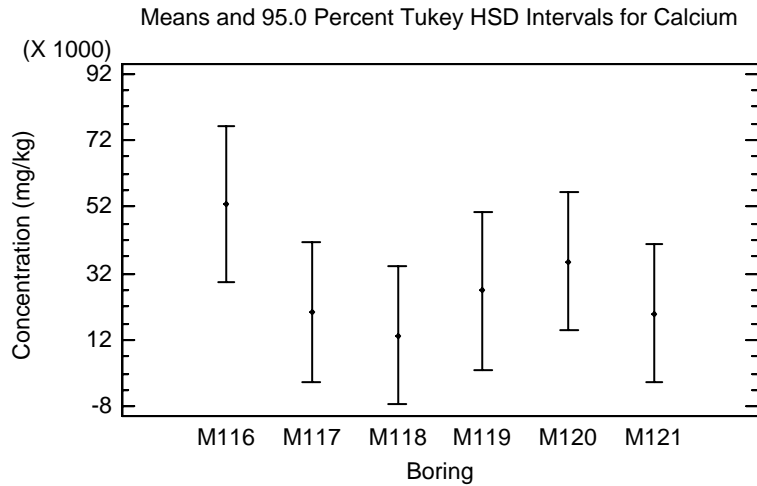
Do not reject the null hypothesis for alpha = 0.05.

DRAFT

## 2.8 Calcium

ANOVA Table for Calcium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	7.81267E9	5	1.56253E9	1.78	0.1365
Within groups	3.85925E10	44	8.77102E8		
Total (Corr.)	4.64052E10	49			



Kruskal-Wallis Test for Calcium by Location ID

Location ID	Sample Size	Average Rank
M116	7	37.7143
M117	9	22.7778
M118	9	16.1111
M119	7	27.2857
M120	9	28.8889
M121	9	23.3333

Test statistic = 9.75204 P-Value = 0.0825736

**DRAFT**

**Uncensored Data - Calcium (Data Set = "Tronox")**

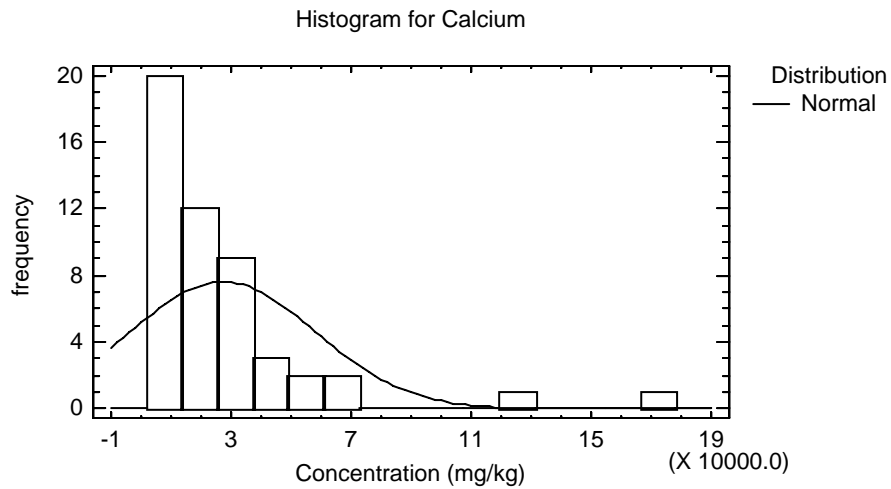
Data variable: Calcium

Selection variable: Data Set = "Tronox"

50 values ranging from 2440.0 to 170000.

Fitted Distributions

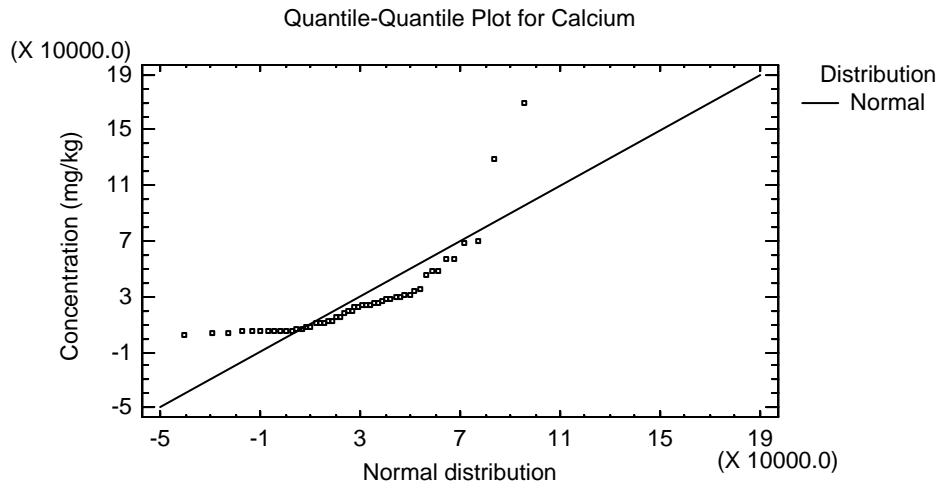
Normal
mean = 27219.7
standard deviation = 30774.1



Tests for Normality for Calcium

Test	Statistic	P-Value
Shapiro-Wilk W	0.692824	8.7419E-13





**DRAFT**

**Uncensored Data - log(Calcium) (Data Set = "Tronox")**

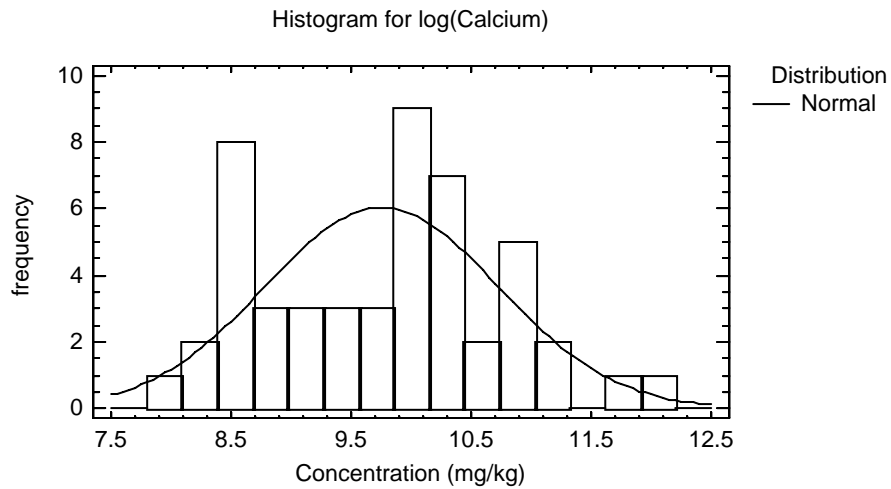
Data variable: log(Calcium)

Selection variable: Data Set = "Tronox"

50 values ranging from 7.79975 to 12.0436

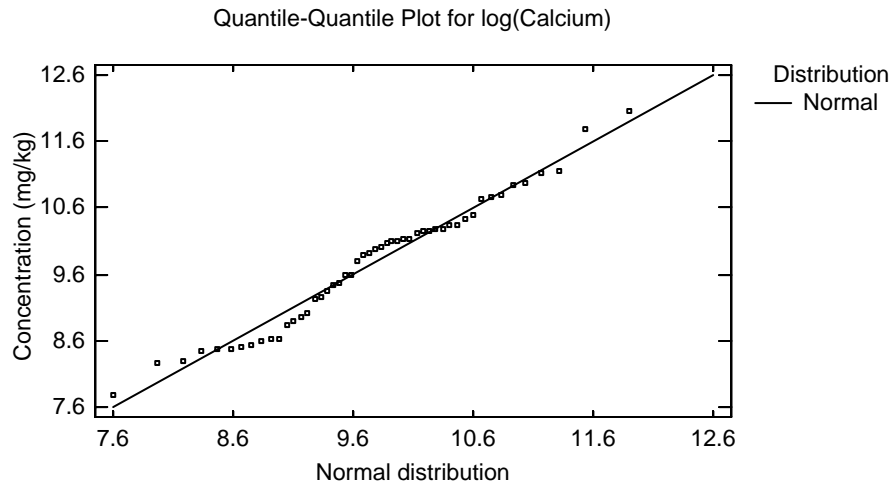
Fitted Distributions

Normal
mean = 9.75403
standard deviation = 0.972345



Tests for Normality for log(Calcium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.966735	0.287752



**DRAFT**

**Uncensored Data - Calcium (Data Set = "Tronox"&Depth Value<=20)**

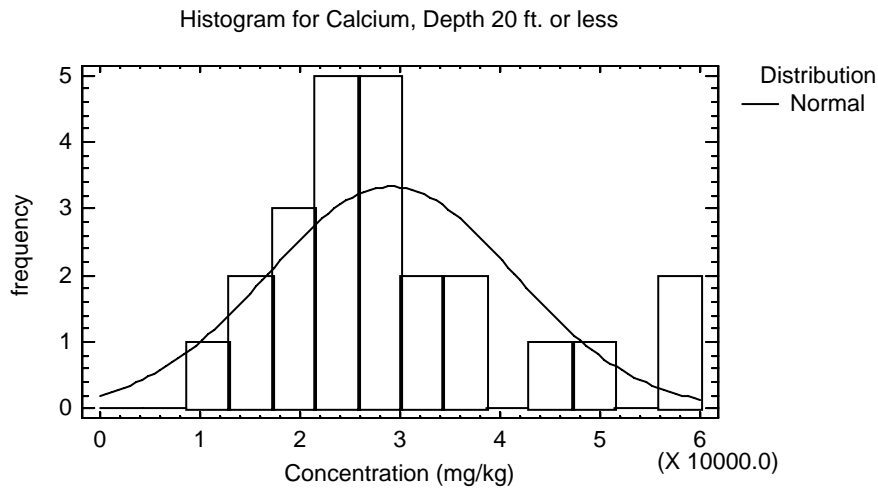
Data variable: Calcium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 11400.0 to 57350.0

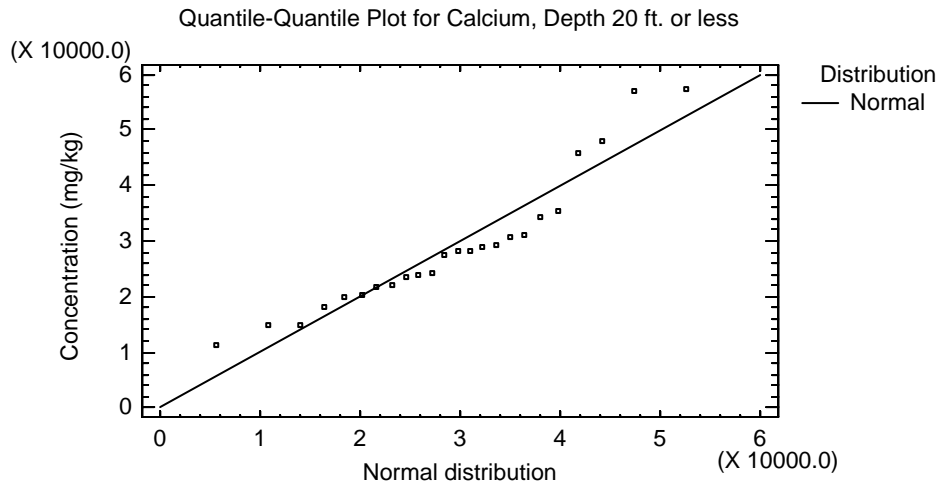
Fitted Distributions

Normal
mean = 29081.3
standard deviation = 12309.8



Tests for Normality for Calcium

Test	Statistic	P-Value
Shapiro-Wilk W	0.899601	0.0201436



**DRAFT**

**Uncensored Data - log(Calcium) (Data Set = "Tronox"&Depth Value<=20)**

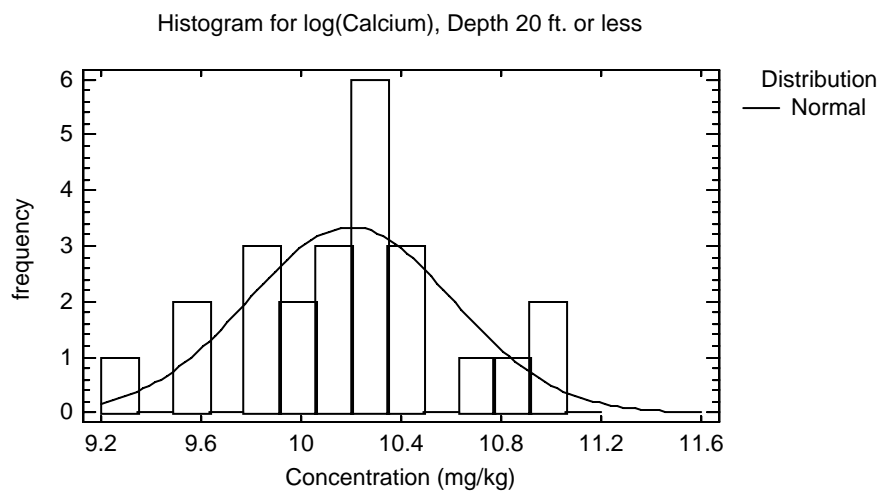
Data variable: log(Calcium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 9.34137 to 10.9569

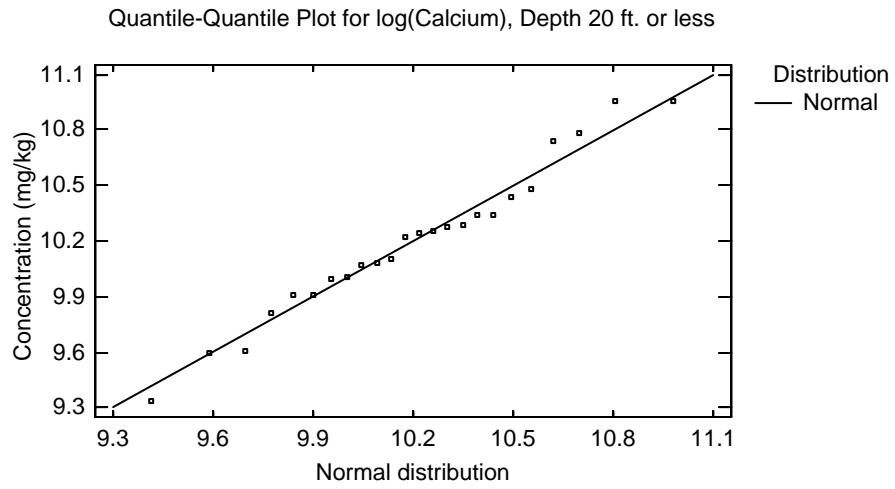
Fitted Distributions

Normal
mean = 10.1973
standard deviation = 0.409457



Tests for Normality for log(Calcium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.973454	0.747961



**DRAFT**

**Uncensored Data - Calcium (Data Set = "Tronox"&Depth Value>=30)**

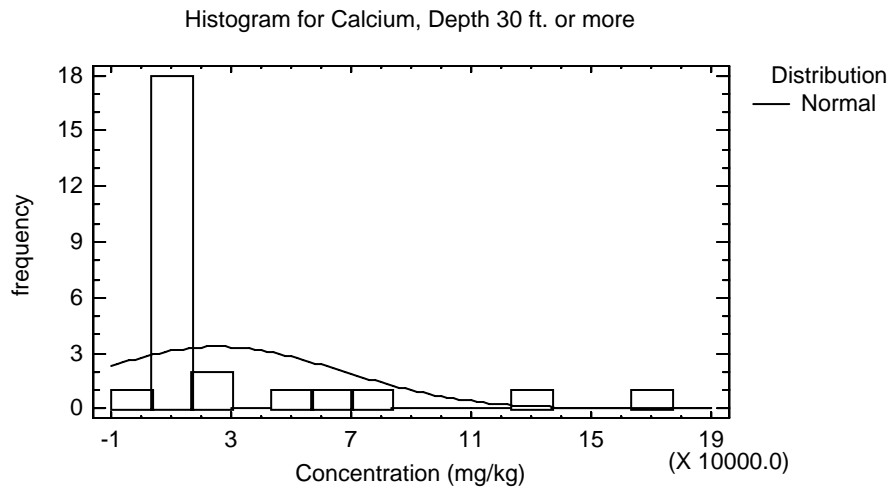
Data variable: Calcium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2440.0 to 170000.

Fitted Distributions

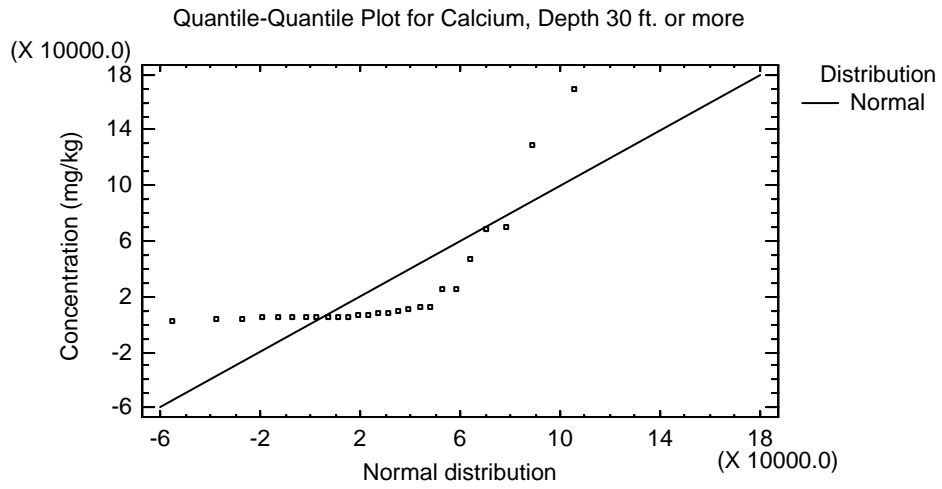
Normal
mean = 25501.3
standard deviation = 41357.0



Tests for Normality for Calcium

Test	Statistic	P-Value
Shapiro-Wilk W	0.584093	2.1498E-8





**DRAFT**

**Uncensored Data - log(Calcium) (Data Set = "Tronox"&Depth Value>=30)**

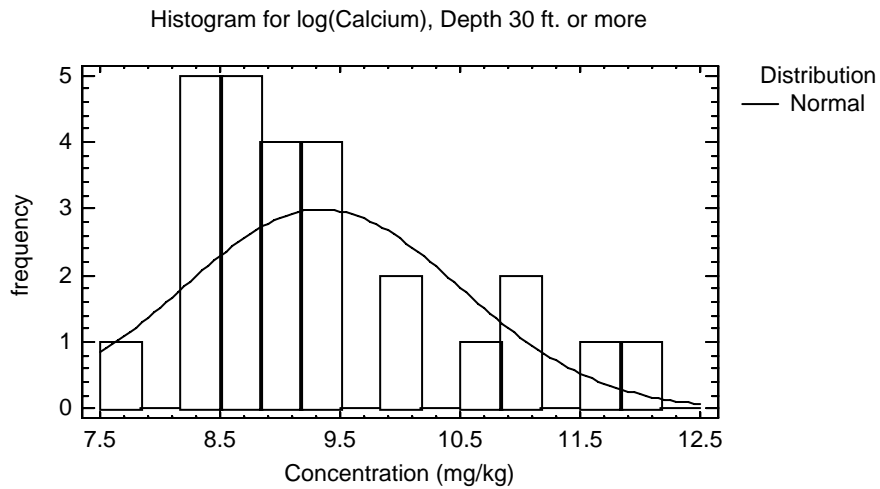
Data variable: log(Calcium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 7.79975 to 12.0436

Fitted Distributions

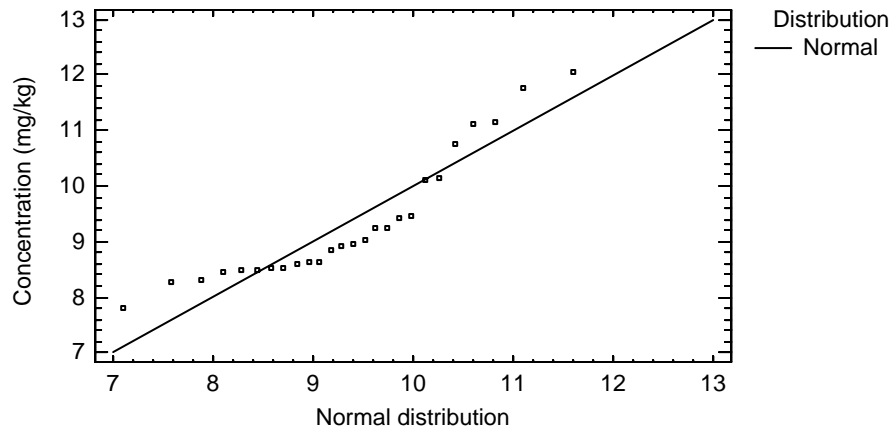
Normal
mean = 9.3449
standard deviation = 1.15593



Tests for Normality for log(Calcium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.862798	0.00212791

Quantile-Quantile Plot for log(Calcium), Depth 30 ft. or more



**DRAFT****Two-Sample Comparison - Calcium & Depth Range (Data Set="Tronox") for Calcium**

Sample 1: Depth Range=20 ft. or less

Sample 2: Depth Range=30 ft. or more

Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 11400.0 to 57350.0

Sample 2: 26 values ranging from 2440.0 to 170000.

Comparison of Medians for Calcium

Median of sample 1: 27800.0

Median of sample 2: 7575.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 32.625

Average rank of sample 2: 18.9231

W = -171.0 P-value = 0.000930292

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Calcium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

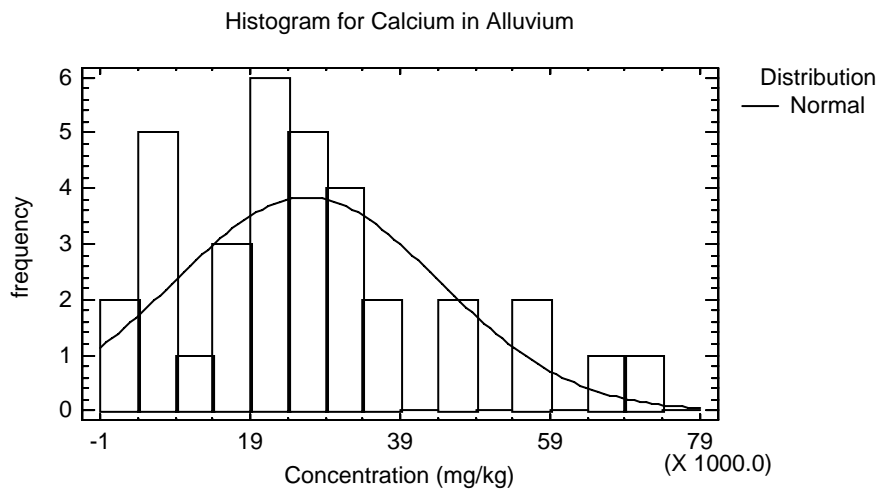
Data variable: Calcium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2440.0 to 70200.0

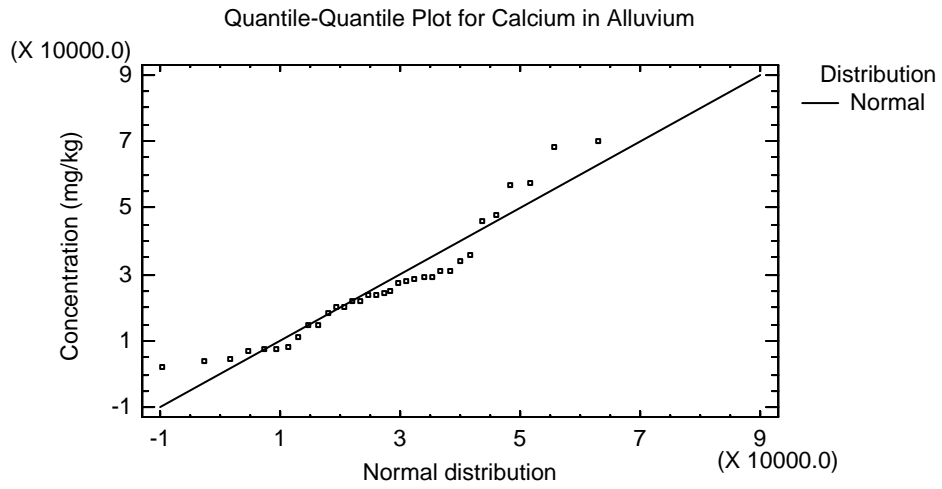
Fitted Distributions

Normal
mean = 26555.6
standard deviation = 17665.2



Tests for Normality for Calcium

Test	Statistic	P-Value
Shapiro-Wilk W	0.910442	0.00953333



**DRAFT**

**Uncensored Data - log(Calcium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

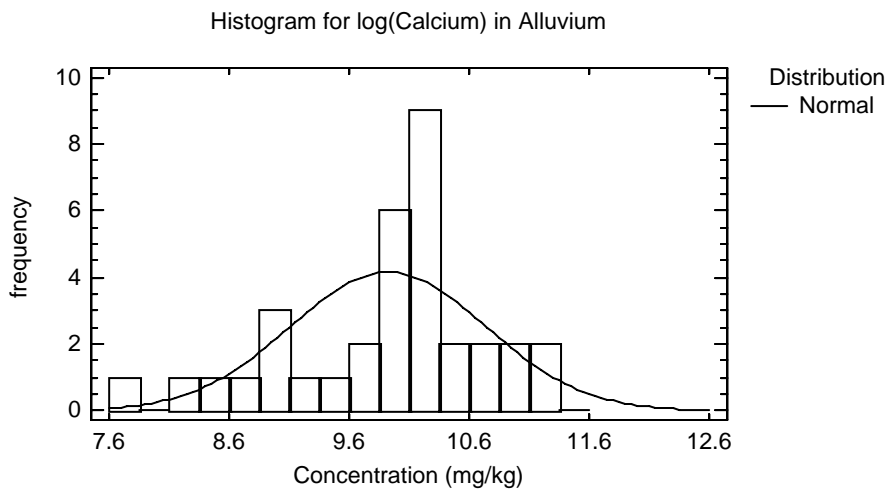
Data variable: log(Calcium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 7.79975 to 11.1591

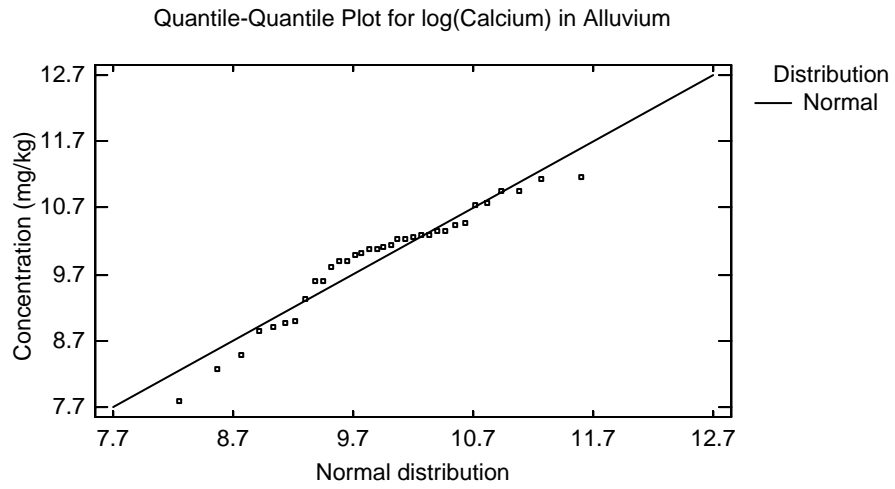
Fitted Distributions

Normal
mean = 9.92424
standard deviation = 0.815743



Tests for Normality for log(Calcium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.933072	0.0477204





**DRAFT**

**Uncensored Data - Calcium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

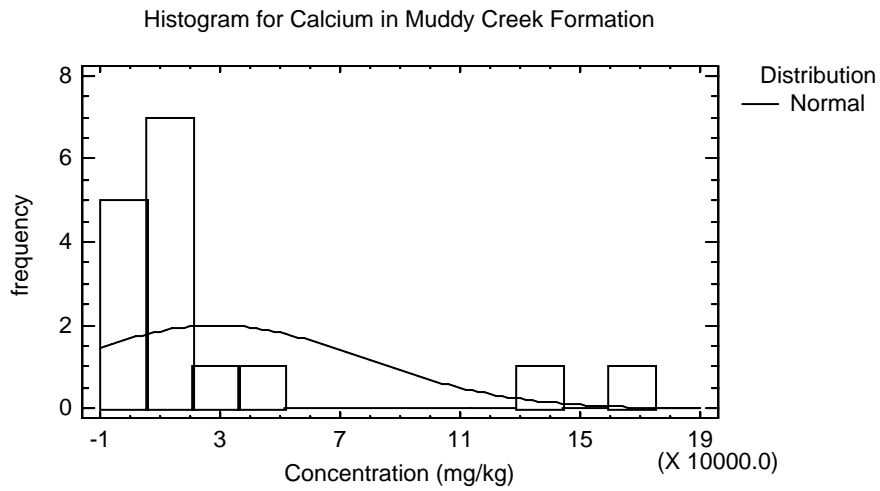
Data variable: Calcium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 4080.0 to 170000.

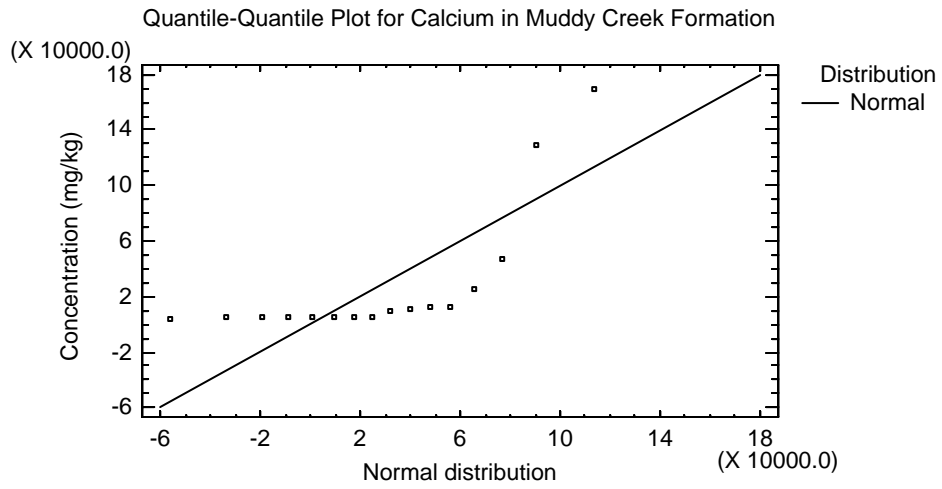
Fitted Distributions

Normal
mean = 28630.9
standard deviation = 49030.8



Tests for Normality for Calcium

Test	Statistic	P-Value
Shapiro-Wilk W	0.554936	0.00000180706



**DRAFT**

**Uncensored Data - log(Calcium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

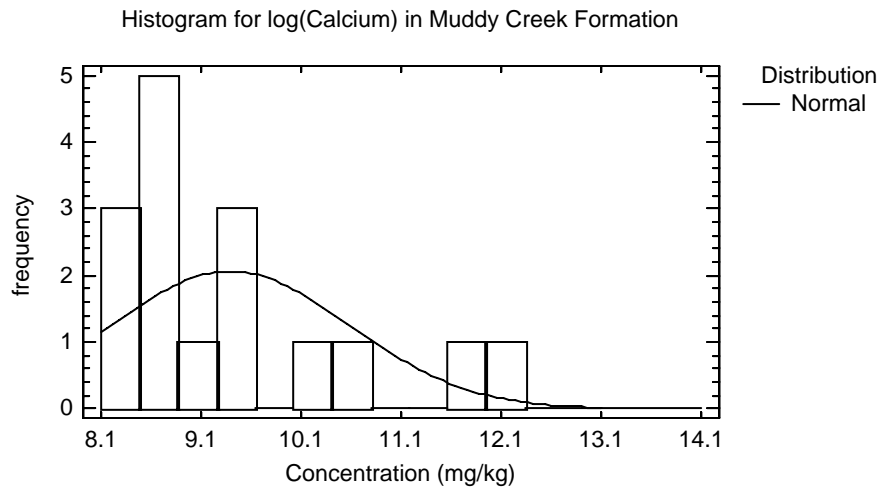
Data variable: log(Calcium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 8.31385 to 12.0436

Fitted Distributions

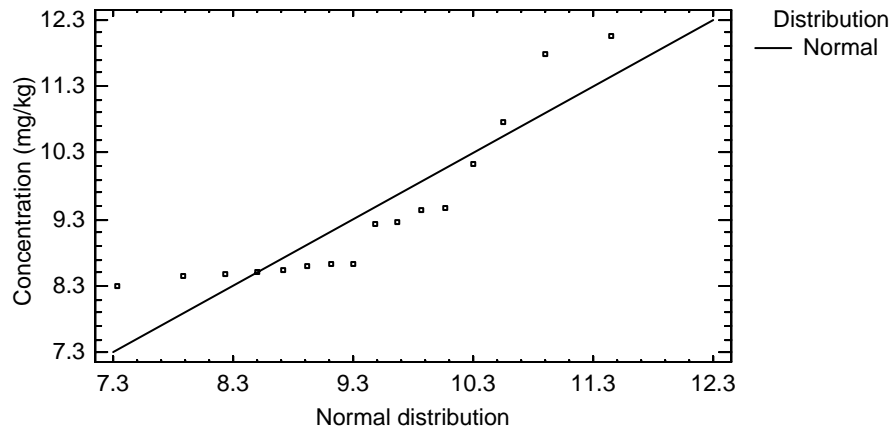
Normal
mean = 9.39234
standard deviation = 1.19135



Tests for Normality for log(Calcium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.802047	0.00245787

Quantile-Quantile Plot for log(Calcium) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Calcium & Geological Formation 1 (Data Set="Tronox")  
for Calcium**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 2440.0 to 70200.0

Sample 2: 16 values ranging from 4080.0 to 170000.

Comparison of Medians for Calcium

Median of sample 1: 24200.0

Median of sample 2: 7967.5

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 28.6176

Average rank of sample 2: 18.875

W = -106.0 P-value = 0.0282273

Reject the null hypothesis for alpha = 0.05.

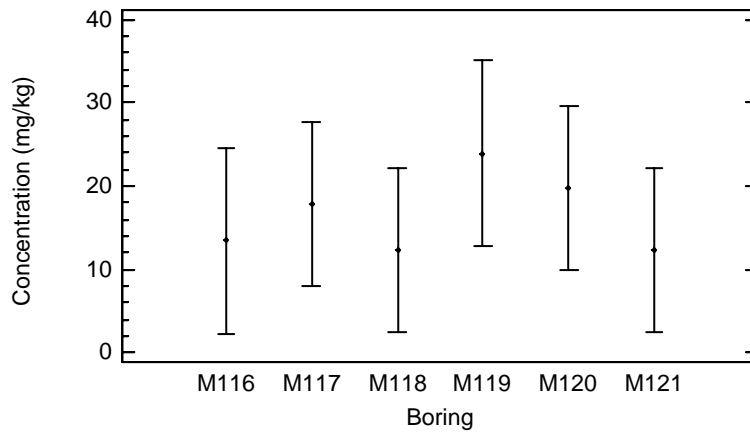
DRAFT

## 2.9 Chromium

ANOVA Table for Chromium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	858.725	5	171.745	0.87	0.5059
Within groups	8640.31	44	196.371		
Total (Corr.)	9499.04	49			

Means and 95.0 Percent Tukey HSD Intervals for Chromium



Kruskal-Wallis Test for Chromium by Location ID

Location ID	Sample Size	Average Rank
M116	7	24.2857
M117	9	26.8889
M118	9	22.6667
M119	7	31.2857
M120	9	26.6667
M121	9	22.2222

Test statistic = 2.08584 P-Value = 0.837144

**DRAFT**

**Uncensored Data - Chromium (Data Set = "Tronox")**

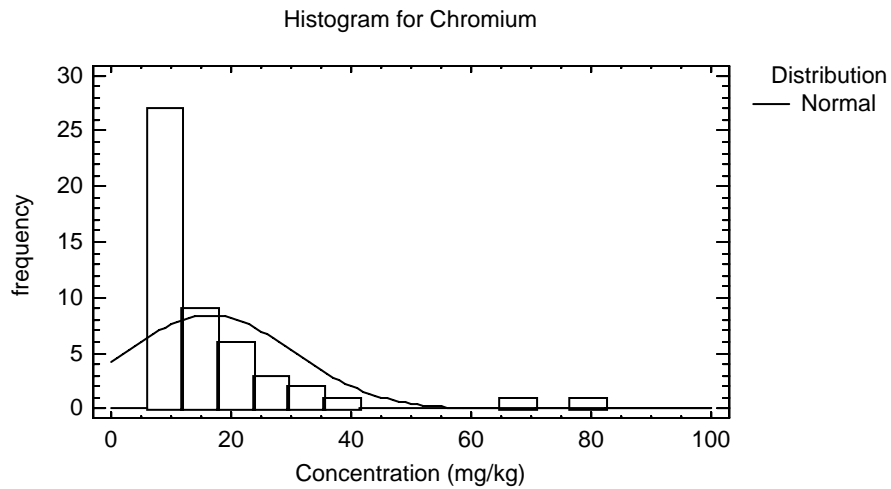
Data variable: Chromium

Selection variable: Data Set = "Tronox"

50 values ranging from 6.53 to 79.6

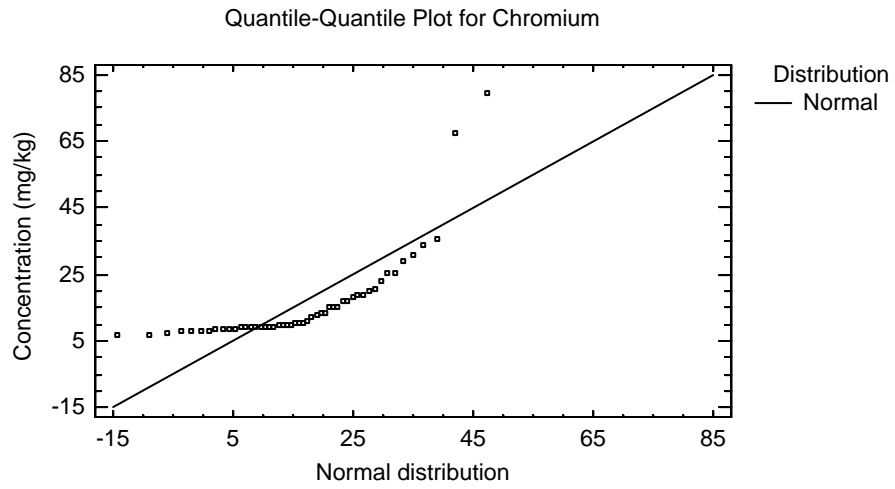
Fitted Distributions

Normal
mean = 16.4177
standard deviation = 13.9233



Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.632015	6.88338E-15





**DRAFT**

**Uncensored Data - log(Chromium) (Data Set = "Tronox")**

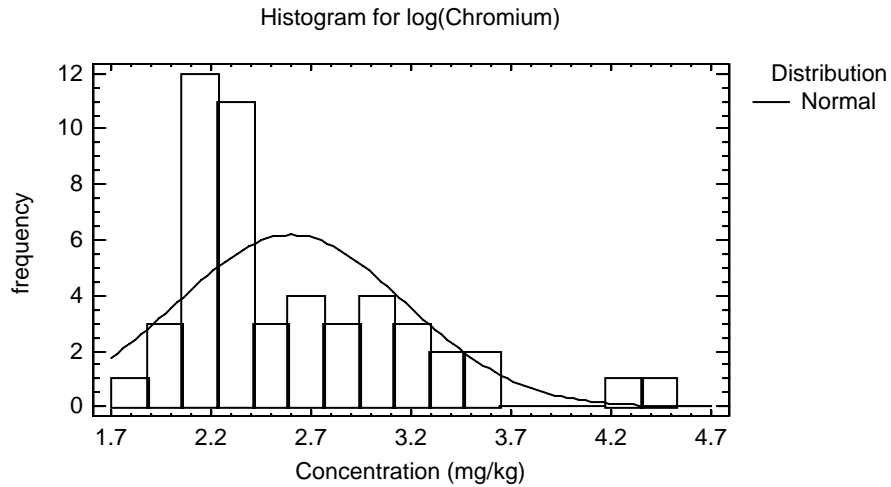
Data variable: log(Chromium)

Selection variable: Data Set = "Tronox"

50 values ranging from 1.87641 to 4.37701

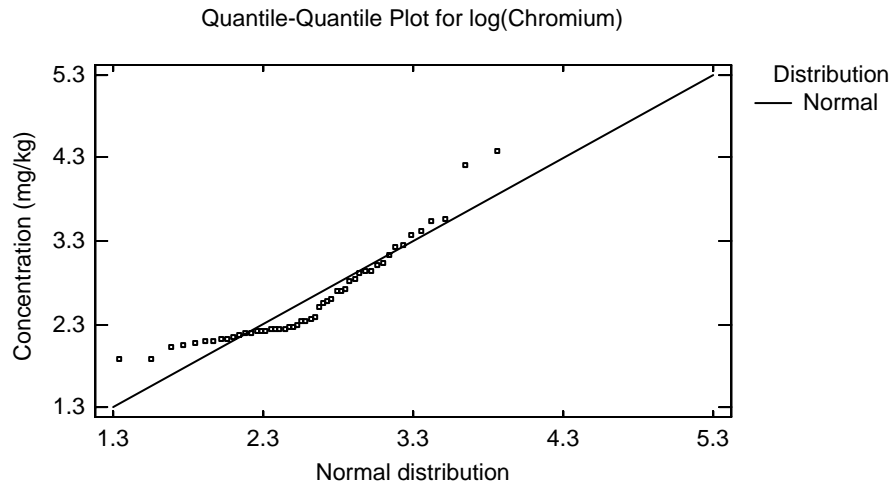
Fitted Distributions

Normal
mean = 2.59958
standard deviation = 0.568938



Tests for Normality for log(Chromium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.872458	0.0000142243



**DRAFT**

**Uncensored Data - Chromium (Data Set = "Tronox"&Depth Value<=20)**

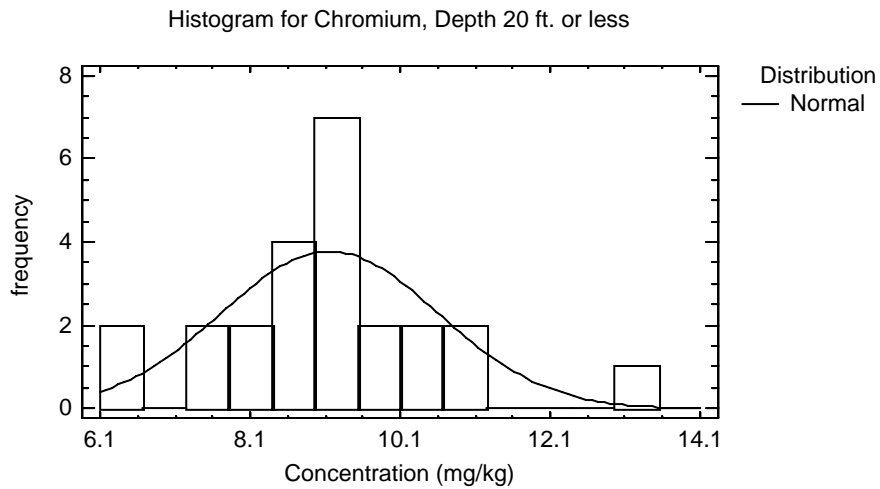
Data variable: Chromium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 6.53 to 13.5

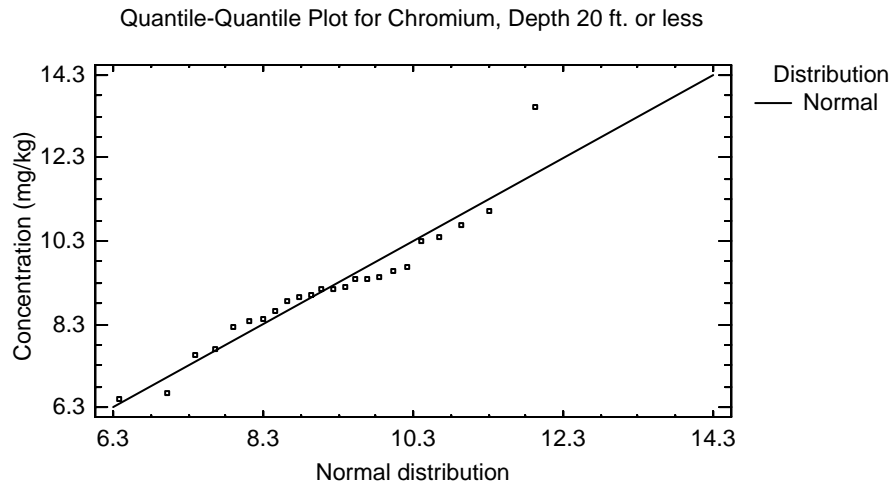
Fitted Distributions

Normal
mean = 9.15729
standard deviation = 1.4479



Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.933456	0.119383



**DRAFT**

**Uncensored Data - log(Chromium) (Data Set = "Tronox"&Depth Value<=20)**

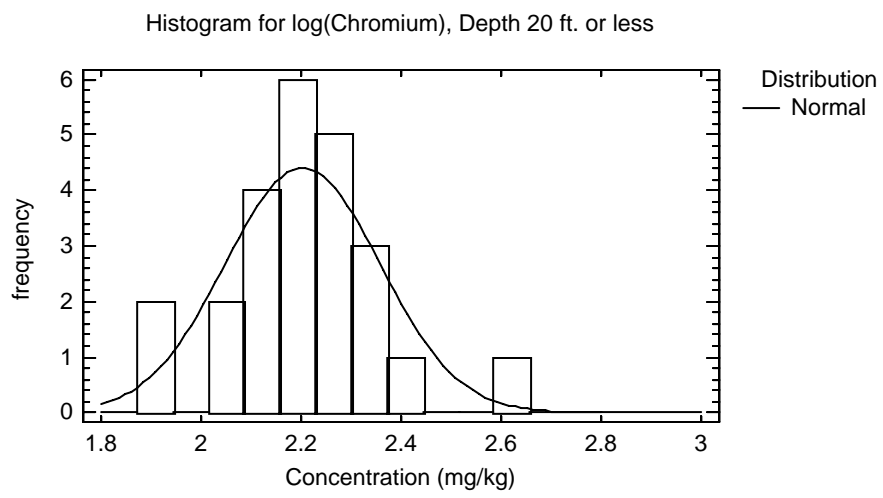
Data variable: log(Chromium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 1.87641 to 2.60269

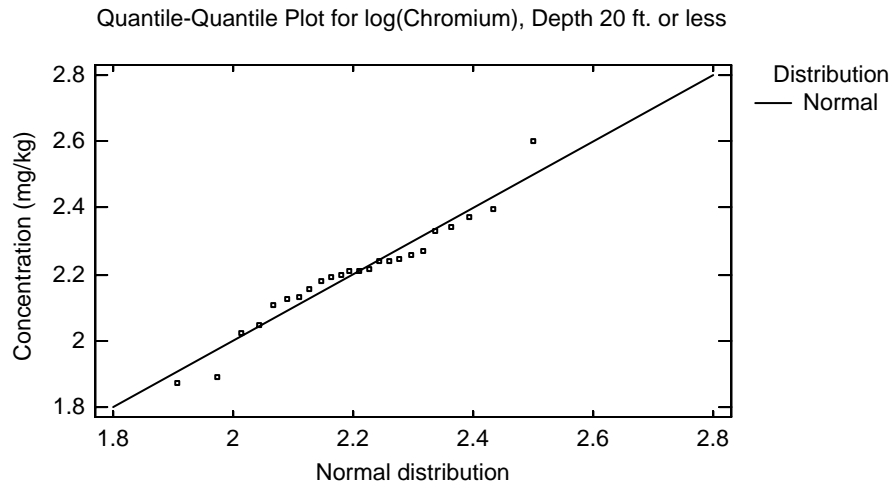
Fitted Distributions

Normal
mean = 2.20293
standard deviation = 0.15531



Tests for Normality for log(Chromium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.956209	0.374439



**DRAFT**

**Uncensored Data - Chromium (Data Set = "Tronox"&Depth Value>=30)**

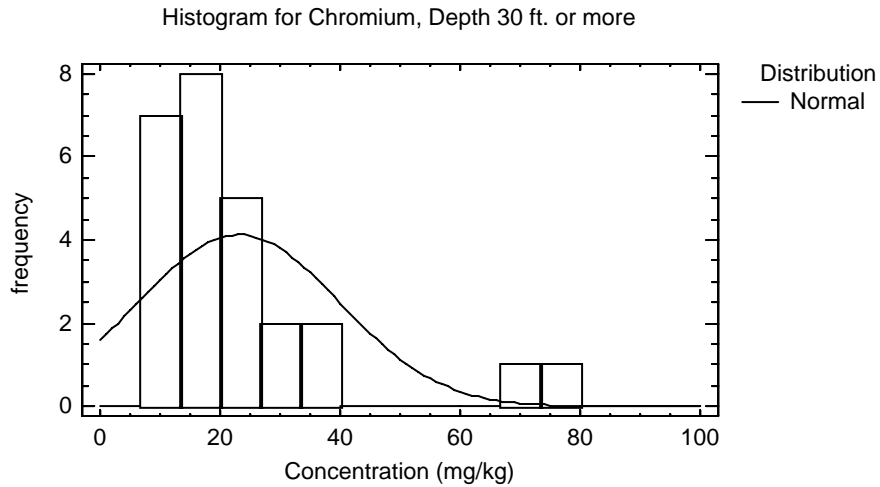
Data variable: Chromium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.0 to 79.6

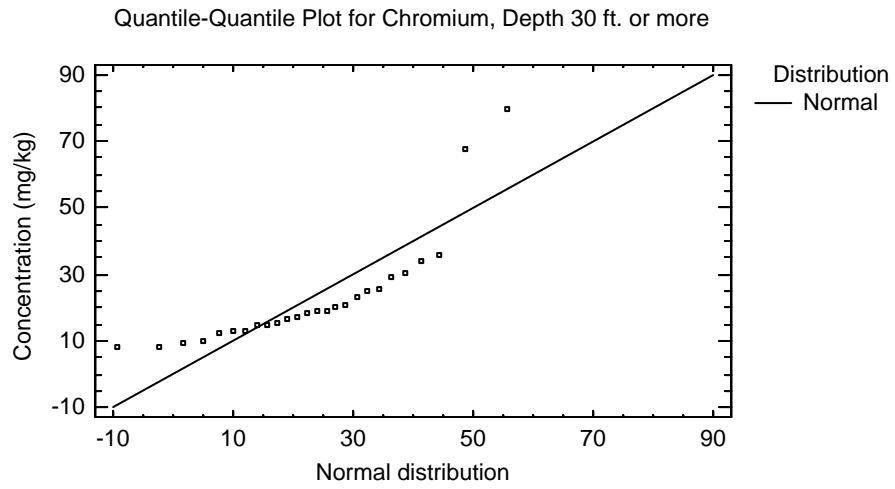
Fitted Distributions

Normal
mean = 23.1196
standard deviation = 16.7546



Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.72748	0.00000429148





**DRAFT**

**Uncensored Data - log(Chromium) (Data Set = "Tronox"&Depth Value>=30)**

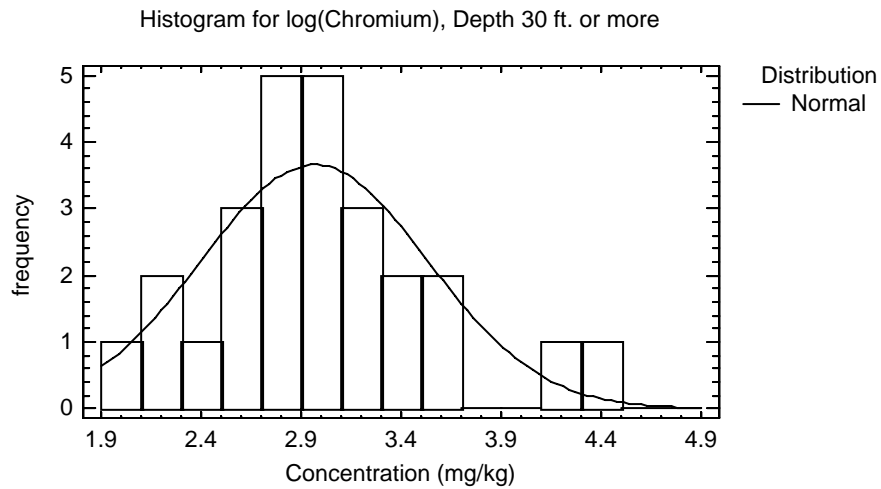
Data variable: log(Chromium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.07944 to 4.37701

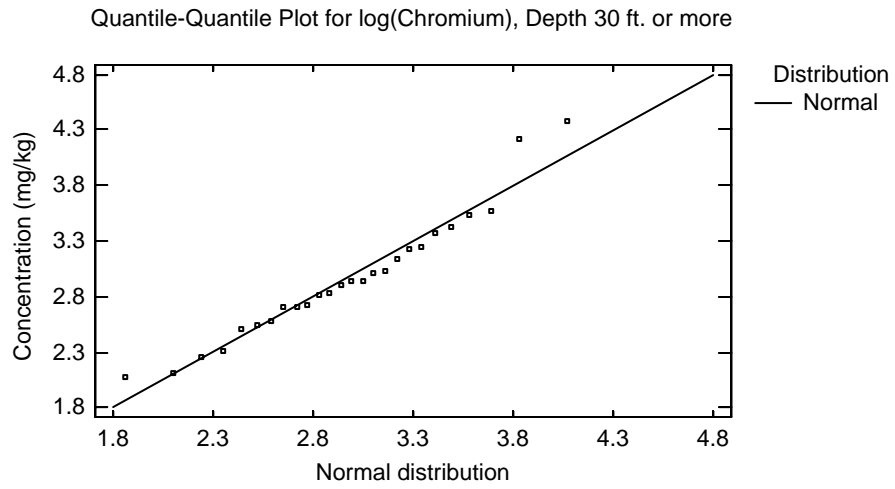
Fitted Distributions

Normal
mean = 2.96571
standard deviation = 0.567264



Tests for Normality for log(Chromium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.951967	0.274787



**DRAFT**

**Two-Sample Comparison - log(Chromium) & Depth Range (Data Set="Tronox") for log(Chromium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 1.87641 to 2.60269  
 Sample 2: 26 values ranging from 2.07944 to 4.37701

Comparison of Means for log(Chromium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 2.20293 +/- 0.0655819 [2.13735, 2.26851]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 2.96571 +/- 0.229124 [2.73659, 3.19484]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -0.762783 +/- 0.236584 [-0.999366, -0.526199]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -6.59398 P-value = 3.15753E-7  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Chromium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.15531	0.567264
Variance	0.0241213	0.321789
Df	23	25

Ratio of Variances = 0.07496

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.120709, 0.217863]  
 Standard deviation of Depth Range=30 ft. or more: [0.444881, 0.783057]  
 Ratio of Variances: [0.0332406, 0.171441]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.07496 P-value = 2.80028E-8  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Chromium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

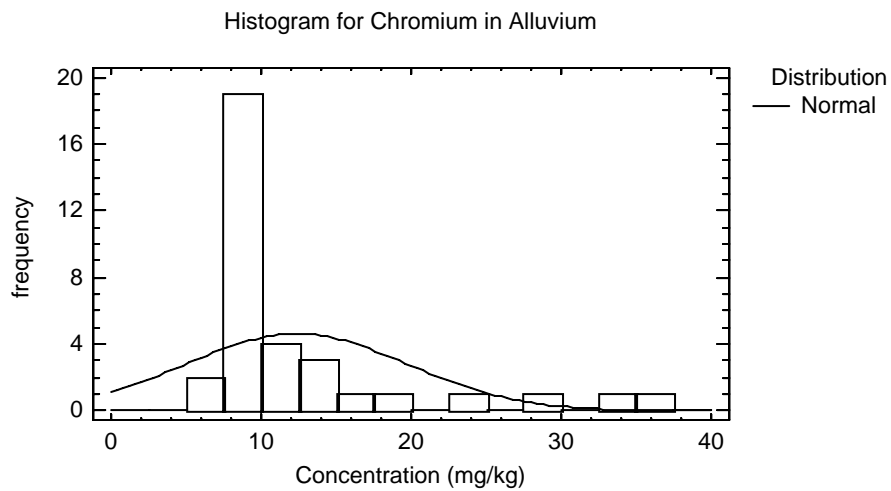
Data variable: Chromium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 6.53 to 35.6

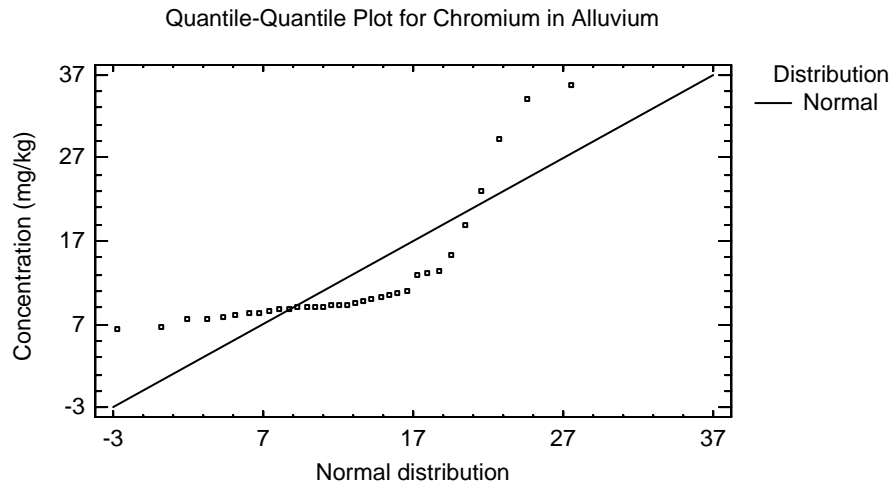
Fitted Distributions

Normal
mean = 12.3581
standard deviation = 7.36009



Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.649858	3.06932E-9



**DRAFT**

**Uncensored Data - log(Chromium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

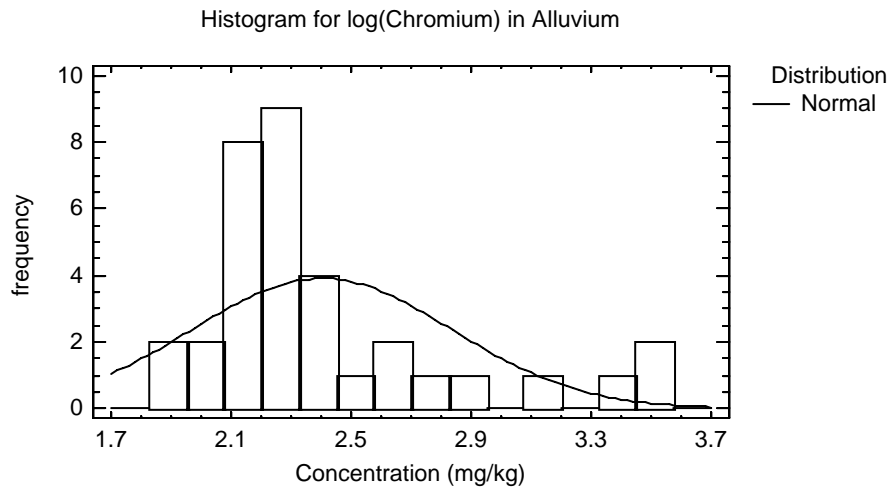
Data variable: log(Chromium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 1.87641 to 3.57235

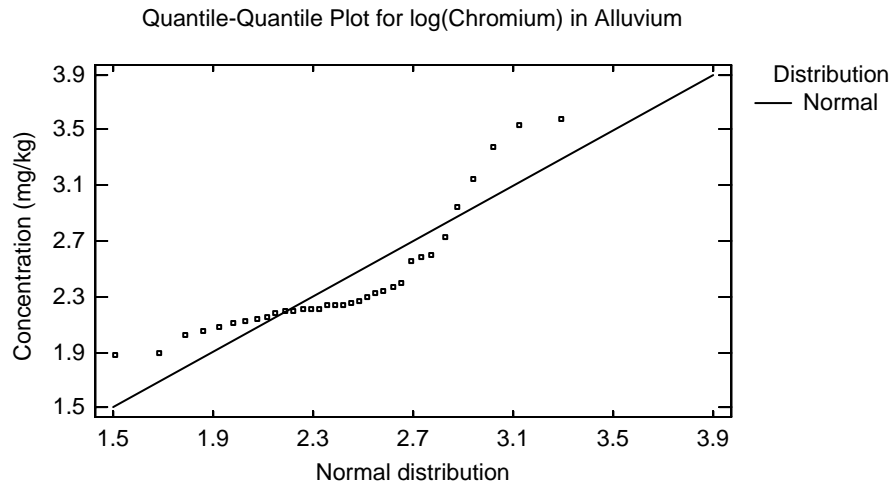
Fitted Distributions

Normal
mean = 2.40216
standard deviation = 0.433814



Tests for Normality for log(Chromium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.799779	0.00000749675



**DRAFT**

**Uncensored Data - Chromium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

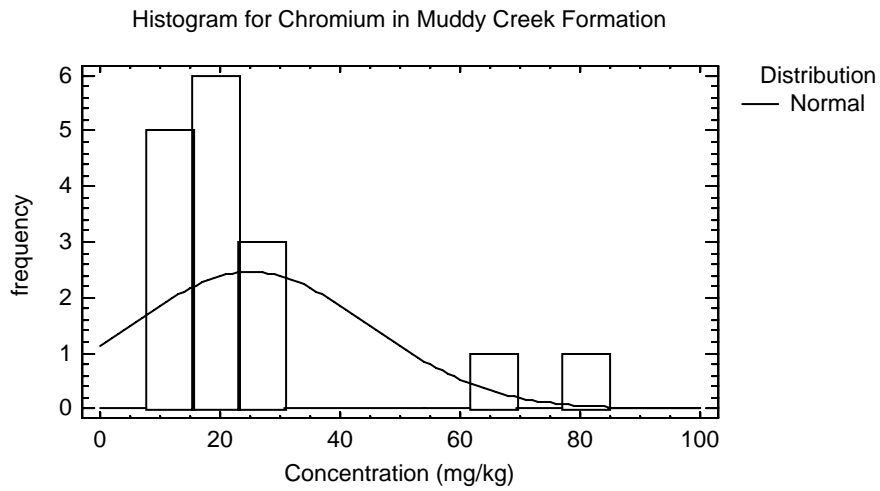
Data variable: Chromium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 8.2 to 79.6

Fitted Distributions

Normal
mean = 25.0444
standard deviation = 19.9338

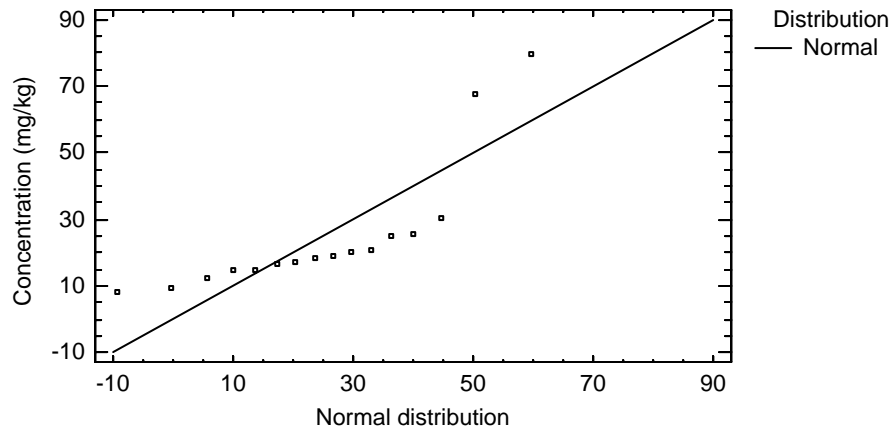


Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.686275	0.0000646428



Quantile-Quantile Plot for Chromium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Chromium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

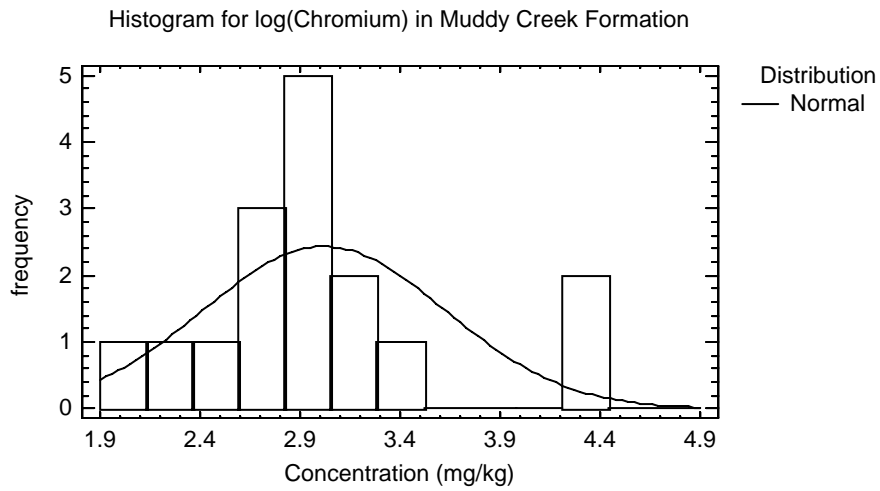
Data variable: log(Chromium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 2.10413 to 4.37701

Fitted Distributions

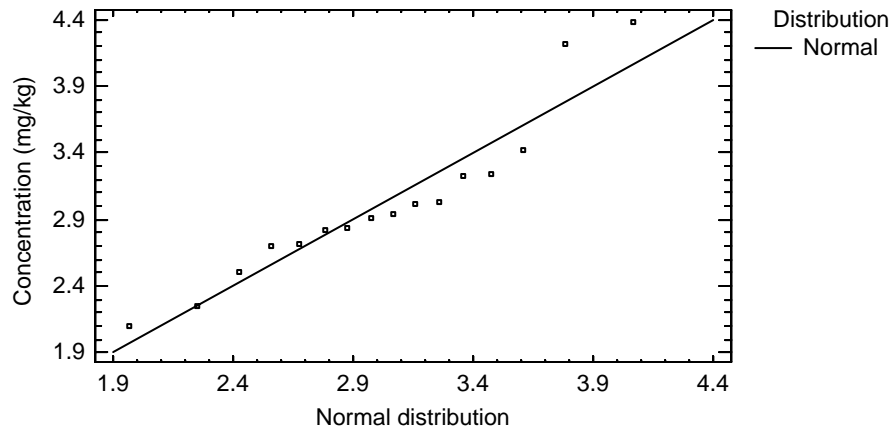
Normal
mean = 3.01909
standard deviation = 0.606048



Tests for Normality for log(Chromium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.910021	0.118106

Quantile-Quantile Plot for log(Chromium) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Chromium & Geological Formation 1 (Data Set="Tronox") for Chromium**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 6.53 to 35.6

Sample 2: 16 values ranging from 8.2 to 79.6

Comparison of Medians for Chromium

Median of sample 1: 9.405

Median of sample 2: 18.65

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 20.4853

Average rank of sample 2: 36.1563

W = 170.5 P-value = 0.000406773

Reject the null hypothesis for alpha = 0.05.

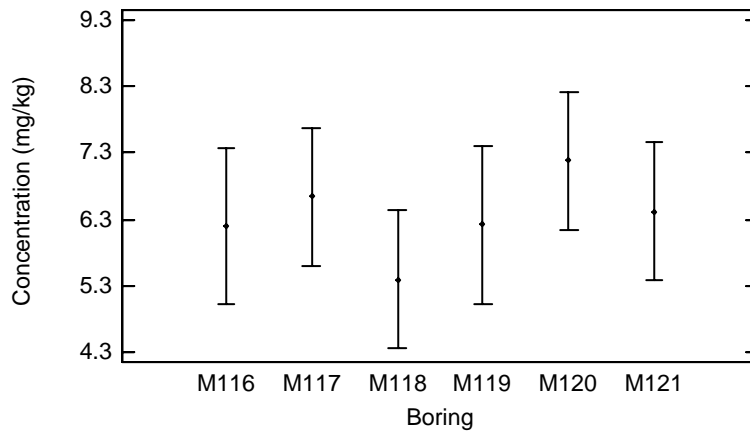
**DRAFT**

**2.10 Cobalt**

ANOVA Table for Cobalt by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	15.2296	5	3.04593	1.40	0.2430
Within groups	95.7311	44	2.17571		
Total (Corr.)	110.961	49			

Means and 95.0 Percent Tukey HSD Intervals for Cobalt



Kruskal-Wallis Test for Cobalt by Location ID

Location ID	Sample Size	Average Rank
M116	7	23.7143
M117	9	27.3333
M118	9	17.3333
M119	7	24.7857
M120	9	34.6111
M121	9	24.6667

Test statistic = 6.63445 P-Value = 0.249276

**DRAFT**

**Uncensored Data - Cobalt (Data Set = "Tronox")**

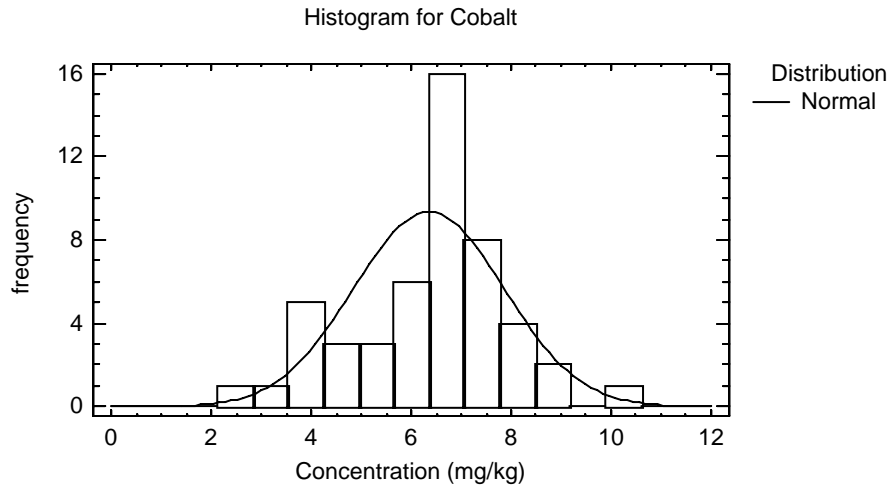
Data variable: Cobalt

Selection variable: Data Set = "Tronox"

50 values ranging from 2.6 to 10.4

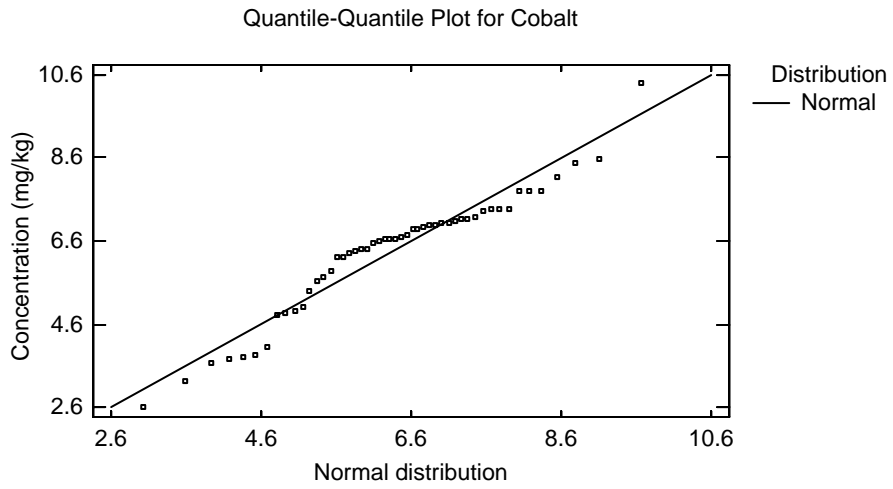
Fitted Distributions

Normal
mean = 6.3533
standard deviation = 1.50483



Tests for Normality for Cobalt

Test	Statistic	P-Value
Shapiro-Wilk W	0.946313	0.0395266



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set = "Tronox")**

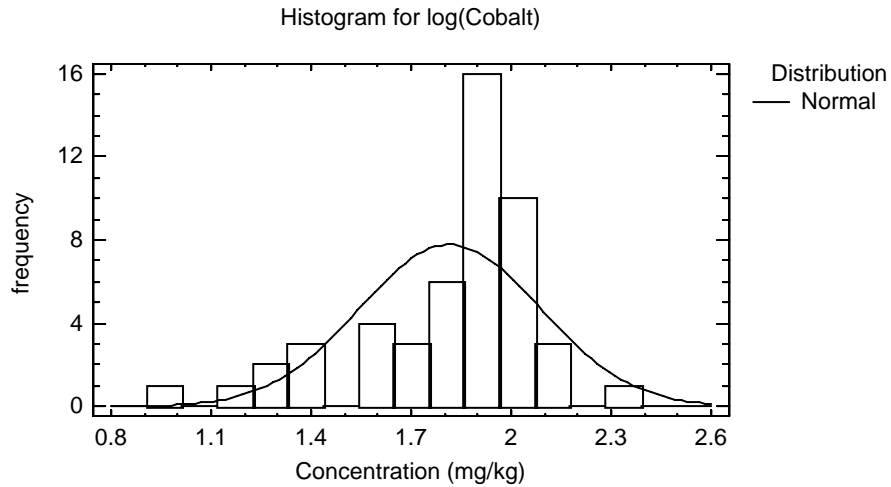
Data variable: log(Cobalt)

Selection variable: Data Set = "Tronox"

50 values ranging from 0.955511 to 2.34181

Fitted Distributions

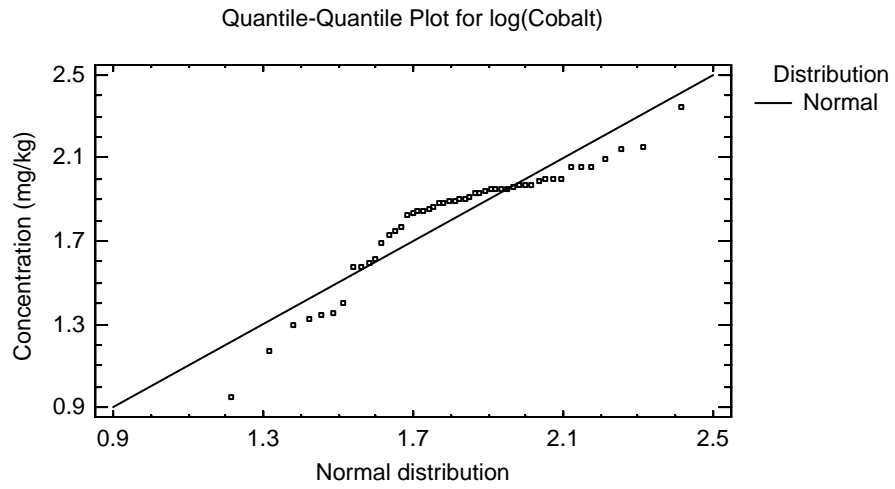
Normal
mean = 1.81634
standard deviation = 0.271721



Tests for Normality for log(Cobalt)

Test	Statistic	P-Value
Shapiro-Wilk W	0.885451	0.0000558056





**DRAFT**

**Uncensored Data - Cobalt (Data Set = "Tronox"&Depth Value<=20)**

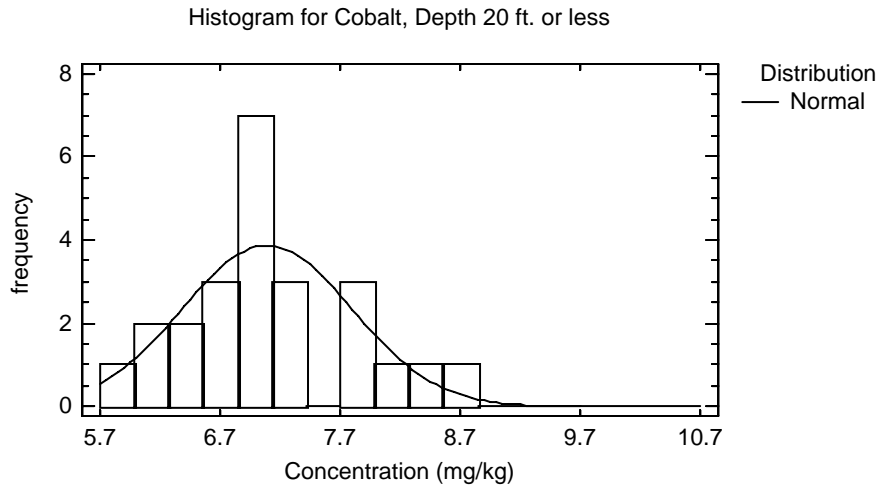
Data variable: Cobalt

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.88 to 8.57

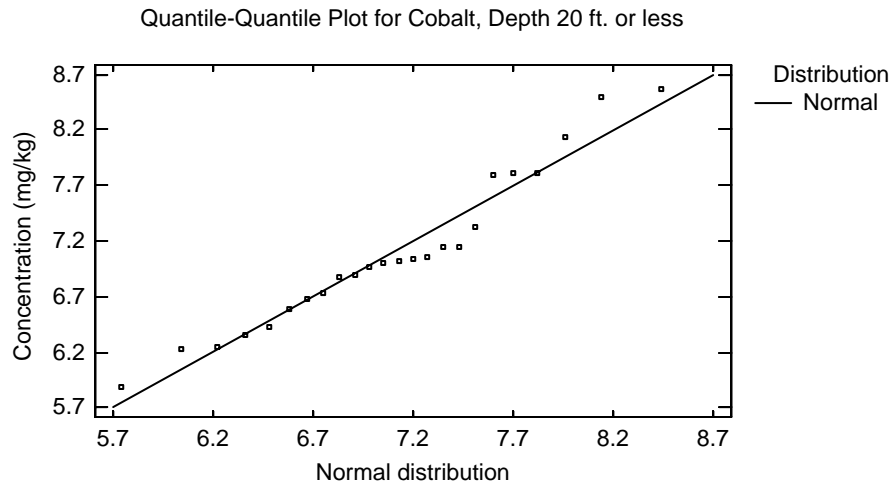
Fitted Distributions

Normal
mean = 7.09021
standard deviation = 0.706183



Tests for Normality for Cobalt

Test	Statistic	P-Value
Shapiro-Wilk W	0.948914	0.263497



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set = "Tronox"&Depth Value<=20)**

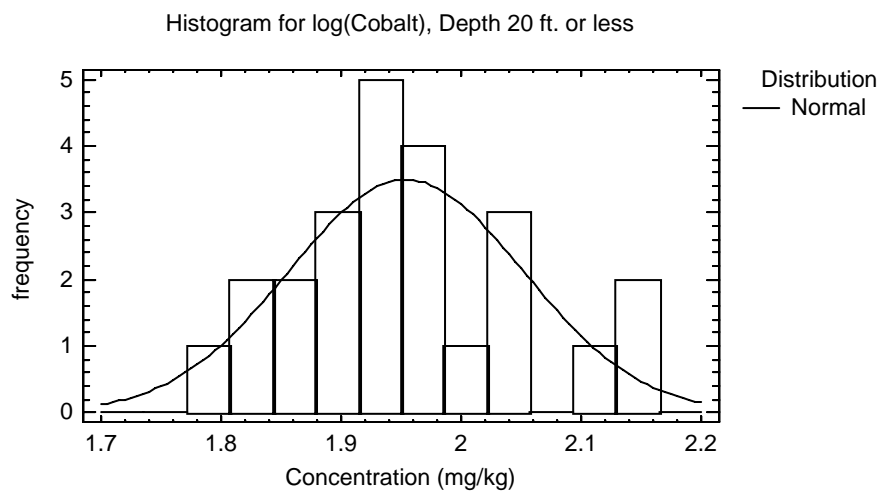
Data variable: log(Cobalt)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 1.77156 to 2.14827

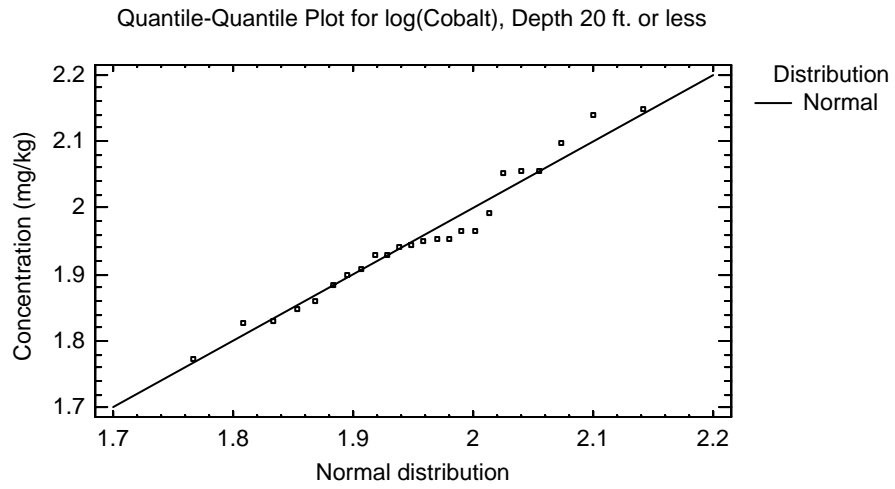
Fitted Distributions

Normal
mean = 1.95407
standard deviation = 0.0979352



Tests for Normality for log(Cobalt)

Test	Statistic	P-Value
Shapiro-Wilk W	0.963169	0.510466



**DRAFT**

**Uncensored Data - Cobalt (Data Set = "Tronox"&Depth Value>=30)**

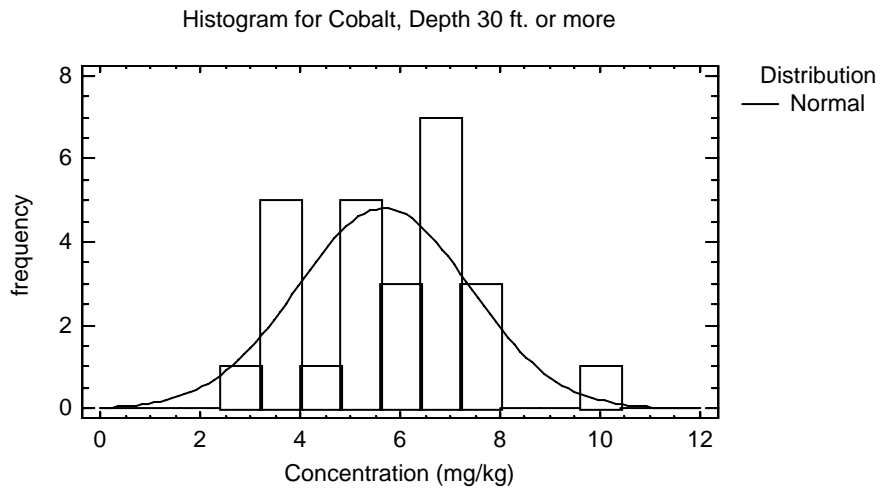
Data variable: Cobalt

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.6 to 10.4

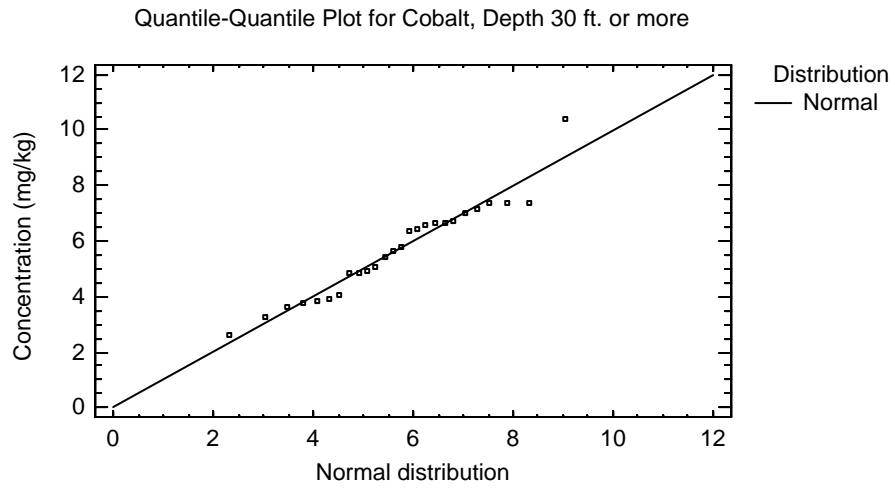
Fitted Distributions

Normal
mean = 5.67308
standard deviation = 1.72543



Tests for Normality for Cobalt

Test	Statistic	P-Value
Shapiro-Wilk W	0.952631	0.284425



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set = "Tronox"&Depth Value>=30)**

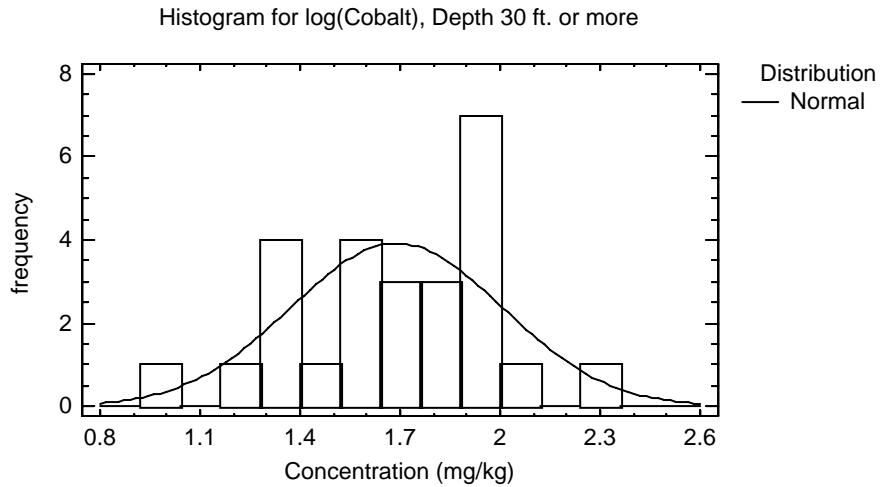
Data variable: log(Cobalt)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.955511 to 2.34181

Fitted Distributions

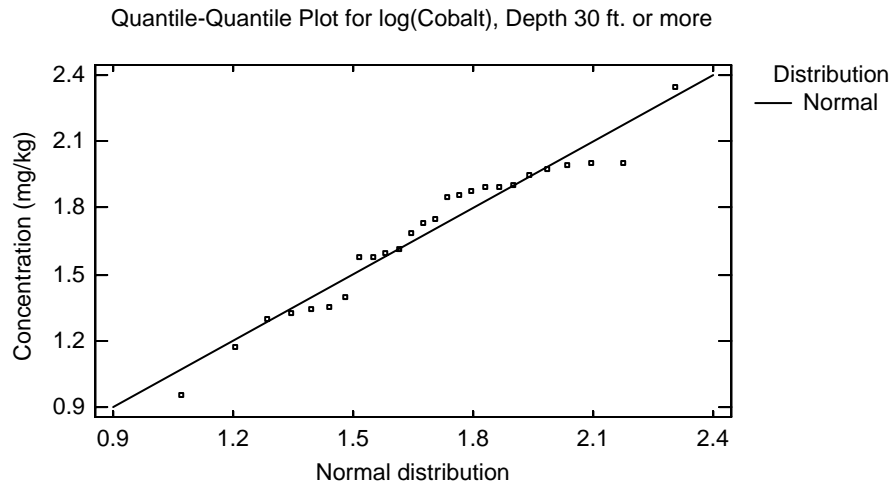
Normal
mean = 1.68921
standard deviation = 0.317596



Tests for Normality for log(Cobalt)

Test	Statistic	P-Value
Shapiro-Wilk W	0.958236	0.377407





**DRAFT**

**Two-Sample Comparison - log(Cobalt) & Depth Range (Data Set="Tronox") for log(Cobalt)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 1.77156 to 2.14827  
 Sample 2: 26 values ranging from 0.955511 to 2.34181

Comparison of Means for log(Cobalt)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 1.95407 +/- 0.0413545 [1.91272, 1.99543]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 1.68921 +/- 0.12828 [1.56093, 1.81749]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: 0.264862 +/- 0.133583 [0.131279, 0.398445]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = 4.04894 P-value = 0.000332712  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Cobalt)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.0979352	0.317596
Variance	0.0095913	0.100867
Df	23	25

Ratio of Variances = 0.0950883

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.0761165, 0.13738]  
 Standard deviation of Depth Range=30 ft. or more: [0.249077, 0.438412]  
 Ratio of Variances: [0.0421664, 0.217476]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.0950883 P-value = 2.96034E-7  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Cobalt (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

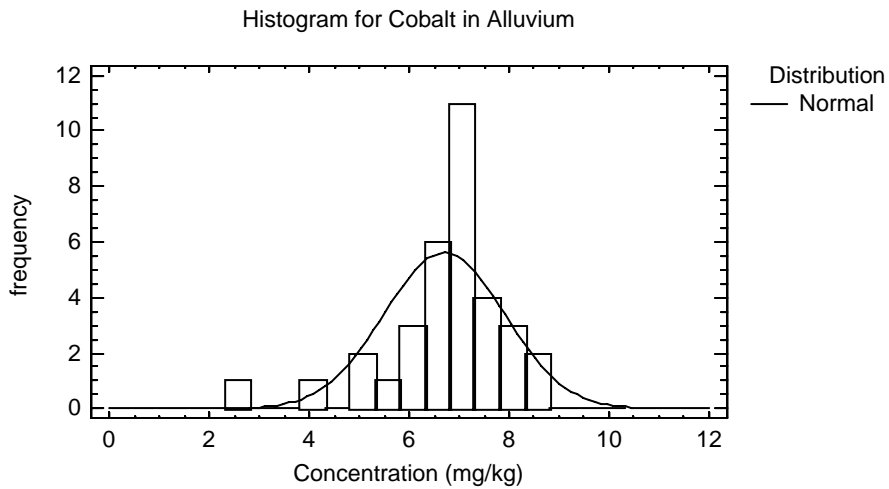
Data variable: Cobalt

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2.6 to 8.57

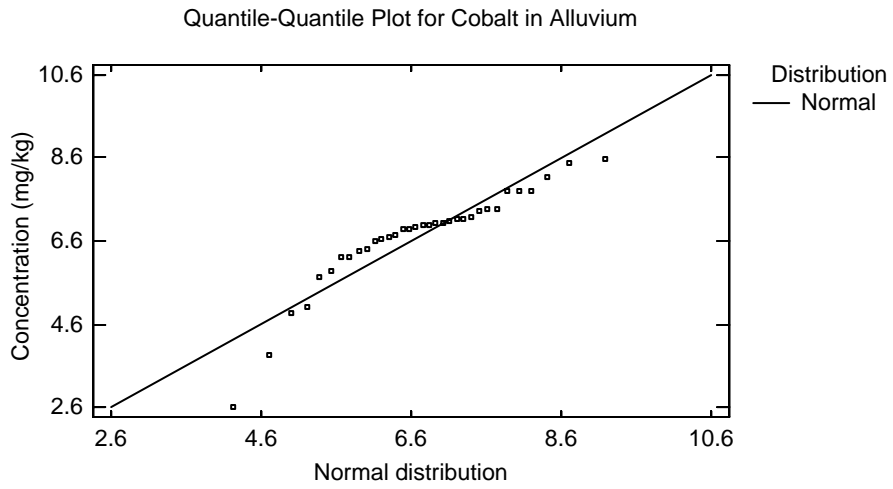
Fitted Distributions

Normal
mean = 6.70324
standard deviation = 1.20872



Tests for Normality for Cobalt

Test	Statistic	P-Value
Shapiro-Wilk W	0.877388	0.000972228



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

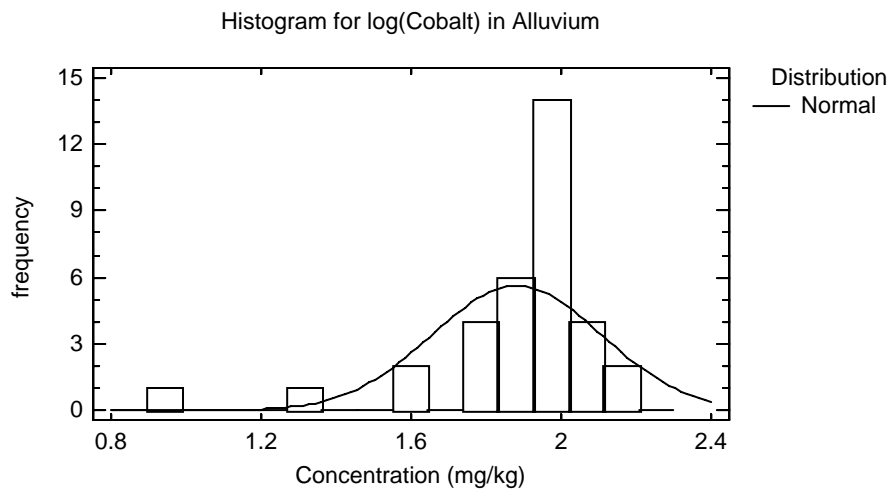
Data variable: log(Cobalt)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.955511 to 2.14827

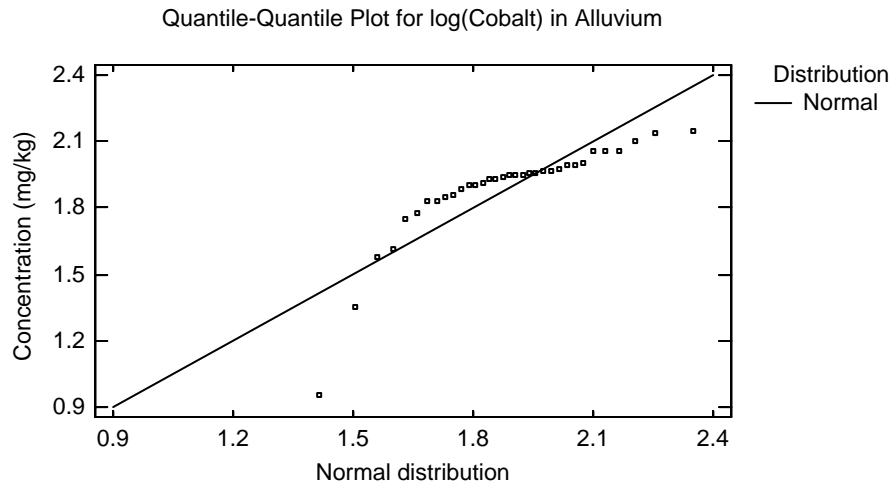
Fitted Distributions

Normal
mean = 1.88144
standard deviation = 0.226976



Tests for Normality for log(Cobalt)

Test	Statistic	P-Value
Shapiro-Wilk W	0.75342	5.54241E-7



**DRAFT**

**Uncensored Data - Cobalt (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

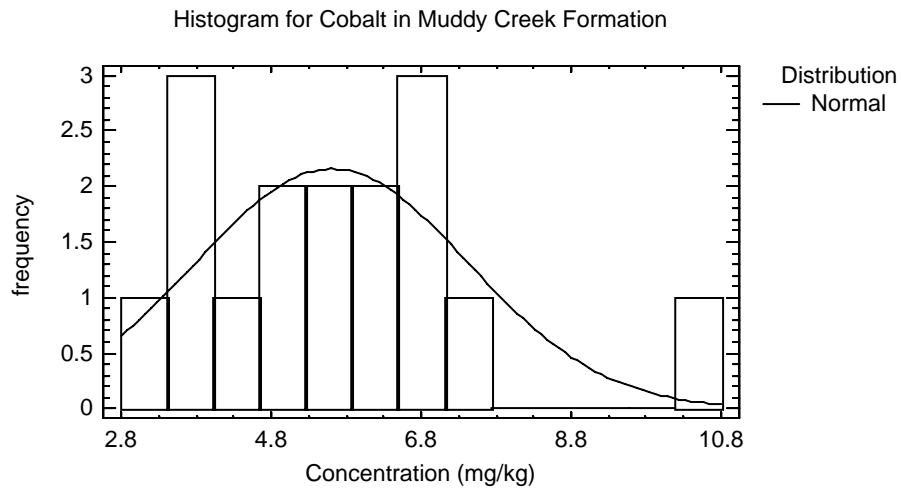
Data variable: Cobalt

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 3.24 to 10.4

Fitted Distributions

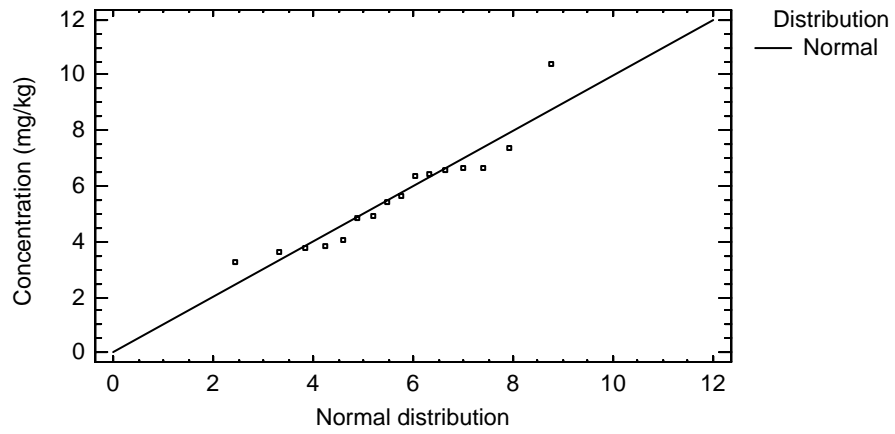
Normal
mean = 5.60969
standard deviation = 1.82093



Tests for Normality for Cobalt

Test	Statistic	P-Value
Shapiro-Wilk W	0.908757	0.112729

Quantile-Quantile Plot for Cobalt in Muddy Creek Formation





**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

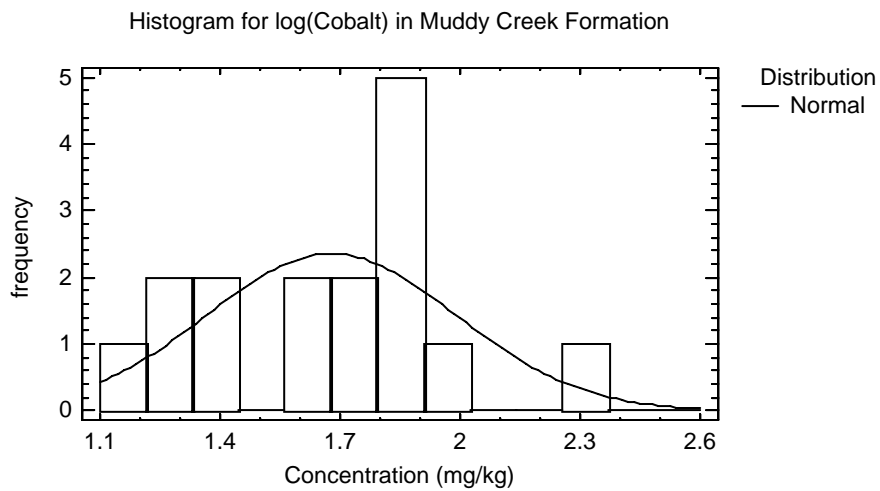
Data variable: log(Cobalt)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 1.17557 to 2.34181

Fitted Distributions

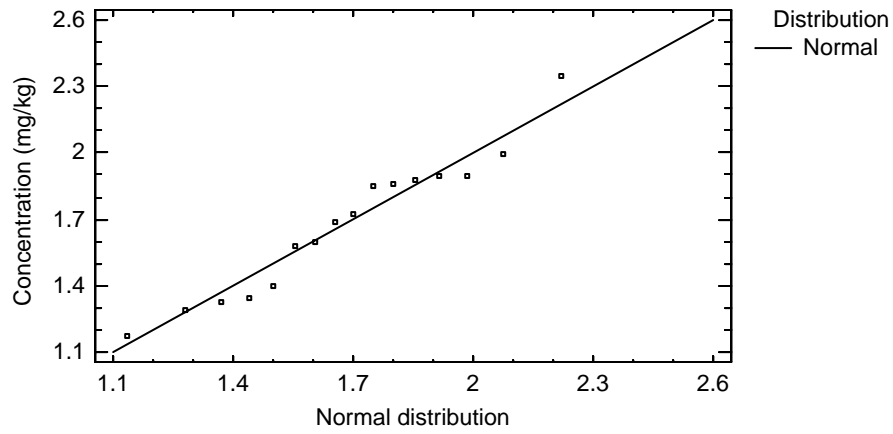
Normal
mean = 1.678
standard deviation = 0.31277



Tests for Normality for log(Cobalt)

Test	Statistic	P-Value
Shapiro-Wilk W	0.955651	0.565684

Quantile-Quantile Plot for log(Cobalt) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Cobalt & Geological Formation 1 (Data Set="Tronox") for Cobalt**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 2.6 to 8.57

Sample 2: 16 values ranging from 3.24 to 10.4

Comparison of Medians for Cobalt

Median of sample 1: 6.9775

Median of sample 2: 5.52

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 29.7059

Average rank of sample 2: 16.5625

W = -143.0 P-value = 0.00303997

Reject the null hypothesis for alpha = 0.05.

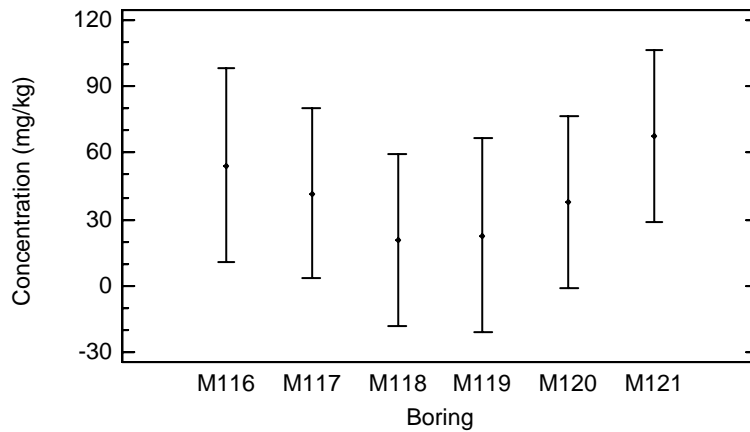
**DRAFT**

## 2.11 Copper

ANOVA Table for Copper by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	13819.6	5	2763.92	0.92	0.4788
Within groups	132584.	44	3013.28		
Total (Corr.)	146404.	49			

Means and 95.0 Percent Tukey HSD Intervals for Copper



Kruskal-Wallis Test for Copper by Location ID

Location ID	Sample Size	Average Rank
M116	7	31.3571
M117	9	28.9444
M118	9	15.1667
M119	7	21.0714
M120	9	29.0
M121	9	27.7778

Test statistic = 7.54026 P-Value = 0.183459

**DRAFT**

**Uncensored Data - Copper (Data Set = "Tronox")**

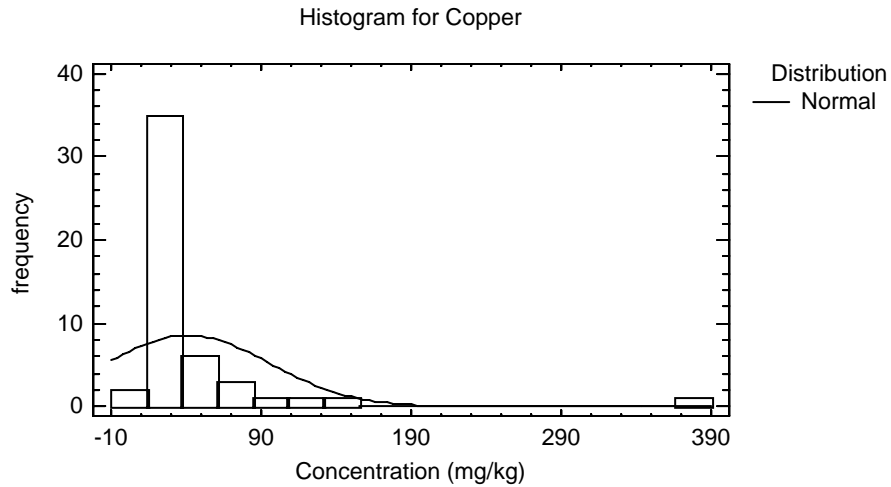
Data variable: Copper

Selection variable: Data Set = "Tronox"

50 values ranging from 8.54 to 367.0

Fitted Distributions

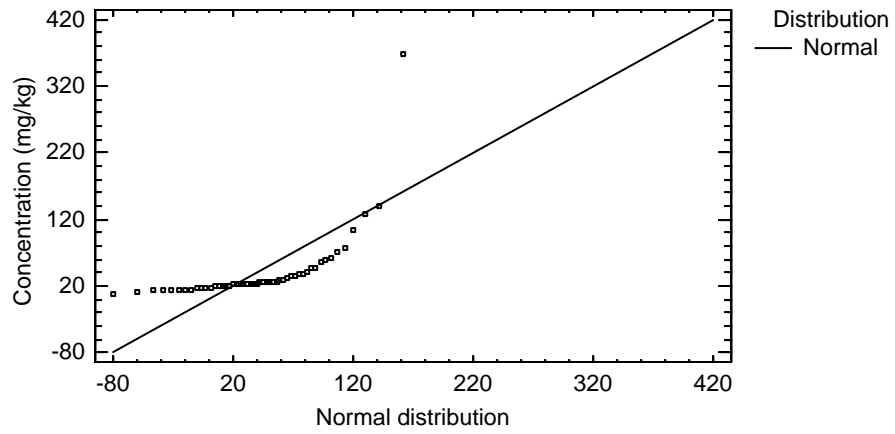
Normal
mean = 41.0178
standard deviation = 54.6611



Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.494221	0.0

Quantile-Quantile Plot for Copper



**DRAFT**

**Uncensored Data - log(Copper) (Data Set = "Tronox")**

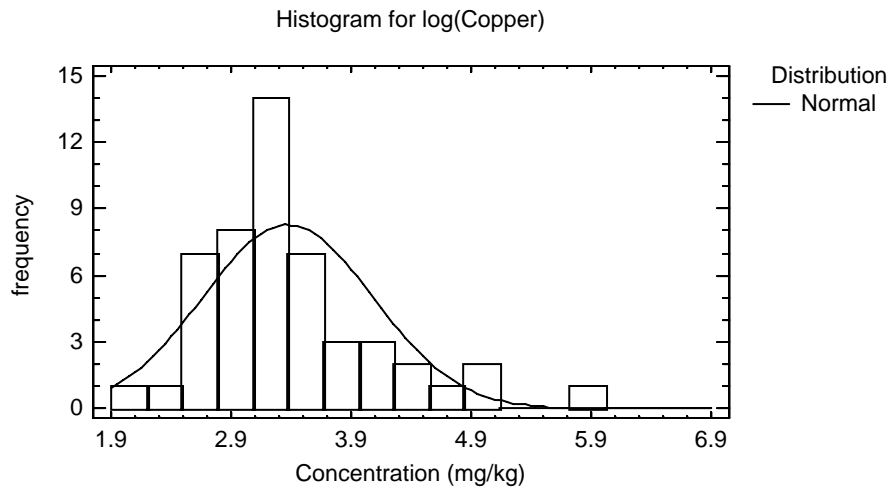
Data variable: log(Copper)

Selection variable: Data Set = "Tronox"

50 values ranging from 2.14476 to 5.90536

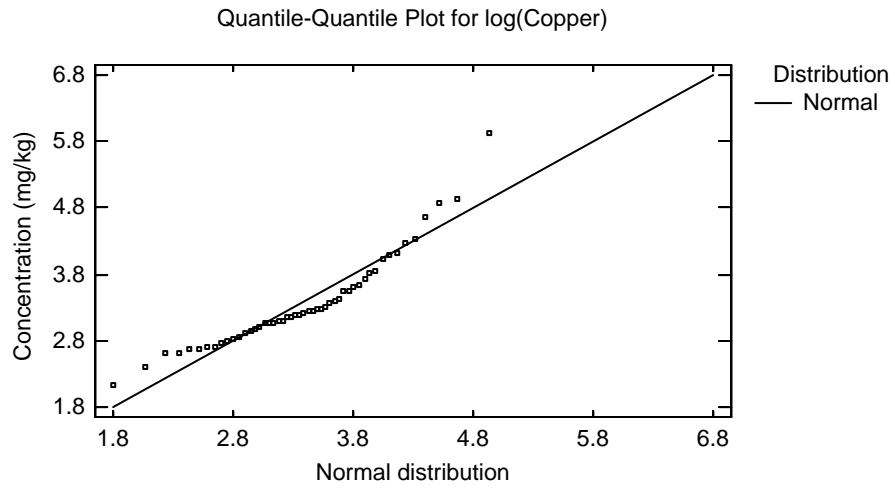
Fitted Distributions

Normal
mean = 3.37301
standard deviation = 0.709323



Tests for Normality for log(Copper)

Test	Statistic	P-Value
Shapiro-Wilk W	0.909823	0.000765937





**DRAFT**

**Uncensored Data - Copper (Data Set = "Tronox"&Depth Value<=20)**

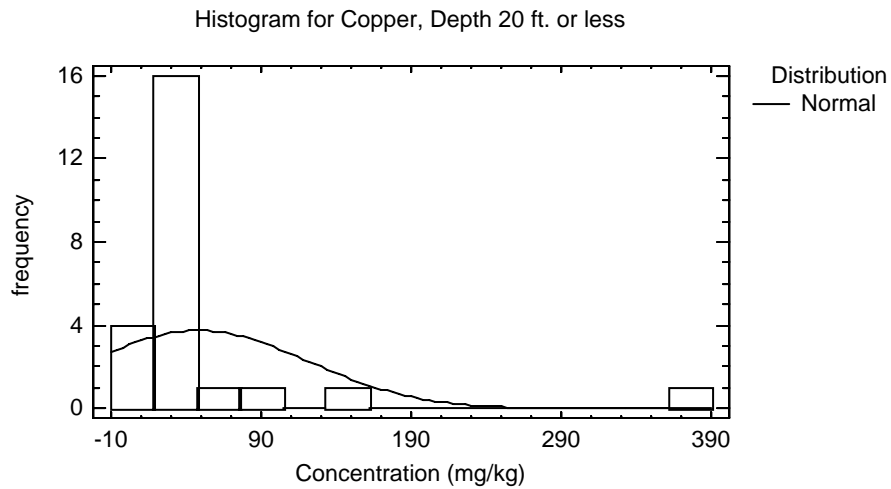
Data variable: Copper

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 13.65 to 367.0

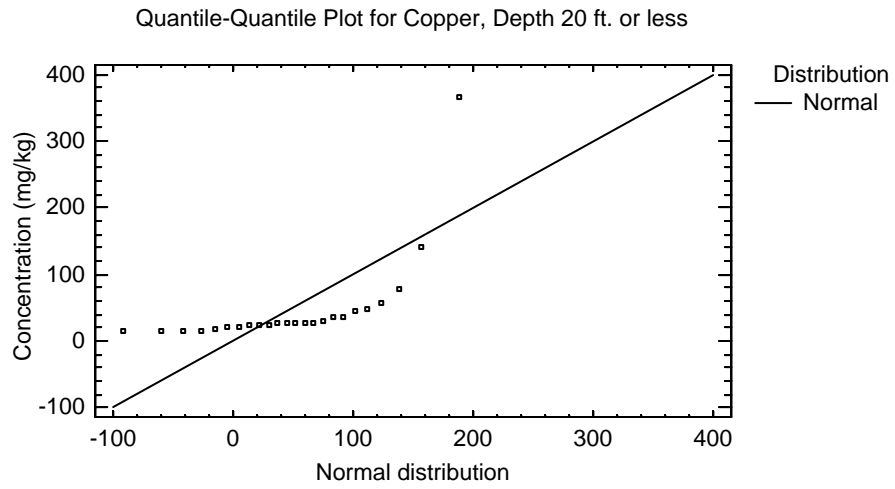
Fitted Distributions

Normal
mean = 48.3333
standard deviation = 72.9734



Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.450243	1.05049E-9



**DRAFT**

**Uncensored Data - log(Copper) (Data Set = "Tronox"&Depth Value<=20)**

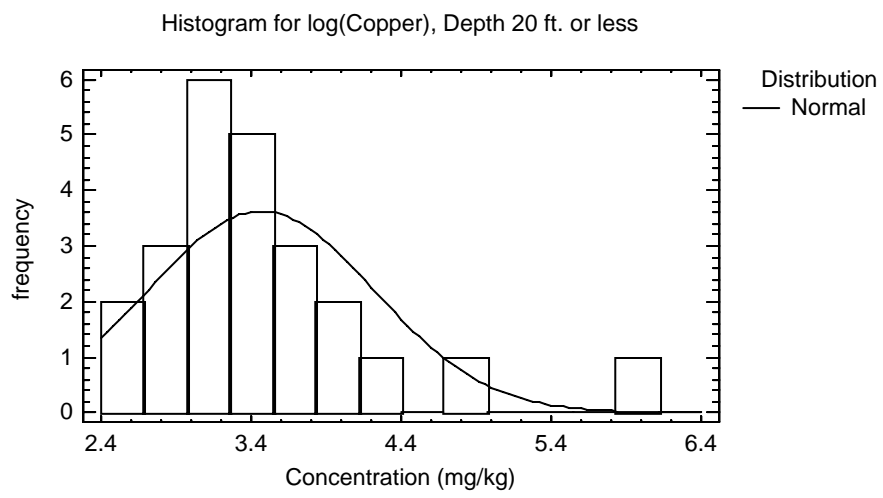
Data variable: log(Copper)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 2.61374 to 5.90536

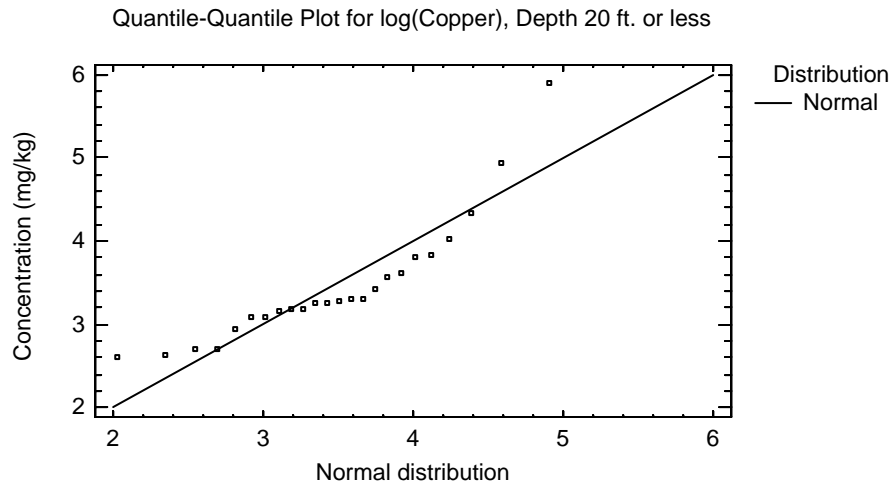
Fitted Distributions

Normal
mean = 3.46543
standard deviation = 0.75417



Tests for Normality for log(Copper)

Test	Statistic	P-Value
Shapiro-Wilk W	0.83322	0.000763956



**DRAFT**

**Uncensored Data - Copper (Data Set = "Tronox"&Depth Value>=30)**

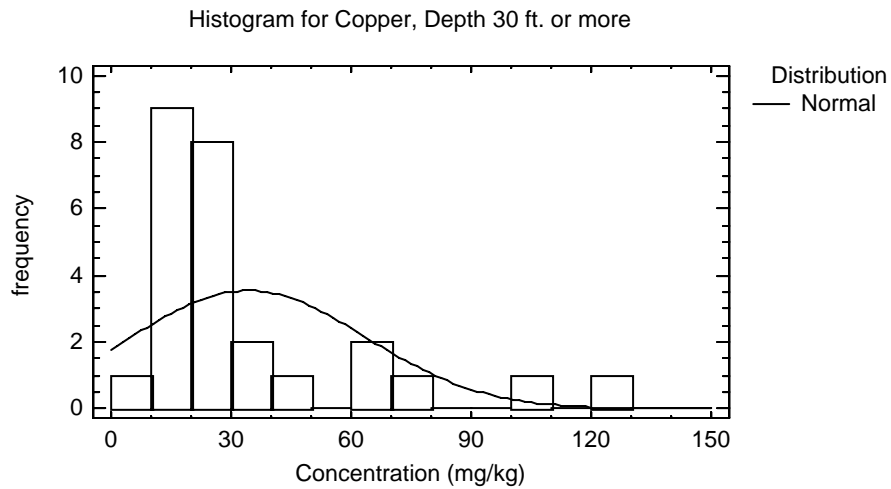
Data variable: Copper

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.54 to 129.25

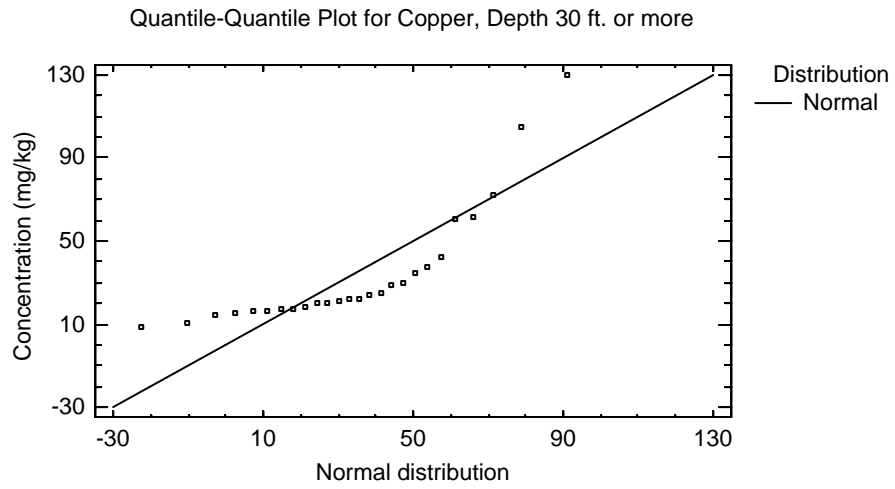
Fitted Distributions

Normal
mean = 34.265
standard deviation = 29.2957



Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.726648	0.00000414838



**DRAFT**

**Uncensored Data - log(Copper) (Data Set = "Tronox"&Depth Value>=30)**

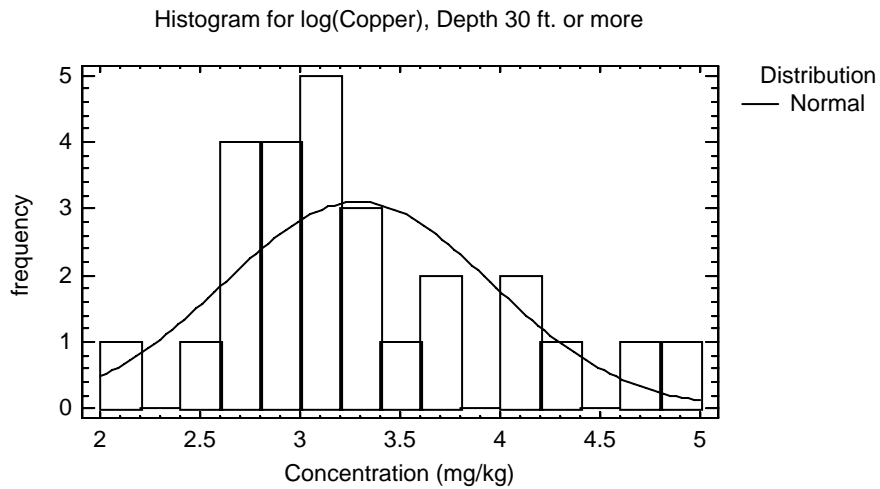
Data variable: log(Copper)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.14476 to 4.86175

Fitted Distributions

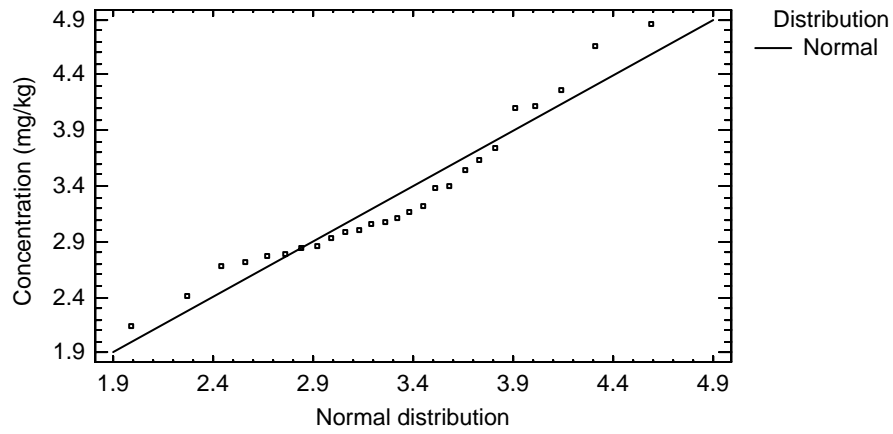
Normal
mean = 3.28769
standard deviation = 0.668664



Tests for Normality for log(Copper)

Test	Statistic	P-Value
Shapiro-Wilk W	0.935989	0.115712

Quantile-Quantile Plot for log(Copper), Depth 30 ft. or more





**DRAFT****Two-Sample Comparison - Copper & Depth Range (Data Set="Tronox") for Copper**

Sample 1: Depth Range=20 ft. or less

Sample 2: Depth Range=30 ft. or more

Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 13.65 to 367.0

Sample 2: 26 values ranging from 8.54 to 129.25

Comparison of Medians for Copper

Median of sample 1: 26.3

Median of sample 2: 22.15

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 27.6667

Average rank of sample 2: 23.5

W = -52.0 P-value = 0.317263

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Copper (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

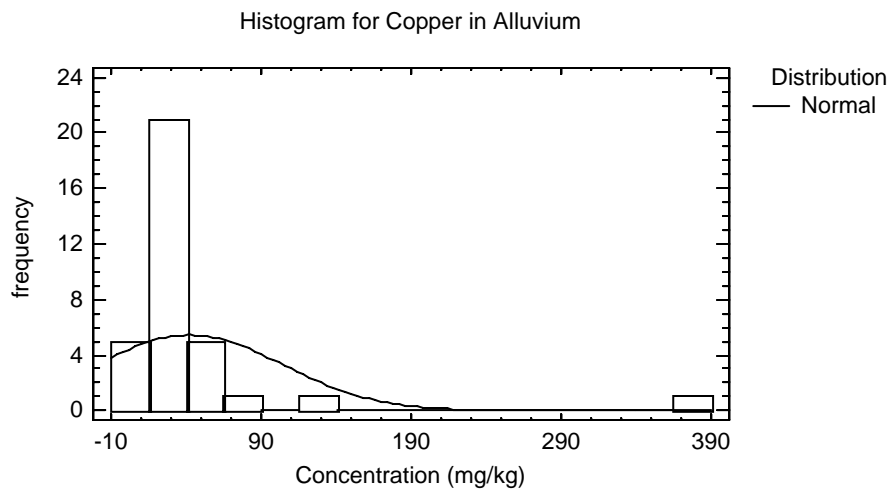
Data variable: Copper

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 8.54 to 367.0

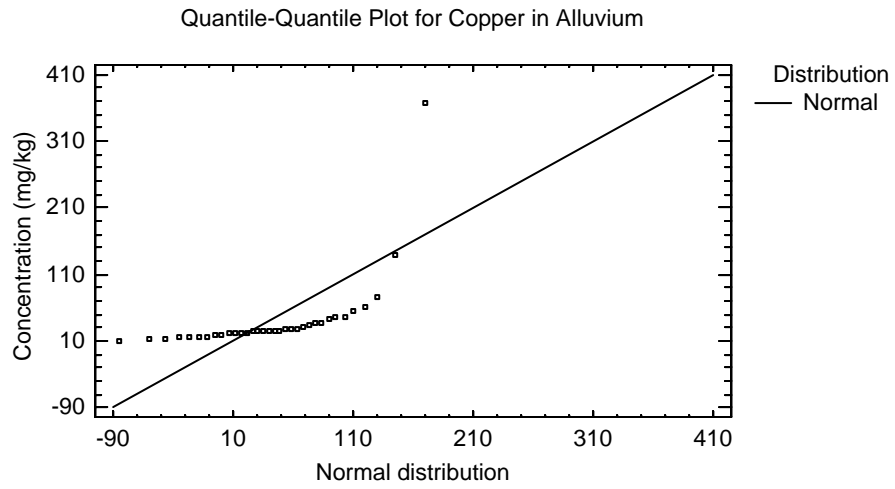
Fitted Distributions

Normal
mean = 42.2012
standard deviation = 62.2261



Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.434199	4.00346E-13



**DRAFT**

**Uncensored Data - log(Copper) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

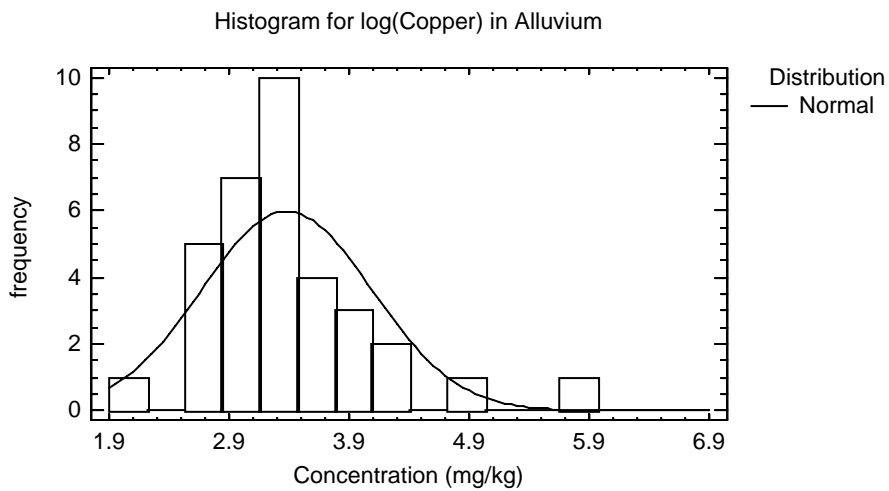
Data variable: log(Copper)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2.14476 to 5.90536

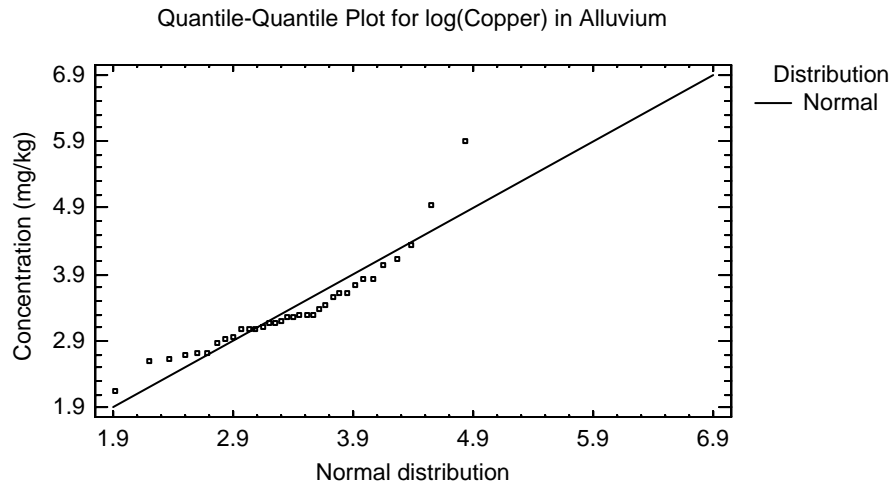
Fitted Distributions

Normal
mean = 3.37889
standard deviation = 0.709285



Tests for Normality for log(Copper)

Test	Statistic	P-Value
Shapiro-Wilk W	0.888732	0.00210026



**DRAFT**

**Uncensored Data - Copper (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

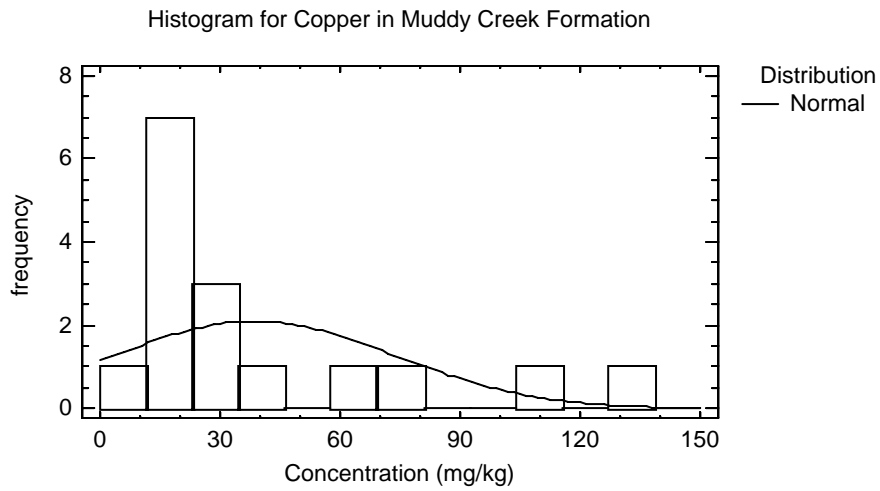
Data variable: Copper

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 11.1 to 129.25

Fitted Distributions

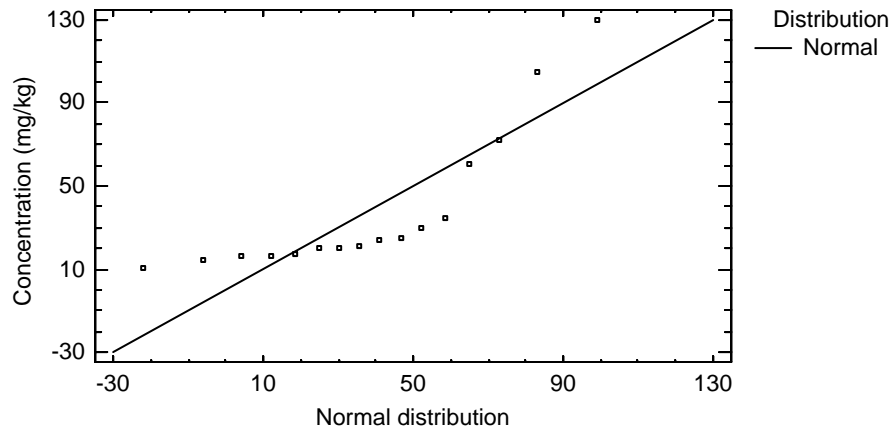
Normal
mean = 38.5031
standard deviation = 35.0962



Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.725972	0.000212221

Quantile-Quantile Plot for Copper in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Copper) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

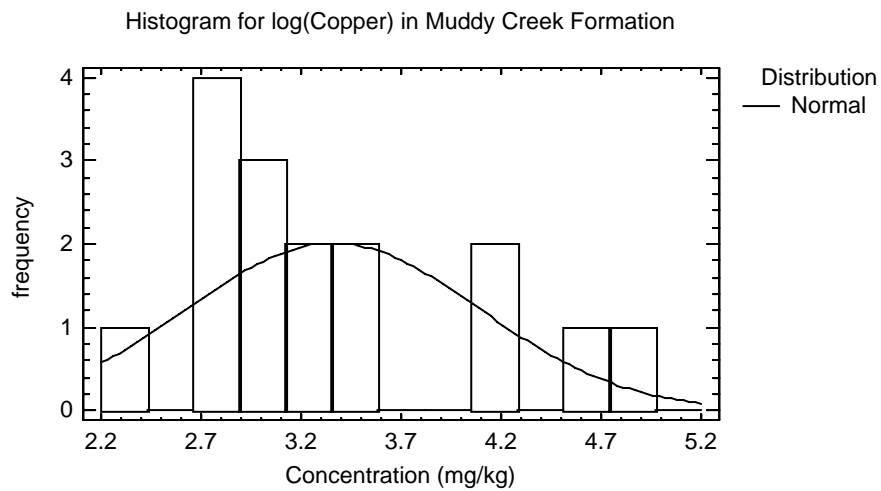
Data variable: log(Copper)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 2.40695 to 4.86175

Fitted Distributions

Normal
mean = 3.36052
standard deviation = 0.7325

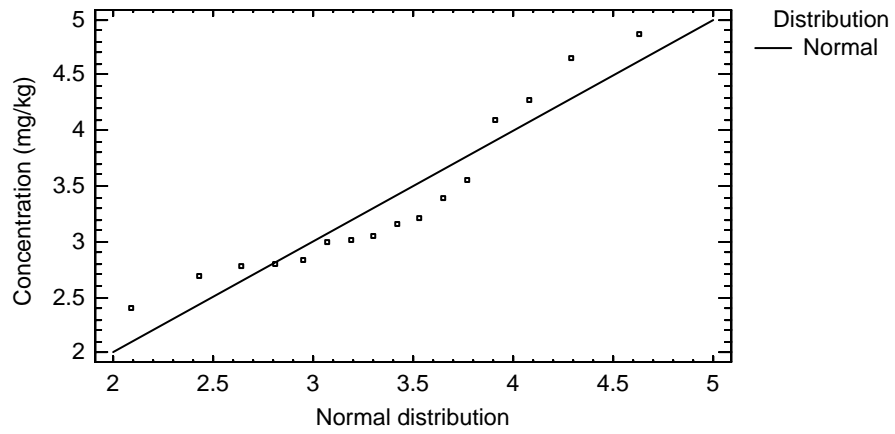


Tests for Normality for log(Copper)

Test	Statistic	P-Value
Shapiro-Wilk W	0.889861	0.0560182



Quantile-Quantile Plot for log(Copper) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Copper & Geological Formation 1 (Data Set="Tronox") for Copper**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 8.54 to 367.0

Sample 2: 16 values ranging from 11.1 to 129.25

Comparison of Medians for Copper

Median of sample 1: 26.0

Median of sample 2: 22.45

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 26.1912

Average rank of sample 2: 24.0313

W = -23.5 P-value = 0.632391

Do not reject the null hypothesis for alpha = 0.05.

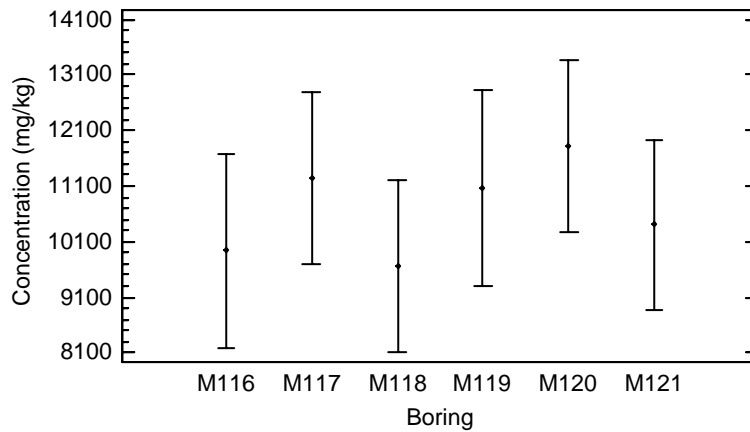
DRAFT

### 2.12 Iron

ANOVA Table for Iron by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	2.95365E7	5	5.90731E6	1.22	0.3148
Within groups	2.12651E8	44	4.83299E6		
Total (Corr.)	2.42188E8	49			

Means and 95.0 Percent Tukey HSD Intervals for Iron



Kruskal-Wallis Test for Iron by Location ID

Location ID	Sample Size	Average Rank
M116	7	19.7857
M117	9	28.5556
M118	9	18.5556
M119	7	28.6429
M120	9	33.8333
M121	9	23.0556

Test statistic = 7.03587 P-Value = 0.217986

**DRAFT**

**Uncensored Data - Iron (Data Set = "Tronox")**

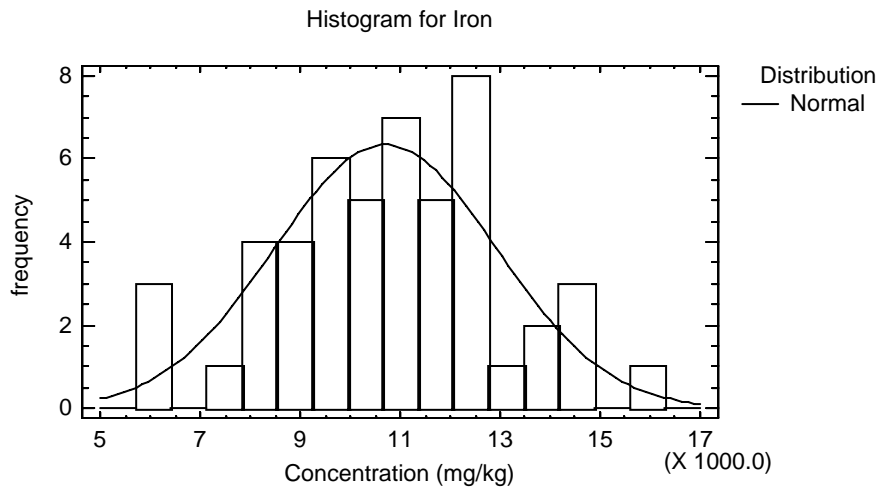
Data variable: Iron

Selection variable: Data Set = "Tronox"

50 values ranging from 5960.0 to 15900.0

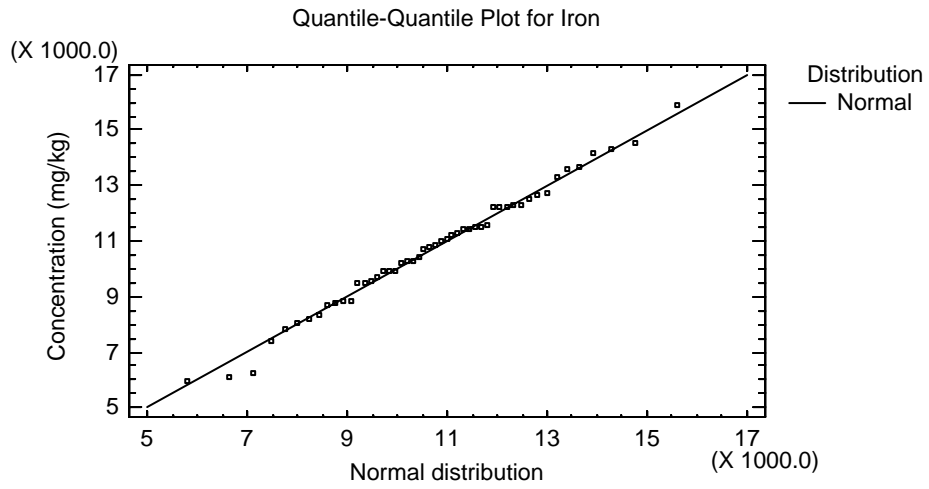
Fitted Distributions

Normal
mean = 10704.5
standard deviation = 2223.2



Tests for Normality for Iron

Test	Statistic	P-Value
Shapiro-Wilk W	0.98423	0.868428



**DRAFT**

**Uncensored Data - log(Iron) (Data Set = "Tronox")**

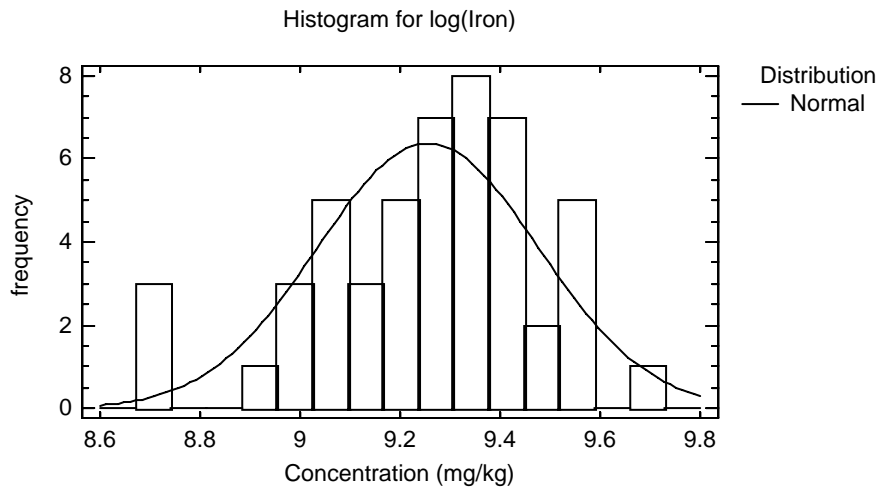
Data variable: log(Iron)

Selection variable: Data Set = "Tronox"

50 values ranging from 8.69283 to 9.67407

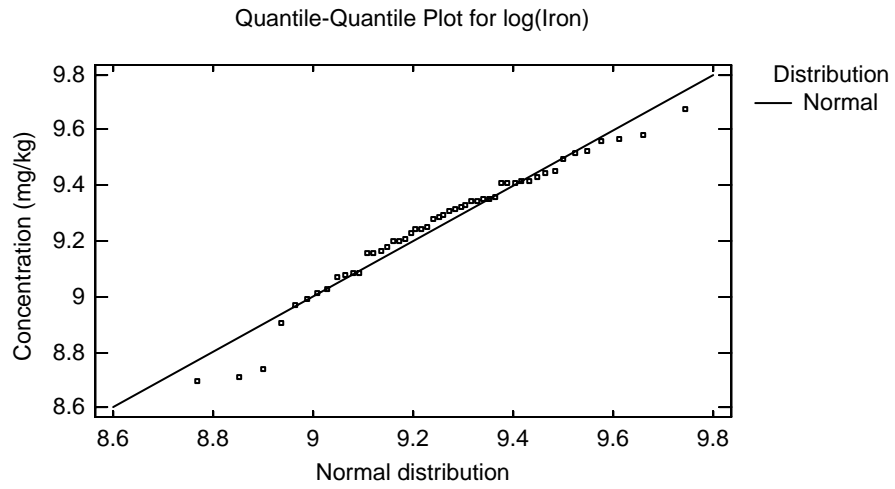
Fitted Distributions

Normal
mean = 9.25561
standard deviation = 0.221063



Tests for Normality for log(Iron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.955852	0.10467



**DRAFT**

**Uncensored Data - Iron (Data Set = "Tronox"&Depth Value<=20)**

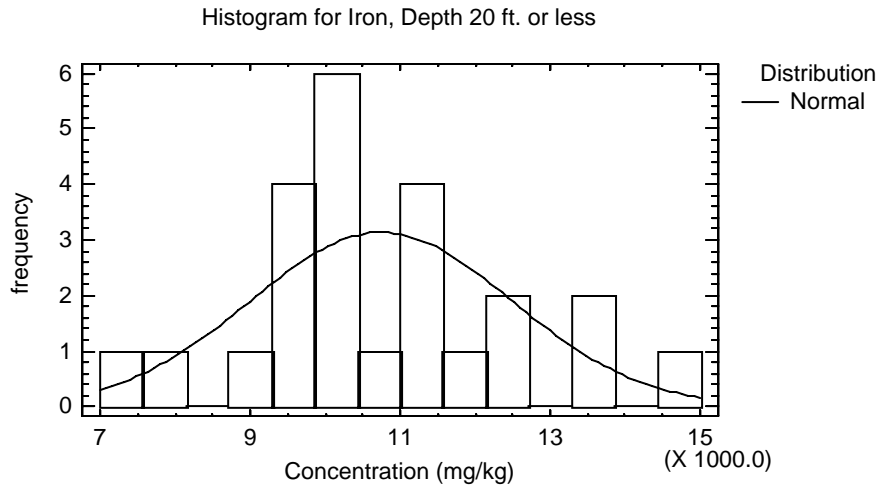
Data variable: Iron

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 7390.0 to 14500.0

Fitted Distributions

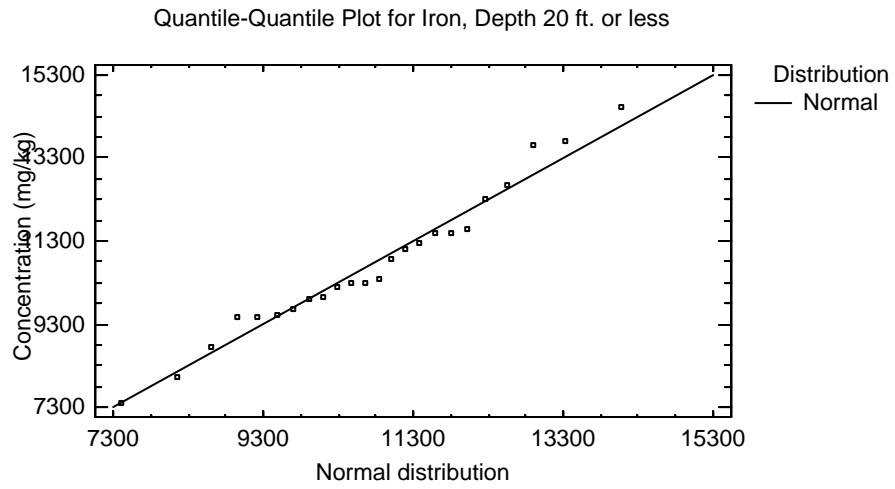
Normal
mean = 10749.4
standard deviation = 1743.4



Tests for Normality for Iron

Test	Statistic	P-Value
Shapiro-Wilk W	0.97309	0.739472





**DRAFT**

**Uncensored Data - log(Iron) (Data Set = "Tronox"&Depth Value<=20)**

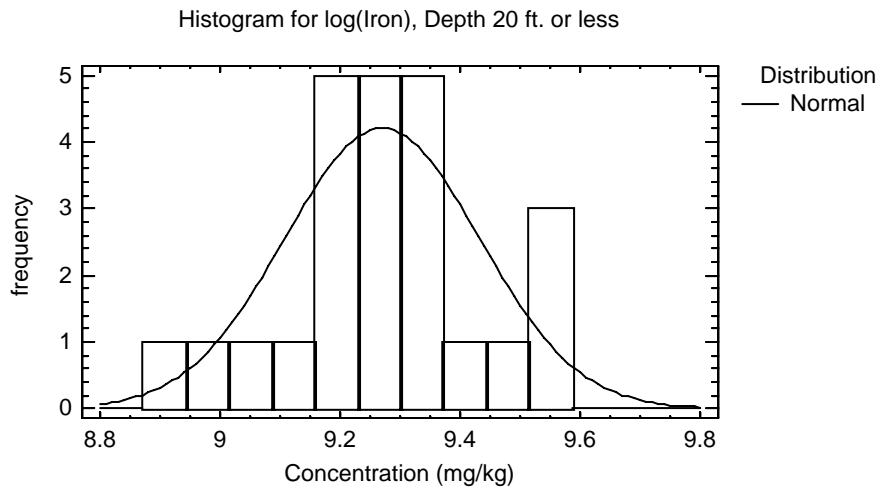
Data variable: log(Iron)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 8.90788 to 9.5819

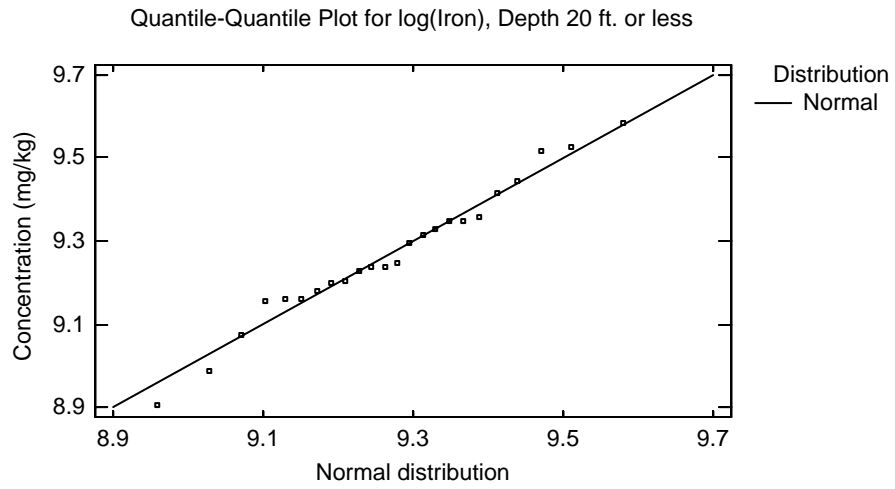
Fitted Distributions

Normal
mean = 9.27
standard deviation = 0.16264



Tests for Normality for log(Iron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.979794	0.882949



**DRAFT**

**Uncensored Data - Iron (Data Set = "Tronox"&Depth Value>=30)**

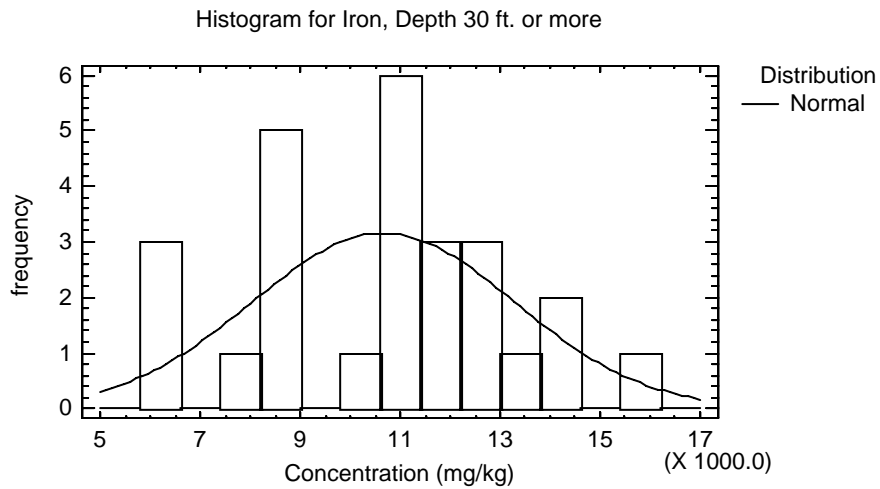
Data variable: Iron

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 5960.0 to 15900.0

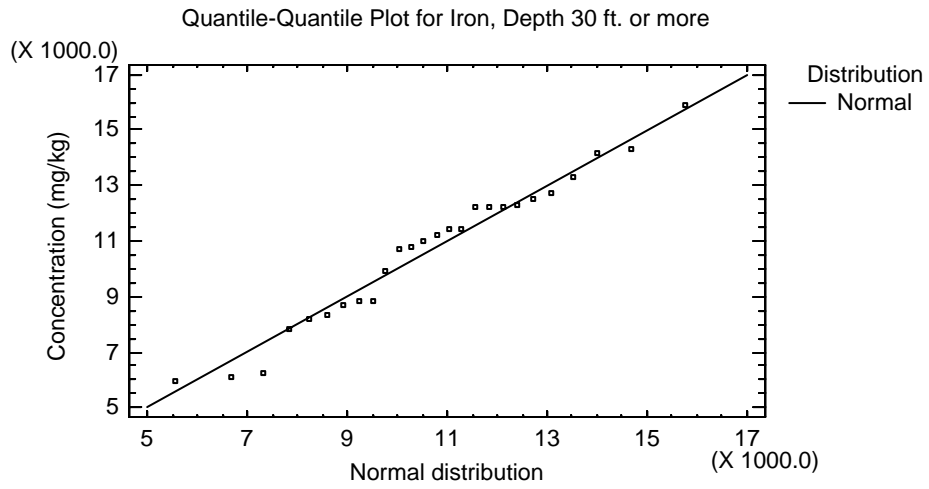
Fitted Distributions

Normal
mean = 10663.1
standard deviation = 2624.41



Tests for Normality for Iron

Test	Statistic	P-Value
Shapiro-Wilk W	0.965374	0.526231



**DRAFT**

**Uncensored Data - log(Iron) (Data Set = "Tronox"&Depth Value>=30)**

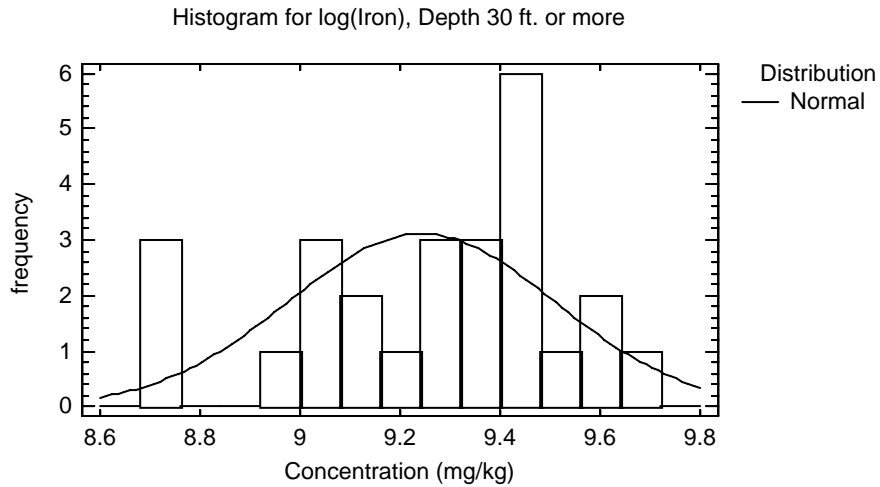
Data variable: log(Iron)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.69283 to 9.67407

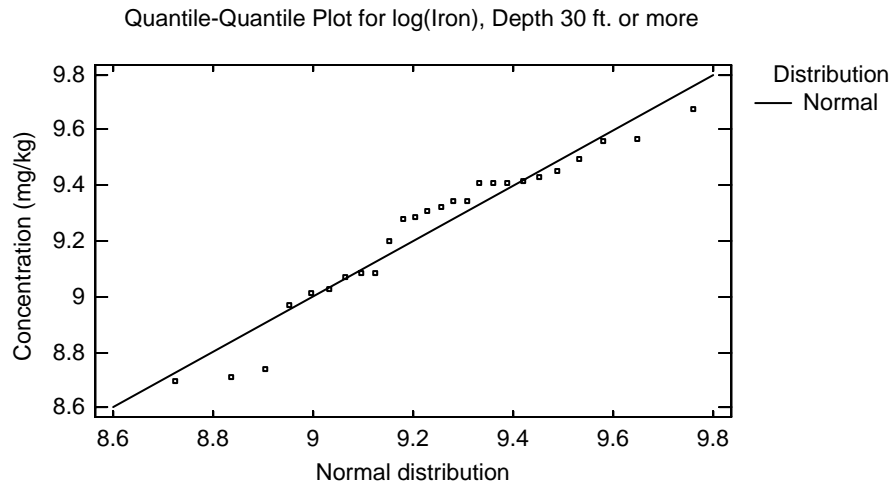
Fitted Distributions

Normal
mean = 9.24233
standard deviation = 0.266581



Tests for Normality for log(Iron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.931353	0.089372



**DRAFT**

**Two-Sample Comparison - Iron & Depth Range (Data Set="Tronox") for Iron**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 7390.0 to 14500.0  
 Sample 2: 26 values ranging from 5960.0 to 15900.0

Comparison of Means for Iron

95.0% confidence interval for mean of Depth Range=20 ft. or less: 10749.4 +/- 736.174 [10013.2, 11485.5]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 10663.1 +/- 1060.02 [9603.05, 11723.1]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: 86.2981 +/- 1278.2 [-1191.9, 1364.5]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = 0.135749 P-value = 0.892588  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Iron

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	1743.4	2624.41
Variance	3.03944E6	6.88752E6
Df	23	25

Ratio of Variances = 0.441296

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [1354.99, 2445.57]  
 Standard deviation of Depth Range=30 ft. or more: [2058.21, 3622.76]  
 Ratio of Variances: [0.195691, 1.00929]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.441296 P-value = 0.0525403  
 Do not reject the null hypothesis for alpha = 0.05.



**DRAFT**

**Uncensored Data - Iron (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

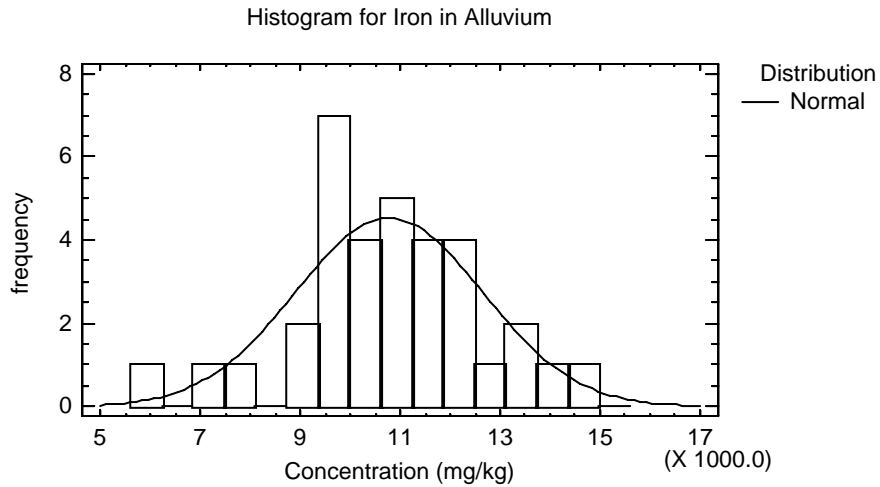
Data variable: Iron

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 6070.0 to 14500.0

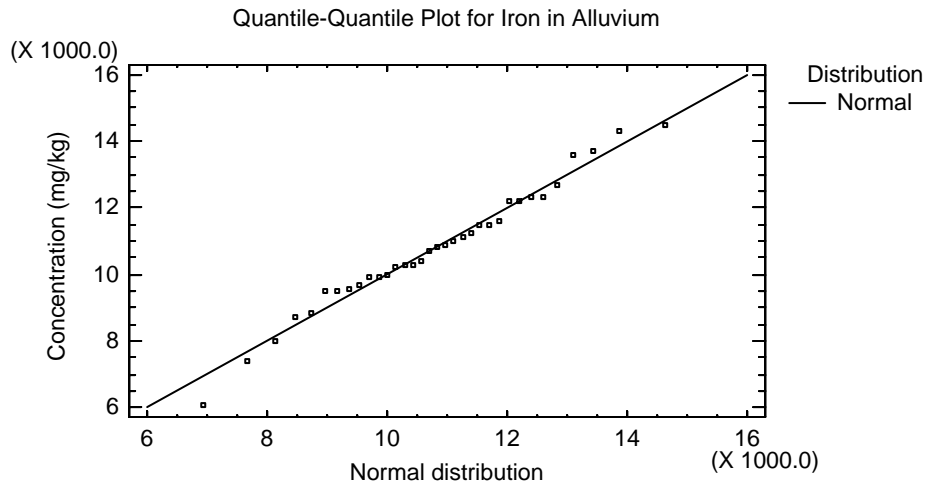
Fitted Distributions

Normal
mean = 10773.7
standard deviation = 1870.19



Tests for Normality for Iron

Test	Statistic	P-Value
Shapiro-Wilk W	0.981684	0.863764



**DRAFT**

**Uncensored Data - log(Iron) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

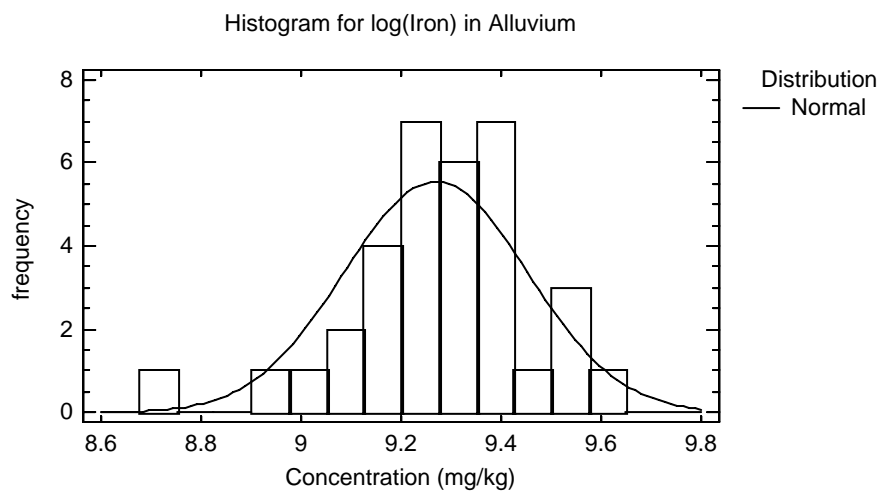
Data variable: log(Iron)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 8.71111 to 9.5819

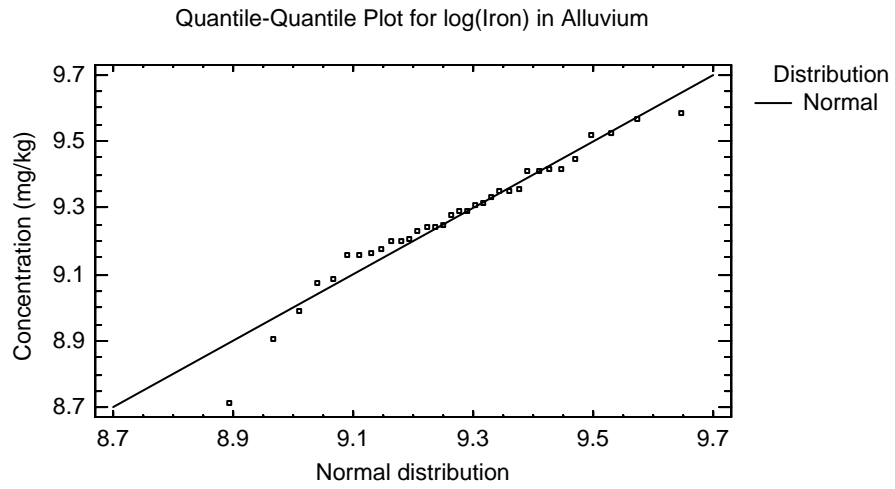
Fitted Distributions

Normal
mean = 9.26924
standard deviation = 0.183388



Tests for Normality for log(Iron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.956403	0.23902



**DRAFT**

**Uncensored Data - Iron (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

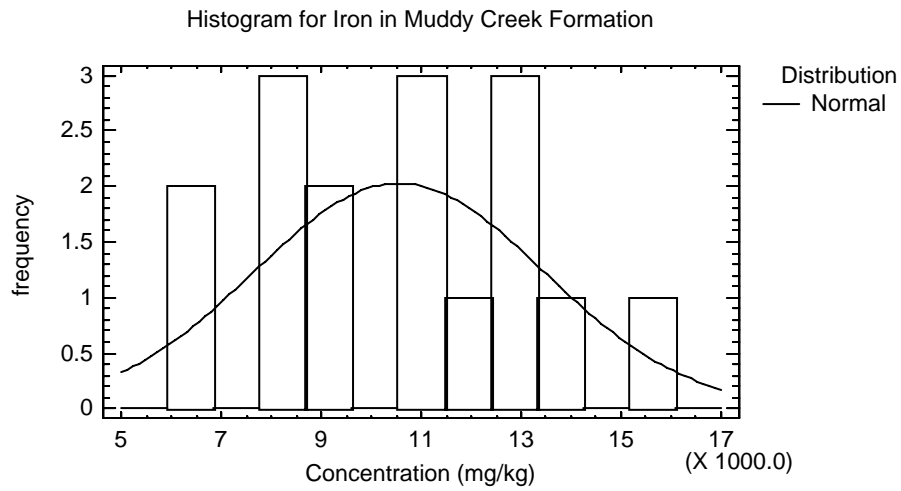
Data variable: Iron

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 5960.0 to 15900.0

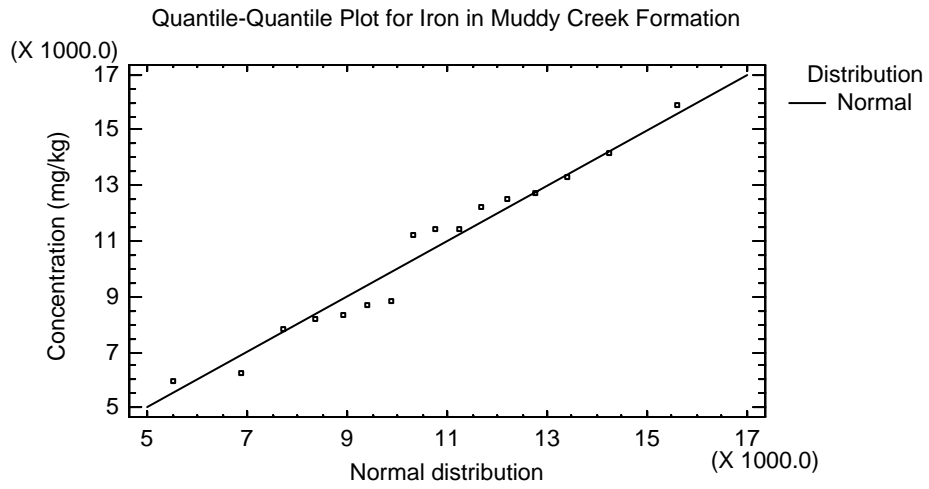
Fitted Distributions

Normal
mean = 10557.5
standard deviation = 2901.24



Tests for Normality for Iron

Test	Statistic	P-Value
Shapiro-Wilk W	0.959644	0.632292



**DRAFT**

**Uncensored Data - log(Iron) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

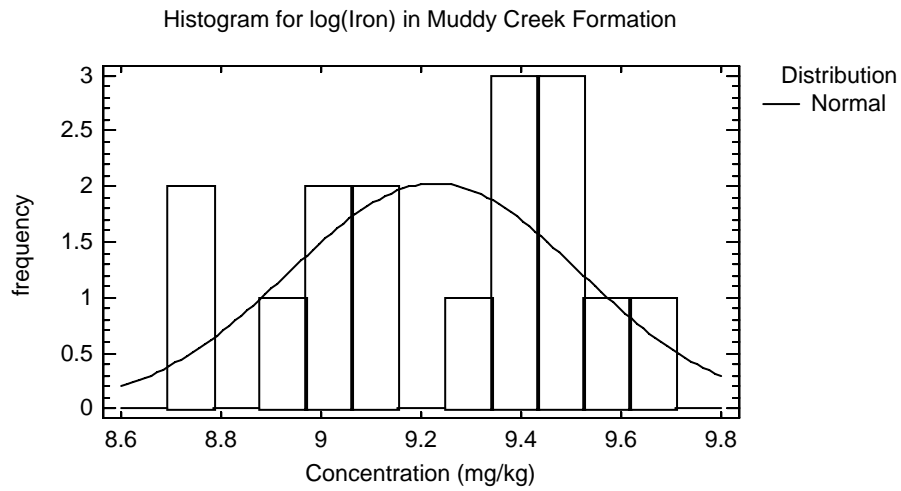
Data variable: log(Iron)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 8.69283 to 9.67407

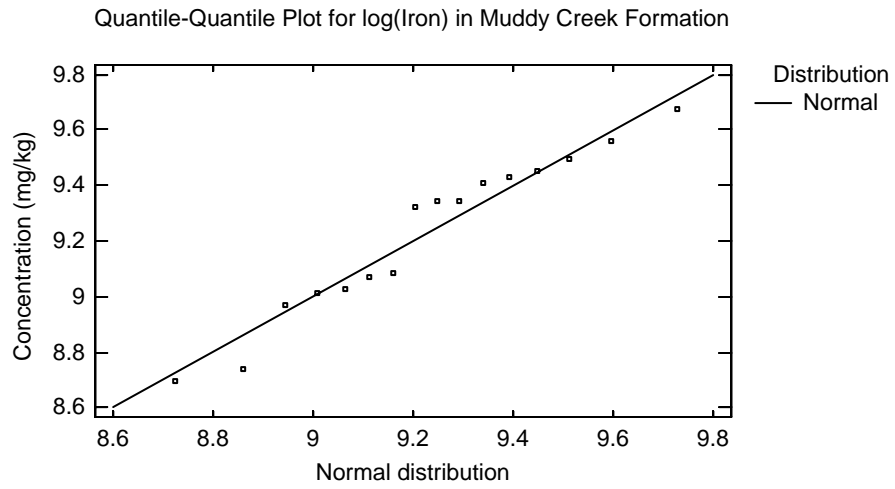
Fitted Distributions

Normal
mean = 9.22665
standard deviation = 0.290404



Tests for Normality for log(Iron)

Test	Statistic	P-Value
Shapiro-Wilk W	0.944453	0.400021





**DRAFT**

**Two-Sample Comparison - Iron & Geological Formation 1 (Data Set="Tronox") for Iron**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 6070.0 to 14500.0  
 Sample 2: 16 values ranging from 5960.0 to 15900.0

Comparison of Means for Iron

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 10773.7 +/- 652.543 [10121.1, 11426.2]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 10557.5 +/- 1545.97 [9011.53, 12103.5]

95.0% confidence interval for the difference between the means  
 not assuming equal variances: 216.176 +/- 1648.91 [-1432.74, 1865.09]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = 0.272585 P-value = 0.787825  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Iron

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	1870.19	2901.24
Variance	3.49762E6	8.41719E6
Df	33	15

Ratio of Variances = 0.415533

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [1508.45, 2461.69]  
 Standard deviation of Geological Formation 1=Muddy Creek: [2143.16, 4490.22]  
 Ratio of Variances: [0.158443, 0.93954]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.415533 P-value = 0.0349068  
 Reject the null hypothesis for alpha = 0.05.

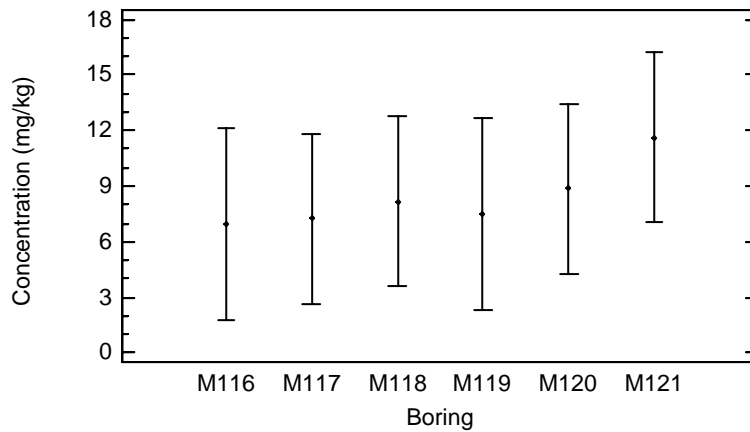
**DRAFT**

**2.13 Lead**

ANOVA Table for Lead by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	129.542	5	25.9083	0.61	0.6931
Within groups	1870.87	44	42.5199		
Total (Corr.)	2000.42	49			

Means and 95.0 Percent Tukey HSD Intervals for Lead



Kruskal-Wallis Test for Lead by Location ID

Location ID	Sample Size	Average Rank
M116	7	17.7857
M117	9	23.2778
M118	9	30.1667
M119	7	27.4286
M120	9	31.3333
M121	9	21.7222

Test statistic = 5.26049 P-Value = 0.384924

**DRAFT**

**Uncensored Data - Lead (Data Set = "Tronox")**

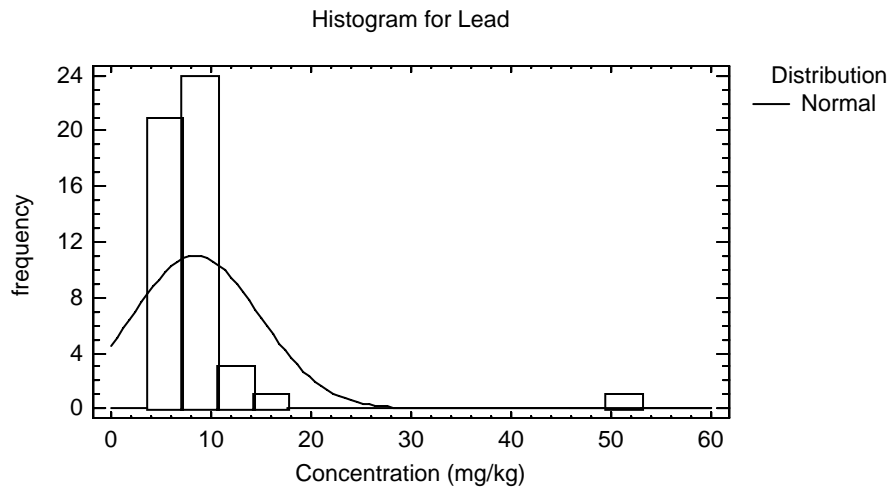
Data variable: Lead

Selection variable: Data Set = "Tronox"

50 values ranging from 4.33 to 50.8

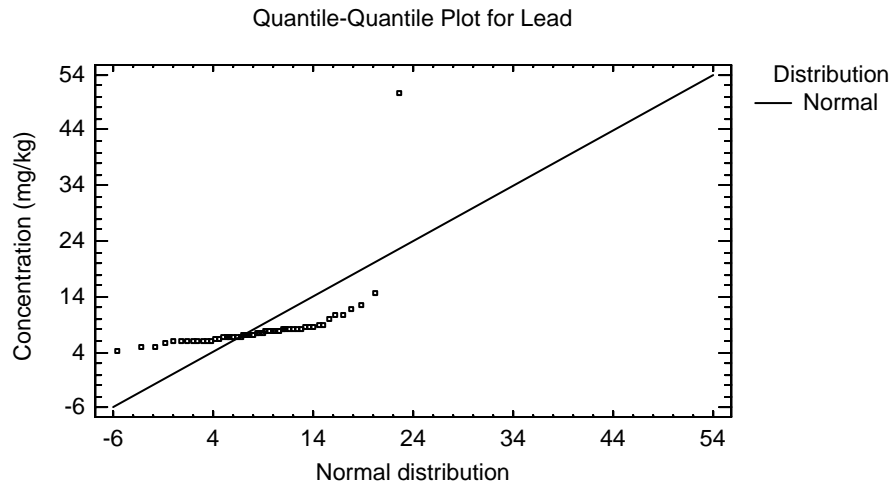
Fitted Distributions

Normal
mean = 8.4821
standard deviation = 6.38943



Tests for Normality for Lead

Test	Statistic	P-Value
Shapiro-Wilk W	0.375387	0.0



**DRAFT**

**Uncensored Data - log(Lead) (Data Set = "Tronox")**

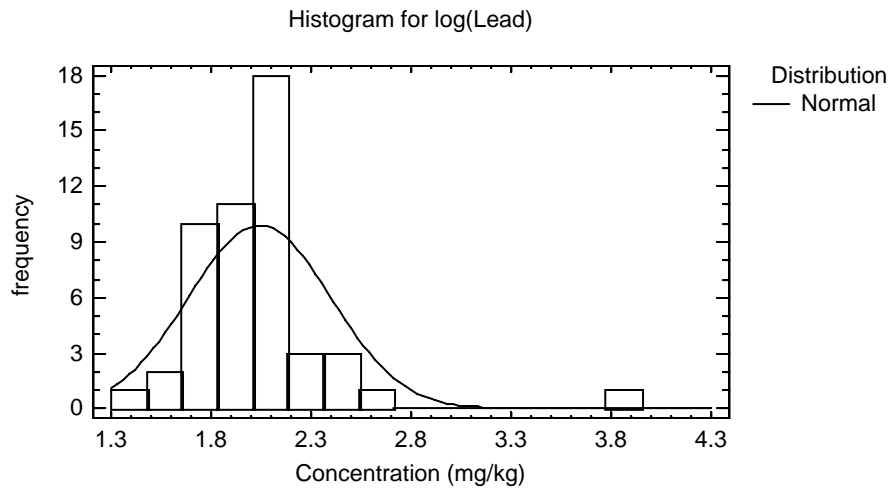
Data variable: log(Lead)

Selection variable: Data Set = "Tronox"

50 values ranging from 1.46557 to 3.9279

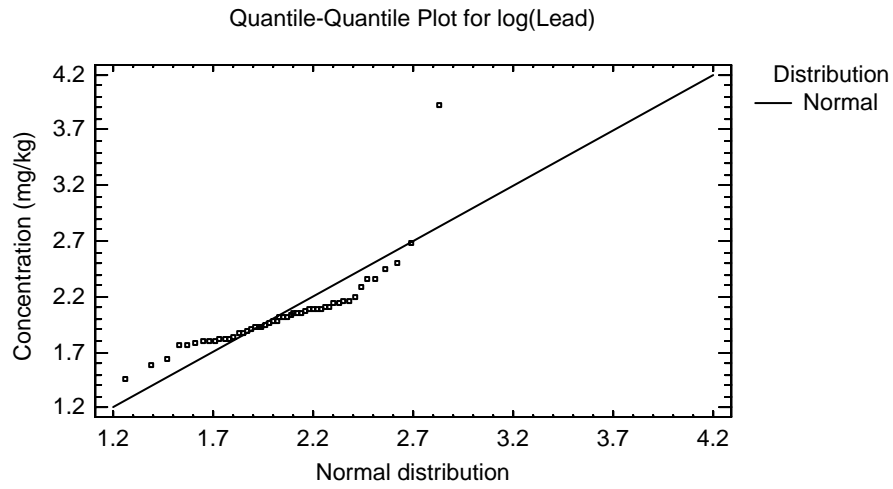
Fitted Distributions

Normal
mean = 2.04199
standard deviation = 0.355085



Tests for Normality for log(Lead)

Test	Statistic	P-Value
Shapiro-Wilk W	0.754275	1.65636E-10



**DRAFT**

**Uncensored Data - Lead (Data Set = "Tronox"&Depth Value<=20)**

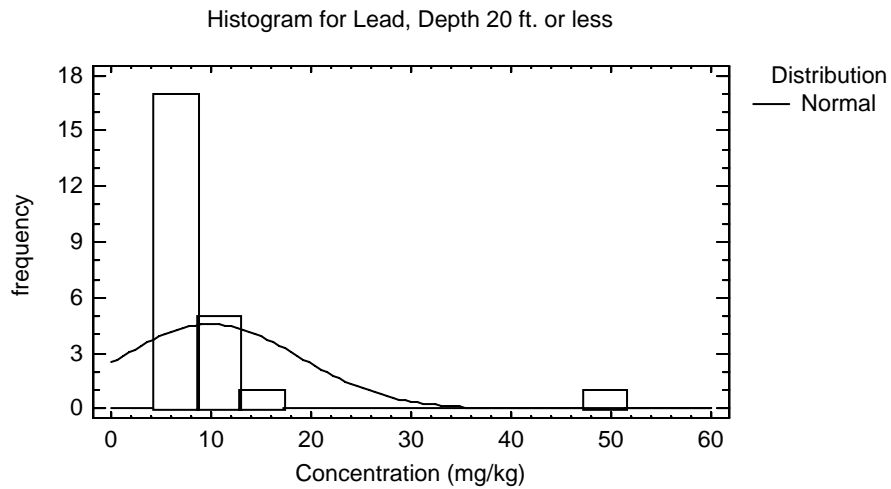
Data variable: Lead

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.81 to 50.8

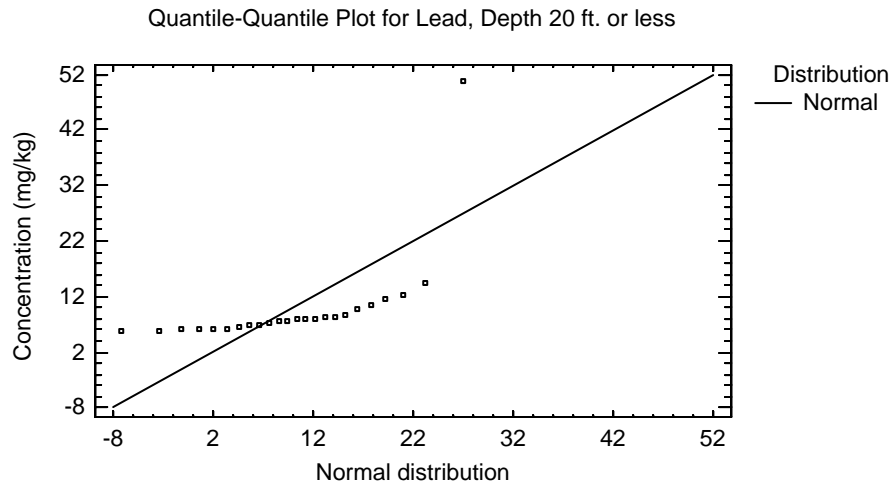
Fitted Distributions

Normal
mean = 9.90458
standard deviation = 8.99167



Tests for Normality for Lead

Test	Statistic	P-Value
Shapiro-Wilk W	0.410465	3.5525E-10





**DRAFT**

**Uncensored Data - log(Lead) (Data Set = "Tronox"&Depth Value<=20)**

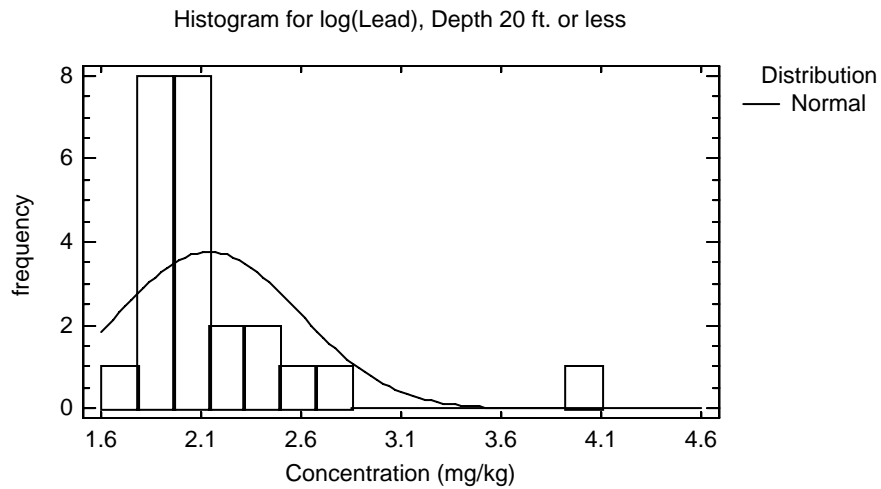
Data variable: log(Lead)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 1.75958 to 3.9279

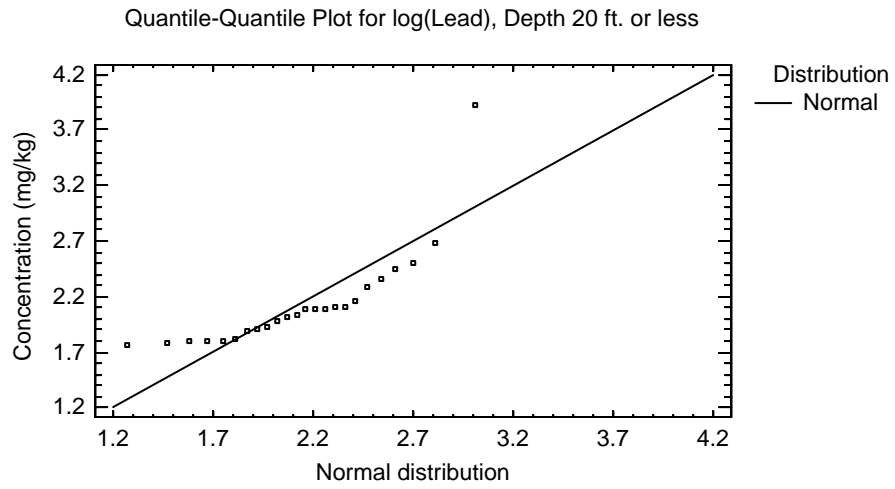
Fitted Distributions

Normal
mean = 2.14033
standard deviation = 0.453728



Tests for Normality for log(Lead)

Test	Statistic	P-Value
Shapiro-Wilk W	0.699865	0.00000303347



**DRAFT**

**Uncensored Data - Lead (Data Set = "Tronox"&Depth Value>=30)**

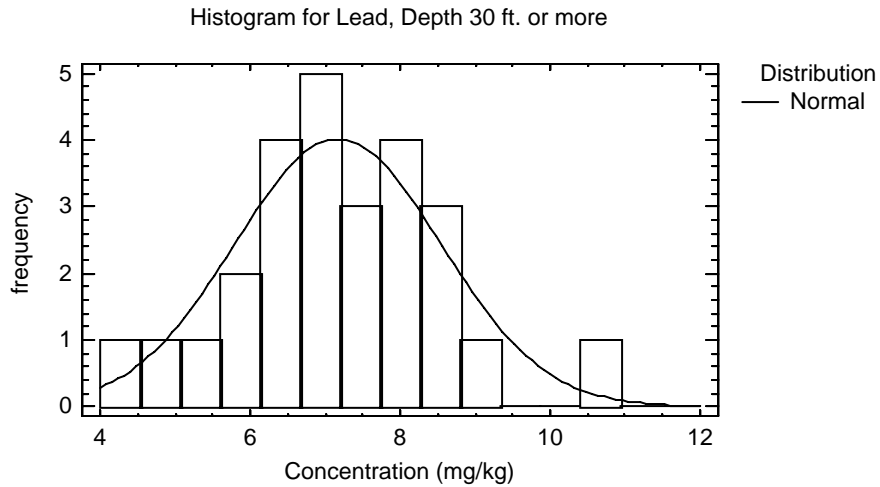
Data variable: Lead

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 4.33 to 10.6

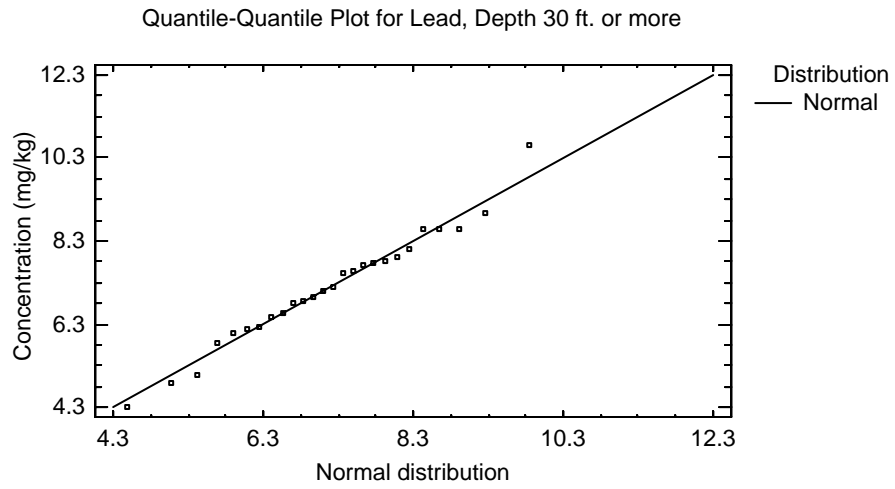
Fitted Distributions

Normal
mean = 7.16904
standard deviation = 1.37801



Tests for Normality for Lead

Test	Statistic	P-Value
Shapiro-Wilk W	0.984485	0.94718



**DRAFT**

**Uncensored Data - log(Lead) (Data Set = "Tronox"&Depth Value>=30)**

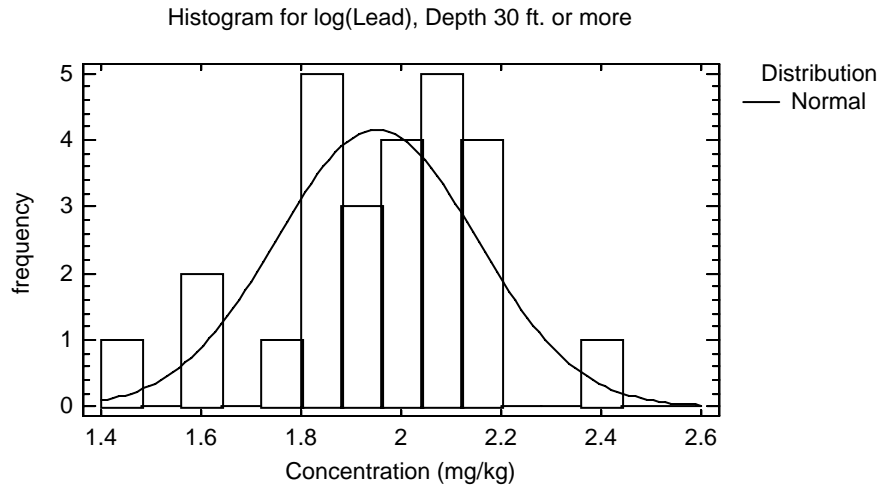
Data variable: log(Lead)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 1.46557 to 2.36085

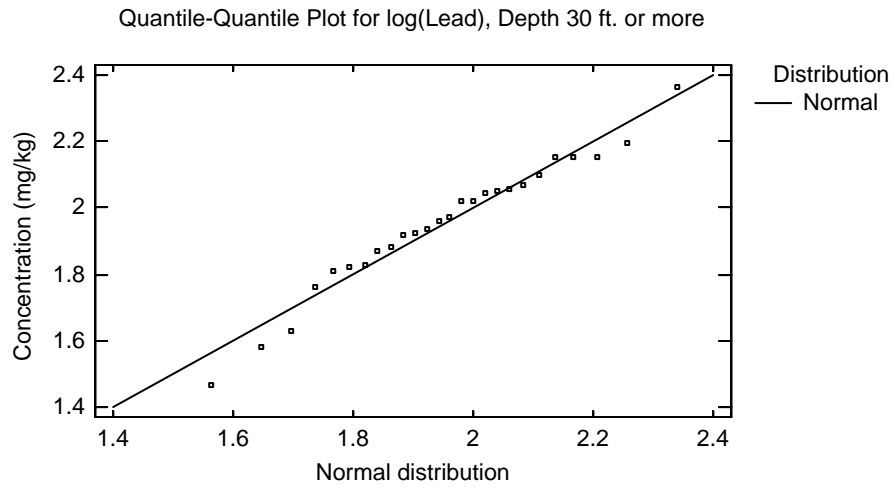
Fitted Distributions

Normal
mean = 1.95121
standard deviation = 0.199681



Tests for Normality for log(Lead)

Test	Statistic	P-Value
Shapiro-Wilk W	0.971135	0.665339



**DRAFT****Two-Sample Comparison - Lead & Depth Range (Data Set="Tronox") for Lead**

Sample 1: Depth Range=20 ft. or less  
Sample 2: Depth Range=30 ft. or more  
Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 5.81 to 50.8  
Sample 2: 26 values ranging from 4.33 to 10.6

Comparison of Medians for Lead  
Median of sample 1: 7.86  
Median of sample 2: 7.16

Mann-Whitney (Wilcoxon) W test to compare medians  
Null hypothesis: median1 = median2  
Alt. hypothesis: median1 NE median2

Average rank of sample 1: 28.1875  
Average rank of sample 2: 23.0192

W = -64.5 P-value = 0.213927  
Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Lead (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

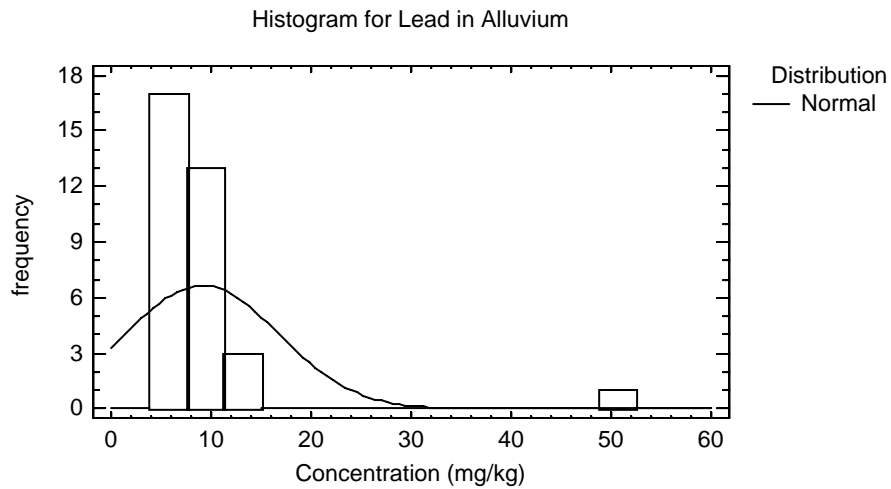
Data variable: Lead

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 5.1 to 50.8

Fitted Distributions

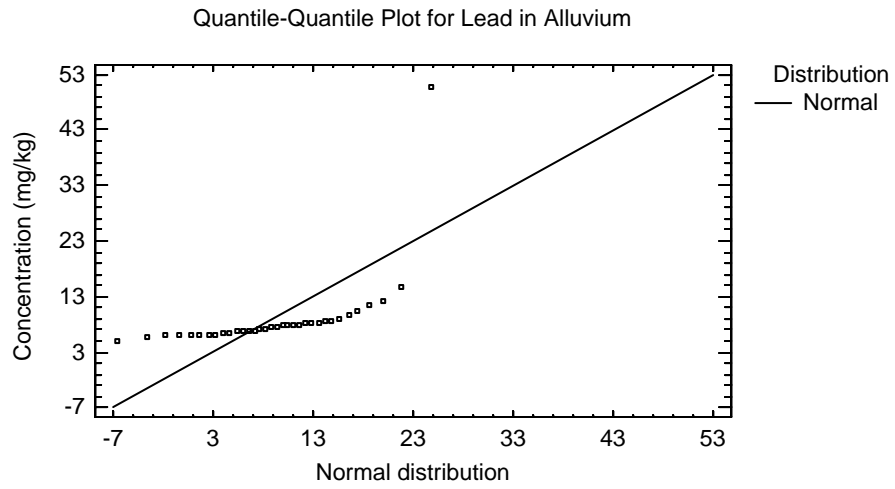
Normal
mean = 9.08706
standard deviation = 7.63966



Tests for Normality for Lead

Test	Statistic	P-Value
Shapiro-Wilk W	0.381076	5.81757E-14





**DRAFT**

**Uncensored Data - log(Lead) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

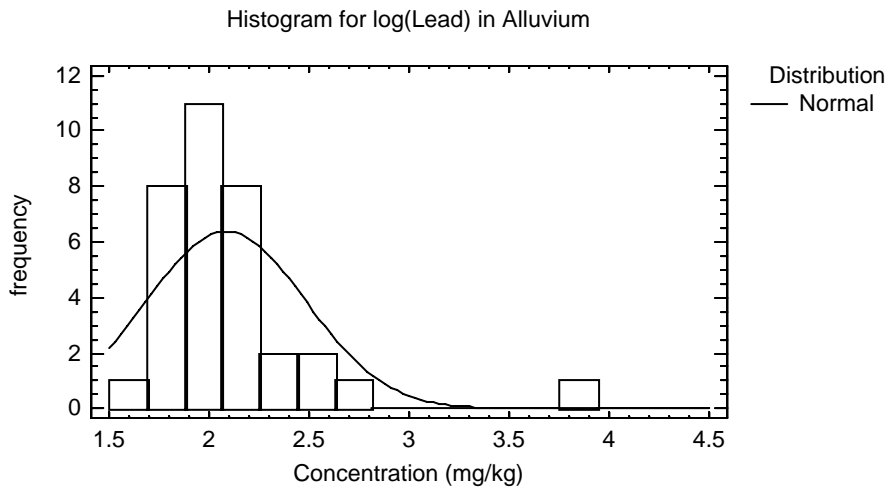
Data variable: log(Lead)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 1.62924 to 3.9279

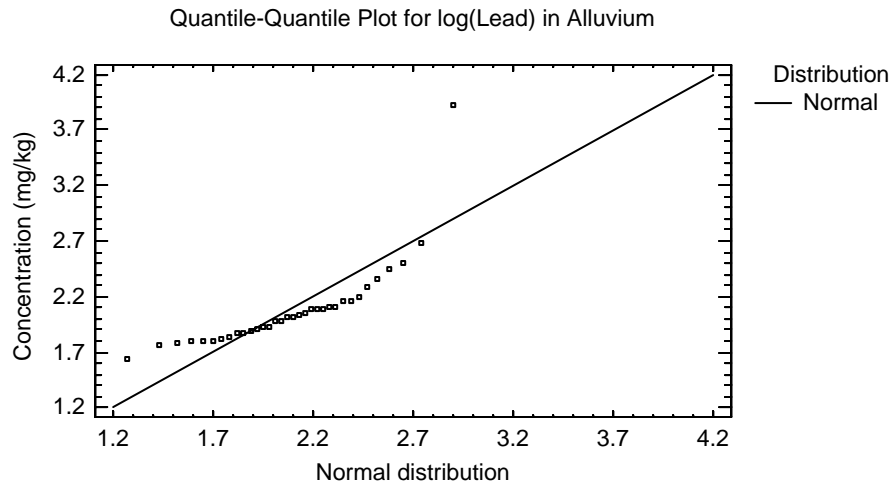
Fitted Distributions

Normal
mean = 2.0848
standard deviation = 0.398209



Tests for Normality for log(Lead)

Test	Statistic	P-Value
Shapiro-Wilk W	0.702573	3.92988E-8



**DRAFT**

**Uncensored Data - Lead (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

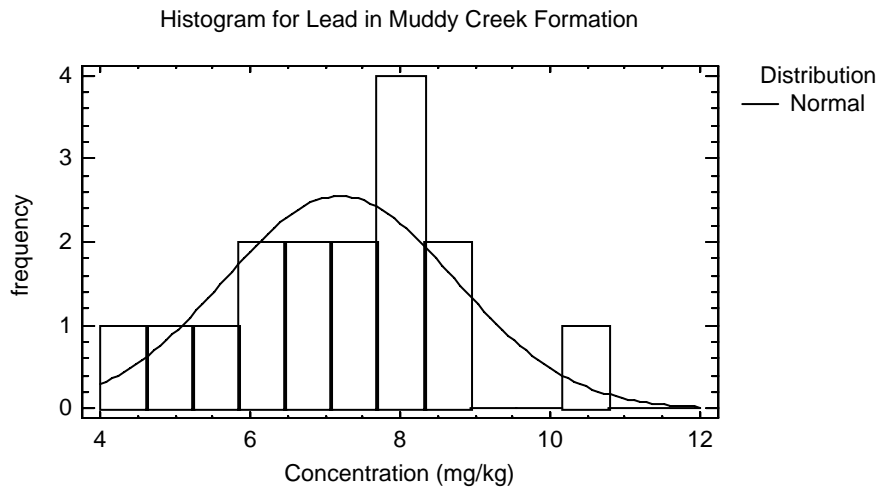
Data variable: Lead

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 4.33 to 10.6

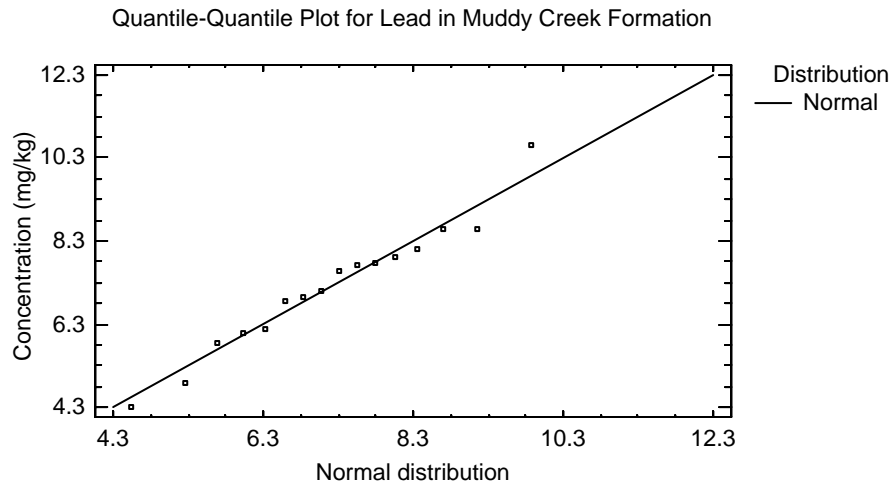
Fitted Distributions

Normal
mean = 7.19656
standard deviation = 1.53856



Tests for Normality for Lead

Test	Statistic	P-Value
Shapiro-Wilk W	0.973586	0.862609



**DRAFT**

**Uncensored Data - log(Lead) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

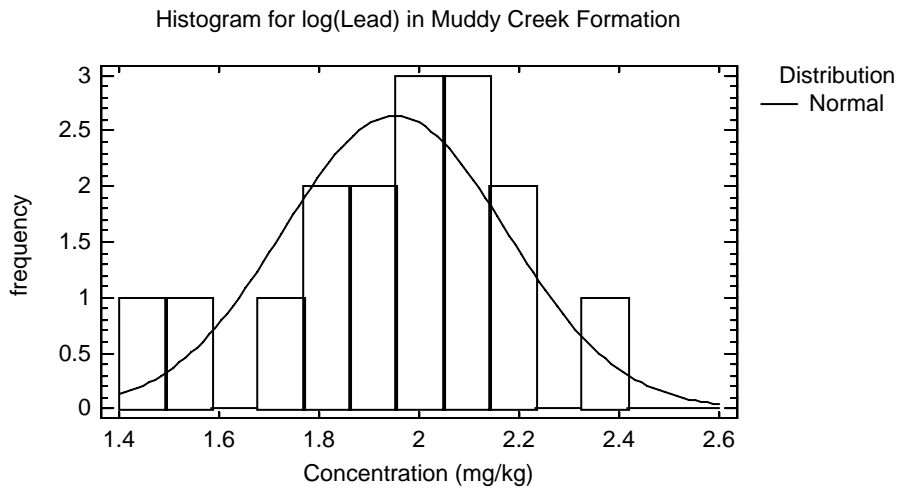
Data variable: log(Lead)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 1.46557 to 2.36085

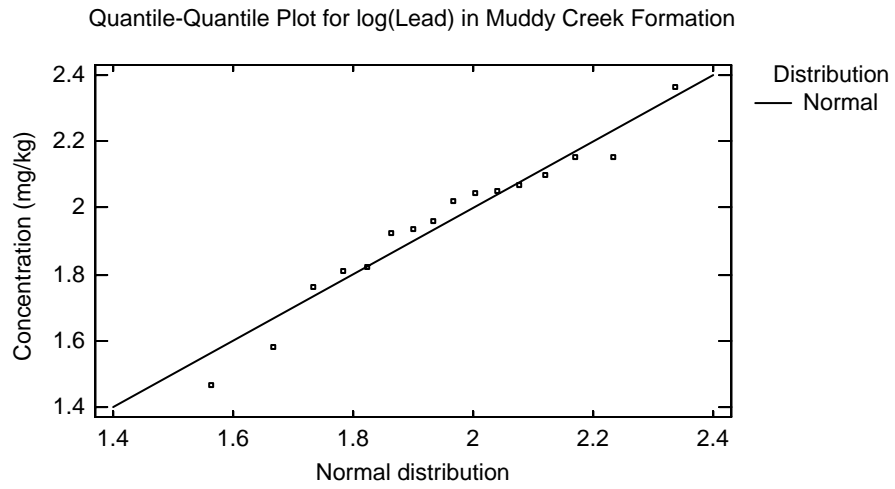
Fitted Distributions

Normal
mean = 1.95101
standard deviation = 0.223699



Tests for Normality for log(Lead)

Test	Statistic	P-Value
Shapiro-Wilk W	0.958725	0.616735



**DRAFT****Two-Sample Comparison - Lead & Geological Formation 1 (Data Set="Tronox") for Lead**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 5.1 to 50.8

Sample 2: 16 values ranging from 4.33 to 10.6

Comparison of Medians for Lead

Median of sample 1: 7.5

Median of sample 2: 7.34

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 26.5735

Average rank of sample 2: 23.2188

W = -36.5 P-value = 0.454013

Do not reject the null hypothesis for alpha = 0.05.

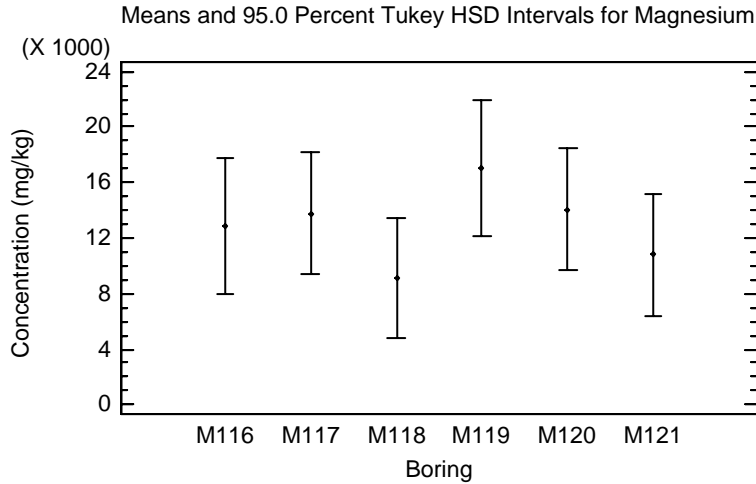


**DRAFT**

### 2.14 Magnesium

ANOVA Table for Magnesium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	3.07453E8	5	6.14906E7	1.60	0.1801
Within groups	1.69097E9	44	3.84312E7		
Total (Corr.)	1.99843E9	49			



Kruskal-Wallis Test for Magnesium by Location ID

Location ID	Sample Size	Average Rank
M116	7	31.5714
M117	9	30.2222
M118	9	15.7222
M119	7	32.6429
M120	9	26.4444
M121	9	19.3333

Test statistic = 9.53783 P-Value = 0.089441

**DRAFT**

**Uncensored Data - Magnesium (Data Set = "Tronox")**

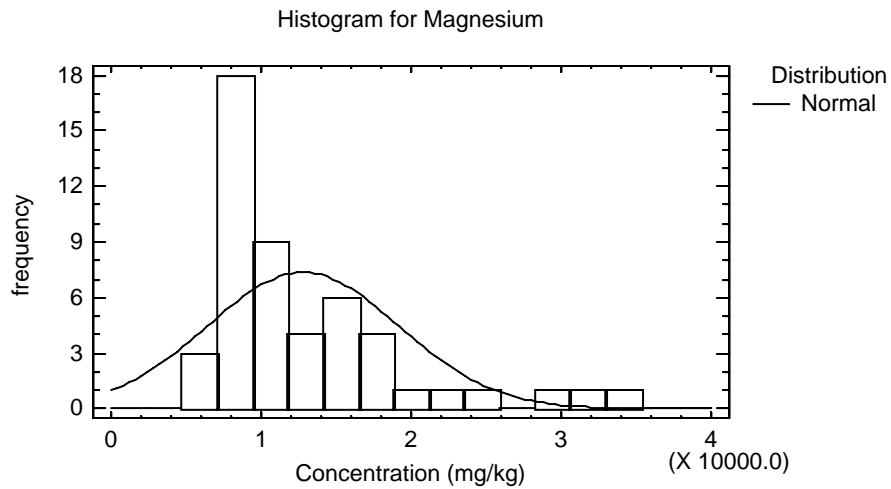
Data variable: Magnesium

Selection variable: Data Set = "Tronox"

50 values ranging from 6140.0 to 34600.0

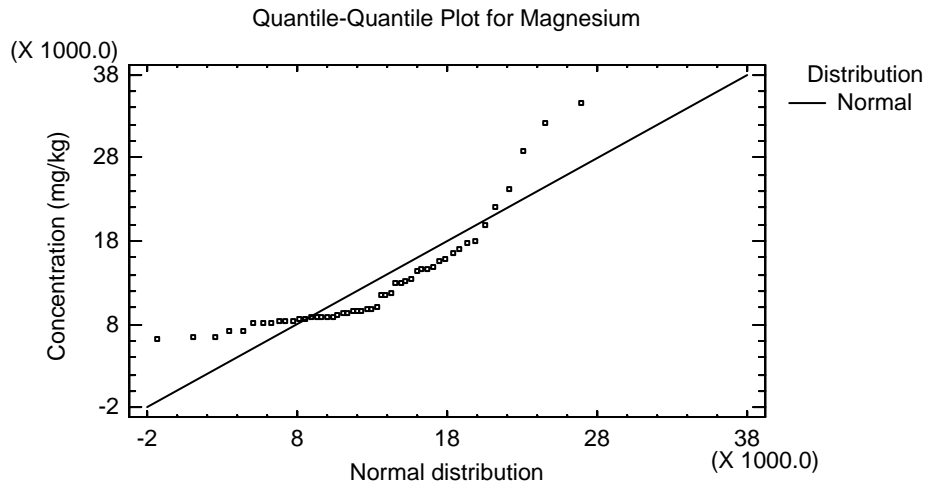
Fitted Distributions

Normal
mean = 12792.2
standard deviation = 6386.25



Tests for Normality for Magnesium

Test	Statistic	P-Value
Shapiro-Wilk W	0.796814	7.98946E-9



**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set = "Tronox")**

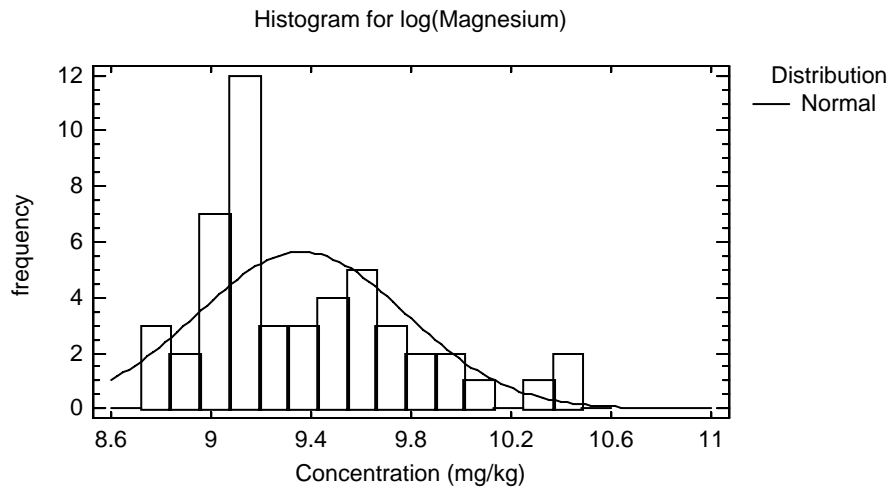
Data variable: log(Magnesium)

Selection variable: Data Set = "Tronox"

50 values ranging from 8.72258 to 10.4516

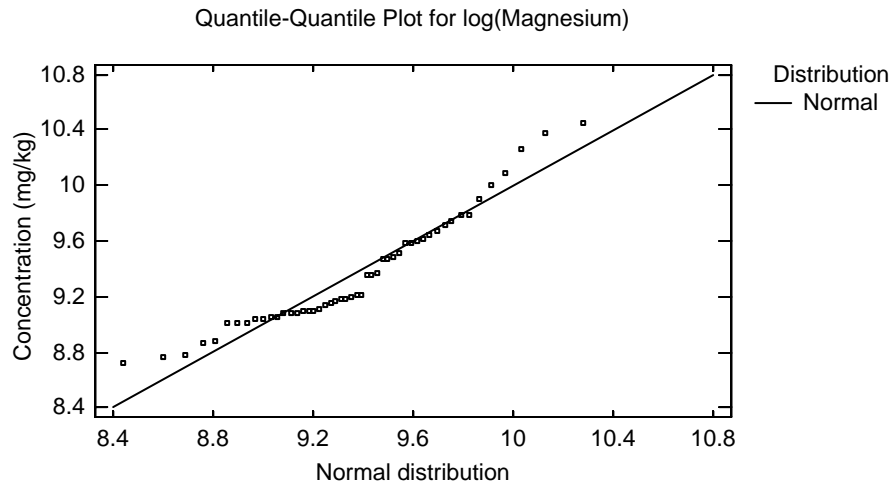
Fitted Distributions

Normal
mean = 9.36231
standard deviation = 0.416146



Tests for Normality for log(Magnesium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.921741	0.00280347



**DRAFT**

**Uncensored Data - Magnesium (Data Set = "Tronox"&Depth Value<=20)**

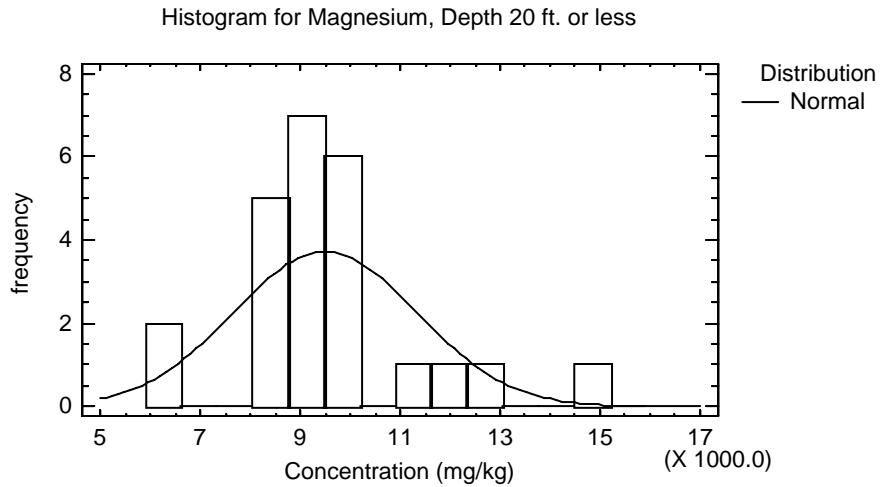
Data variable: Magnesium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 6420.0 to 14900.0

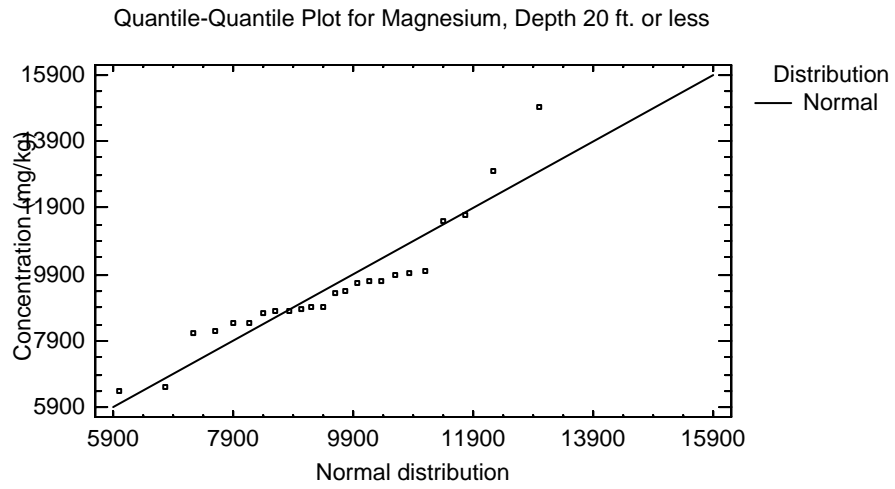
Fitted Distributions

Normal
mean = 9497.92
standard deviation = 1838.79



Tests for Normality for Magnesium

Test	Statistic	P-Value
Shapiro-Wilk W	0.888492	0.0113556



**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set = "Tronox"&Depth Value<=20)**

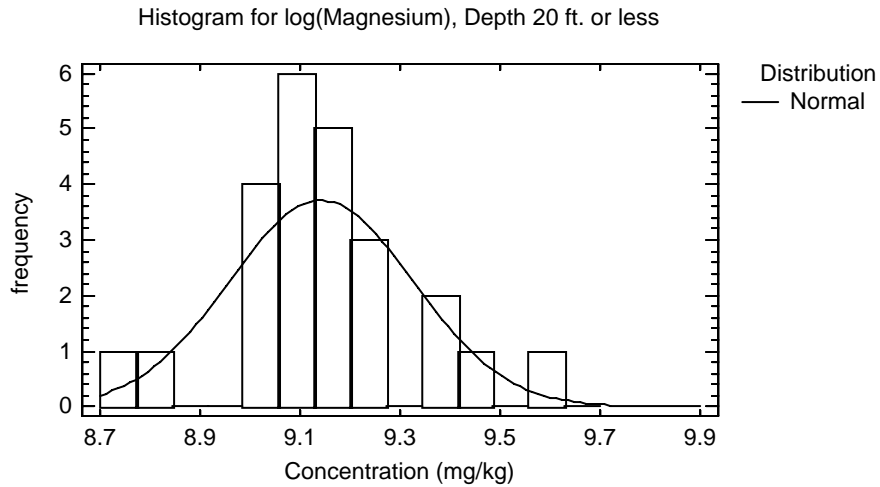
Data variable: log(Magnesium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 8.76717 to 9.60912

Fitted Distributions

Normal
mean = 9.14214
standard deviation = 0.184347

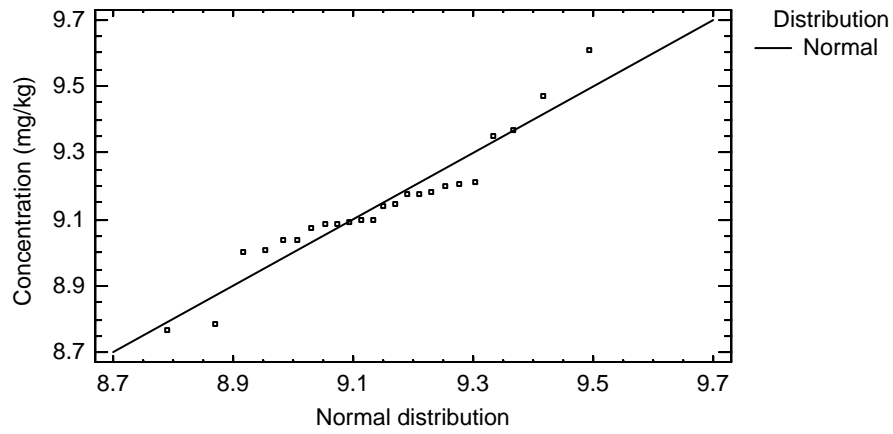


Tests for Normality for log(Magnesium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.929684	0.0979464



Quantile-Quantile Plot for log(Magnesium), Depth 20 ft. or less



**DRAFT**

**Uncensored Data - Magnesium (Data Set = "Tronox"&Depth Value>=30)**

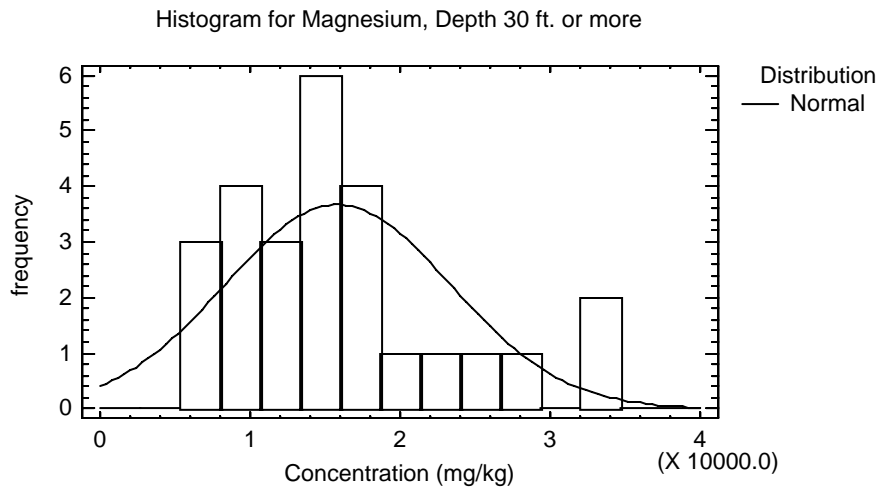
Data variable: Magnesium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 6140.0 to 34600.0

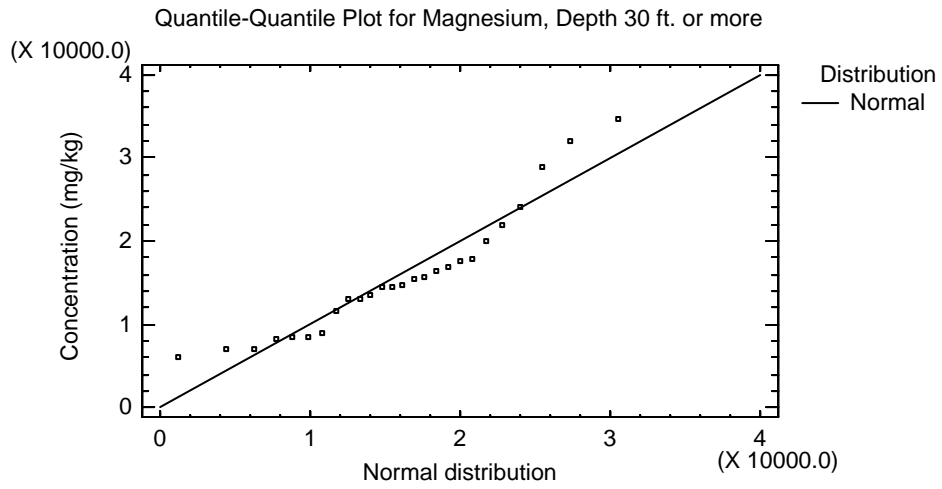
Fitted Distributions

Normal
mean = 15833.1
standard deviation = 7536.01



Tests for Normality for Magnesium

Test	Statistic	P-Value
Shapiro-Wilk W	0.906845	0.0226971



**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set = "Tronox"&Depth Value>=30)**

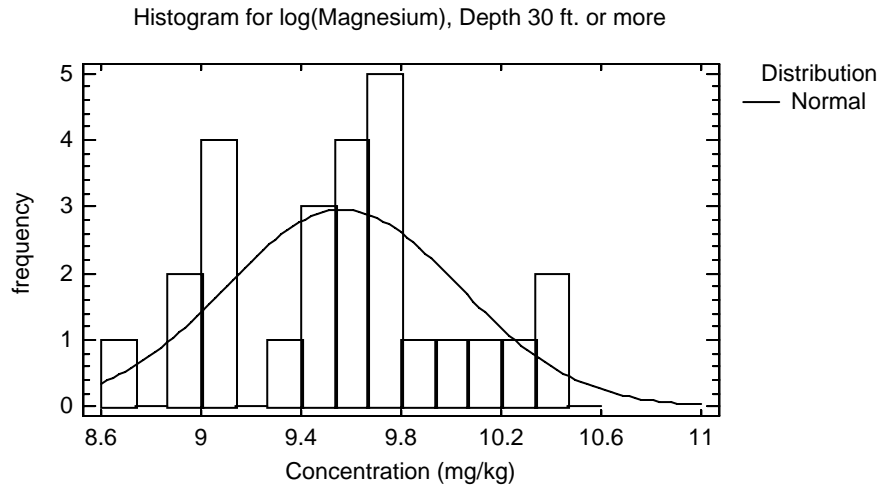
Data variable: log(Magnesium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.72258 to 10.4516

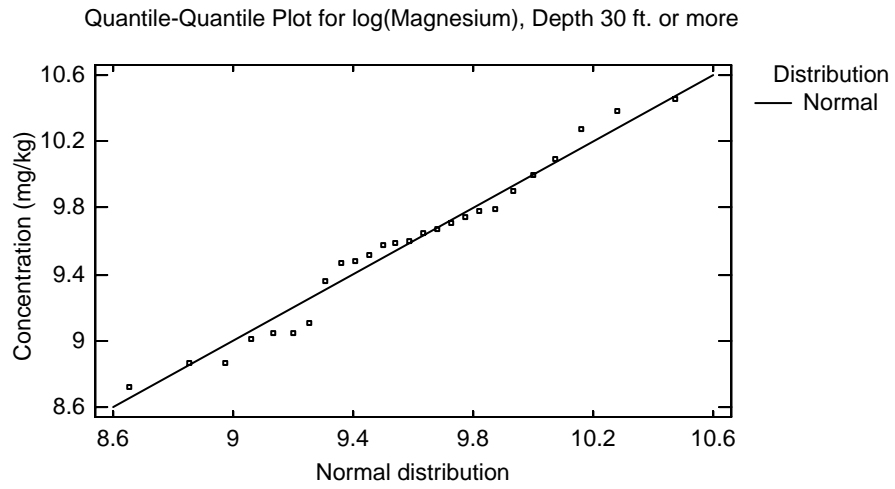
Fitted Distributions

Normal
mean = 9.56555
standard deviation = 0.467617



Tests for Normality for log(Magnesium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.966265	0.546919



**DRAFT**

**Two-Sample Comparison - log(Magnesium) & Depth Range (Data Set="Tronox") for log(Magnesium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 8.76717 to 9.60912  
 Sample 2: 26 values ranging from 8.72258 to 10.4516

Comparison of Means for log(Magnesium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 9.14214 +/- 0.0778429 [9.0643, 9.21998]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 9.56555 +/- 0.188875 [9.37668, 9.75443]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -0.423415 +/- 0.201651 [-0.625067, -0.221764]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -4.27144 P-value = 0.000154399  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Magnesium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.184347	0.467617
Variance	0.0339837	0.218665
Df	23	25

Ratio of Variances = 0.155414

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.143277, 0.258594]  
 Standard deviation of Depth Range=30 ft. or more: [0.366732, 0.645502]  
 Ratio of Variances: [0.0689175, 0.355447]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.155414 P-value = 0.0000282936  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Magnesium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

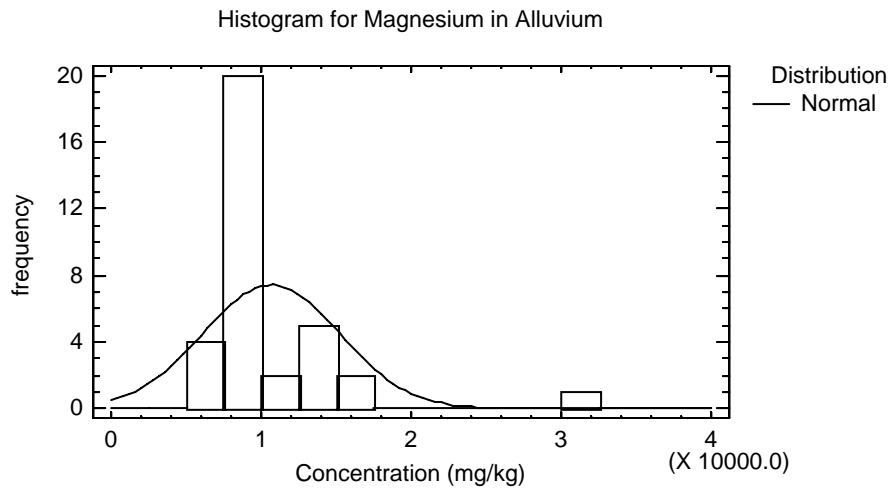
Data variable: Magnesium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 6140.0 to 32100.0

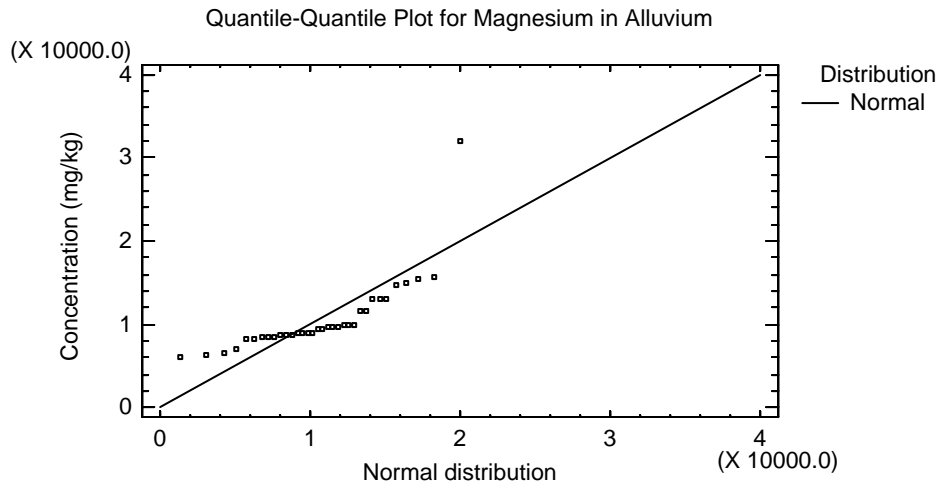
Fitted Distributions

Normal
mean = 10676.2
standard deviation = 4564.48



Tests for Normality for Magnesium

Test	Statistic	P-Value
Shapiro-Wilk W	0.672497	8.97528E-9





**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

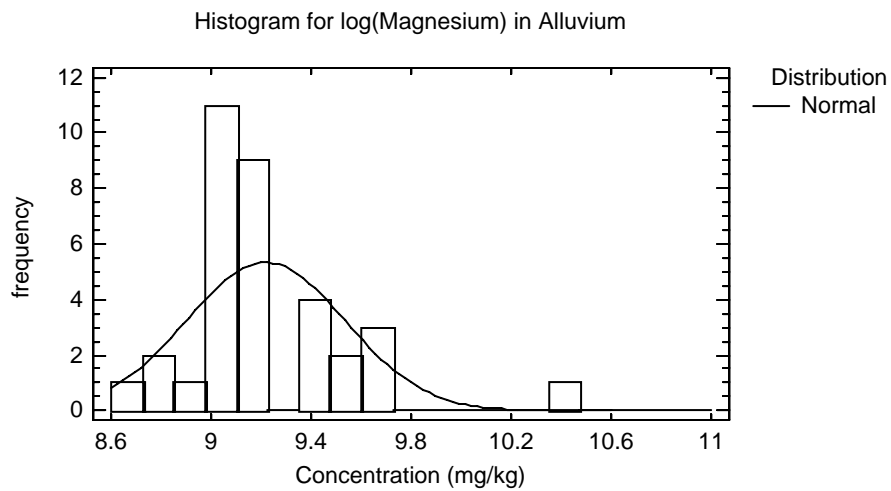
Data variable: log(Magnesium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 8.72258 to 10.3766

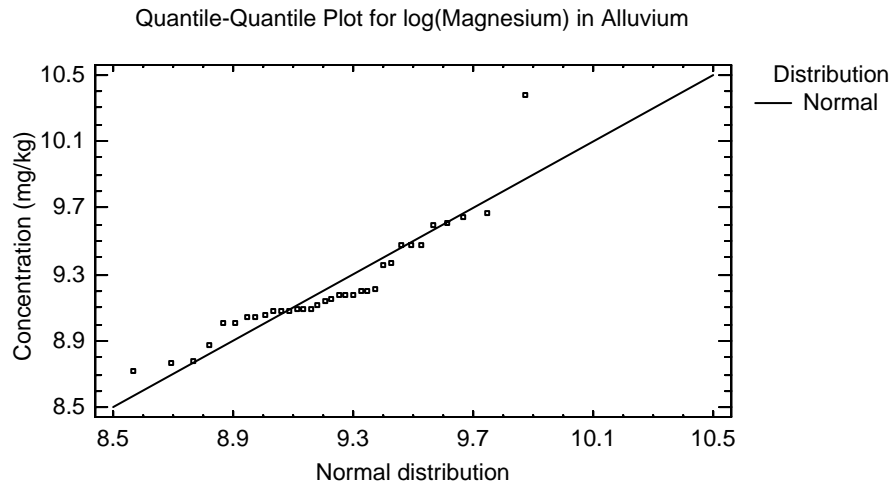
Fitted Distributions

Normal
mean = 9.21788
standard deviation = 0.317742



Tests for Normality for log(Magnesium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.881853	0.00131413



**DRAFT**

**Uncensored Data - Magnesium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

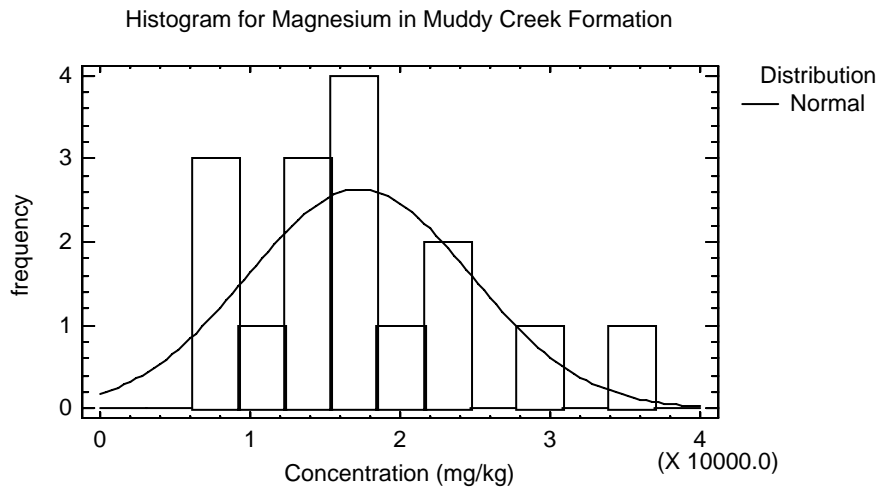
Data variable: Magnesium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 7140.0 to 34600.0

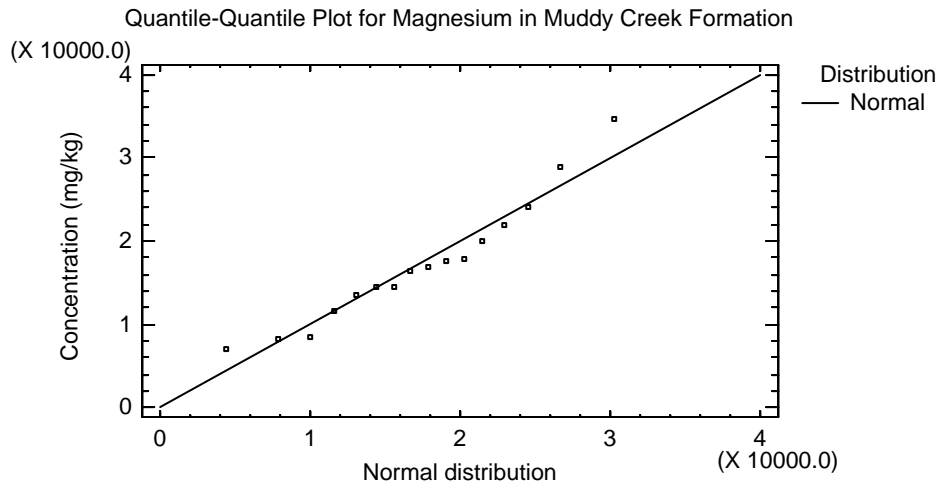
Fitted Distributions

Normal
mean = 17288.8
standard deviation = 7461.67



Tests for Normality for Magnesium

Test	Statistic	P-Value
Shapiro-Wilk W	0.94566	0.41605



**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

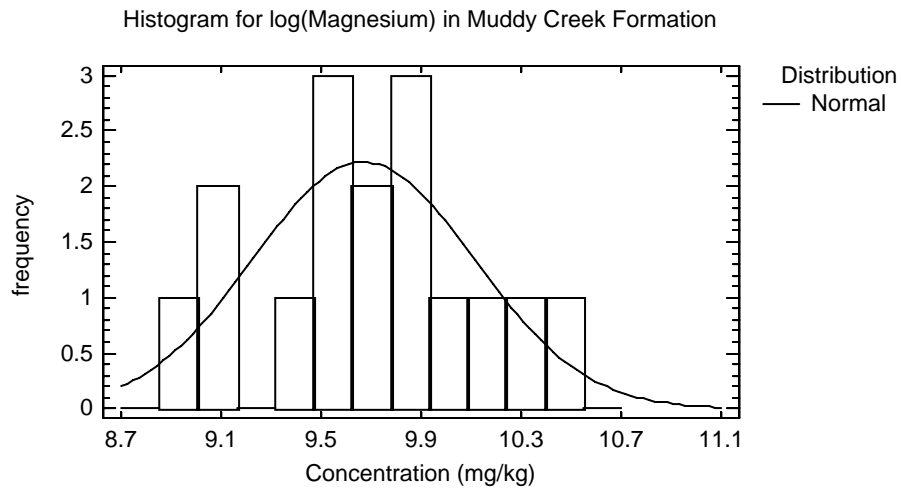
Data variable: log(Magnesium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 8.87347 to 10.4516

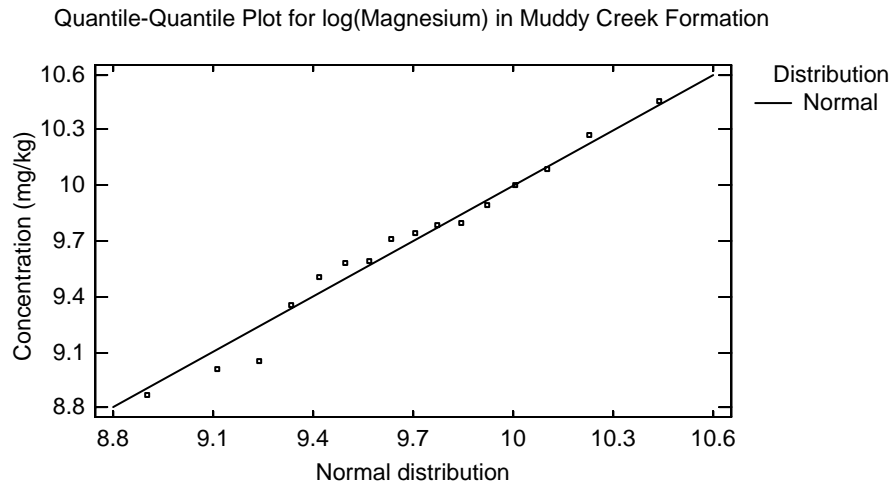
Fitted Distributions

Normal
mean = 9.66923
standard deviation = 0.442535



Tests for Normality for log(Magnesium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.97163	0.83332



**DRAFT****Two-Sample Comparison - Magnesium & Geological Formation 1 (Data Set="Tronox") for Magnesium**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 6140.0 to 32100.0

Sample 2: 16 values ranging from 7140.0 to 34600.0

Comparison of Medians for Magnesium

Median of sample 1: 9365.0

Median of sample 2: 16750.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 20.9118

Average rank of sample 2: 35.25

W = 156.0 P-value = 0.00122027

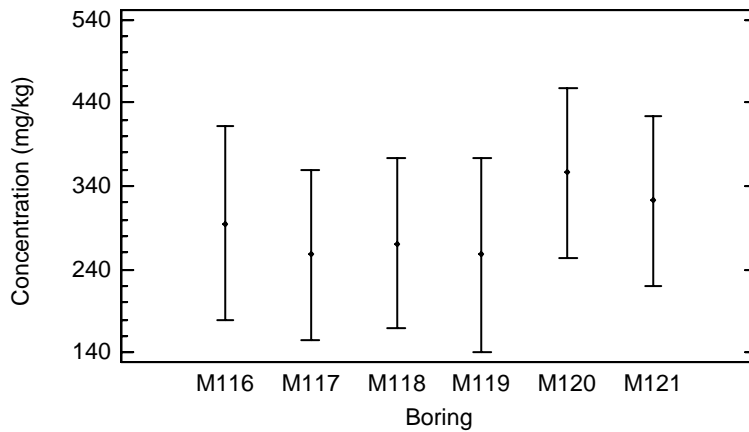
Reject the null hypothesis for alpha = 0.05.

### 2.15 Manganese

ANOVA Table for Manganese by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	67675.3	5	13535.1	0.63	0.6748
Within groups	939340.	44	21348.6		
Total (Corr.)	1.00702E6	49			

Means and 95.0 Percent Tukey HSD Intervals for Manganese



Kruskal-Wallis Test for Manganese by Location ID

Location ID	Sample Size	Average Rank
M116	7	23.0714
M117	9	23.2222
M118	9	21.8333
M119	7	23.2857
M120	9	32.7222
M121	9	27.8333

Test statistic = 3.5852 P-Value = 0.610536



**DRAFT**

**Uncensored Data - Manganese (Data Set = "Tronox")**

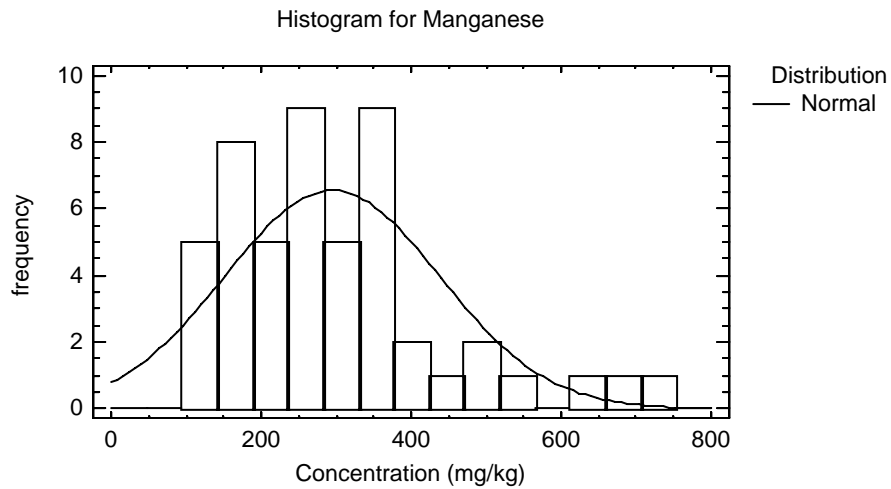
Data variable: Manganese

Selection variable: Data Set = "Tronox"

50 values ranging from 100.0 to 710.5

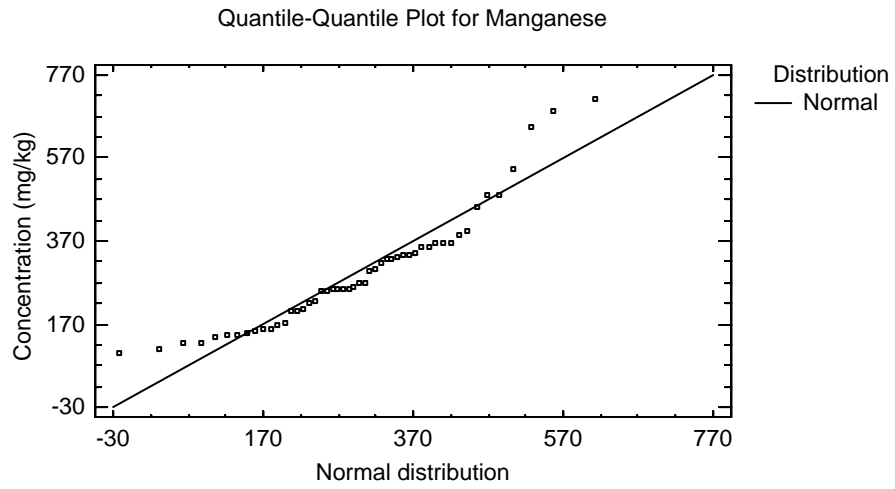
Fitted Distributions

Normal
mean = 294.72
standard deviation = 143.357



Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.900792	0.000288124



**DRAFT**

**Uncensored Data - log(Manganese) (Data Set = "Tronox")**

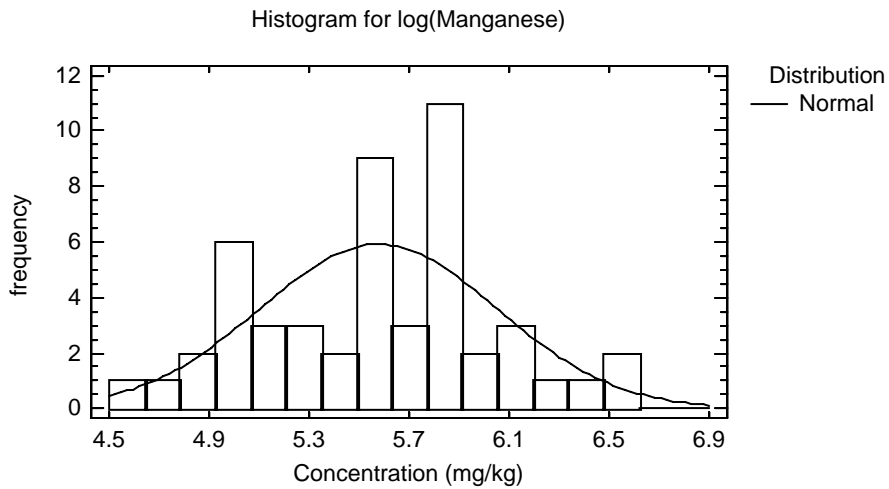
Data variable: log(Manganese)

Selection variable: Data Set = "Tronox"

50 values ranging from 4.60517 to 6.56597

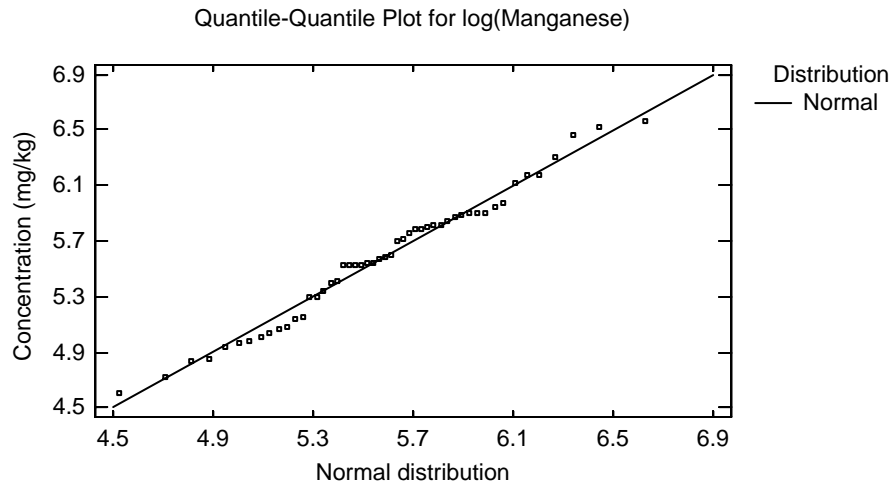
Fitted Distributions

Normal
mean = 5.57628
standard deviation = 0.475519



Tests for Normality for log(Manganese)

Test	Statistic	P-Value
Shapiro-Wilk W	0.970321	0.386203



**DRAFT**

**Uncensored Data - Manganese (Data Set = "Tronox"&Depth Value<=20)**

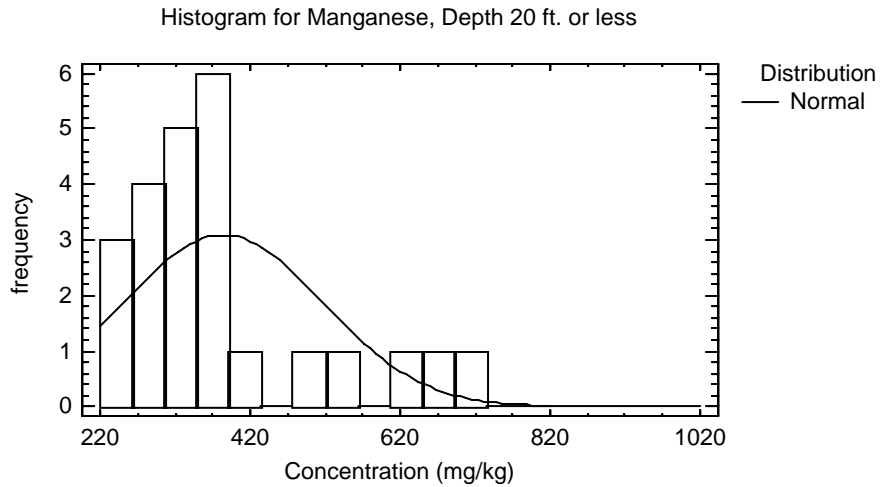
Data variable: Manganese

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 252.0 to 710.5

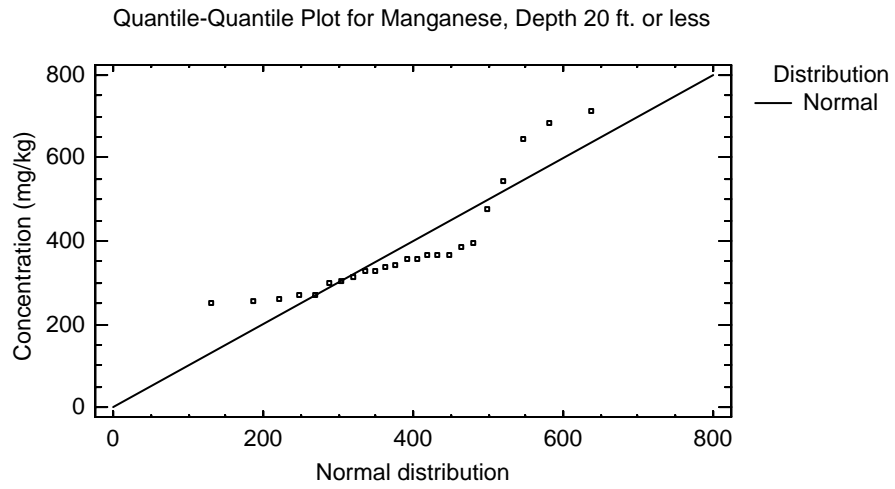
Fitted Distributions

Normal
mean = 383.896
standard deviation = 132.786



Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.796927	0.000149586



**DRAFT**

**Uncensored Data - log(Manganese) (Data Set = "Tronox"&Depth Value<=20)**

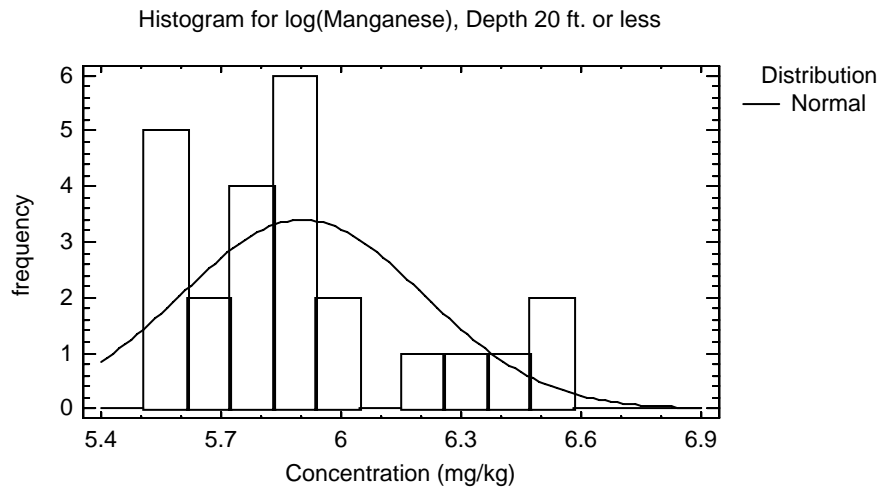
Data variable: log(Manganese)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.52943 to 6.56597

Fitted Distributions

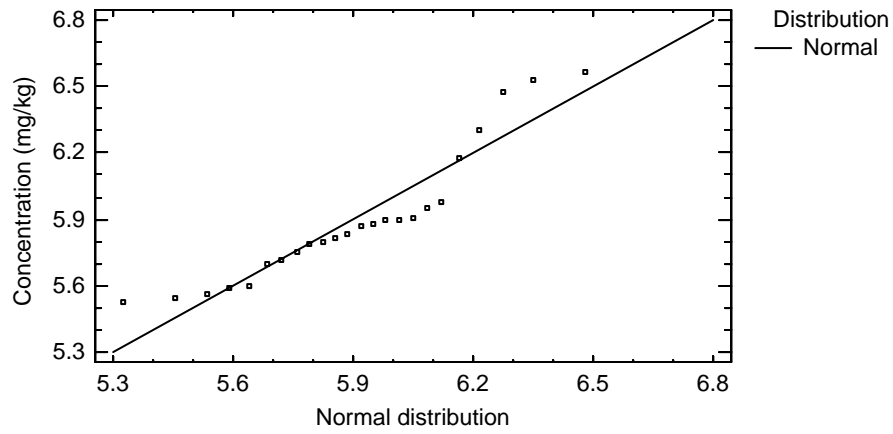
Normal
mean = 5.90284
standard deviation = 0.301517



Tests for Normality for log(Manganese)

Test	Statistic	P-Value
Shapiro-Wilk W	0.881713	0.0080413

Quantile-Quantile Plot for log(Manganese), Depth 20 ft. or less





**DRAFT**

**Uncensored Data - Manganese (Data Set = "Tronox"&Depth Value>=30)**

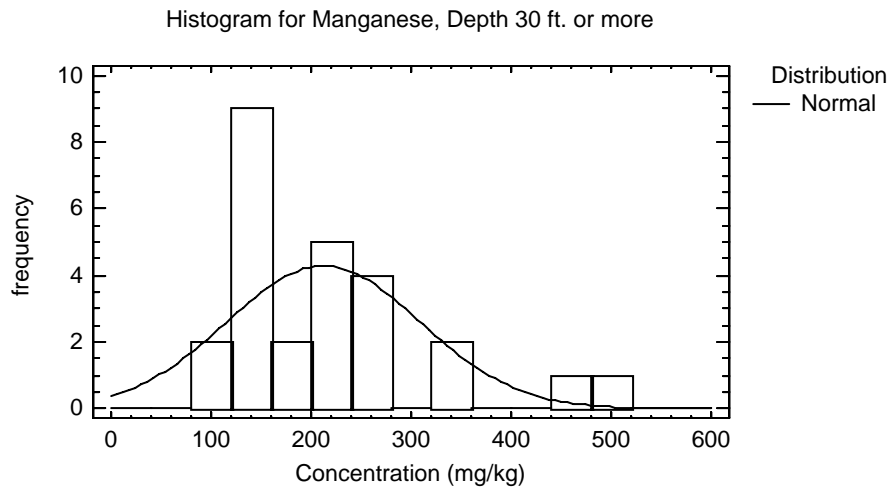
Data variable: Manganese

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 100.0 to 481.0

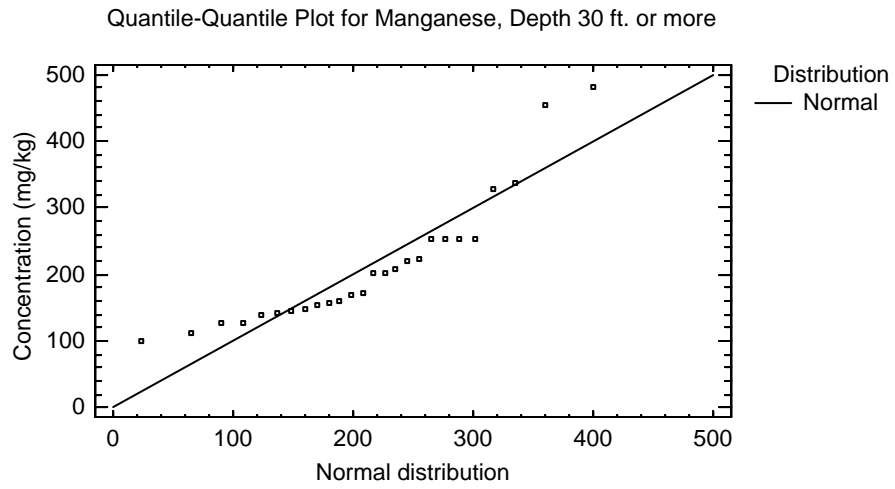
Fitted Distributions

Normal
mean = 212.404
standard deviation = 96.8393



Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.846331	0.000919694



**DRAFT**

**Uncensored Data - log(Manganese) (Data Set = "Tronox"&Depth Value>=30)**

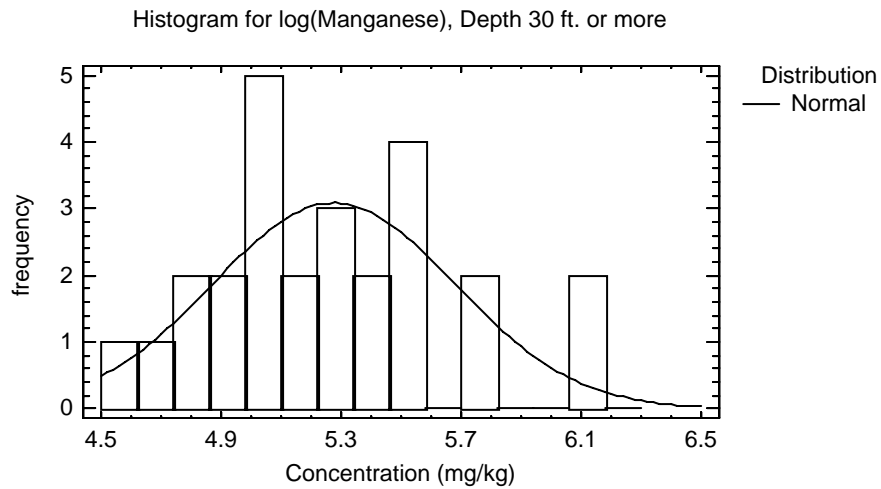
Data variable: log(Manganese)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 4.60517 to 6.17587

Fitted Distributions

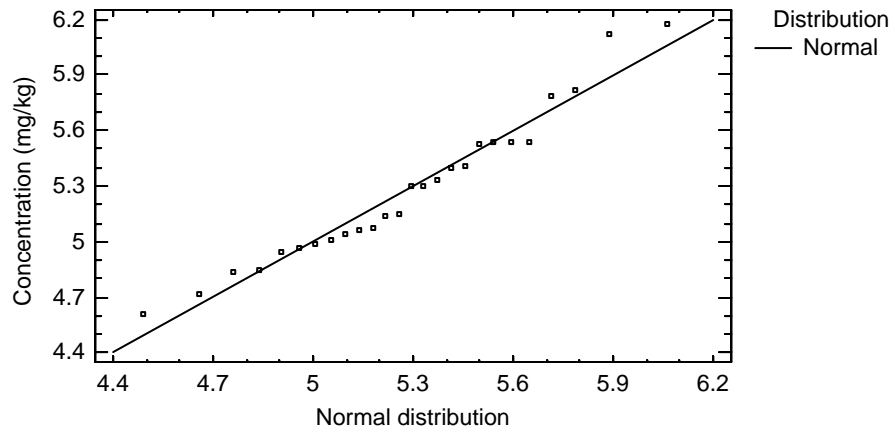
Normal
mean = 5.27485
standard deviation = 0.403338



Tests for Normality for log(Manganese)

Test	Statistic	P-Value
Shapiro-Wilk W	0.956454	0.345534

Quantile-Quantile Plot for log(Manganese), Depth 30 ft. or more



**DRAFT****Two-Sample Comparison - Manganese & Depth Range (Data Set="Tronox") for Manganese**

Sample 1: Depth Range=20 ft. or less  
Sample 2: Depth Range=30 ft. or more  
Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 252.0 to 710.5  
Sample 2: 26 values ranging from 100.0 to 481.0

Comparison of Medians for Manganese  
Median of sample 1: 349.0  
Median of sample 2: 186.75

Mann-Whitney (Wilcoxon) W test to compare medians  
Null hypothesis: median1 = median2  
Alt. hypothesis: median1 NE median2

Average rank of sample 1: 35.9583  
Average rank of sample 2: 15.8462

W = -251.0 P-value = 0.00000114813  
Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Manganese (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

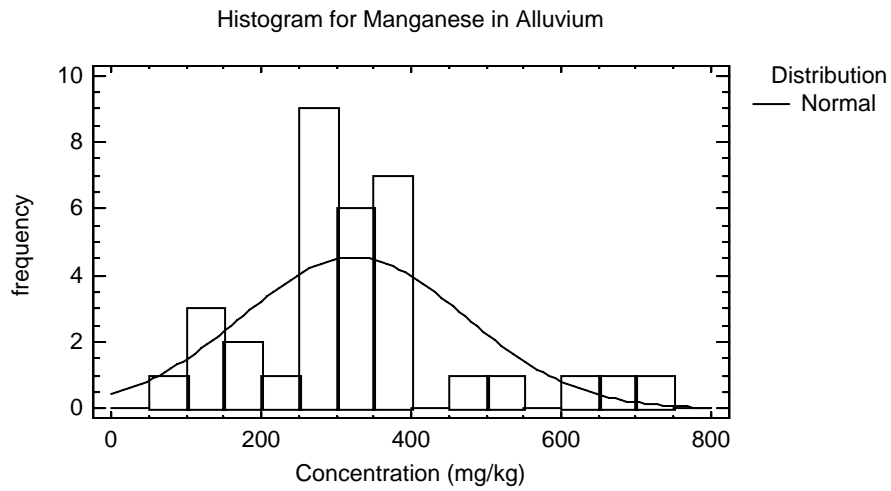
Data variable: Manganese

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 100.0 to 710.5

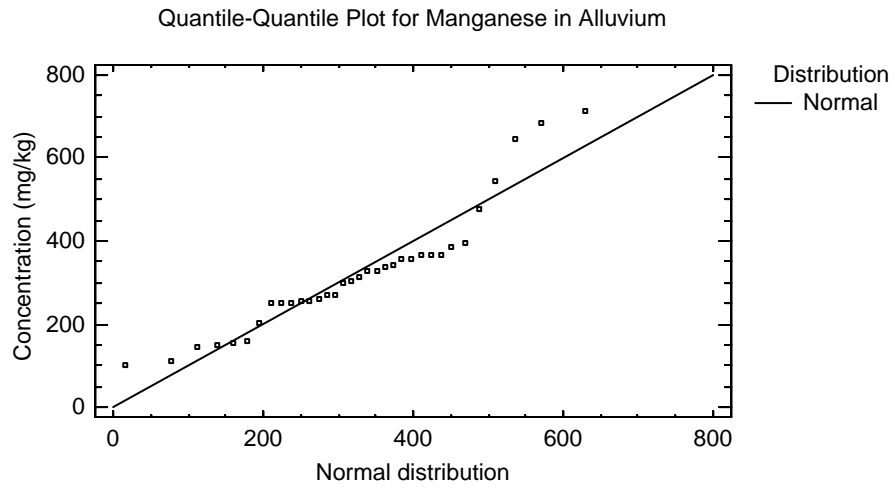
Fitted Distributions

Normal
mean = 323.368
standard deviation = 149.251



Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.899264	0.00434947



**DRAFT**

**Uncensored Data - log(Manganese) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

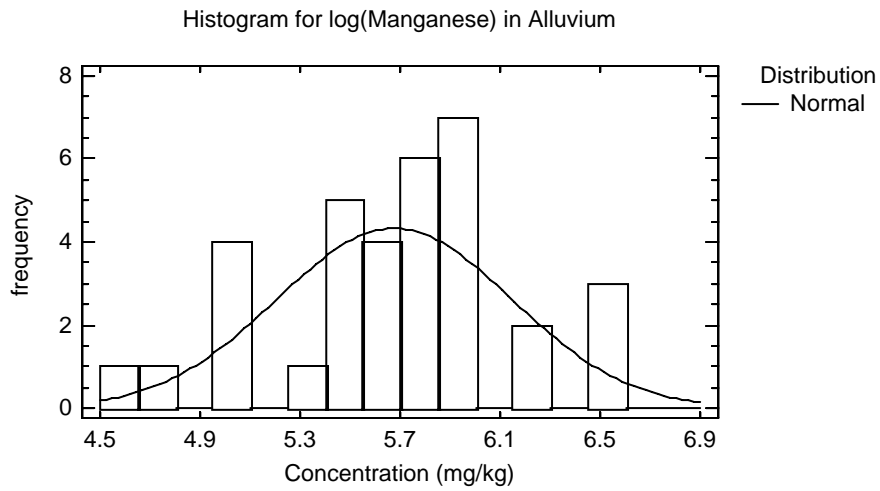
Data variable: log(Manganese)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 4.60517 to 6.56597

Fitted Distributions

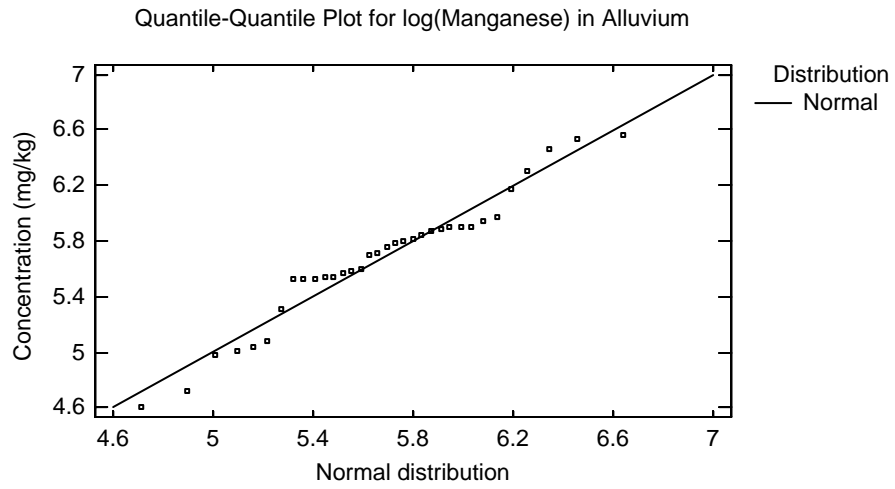
Normal
mean = 5.67632
standard deviation = 0.470003



Tests for Normality for log(Manganese)

Test	Statistic	P-Value
Shapiro-Wilk W	0.953346	0.195449





**DRAFT**

**Uncensored Data - Manganese (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

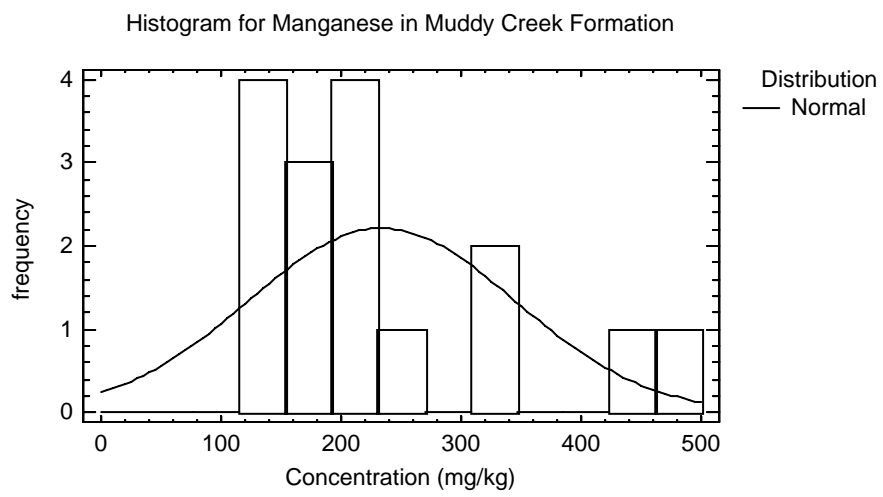
Data variable: Manganese

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 126.0 to 481.0

Fitted Distributions

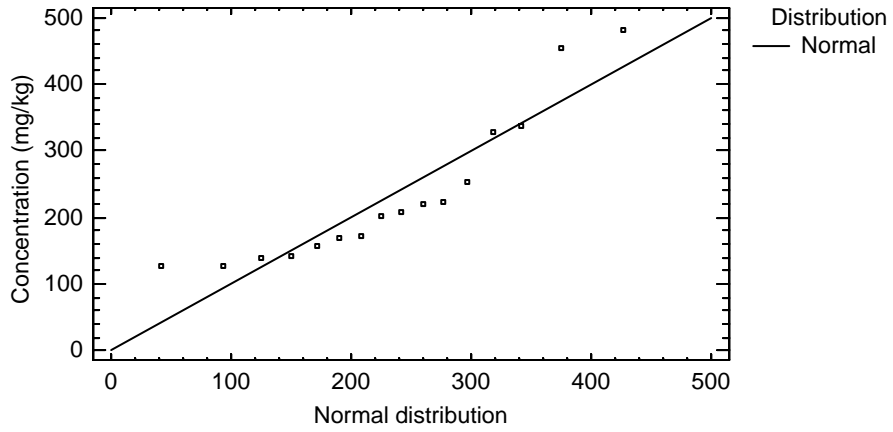
Normal
mean = 233.844
standard deviation = 110.969



Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.842103	0.00985671

Quantile-Quantile Plot for Manganese in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Manganese) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

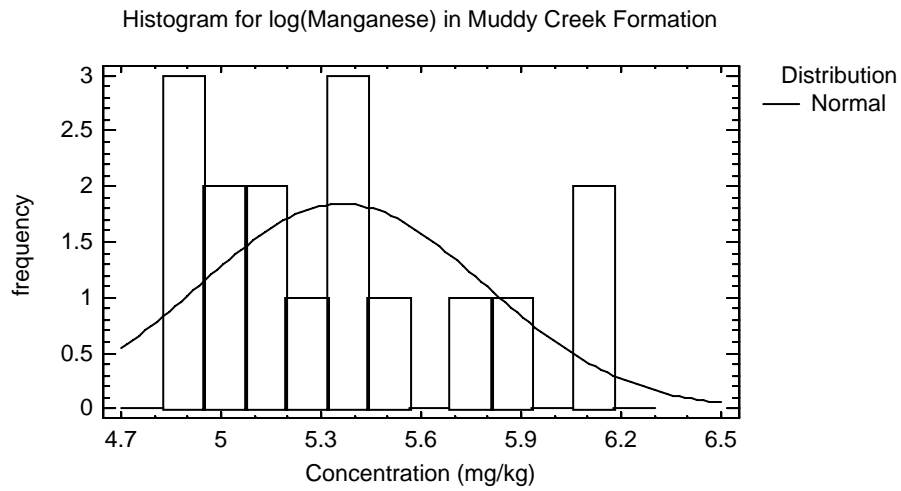
Data variable: log(Manganese)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 4.83628 to 6.17587

Fitted Distributions

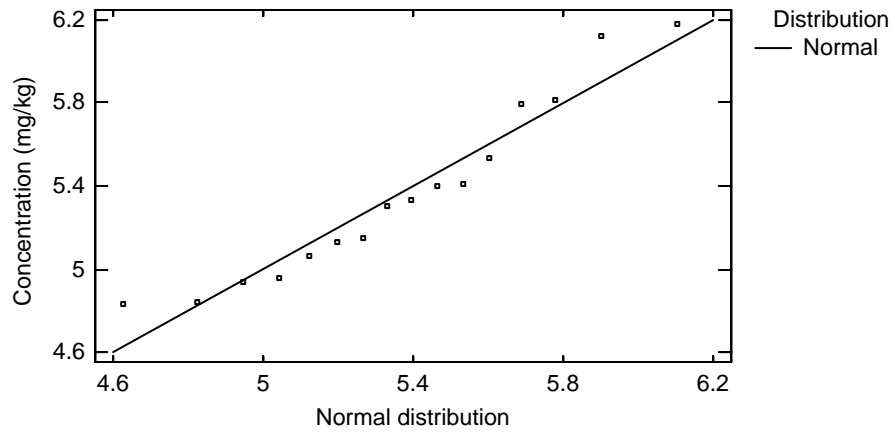
Normal
mean = 5.3637
standard deviation = 0.426356



Tests for Normality for log(Manganese)

Test	Statistic	P-Value
Shapiro-Wilk W	0.926516	0.215417

Quantile-Quantile Plot for log(Manganese) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - log(Manganese) & Geological Formation 1 (Data Set="Tronox") for log(Manganese)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 4.60517 to 6.56597  
 Sample 2: 16 values ranging from 4.83628 to 6.17587

Comparison of Means for log(Manganese)

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 5.67632 +/- 0.163992 [5.51233, 5.84031]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 5.3637 +/- 0.227189 [5.13651, 5.59089]

95.0% confidence interval for the difference between the means  
 assuming equal variances: 0.312619 +/- 0.278456 [0.0341629, 0.591075]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 2.25732 P-value = 0.0285755

Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Manganese)

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	0.470003	0.426356
Variance	0.220903	0.181779
Df	33	15

Ratio of Variances = 1.21523

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.379093, 0.618654]

Standard deviation of Geological Formation 1=Muddy Creek: [0.314951, 0.659867]

Ratio of Variances: [0.463366, 2.74768]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.21523 P-value = 0.706323

Do not reject the null hypothesis for alpha = 0.05.

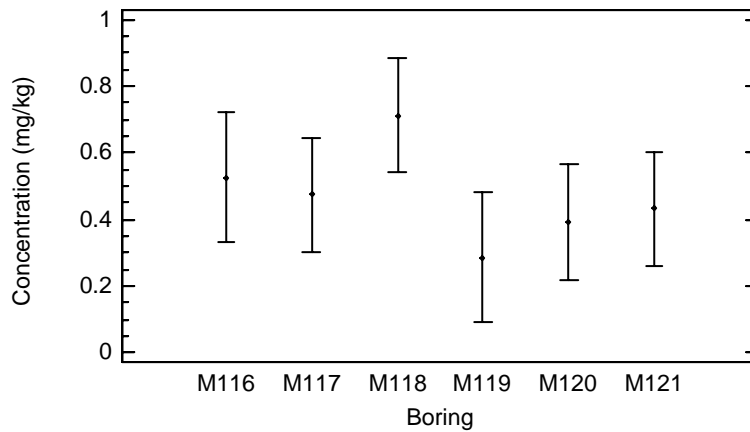
**DRAFT**

### 2.16 Molybdenum

ANOVA Table for Molybdenum by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.846762	5	0.169352	2.83	0.0265
Within groups	2.62924	44	0.0597554		
Total (Corr.)	3.476	49			

Means and 95.0 Percent Tukey HSD Intervals for Molybdenum



Kruskal-Wallis Test for Molybdenum by Location ID

Location ID	Sample Size	Average Rank
M116	7	27.0
M117	9	26.5556
M118	9	39.6667
M119	7	14.5714
M120	9	20.9444
M121	9	22.1667

Test statistic = 13.9065 P-Value = 0.0162146

**DRAFT**

**Uncensored Data - Molybdenum (Data Set = "Tronox")**

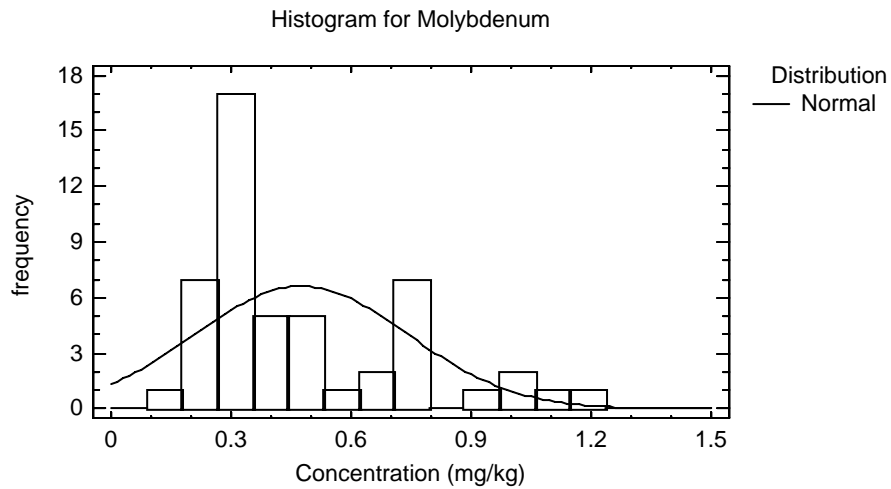
Data variable: Molybdenum

Selection variable: Data Set = "Tronox"

50 values ranging from 0.1555 to 1.22

Fitted Distributions

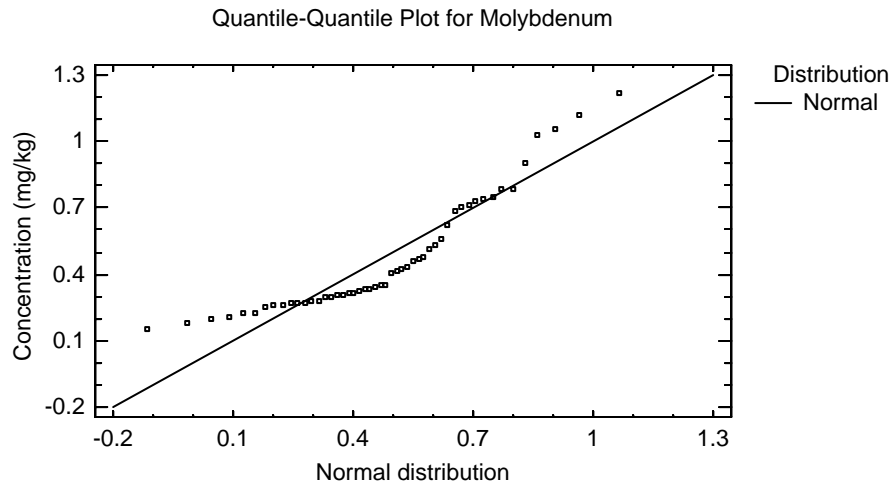
Normal
mean = 0.475325
standard deviation = 0.266343



Tests for Normality for Molybdenum

Test	Statistic	P-Value
Shapiro-Wilk W	0.861546	0.00000459569





**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set = "Tronox")**

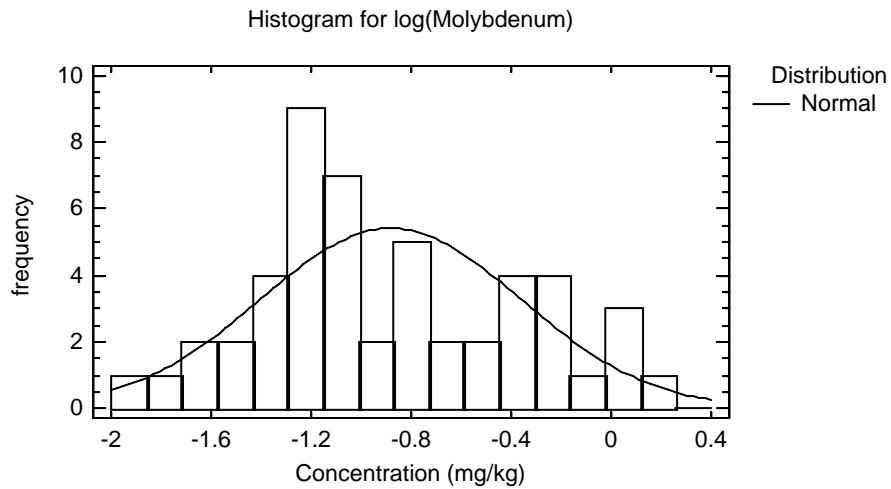
Data variable: log(Molybdenum)

Selection variable: Data Set = "Tronox"

50 values ranging from -1.86111 to 0.198851

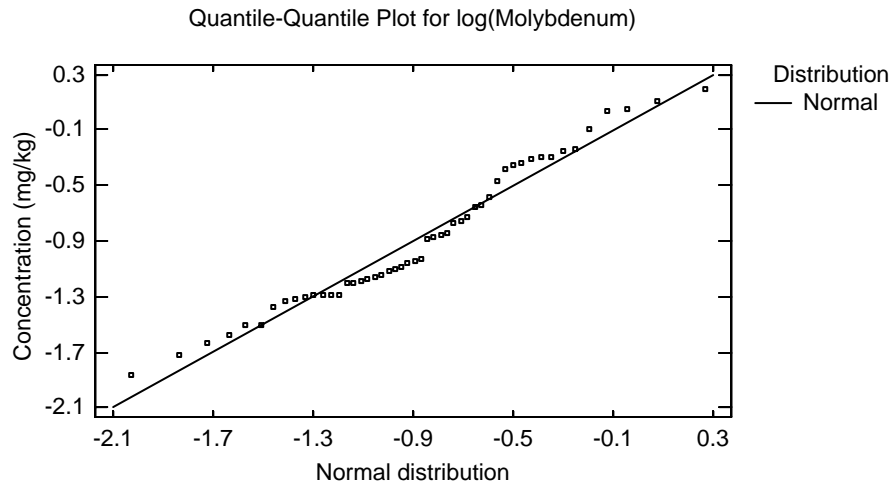
Fitted Distributions

Normal
mean = -0.881296
standard deviation = 0.520419



Tests for Normality for log(Molybdenum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.951835	0.0699389



**DRAFT**

**Uncensored Data - Molybdenum (Data Set = "Tronox"&Depth Value<=20)**

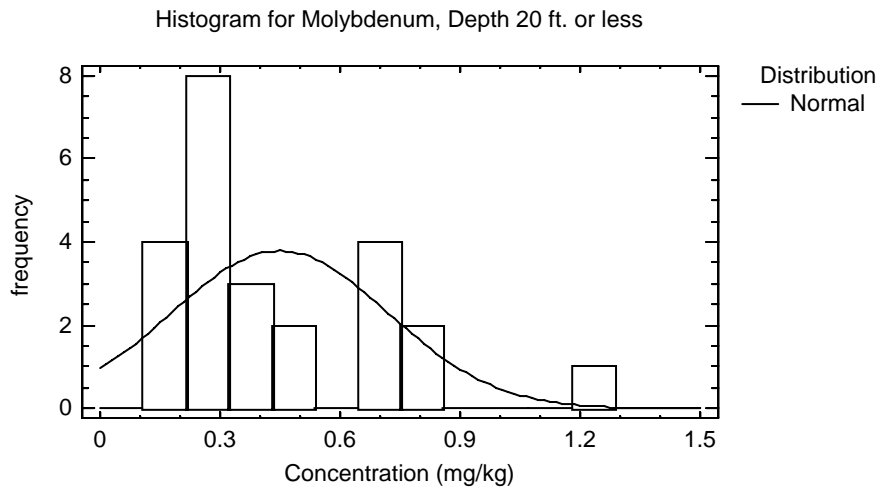
Data variable: Molybdenum

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.1555 to 1.22

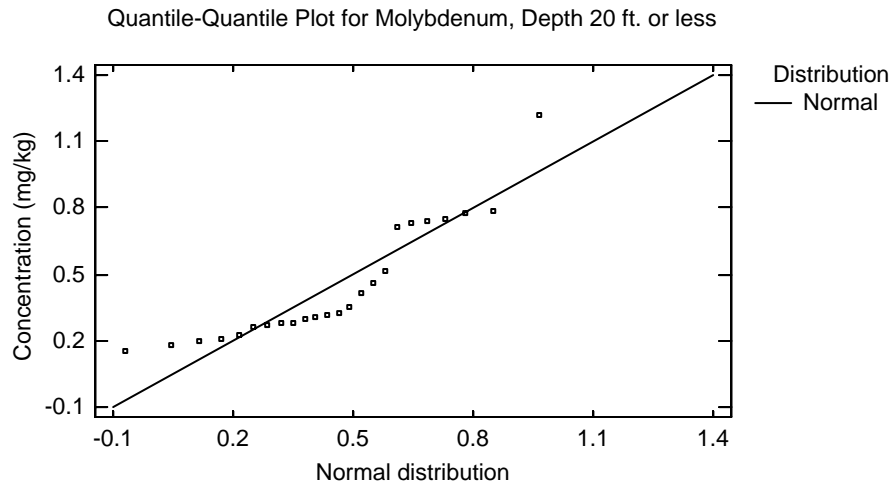
Fitted Distributions

Normal
mean = 0.448698
standard deviation = 0.270756



Tests for Normality for Molybdenum

Test	Statistic	P-Value
Shapiro-Wilk W	0.848474	0.0015667



**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set = "Tronox"&Depth Value<=20)**

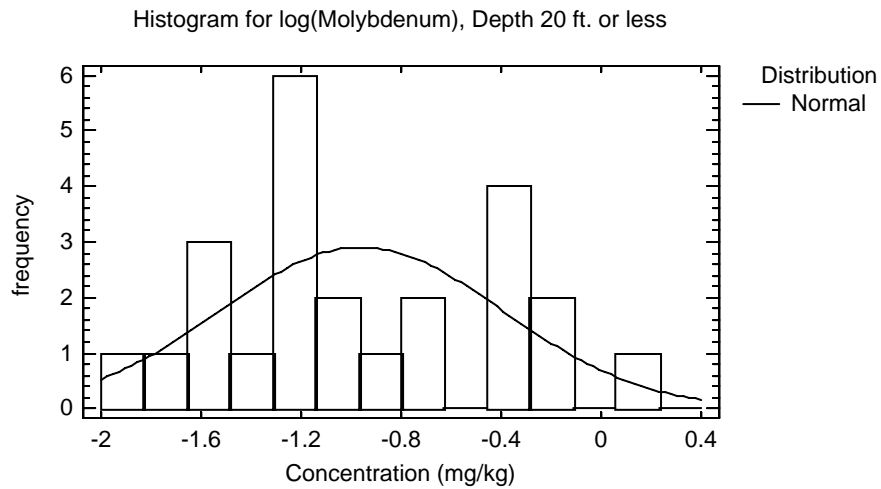
Data variable: log(Molybdenum)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -1.86111 to 0.198851

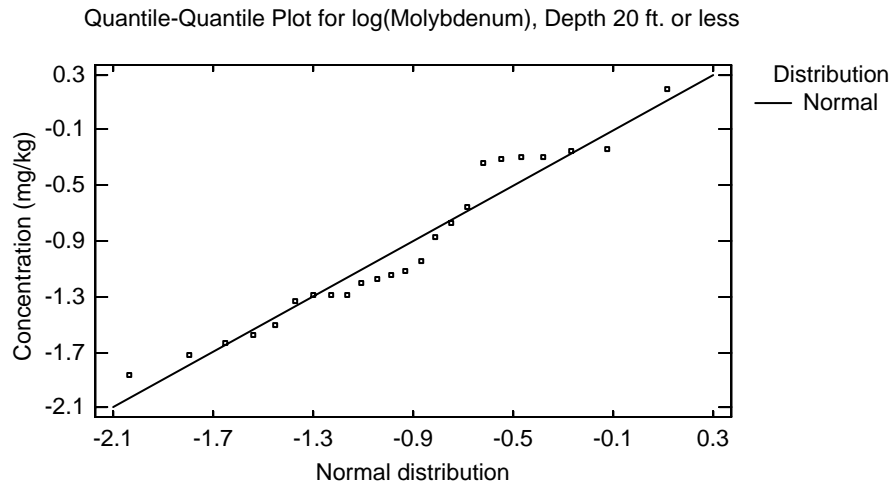
Fitted Distributions

Normal
mean = -0.95903
standard deviation = 0.564621



Tests for Normality for log(Molybdenum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.941183	0.178294



**DRAFT**

**Uncensored Data - Molybdenum (Data Set = "Tronox"&Depth Value>=30)**

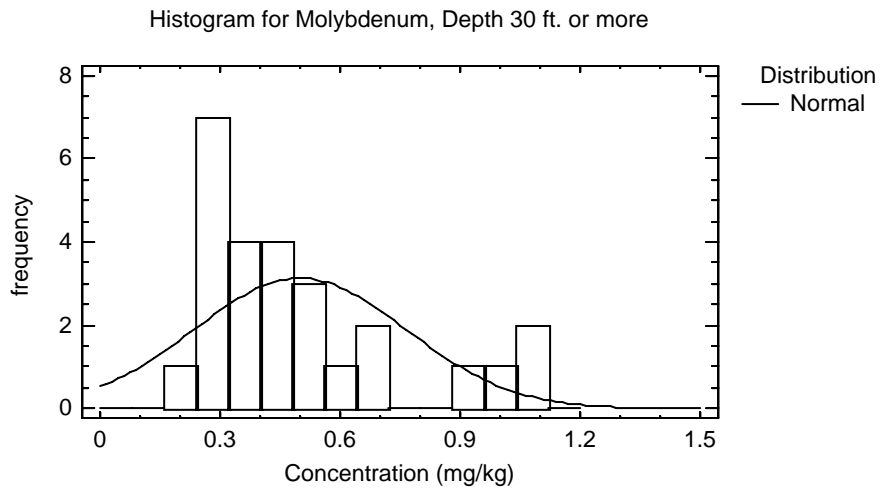
Data variable: Molybdenum

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.222 to 1.12

Fitted Distributions

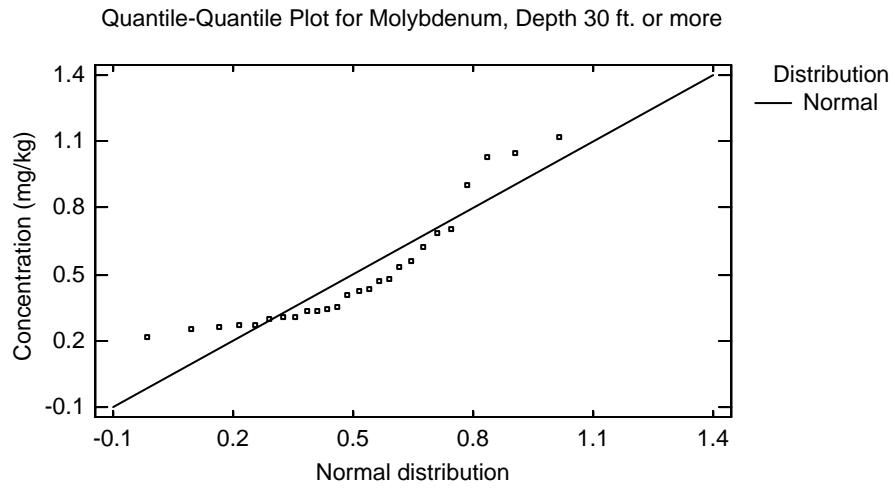
Normal
mean = 0.499904
standard deviation = 0.265117



Tests for Normality for Molybdenum

Test	Statistic	P-Value
Shapiro-Wilk W	0.83543	0.000535276





**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set = "Tronox"&Depth Value>=30)**

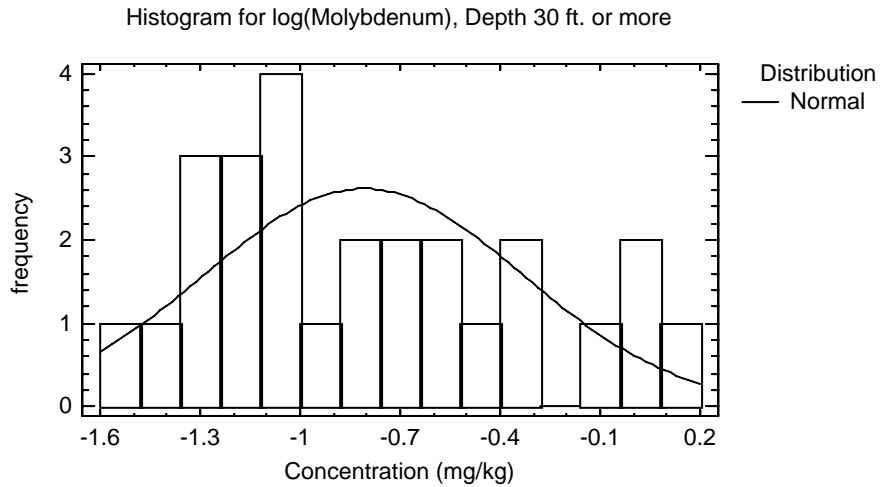
Data variable: log(Molybdenum)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -1.50508 to 0.113329

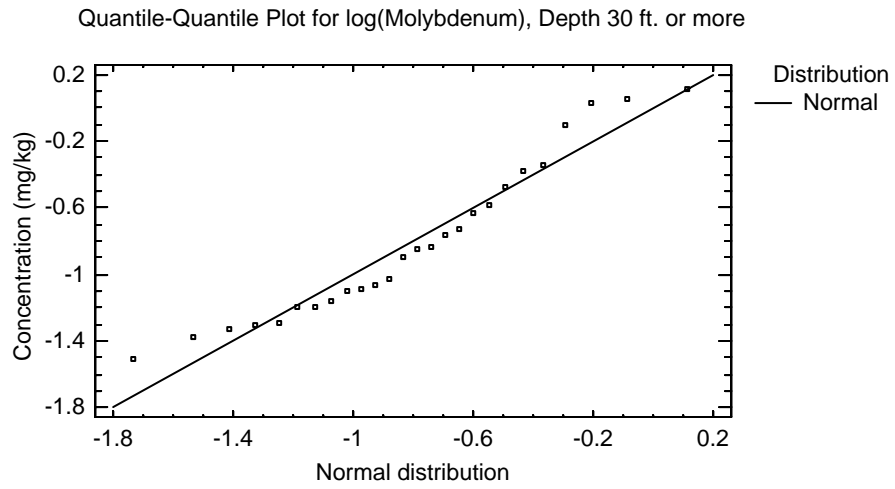
Fitted Distributions

Normal
mean = -0.809542
standard deviation = 0.475805



Tests for Normality for log(Molybdenum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.929871	0.0822675



**DRAFT**

**Two-Sample Comparison - log(Molybdenum) & Depth Range (Data Set="Tronox") for log(Molybdenum)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from -1.86111 to 0.198851  
 Sample 2: 26 values ranging from -1.50508 to 0.113329

Comparison of Means for log(Molybdenum)

95.0% confidence interval for mean of Depth Range=20 ft. or less: -0.95903 +/- 0.238419 [-1.19745, -0.720611]

95.0% confidence interval for mean of Depth Range=30 ft. or more: -0.809542 +/- 0.192182 [-1.00172, -0.61736]

95.0% confidence interval for the difference between the means  
 assuming equal variances: -0.149488 +/- 0.296105 [-0.445593, 0.146618]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -1.01506 P-value = 0.315165  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Molybdenum)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.564621	0.475805
Variance	0.318797	0.226391
Df	23	25

Ratio of Variances = 1.40817

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.438831, 0.792028]  
 Standard deviation of Depth Range=30 ft. or more: [0.373154, 0.656806]  
 Ratio of Variances: [0.624447, 3.22063]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 1.40817 P-value = 0.403886  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Molybdenum (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

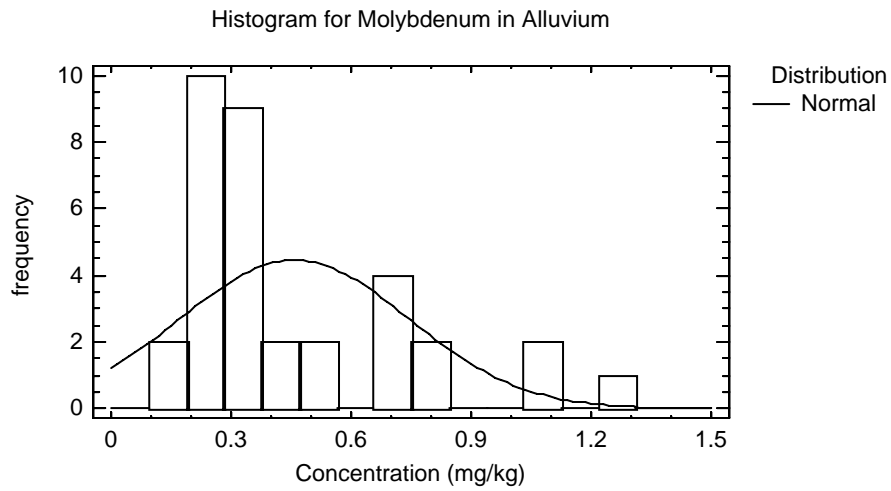
Data variable: Molybdenum

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.1555 to 1.22

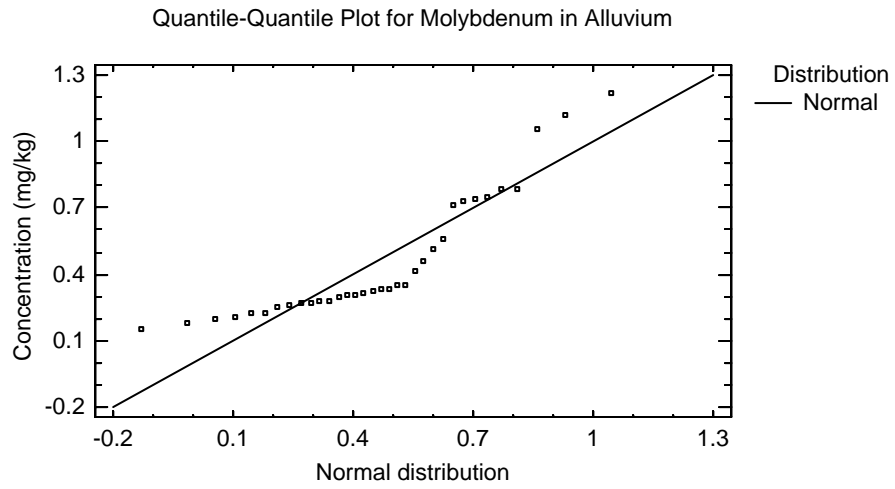
Fitted Distributions

Normal
mean = 0.458022
standard deviation = 0.285117



Tests for Normality for Molybdenum

Test	Statistic	P-Value
Shapiro-Wilk W	0.82367	0.0000311761



**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

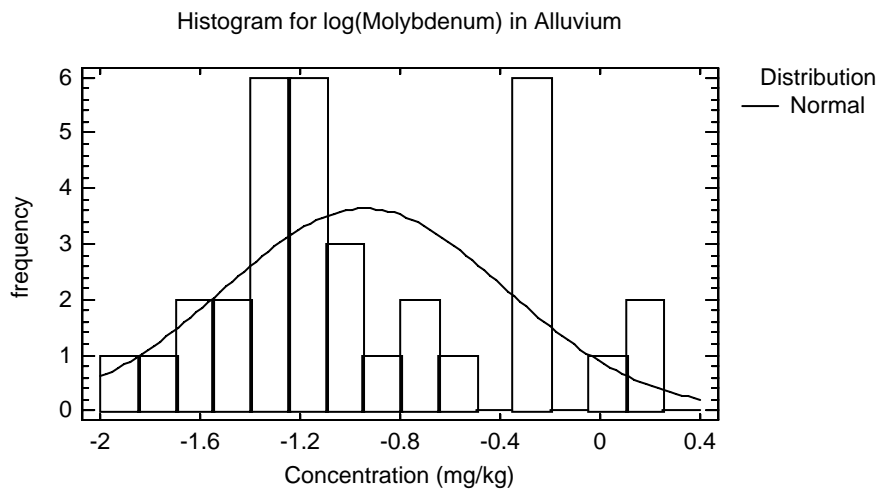
Data variable: log(Molybdenum)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -1.86111 to 0.198851

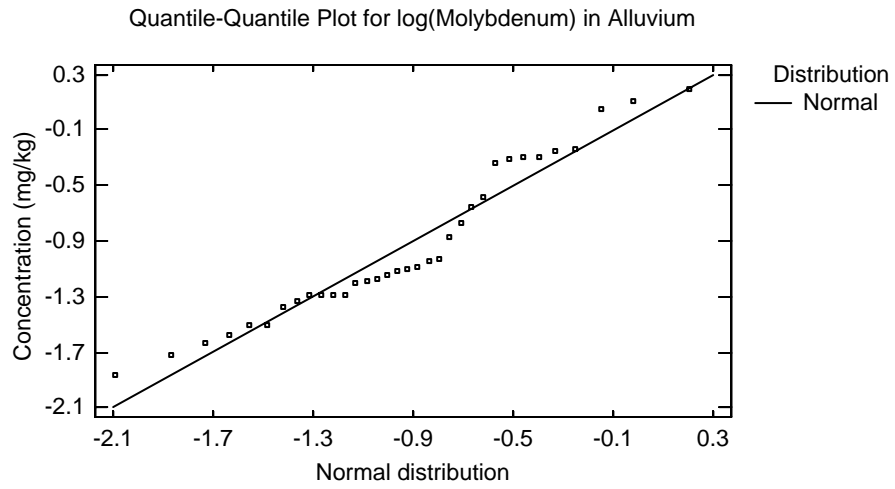
Fitted Distributions

Normal
mean = -0.942034
standard deviation = 0.558822



Tests for Normality for log(Molybdenum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.930109	0.0386411





**DRAFT**

**Uncensored Data - Molybdenum (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

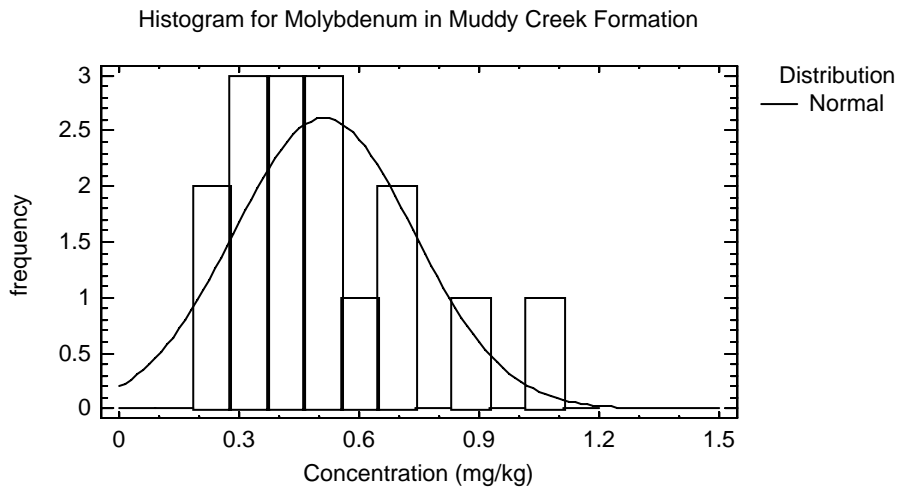
Data variable: Molybdenum

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.266 to 1.03

Fitted Distributions

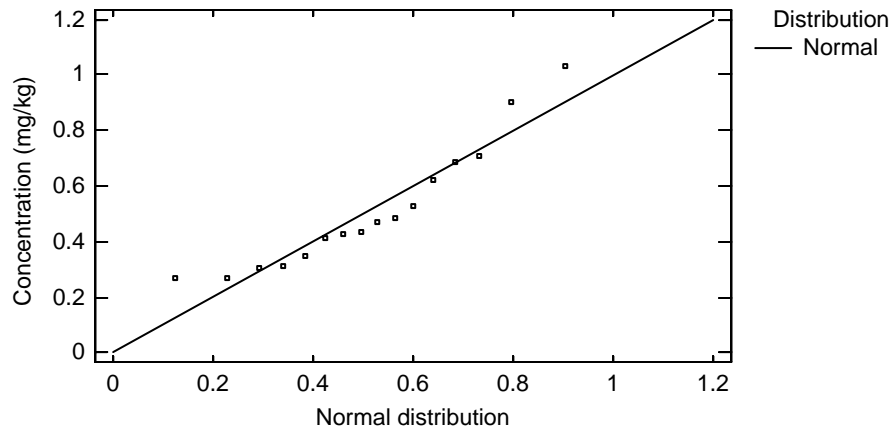
Normal
mean = 0.512094
standard deviation = 0.225322



Tests for Normality for Molybdenum

Test	Statistic	P-Value
Shapiro-Wilk W	0.896022	0.0703724

Quantile-Quantile Plot for Molybdenum in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

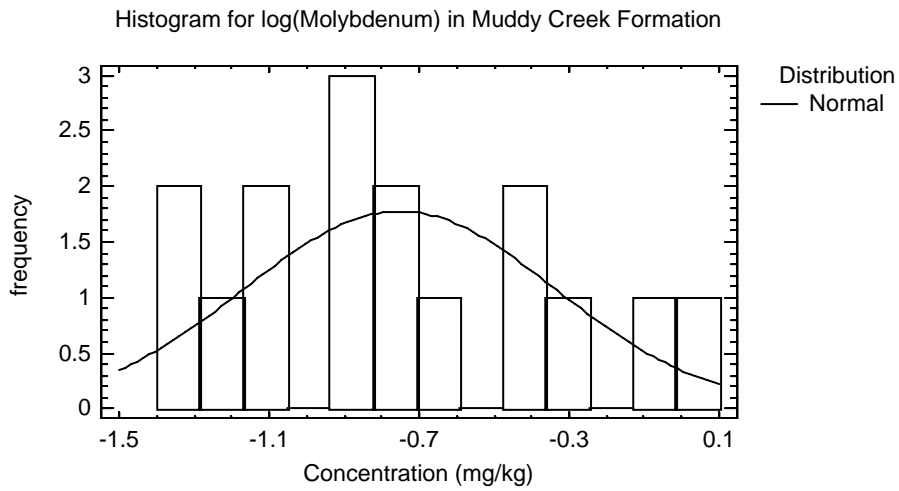
Data variable: log(Molybdenum)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -1.32426 to 0.0295588

Fitted Distributions

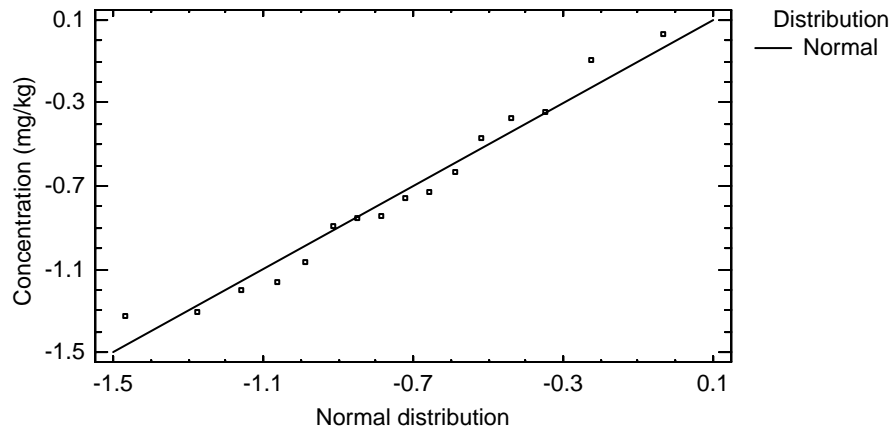
Normal
mean = -0.75223
standard deviation = 0.414224



Tests for Normality for log(Molybdenum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.95796	0.60388

Quantile-Quantile Plot for log(Molybdenum) in Muddy Creek Formation



**DRAFT**

## Tronox Molybdenum by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = 0.778673527$   $p = 0.436172054$

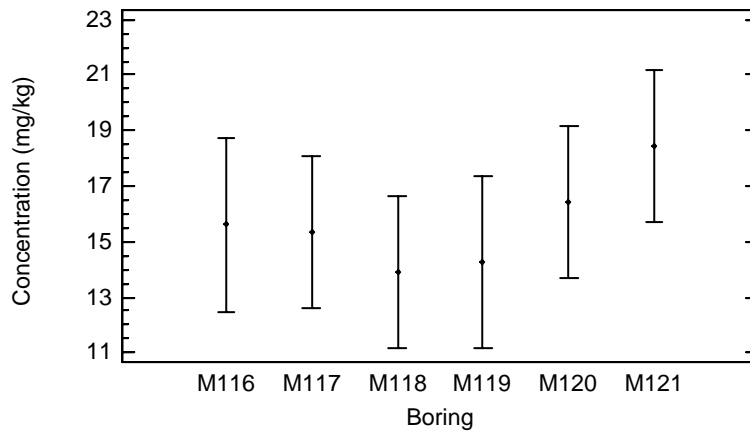
Do not reject the null hypothesis for  $\alpha = 0.05$

### 2.17 Nickel

ANOVA Table for Nickel by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	116.348	5	23.2696	1.53	0.2011
Within groups	670.608	44	15.2411		
Total (Corr.)	786.956	49			

Means and 95.0 Percent Tukey HSD Intervals for Nickel



Kruskal-Wallis Test for Nickel by Location ID

Location ID	Sample Size	Average Rank
M116	7	25.3571
M117	9	26.0556
M118	9	19.7222
M119	7	20.5
M120	9	29.5556
M121	9	30.6667

Test statistic = 4.08008 P-Value = 0.537945

**DRAFT**

**Uncensored Data - Nickel (Data Set = "Tronox")**

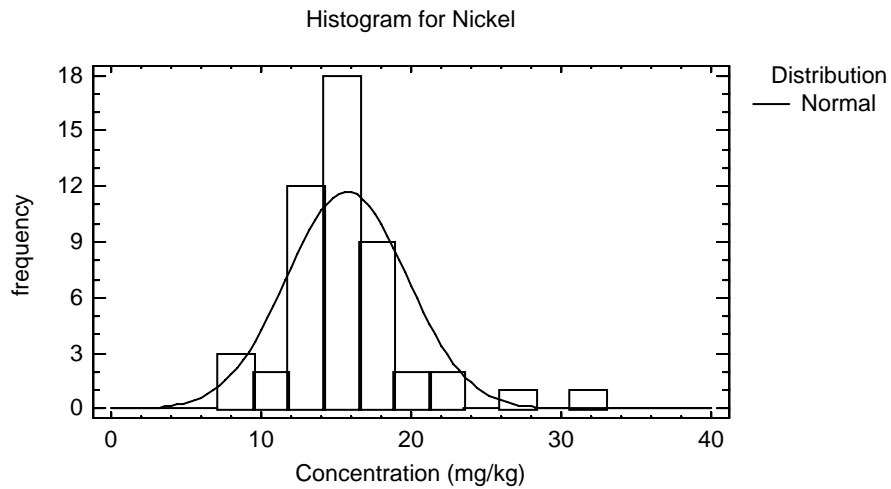
Data variable: Nickel

Selection variable: Data Set = "Tronox"

50 values ranging from 8.85 to 31.5

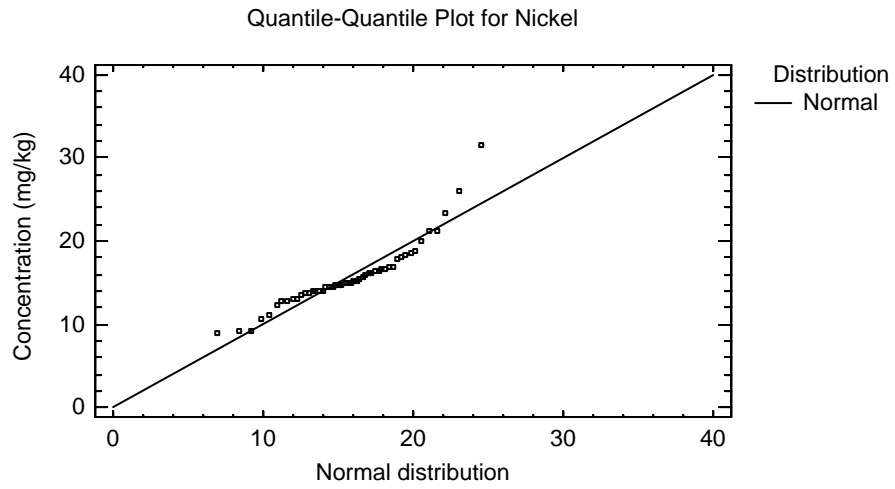
Fitted Distributions

Normal
mean = 15.724
standard deviation = 4.00753



Tests for Normality for Nickel

Test	Statistic	P-Value
Shapiro-Wilk W	0.8916	0.000107396





**DRAFT**

**Uncensored Data - log(Nickel) (Data Set = "Tronox")**

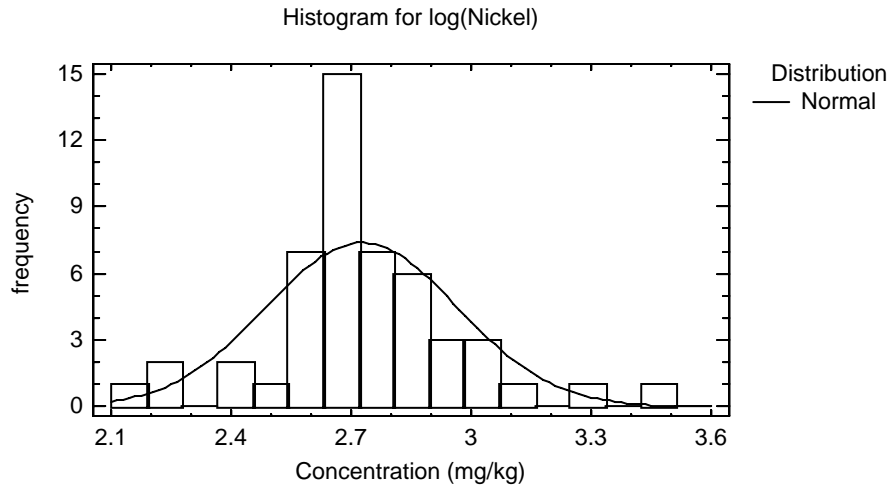
Data variable: log(Nickel)

Selection variable: Data Set = "Tronox"

50 values ranging from 2.18042 to 3.44999

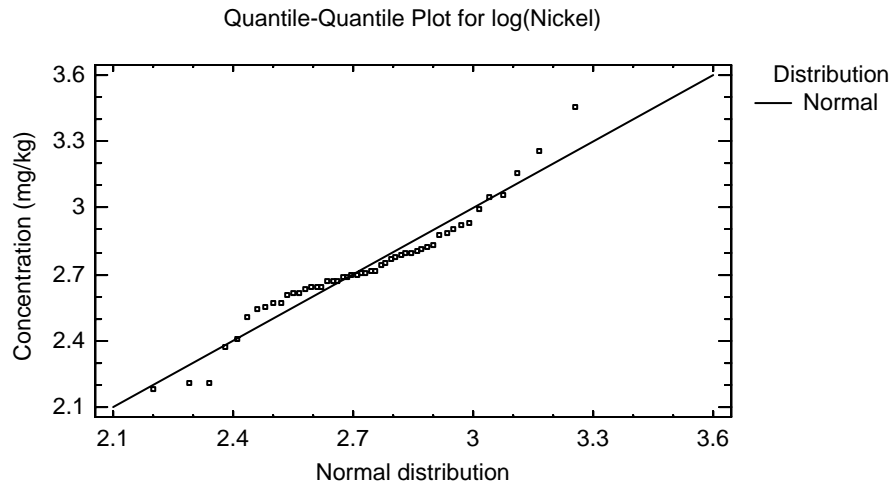
Fitted Distributions

Normal
mean = 2.72654
standard deviation = 0.238623



Tests for Normality for log(Nickel)

Test	Statistic	P-Value
Shapiro-Wilk W	0.955843	0.104578



**DRAFT**

**Uncensored Data - Nickel (Data Set = "Tronox"&Depth Value<=20)**

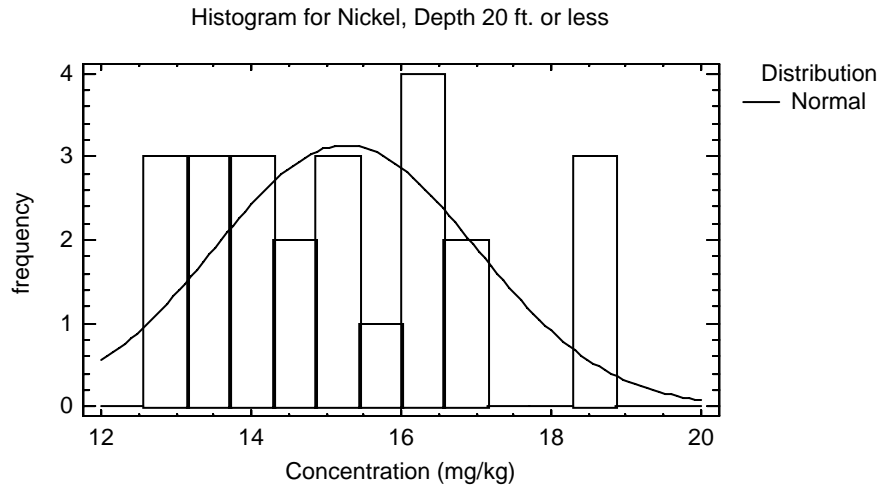
Data variable: Nickel

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 12.8 to 18.8

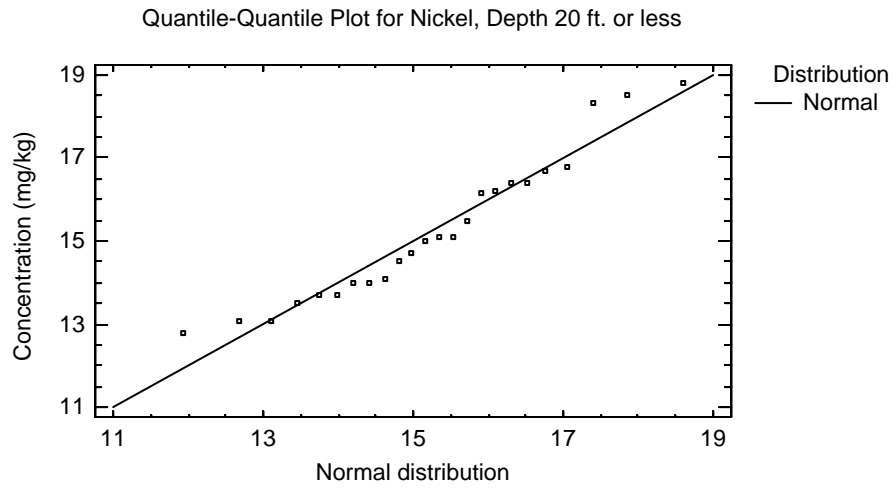
Fitted Distributions

Normal
mean = 15.2563
standard deviation = 1.74364



Tests for Normality for Nickel

Test	Statistic	P-Value
Shapiro-Wilk W	0.937768	0.149471



**DRAFT**

**Uncensored Data - log(Nickel) (Data Set = "Tronox"&Depth Value<=20)**

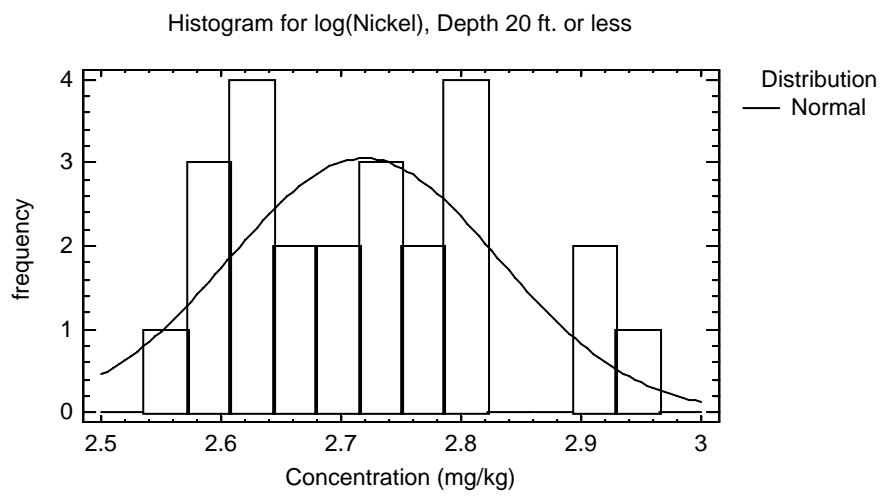
Data variable: log(Nickel)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 2.54945 to 2.93386

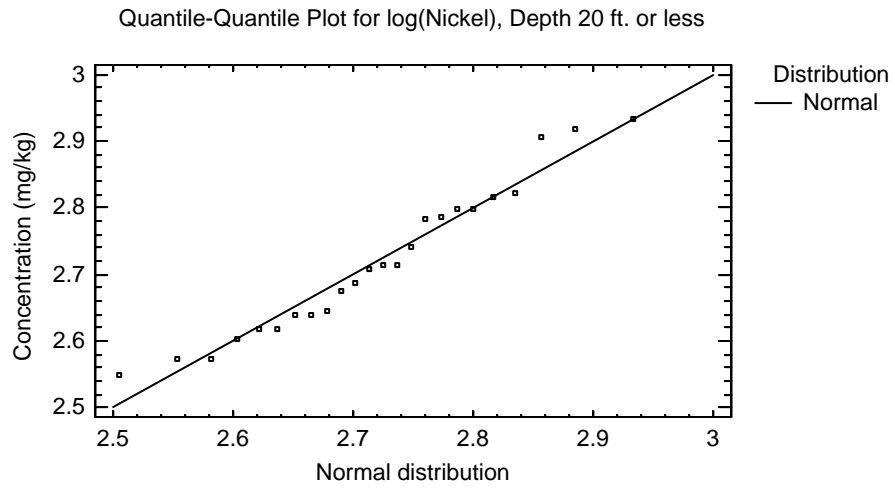
Fitted Distributions

Normal
mean = 2.7189
standard deviation = 0.112058



Tests for Normality for log(Nickel)

Test	Statistic	P-Value
Shapiro-Wilk W	0.950991	0.291832



**DRAFT**

**Uncensored Data - Nickel (Data Set = "Tronox"&Depth Value>=30)**

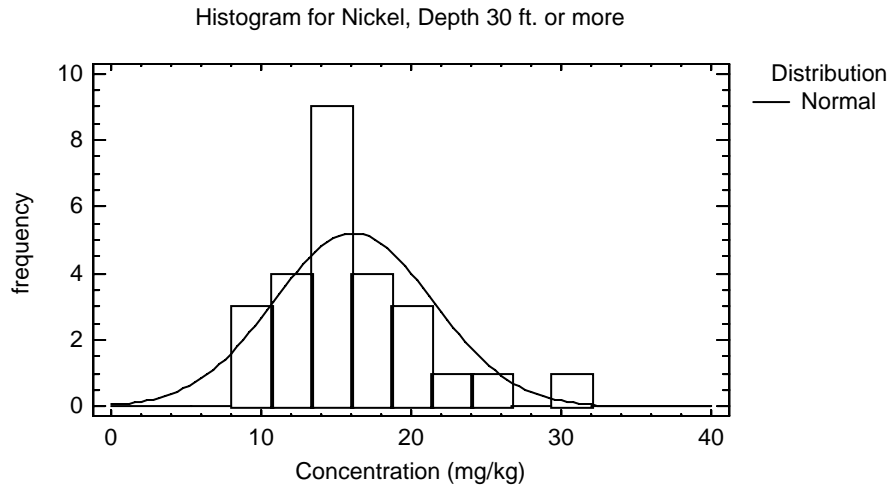
Data variable: Nickel

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 8.85 to 31.5

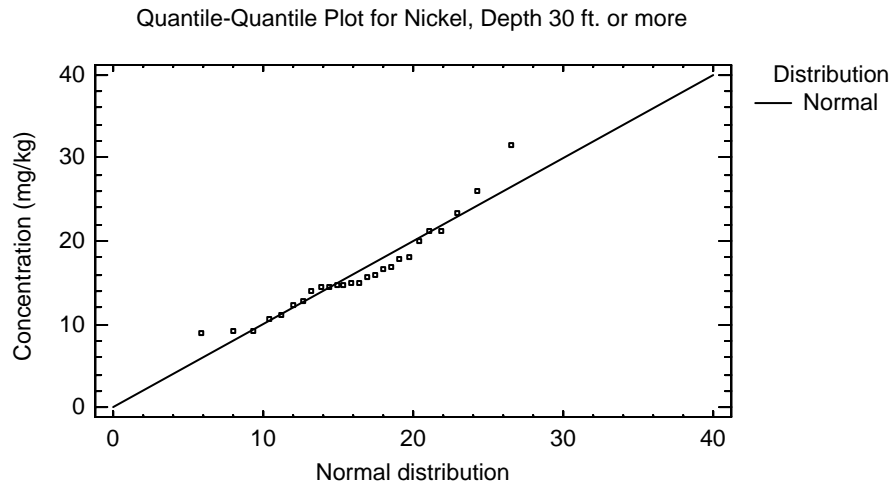
Fitted Distributions

Normal
mean = 16.1558
standard deviation = 5.31764



Tests for Normality for Nickel

Test	Statistic	P-Value
Shapiro-Wilk W	0.925295	0.063663





**DRAFT**

**Uncensored Data - log(Nickel) (Data Set = "Tronox"&Depth Value>=30)**

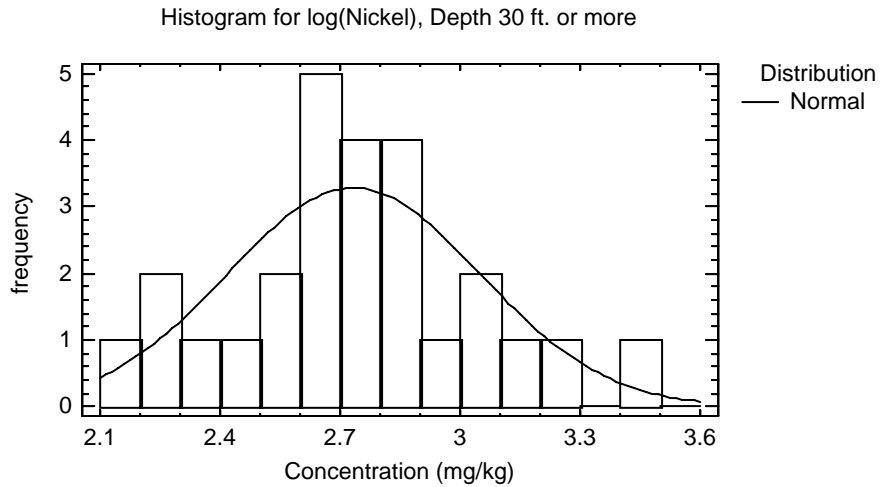
Data variable: log(Nickel)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.18042 to 3.44999

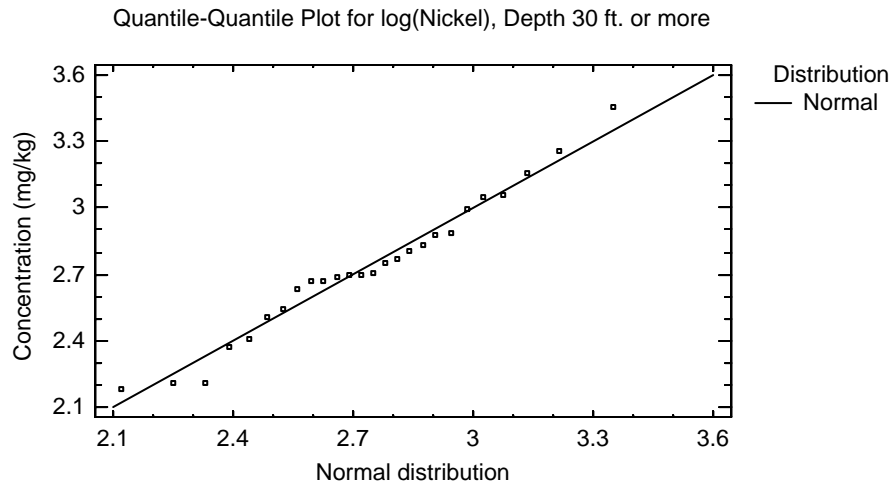
Fitted Distributions

Normal
mean = 2.7336
standard deviation = 0.316139



Tests for Normality for log(Nickel)

Test	Statistic	P-Value
Shapiro-Wilk W	0.973122	0.714688



**DRAFT**

**Two-Sample Comparison - log(Nickel) & Depth Range (Data Set="Tronox") for log(Nickel)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 2.54945 to 2.93386  
 Sample 2: 26 values ranging from 2.18042 to 3.44999

Comparison of Means for log(Nickel)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 2.7189 +/- 0.0473181 [2.67158, 2.76622]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 2.7336 +/- 0.127692 [2.60591, 2.86129]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -0.0147044 +/- 0.134672 [-0.149377, 0.119968]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -0.222508 P-value = 0.825349  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Nickel)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.112058	0.316139
Variance	0.012557	0.0999438
Df	23	25

Ratio of Variances = 0.125641

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.0870932, 0.157191]  
 Standard deviation of Depth Range=30 ft. or more: [0.247934, 0.436401]  
 Ratio of Variances: [0.0557149, 0.287353]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.125641 P-value = 0.00000416843  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Nickel (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

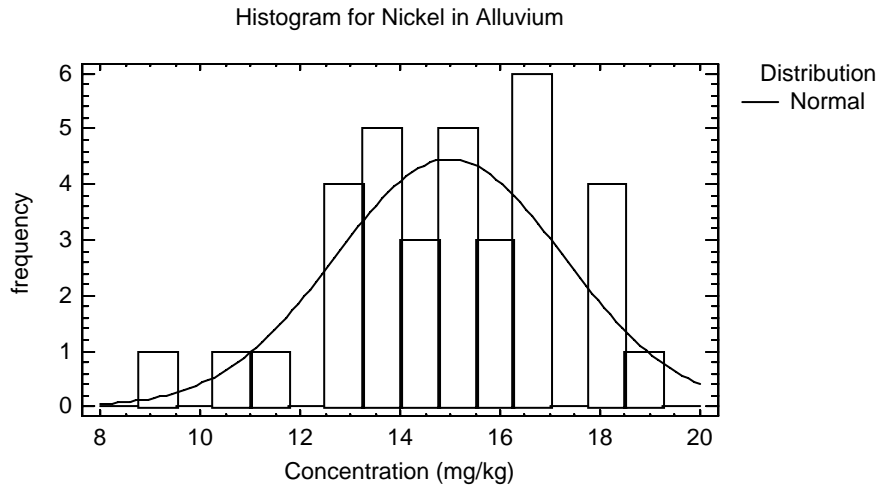
Data variable: Nickel

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 8.85 to 18.8

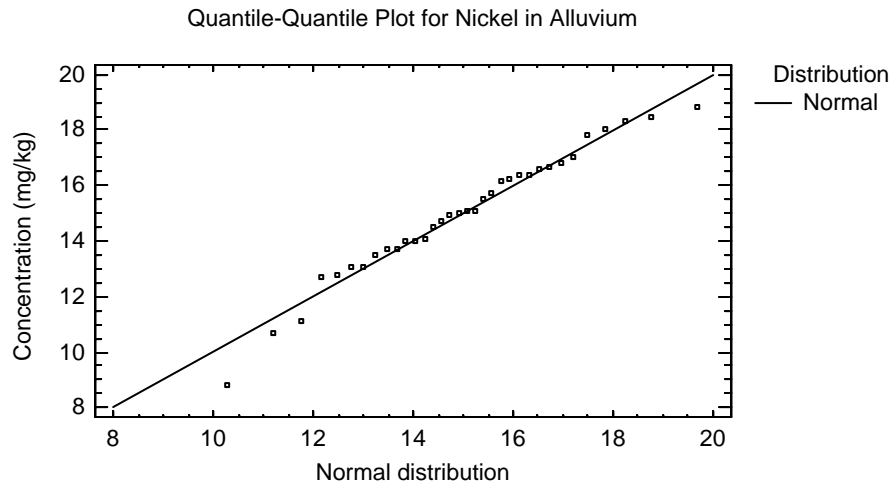
Fitted Distributions

Normal
mean = 14.9853
standard deviation = 2.28438



Tests for Normality for Nickel

Test	Statistic	P-Value
Shapiro-Wilk W	0.97021	0.541794



**DRAFT**

**Uncensored Data - log(Nickel) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

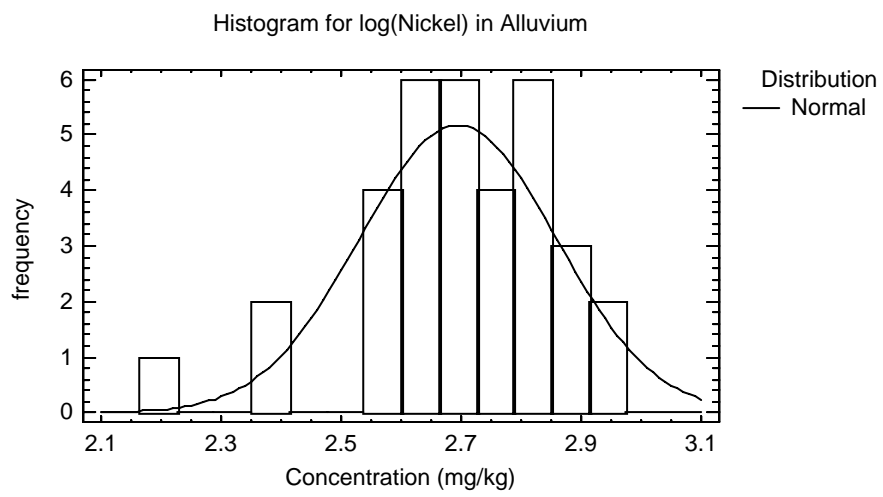
Data variable: log(Nickel)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2.18042 to 2.93386

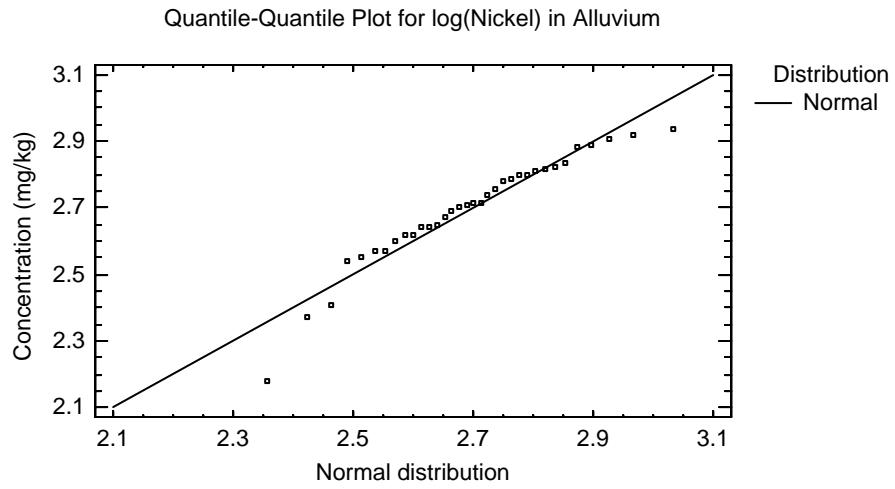
Fitted Distributions

Normal
mean = 2.6947
standard deviation = 0.163953



Tests for Normality for log(Nickel)

Test	Statistic	P-Value
Shapiro-Wilk W	0.933254	0.0483411



**DRAFT**

**Uncensored Data - Nickel (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

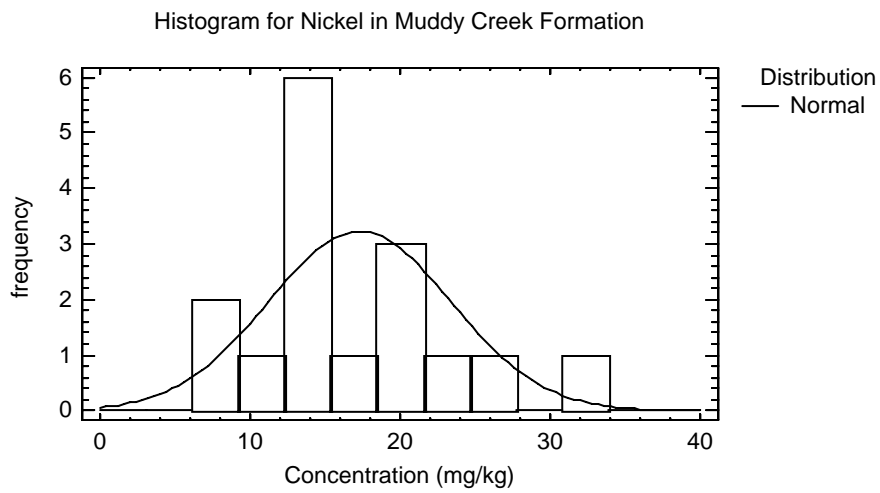
Data variable: Nickel

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 9.1 to 31.5

Fitted Distributions

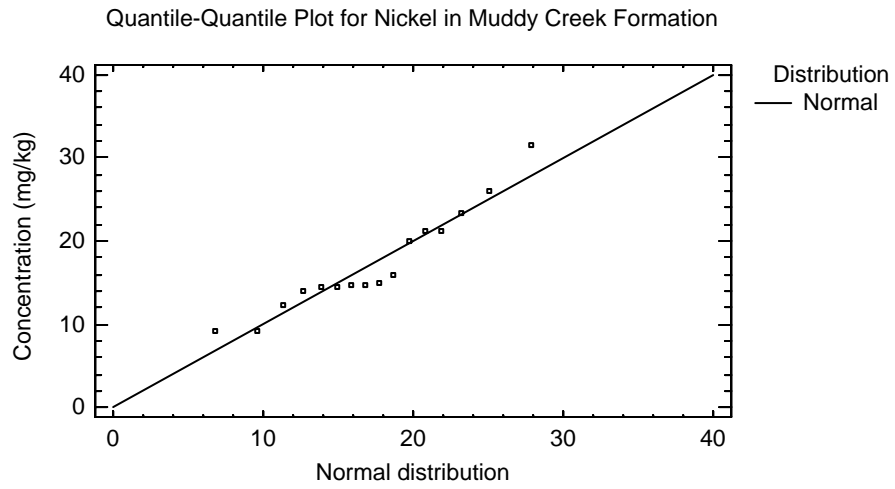
Normal
mean = 17.2937
standard deviation = 6.09245



Tests for Normality for Nickel

Test	Statistic	P-Value
Shapiro-Wilk W	0.921617	0.180546





**DRAFT**

**Uncensored Data - log(Nickel) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

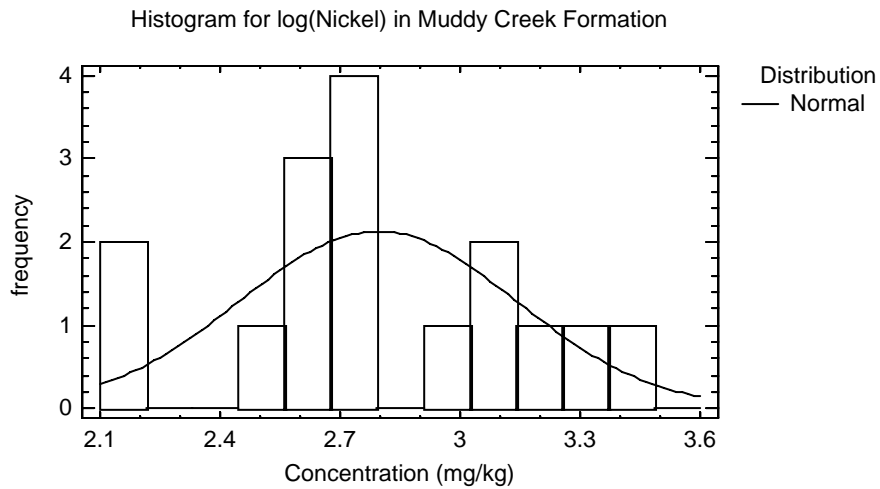
Data variable: log(Nickel)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 2.20827 to 3.44999

Fitted Distributions

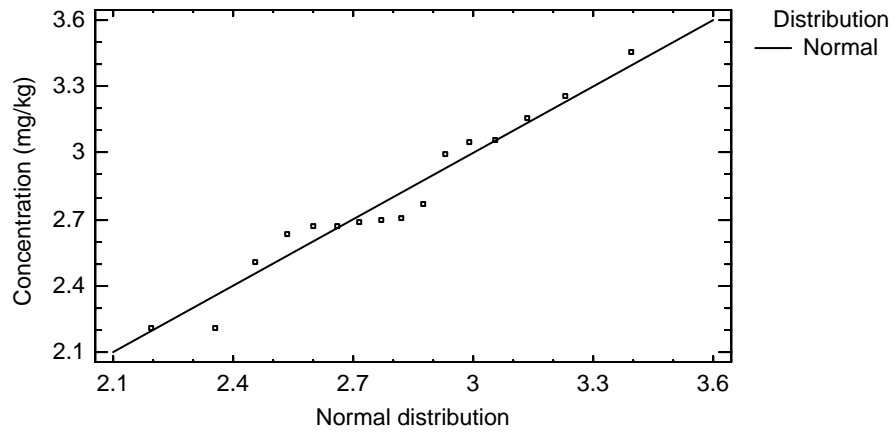
Normal
mean = 2.7942
standard deviation = 0.345962



Tests for Normality for log(Nickel)

Test	Statistic	P-Value
Shapiro-Wilk W	0.952848	0.520904

Quantile-Quantile Plot for log(Nickel) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - Nickel & Geological Formation 1 (Data Set="Tronox") for Nickel**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 8.85 to 18.8  
 Sample 2: 16 values ranging from 9.1 to 31.5

Comparison of Means for Nickel

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 14.9853 +/- 0.797061 [14.1882, 15.7824]  
 95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 17.2937 +/- 3.24645 [14.0473, 20.5402]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -2.30846 +/- 3.31785 [-5.6263, 1.00939]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -1.46784 P-value = 0.160389  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Nickel

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	2.28438	6.09245
Variance	5.21841	37.118
Df	33	15

Ratio of Variances = 0.14059

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [1.84253, 3.00688]  
 Standard deviation of Geological Formation 1=Muddy Creek: [4.50052, 9.42923]  
 Ratio of Variances: [0.0536071, 0.31788]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.14059 P-value = 0.0000028821  
 Reject the null hypothesis for alpha = 0.05.

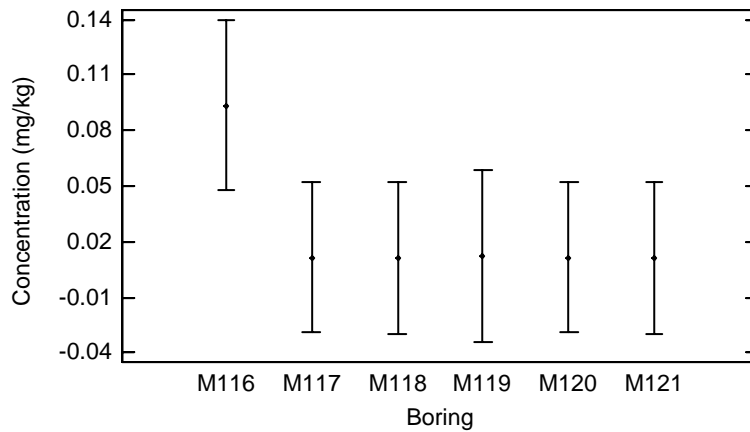
DRAFT

### 2.18 Platinum

ANOVA Table for Platinum by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.0406529	5	0.00813057	2.41	0.0510
Within groups	0.148164	44	0.00336735		
Total (Corr.)	0.188816	49			

Means and 95.0 Percent Tukey HSD Intervals for Platinum



Kruskal-Wallis Test for Platinum by Location ID

Location ID	Sample Size	Average Rank
M116	7	33.2857
M117	9	27.2222
M118	9	24.0556
M119	7	28.5
M120	9	25.0
M121	9	17.3333

Test statistic = 5.3531 P-Value = 0.374323

**DRAFT**

**Uncensored Data - Platinum (Data Set = "Tronox")**

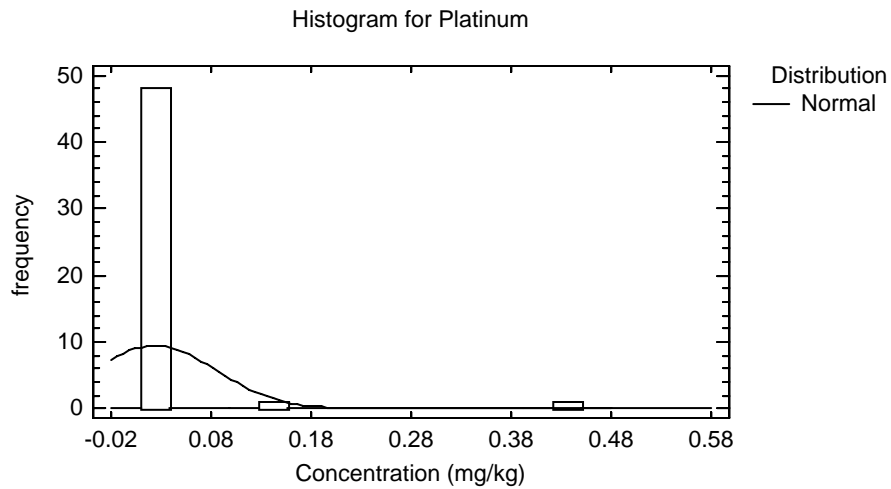
Data variable: Platinum

Selection variable: Data Set = "Tronox"

50 values ranging from 0.01035 to 0.429

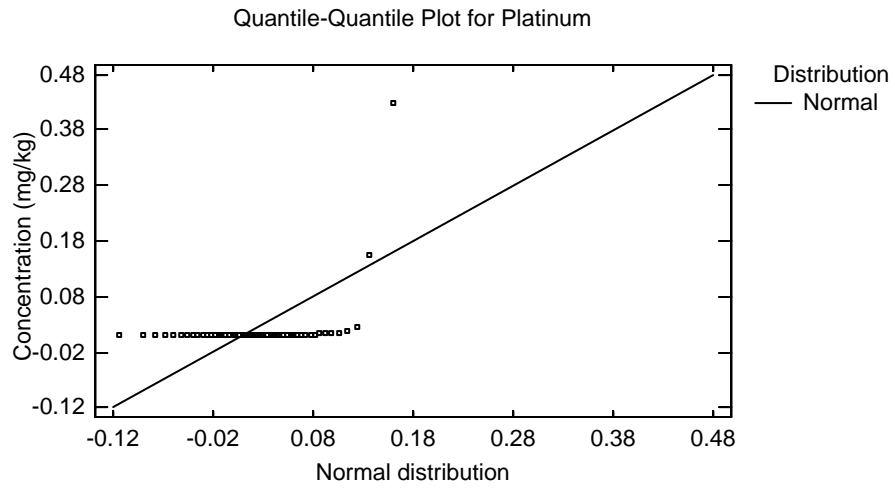
Fitted Distributions

Normal
mean = 0.0230335
standard deviation = 0.0620757



Tests for Normality for Platinum

Test	Statistic	P-Value
Shapiro-Wilk W	0.217641	0.0



**DRAFT**

**Uncensored Data - log(Platinum) (Data Set = "Tronox")**

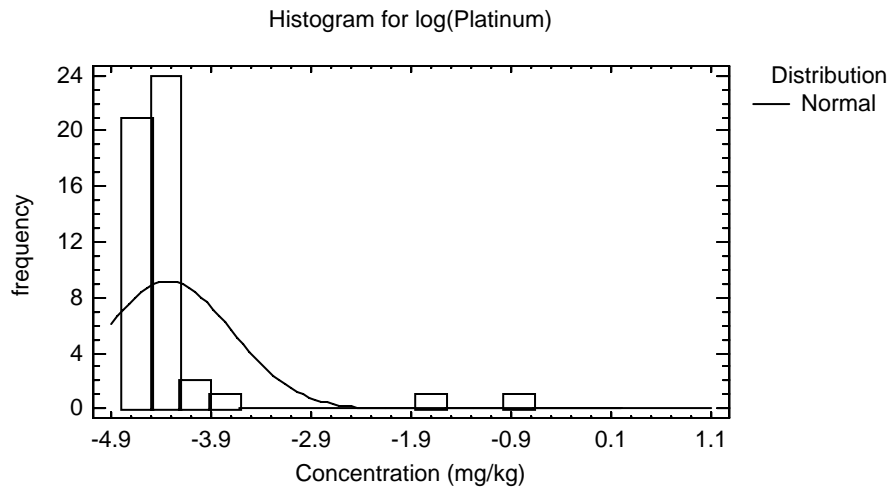
Data variable: log(Platinum)

Selection variable: Data Set = "Tronox"

50 values ranging from -4.57077 to -0.846298

Fitted Distributions

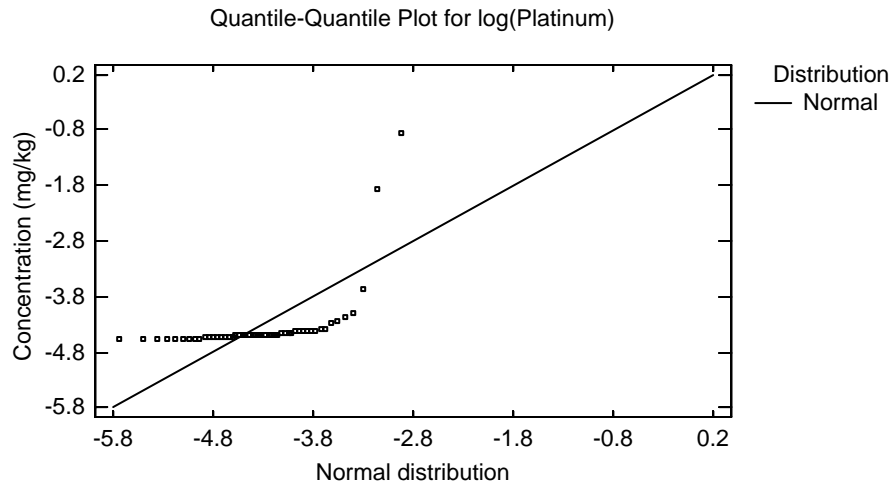
Normal
mean = -4.32893
standard deviation = 0.639998



Tests for Normality for log(Platinum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.357834	0.0





**DRAFT**

**Uncensored Data - Platinum (Data Set = "Tronox"&Depth Value<=20)**

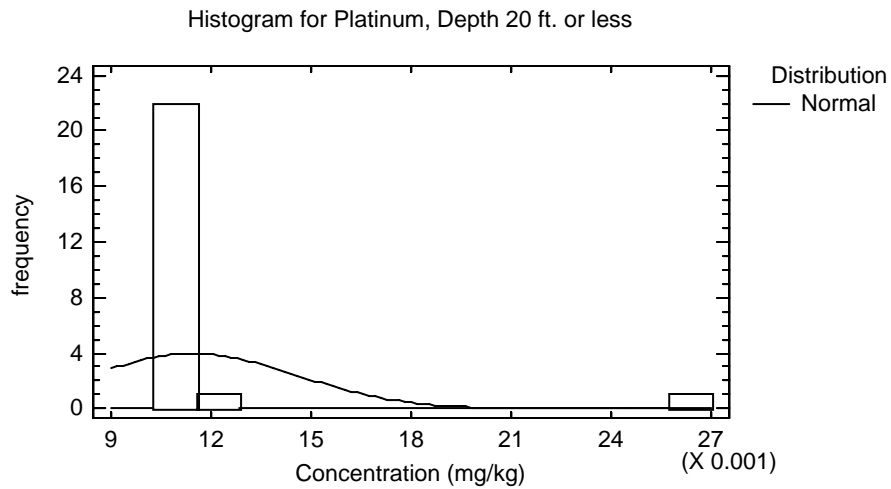
Data variable: Platinum

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.01035 to 0.026

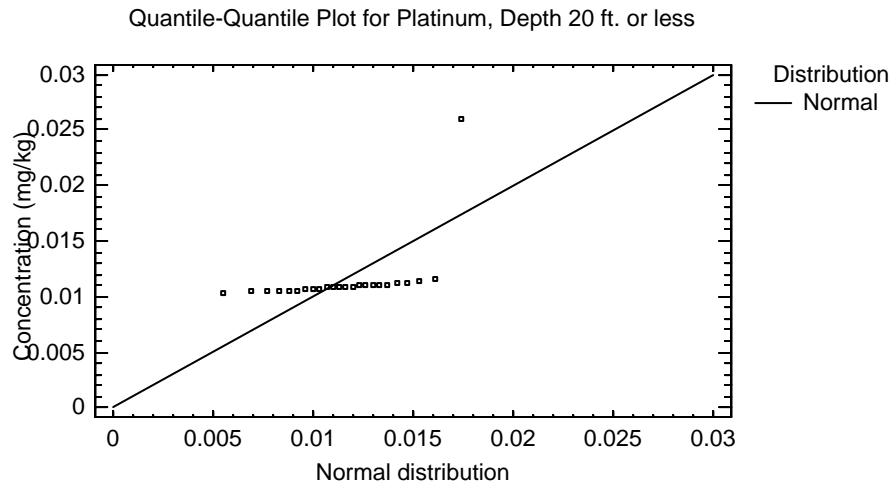
Fitted Distributions

Normal
mean = 0.011474
standard deviation = 0.00310842



Tests for Normality for Platinum

Test	Statistic	P-Value
Shapiro-Wilk W	0.290565	1.68346E-11



**DRAFT**

**Uncensored Data - log(Platinum) (Data Set = "Tronox"&Depth Value<=20)**

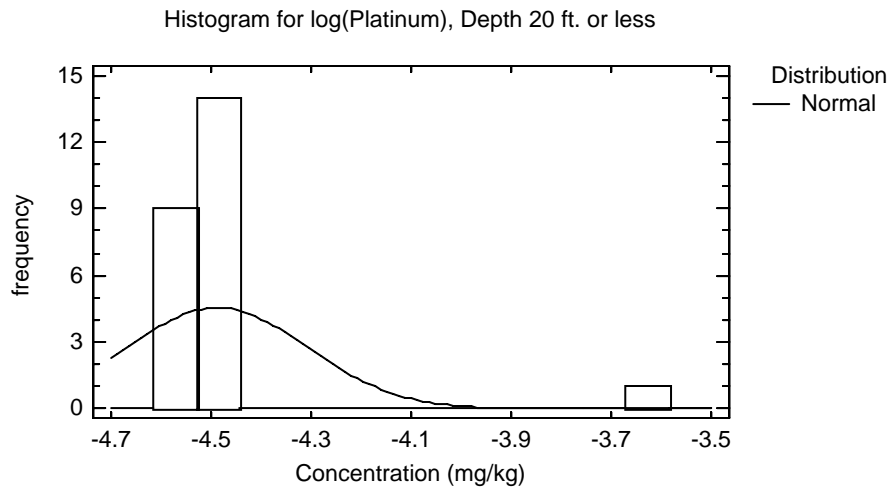
Data variable: log(Platinum)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -4.57077 to -3.64966

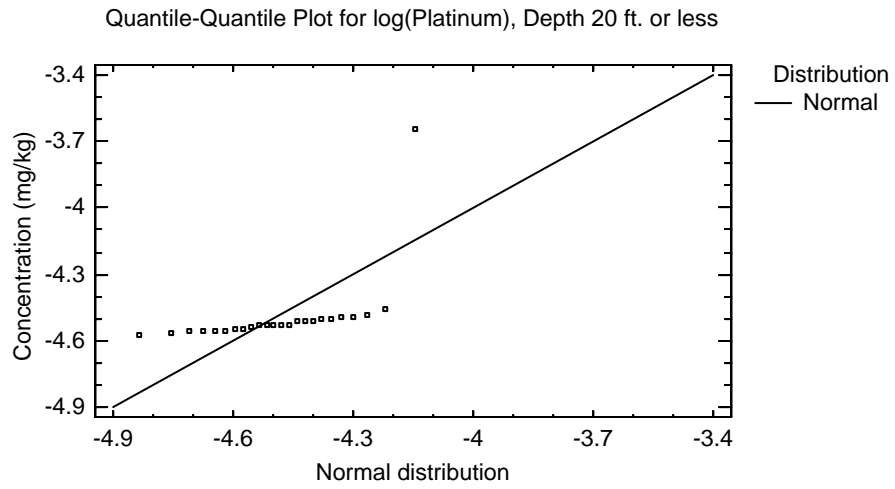
Fitted Distributions

Normal
mean = -4.48821
standard deviation = 0.180694



Tests for Normality for log(Platinum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.340597	5.79172E-11



**DRAFT**

**Uncensored Data - Platinum (Data Set = "Tronox"&Depth Value>=30)**

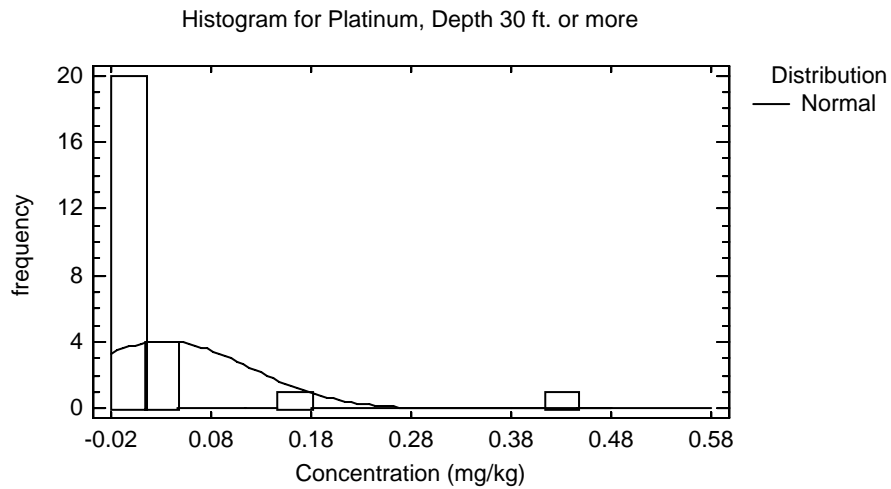
Data variable: Platinum

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.0106 to 0.429

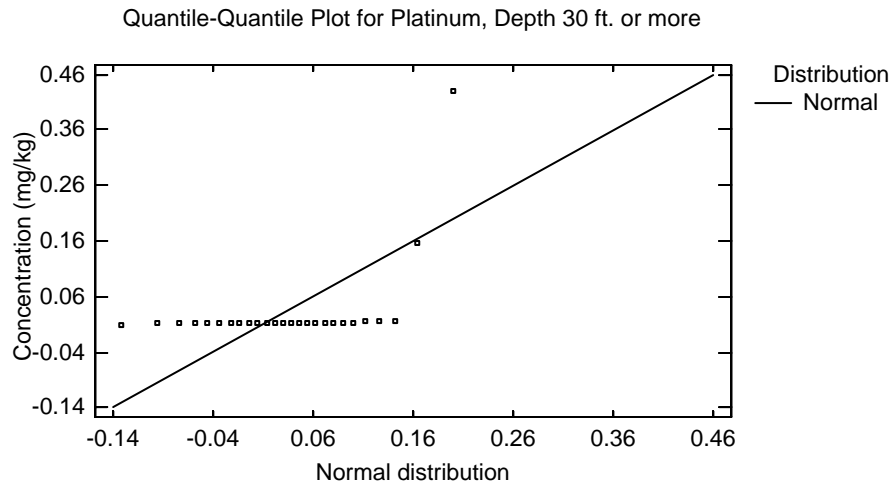
Fitted Distributions

Normal
mean = 0.0337038
standard deviation = 0.0854229



Tests for Normality for Platinum

Test	Statistic	P-Value
Shapiro-Wilk W	0.296207	4.87121E-12



**DRAFT**

**Uncensored Data - log(Platinum) (Data Set = "Tronox"&Depth Value>=30)**

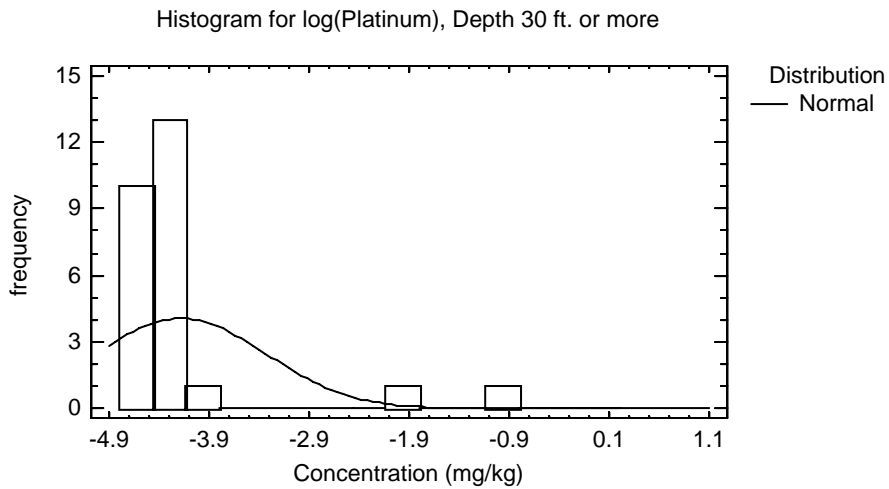
Data variable: log(Platinum)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -4.5469 to -0.846298

Fitted Distributions

Normal
mean = -4.18191
standard deviation = 0.852019

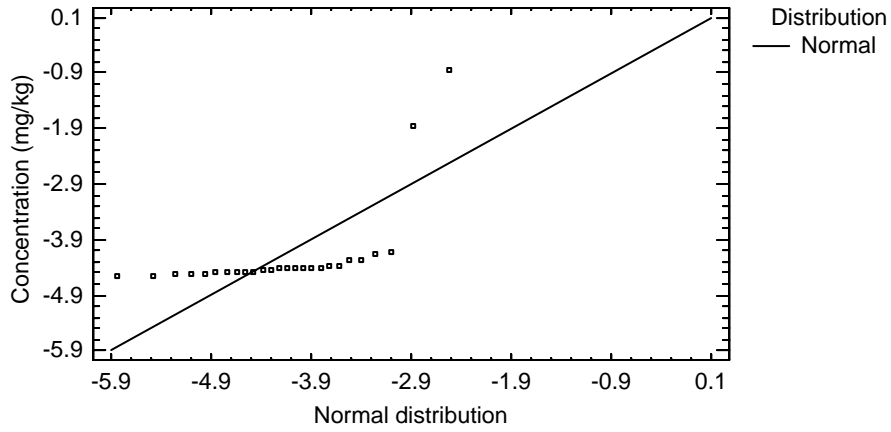


Tests for Normality for log(Platinum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.414962	1.18389E-10



Quantile-Quantile Plot for log(Platinum), Depth 30 ft. or more



**DRAFT**

## Tronox Platinum by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = 0.678119018   p= 0.497696233

Do not reject the null hypothesis for alpha=0.05

**DRAFT**

**Uncensored Data - Platinum (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

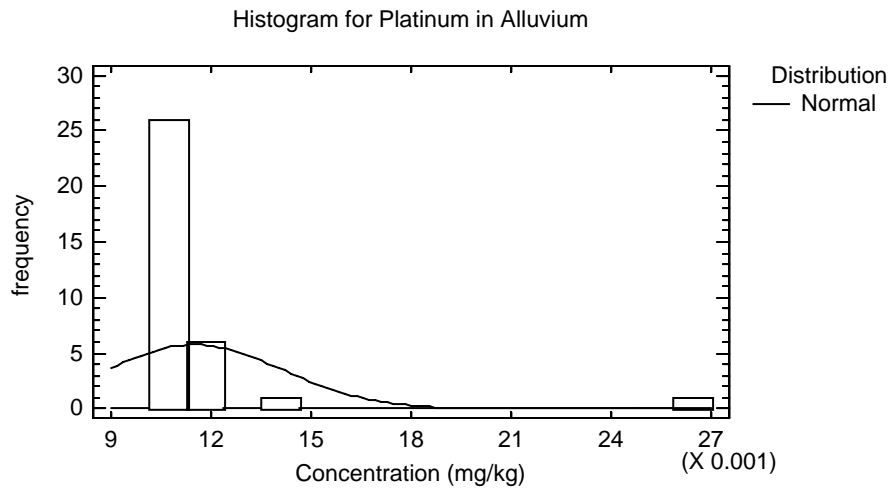
Data variable: Platinum

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.01035 to 0.026

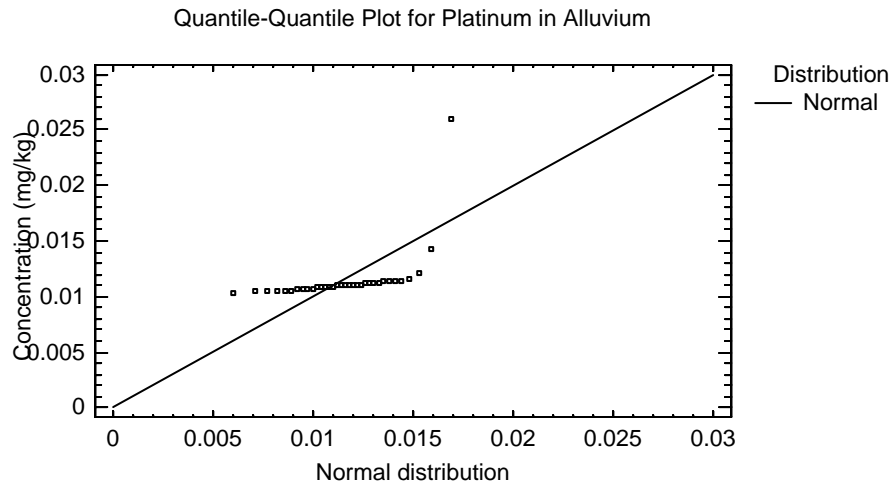
Fitted Distributions

Normal
mean = 0.0114985
standard deviation = 0.00264995



Tests for Normality for Platinum

Test	Statistic	P-Value
Shapiro-Wilk W	0.338857	1.33227E-14



**DRAFT**

**Uncensored Data - log(Platinum) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

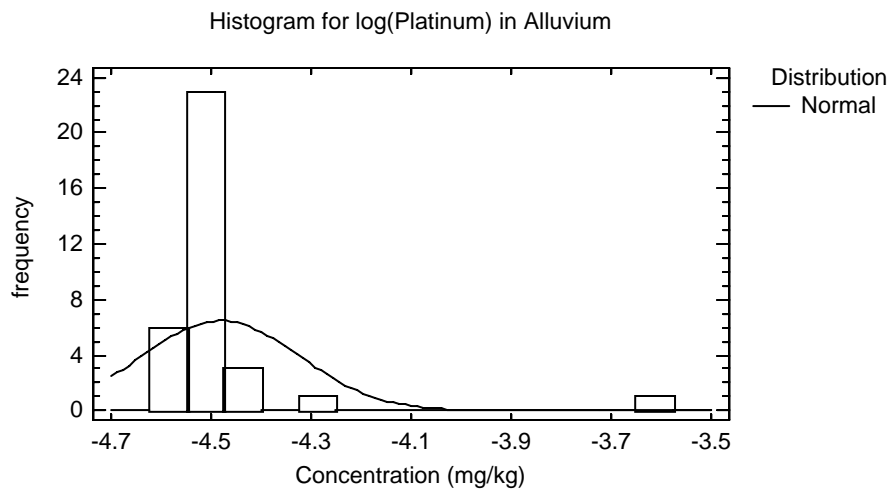
Data variable: log(Platinum)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -4.57077 to -3.64966

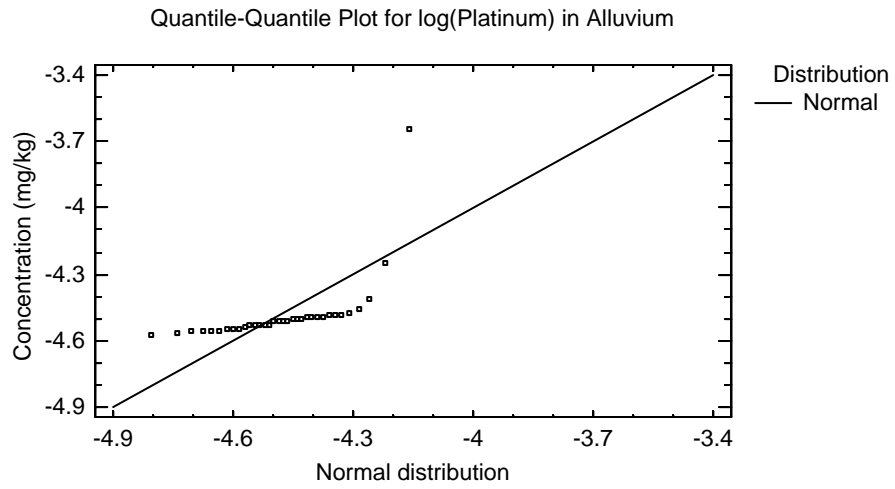
Fitted Distributions

Normal
mean = -4.48098
standard deviation = 0.157273



Tests for Normality for log(Platinum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.423018	2.64677E-13



**DRAFT**

**Uncensored Data - Platinum (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

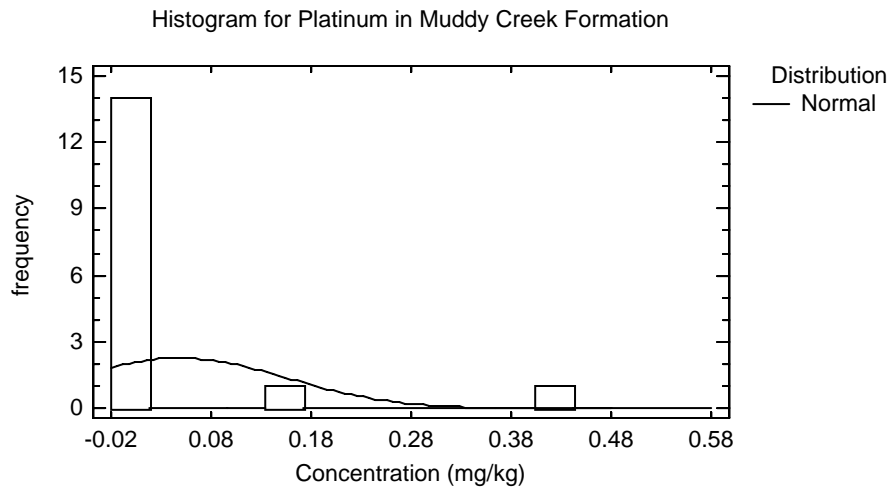
Data variable: Platinum

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.01065 to 0.429

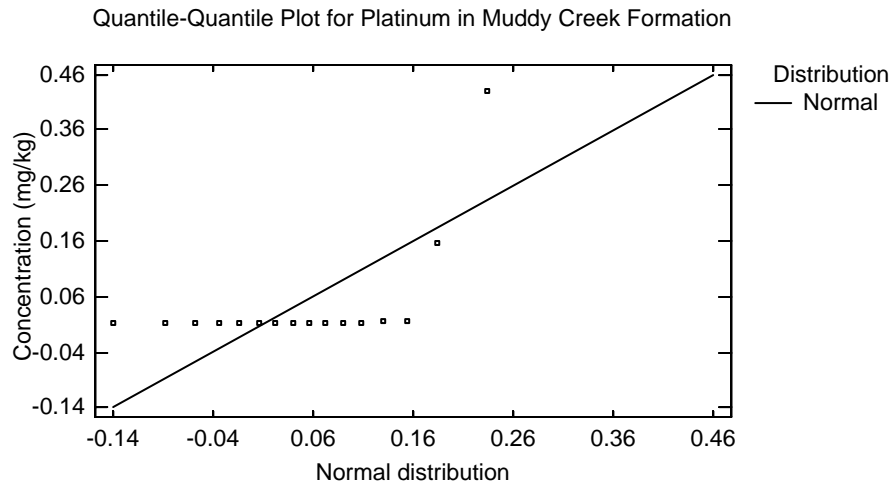
Fitted Distributions

Normal
mean = 0.0475453
standard deviation = 0.107842



Tests for Normality for Platinum

Test	Statistic	P-Value
Shapiro-Wilk W	0.390096	3.6587E-8





**DRAFT**

**Uncensored Data - log(Platinum) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

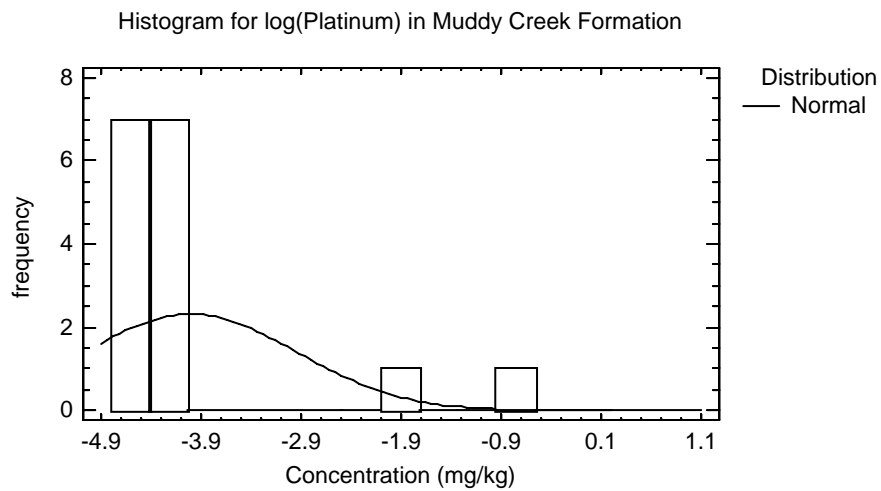
Data variable: log(Platinum)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -4.5422 to -0.846298

Fitted Distributions

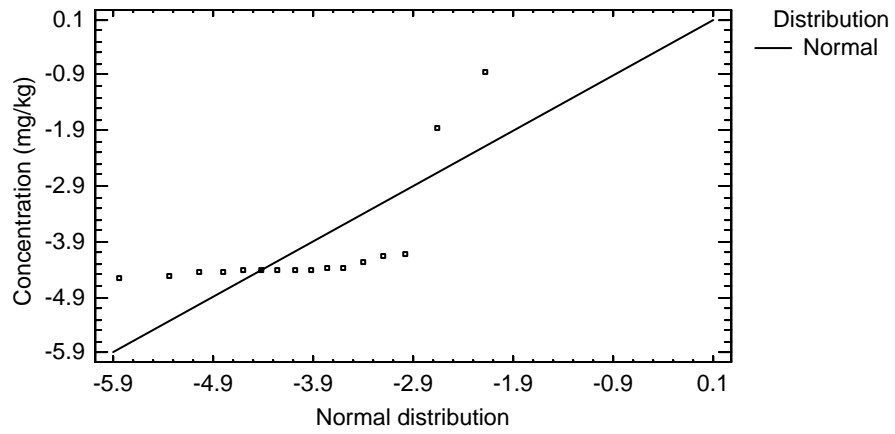
Normal
mean = -4.00583
standard deviation = 1.05823



Tests for Normality for log(Platinum)

Test	Statistic	P-Value
Shapiro-Wilk W	0.504442	5.15322E-7

Quantile-Quantile Plot for log(Platinum) in Muddy Creek Formation



**DRAFT**

## Tronox Platinum by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = 1.478480477 p= 0.139279219

Do not reject the null hypothesis for alpha=0.05 \

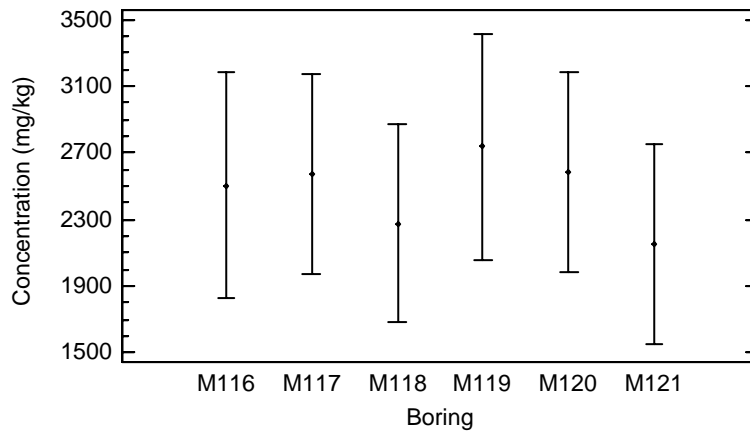
DRAFT

### 2.19 Potassium

ANOVA Table for Potassium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	1.97743E6	5	395486.	0.54	0.7422
Within groups	3.20089E7	44	727475.		
Total (Corr.)	3.39863E7	49			

Means and 95.0 Percent Tukey HSD Intervals for Potassium



Kruskal-Wallis Test for Potassium by Location ID

Location ID	Sample Size	Average Rank
M116	7	25.3571
M117	9	28.5
M118	9	23.0
M119	7	33.4286
M120	9	26.1111
M121	9	18.3333

Test statistic = 4.90913 P-Value = 0.427071

**DRAFT**

**Uncensored Data - Potassium (Data Set = "Tronox")**

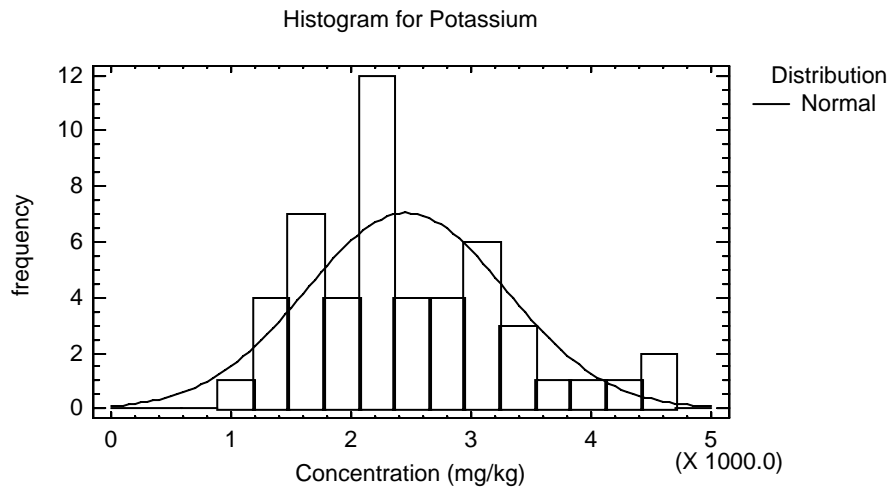
Data variable: Potassium

Selection variable: Data Set = "Tronox"

50 values ranging from 1040.0 to 4540.0

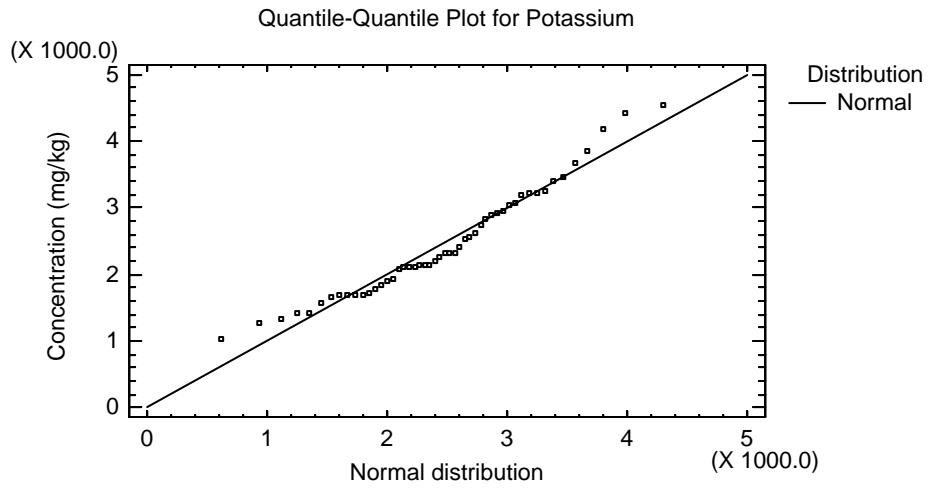
Fitted Distributions

Normal
mean = 2458.1
standard deviation = 832.826



Tests for Normality for Potassium

Test	Statistic	P-Value
Shapiro-Wilk W	0.949352	0.0542192



**DRAFT**

**Uncensored Data - log(Potassium) (Data Set = "Tronox")**

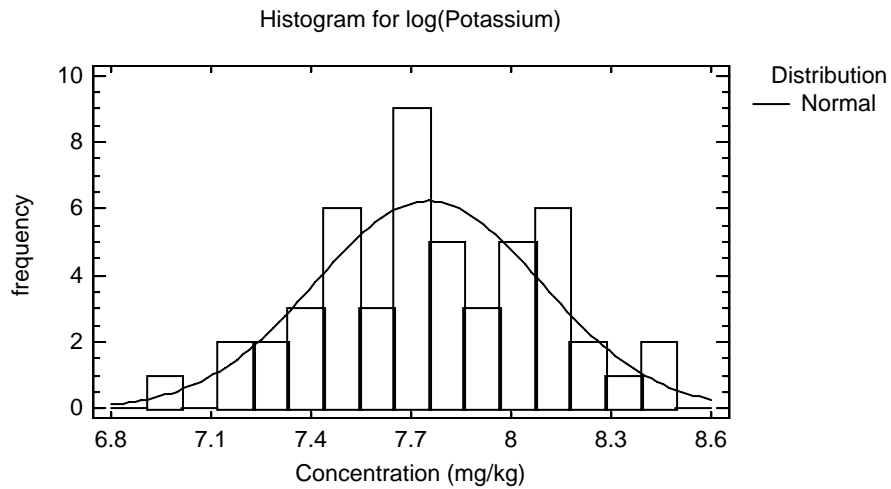
Data variable: log(Potassium)

Selection variable: Data Set = "Tronox"

50 values ranging from 6.94698 to 8.42068

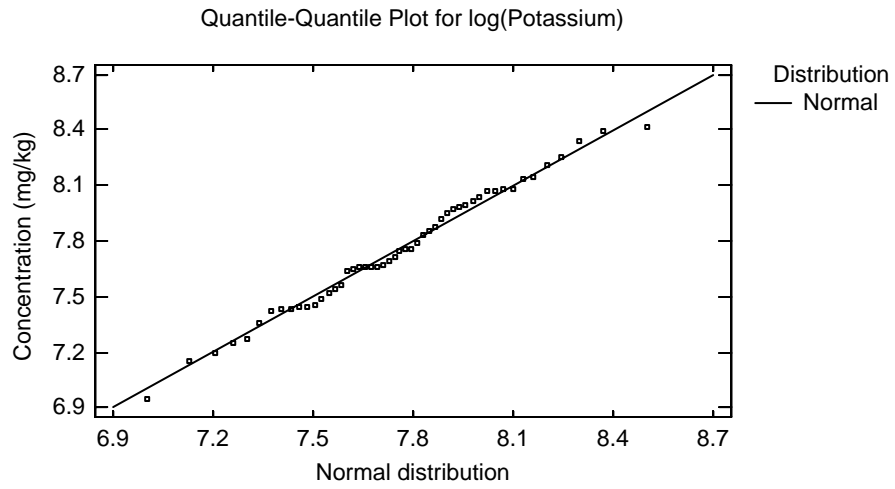
Fitted Distributions

Normal
mean = 7.75149
standard deviation = 0.338977



Tests for Normality for log(Potassium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.981527	0.782576





**DRAFT**

**Uncensored Data - Potassium (Data Set = "Tronox"&Depth Value<=20)**

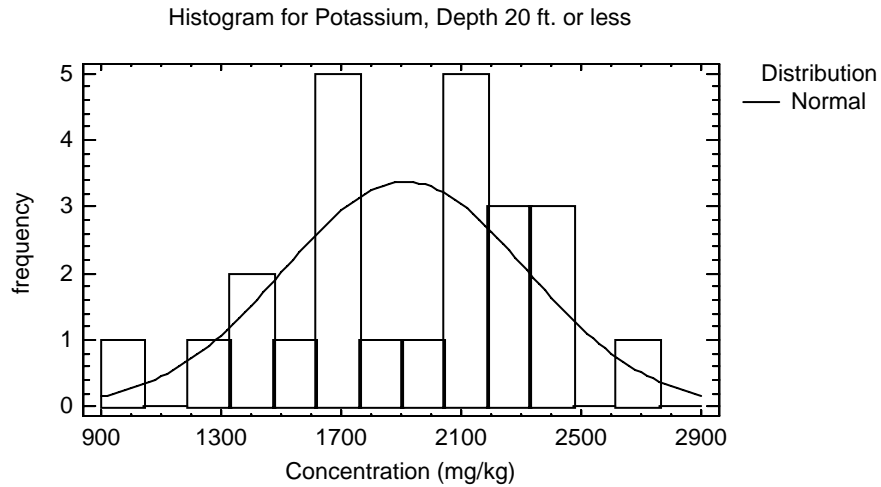
Data variable: Potassium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 1040.0 to 2630.0

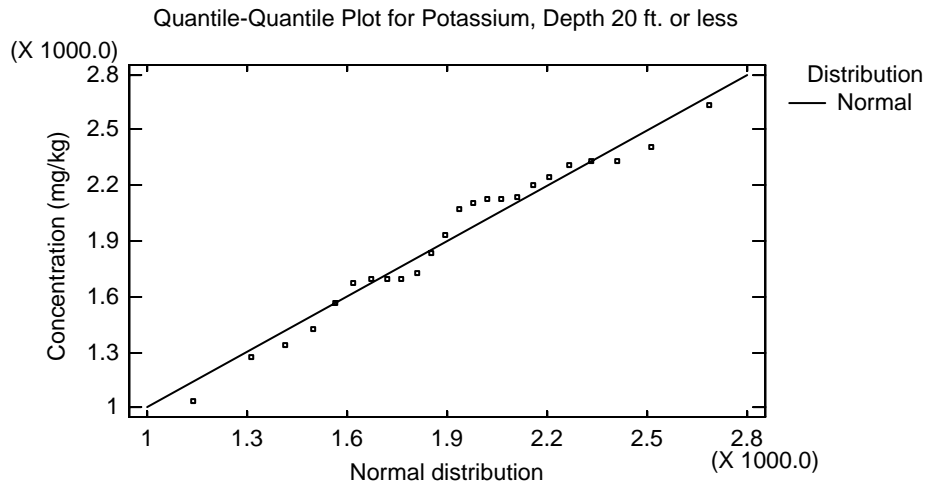
Fitted Distributions

Normal
mean = 1913.54
standard deviation = 405.134



Tests for Normality for Potassium

Test	Statistic	P-Value
Shapiro-Wilk W	0.966329	0.580747



**DRAFT**

**Uncensored Data - log(Potassium) (Data Set = "Tronox"&Depth Value<=20)**

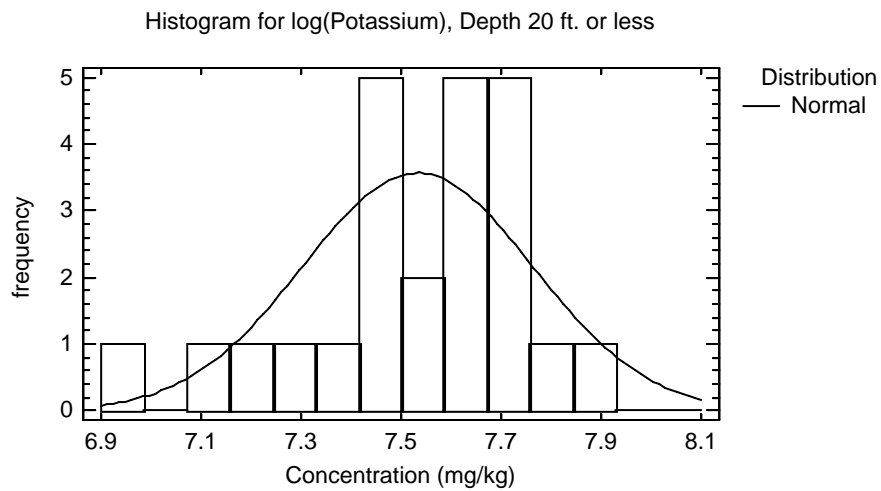
Data variable: log(Potassium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 6.94698 to 7.87474

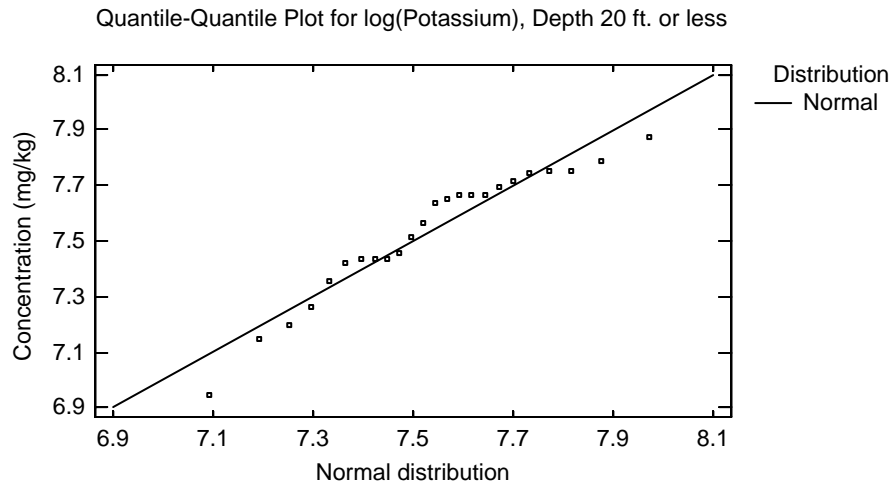
Fitted Distributions

Normal
mean = 7.53282
standard deviation = 0.230168



Tests for Normality for log(Potassium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.935008	0.129473



**DRAFT**

**Uncensored Data - Potassium (Data Set = "Tronox"&Depth Value>=30)**

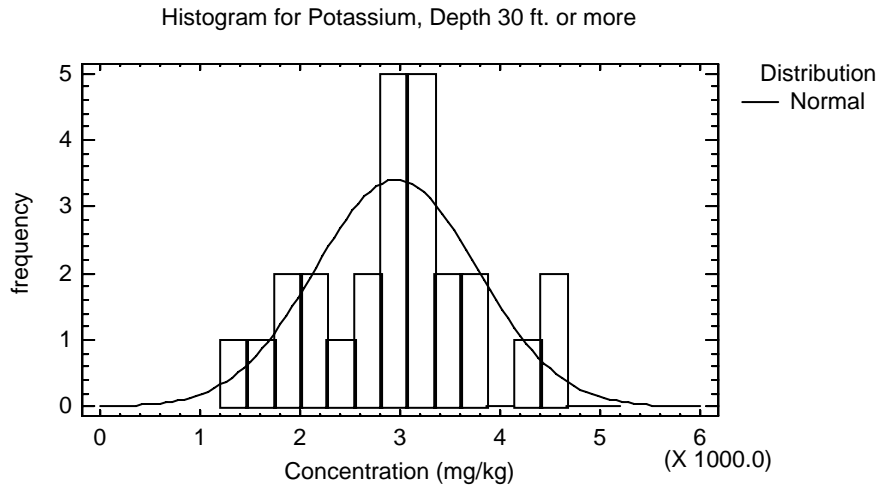
Data variable: Potassium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 1410.0 to 4540.0

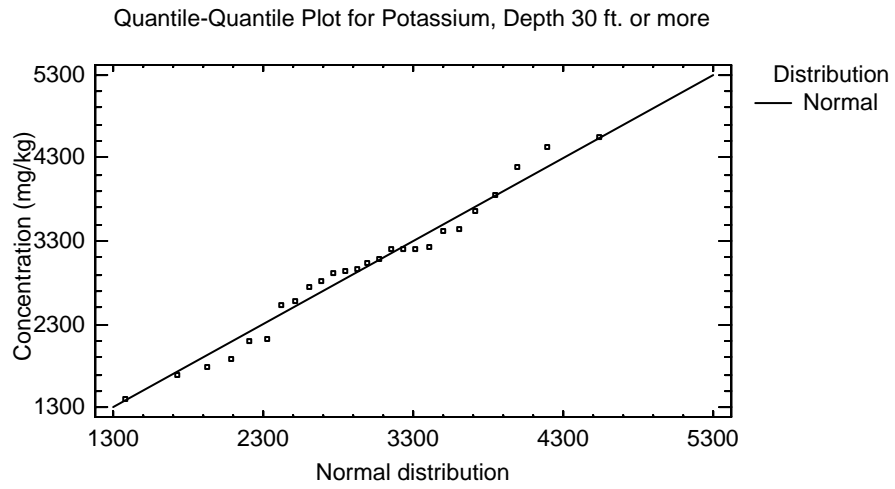
Fitted Distributions

Normal
mean = 2960.77
standard deviation = 813.01



Tests for Normality for Potassium

Test	Statistic	P-Value
Shapiro-Wilk W	0.972451	0.698041



**DRAFT**

**Uncensored Data - log(Potassium) (Data Set = "Tronox"&Depth Value>=30)**

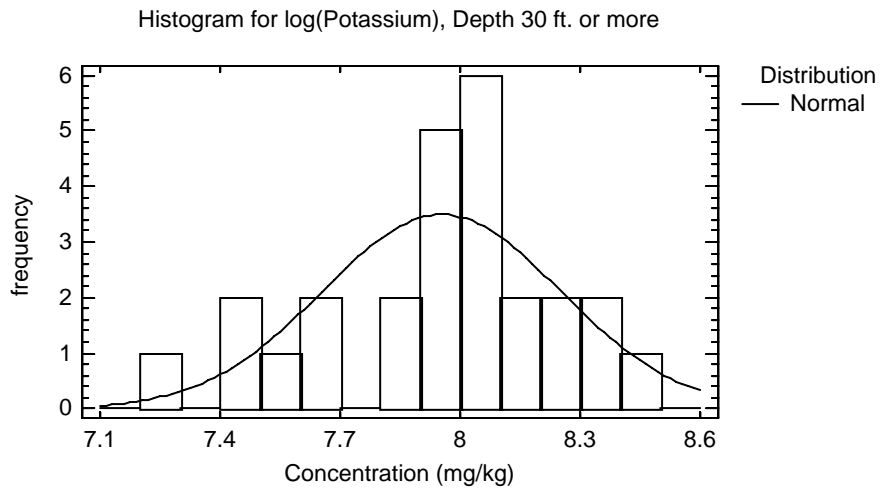
Data variable: log(Potassium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 7.25134 to 8.42068

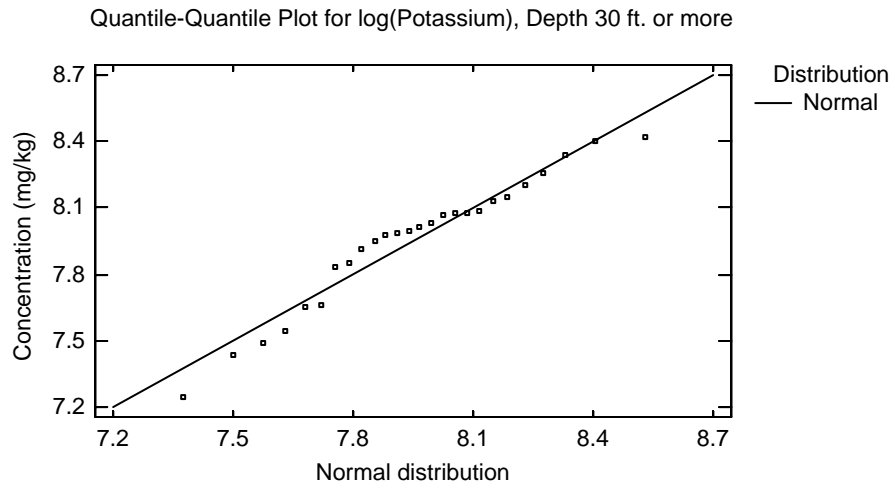
Fitted Distributions

Normal
mean = 7.95334
standard deviation = 0.296983



Tests for Normality for log(Potassium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.948737	0.231871





**DRAFT**

**Two-Sample Comparison - Potassium & Depth Range (Data Set="Tronox") for Potassium**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 1040.0 to 2630.0  
 Sample 2: 26 values ranging from 1410.0 to 4540.0

Comparison of Means for Potassium

95.0% confidence interval for mean of Depth Range=20 ft. or less: 1913.54 +/- 171.073 [1742.47, 2084.62]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 2960.77 +/- 328.383 [2632.39, 3289.15]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -1047.23 +/- 363.828 [-1411.06, -683.4]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -5.83041 P-value = 0.00000146097  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Potassium

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	405.134	813.01
Variance	164134.	660985.
Df	23	25

Ratio of Variances = 0.248317

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [314.876, 568.306]  
 Standard deviation of Depth Range=30 ft. or more: [637.609, 1122.29]  
 Ratio of Variances: [0.110115, 0.567925]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.248317 P-value = 0.00128893  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Potassium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

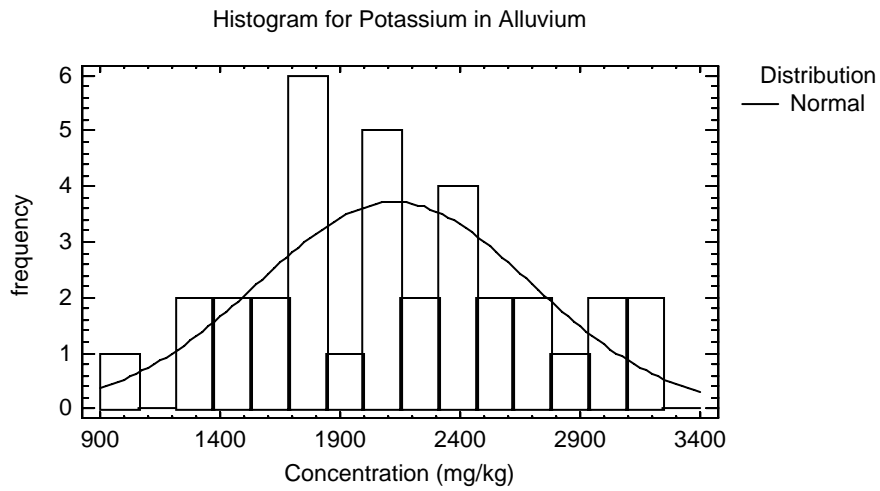
Data variable: Potassium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 1040.0 to 3240.0

Fitted Distributions

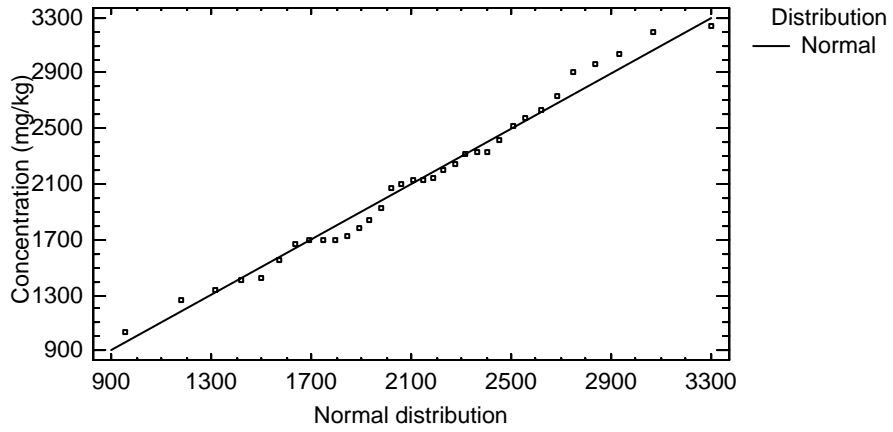
Normal
mean = 2126.18
standard deviation = 570.152



Tests for Normality for Potassium

Test	Statistic	P-Value
Shapiro-Wilk W	0.973145	0.625895

Quantile-Quantile Plot for Potassium in Alluvium



**DRAFT**

**Uncensored Data - log(Potassium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

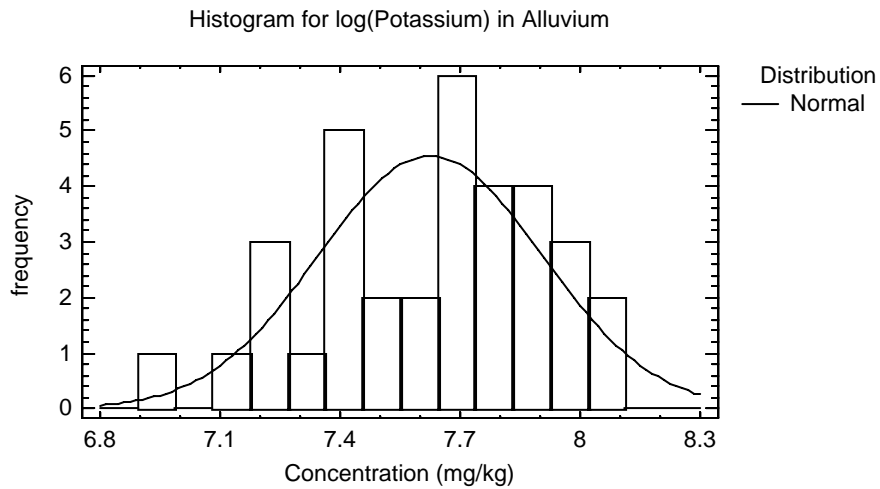
Data variable: log(Potassium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 6.94698 to 8.08333

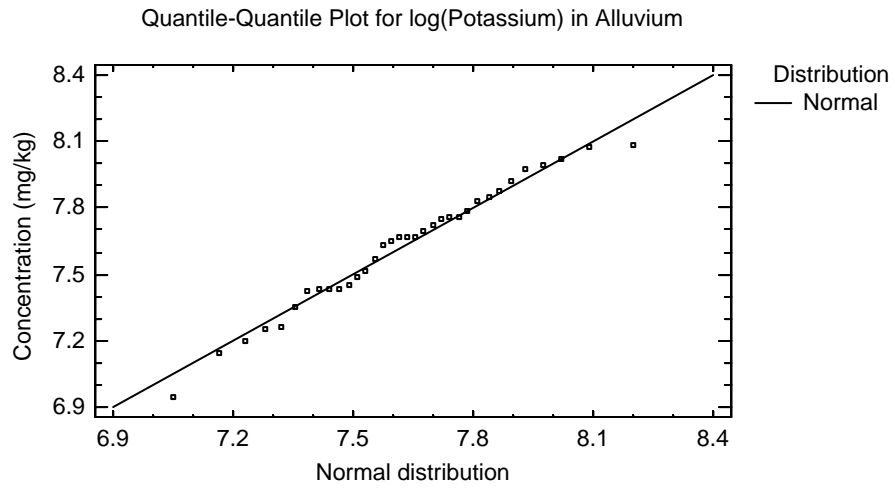
Fitted Distributions

Normal
mean = 7.62547
standard deviation = 0.279521



Tests for Normality for log(Potassium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.973496	0.636183



**DRAFT**

**Uncensored Data - Potassium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

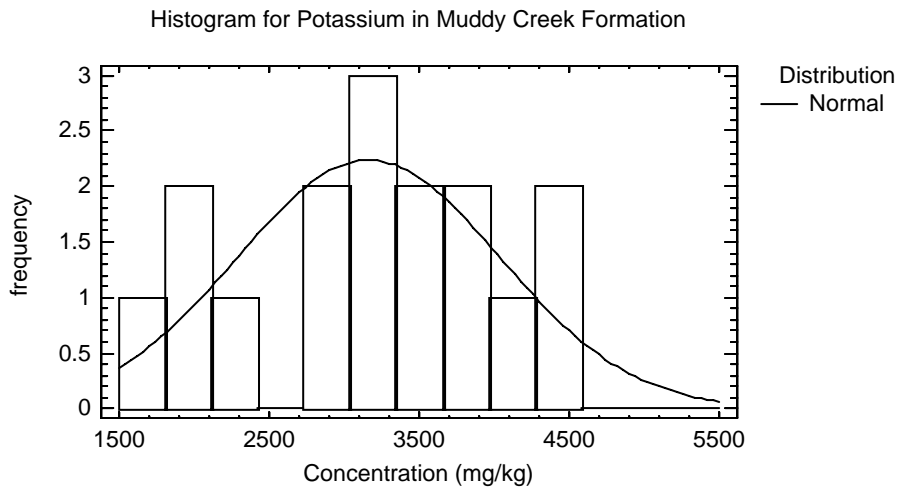
Data variable: Potassium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 1700.0 to 4540.0

Fitted Distributions

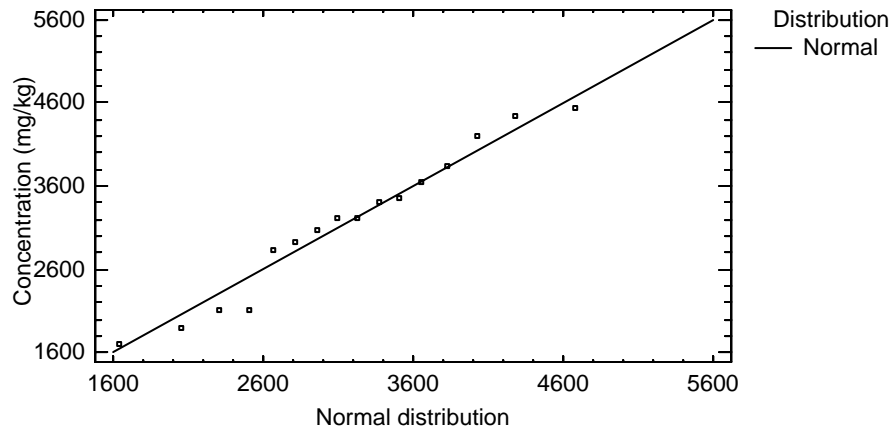
Normal
mean = 3163.44
standard deviation = 877.612



Tests for Normality for Potassium

Test	Statistic	P-Value
Shapiro-Wilk W	0.957034	0.588438

Quantile-Quantile Plot for Potassium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Potassium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

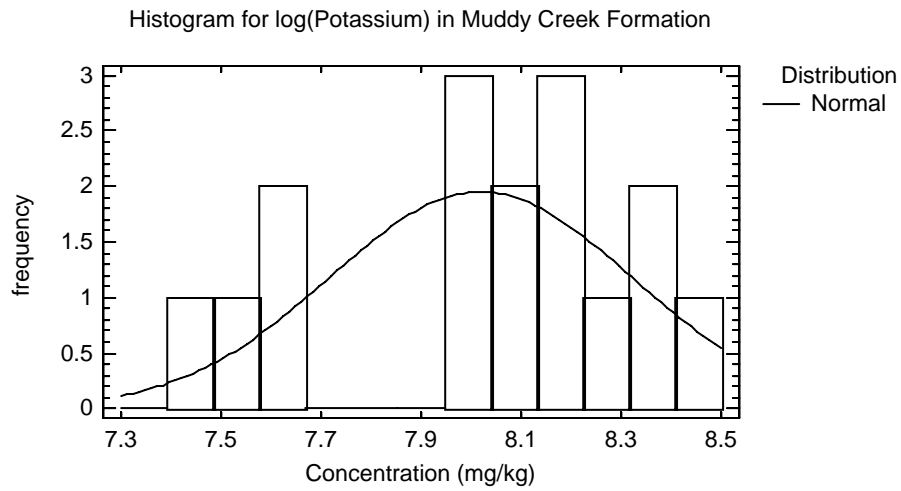
Data variable: log(Potassium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 7.43838 to 8.42068

Fitted Distributions

Normal
mean = 8.01927
standard deviation = 0.301635

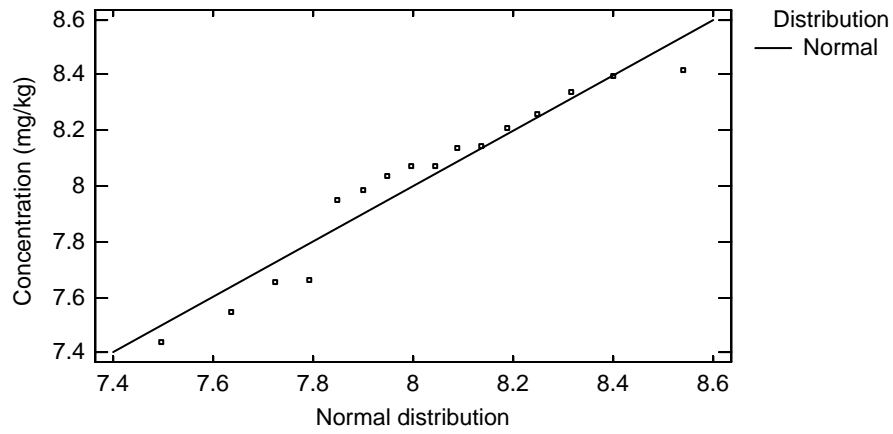


Tests for Normality for log(Potassium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.928582	0.231908



Quantile-Quantile Plot for log(Potassium) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - Potassium & Geological Formation 1 (Data Set="Tronox") for Potassium**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 1040.0 to 3240.0  
 Sample 2: 16 values ranging from 1700.0 to 4540.0

Comparison of Means for Potassium

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 2126.18 +/- 198.936 [1927.24, 2325.11]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 3163.44 +/- 467.647 [2695.79, 3631.08]

95.0% confidence interval for the difference between the means  
 not assuming equal variances: -1037.26 +/- 499.29 [-1536.55, -537.971]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -4.31823 P-value = 0.000299473

Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Potassium

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	570.152	877.612
Variance	325073.	770202.
Df	33	15

Ratio of Variances = 0.422062

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [459.871, 750.478]

Standard deviation of Geological Formation 1=Muddy Creek: [648.296, 1358.27]

Ratio of Variances: [0.160932, 0.954301]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.422062 P-value = 0.0382604

Reject the null hypothesis for alpha = 0.05.

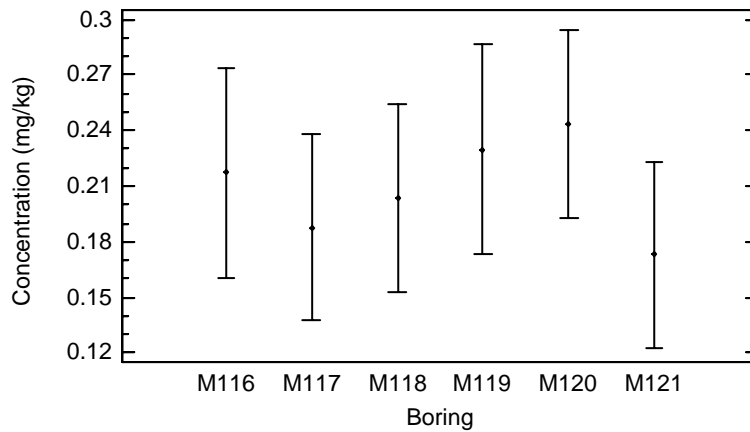
DRAFT

## 2.20 Selenium

ANOVA Table for Selenium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.0301082	5	0.00602164	1.18	0.3365
Within groups	0.225409	44	0.00512293		
Total (Corr.)	0.255517	49			

Means and 95.0 Percent Tukey HSD Intervals for Selenium



Kruskal-Wallis Test for Selenium by Location ID

Location ID	Sample Size	Average Rank
M116	7	26.4286
M117	9	20.2778
M118	9	25.7222
M119	7	27.7143
M120	9	33.2222
M121	9	20.3333

Test statistic = 5.00469 P-Value = 0.415308

**DRAFT**

**Uncensored Data - Selenium (Data Set = "Tronox")**

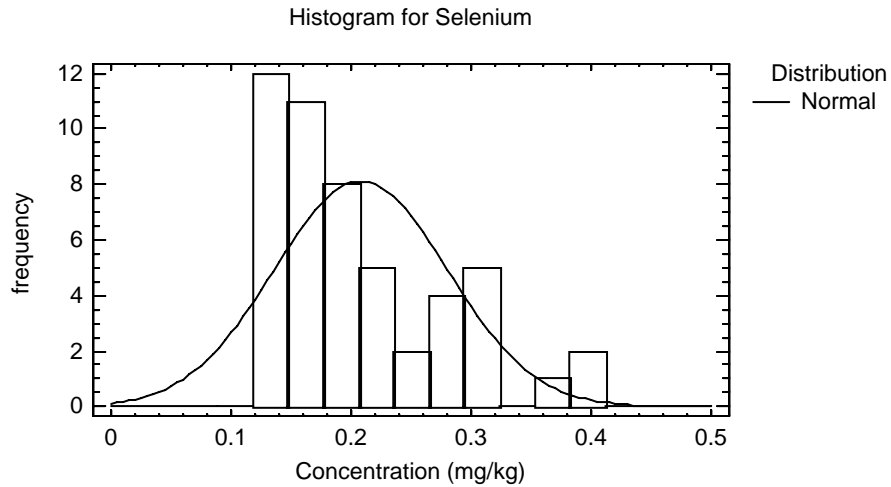
Data variable: Selenium

Selection variable: Data Set = "Tronox"

50 values ranging from 0.123 to 0.4105

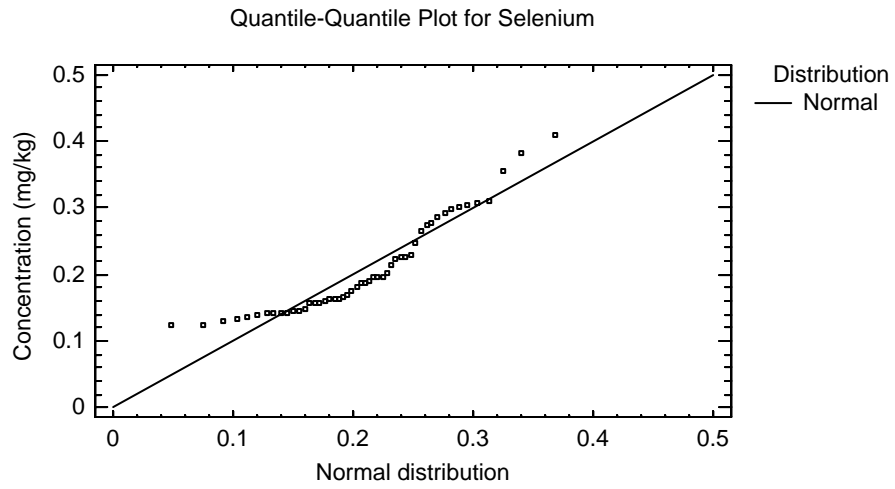
Fitted Distributions

Normal
mean = 0.208005
standard deviation = 0.0722124



Tests for Normality for Selenium

Test	Statistic	P-Value
Shapiro-Wilk W	0.88148	0.0000366623



**DRAFT**

**Uncensored Data - log(Selenium) (Data Set = "Tronox")**

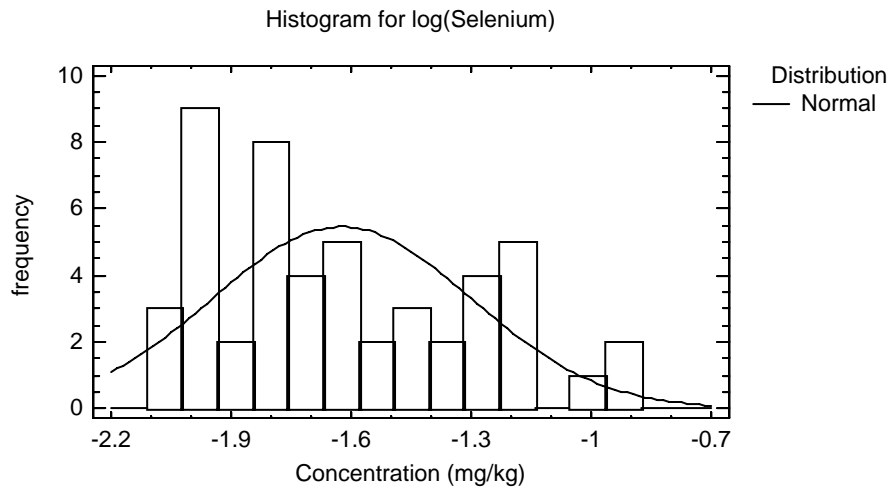
Data variable: log(Selenium)

Selection variable: Data Set = "Tronox"

50 values ranging from -2.09557 to -0.890379

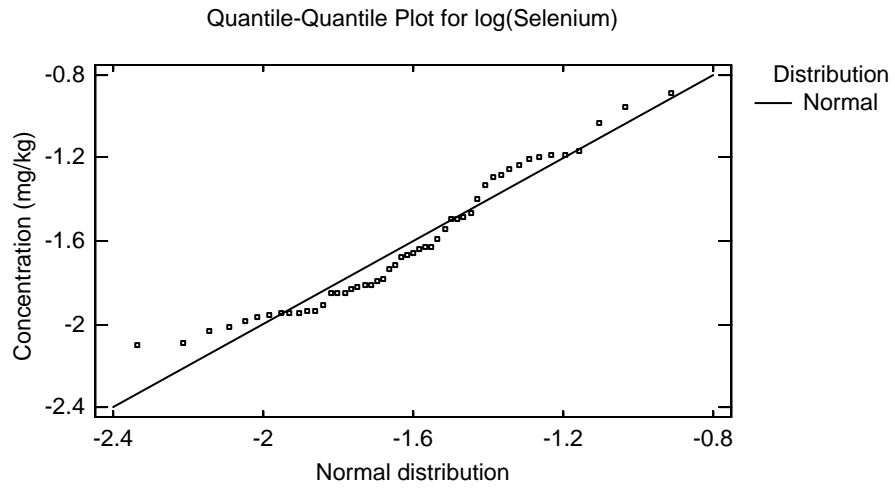
Fitted Distributions

Normal
mean = -1.62348
standard deviation = 0.32254



Tests for Normality for log(Selenium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.928424	0.00580467



**DRAFT**

**Uncensored Data - Selenium (Data Set = "Tronox"&Depth Value<=20)**

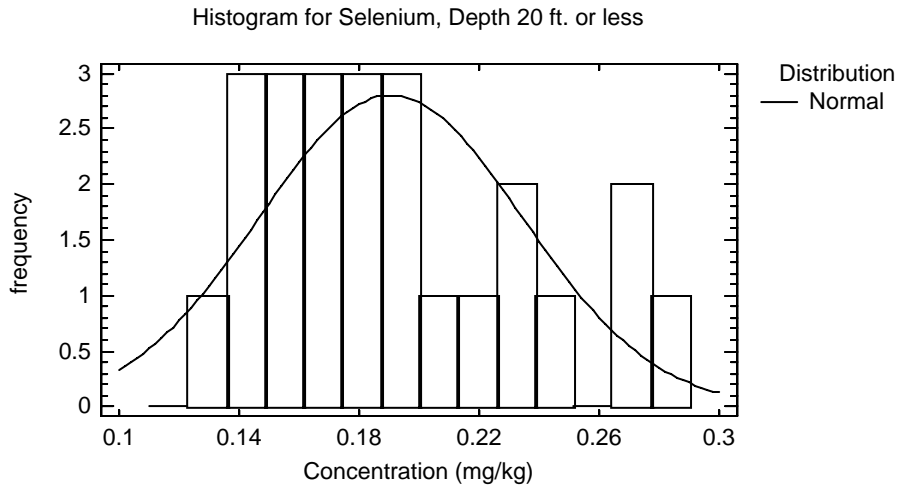
Data variable: Selenium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.123 to 0.278

Fitted Distributions

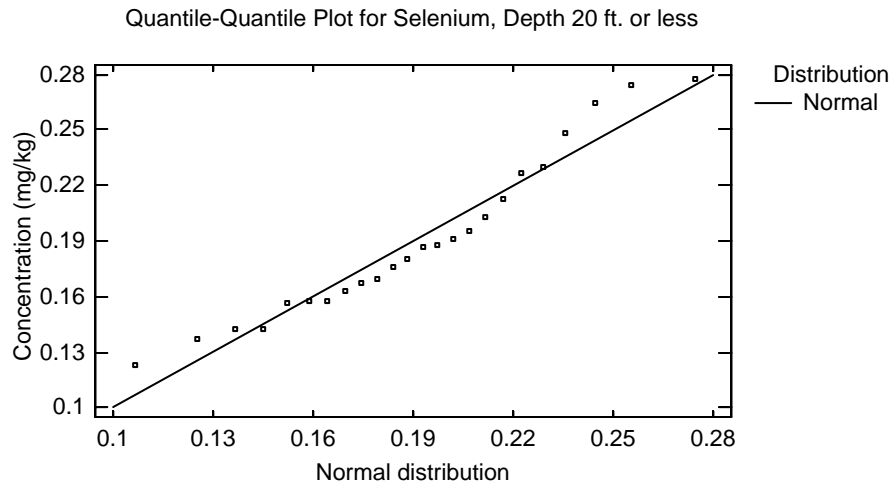
Normal
mean = 0.190542
standard deviation = 0.0439097



Tests for Normality for Selenium

Test	Statistic	P-Value
Shapiro-Wilk W	0.938876	0.158301





**DRAFT**

**Uncensored Data - log(Selenium) (Data Set = "Tronox"&Depth Value<=20)**

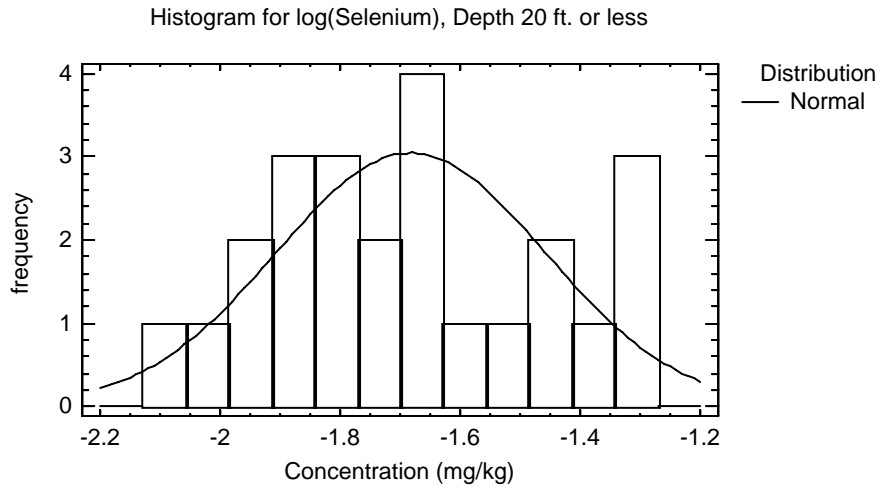
Data variable: log(Selenium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -2.09557 to -1.28013

Fitted Distributions

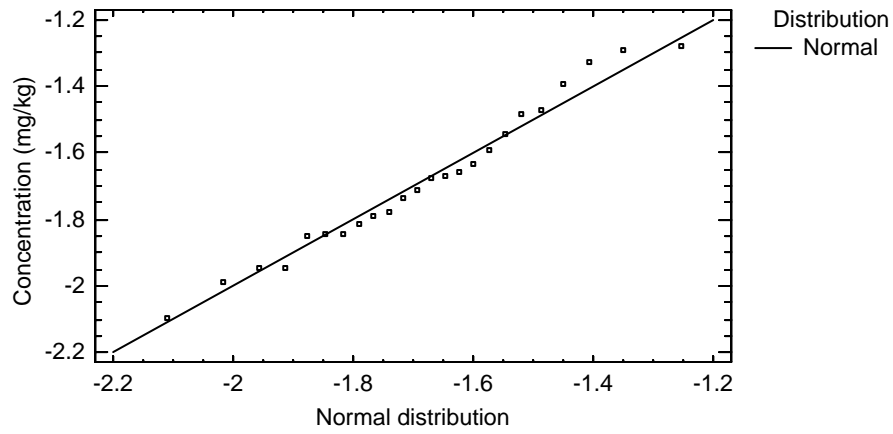
Normal
mean = -1.6824
standard deviation = 0.224641



Tests for Normality for log(Selenium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.969376	0.651758

Quantile-Quantile Plot for log(Selenium), Depth 20 ft. or less



**DRAFT**

**Uncensored Data - Selenium (Data Set = "Tronox"&Depth Value>=30)**

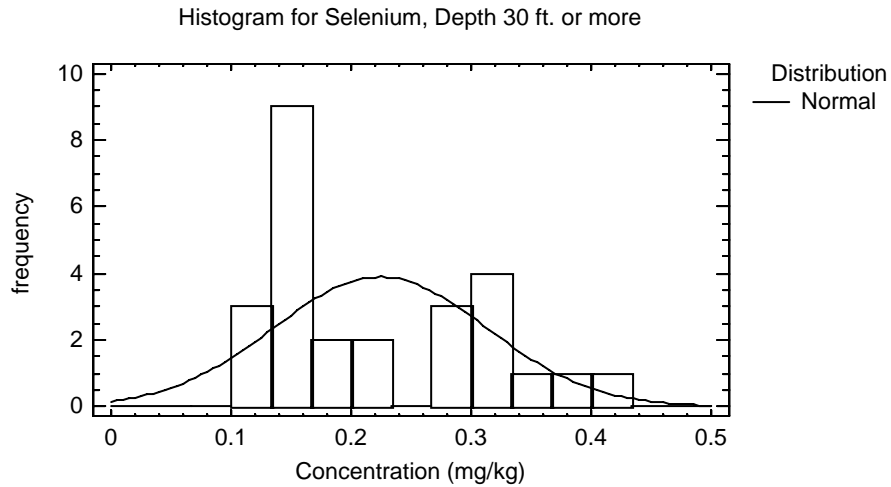
Data variable: Selenium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.124 to 0.4105

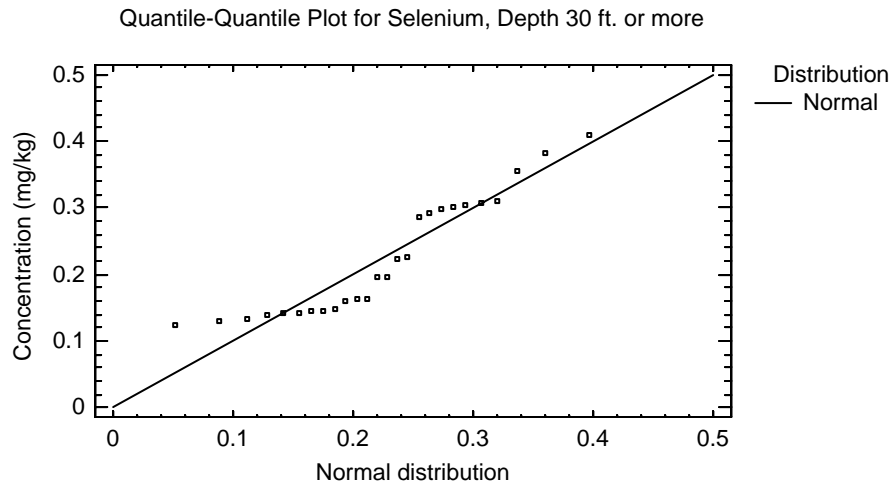
Fitted Distributions

Normal
mean = 0.224125
standard deviation = 0.088791



Tests for Normality for Selenium

Test	Statistic	P-Value
Shapiro-Wilk W	0.873243	0.00367178



**DRAFT**

**Uncensored Data - log(Selenium) (Data Set = "Tronox"&Depth Value>=30)**

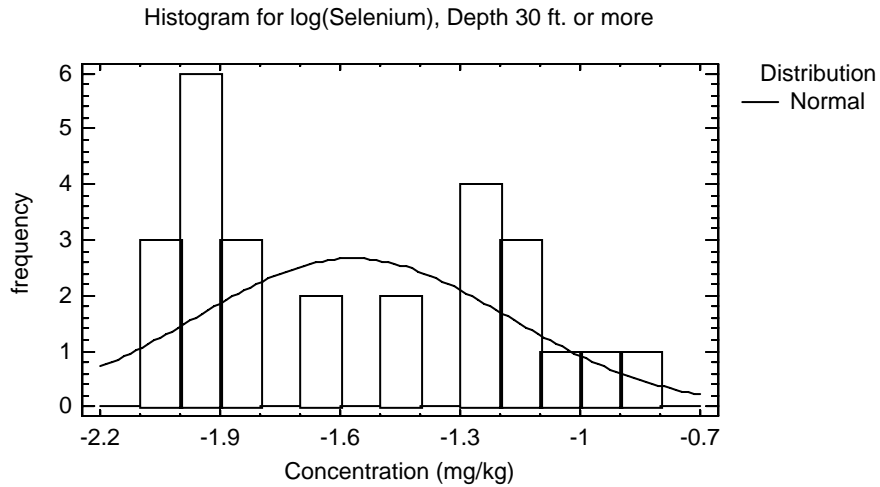
Data variable: log(Selenium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -2.08747 to -0.890379

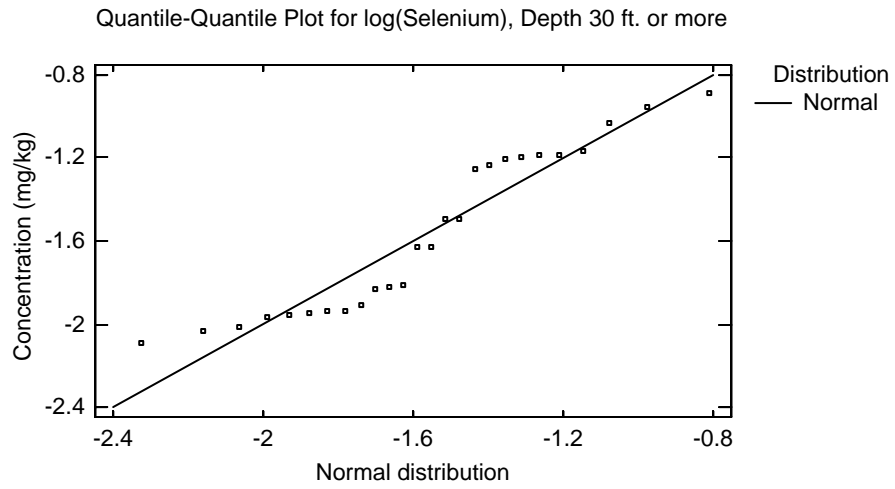
Fitted Distributions

Normal
mean = -1.5691
standard deviation = 0.388676



Tests for Normality for log(Selenium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.890054	0.00902563



**DRAFT**

## Tronox Selenium by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -2.114057917$   $p = 0.034510321$

Reject the null hypothesis for  $\alpha = 0.05$



**DRAFT**

**Uncensored Data - Selenium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

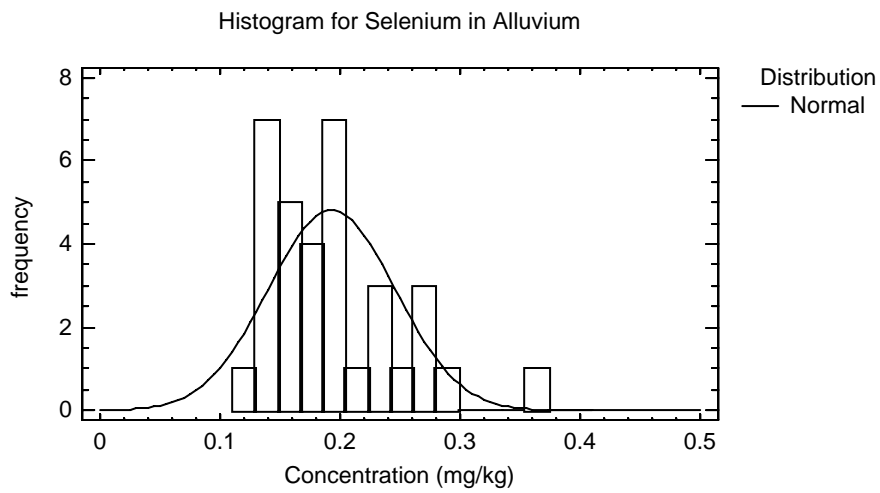
Data variable: Selenium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.123 to 0.356

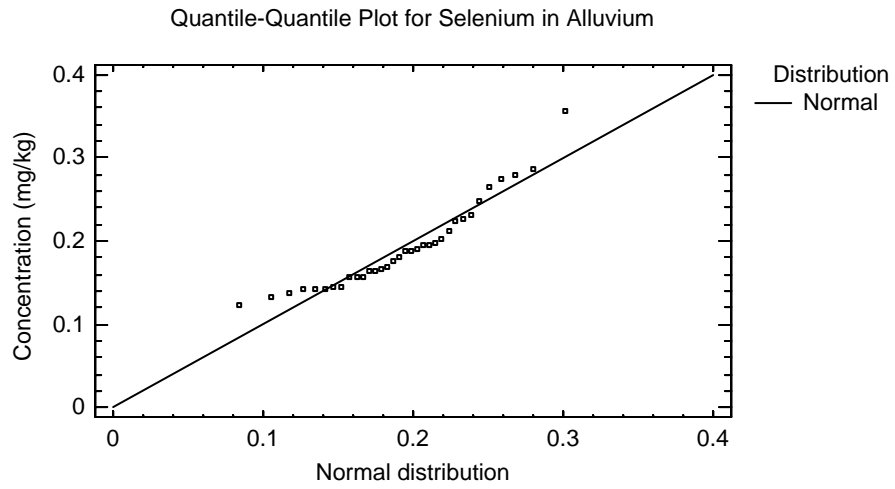
Fitted Distributions

Normal
mean = 0.192912
standard deviation = 0.0529546



Tests for Normality for Selenium

Test	Statistic	P-Value
Shapiro-Wilk W	0.906269	0.00710319



**DRAFT**

**Uncensored Data - log(Selenium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

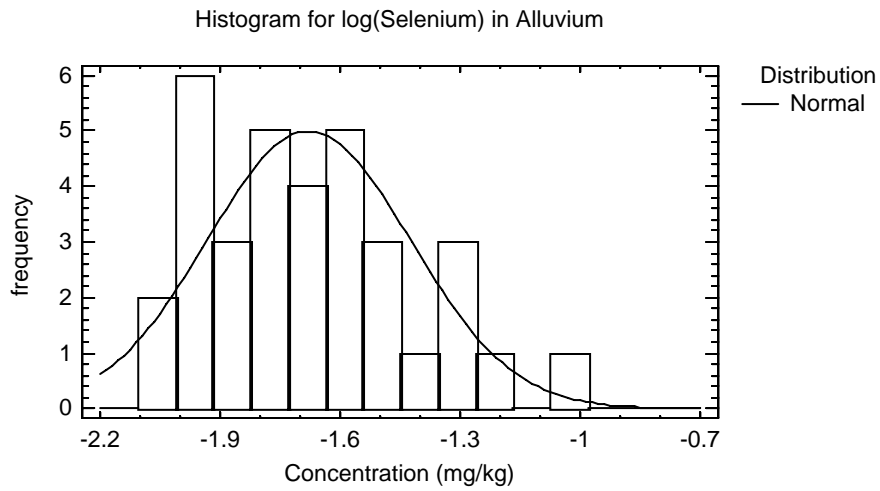
Data variable: log(Selenium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -2.09557 to -1.03282

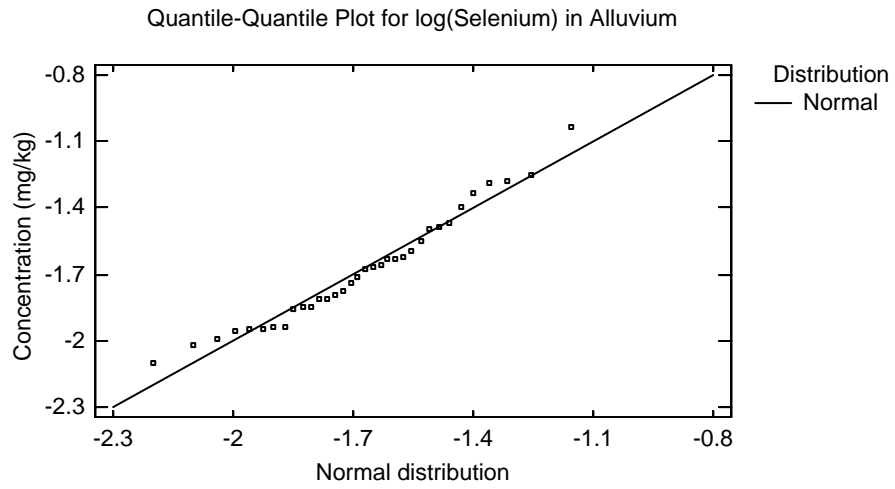
Fitted Distributions

Normal
mean = -1.6784
standard deviation = 0.254628



Tests for Normality for log(Selenium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.959578	0.292855



**DRAFT**

**Uncensored Data - Selenium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

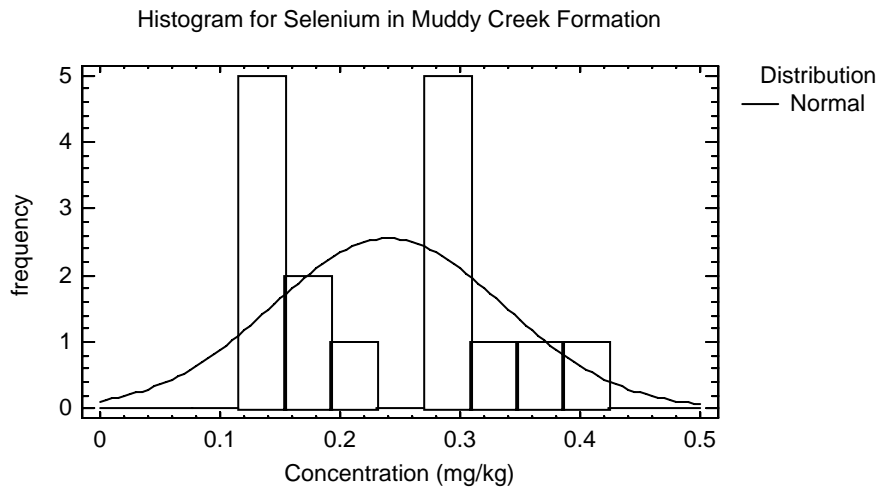
Data variable: Selenium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.124 to 0.4105

Fitted Distributions

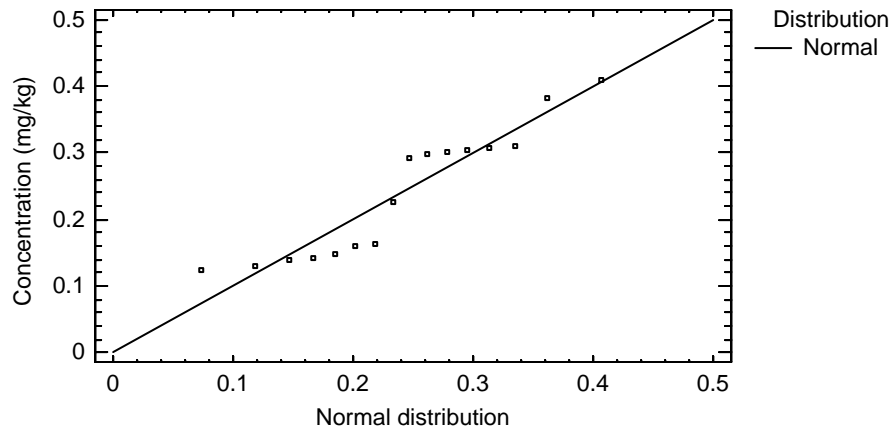
Normal
mean = 0.240078
standard deviation = 0.0961854



Tests for Normality for Selenium

Test	Statistic	P-Value
Shapiro-Wilk W	0.877113	0.0349973

Quantile-Quantile Plot for Selenium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Selenium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

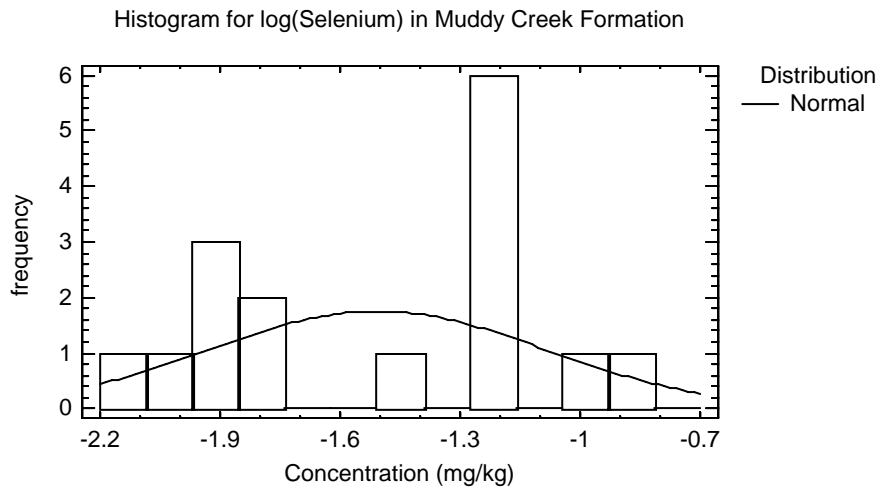
Data variable: log(Selenium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -2.08747 to -0.890379

Fitted Distributions

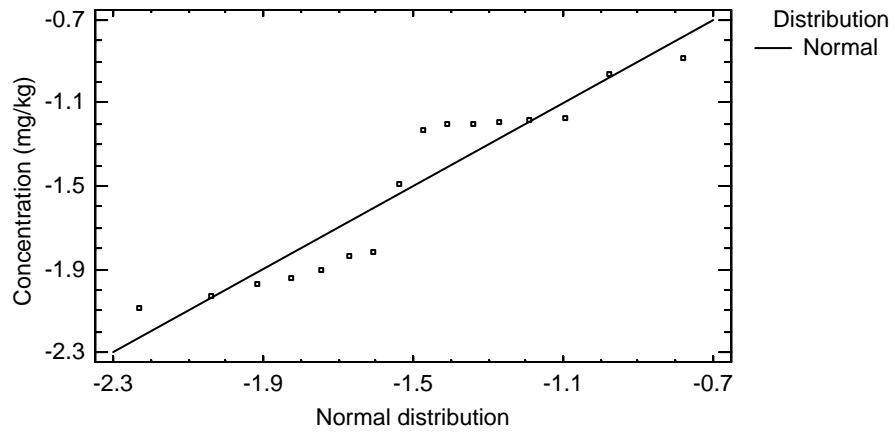
Normal
mean = -1.50679
standard deviation = 0.419333



Tests for Normality for log(Selenium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.872334	0.0293675

Quantile-Quantile Plot for log(Selenium) in Muddy Creek Formation





**DRAFT**

## Tronox Selenium by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -2.093935002$   $p = 0.036265771$

Reject the null hypothesis for  $\alpha = 0.05$

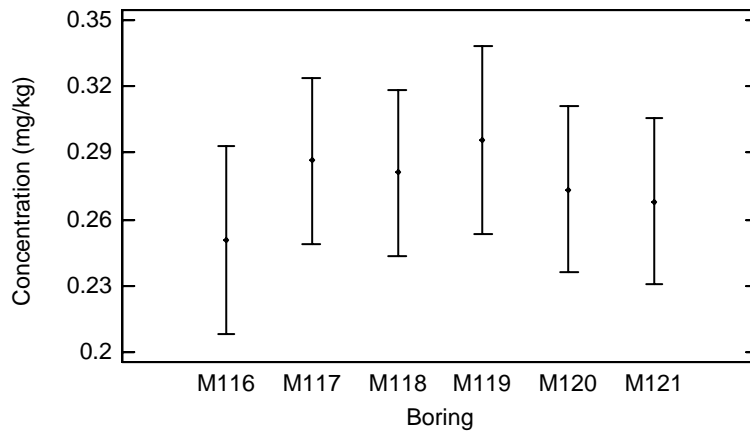
DRAFT

### 2.21 Silver

ANOVA Table for Silver by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.00905891	5	0.00181178	0.64	0.6691
Within groups	0.124219	44	0.00282315		
Total (Corr.)	0.133278	49			

Means and 95.0 Percent Tukey HSD Intervals for Silver



Kruskal-Wallis Test for Silver by Location ID

Location ID	Sample Size	Average Rank
M116	7	24.7143
M117	9	29.3333
M118	9	26.3333
M119	7	28.5714
M120	9	24.5556
M121	9	20.0

Test statistic = 2.30325 P-Value = 0.80579

**DRAFT**

**Uncensored Data - Silver (Data Set = "Tronox")**

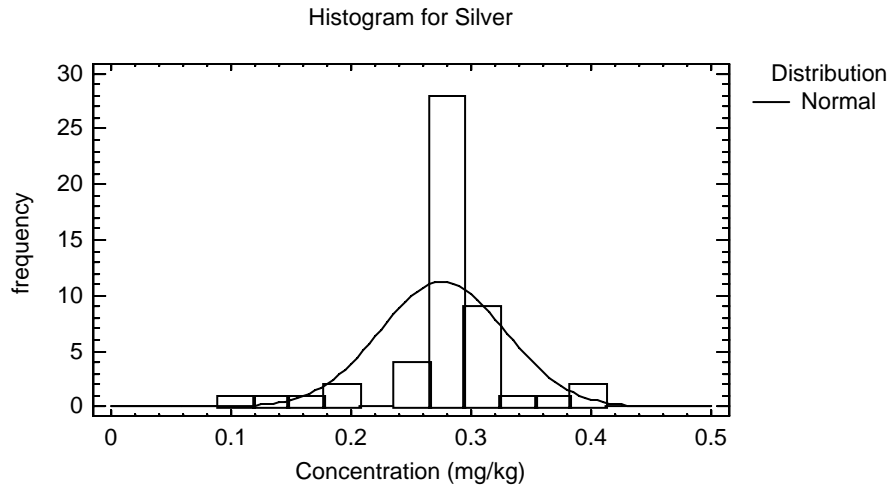
Data variable: Silver

Selection variable: Data Set = "Tronox"

50 values ranging from 0.106 to 0.4105

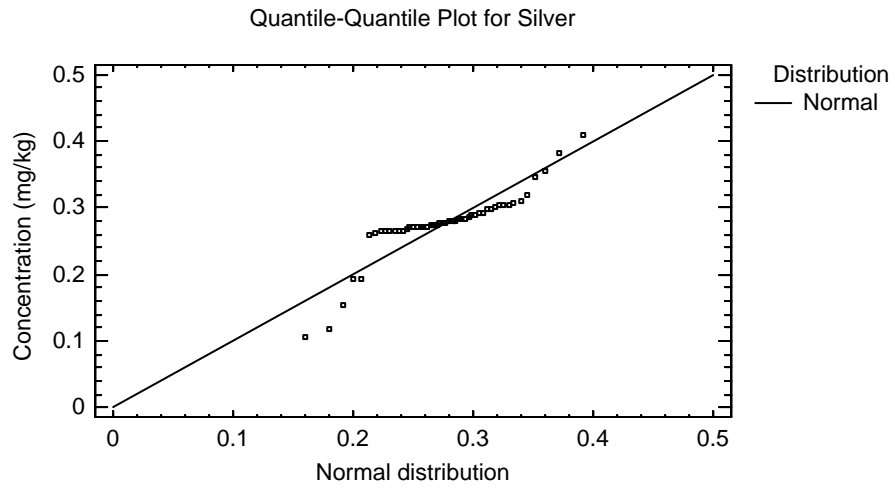
Fitted Distributions

Normal
mean = 0.276065
standard deviation = 0.0521531



Tests for Normality for Silver

Test	Statistic	P-Value
Shapiro-Wilk W	0.824961	1.17864E-7



**DRAFT**

**Uncensored Data - log(Silver) (Data Set = "Tronox")**

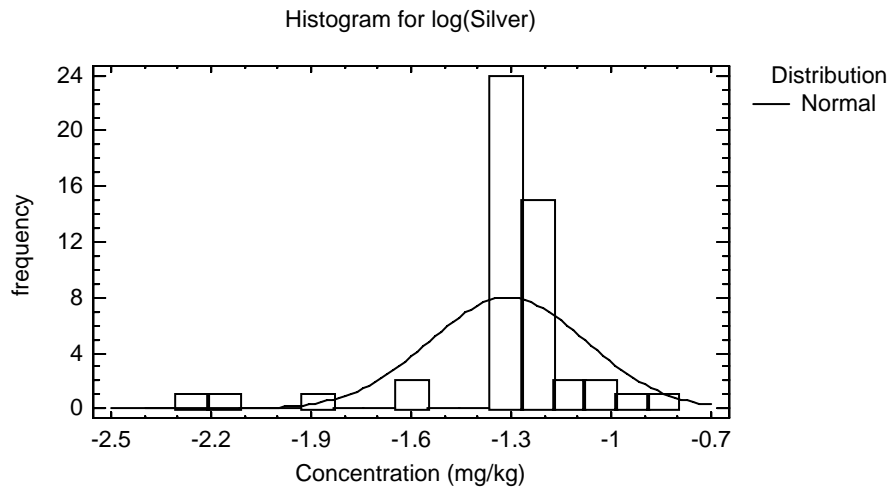
Data variable: log(Silver)

Selection variable: Data Set = "Tronox"

50 values ranging from -2.24432 to -0.890379

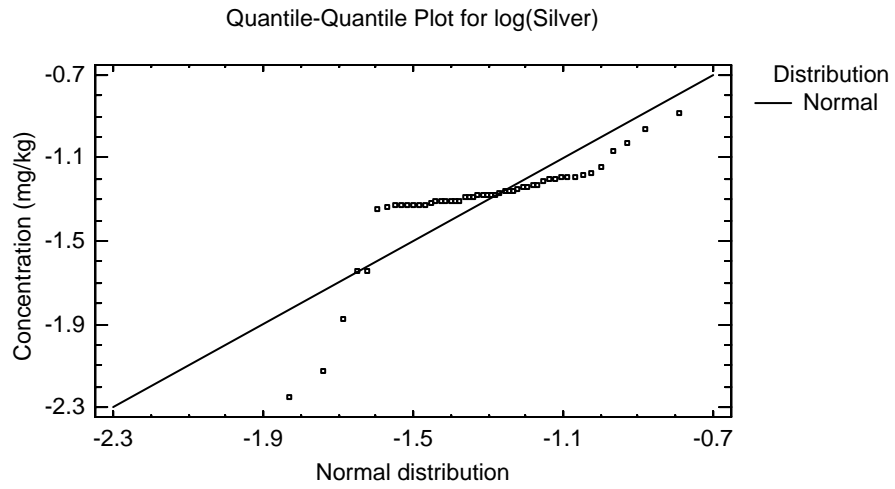
Fitted Distributions

Normal
mean = -1.31002
standard deviation = 0.234619



Tests for Normality for log(Silver)

Test	Statistic	P-Value
Shapiro-Wilk W	0.710183	3.69949E-12



**DRAFT**

**Uncensored Data - Silver (Data Set = "Tronox"&Depth Value<=20)**

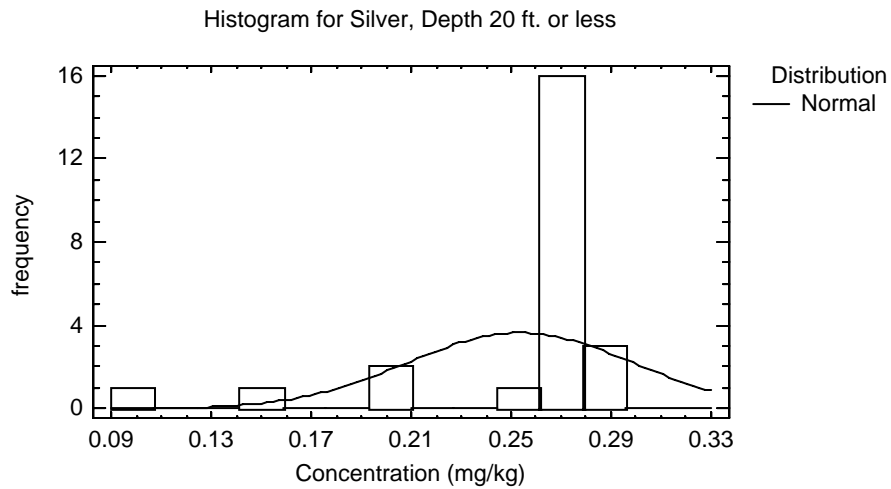
Data variable: Silver

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.106 to 0.2895

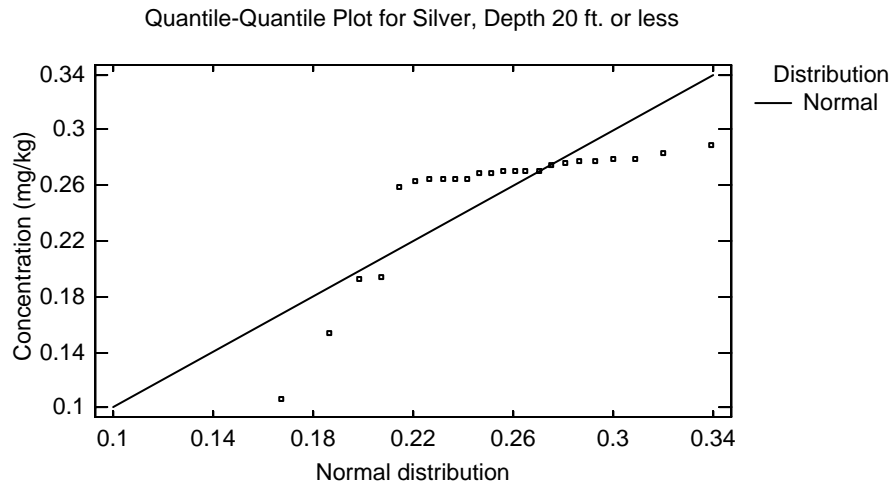
Fitted Distributions

Normal
mean = 0.253469
standard deviation = 0.0450278



Tests for Normality for Silver

Test	Statistic	P-Value
Shapiro-Wilk W	0.627853	2.37052E-7





**DRAFT**

**Uncensored Data - log(Silver) (Data Set = "Tronox"&Depth Value<=20)**

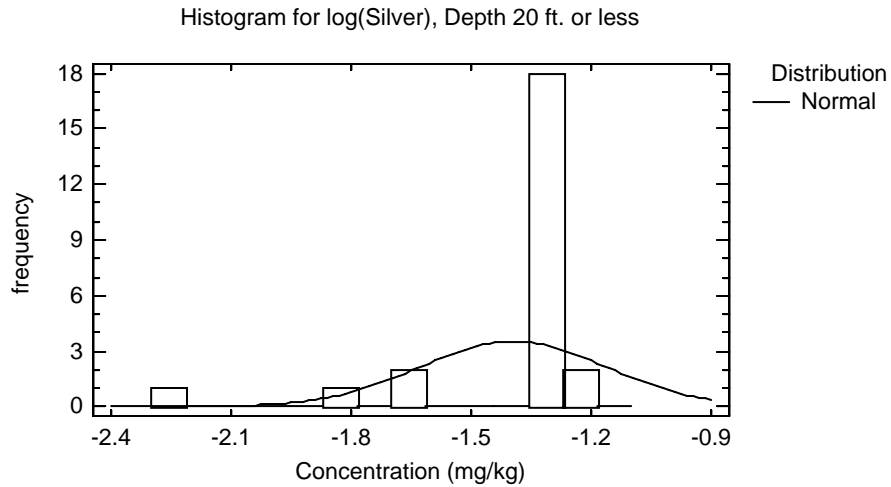
Data variable: log(Silver)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -2.24432 to -1.2396

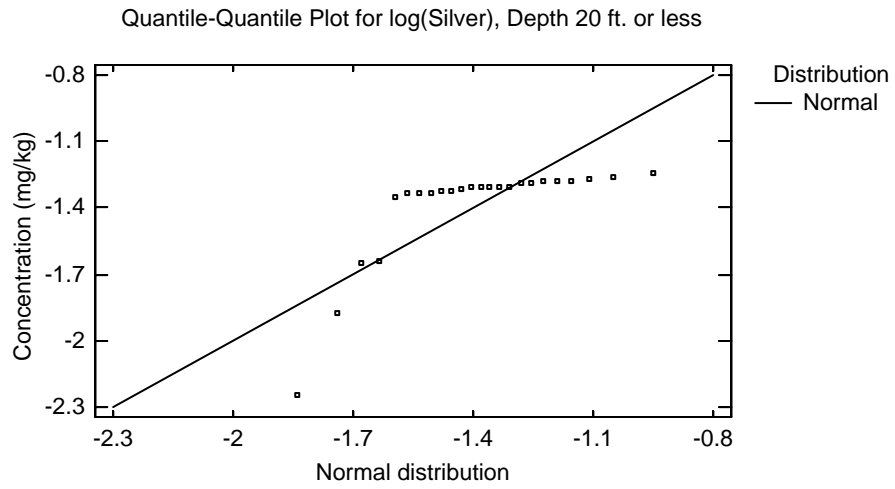
Fitted Distributions

Normal
mean = -1.39417
standard deviation = 0.233477



Tests for Normality for log(Silver)

Test	Statistic	P-Value
Shapiro-Wilk W	0.567629	3.34413E-8



**DRAFT**

**Uncensored Data - Silver (Data Set = "Tronox"&Depth Value>=30)**

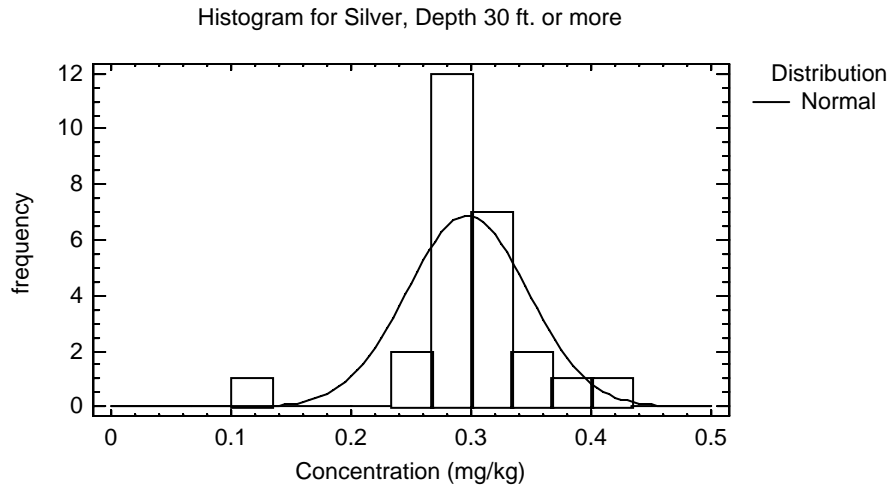
Data variable: Silver

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.119 to 0.4105

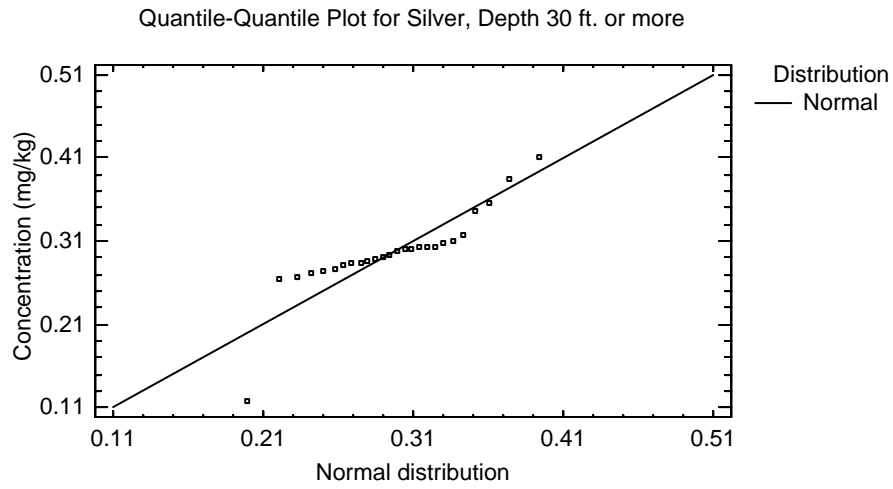
Fitted Distributions

Normal
mean = 0.296923
standard deviation = 0.0502312



Tests for Normality for Silver

Test	Statistic	P-Value
Shapiro-Wilk W	0.807033	0.000137455



**DRAFT**

**Uncensored Data - log(Silver) (Data Set = "Tronox"&Depth Value>=30)**

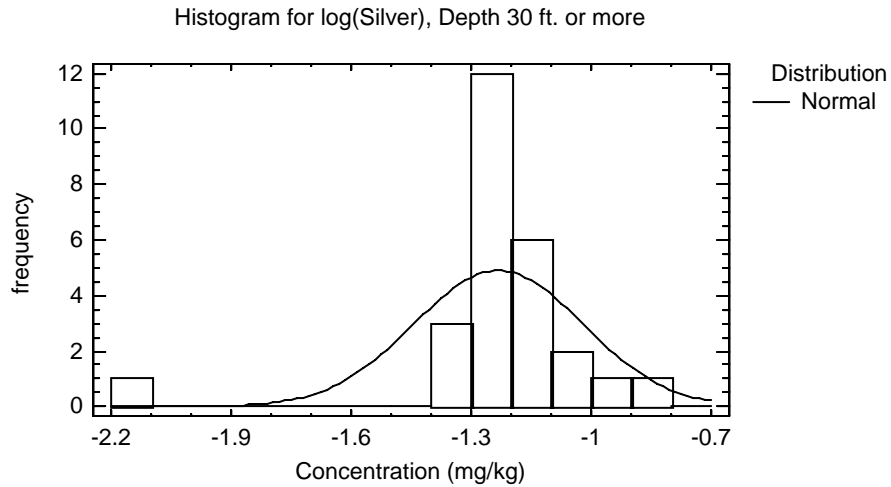
Data variable: log(Silver)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -2.12863 to -0.890379

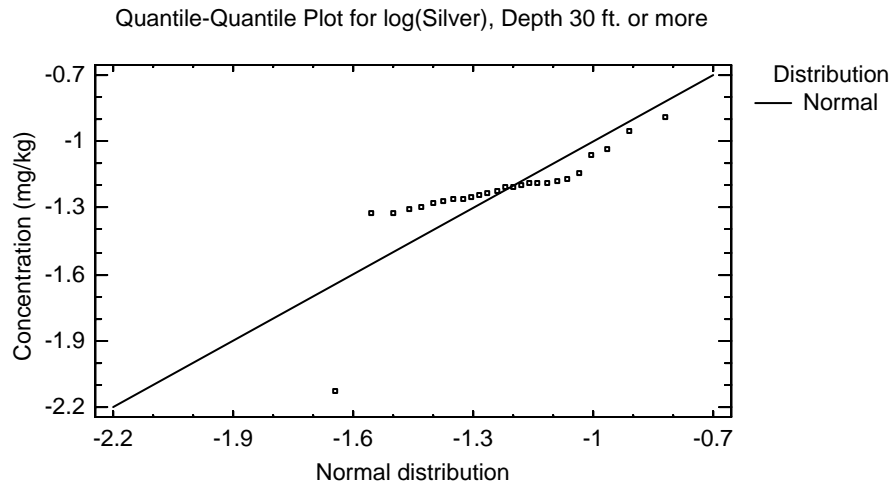
Fitted Distributions

Normal
mean = -1.23235
standard deviation = 0.211347



Tests for Normality for log(Silver)

Test	Statistic	P-Value
Shapiro-Wilk W	0.662232	3.39279E-7



**DRAFT**

## Tronox Silver by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.443073473$   $p = 0.657712592$

Do not reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

**Uncensored Data - Silver (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

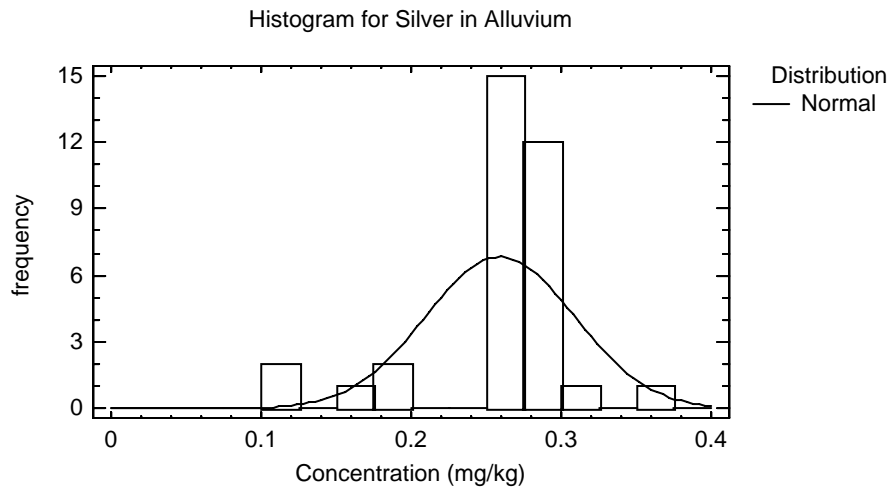
Data variable: Silver

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.106 to 0.356

Fitted Distributions

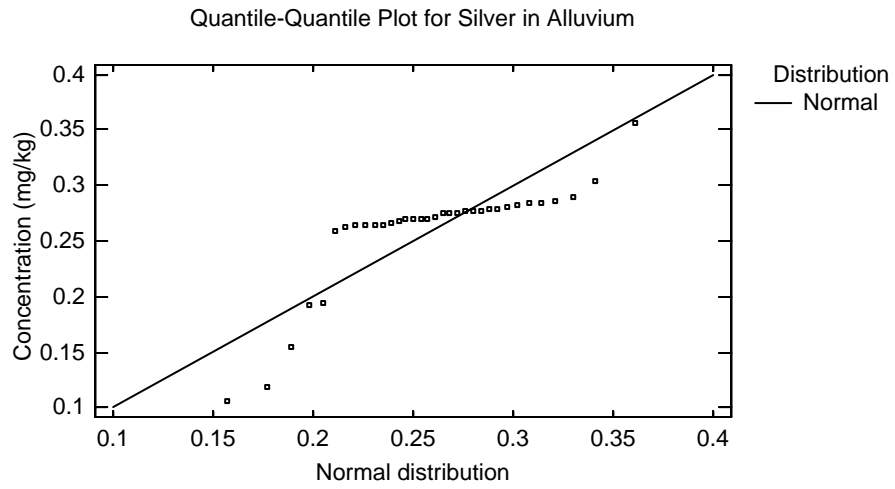
Normal
mean = 0.259221
standard deviation = 0.0496762



Tests for Normality for Silver

Test	Statistic	P-Value
Shapiro-Wilk W	0.711132	6.0515E-8





**DRAFT**

**Uncensored Data - log(Silver) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

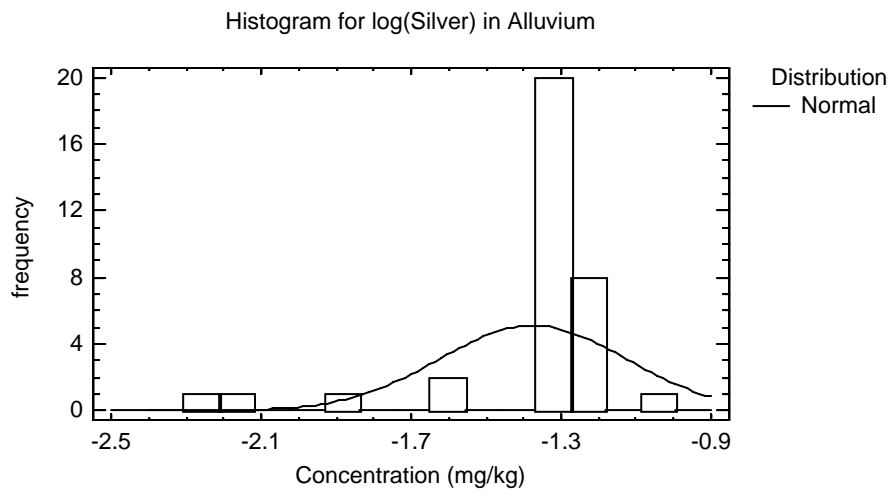
Data variable: log(Silver)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -2.24432 to -1.03282

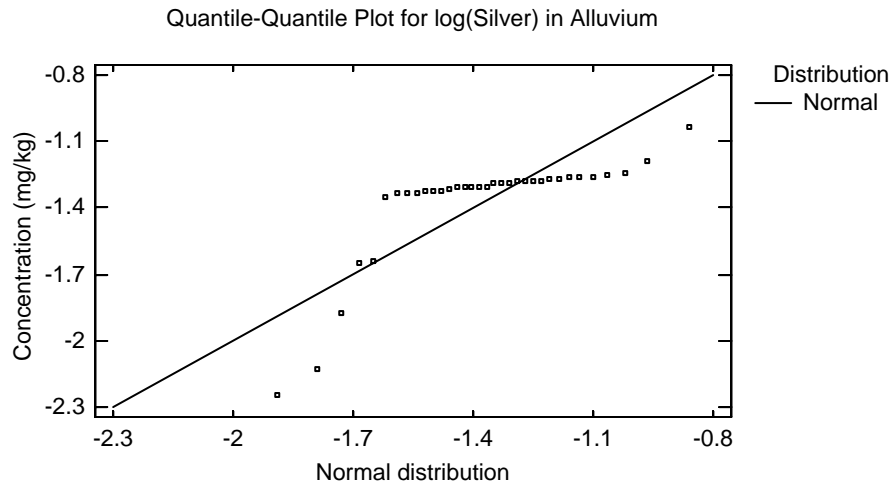
Fitted Distributions

Normal
mean = -1.37519
standard deviation = 0.249353



Tests for Normality for log(Silver)

Test	Statistic	P-Value
Shapiro-Wilk W	0.624282	9.47245E-10



**DRAFT**

**Uncensored Data - Silver (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

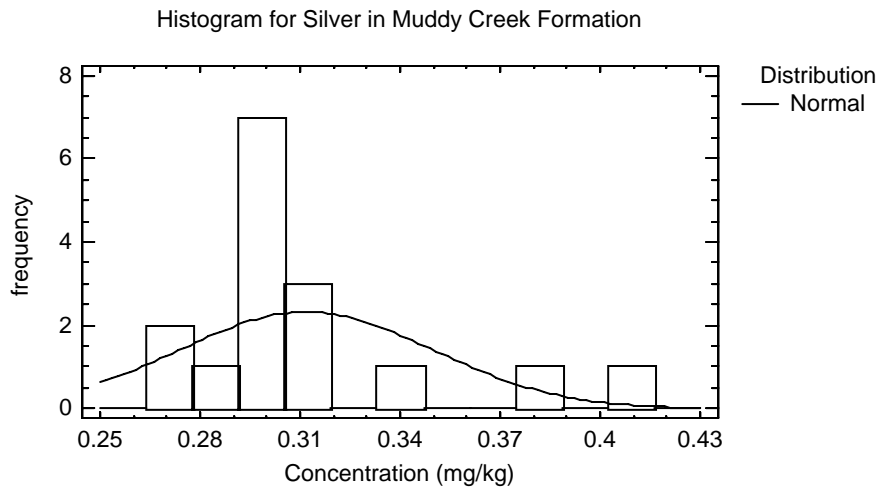
Data variable: Silver

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.266 to 0.4105

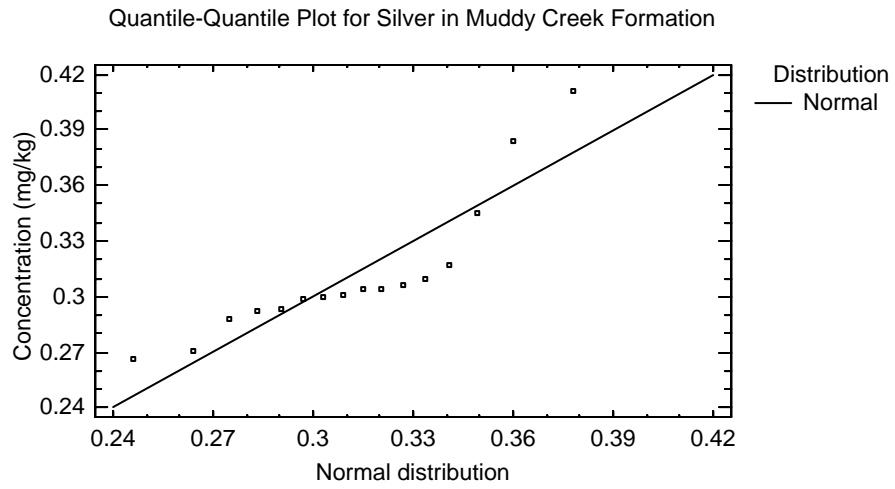
Fitted Distributions

Normal
mean = 0.311859
standard deviation = 0.0380316



Tests for Normality for Silver

Test	Statistic	P-Value
Shapiro-Wilk W	0.813883	0.00367815



**DRAFT**

**Uncensored Data - log(Silver) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

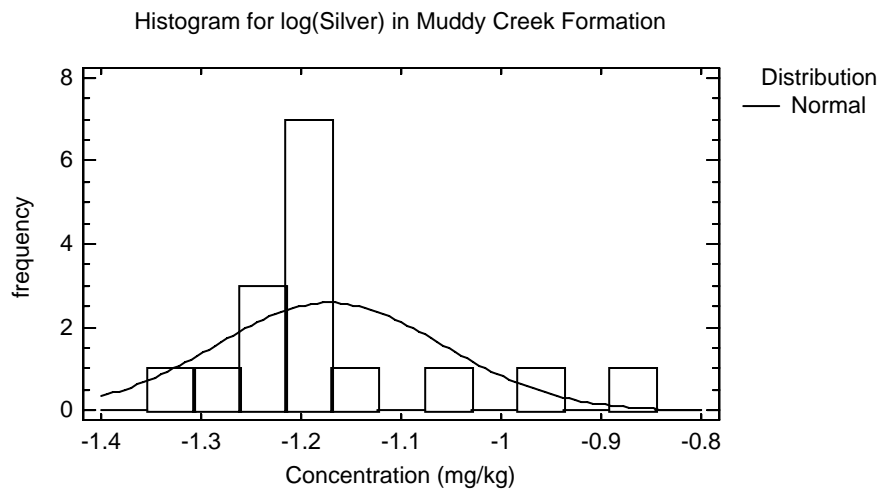
Data variable: log(Silver)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -1.32426 to -0.890379

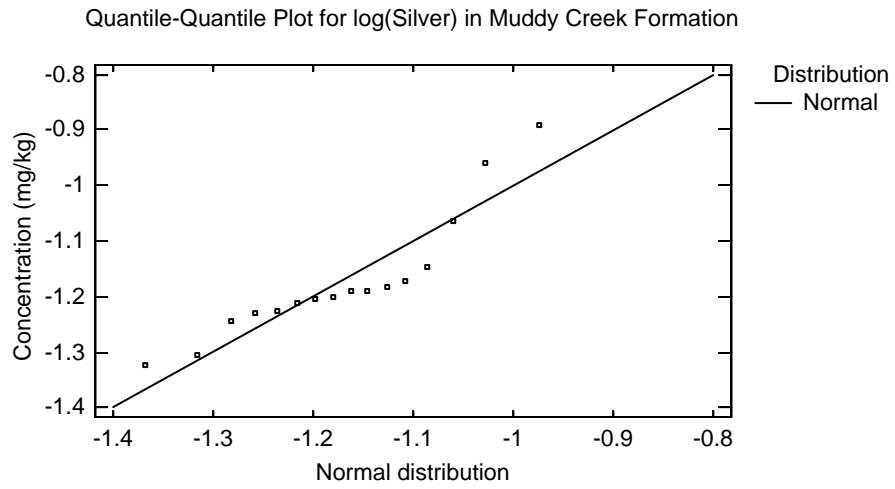
Fitted Distributions

Normal
mean = -1.17155
standard deviation = 0.113802



Tests for Normality for log(Silver)

Test	Statistic	P-Value
Shapiro-Wilk W	0.852817	0.0144568



**DRAFT**

## Tronox Silver by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = 0    p= 1

Do not reject the null hypothesis for alpha=0.05



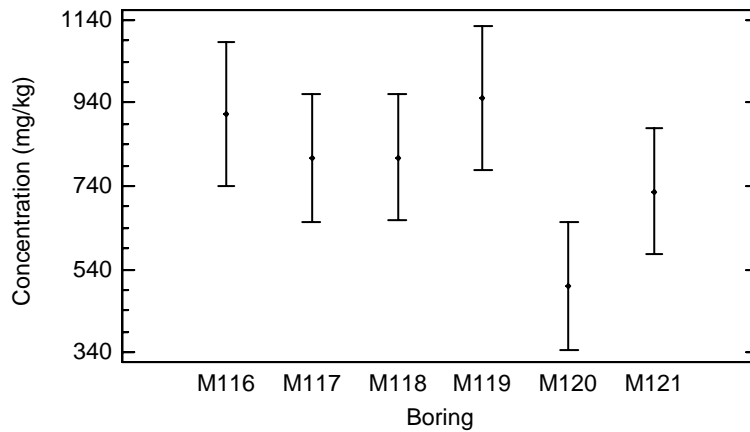
**DRAFT**

**2.22 Sodium**

ANOVA Table for Sodium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	1.07322E6	5	214643.	4.52	0.0021
Within groups	2.08778E6	44	47449.5		
Total (Corr.)	3.161E6	49			

Means and 95.0 Percent Tukey HSD Intervals for Sodium



Kruskal-Wallis Test for Sodium by Location ID

Location ID	Sample Size	Average Rank
M116	7	35.1429
M117	9	28.4444
M118	9	27.1111
M119	7	34.2143
M120	9	9.38889
M121	9	22.7778

Test statistic = 17.354 P-Value = **0.0038752**

**DRAFT**

**Uncensored Data - Sodium (Data Set = "Tronox")**

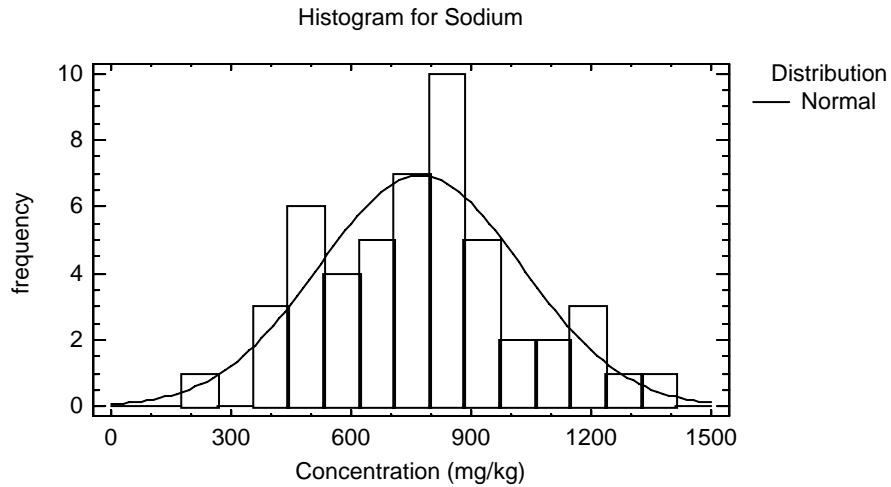
Data variable: Sodium

Selection variable: Data Set = "Tronox"

50 values ranging from 238.0 to 1350.0

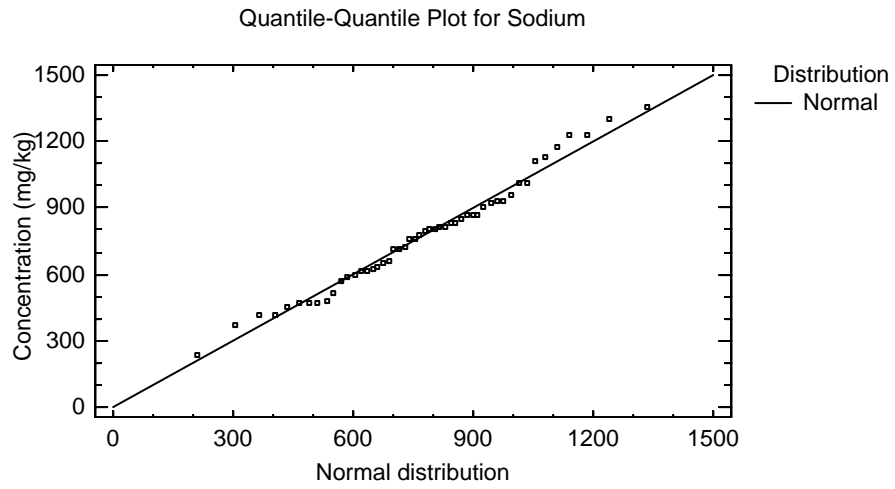
Fitted Distributions

Normal
mean = 772.8
standard deviation = 253.988



Tests for Normality for Sodium

Test	Statistic	P-Value
Shapiro-Wilk W	0.974631	0.529784



**DRAFT**

**Uncensored Data - log(Sodium) (Data Set = "Tronox")**

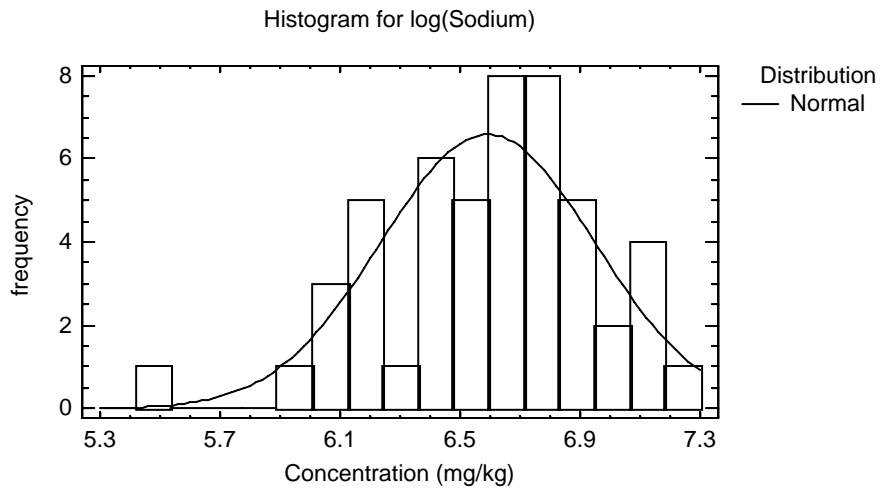
Data variable: log(Sodium)

Selection variable: Data Set = "Tronox"

50 values ranging from 5.47227 to 7.20786

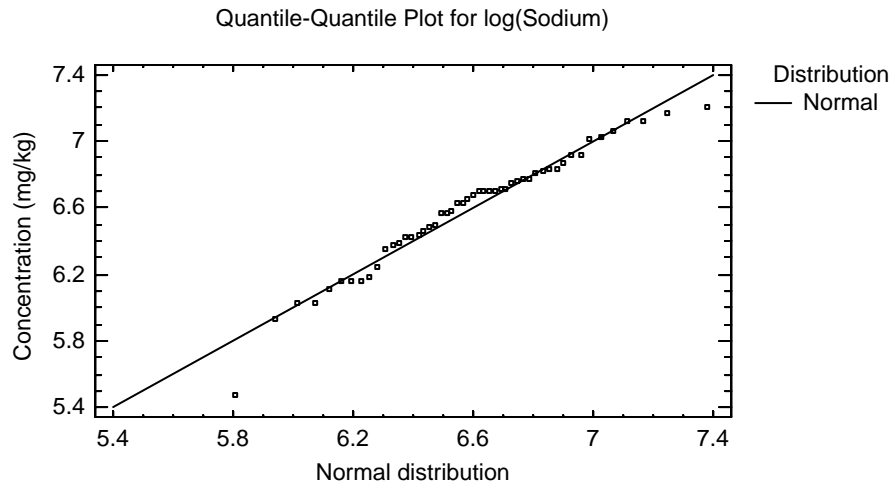
Fitted Distributions

Normal
mean = 6.5921
standard deviation = 0.356598



Tests for Normality for log(Sodium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.964659	0.240137



**DRAFT**

**Uncensored Data - Sodium (Data Set = "Tronox"&Depth Value<=20)**

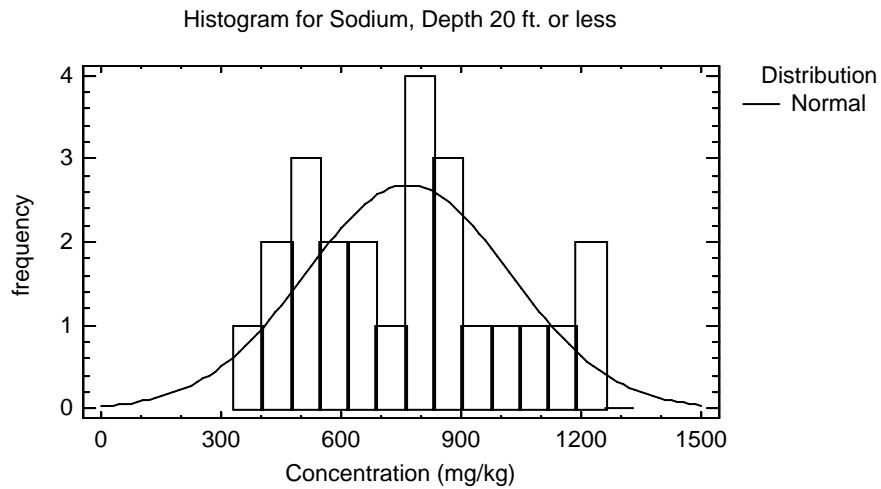
Data variable: Sodium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 376.0 to 1230.0

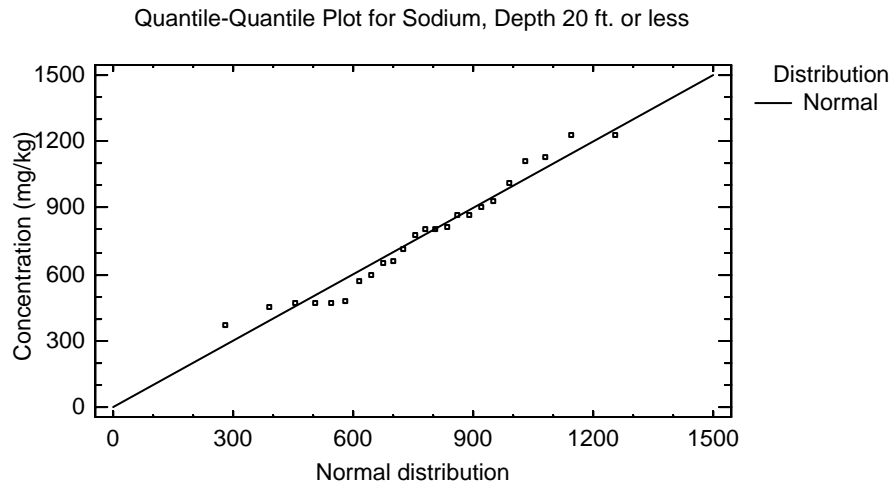
Fitted Distributions

Normal
mean = 766.833
standard deviation = 254.881



Tests for Normality for Sodium

Test	Statistic	P-Value
Shapiro-Wilk W	0.947524	0.245898



**DRAFT**

**Uncensored Data - log(Sodium) (Data Set = "Tronox"&Depth Value<=20)**

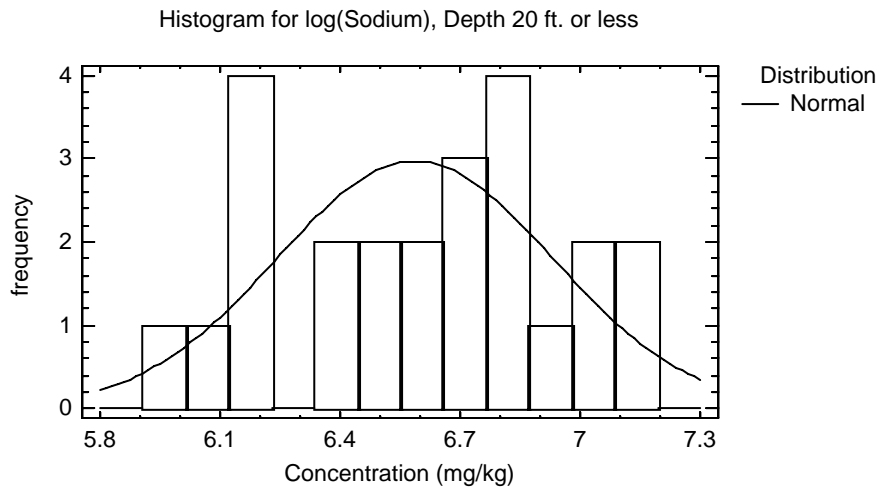
Data variable: log(Sodium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.92959 to 7.11477

Fitted Distributions

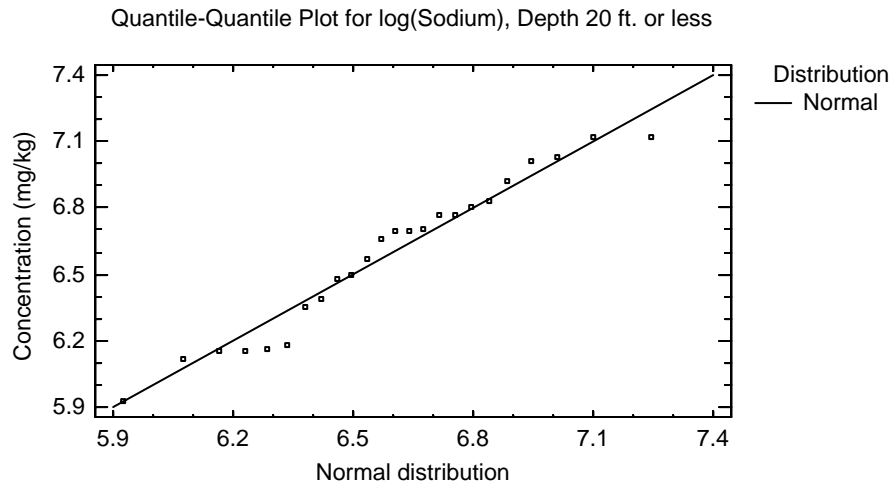
Normal
mean = 6.58688
standard deviation = 0.345337



Tests for Normality for log(Sodium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.951623	0.300957





**DRAFT**

**Uncensored Data - Sodium (Data Set = "Tronox"&Depth Value>=30)**

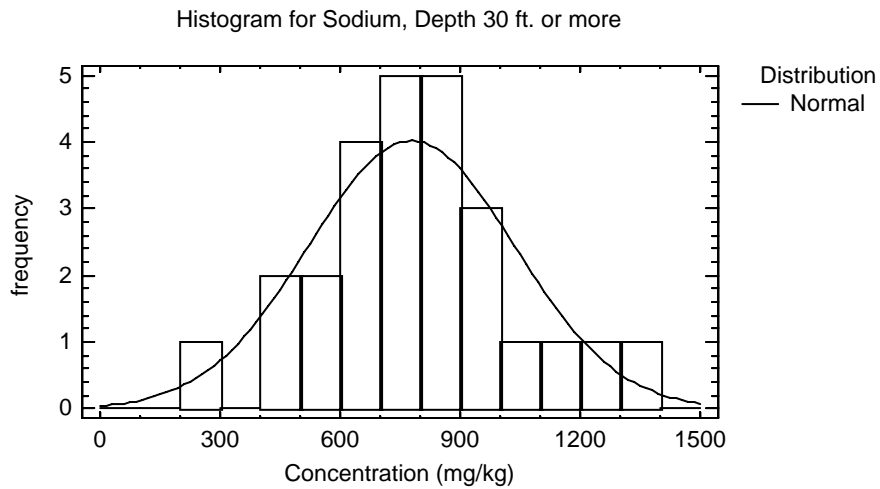
Data variable: Sodium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 238.0 to 1350.0

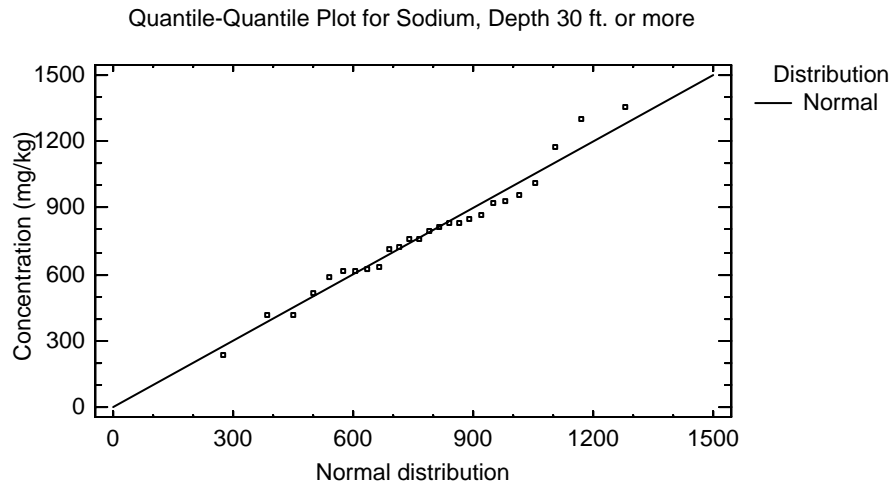
Fitted Distributions

Normal
mean = 778.308
standard deviation = 258.083



Tests for Normality for Sodium

Test	Statistic	P-Value
Shapiro-Wilk W	0.973967	0.735524



**DRAFT**

**Uncensored Data - log(Sodium) (Data Set = "Tronox"&Depth Value>=30)**

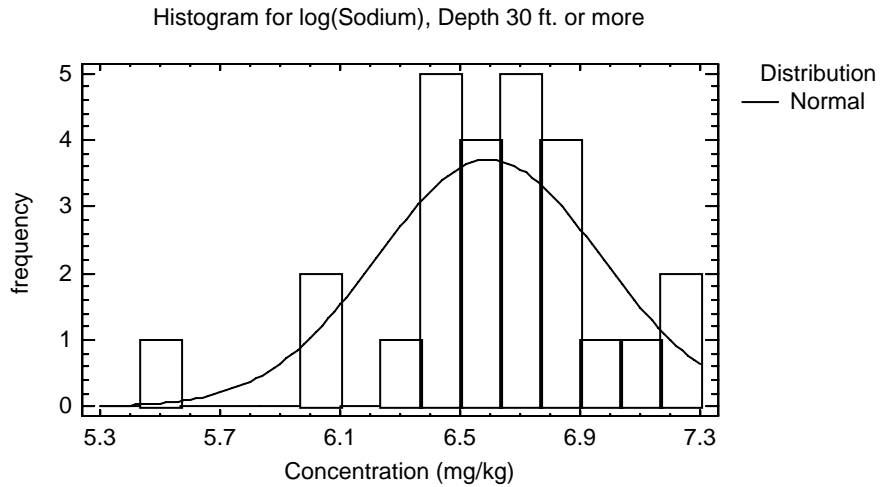
Data variable: log(Sodium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 5.47227 to 7.20786

Fitted Distributions

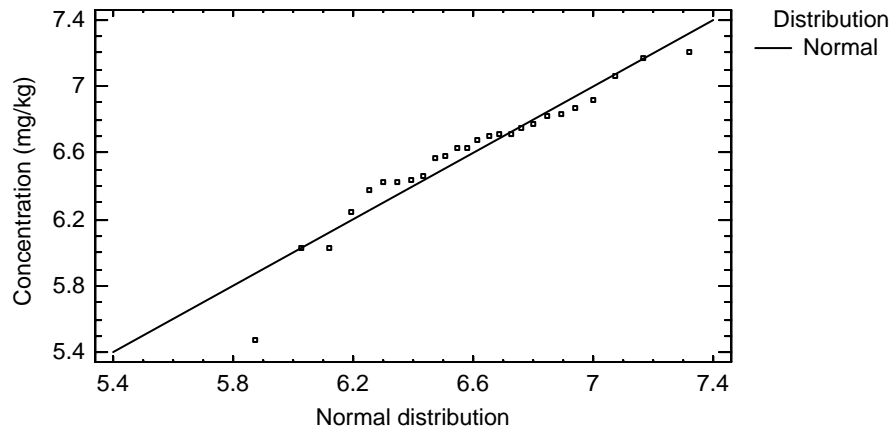
Normal
mean = 6.59692
standard deviation = 0.373457



Tests for Normality for log(Sodium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.934619	0.107226

Quantile-Quantile Plot for log(Sodium), Depth 30 ft. or more



**DRAFT**

**Two-Sample Comparison - Sodium & Depth Range (Data Set="Tronox") for Sodium**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 376.0 to 1230.0  
 Sample 2: 26 values ranging from 238.0 to 1350.0

Comparison of Means for Sodium

95.0% confidence interval for mean of Depth Range=20 ft. or less: 766.833 +/- 107.627 [659.206, 874.46]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 778.308 +/- 104.242 [674.065, 882.55]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: -11.4744 +/- 146.018 [-157.492, 134.543]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -0.158 P-value = 0.87512  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Sodium

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	254.881	258.083
Variance	64964.3	66606.9
Df	23	25

Ratio of Variances = 0.975339

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [198.097, 357.537]  
 Standard deviation of Depth Range=30 ft. or more: [202.404, 356.26]  
 Ratio of Variances: [0.432509, 2.2307]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.975339 P-value = 0.956331  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Sodium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

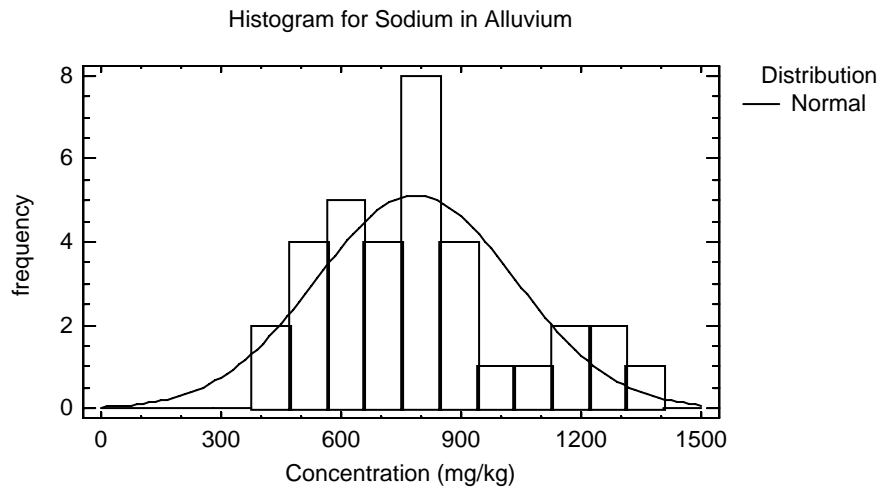
Data variable: Sodium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 376.0 to 1350.0

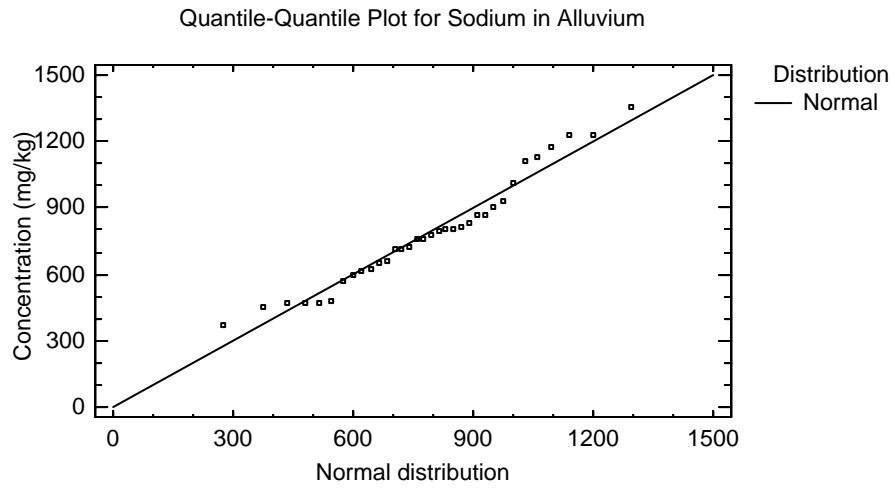
Fitted Distributions

Normal
mean = 786.485
standard deviation = 248.349



Tests for Normality for Sodium

Test	Statistic	P-Value
Shapiro-Wilk W	0.95335	0.195504





**DRAFT**

**Uncensored Data - log(Sodium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

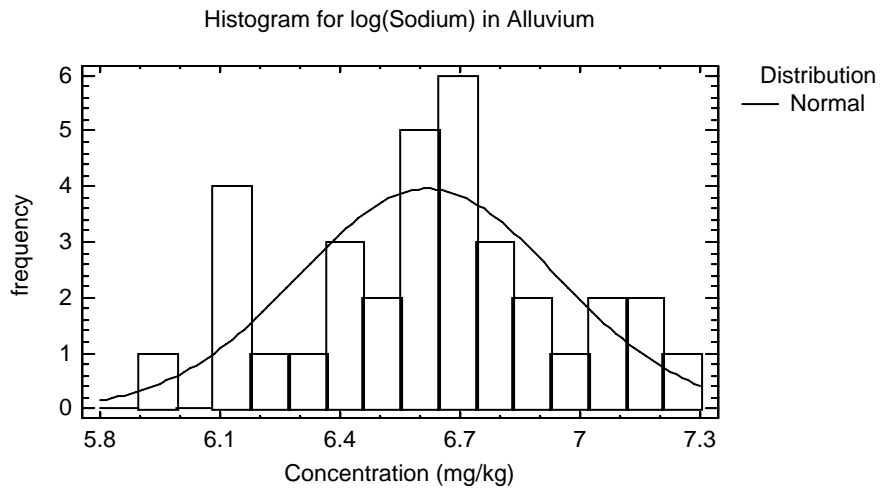
Data variable: log(Sodium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 5.92959 to 7.20786

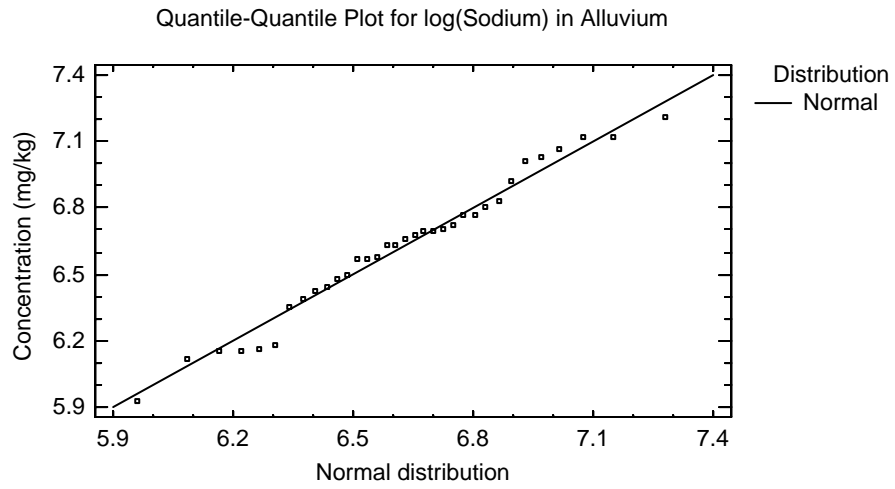
Fitted Distributions

Normal
mean = 6.61858
standard deviation = 0.321005



Tests for Normality for log(Sodium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.970558	0.551562



**DRAFT**

**Uncensored Data - Sodium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

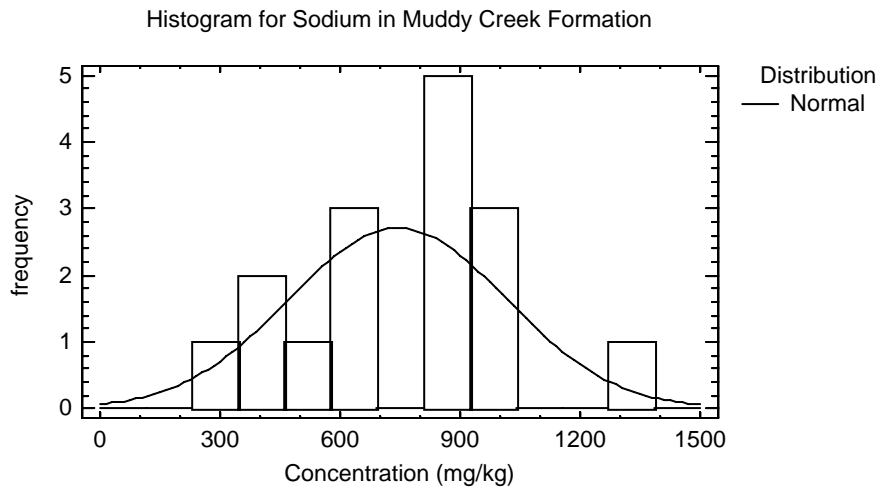
Data variable: Sodium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 238.0 to 1300.0

Fitted Distributions

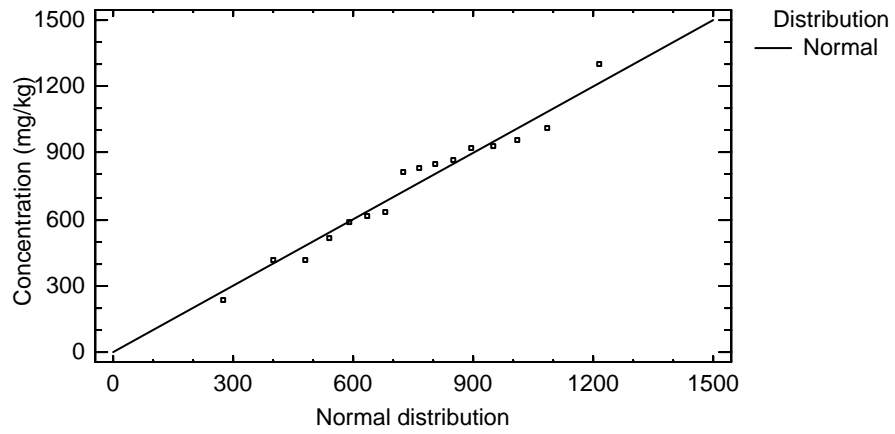
Normal
mean = 743.719
standard deviation = 271.508



Tests for Normality for Sodium

Test	Statistic	P-Value
Shapiro-Wilk W	0.971418	0.830033

Quantile-Quantile Plot for Sodium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Sodium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

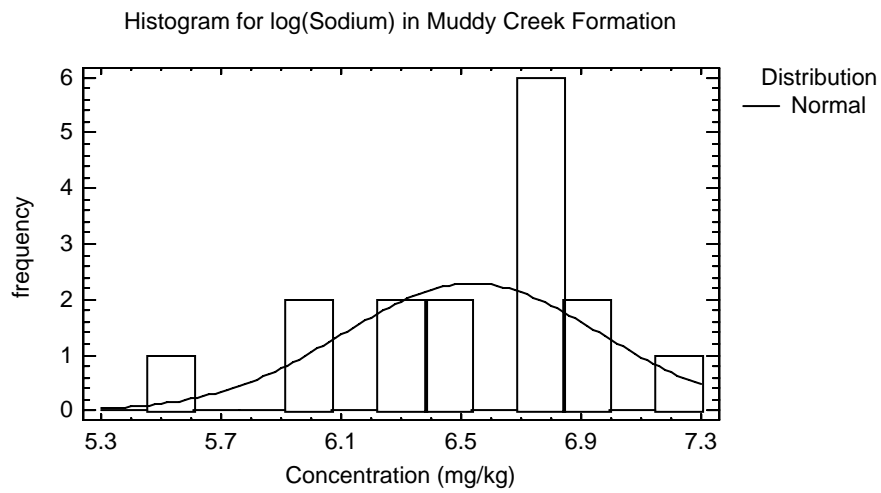
Data variable: log(Sodium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 5.47227 to 7.17012

Fitted Distributions

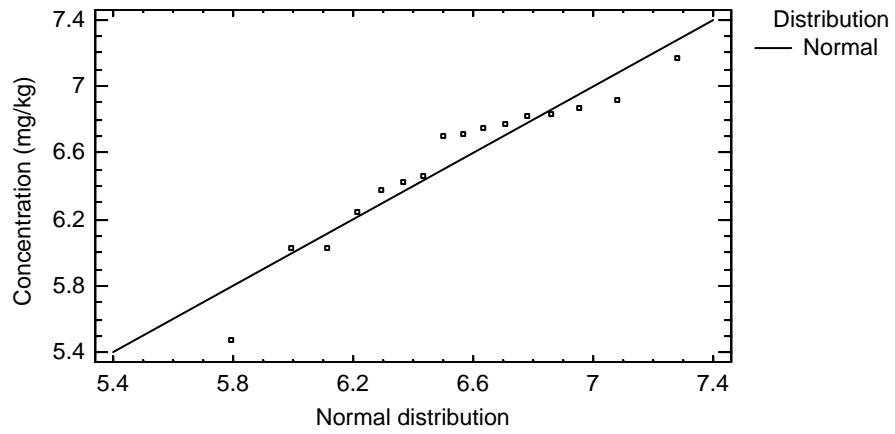
Normal
mean = 6.53584
standard deviation = 0.42864



Tests for Normality for log(Sodium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.919745	0.168678

Quantile-Quantile Plot for log(Sodium) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - Sodium & Geological Formation 1 (Data Set="Tronox") for Sodium**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 376.0 to 1350.0  
 Sample 2: 16 values ranging from 238.0 to 1300.0

Comparison of Means for Sodium

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 786.485 +/- 86.6532 [699.832, 873.139]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 743.719 +/- 144.677 [599.042, 888.395]

95.0% confidence interval for the difference between the means  
 assuming equal variances: 42.7665 +/- 155.934 [-113.167, 198.7]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 0.55144 P-value = 0.58389

Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Sodium

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	248.349	271.508
Variance	61677.2	73716.5
Df	33	15

Ratio of Variances = 0.836681

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [200.312, 326.896]

Standard deviation of Geological Formation 1=Muddy Creek: [200.564, 420.21]

Ratio of Variances: [0.319027, 1.89177]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.836681 P-value = 0.645463

Do not reject the null hypothesis for alpha = 0.05.

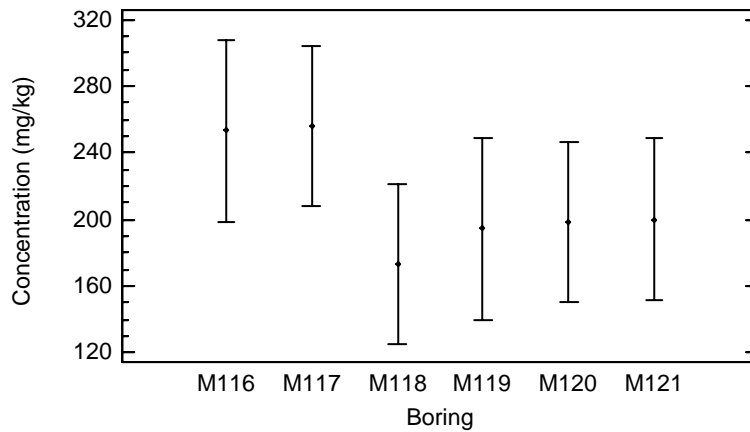
DRAFT

### 2.23 Strontium

ANOVA Table for Strontium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	47694.8	5	9538.96	2.03	0.0934
Within groups	207123.	44	4707.35		
Total (Corr.)	254818.	49			

Means and 95.0 Percent Tukey HSD Intervals for Strontium



Kruskal-Wallis Test for Strontium by Location ID

Location ID	Sample Size	Average Rank
M116	7	34.5714
M117	9	33.1111
M118	9	17.3889
M119	7	22.1429
M120	9	21.5556
M121	9	25.5

Test statistic = 8.983 P-Value = 0.109744



**DRAFT**

**Uncensored Data - Strontium (Data Set = "Tronox")**

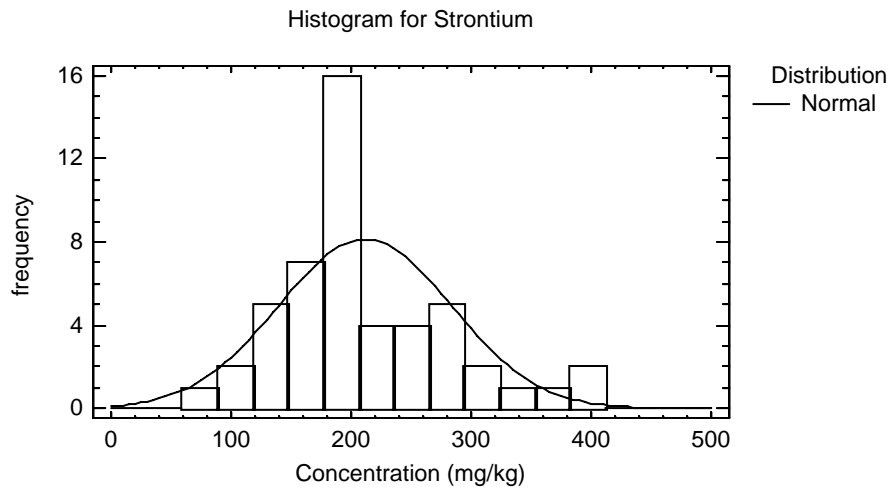
Data variable: Strontium

Selection variable: Data Set = "Tronox"

50 values ranging from 78.2 to 393.0

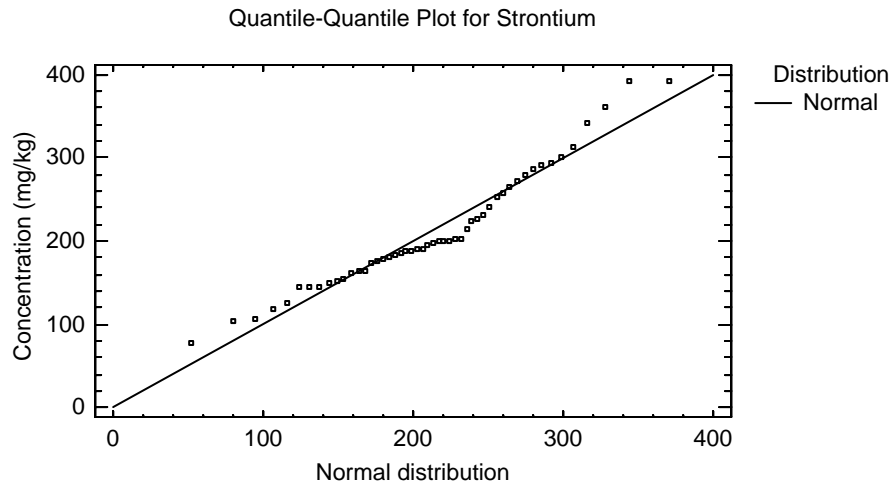
Fitted Distributions

Normal
mean = 211.584
standard deviation = 72.1136



Tests for Normality for Strontium

Test	Statistic	P-Value
Shapiro-Wilk W	0.943346	0.0289208



**DRAFT**

**Uncensored Data - log(Strontium) (Data Set = "Tronox")**

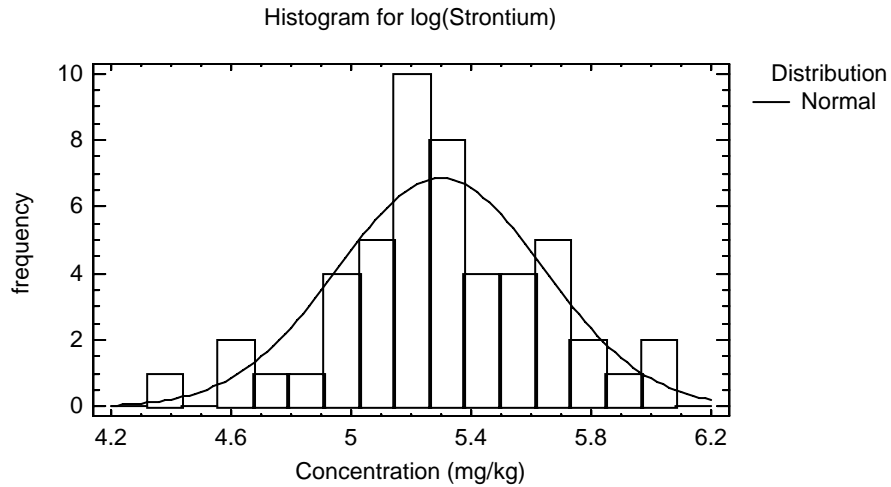
Data variable: log(Strontium)

Selection variable: Data Set = "Tronox"

50 values ranging from 4.35927 to 5.97381

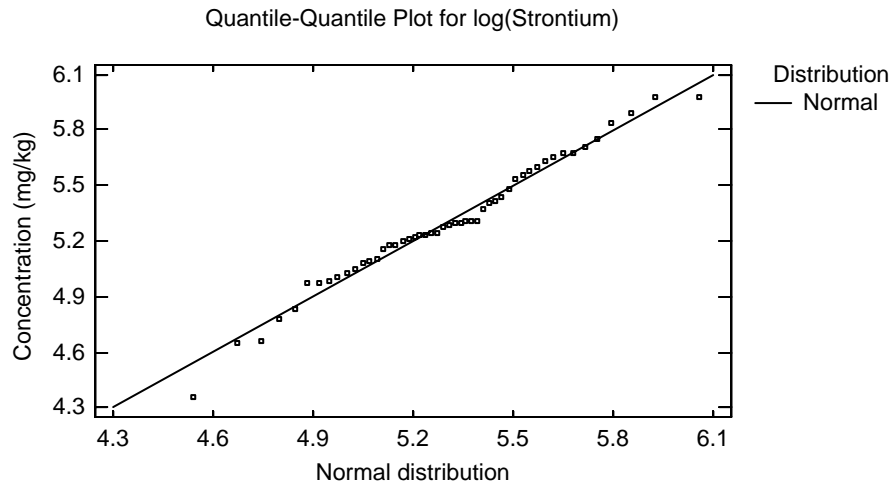
Fitted Distributions

Normal
mean = 5.29828
standard deviation = 0.342648



Tests for Normality for log(Strontium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.979205	0.699131



**DRAFT**

**Uncensored Data - Strontium (Data Set = "Tronox"&Depth Value<=20)**

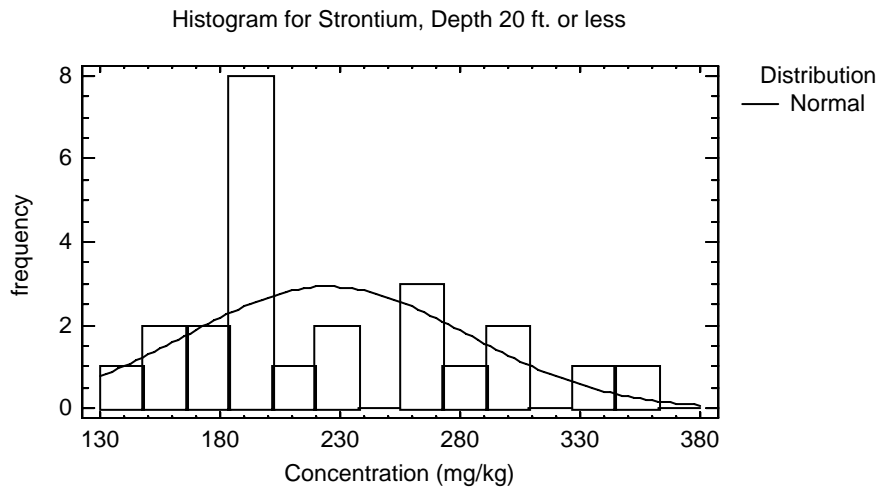
Data variable: Strontium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 146.0 to 361.0

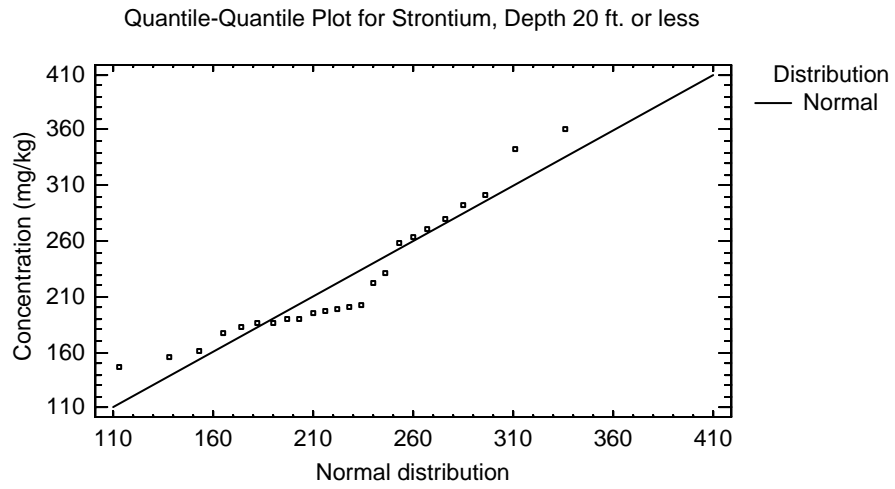
Fitted Distributions

Normal
mean = 224.792
standard deviation = 58.3289



Tests for Normality for Strontium

Test	Statistic	P-Value
Shapiro-Wilk W	0.906501	0.028876



**DRAFT**

**Uncensored Data - log(Strontium) (Data Set = "Tronox"&Depth Value<=20)**

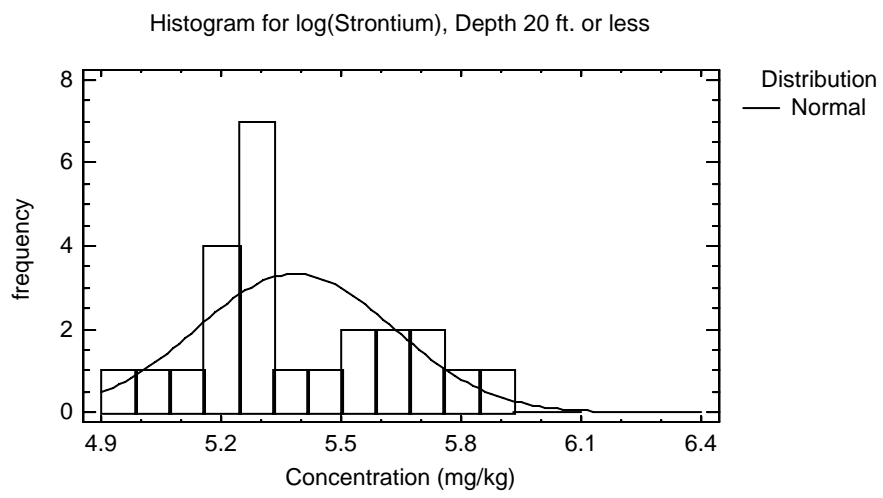
Data variable: log(Strontium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 4.98361 to 5.88888

Fitted Distributions

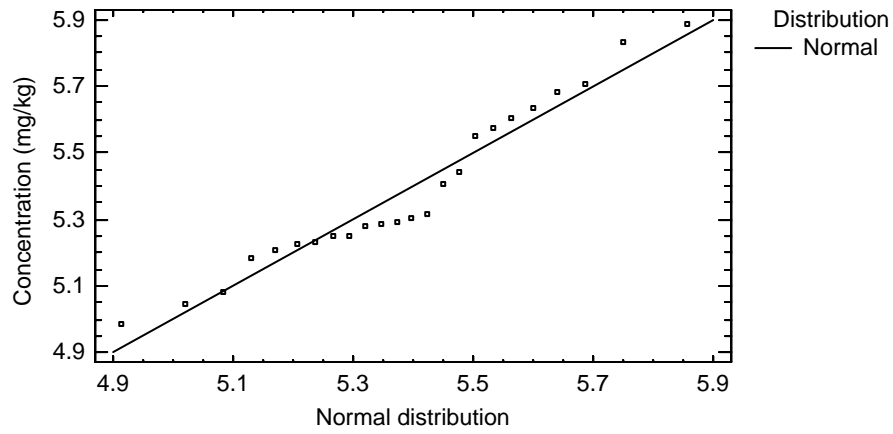
Normal
mean = 5.38519
standard deviation = 0.246235



Tests for Normality for log(Strontium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.945346	0.220423

Quantile-Quantile Plot for log(Strontium), Depth 20 ft. or less





**DRAFT**

**Uncensored Data - Strontium (Data Set = "Tronox"&Depth Value>=30)**

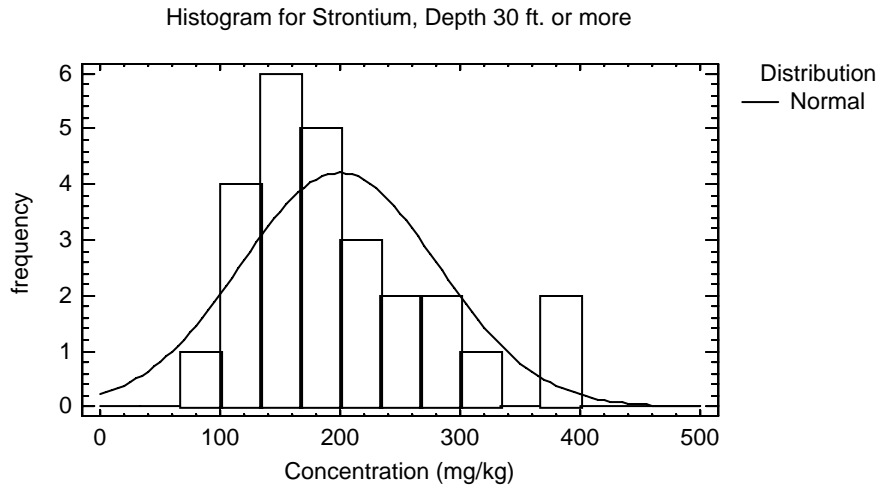
Data variable: Strontium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 78.2 to 393.0

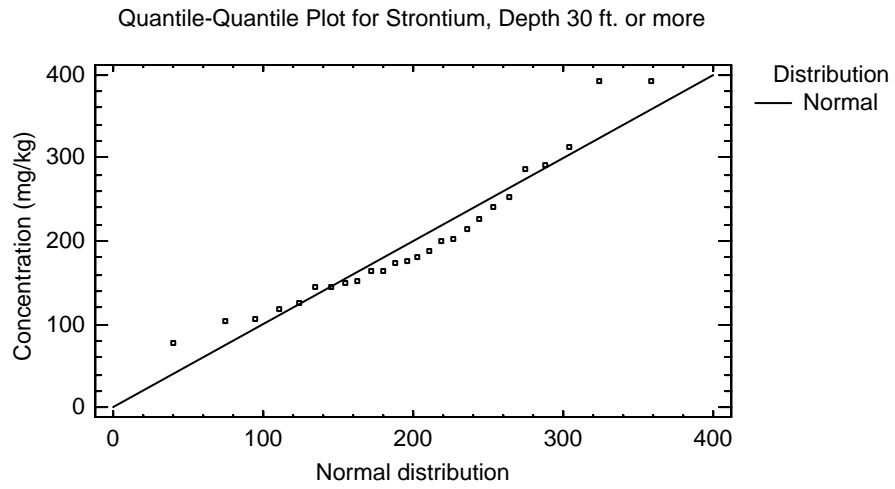
Fitted Distributions

Normal
mean = 199.392
standard deviation = 82.1012



Tests for Normality for Strontium

Test	Statistic	P-Value
Shapiro-Wilk W	0.918788	0.0442026



**DRAFT**

**Uncensored Data - log(Strontium) (Data Set = "Tronox"&Depth Value>=30)**

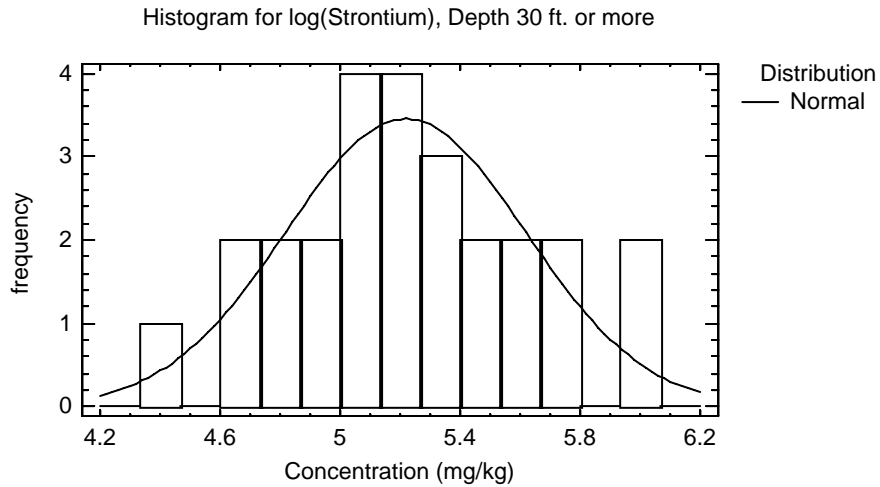
Data variable: log(Strontium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 4.35927 to 5.97381

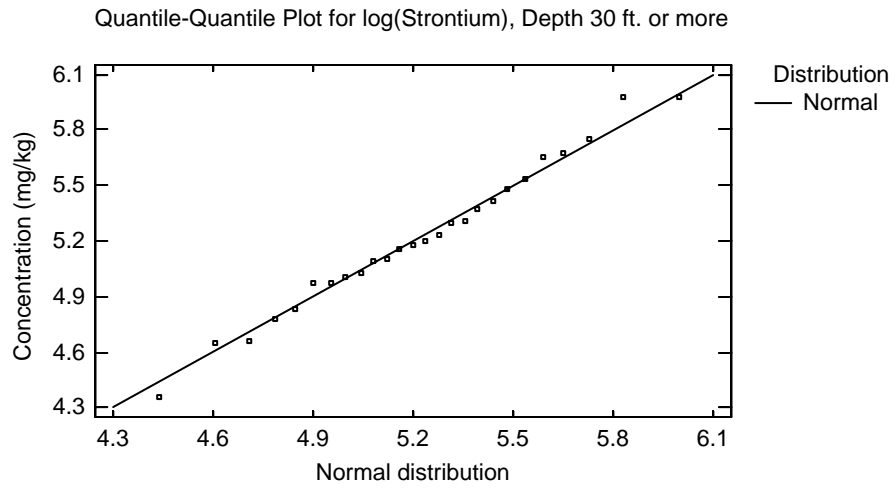
Fitted Distributions

Normal
mean = 5.21806
standard deviation = 0.400491



Tests for Normality for log(Strontium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.984514	0.947545



**DRAFT**

**Two-Sample Comparison - log(Strontium) & Depth Range (Data Set="Tronox") for log(Strontium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 4.98361 to 5.88888  
 Sample 2: 26 values ranging from 4.35927 to 5.97381

Comparison of Means for log(Strontium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: 5.38519 +/- 0.103976 [5.28121, 5.48917]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 5.21806 +/- 0.161762 [5.0563, 5.37982]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: 0.167131 +/- 0.188182 [-0.0210508, 0.355313]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = 1.79232 P-value = 0.0802852  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Strontium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.246235	0.400491
Variance	0.0606317	0.160393
Df	23	25

Ratio of Variances = 0.378019

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.191377, 0.345409]  
 Standard deviation of Depth Range=30 ft. or more: [0.314088, 0.552842]  
 Ratio of Variances: [0.167631, 0.864568]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.378019 P-value = 0.021896  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Strontium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

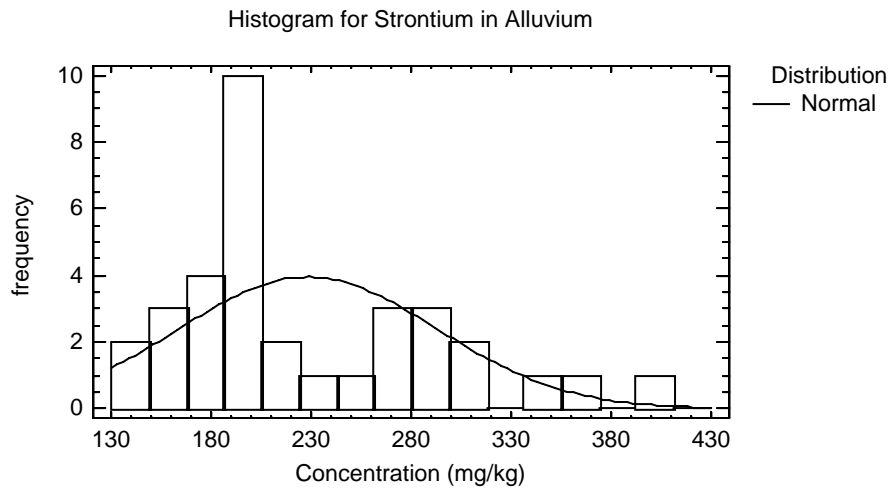
Data variable: Strontium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 145.0 to 393.0

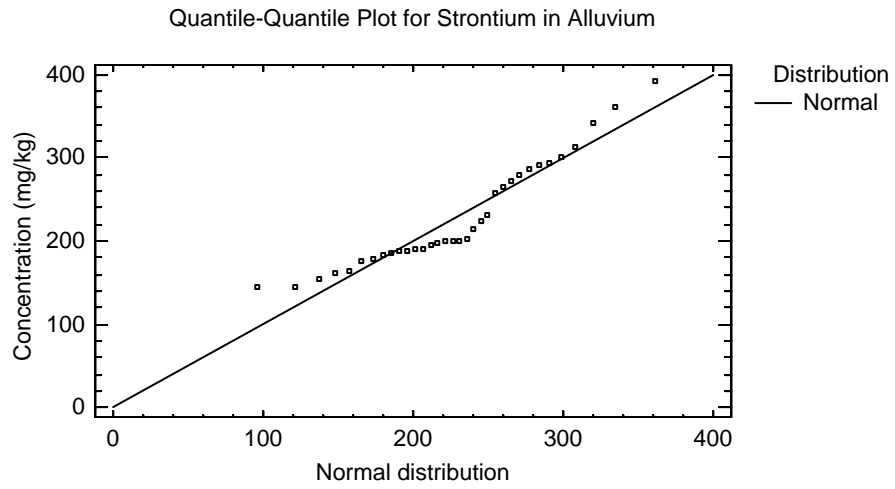
Fitted Distributions

Normal
mean = 228.397
standard deviation = 64.3473



Tests for Normality for Strontium

Test	Statistic	P-Value
Shapiro-Wilk W	0.903675	0.00592018



**DRAFT**

**Uncensored Data - log(Strontium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

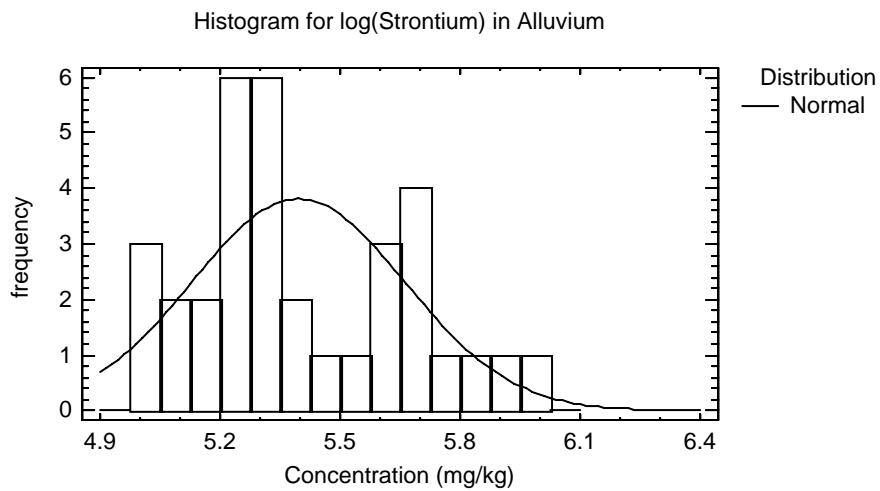
Data variable: log(Strontium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 4.97673 to 5.97381

Fitted Distributions

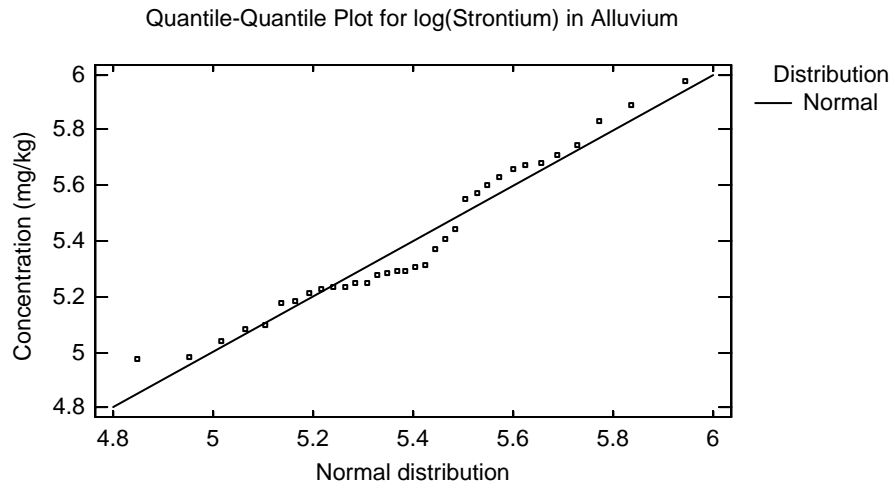
Normal
mean = 5.39539
standard deviation = 0.266836



Tests for Normality for log(Strontium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.941584	0.087147





**DRAFT**

**Uncensored Data - Strontium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

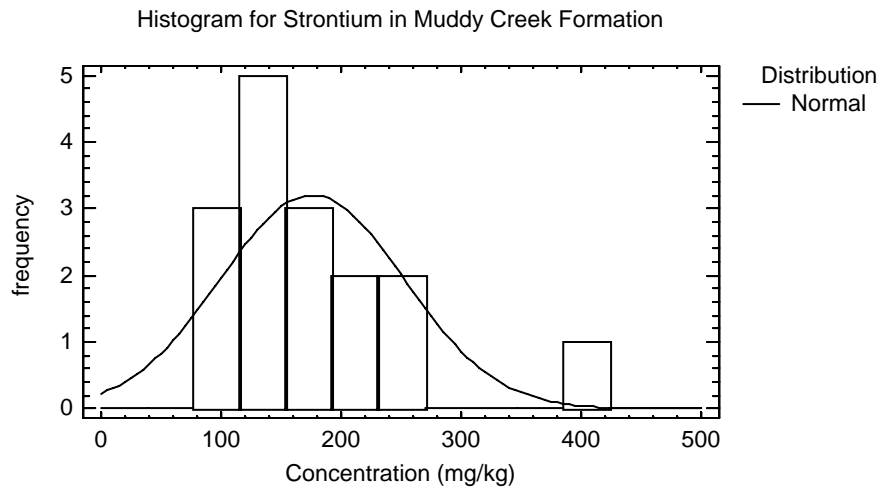
Data variable: Strontium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 78.2 to 393.0

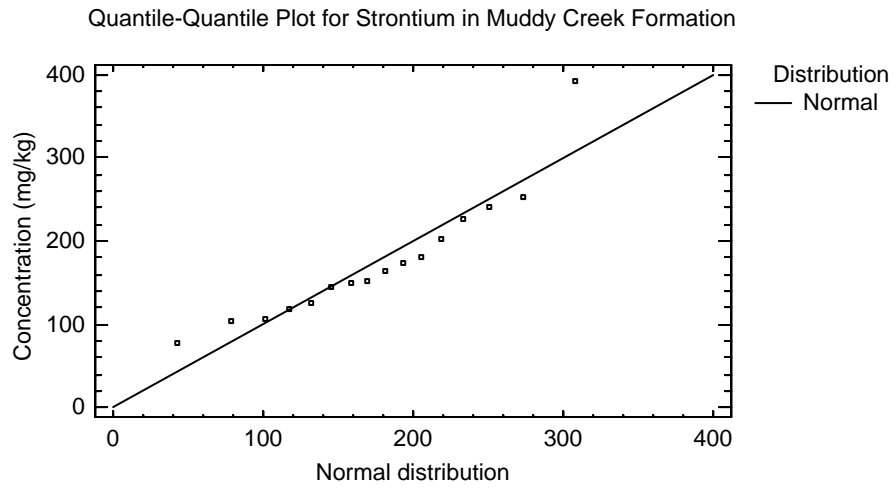
Fitted Distributions

Normal
mean = 175.856
standard deviation = 76.6571



Tests for Normality for Strontium

Test	Statistic	P-Value
Shapiro-Wilk W	0.882905	0.0433203



**DRAFT**

**Uncensored Data - log(Strontium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

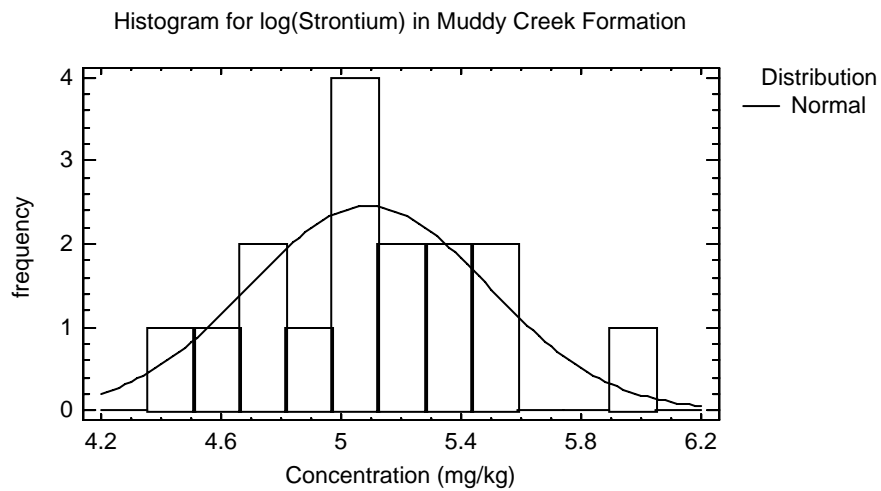
Data variable: log(Strontium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 4.35927 to 5.97381

Fitted Distributions

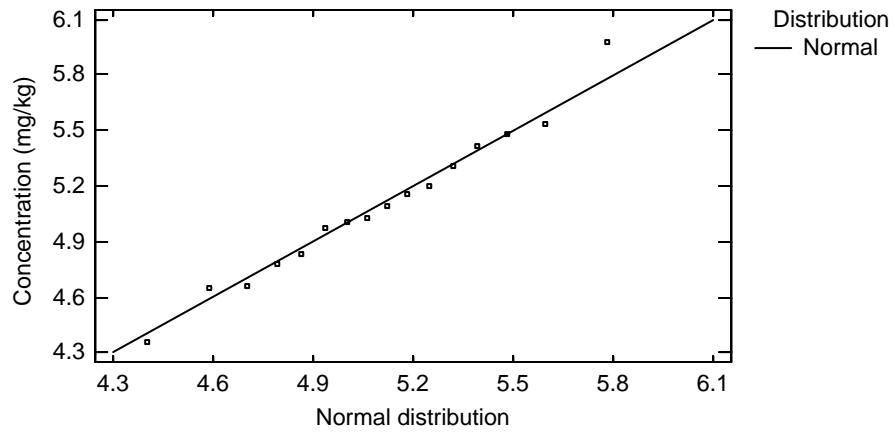
Normal
mean = 5.09192
standard deviation = 0.400113



Tests for Normality for log(Strontium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.986553	0.98699

Quantile-Quantile Plot for log(Strontium) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - log(Strontium) & Geological Formation 1 (Data Set="Tronox") for log(Strontium)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 4.97673 to 5.97381  
 Sample 2: 16 values ranging from 4.35927 to 5.97381

Comparison of Means for log(Strontium)

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 5.39539 +/- 0.0931036 [5.30229, 5.48849]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 5.09192 +/- 0.213206 [4.87872, 5.30513]

95.0% confidence interval for the difference between the means  
 assuming equal variances: 0.303466 +/- 0.191775 [0.111691, 0.495241]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 3.18165 P-value = 0.00256788

Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Strontium)

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	0.266836	0.400113
Variance	0.0712014	0.160091
Df	33	15

Ratio of Variances = 0.444757

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.215224, 0.35123]

Standard deviation of Geological Formation 1=Muddy Creek: [0.295566, 0.619252]

Ratio of Variances: [0.169586, 1.00562]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.444757 P-value = 0.0515882

Do not reject the null hypothesis for alpha = 0.05.

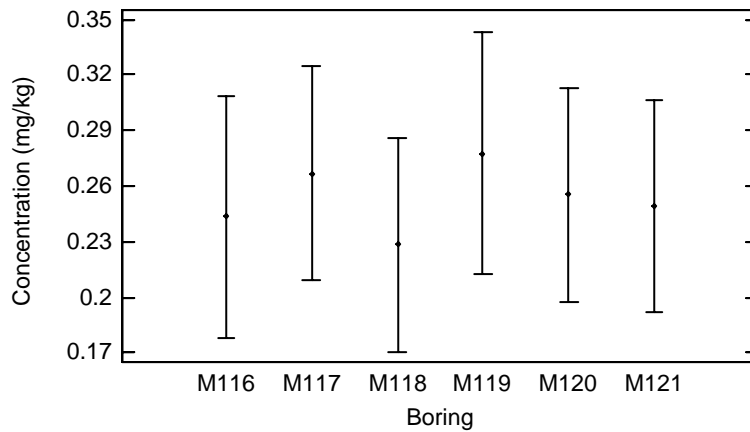
DRAFT

### 2.24 Thallium

ANOVA Table for Thallium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.0122367	5	0.00244733	0.36	0.8715
Within groups	0.297159	44	0.00675362		
Total (Corr.)	0.309396	49			

Means and 95.0 Percent Tukey HSD Intervals for Thallium



Kruskal-Wallis Test for Thallium by Location ID

Location ID	Sample Size	Average Rank
M116	7	25.3571
M117	9	30.1111
M118	9	21.8889
M119	7	30.0
M120	9	24.5556
M121	9	22.0556

Test statistic = 2.66157 P-Value = 0.75199

**DRAFT**

**Uncensored Data - Thallium (Data Set = "Tronox")**

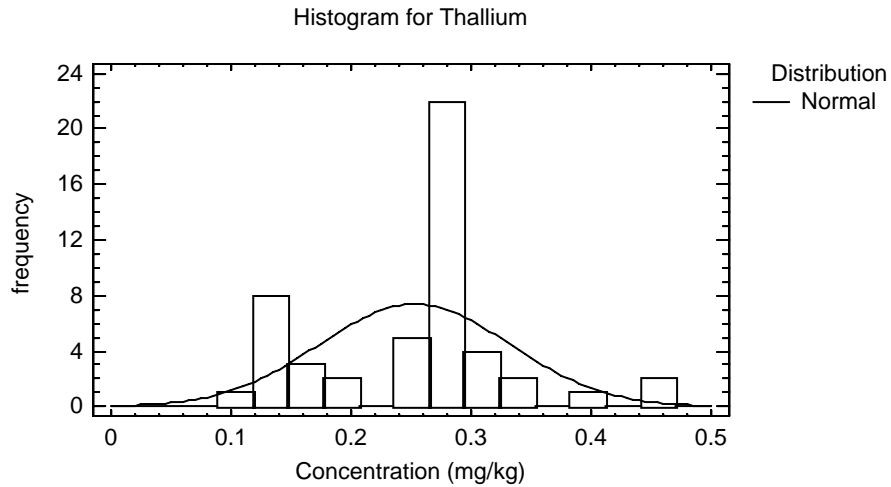
Data variable: Thallium

Selection variable: Data Set = "Tronox"

50 values ranging from 0.114 to 0.454

Fitted Distributions

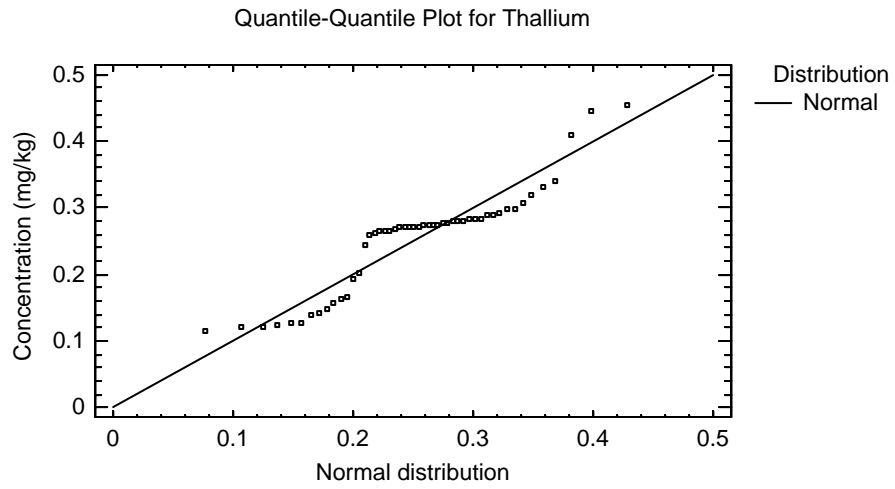
Normal
mean = 0.2528
standard deviation = 0.079462



Tests for Normality for Thallium

Test	Statistic	P-Value
Shapiro-Wilk W	0.883445	0.0000451249





**DRAFT**

**Uncensored Data - log(Thallium) (Data Set = "Tronox")**

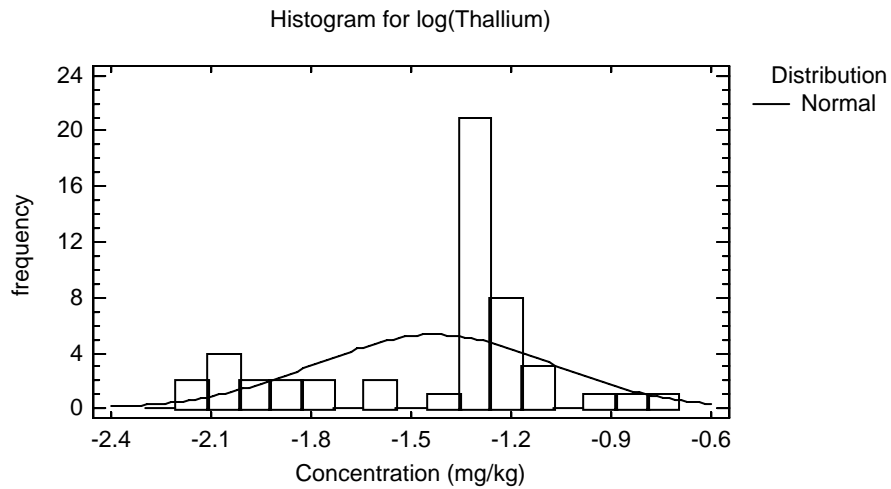
Data variable: log(Thallium)

Selection variable: Data Set = "Tronox"

50 values ranging from -2.17156 to -0.789658

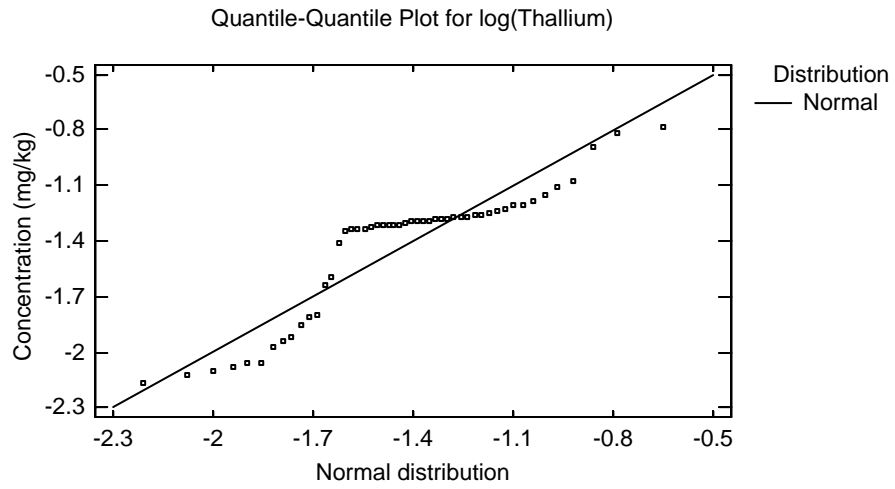
Fitted Distributions

Normal
mean = -1.43077
standard deviation = 0.352072



Tests for Normality for log(Thallium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.847438	0.00000109375



**DRAFT**

**Uncensored Data - Thallium (Data Set = "Tronox"&Depth Value<=20)**

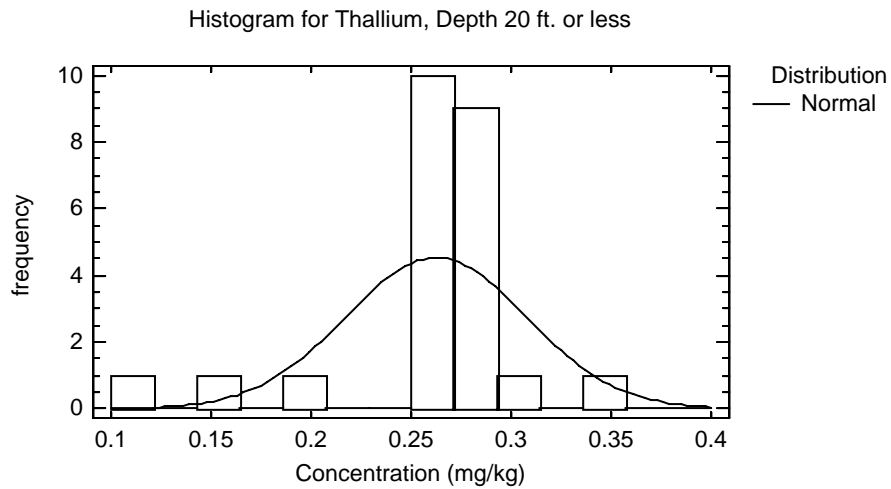
Data variable: Thallium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.114 to 0.34

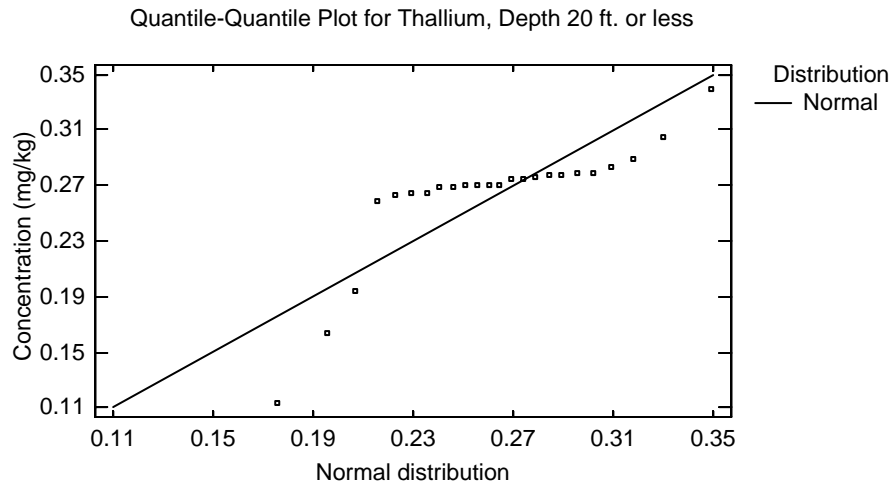
Fitted Distributions

Normal
mean = 0.262406
standard deviation = 0.0453199



Tests for Normality for Thallium

Test	Statistic	P-Value
Shapiro-Wilk W	0.711081	0.00000462008



**DRAFT**

**Uncensored Data - log(Thallium) (Data Set = "Tronox"&Depth Value<=20)**

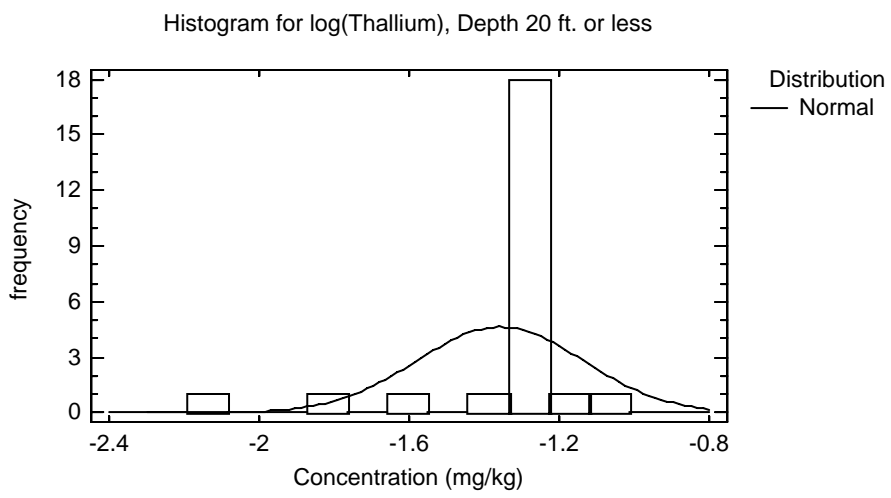
Data variable: log(Thallium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -2.17156 to -1.07881

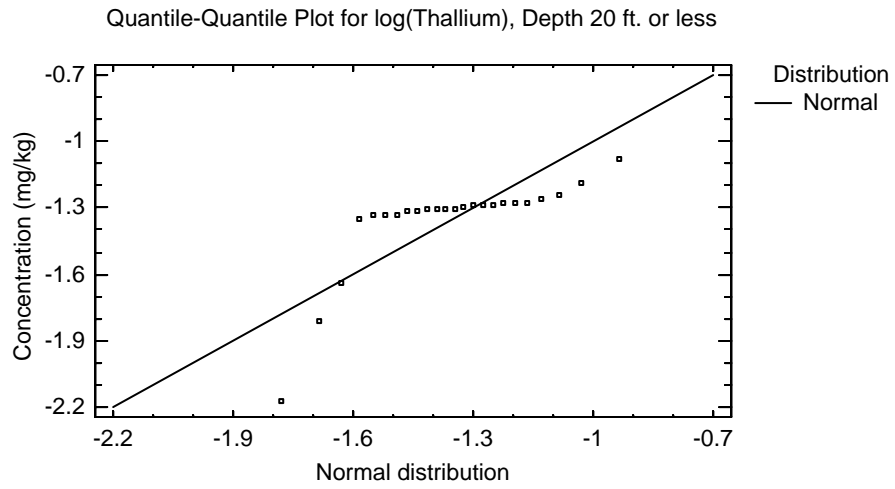
Fitted Distributions

Normal
mean = -1.35761
standard deviation = 0.221509



Tests for Normality for log(Thallium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.618928	1.75716E-7



**DRAFT**

**Uncensored Data - Thallium (Data Set = "Tronox"&Depth Value>=30)**

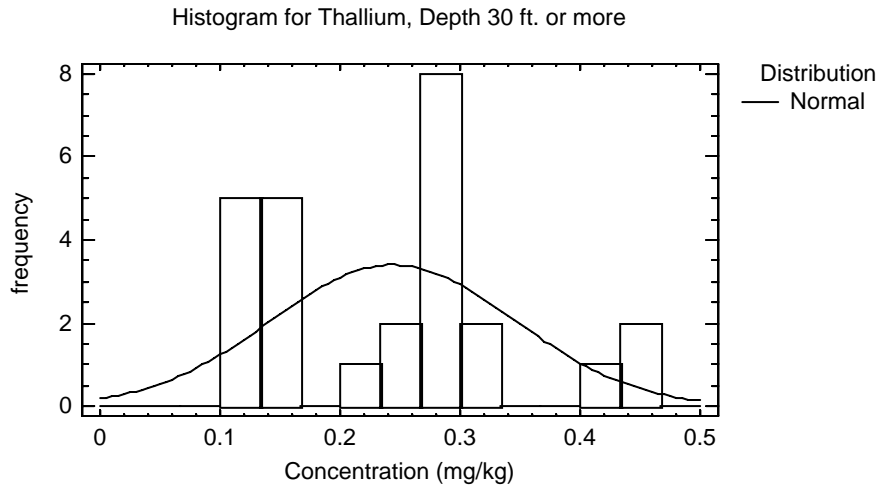
Data variable: Thallium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.12 to 0.454

Fitted Distributions

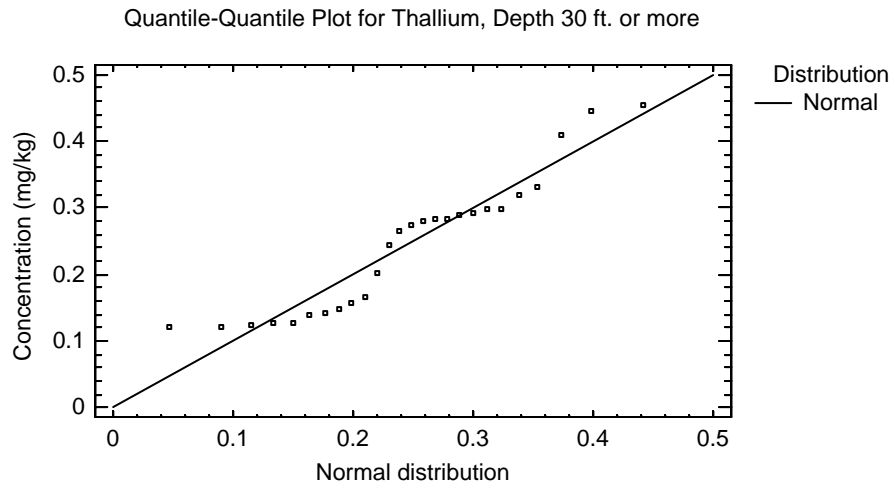
Normal
mean = 0.243933
standard deviation = 0.101567



Tests for Normality for Thallium

Test	Statistic	P-Value
Shapiro-Wilk W	0.898233	0.0141059





**DRAFT**

**Uncensored Data - log(Thallium) (Data Set = "Tronox"&Depth Value>=30)**

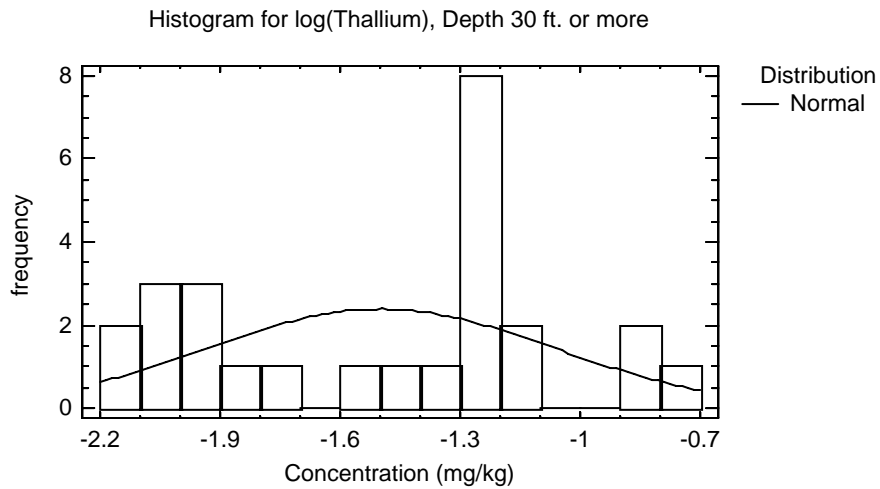
Data variable: log(Thallium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -2.12026 to -0.789658

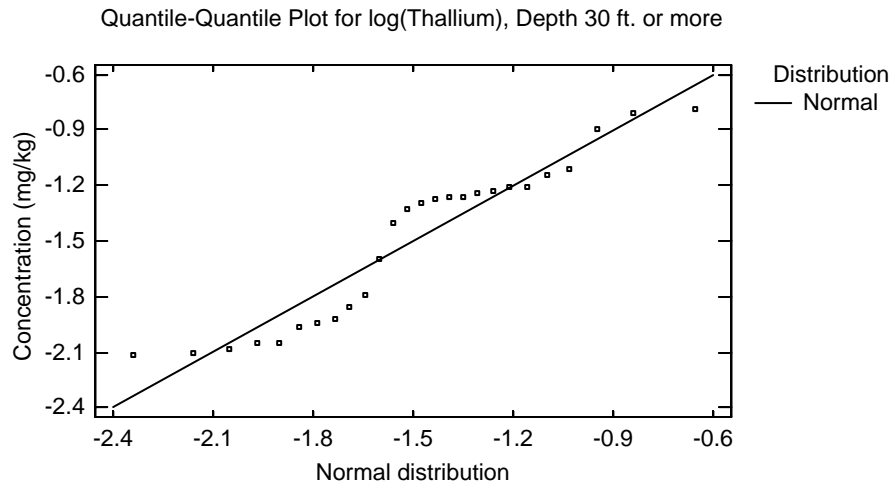
Fitted Distributions

Normal
mean = -1.4983
standard deviation = 0.433508



Tests for Normality for log(Thallium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.895791	0.0123384



**DRAFT**

## Tronox Thallium by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.665880757$   $p = 0.505487321$

Do not reject the null hypothesis for  $\alpha=0.05$

**DRAFT**

**Uncensored Data - Thallium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

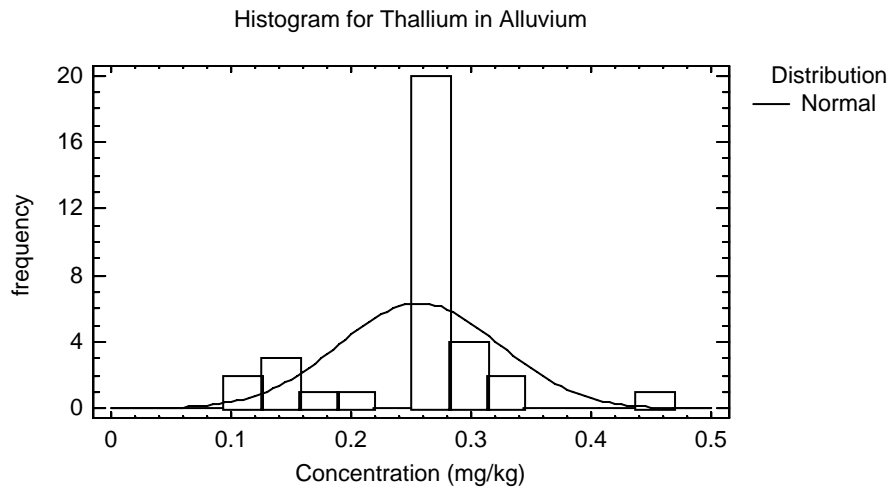
Data variable: Thallium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.114 to 0.444

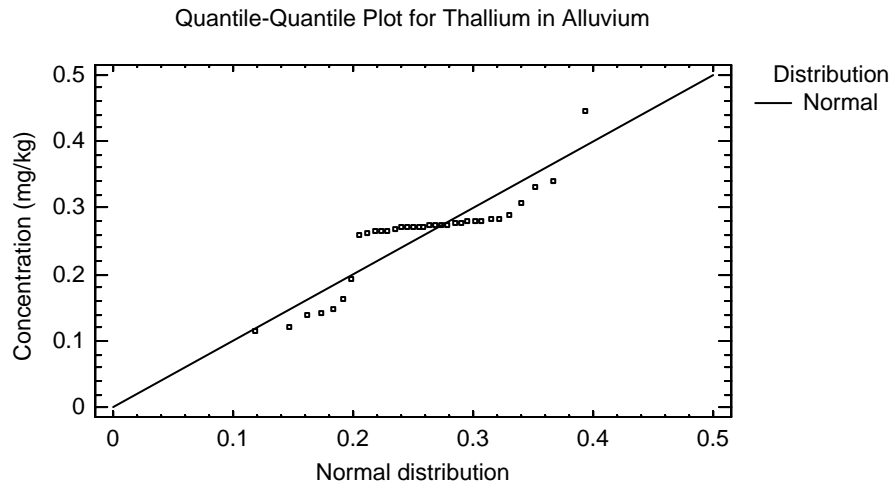
Fitted Distributions

Normal
mean = 0.256625
standard deviation = 0.0668653



Tests for Normality for Thallium

Test	Statistic	P-Value
Shapiro-Wilk W	0.8242	0.0000321985



**DRAFT**

**Uncensored Data - log(Thallium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

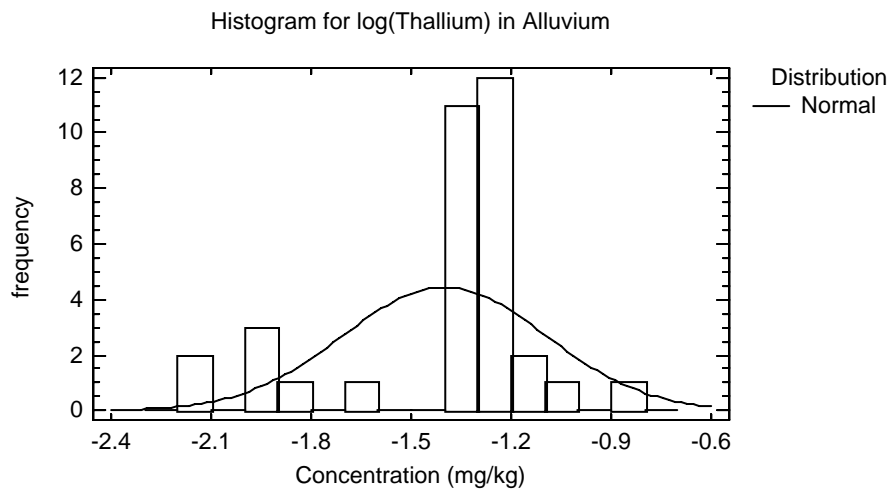
Data variable: log(Thallium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -2.17156 to -0.811931

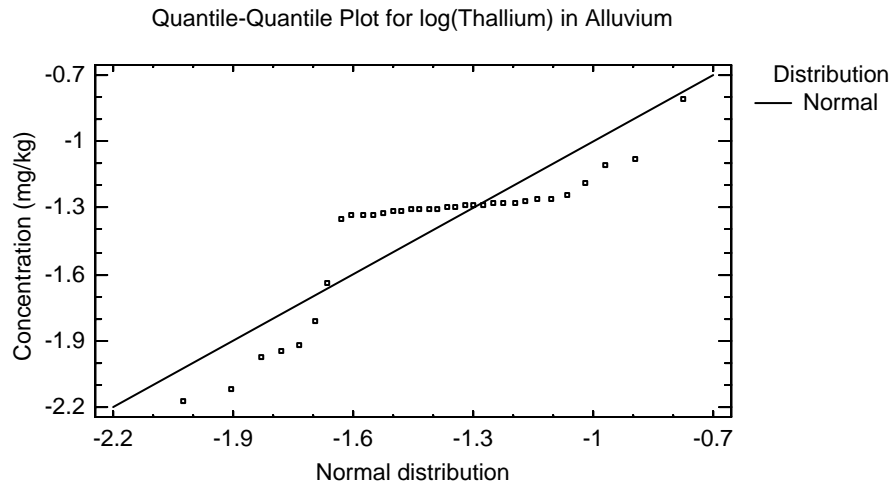
Fitted Distributions

Normal
mean = -1.40018
standard deviation = 0.304673



Tests for Normality for log(Thallium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.771203	0.00000147032





**DRAFT**

**Uncensored Data - Thallium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

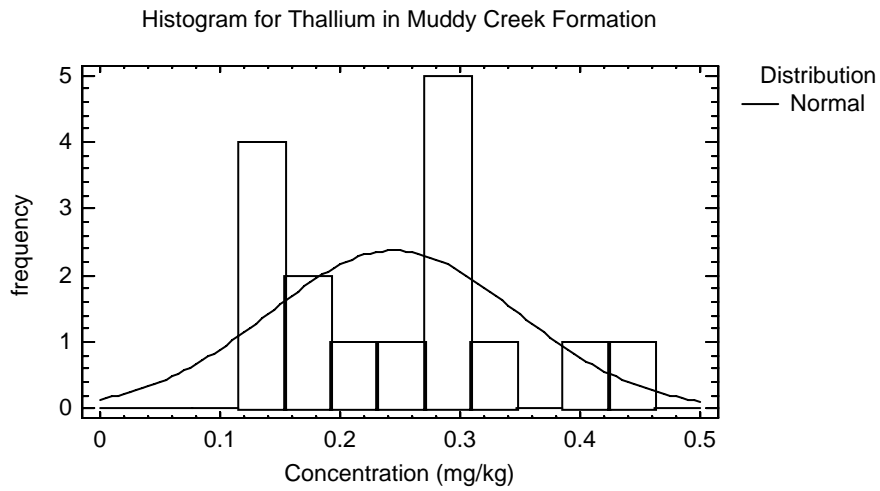
Data variable: Thallium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.122 to 0.454

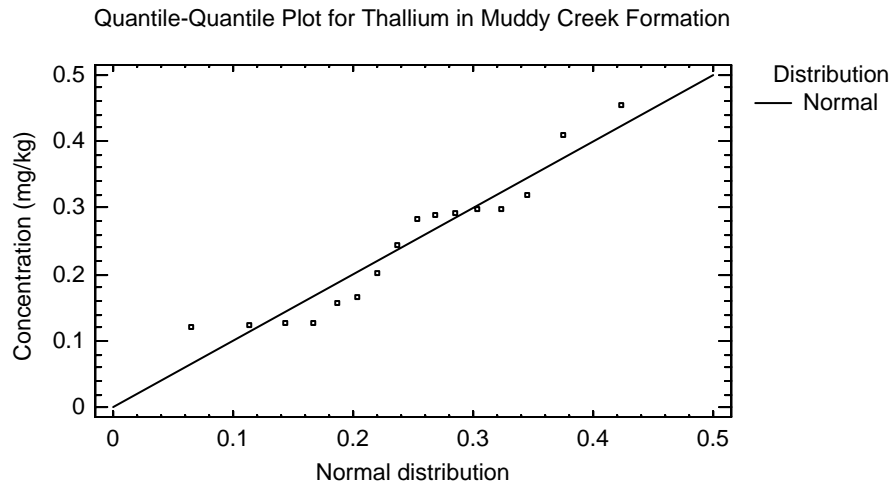
Fitted Distributions

Normal
mean = 0.244672
standard deviation = 0.103376



Tests for Normality for Thallium

Test	Statistic	P-Value
Shapiro-Wilk W	0.910197	0.118874



**DRAFT**

**Uncensored Data - log(Thallium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

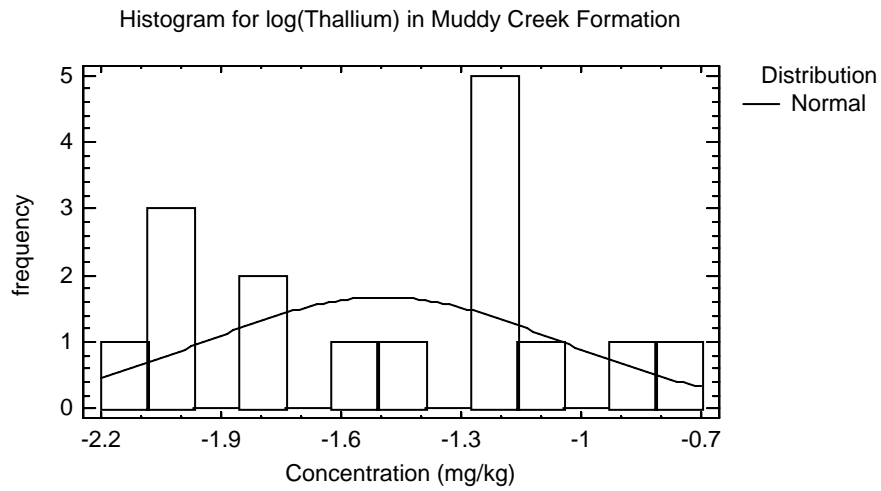
Data variable: log(Thallium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -2.10373 to -0.789658

Fitted Distributions

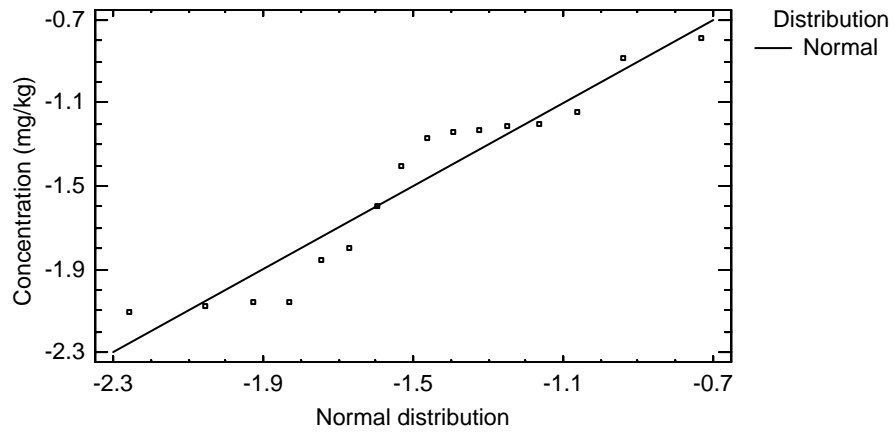
Normal
mean = -1.49577
standard deviation = 0.440538



Tests for Normality for log(Thallium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.9064	0.103331

Quantile-Quantile Plot for log(Thallium) in Muddy Creek Formation



**DRAFT**

## Tronox Thallium by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.499214682$   $p = 0.617628152$

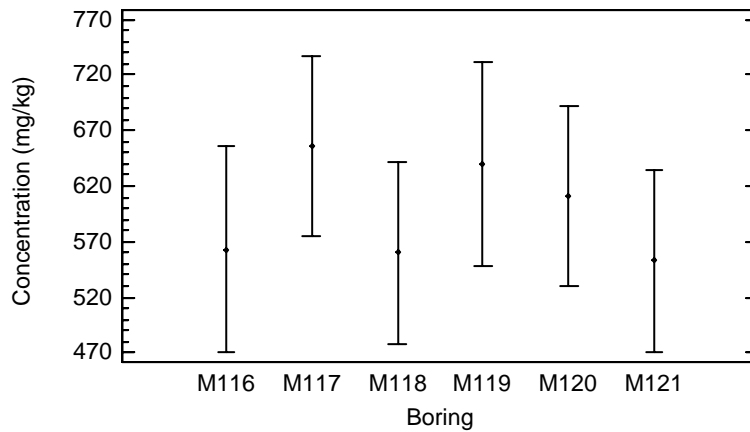
Do not reject the null hypothesis for  $\alpha = 0.05$

### 2.25 Titanium

ANOVA Table for Titanium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	84785.9	5	16957.2	1.27	0.2954
Within groups	589109.	44	13388.8		
Total (Corr.)	673895.	49			

Means and 95.0 Percent Tukey HSD Intervals for Titanium



Kruskal-Wallis Test for Titanium by Location ID

Location ID	Sample Size	Average Rank
M116	7	22.4286
M117	9	31.9444
M118	9	20.0556
M119	7	31.7857
M120	9	27.8333
M121	9	19.6667

Test statistic = 6.29932 P-Value = 0.278173

**DRAFT**

**Uncensored Data - Titanium (Data Set = "Tronox")**

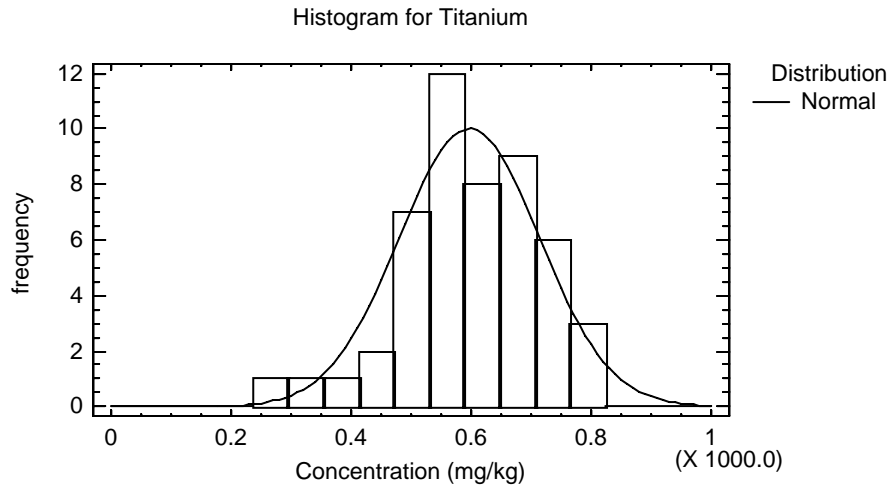
Data variable: Titanium

Selection variable: Data Set = "Tronox"

50 values ranging from 241.0 to 820.0

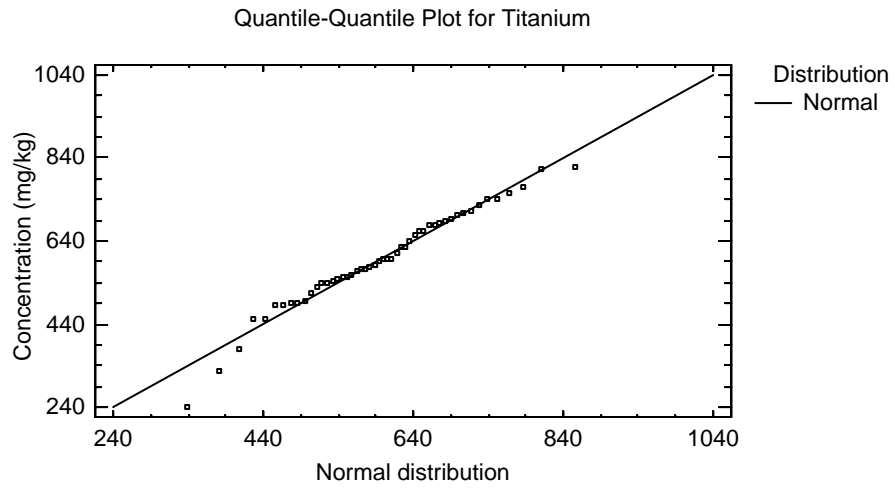
Fitted Distributions

Normal
mean = 596.89
standard deviation = 117.273



Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.972297	0.44898





**DRAFT**

**Uncensored Data - log(Titanium) (Data Set = "Tronox")**

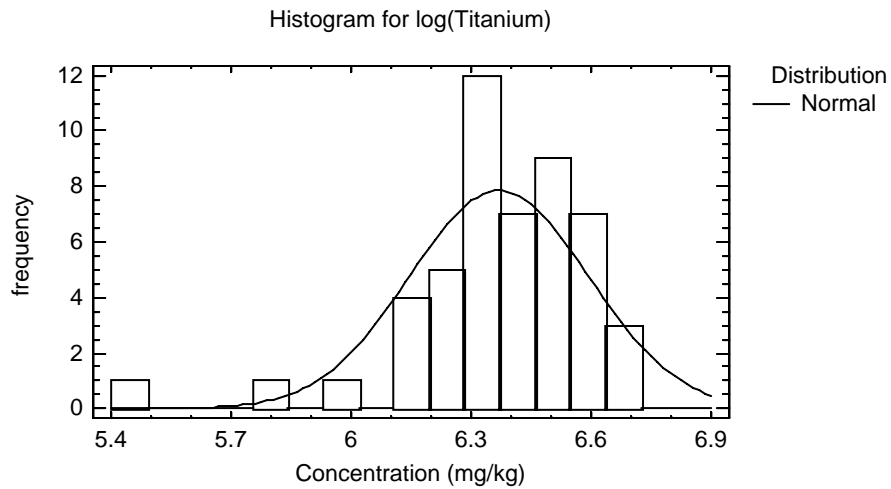
Data variable: log(Titanium)

Selection variable: Data Set = "Tronox"

50 values ranging from 5.4848 to 6.7093

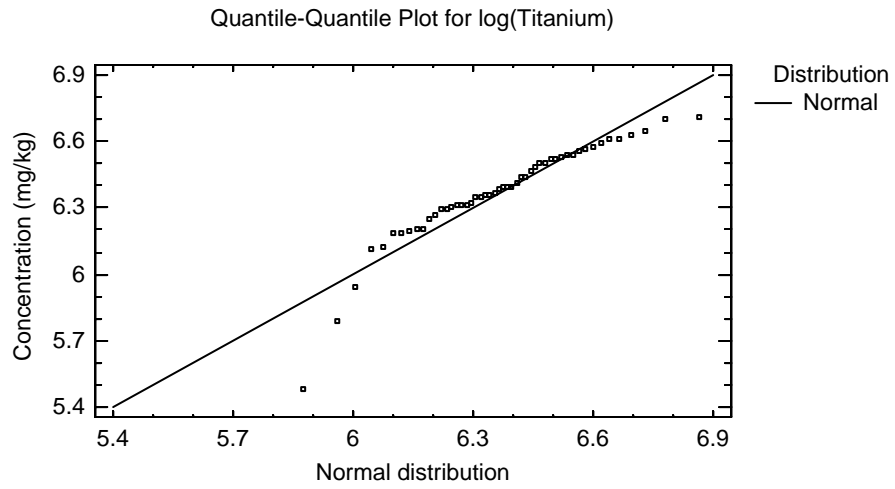
Fitted Distributions

Normal
mean = 6.36949
standard deviation = 0.224294



Tests for Normality for log(Titanium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.898666	0.000229151



**DRAFT**

**Uncensored Data - Titanium (Data Set = "Tronox"&Depth Value<=20)**

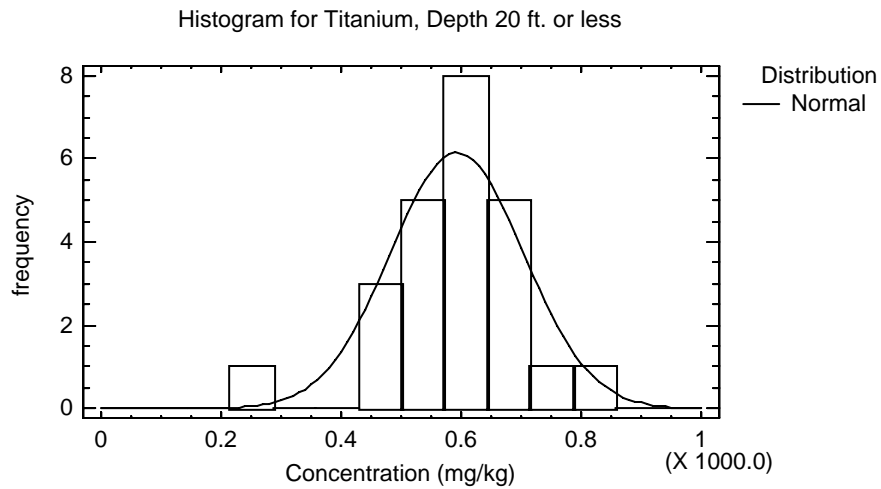
Data variable: Titanium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 241.0 to 820.0

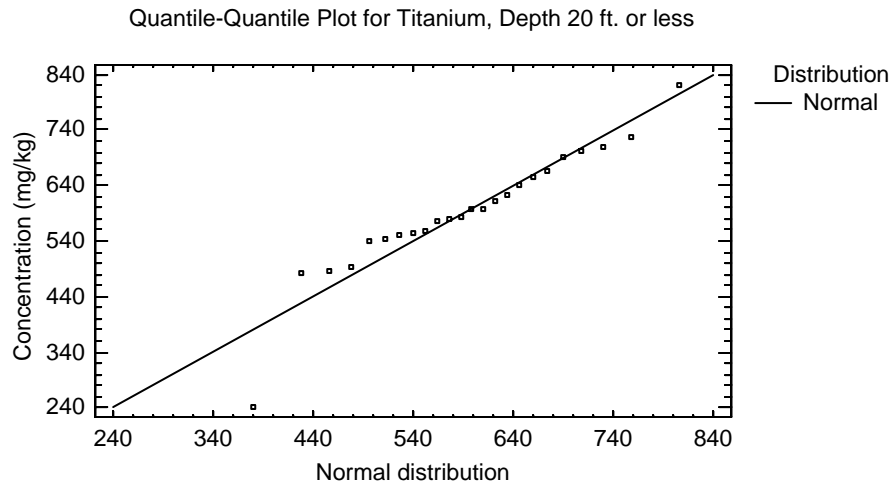
Fitted Distributions

Normal
mean = 592.917
standard deviation = 111.341



Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.921926	0.0650588



**DRAFT**

**Uncensored Data - log(Titanium) (Data Set = "Tronox"&Depth Value<=20)**

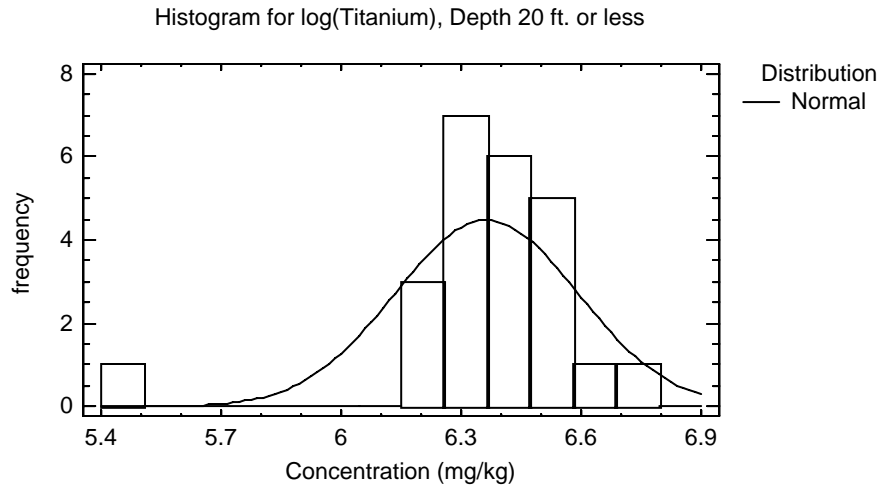
Data variable: log(Titanium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 5.4848 to 6.7093

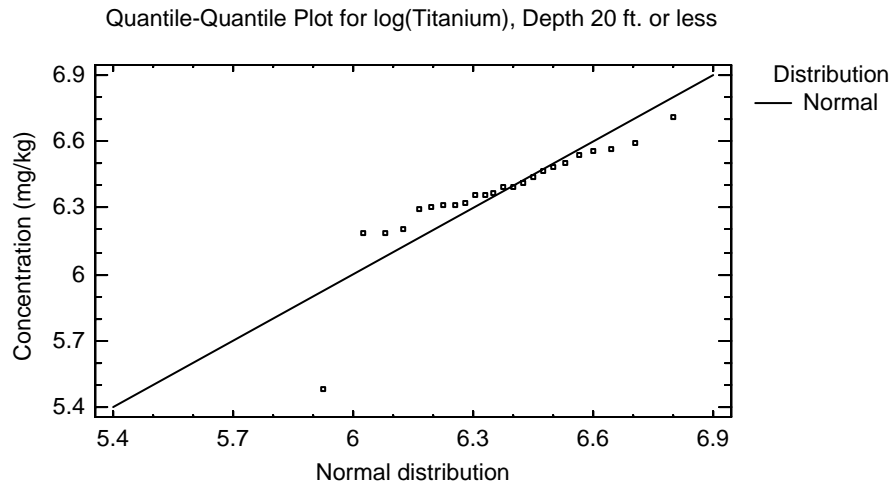
Fitted Distributions

Normal
mean = 6.36344
standard deviation = 0.22936



Tests for Normality for log(Titanium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.782978	0.0000821587



**DRAFT**

**Uncensored Data - Titanium (Data Set = "Tronox"&Depth Value>=30)**

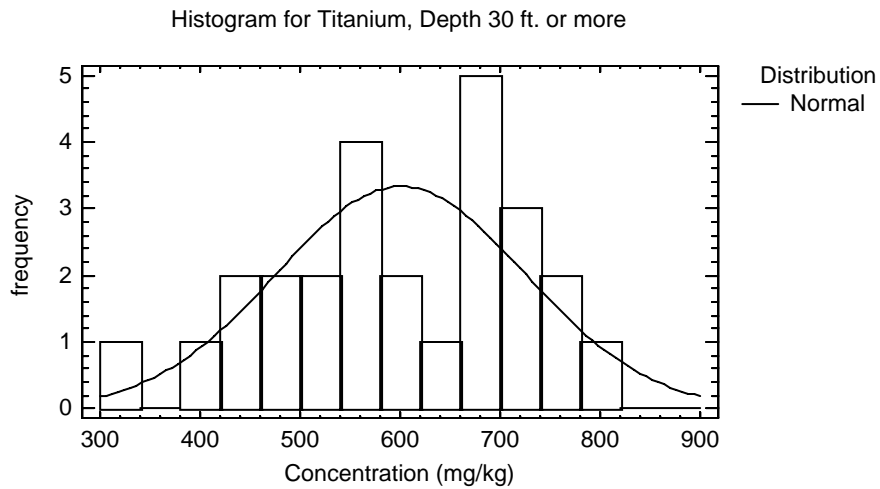
Data variable: Titanium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 328.0 to 811.0

Fitted Distributions

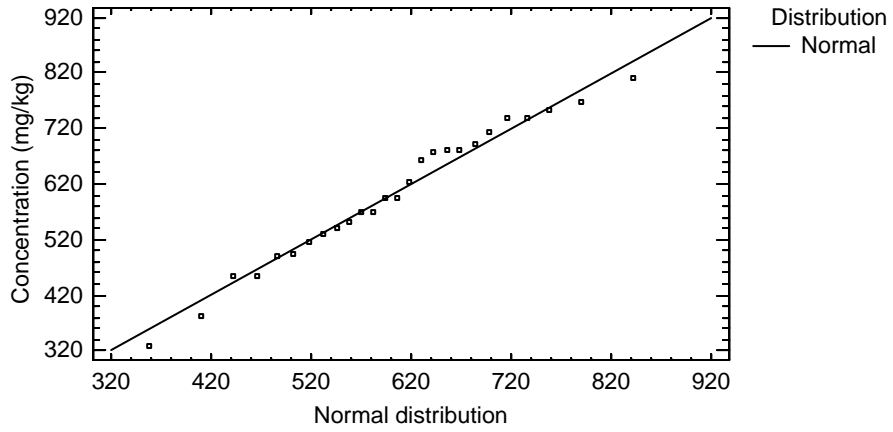
Normal
mean = 600.558
standard deviation = 124.586



Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.973475	0.723405

Quantile-Quantile Plot for Titanium, Depth 30 ft. or more





**DRAFT**

**Uncensored Data - log(Titanium) (Data Set = "Tronox"&Depth Value>=30)**

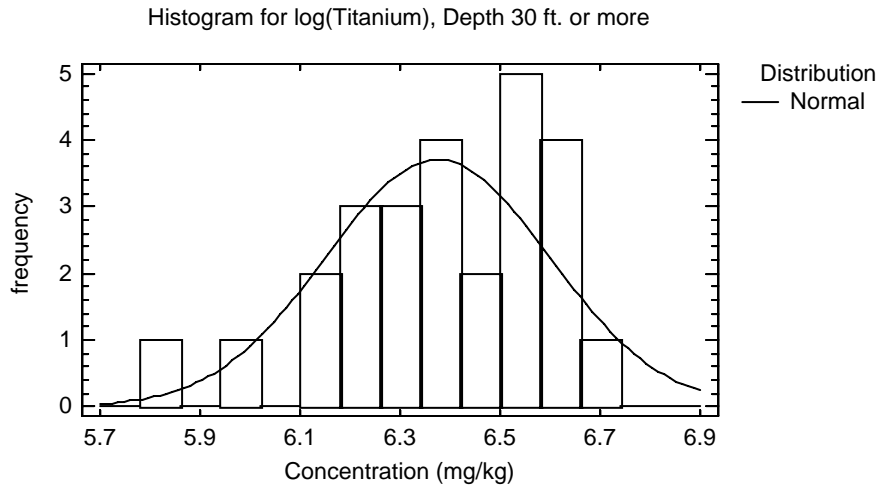
Data variable: log(Titanium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 5.79301 to 6.69827

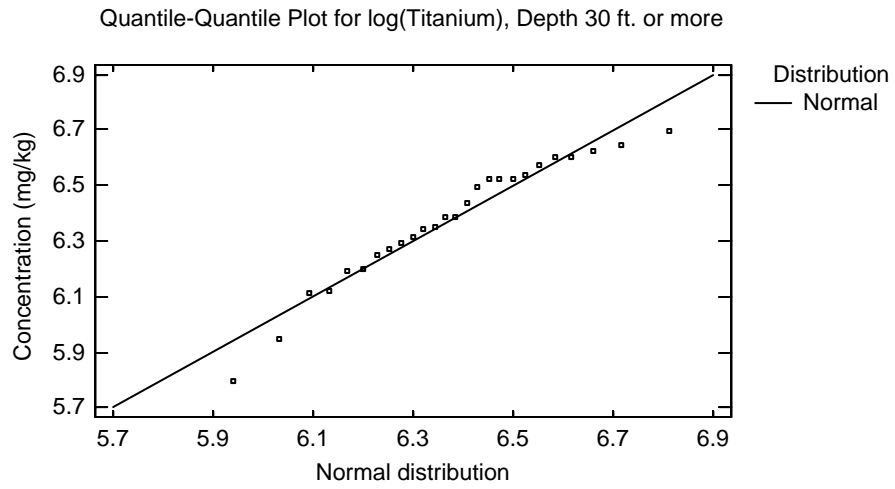
Fitted Distributions

Normal
mean = 6.37507
standard deviation = 0.223916



Tests for Normality for log(Titanium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.945185	0.191673



**DRAFT**

**Two-Sample Comparison - Titanium & Depth Range (Data Set="Tronox") for Titanium**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 241.0 to 820.0  
 Sample 2: 26 values ranging from 328.0 to 811.0

Comparison of Means for Titanium

95.0% confidence interval for mean of Depth Range=20 ft. or less: 592.917 +/- 47.0152 [545.901, 639.932]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 600.558 +/- 50.3214 [550.236, 650.879]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: -7.64103 +/- 67.4012 [-75.0422, 59.7601]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -0.227939 P-value = 0.820662  
 Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Titanium

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	111.341	124.586
Variance	12396.8	15521.6
Df	23	25

Ratio of Variances = 0.79868

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [86.5357, 156.185]  
 Standard deviation of Depth Range=30 ft. or more: [97.7073, 171.979]  
 Ratio of Variances: [0.354171, 1.82666]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.79868 P-value = 0.591035  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Titanium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

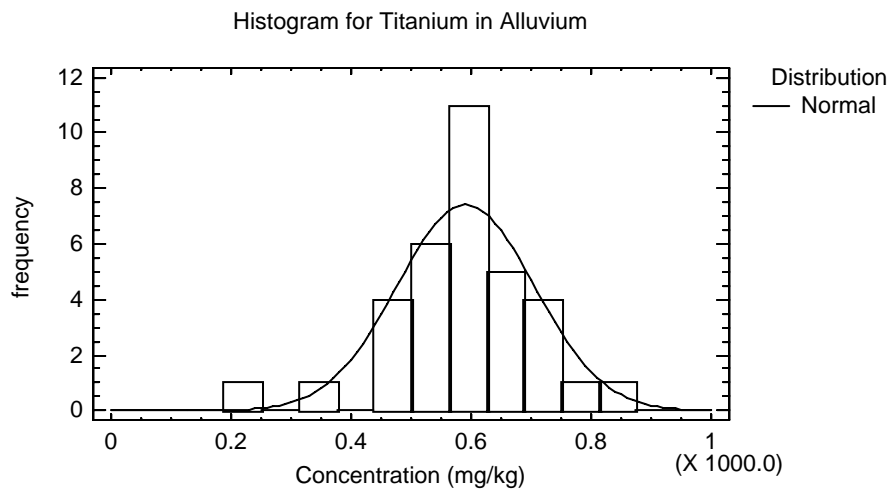
Data variable: Titanium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 241.0 to 820.0

Fitted Distributions

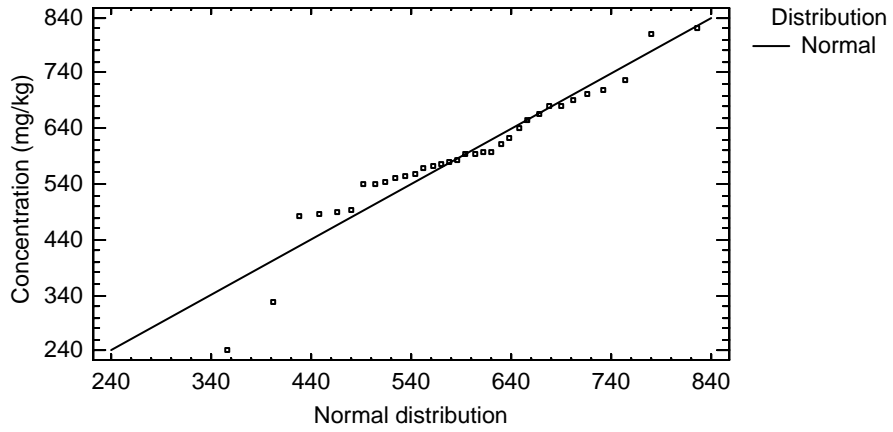
Normal
mean = 590.809
standard deviation = 114.43



Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.936965	0.0629159

Quantile-Quantile Plot for Titanium in Alluvium



**DRAFT**

**Uncensored Data - log(Titanium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

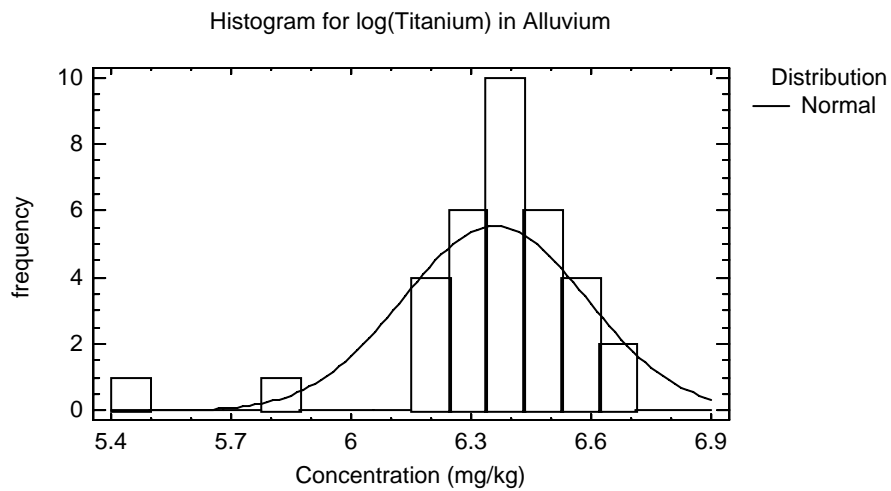
Data variable: log(Titanium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 5.4848 to 6.7093

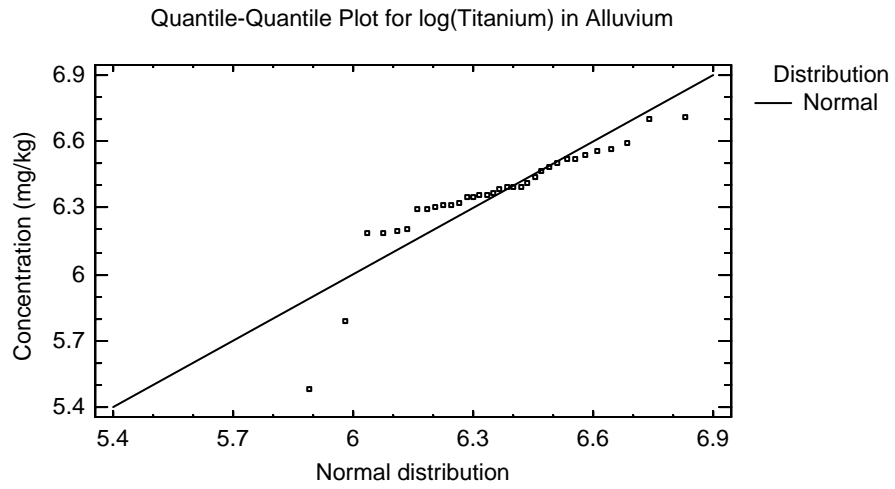
Fitted Distributions

Normal
mean = 6.35912
standard deviation = 0.229103



Tests for Normality for log(Titanium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.830881	0.0000485176



**DRAFT**

**Uncensored Data - Titanium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

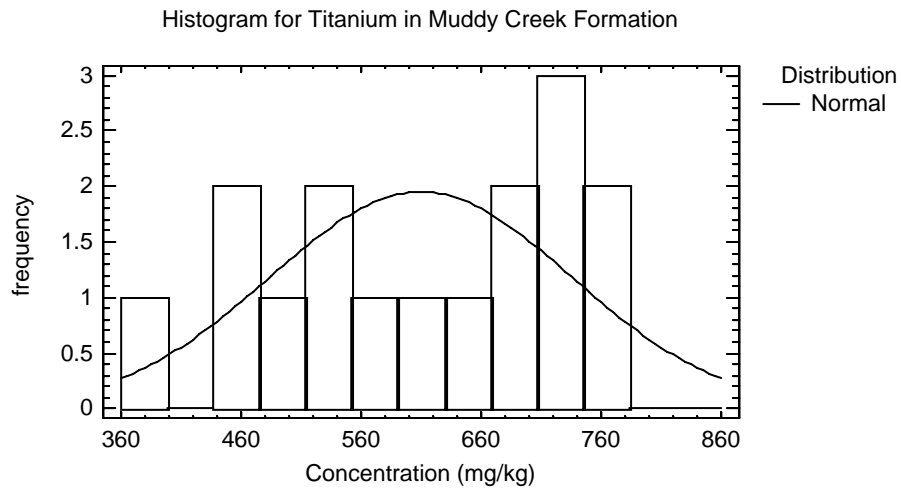
Data variable: Titanium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 382.0 to 768.0

Fitted Distributions

Normal
mean = 609.813
standard deviation = 125.925

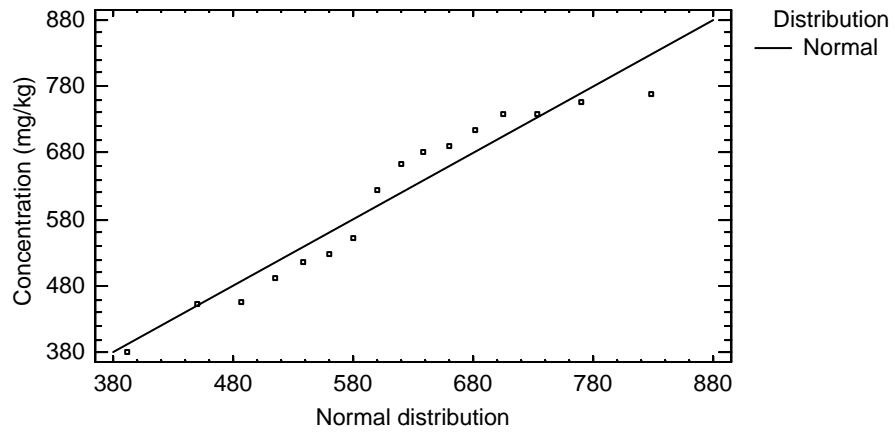


Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.919394	0.166535



Quantile-Quantile Plot for Titanium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Titanium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

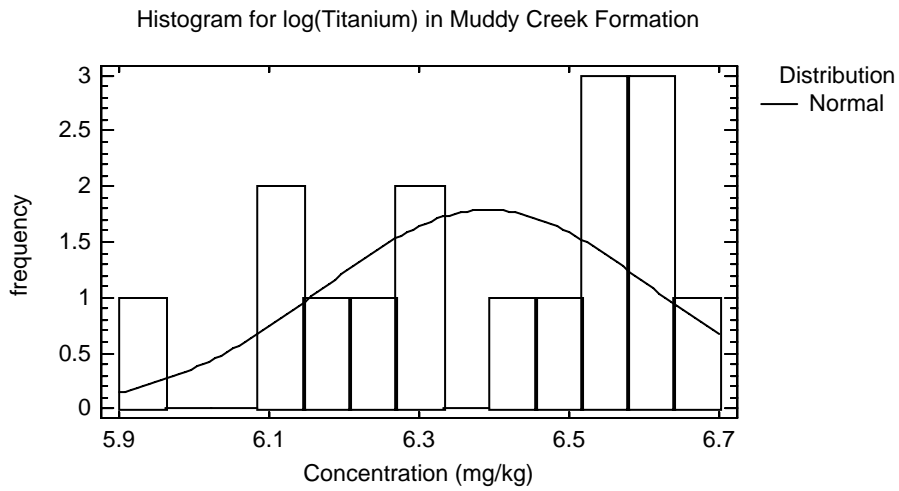
Data variable: log(Titanium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 5.94542 to 6.64379

Fitted Distributions

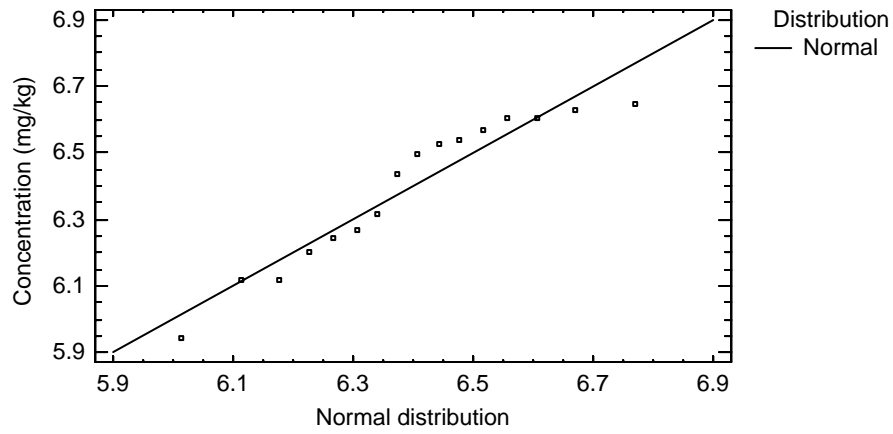
Normal
mean = 6.39152
standard deviation = 0.219327



Tests for Normality for log(Titanium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.90945	0.115648

Quantile-Quantile Plot for log(Titanium) in Muddy Creek Formation



**DRAFT**

**Two-Sample Comparison - Titanium & Geological Formation 1 (Data Set="Tronox") for Titanium**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 241.0 to 820.0  
 Sample 2: 16 values ranging from 382.0 to 768.0

Comparison of Means for Titanium

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 590.809 +/- 39.9265 [550.882, 630.735]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 609.813 +/- 67.1011 [542.711, 676.914]

95.0% confidence interval for the difference between the means  
 assuming equal variances: -19.0037 +/- 72.0154 [-91.0191, 53.0117]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -0.530574 P-value = 0.59816

Do not reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Titanium

	Geological Formation 1=Alluvium	Geological Formation 1=Muddy Creek
Standard deviation	114.43	125.925
Variance	13094.2	15857.2
Df	33	15

Ratio of Variances = 0.825754

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [92.2964, 150.621]

Standard deviation of Geological Formation 1=Muddy Creek: [93.0218, 194.894]

Ratio of Variances: [0.314861, 1.86707]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.825754 P-value = 0.623973

Do not reject the null hypothesis for alpha = 0.05.

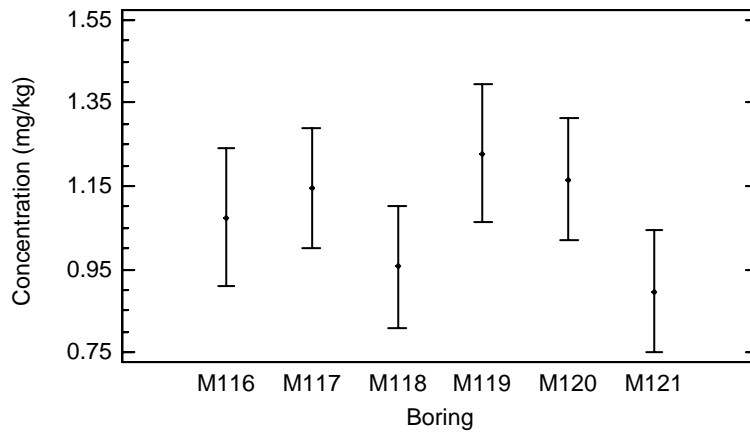
**DRAFT**

## 2.26 Tungsten

ANOVA Table for Tungsten by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0.692009	5	0.138402	3.20	0.0150
Within groups	1.90256	44	0.04324		
Total (Corr.)	2.59457	49			

Means and 95.0 Percent Tukey HSD Intervals for Tungsten



Kruskal-Wallis Test for Tungsten by Location ID

Location ID	Sample Size	Average Rank
M116	7	26.8571
M117	9	30.8333
M118	9	21.3333
M119	7	31.6429
M120	9	28.8333
M121	9	15.1667

Test statistic = 8.24852 P-Value = 0.143061

**DRAFT**

**Uncensored Data - Tungsten (Data Set = "Tronox")**

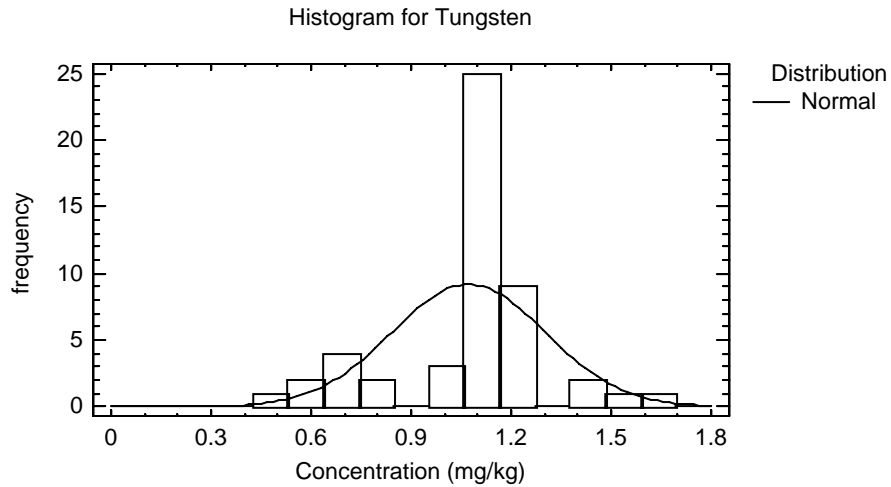
Data variable: Tungsten

Selection variable: Data Set = "Tronox"

50 values ranging from 0.526 to 1.64

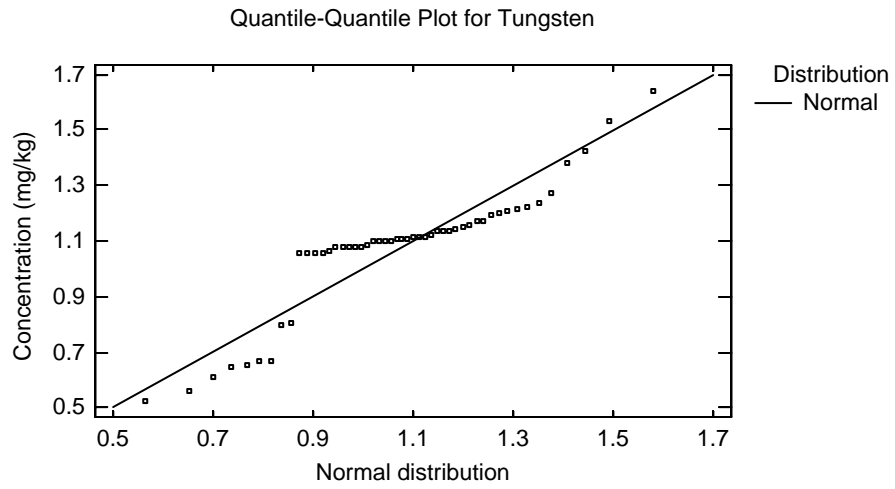
Fitted Distributions

Normal
mean = 1.07215
standard deviation = 0.23011



Tests for Normality for Tungsten

Test	Statistic	P-Value
Shapiro-Wilk W	0.864949	0.00000652484



**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set = "Tronox")**

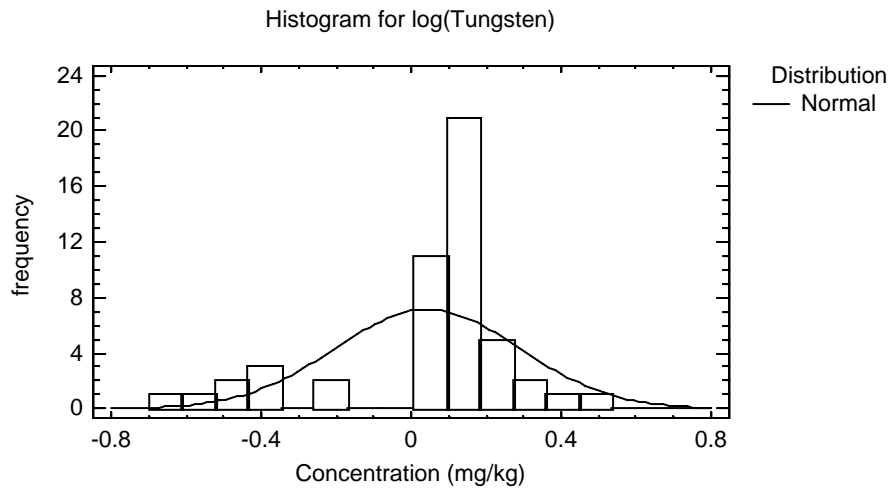
Data variable: log(Tungsten)

Selection variable: Data Set = "Tronox"

50 values ranging from -0.642454 to 0.494696

Fitted Distributions

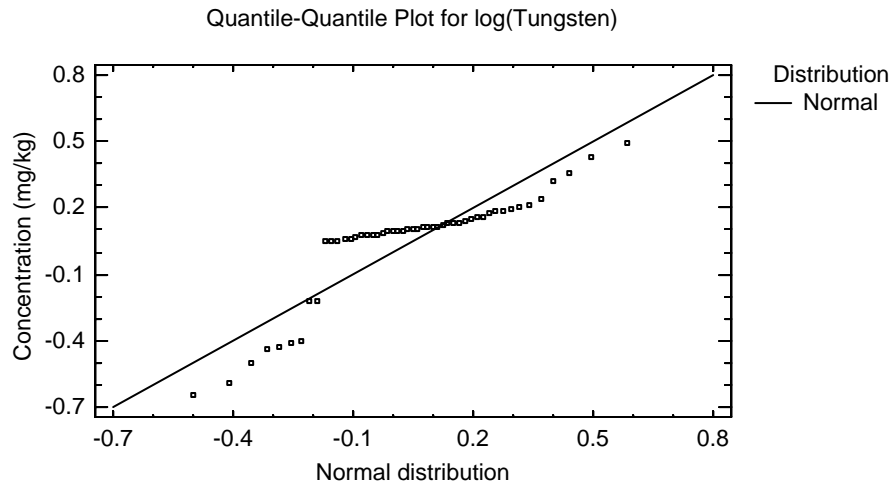
Normal
mean = 0.0427676
standard deviation = 0.246457



Tests for Normality for log(Tungsten)

Test	Statistic	P-Value
Shapiro-Wilk W	0.802927	1.42066E-8





**DRAFT**

**Uncensored Data - Tungsten (Data Set = "Tronox"&Depth Value<=20)**

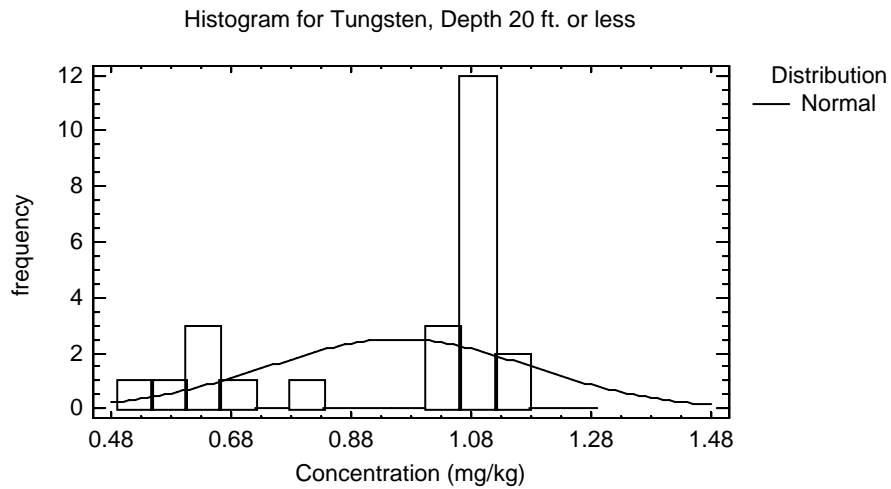
Data variable: Tungsten

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.526 to 1.16

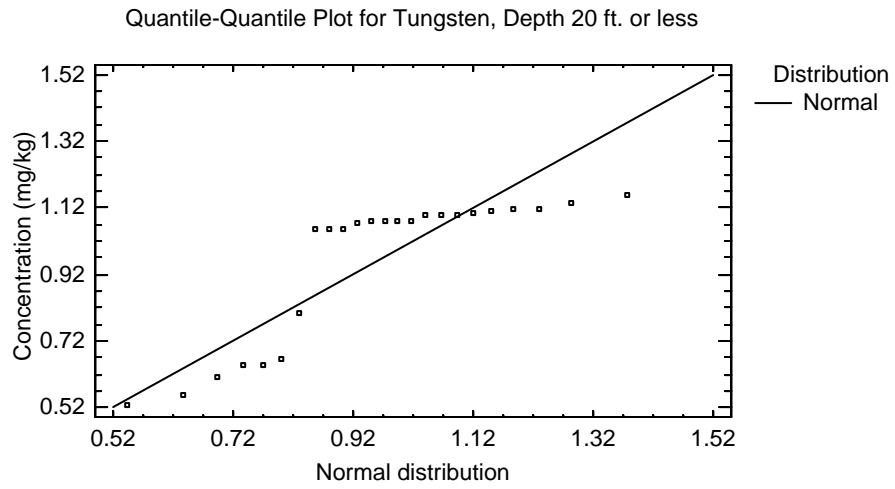
Fitted Distributions

Normal
mean = 0.960562
standard deviation = 0.21856



Tests for Normality for Tungsten

Test	Statistic	P-Value
Shapiro-Wilk W	0.719595	0.00000638853



**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set = "Tronox"&Depth Value<=20)**

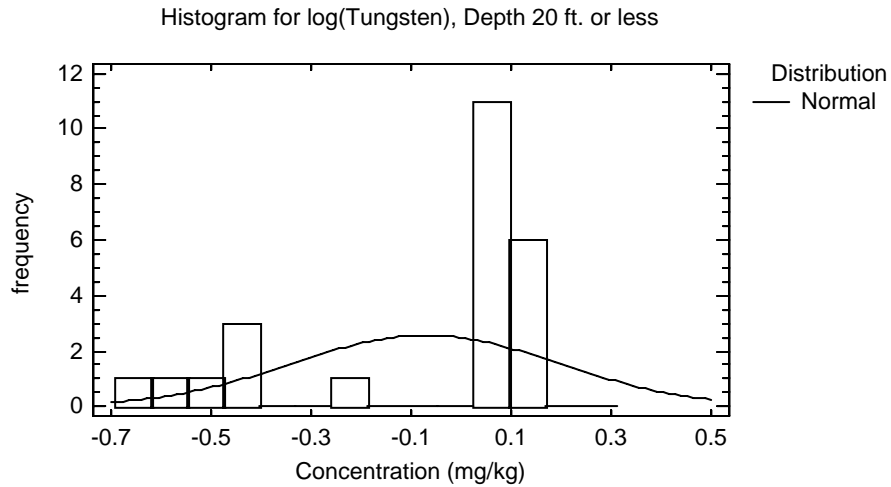
Data variable: log(Tungsten)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -0.642454 to 0.14842

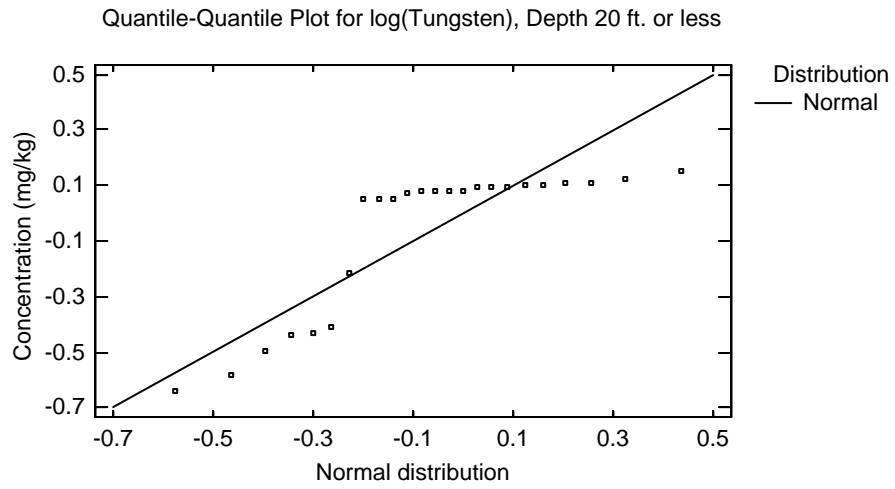
Fitted Distributions

Normal
mean = -0.0707297
standard deviation = 0.265381



Tests for Normality for log(Tungsten)

Test	Statistic	P-Value
Shapiro-Wilk W	0.704657	0.00000362768



**DRAFT**

**Uncensored Data - Tungsten (Data Set = "Tronox"&Depth Value>=30)**

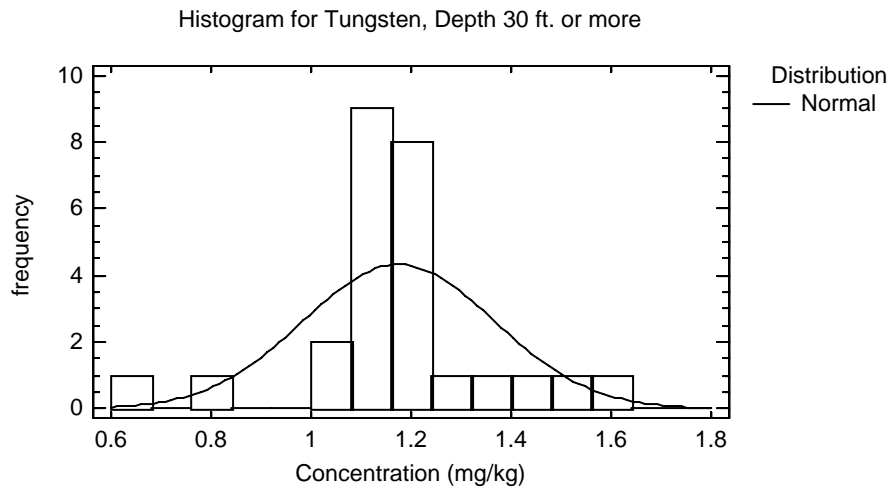
Data variable: Tungsten

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.669 to 1.64

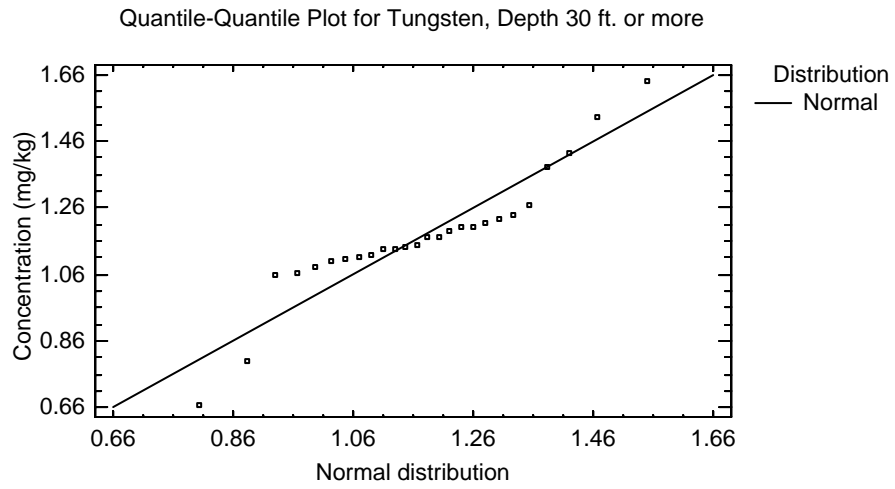
Fitted Distributions

Normal
mean = 1.17515
standard deviation = 0.191958



Tests for Normality for Tungsten

Test	Statistic	P-Value
Shapiro-Wilk W	0.898002	0.0139283



**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set = "Tronox"&Depth Value>=30)**

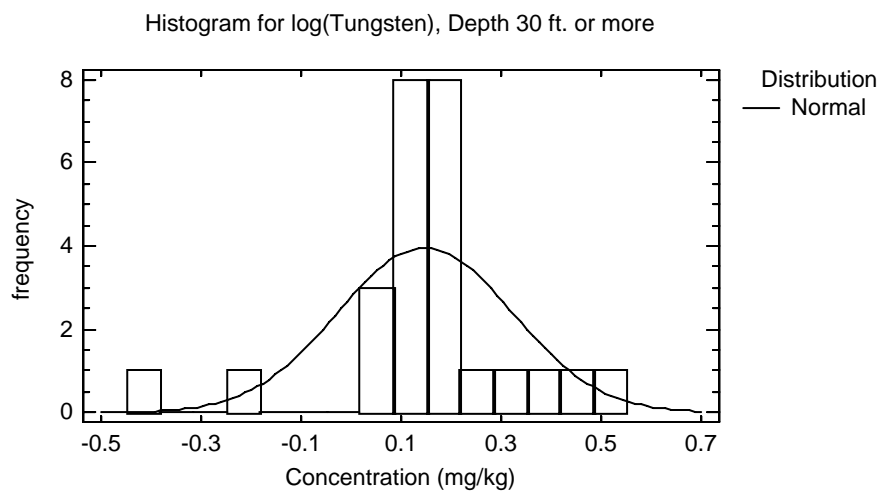
Data variable: log(Tungsten)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -0.401971 to 0.494696

Fitted Distributions

Normal
mean = 0.147534
standard deviation = 0.174581

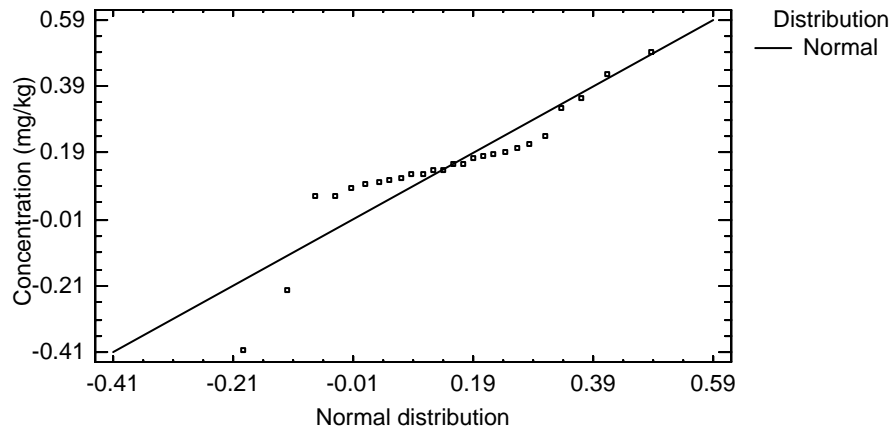


Tests for Normality for log(Tungsten)

Test	Statistic	P-Value
Shapiro-Wilk W	0.856305	0.00152396



Quantile-Quantile Plot for log(Tungsten), Depth 30 ft. or more



**DRAFT**

## Tronox Tungsten by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = 1.834498464$   $p = 0.066580036$

Do not reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

**Uncensored Data - Tungsten (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

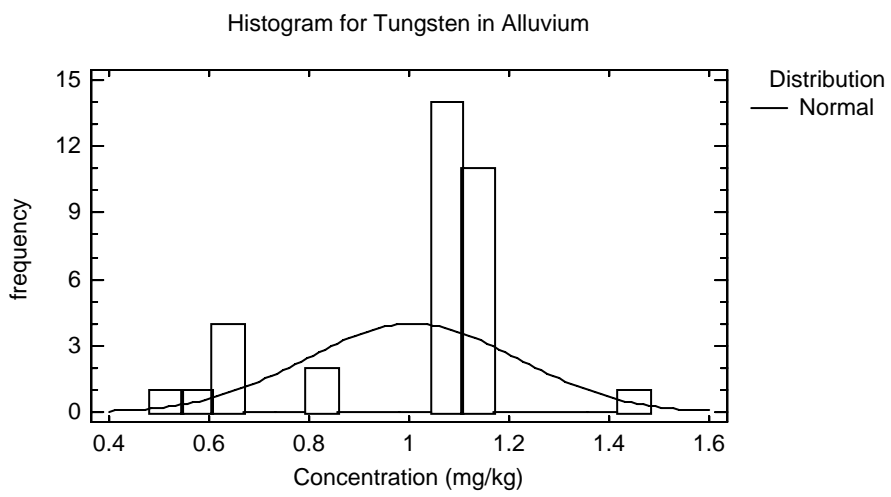
Data variable: Tungsten

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.526 to 1.425

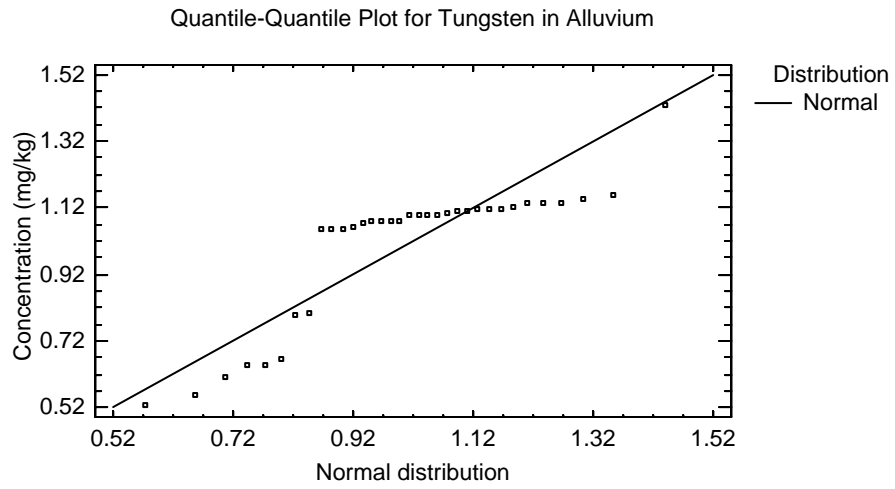
Fitted Distributions

Normal
mean = 1.00576
standard deviation = 0.210753



Tests for Normality for Tungsten

Test	Statistic	P-Value
Shapiro-Wilk W	0.765983	0.00000110098



**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

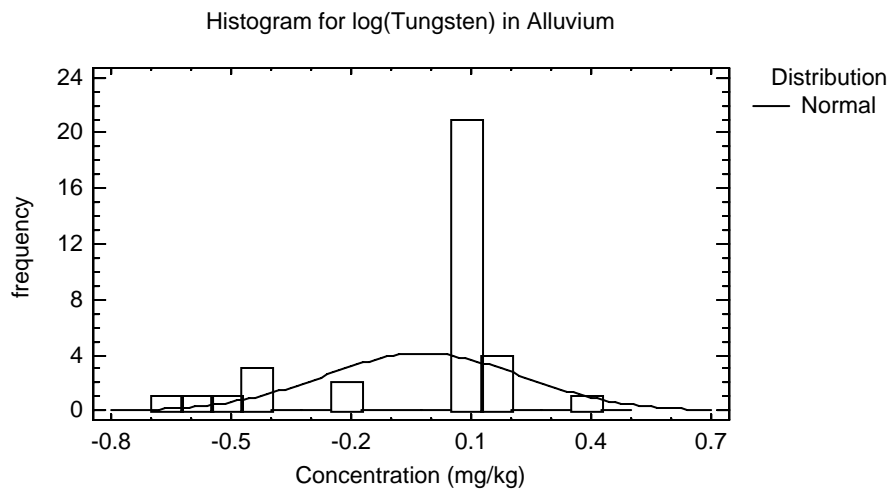
Data variable: log(Tungsten)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -0.642454 to 0.354172

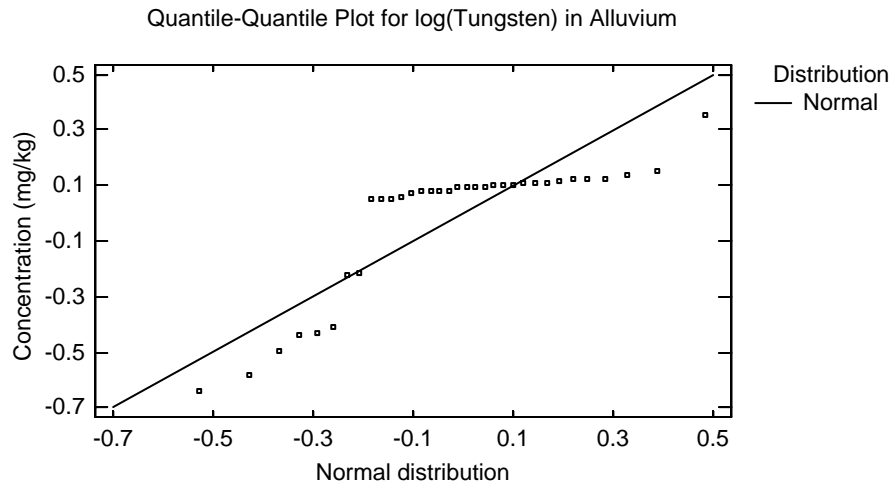
Fitted Distributions

Normal
mean = -0.0205867
standard deviation = 0.246103



Tests for Normality for log(Tungsten)

Test	Statistic	P-Value
Shapiro-Wilk W	0.724637	1.20897E-7



**DRAFT**

**Uncensored Data - Tungsten (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

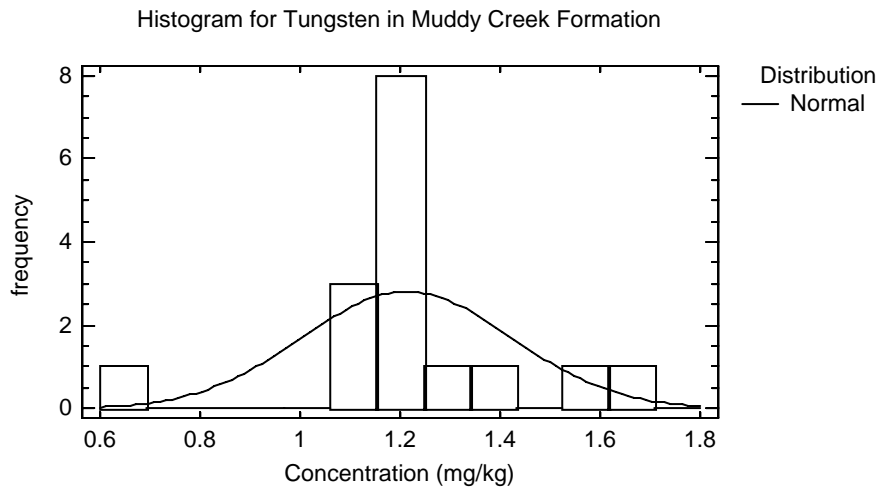
Data variable: Tungsten

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.669 to 1.64

Fitted Distributions

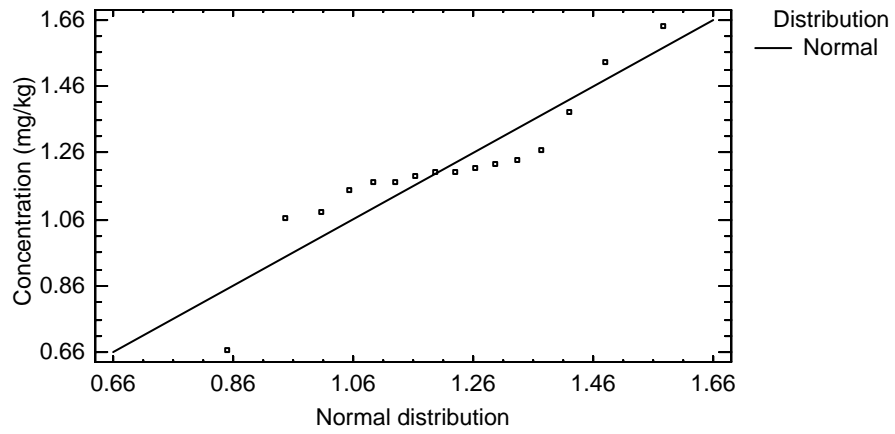
Normal
mean = 1.21322
standard deviation = 0.209853



Tests for Normality for Tungsten

Test	Statistic	P-Value
Shapiro-Wilk W	0.872788	0.0298597

Quantile-Quantile Plot for Tungsten in Muddy Creek Formation





**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

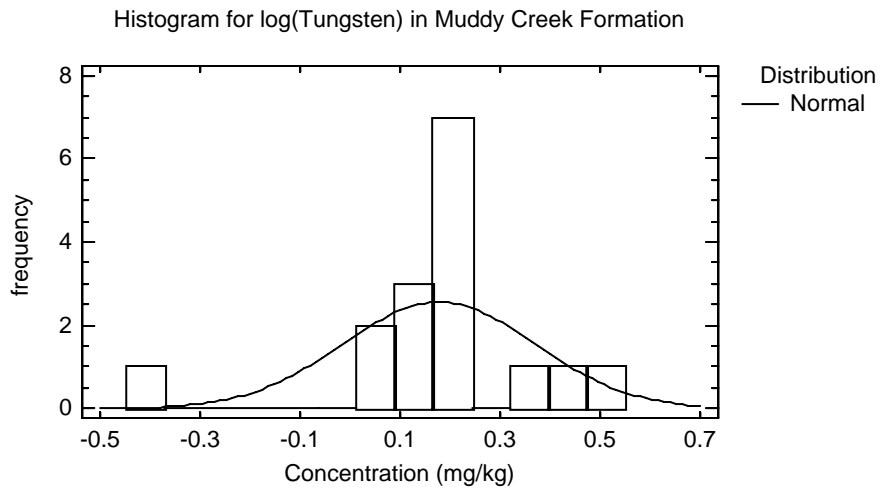
Data variable: log(Tungsten)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -0.401971 to 0.494696

Fitted Distributions

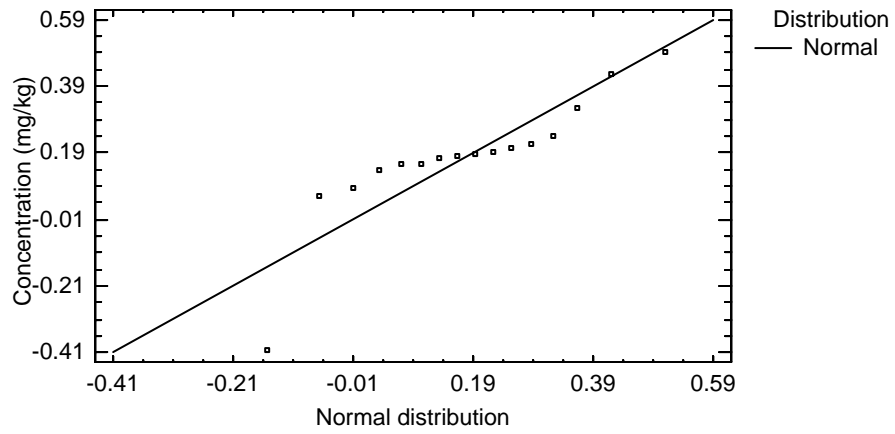
Normal
mean = 0.177396
standard deviation = 0.191686



Tests for Normality for log(Tungsten)

Test	Statistic	P-Value
Shapiro-Wilk W	0.80656	0.00286417

Quantile-Quantile Plot for log(Tungsten) in Muddy Creek Formation



**DRAFT**

## Tronox Tungsten by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = 0.8186513    p= 0.412985389

Do not reject the null hypothesis for alpha=0.05

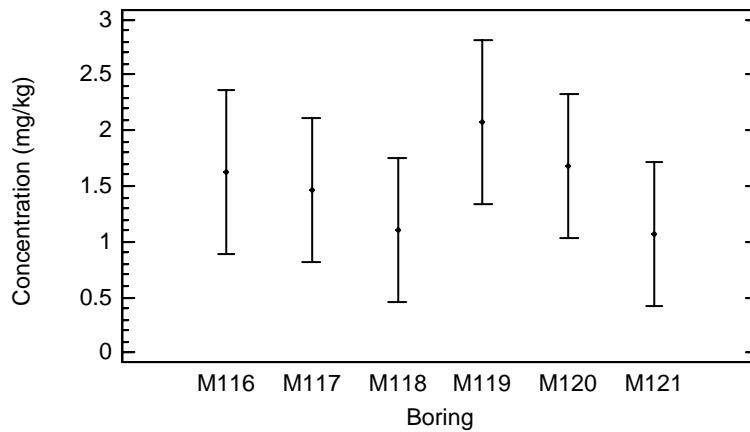
DRAFT

### 2.27 Uranium

ANOVA Table for Uranium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	5.83555	5	1.16711	1.35	0.2599
Within groups	37.9217	44	0.861857		
Total (Corr.)	43.7573	49			

Means and 95.0 Percent Tukey HSD Intervals for Uranium



Kruskal-Wallis Test for Uranium by Location ID

Location ID	Sample Size	Average Rank
M116	7	27.7143
M117	9	28.6111
M118	9	19.0556
M119	7	29.7143
M120	9	30.4444
M121	9	18.8889

Test statistic = 5.80226 P-Value = 0.325938

**DRAFT**

**Uncensored Data - Uranium (Data Set = "Tronox")**

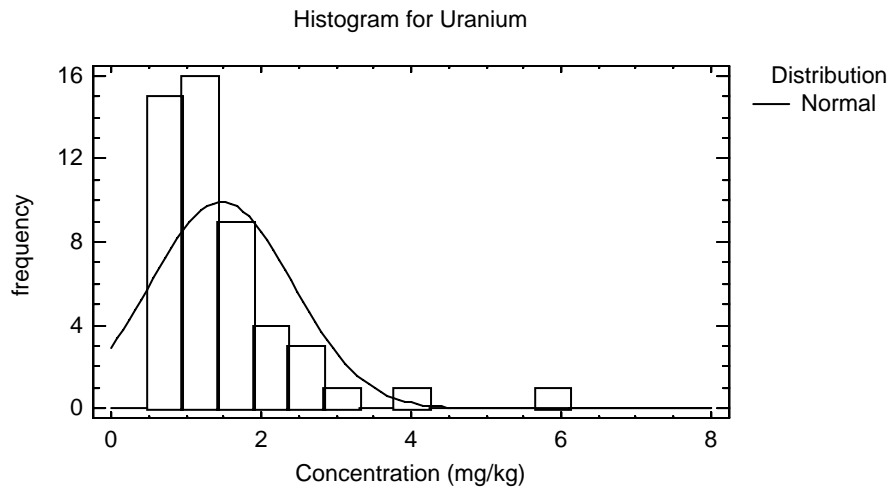
Data variable: Uranium

Selection variable: Data Set = "Tronox"

50 values ranging from 0.619 to 6.07

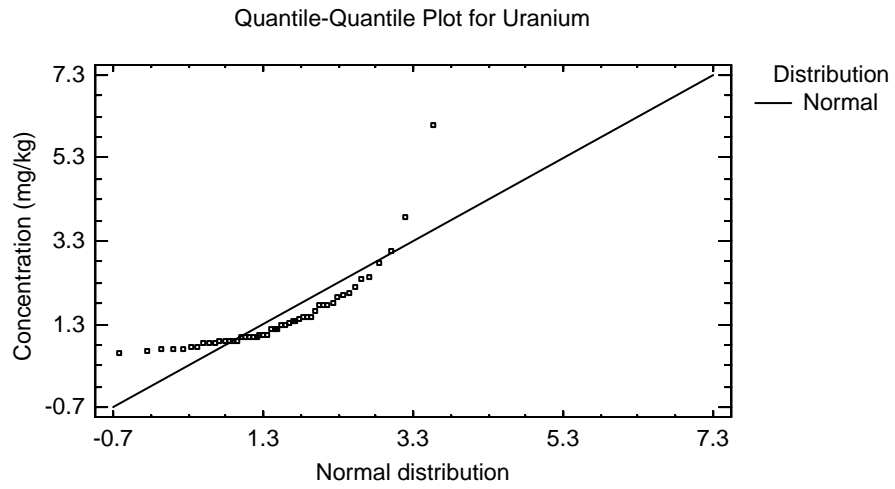
Fitted Distributions

Normal
mean = 1.47336
standard deviation = 0.94499



Tests for Normality for Uranium

Test	Statistic	P-Value
Shapiro-Wilk W	0.729551	1.91616E-11



**DRAFT**

**Uncensored Data - log(Uranium) (Data Set = "Tronox")**

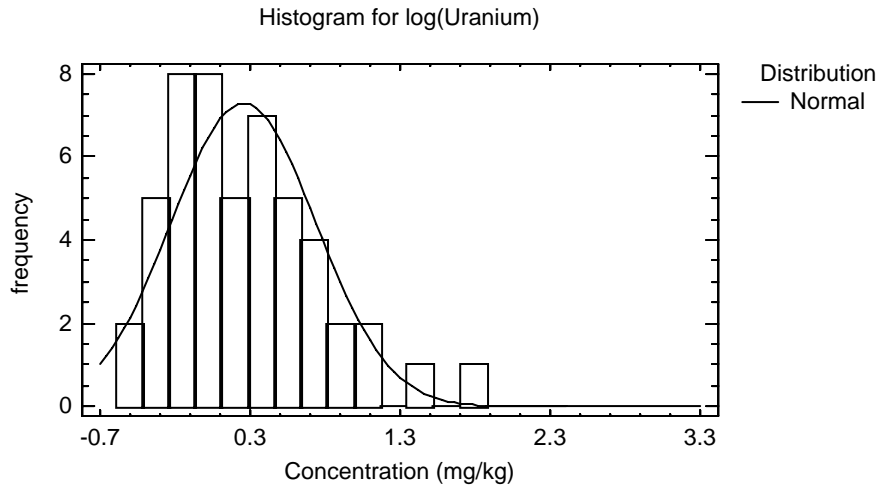
Data variable: log(Uranium)

Selection variable: Data Set = "Tronox"

50 values ranging from -0.47965 to 1.80336

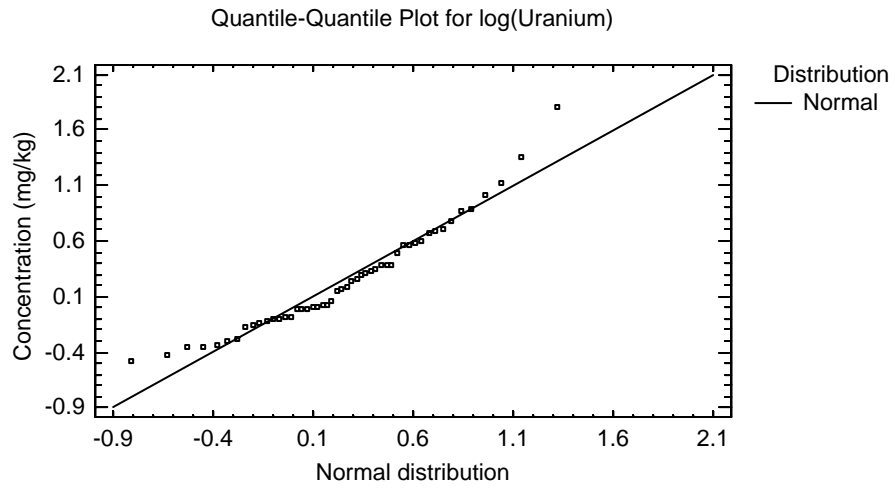
Fitted Distributions

Normal
mean = 0.255023
standard deviation = 0.483591



Tests for Normality for log(Uranium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.942994	0.0278622





**DRAFT**

**Uncensored Data - Uranium (Data Set = "Tronox"&Depth Value<=20)**

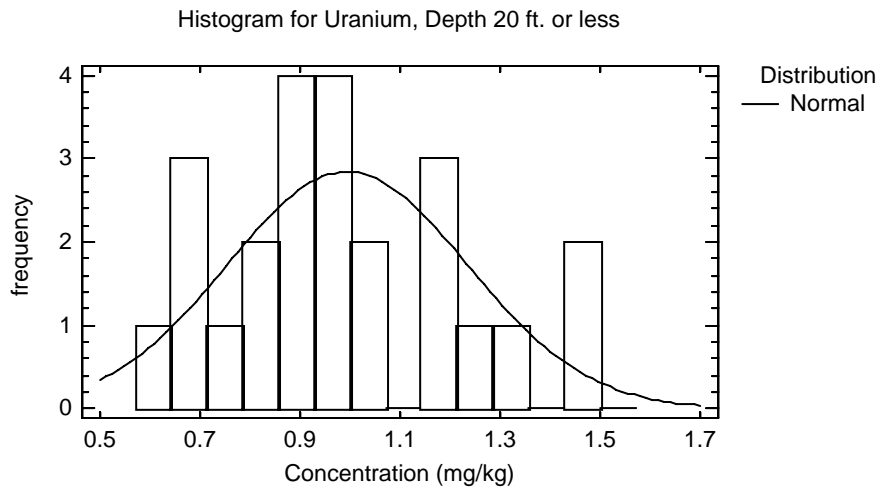
Data variable: Uranium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 0.619 to 1.48

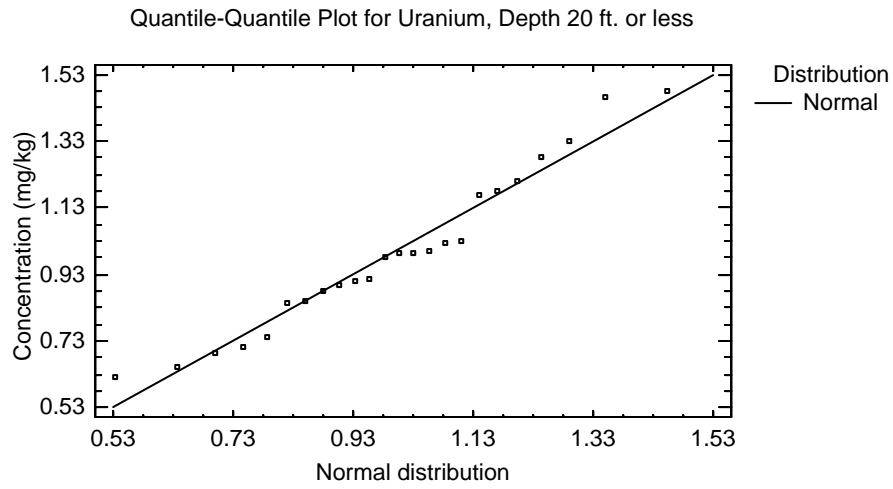
Fitted Distributions

Normal
mean = 0.994292
standard deviation = 0.240525



Tests for Normality for Uranium

Test	Statistic	P-Value
Shapiro-Wilk W	0.956633	0.381891



**DRAFT**

**Uncensored Data - log(Uranium) (Data Set = "Tronox"&Depth Value<=20)**

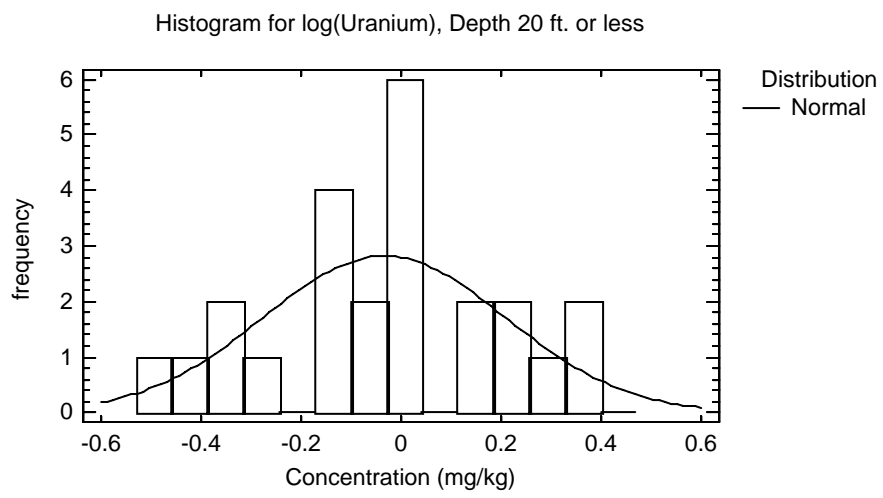
Data variable: log(Uranium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from -0.47965 to 0.392042

Fitted Distributions

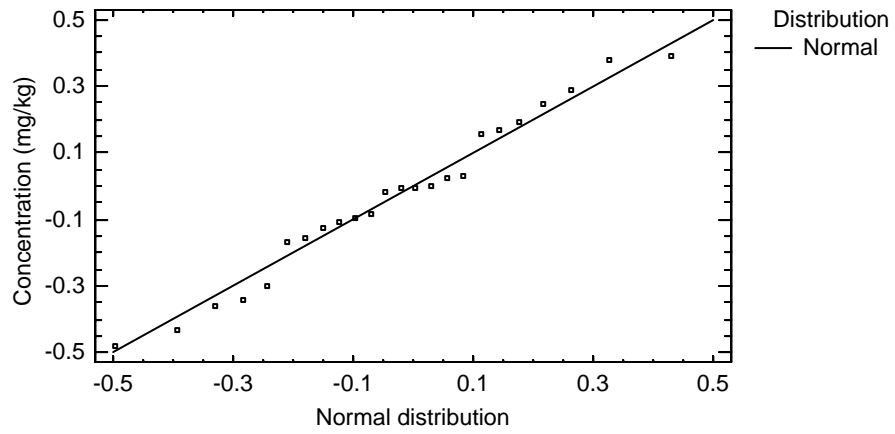
Normal
mean = -0.0337091
standard deviation = 0.242429



Tests for Normality for log(Uranium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.970431	0.676729

Quantile-Quantile Plot for log(Uranium), Depth 20 ft. or less



**DRAFT**

**Uncensored Data - Uranium (Data Set = "Tronox"&Depth Value>=30)**

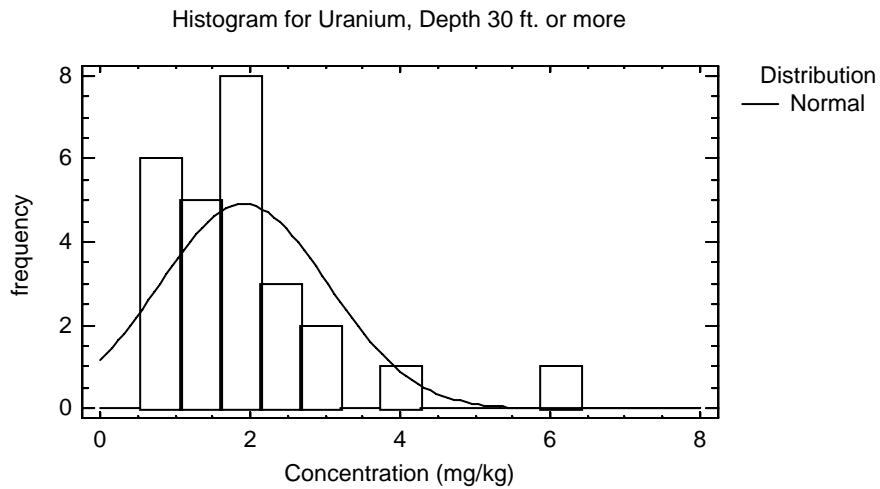
Data variable: Uranium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 0.707 to 6.07

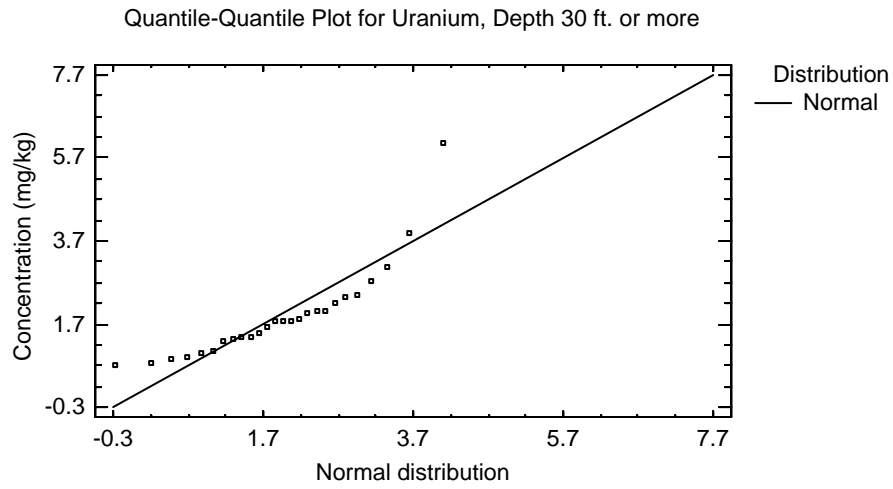
Fitted Distributions

Normal
mean = 1.91558
standard deviation = 1.12843



Tests for Normality for Uranium

Test	Statistic	P-Value
Shapiro-Wilk W	0.798528	0.0000927284



**DRAFT**

**Uncensored Data - log(Uranium) (Data Set = "Tronox"&Depth Value>=30)**

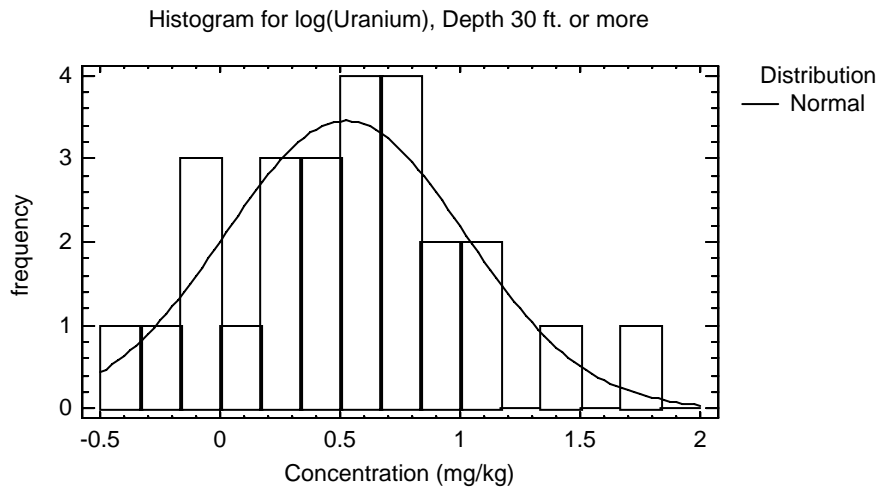
Data variable: log(Uranium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from -0.346725 to 1.80336

Fitted Distributions

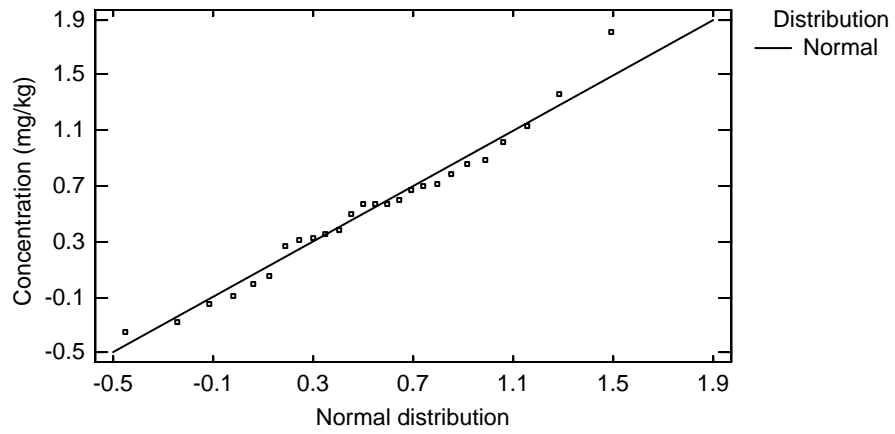
Normal
mean = 0.521545
standard deviation = 0.50039



Tests for Normality for log(Uranium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.974889	0.757995

Quantile-Quantile Plot for log(Uranium), Depth 30 ft. or more





**DRAFT**

**Two-Sample Comparison - log(Uranium) & Depth Range (Data Set="Tronox") for log(Uranium)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from -0.47965 to 0.392042  
 Sample 2: 26 values ranging from -0.346725 to 1.80336

Comparison of Means for log(Uranium)

95.0% confidence interval for mean of Depth Range=20 ft. or less: -0.0337091 +/- 0.102369 [-0.136078, 0.0686599]

95.0% confidence interval for mean of Depth Range=30 ft. or more: 0.521545 +/- 0.202112 [0.319433, 0.723657]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.555254 +/- 0.222742 [-0.777996, -0.332513]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -5.05211 P-value = 0.0000119606

Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for log(Uranium)

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	0.242429	0.50039
Variance	0.0587718	0.25039
Df	23	25

Ratio of Variances = 0.234721

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.188419, 0.34007]

Standard deviation of Depth Range=30 ft. or more: [0.392434, 0.690742]

Ratio of Variances: [0.104086, 0.53683]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.234721 P-value = 0.000842325

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Uranium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

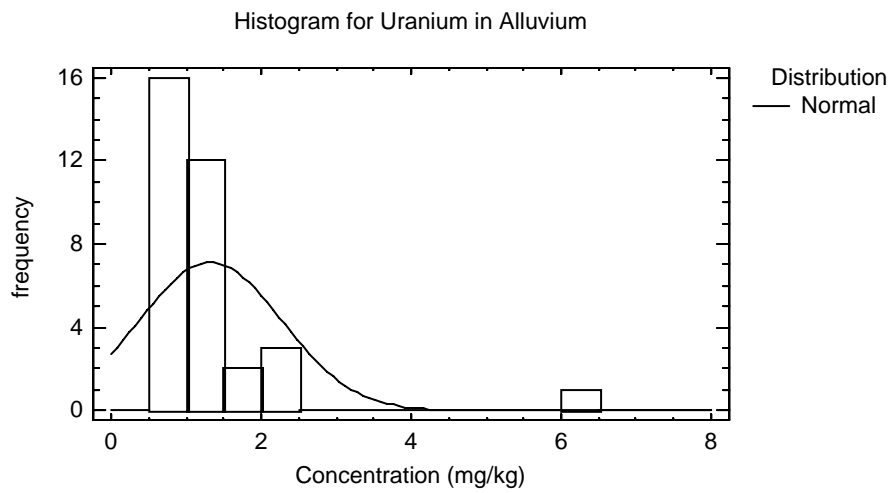
Data variable: Uranium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 0.619 to 6.07

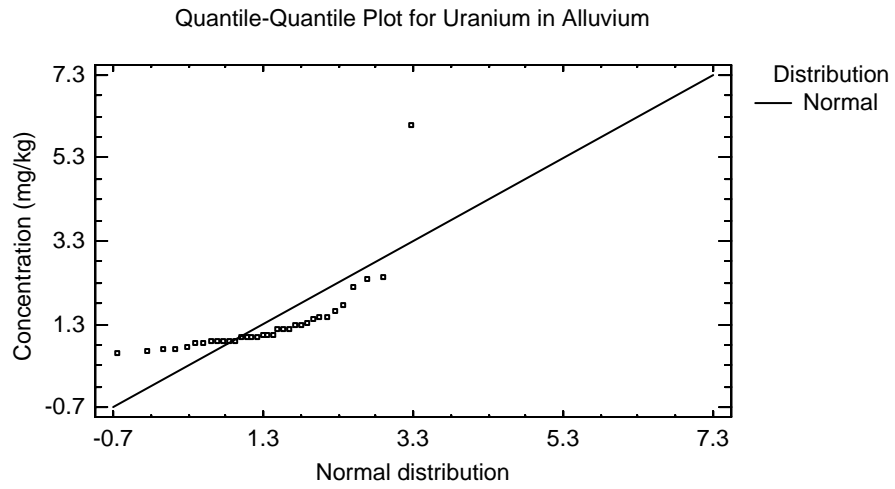
Fitted Distributions

Normal
mean = 1.32371
standard deviation = 0.954221



Tests for Normality for Uranium

Test	Statistic	P-Value
Shapiro-Wilk W	0.574971	1.08385E-10



**DRAFT**

**Uncensored Data - log(Uranium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

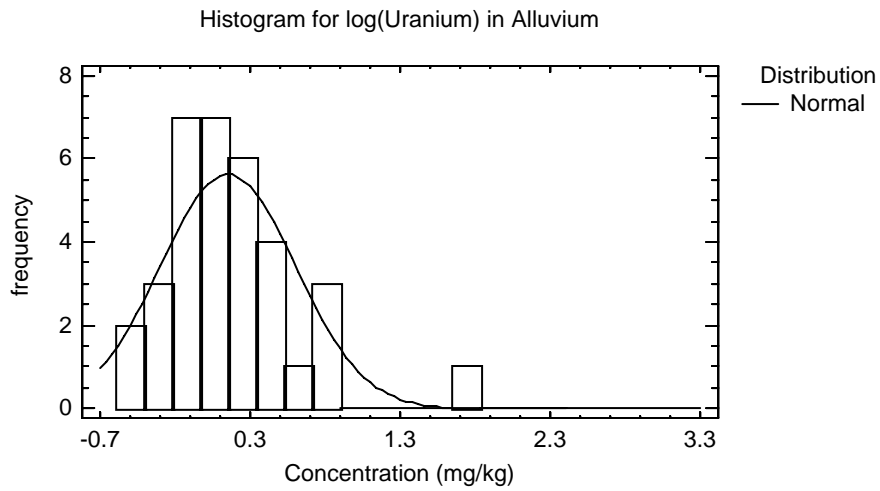
Data variable: log(Uranium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from -0.47965 to 1.80336

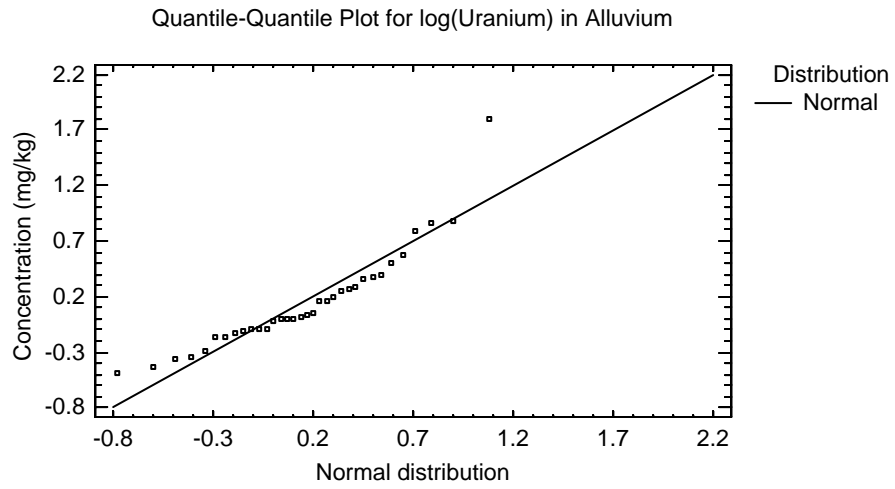
Fitted Distributions

Normal
mean = 0.151917
standard deviation = 0.452413



Tests for Normality for log(Uranium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.884541	0.00157731



**DRAFT**

**Uncensored Data - Uranium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

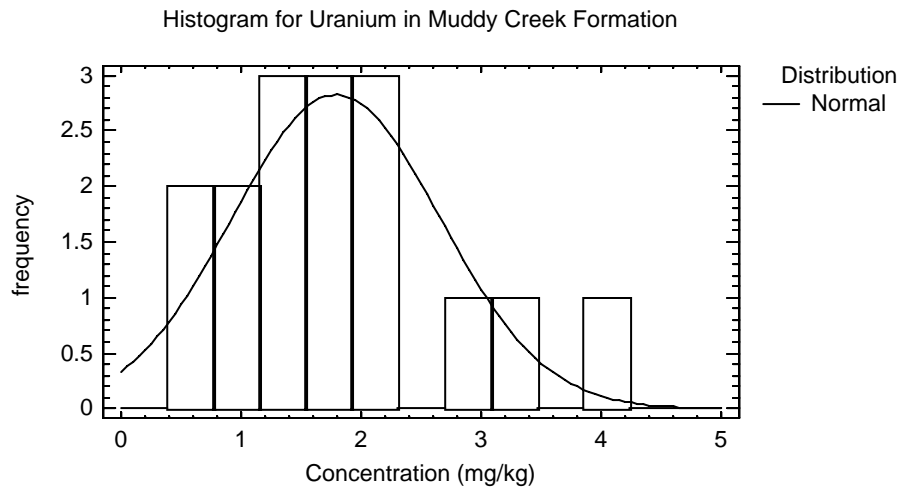
Data variable: Uranium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 0.707 to 3.9

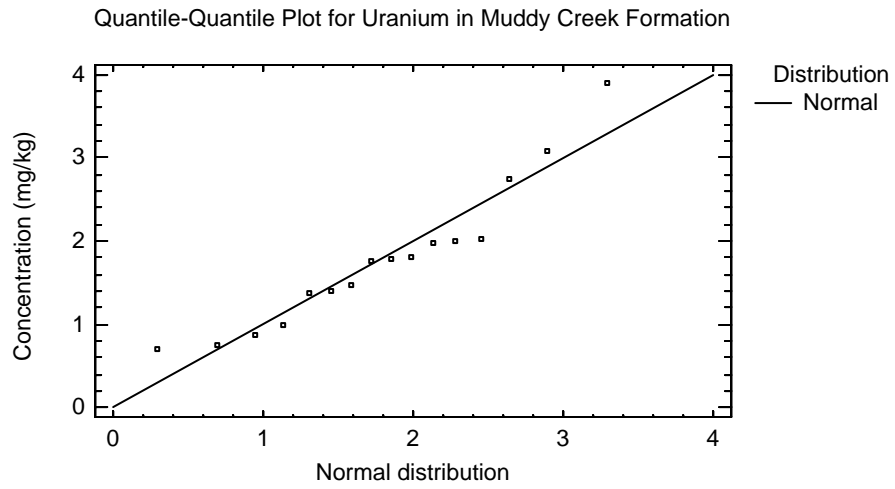
Fitted Distributions

Normal
mean = 1.79137
standard deviation = 0.869096



Tests for Normality for Uranium

Test	Statistic	P-Value
Shapiro-Wilk W	0.917558	0.15575



**DRAFT**

**Uncensored Data - log(Uranium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

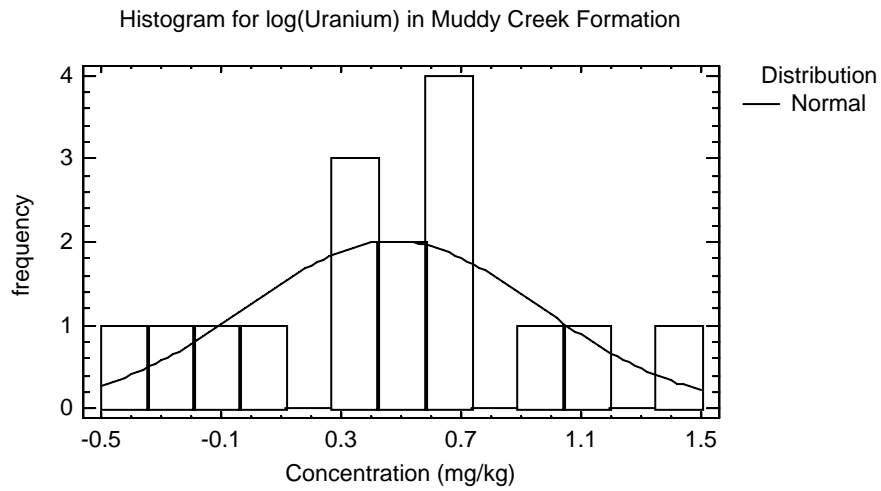
Data variable: log(Uranium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from -0.346725 to 1.36098

Fitted Distributions

Normal
mean = 0.474124
standard deviation = 0.488214

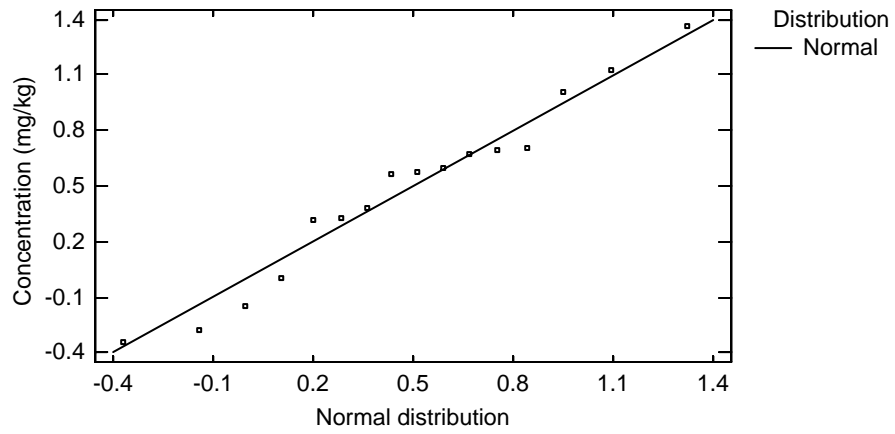


Tests for Normality for log(Uranium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.963706	0.701892



Quantile-Quantile Plot for log(Uranium) in Muddy Creek Formation



**DRAFT****Two-Sample Comparison - Uranium & Geological Formation 1 (Data Set="Tronox") for Uranium**

Sample 1: Geological Formation 1=Alluvium

Sample 2: Geological Formation 1=Muddy Creek

Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 0.619 to 6.07

Sample 2: 16 values ranging from 0.707 to 3.9

Comparison of Medians for Uranium

Median of sample 1: 1.0275

Median of sample 2: 1.77

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 22.1324

Average rank of sample 2: 32.6563

W = 114.5 P-value = 0.0177426

Reject the null hypothesis for alpha = 0.05.

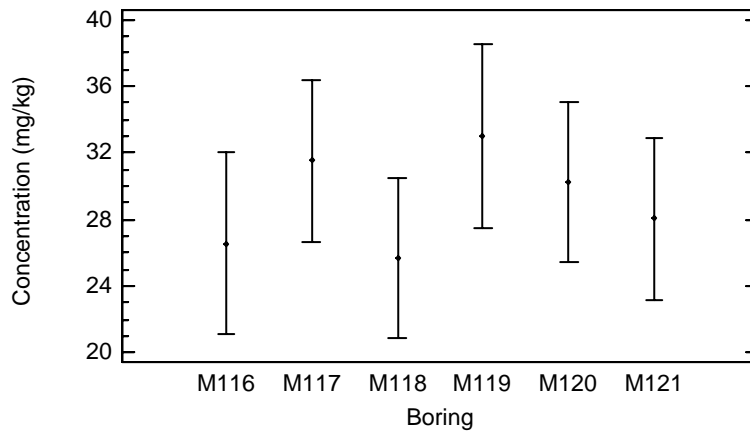
DRAFT

### 2.28 Vanadium

ANOVA Table for Vanadium by Location ID

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	331.769	5	66.3538	1.40	0.2431
Within groups	2086.07	44	47.4107		
Total (Corr.)	2417.84	49			

Means and 95.0 Percent Tukey HSD Intervals for Vanadium



Kruskal-Wallis Test for Vanadium by Location ID

Location ID	Sample Size	Average Rank
M116	7	19.6429
M117	9	29.5556
M118	9	17.1111
M119	7	32.3571
M120	9	30.1111
M121	9	24.4444

Test statistic = 7.30488 P-Value = 0.198935

**DRAFT**

**Uncensored Data - Vanadium (Data Set = "Tronox")**

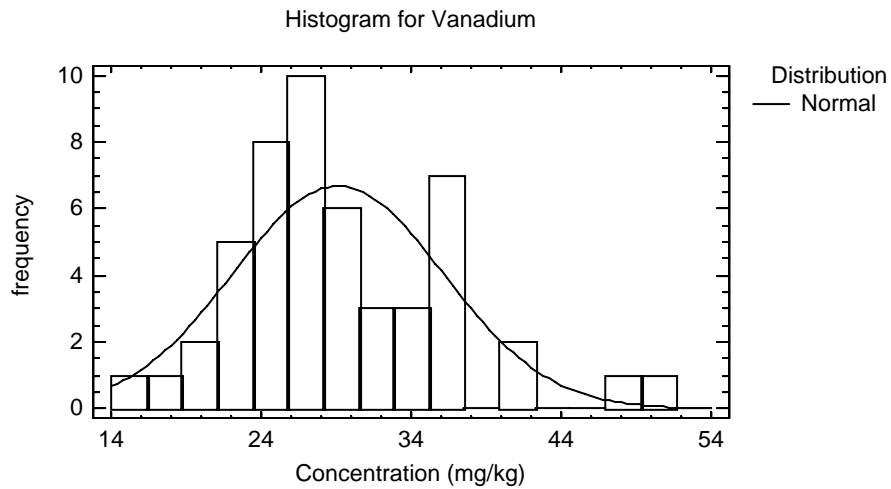
Data variable: Vanadium

Selection variable: Data Set = "Tronox"

50 values ranging from 16.3 to 49.8

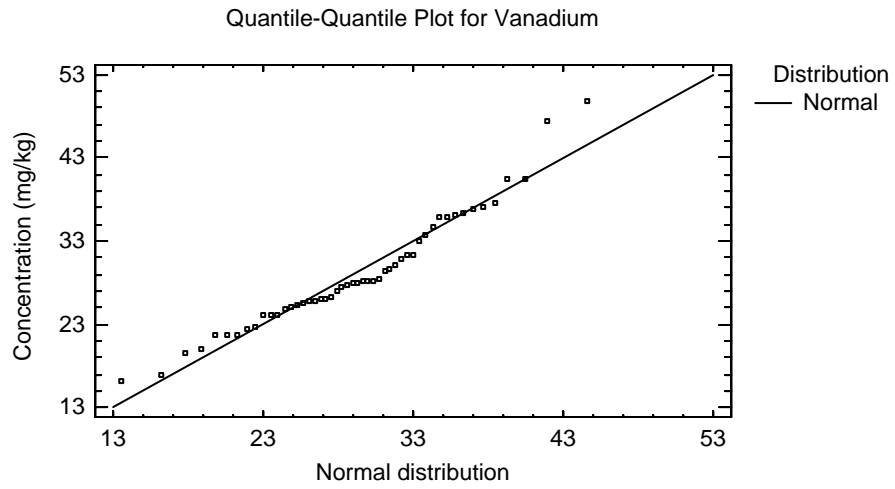
Fitted Distributions

Normal
mean = 29.123
standard deviation = 7.02451



Tests for Normality for Vanadium

Test	Statistic	P-Value
Shapiro-Wilk W	0.951987	0.0710323



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set = "Tronox")**

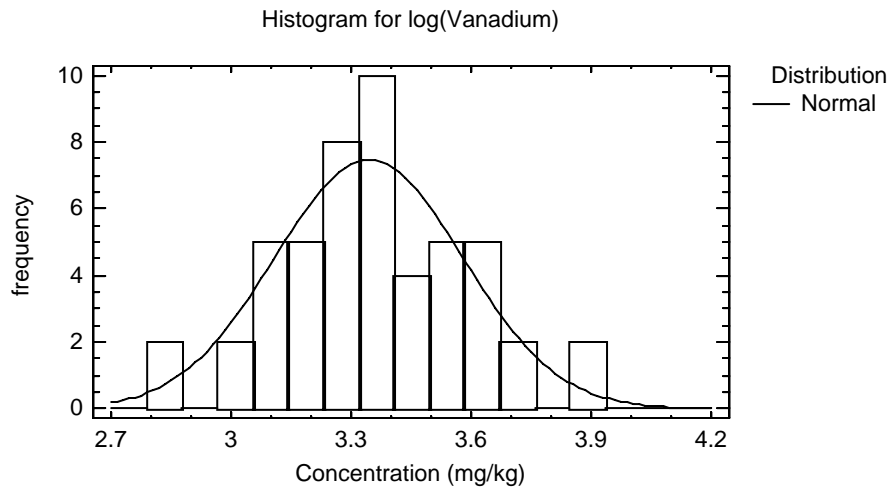
Data variable: log(Vanadium)

Selection variable: Data Set = "Tronox"

50 values ranging from 2.79117 to 3.90801

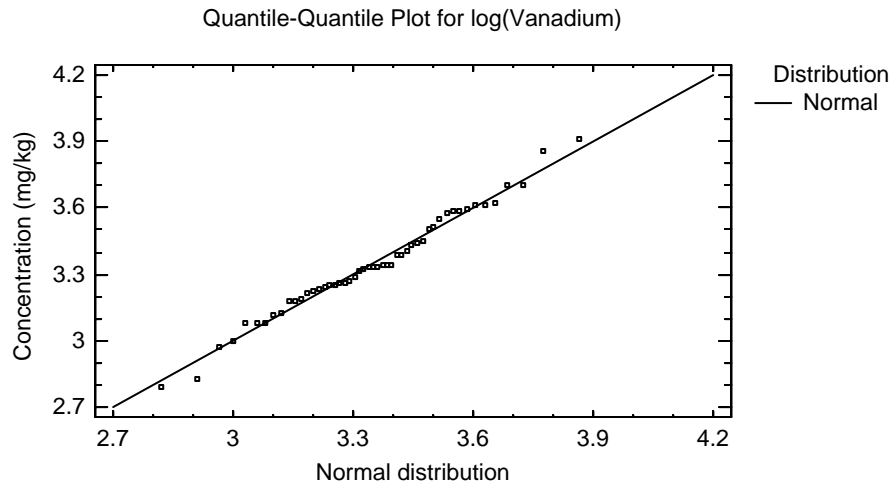
Fitted Distributions

Normal
mean = 3.34408
standard deviation = 0.236009



Tests for Normality for log(Vanadium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.98313	0.835484



**DRAFT**

**Uncensored Data - Vanadium (Data Set = "Tronox"&Depth Value<=20)**

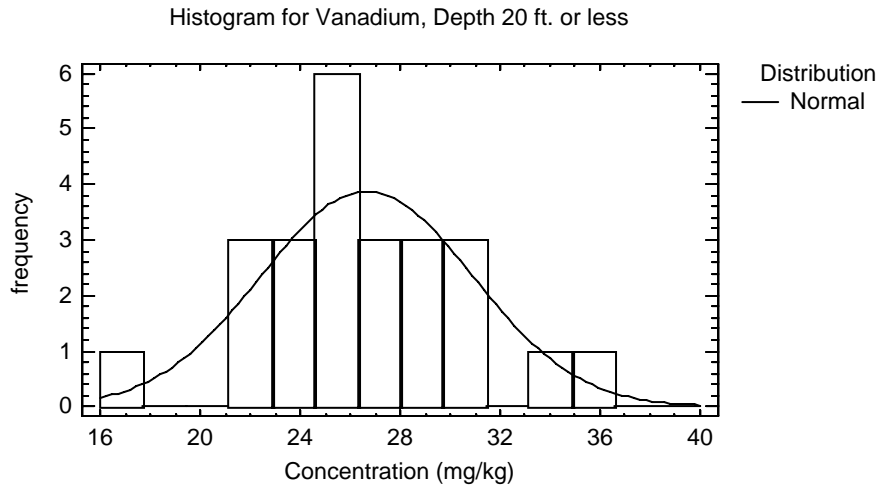
Data variable: Vanadium

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 17.0 to 36.3

Fitted Distributions

Normal
mean = 26.6646
standard deviation = 4.22774

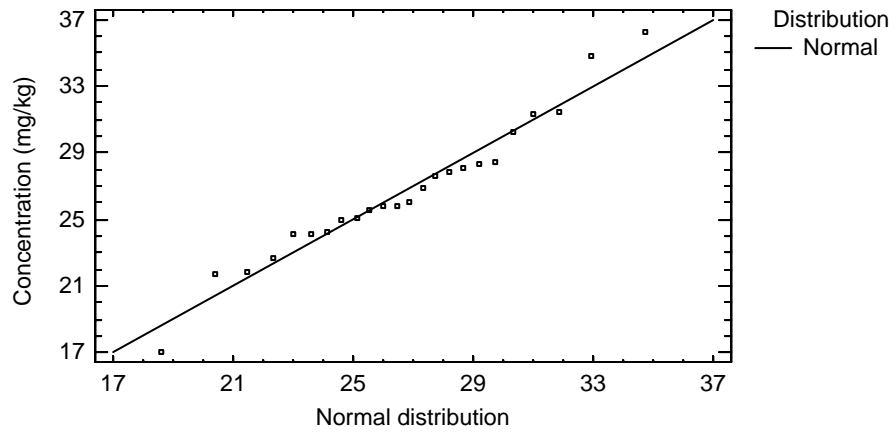


Tests for Normality for Vanadium

Test	Statistic	P-Value
Shapiro-Wilk W	0.970496	0.67827



Quantile-Quantile Plot for Vanadium, Depth 20 ft. or less



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set = "Tronox"&Depth Value<=20)**

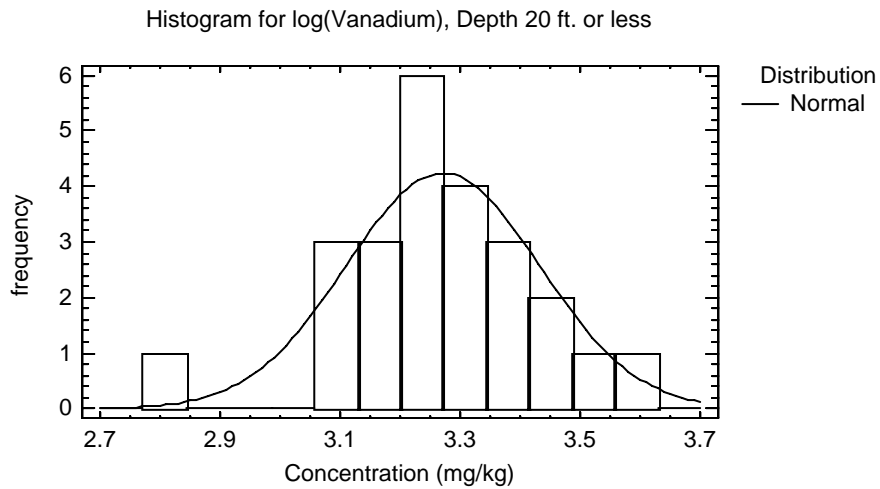
Data variable: log(Vanadium)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 2.83321 to 3.59182

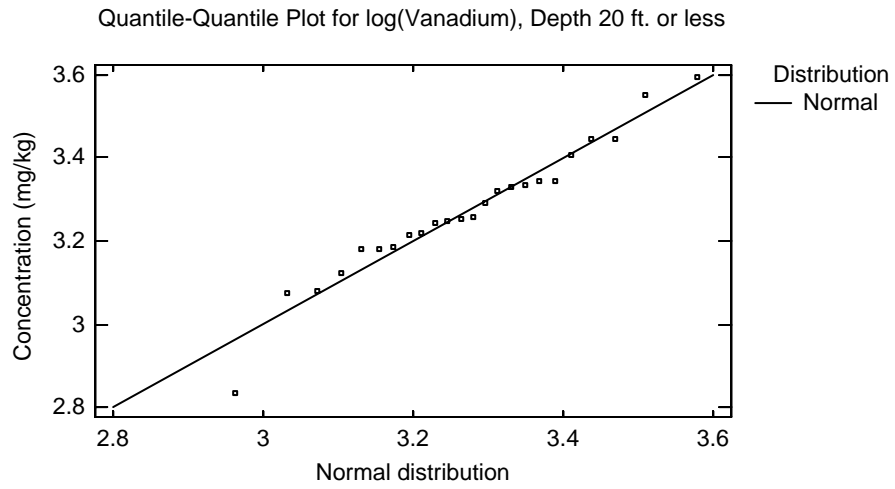
Fitted Distributions

Normal
mean = 3.27109
standard deviation = 0.161303



Tests for Normality for log(Vanadium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.965757	0.567718



**DRAFT**

**Uncensored Data - Vanadium (Data Set = "Tronox"&Depth Value>=30)**

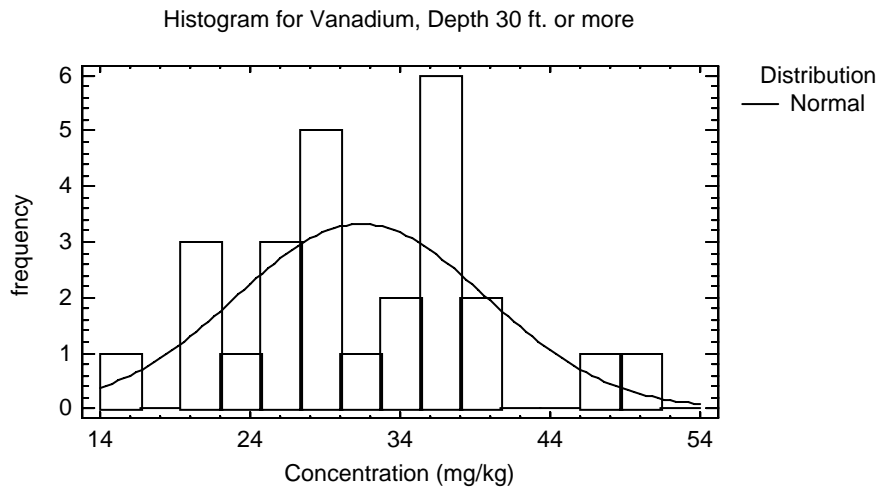
Data variable: Vanadium

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 16.3 to 49.8

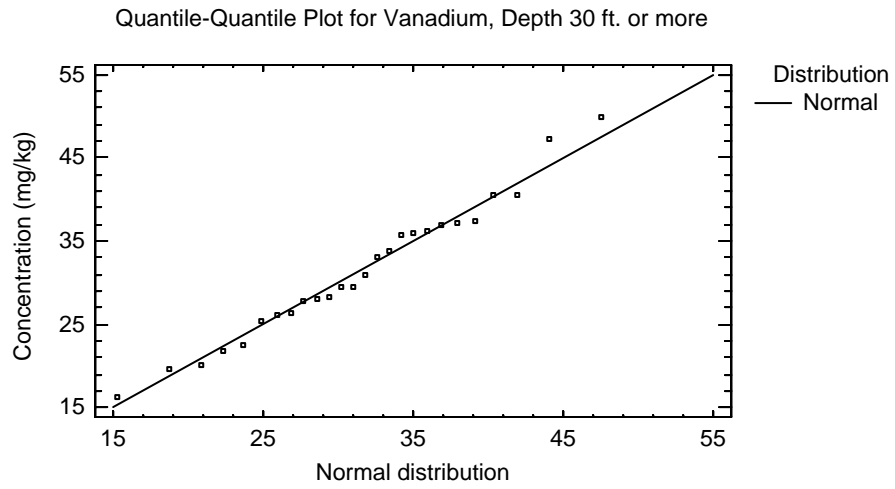
Fitted Distributions

Normal
mean = 31.3923
standard deviation = 8.31336



Tests for Normality for Vanadium

Test	Statistic	P-Value
Shapiro-Wilk W	0.9776	0.821527



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set = "Tronox"&Depth Value>=30)**

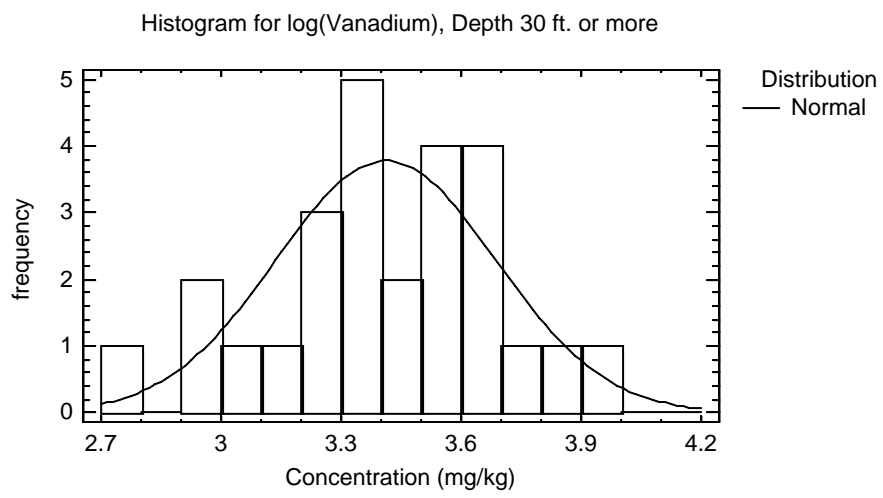
Data variable: log(Vanadium)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.79117 to 3.90801

Fitted Distributions

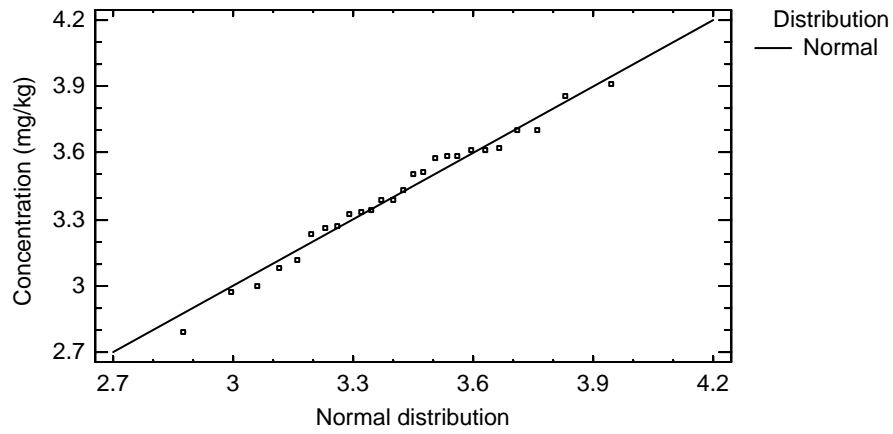
Normal
mean = 3.41147
standard deviation = 0.274586



Tests for Normality for log(Vanadium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.977039	0.808802

Quantile-Quantile Plot for log(Vanadium), Depth 30 ft. or more



**DRAFT**

**Two-Sample Comparison - Vanadium & Depth Range (Data Set="Tronox") for Vanadium**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 17.0 to 36.3  
 Sample 2: 26 values ranging from 16.3 to 49.8

Comparison of Means for Vanadium

95.0% confidence interval for mean of Depth Range=20 ft. or less: 26.6646 +/- 1.78522 [24.8794, 28.4498]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 31.3923 +/- 3.35785 [28.0345, 34.7502]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: -4.72772 +/- 3.73521 [-8.46293, -0.992519]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = -2.56288 P-value = 0.0144941  
 Reject the null hypothesis for alpha = 0.05.

Comparison of Standard Deviations for Vanadium

	Depth Range=20 ft. or less	Depth Range=30 ft. or more
Standard deviation	4.22774	8.31336
Variance	17.8738	69.1119
Df	23	25

Ratio of Variances = 0.258621

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [3.28586, 5.93051]  
 Standard deviation of Depth Range=30 ft. or more: [6.51981, 11.4758]  
 Ratio of Variances: [0.114684, 0.591492]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.258621 P-value = 0.00174142  
 Reject the null hypothesis for alpha = 0.05.



**DRAFT**

**Uncensored Data - Vanadium (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

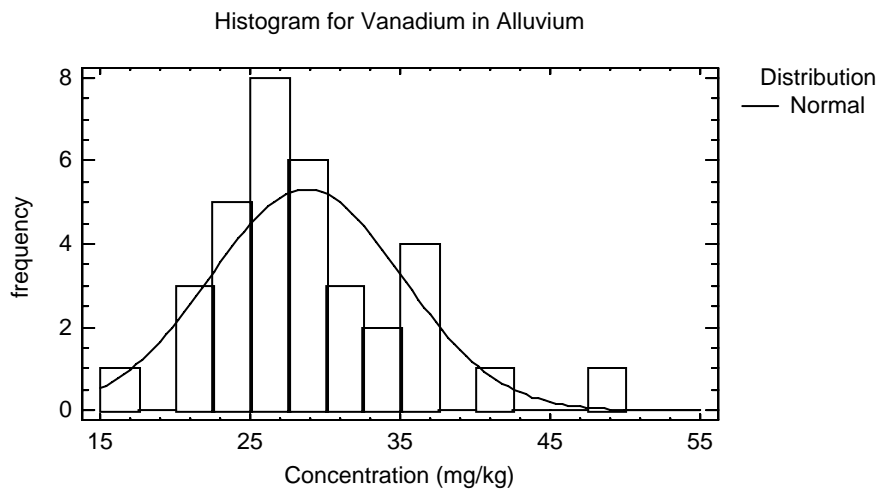
Data variable: Vanadium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 17.0 to 49.8

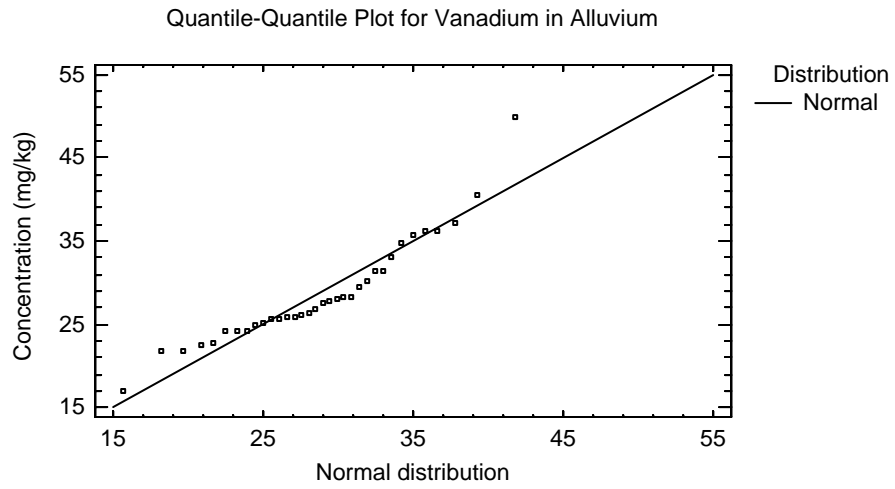
Fitted Distributions

Normal
mean = 28.7338
standard deviation = 6.3801



Tests for Normality for Vanadium

Test	Statistic	P-Value
Shapiro-Wilk W	0.920484	0.0194489



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

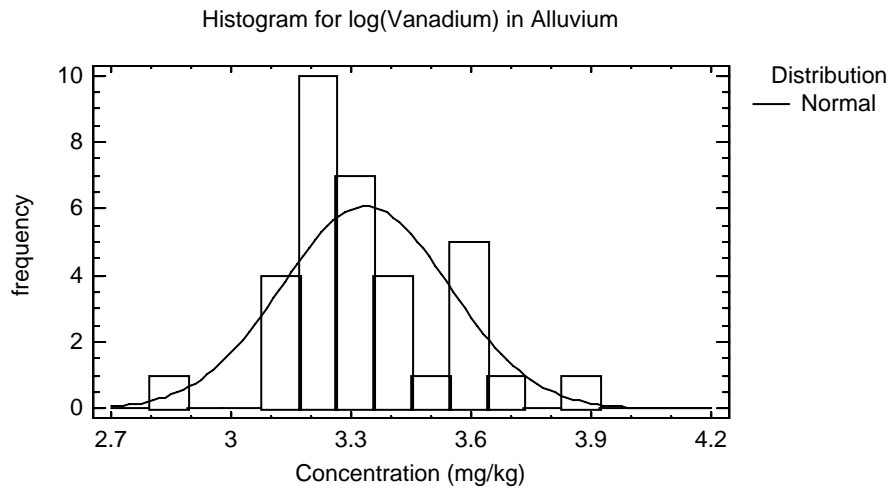
Data variable: log(Vanadium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 2.83321 to 3.90801

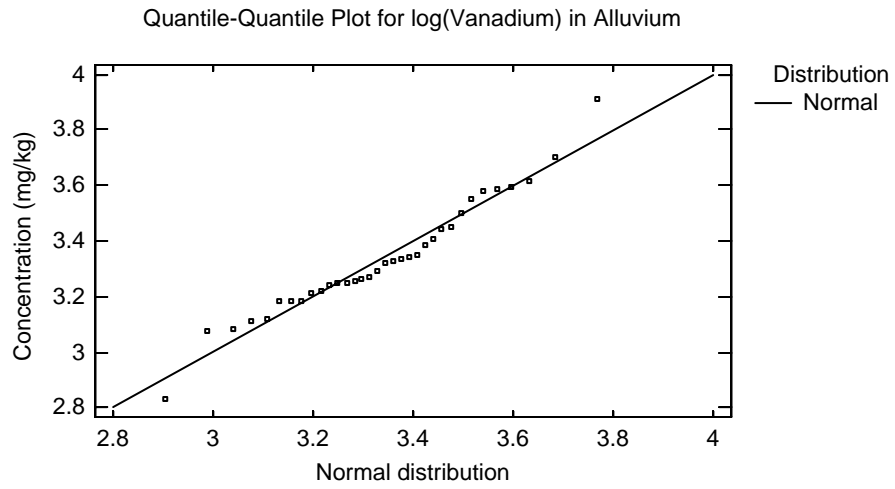
Fitted Distributions

Normal
mean = 3.33613
standard deviation = 0.209522



Tests for Normality for log(Vanadium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.972433	0.605184



**DRAFT**

**Uncensored Data - Vanadium (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

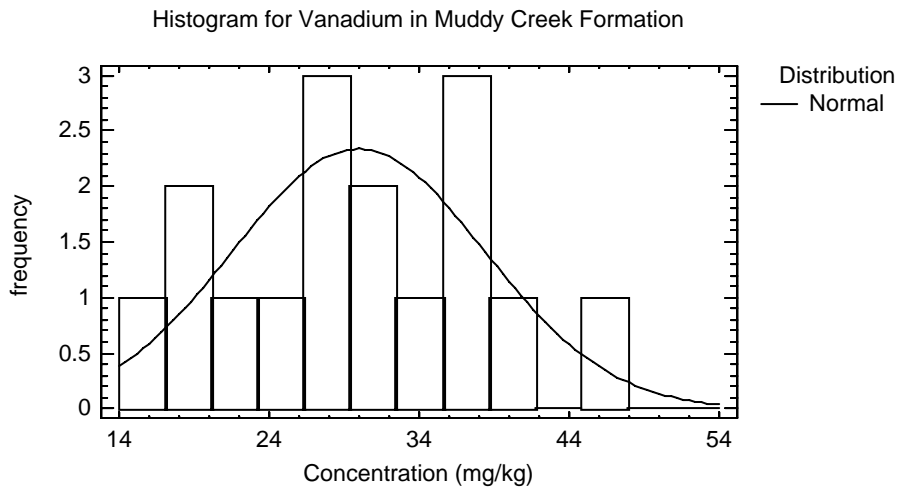
Data variable: Vanadium

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 16.3 to 47.3

Fitted Distributions

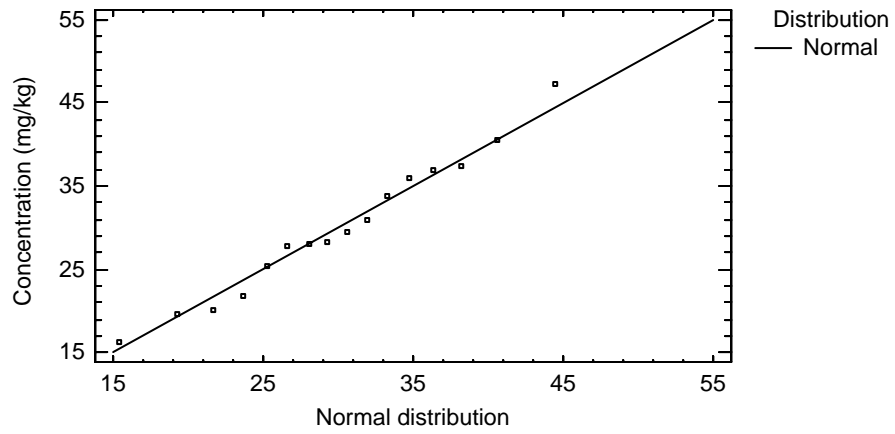
Normal
mean = 29.95
standard deviation = 8.40024



Tests for Normality for Vanadium

Test	Statistic	P-Value
Shapiro-Wilk W	0.979161	0.933127

Quantile-Quantile Plot for Vanadium in Muddy Creek Formation



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

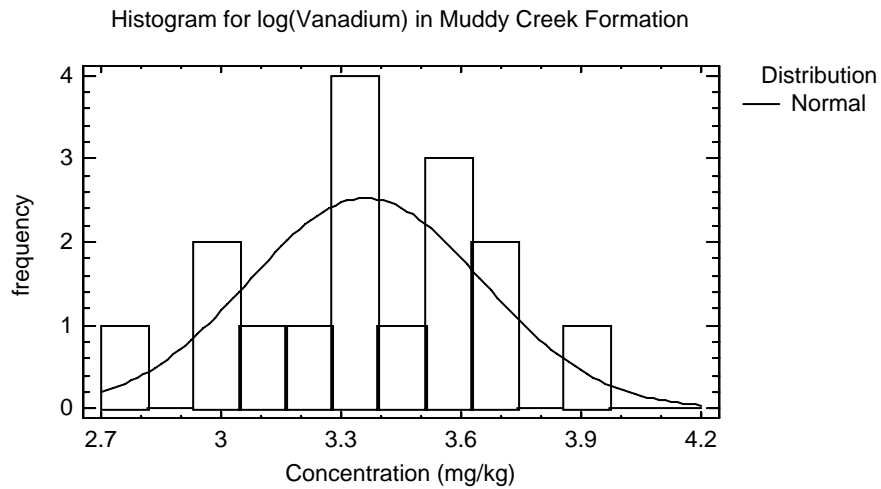
Data variable: log(Vanadium)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 2.79117 to 3.85651

Fitted Distributions

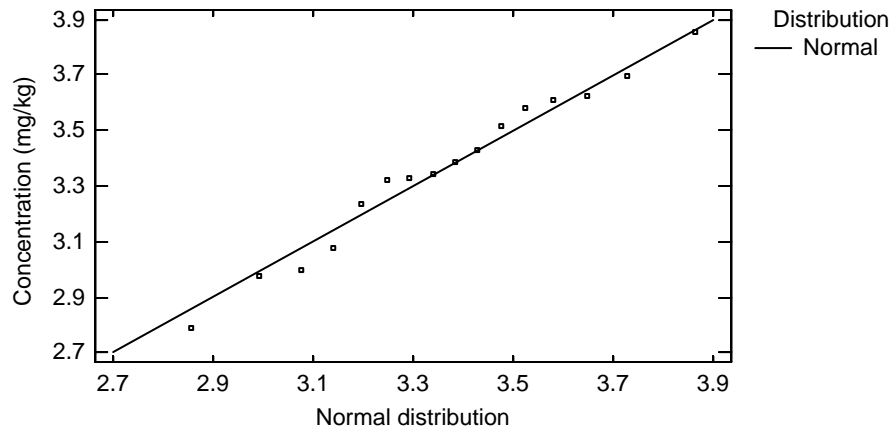
Normal
mean = 3.36099
standard deviation = 0.291422



Tests for Normality for log(Vanadium)

Test	Statistic	P-Value
Shapiro-Wilk W	0.974928	0.881513

Quantile-Quantile Plot for log(Vanadium) in Muddy Creek Formation





**DRAFT**

**Two-Sample Comparison - log(Vanadium) & Geological Formation 1 (Data Set="Tronox") for log(Vanadium)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 2.83321 to 3.90801  
 Sample 2: 16 values ranging from 2.79117 to 3.85651

**Comparison of Means for log(Vanadium)**

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 3.33613 +/- 0.0731058 [3.26302, 3.40923]  
 95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 3.36099 +/- 0.155288 [3.2057, 3.51628]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: -0.0248647 +/- 0.145174 [-0.170039, 0.12031]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = -0.344372 P-value = 0.732071  
 Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Vanadium)**

	<i>Geological Formation 1=Alluvium</i>	<i>Geological Formation 1=Muddy Creek</i>
Standard deviation	0.209522	0.291422
Variance	0.0438995	0.0849267
Df	33	15

Ratio of Variances = 0.51691

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.168996, 0.275789]  
 Standard deviation of Geological Formation 1=Muddy Creek: [0.215275, 0.451031]  
 Ratio of Variances: [0.197098, 1.16876]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.51691 P-value = 0.112384  
 Do not reject the null hypothesis for alpha = 0.05.

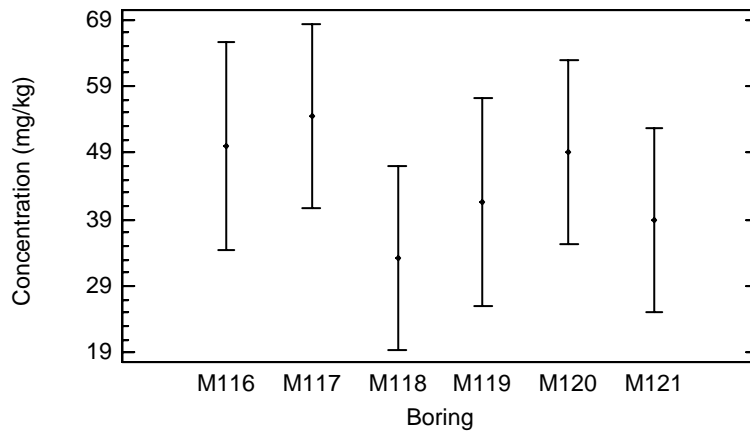
**DRAFT**

**2.29 Zinc**

**ANOVA Table for Zinc by Location ID**

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	2783.28	5	556.656	1.45	0.2268
Within groups	16935.0	44	384.886		
Total (Corr.)	19718.3	49			

Means and 95.0 Percent Tukey HSD Intervals for Zinc



**Kruskal-Wallis Test for Zinc by Location ID**

Location ID	Sample Size	Average Rank
M116	7	31.1429
M117	9	26.5
M118	9	16.1111
M119	7	27.7143
M120	9	32.2778
M121	9	21.0

Test statistic = 7.79063 P-Value = 0.168158

**DRAFT**

**Uncensored Data - Zinc (Data Set = "Tronox")**

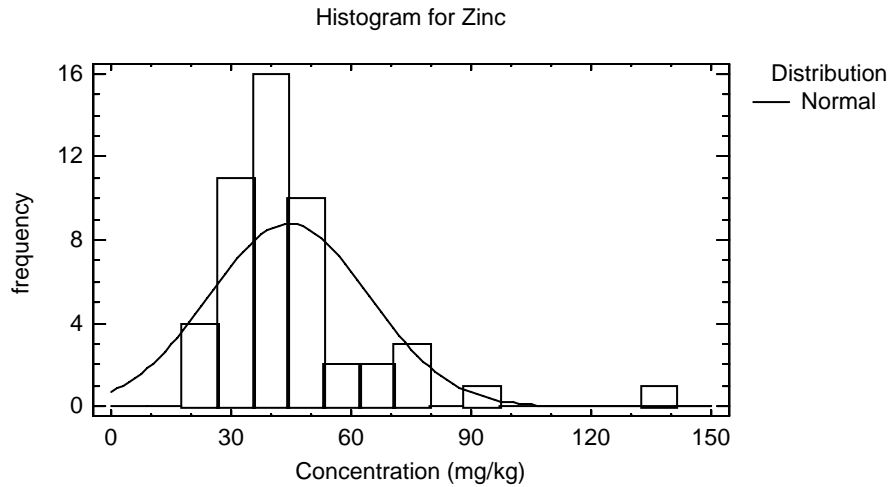
Data variable: Zinc

Selection variable: Data Set = "Tronox"

50 values ranging from 19.1 to 136.85

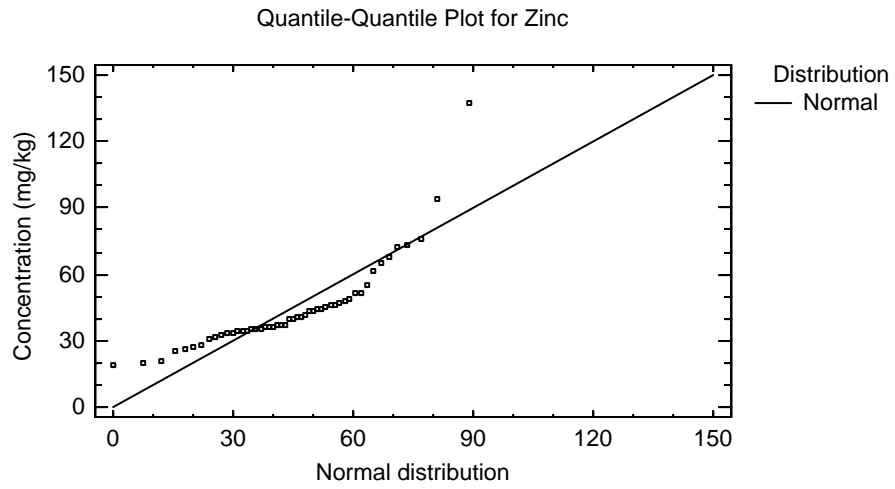
Fitted Distributions

<i>Normal</i>
mean = 44.475
standard deviation = 20.0602



**Tests for Normality for Zinc**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.797782	8.74938E-9



**DRAFT**

**Uncensored Data - log(Zinc) (Data Set = "Tronox")**

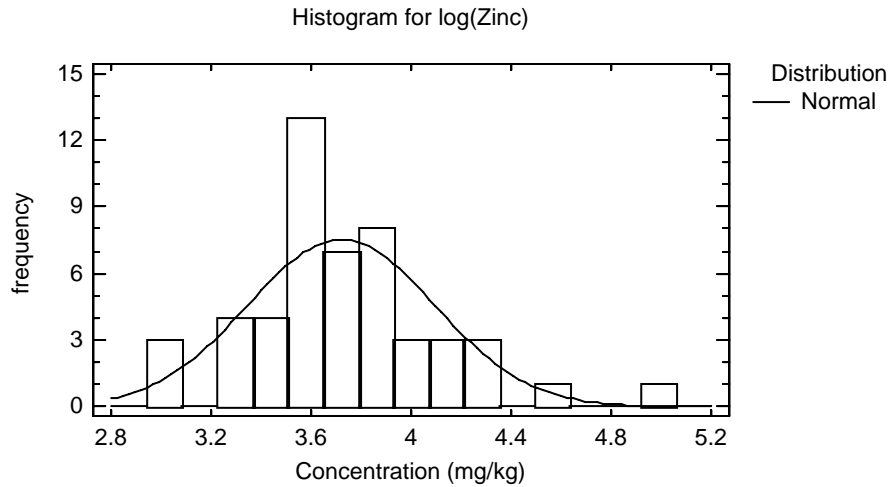
Data variable: log(Zinc)

Selection variable: Data Set = "Tronox"

50 values ranging from 2.94969 to 4.91889

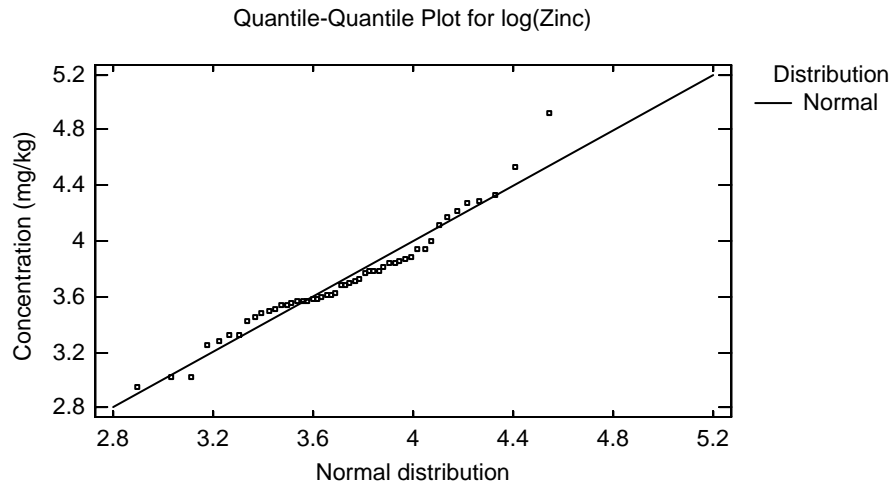
Fitted Distributions

<i>Normal</i>
mean = 3.71985
standard deviation = 0.374475



**Tests for Normality for log(Zinc)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.960839	0.169348



**DRAFT**

**Uncensored Data - Zinc (Data Set = "Tronox"&Depth Value<=20)**

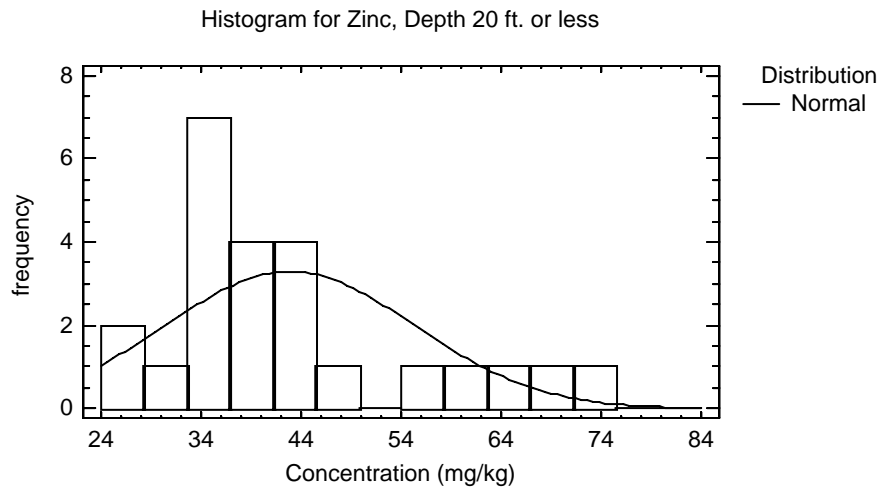
Data variable: Zinc

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 26.6 to 72.1

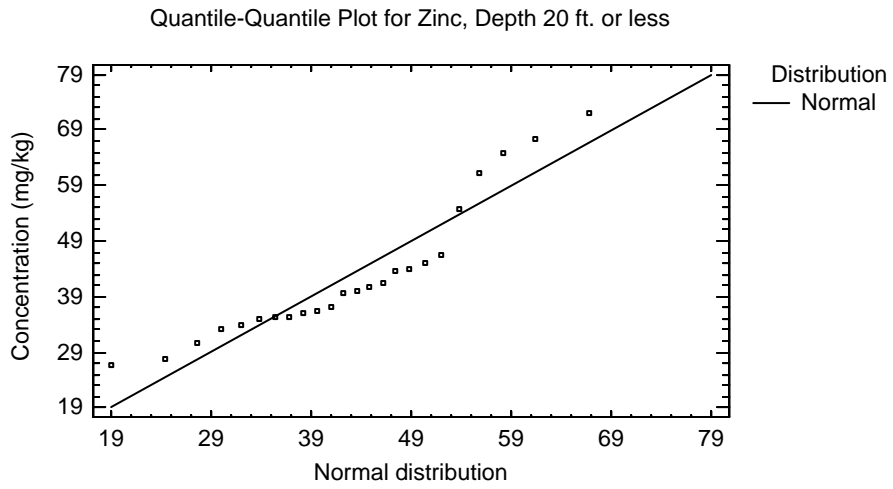
Fitted Distributions

<i>Normal</i>
mean = 42.8687
standard deviation = 12.4746



**Tests for Normality for Zinc**

Test	Statistic	P-Value
Shapiro-Wilk W	0.877427	0.0064773





**DRAFT**

**Uncensored Data - log(Zinc) (Data Set = "Tronox"&Depth Value<=20)**

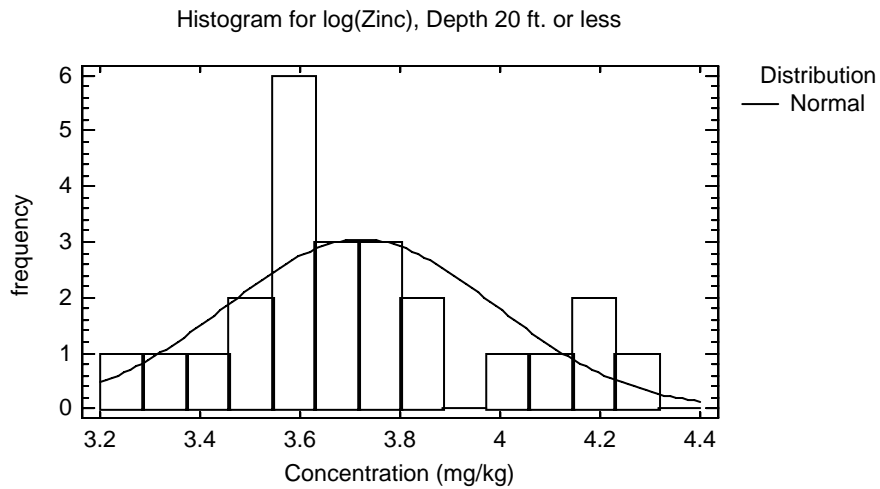
Data variable: log(Zinc)

Selection variable: Data Set = "Tronox"&Depth Value<=20

24 values ranging from 3.28091 to 4.27805

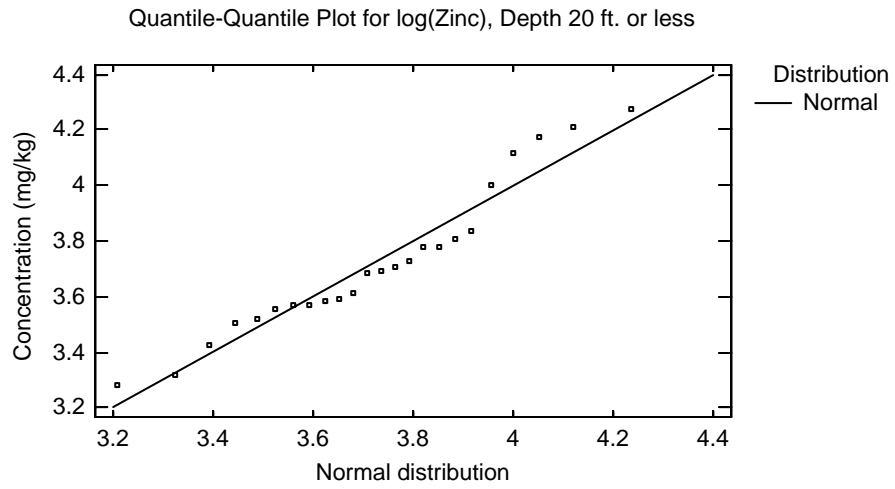
Fitted Distributions

<i>Normal</i>
mean = 3.72169
standard deviation = 0.269507



**Tests for Normality for log(Zinc)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.938793	0.15762



**DRAFT**

**Uncensored Data - Zinc (Data Set = "Tronox"&Depth Value>=30)**

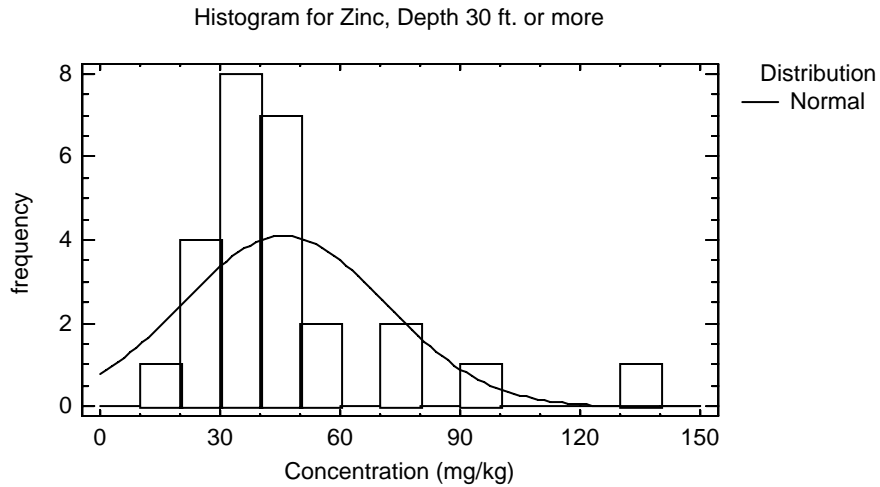
Data variable: Zinc

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 19.1 to 136.85

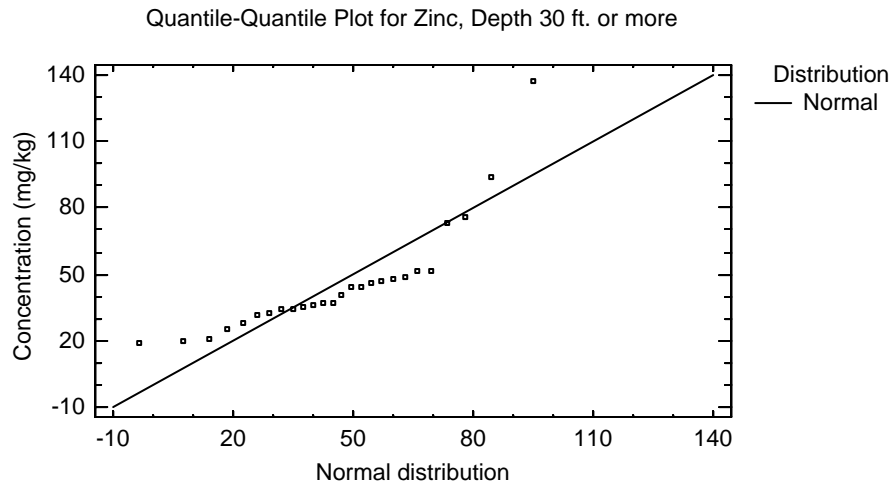
Fitted Distributions

<i>Normal</i>
mean = 45.9577
standard deviation = 25.314



**Tests for Normality for Zinc**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.78187	0.0000436298



**DRAFT**

**Uncensored Data - log(Zinc) (Data Set = "Tronox"&Depth Value>=30)**

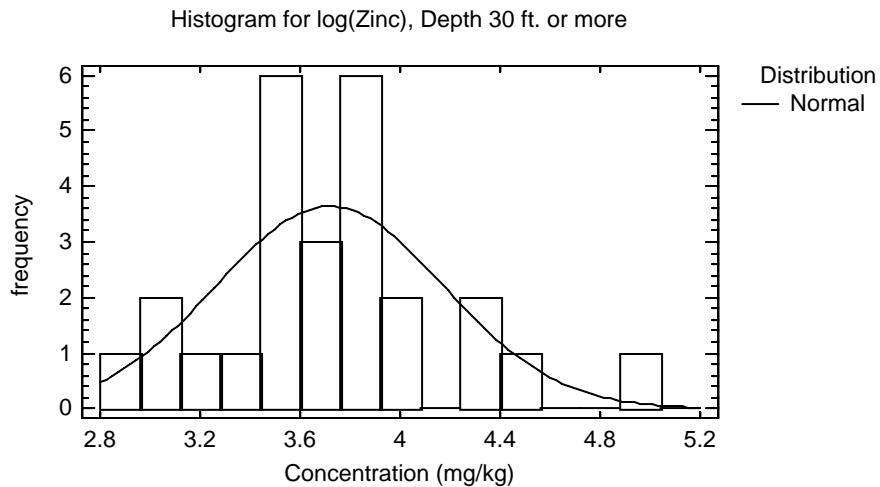
Data variable: log(Zinc)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 2.94969 to 4.91889

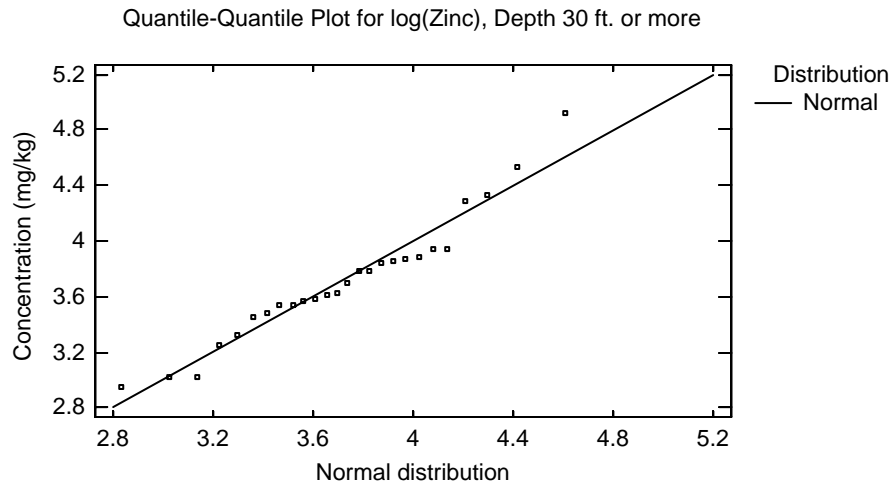
Fitted Distributions

<i>Normal</i>
mean = 3.71815
standard deviation = 0.456097



**Tests for Normality for log(Zinc)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.953698	0.30049



**DRAFT**

**Two-Sample Comparison - log(Zinc) & Depth Range (Data Set="Tronox") for log(Zinc)**

Sample 1: Depth Range=20 ft. or less  
 Sample 2: Depth Range=30 ft. or more  
 Selection variable: Data Set="Tronox"

Sample 1: 24 values ranging from 3.28091 to 4.27805  
 Sample 2: 26 values ranging from 2.94969 to 4.91889

**Comparison of Means for log(Zinc)**

95.0% confidence interval for mean of Depth Range=20 ft. or less: 3.72169 +/- 0.113803 [3.60789, 3.83549]  
 95.0% confidence interval for mean of Depth Range=30 ft. or more: 3.71815 +/- 0.184222 [3.53393, 3.90237]  
 95.0% confidence interval for the difference between the means  
 not assuming equal variances: 0.00354049 +/- 0.212059 [-0.208519, 0.2156]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 not assuming equal variances: t = 0.0337154 P-value = 0.973267  
 Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Zinc)**

	<i>Depth Range=20 ft. or less</i>	<i>Depth Range=30 ft. or more</i>
Standard deviation	0.269507	0.456097
Variance	0.0726339	0.208025
Df	23	25

Ratio of Variances = 0.34916

95.0% Confidence Intervals

Standard deviation of Depth Range=20 ft. or less: [0.209464, 0.378053]  
 Standard deviation of Depth Range=30 ft. or more: [0.357697, 0.6296]  
 Ratio of Variances: [0.154833, 0.798564]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 0.34916 P-value = 0.0134697  
 Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**Uncensored Data - Zinc (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

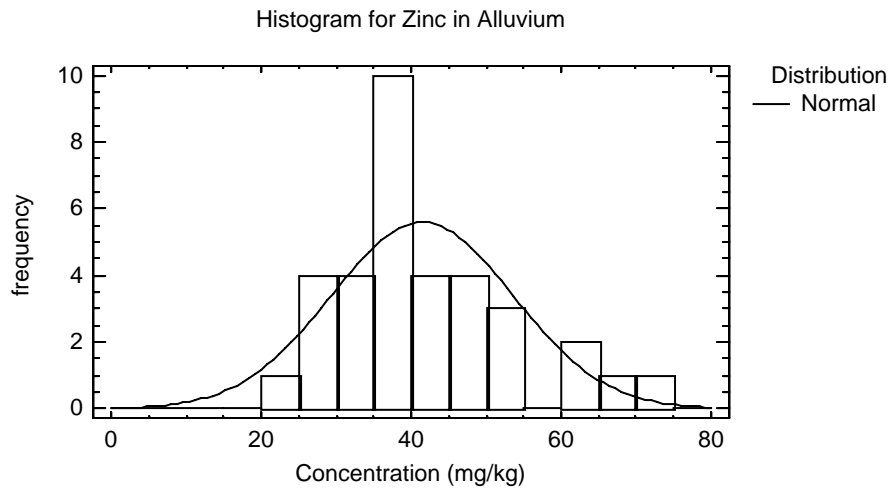
Data variable: Zinc

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 20.4 to 72.1

Fitted Distributions

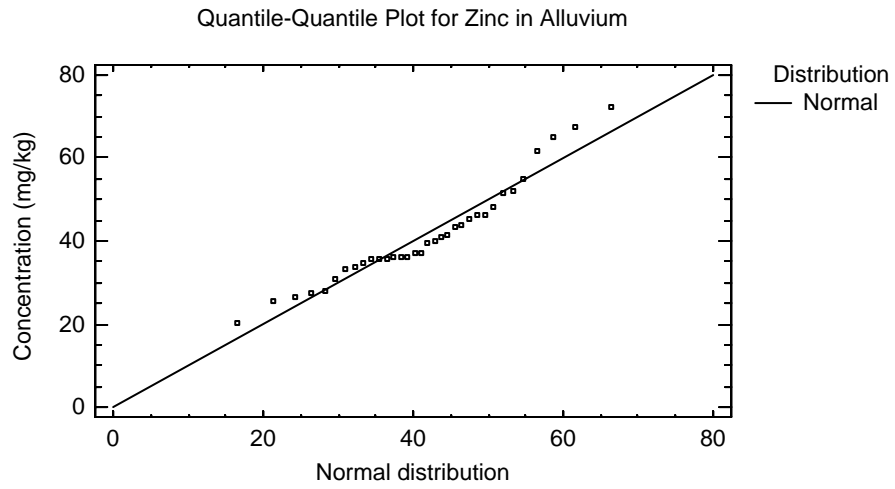
<i>Normal</i>
mean = 41.4706
standard deviation = 12.1366



**Tests for Normality for Zinc**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.938709	<b>0.0711737</b>





**DRAFT**

**Uncensored Data - log(Zinc) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

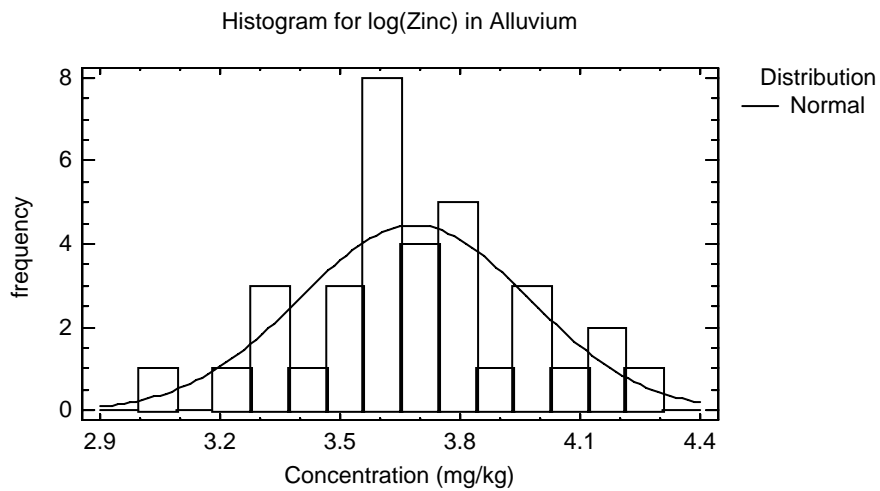
Data variable: log(Zinc)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

34 values ranging from 3.01553 to 4.27805

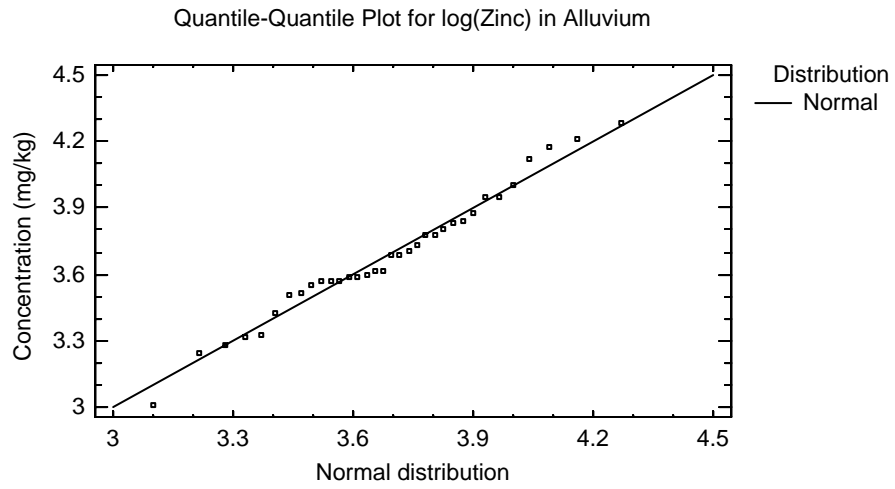
Fitted Distributions

<i>Normal</i>
mean = 3.6852
standard deviation = 0.285548



**Tests for Normality for log(Zinc)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.980446	0.833223



**DRAFT**

**Uncensored Data - Zinc (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

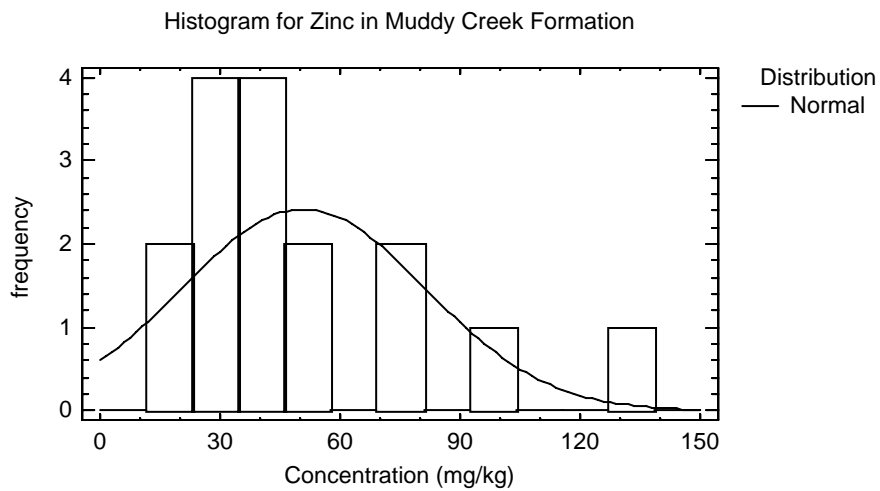
Data variable: Zinc

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 19.1 to 136.85

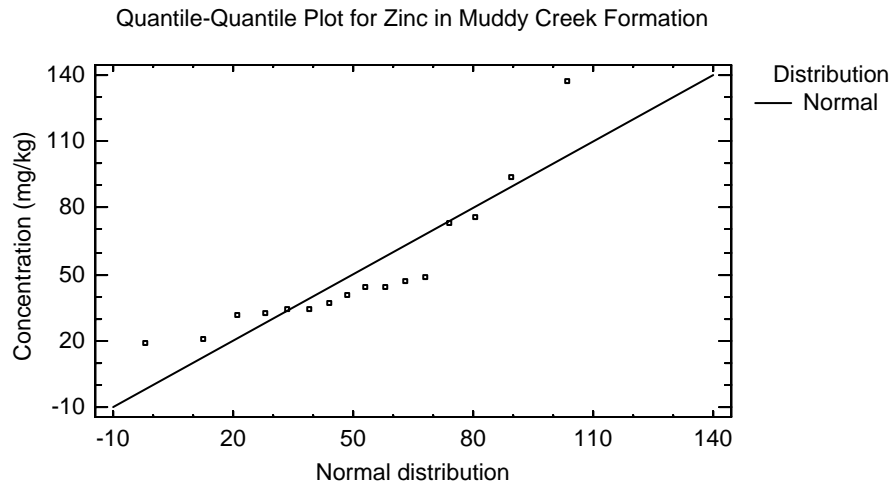
Fitted Distributions

<i>Normal</i>
mean = 50.8594
standard deviation = 30.4394



**Tests for Normality for Zinc**

Test	Statistic	P-Value
Shapiro-Wilk W	0.813399	0.00361767



**DRAFT**

**Uncensored Data - log(Zinc) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

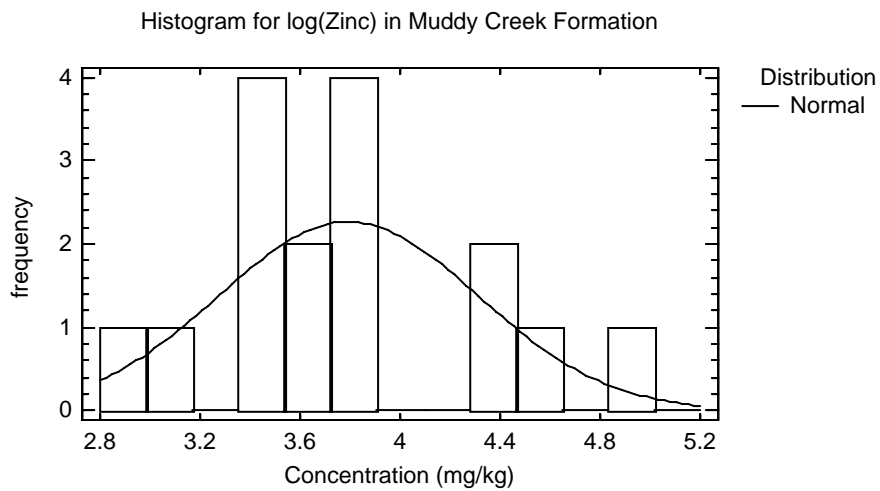
Data variable: log(Zinc)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 2.94969 to 4.91889

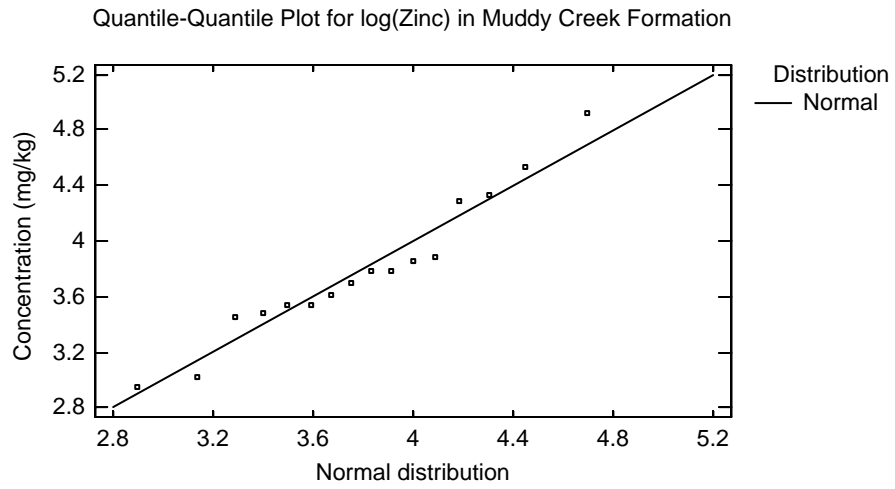
Fitted Distributions

<i>Normal</i>
mean = 3.79348
standard deviation = 0.519811



**Tests for Normality for log(Zinc)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.952807	0.520261



**DRAFT**

**Two-Sample Comparison - log(Zinc) & Geological Formation 1 (Data Set="Tronox") for log(Zinc)**

Sample 1: Geological Formation 1=Alluvium  
 Sample 2: Geological Formation 1=Muddy Creek  
 Selection variable: Data Set="Tronox"

Sample 1: 34 values ranging from 3.01553 to 4.27805  
 Sample 2: 16 values ranging from 2.94969 to 4.91889

**Comparison of Means for log(Zinc)**

95.0% confidence interval for mean of Geological Formation 1=Alluvium: 3.6852 +/- 0.0996325 [3.58557, 3.78483]

95.0% confidence interval for mean of Geological Formation 1=Muddy Creek: 3.79348 +/- 0.276988 [3.51649, 4.07047]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.108279 +/- 0.290276 [-0.398555, 0.181997]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -0.779695 P-value = 0.444986

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Zinc)**

	<i>Geological Formation 1=Alluvium</i>	<i>Geological Formation 1=Muddy Creek</i>
Standard deviation	0.285548	0.519811
Variance	0.0815375	0.270203
Df	33	15

Ratio of Variances = 0.301763

95.0% Confidence Intervals

Standard deviation of Geological Formation 1=Alluvium: [0.230316, 0.37586]

Standard deviation of Geological Formation 1=Muddy Creek: [0.383987, 0.804507]

Ratio of Variances: [0.115063, 0.682301]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.301763 P-value = 0.0040046

Reject the null hypothesis for alpha = 0.05.

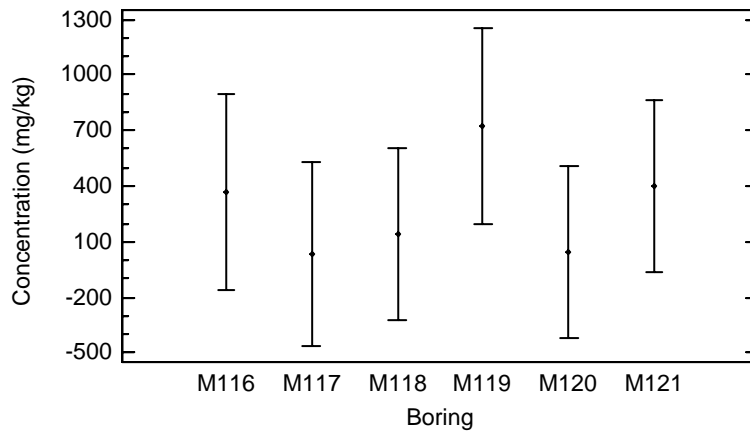


### 2.30 Perchlorate

**ANOVA Table for Perchlorate by Location ID**

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	2.70855E6	5	541710.	1.23	0.3102
Within groups	1.88833E7	43	439146.		
Total (Corr.)	2.15918E7	48			

Means and 95.0 Percent Tukey HSD Intervals for Perchlorate



**Kruskal-Wallis Test for Perchlorate by Location ID**

Location ID	Sample Size	Average Rank
M116	7	32.2857
M117	8	22.125
M118	9	28.7222
M119	7	31.1429
M120	9	20.0
M121	9	18.3889

Test statistic = 7.07812 P-Value = 0.214895

**DRAFT**

**Uncensored Data - Perchlorate (Data Set = "Tronox")**

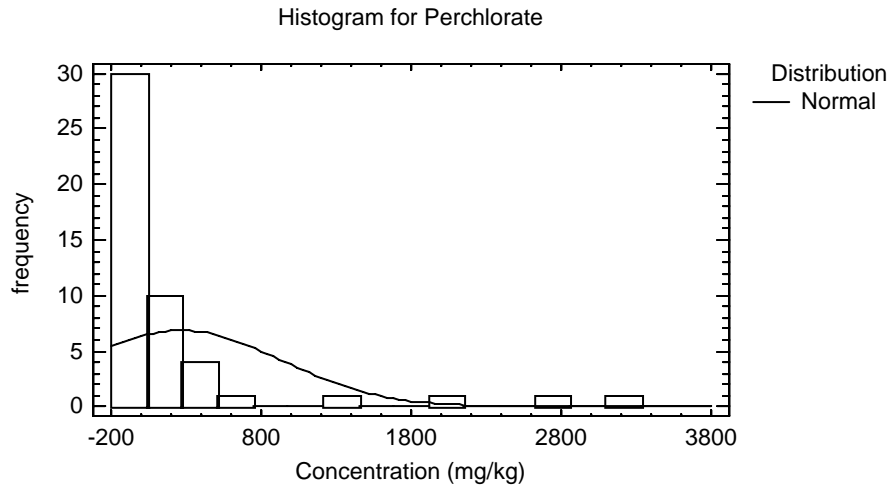
Data variable: Perchlorate

Selection variable: Data Set = "Tronox"

49 values ranging from 20.75 to 3310.0

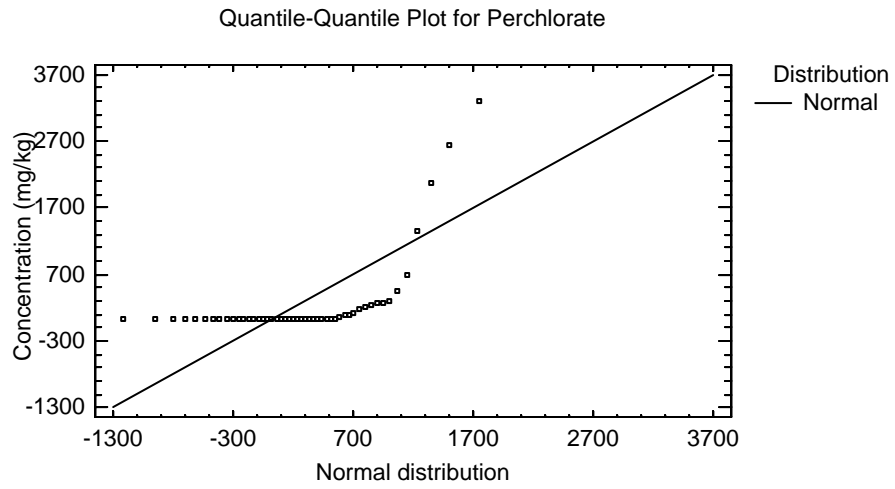
Fitted Distributions

<i>Normal</i>
mean = 268.396
standard deviation = 670.693



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.430208	0.0



**DRAFT**

**Uncensored Data - log(Perchlorate) (Data Set = "Tronox")**

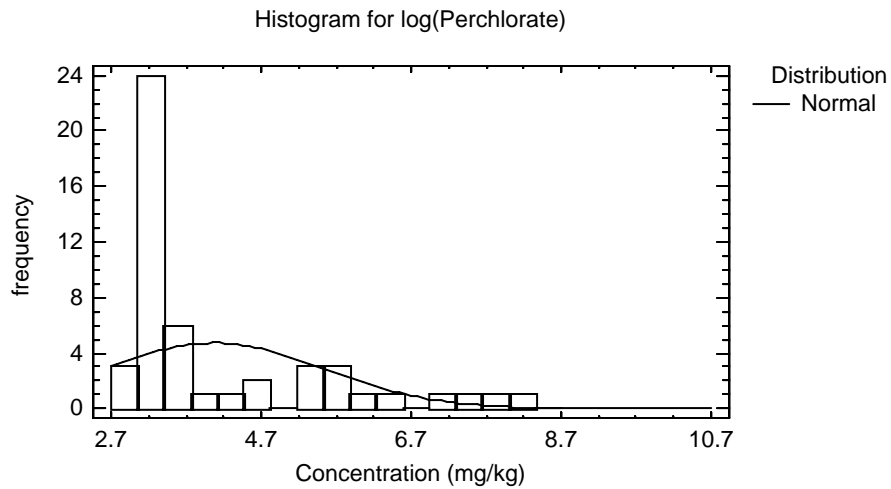
Data variable: log(Perchlorate)

Selection variable: Data Set = "Tronox"

49 values ranging from 3.03255 to 8.1047

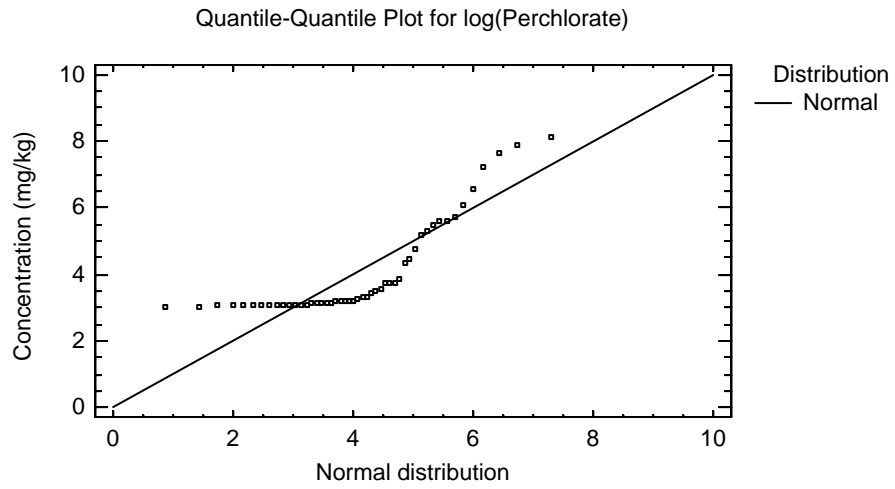
Fitted Distributions

<i>Normal</i>
mean = 4.08331
standard deviation = 1.4559



**Tests for Normality for log(Perchlorate)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.723247	2.11087E-11



**DRAFT**

**Uncensored Data - Perchlorate (Data Set = "Tronox"&Depth Value<=20)**

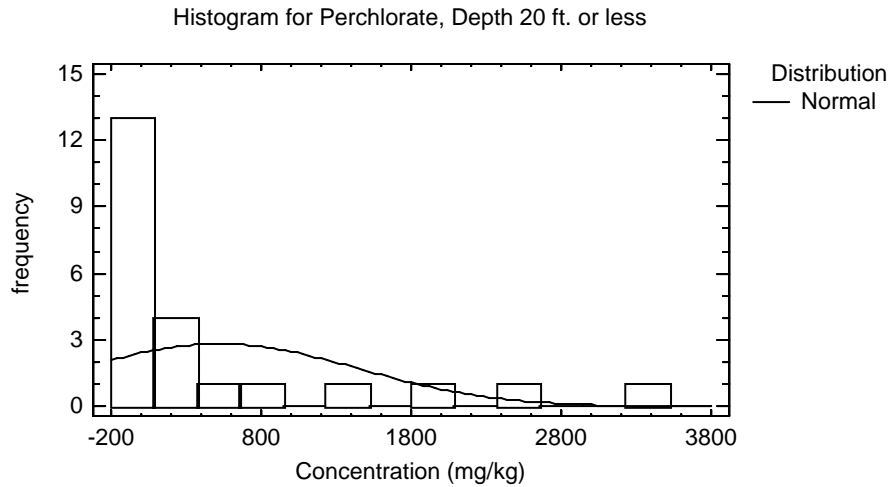
Data variable: Perchlorate

Selection variable: Data Set = "Tronox"&Depth Value<=20

23 values ranging from 20.75 to 3310.0

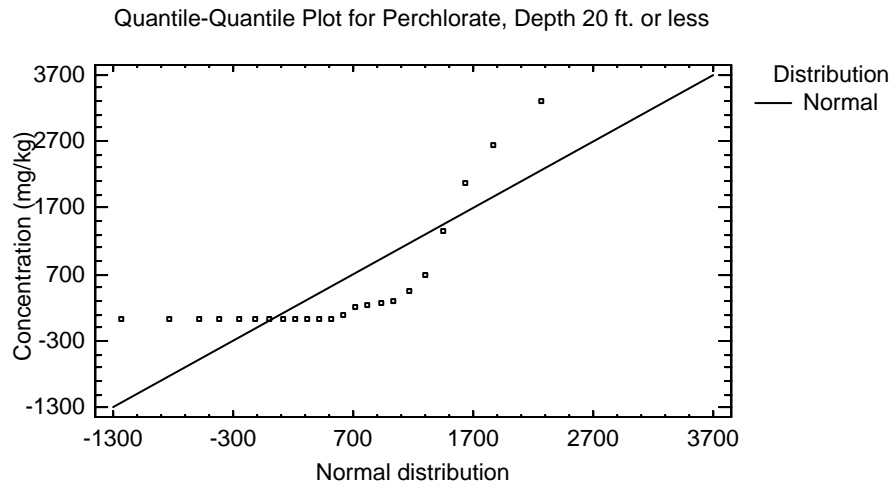
Fitted Distributions

<i>Normal</i>
mean = 519.075
standard deviation = 923.954



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.609382	1.99641E-7



**DRAFT**

**Uncensored Data - log(Perchlorate) (Data Set = "Tronox"&Depth Value<=20)**

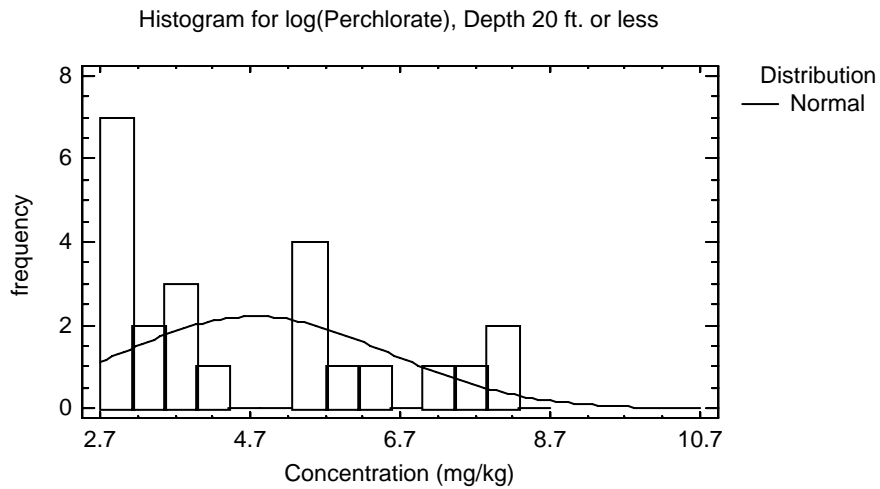
Data variable: log(Perchlorate)

Selection variable: Data Set = "Tronox"&Depth Value<=20

23 values ranging from 3.03255 to 8.1047

Fitted Distributions

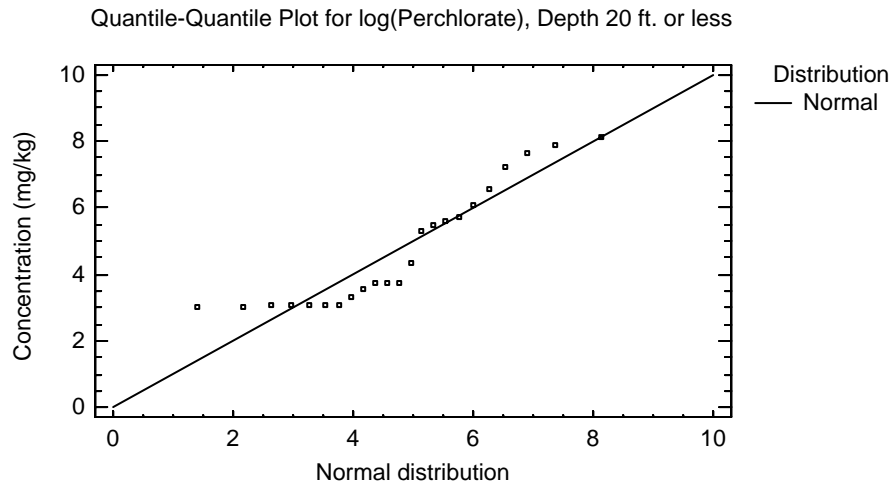
<i>Normal</i>
mean = 4.75963
standard deviation = 1.77679



**Tests for Normality for log(Perchlorate)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.850558	0.00213619





**DRAFT**

**Uncensored Data - Perchlorate (Data Set = "Tronox"&Depth Value>=30)**

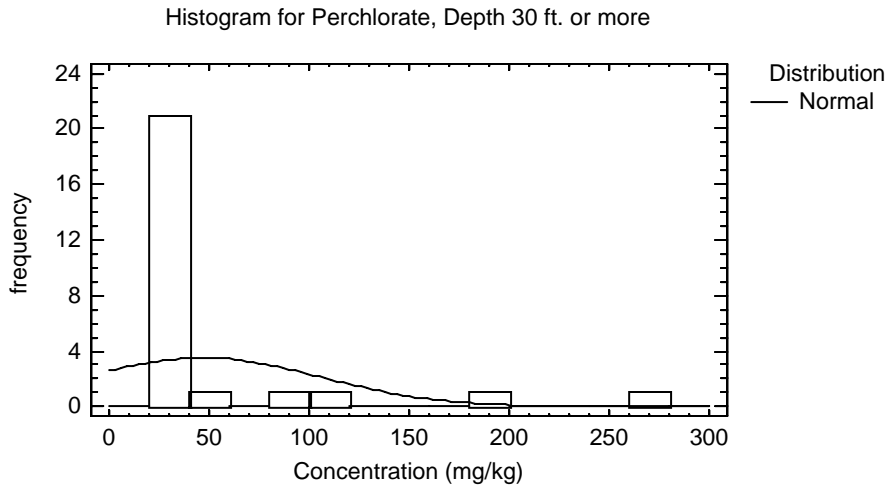
Data variable: Perchlorate

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 21.25 to 273.0

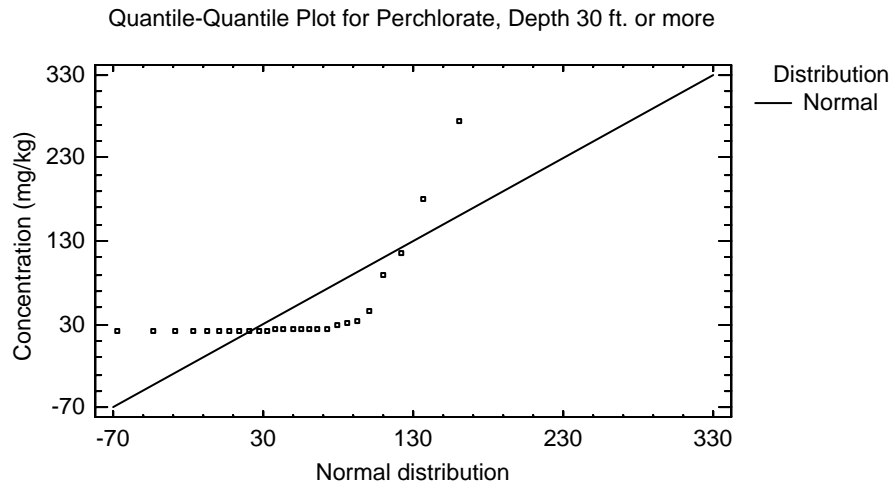
Fitted Distributions

<i>Normal</i>
mean = 46.6413
standard deviation = 58.895



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.49047	1.08093E-9



**DRAFT**

**Uncensored Data - log(Perchlorate) (Data Set = "Tronox"&Depth Value>=30)**

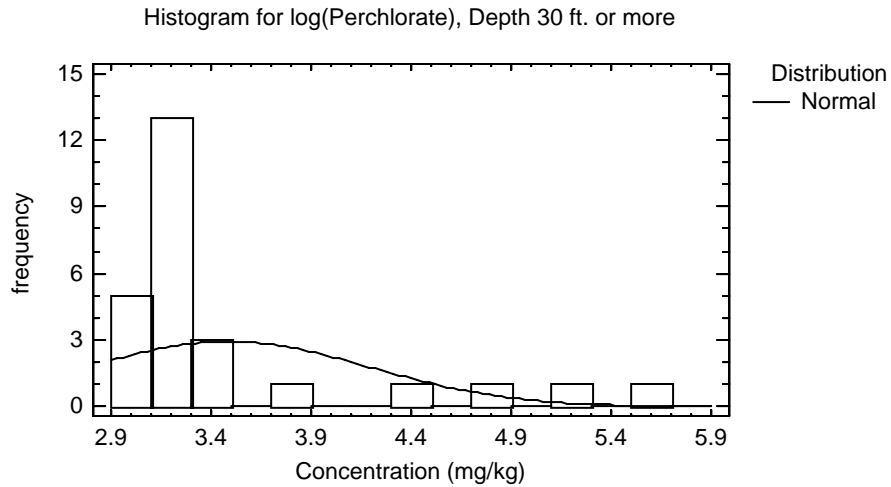
Data variable: log(Perchlorate)

Selection variable: Data Set = "Tronox"&Depth Value>=30

26 values ranging from 3.05636 to 5.60947

Fitted Distributions

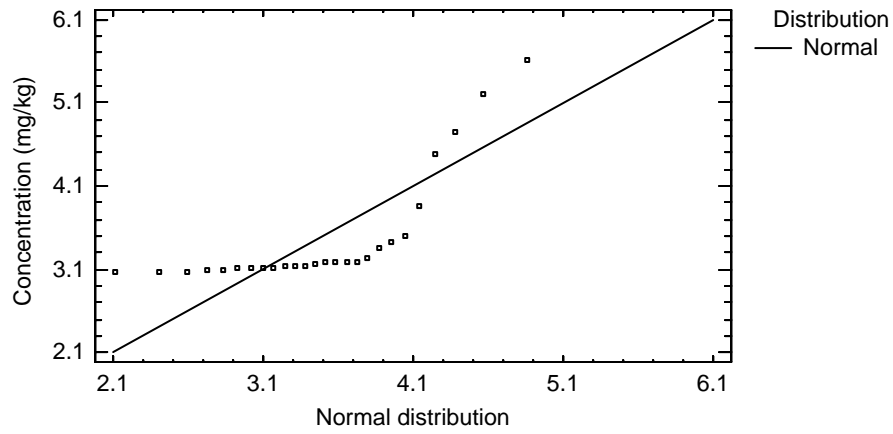
<i>Normal</i>
mean = 3.48503
standard deviation = 0.70603



**Tests for Normality for log(Perchlorate)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.622571	8.08469E-8

Quantile-Quantile Plot for log(Perchlorate), Depth 30 ft. or more



**DRAFT**

## Tronox Perchlorate by Depth Range

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -2.419965847$   $p = 0.015521965$

Reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

**Uncensored Data - Perchlorate (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

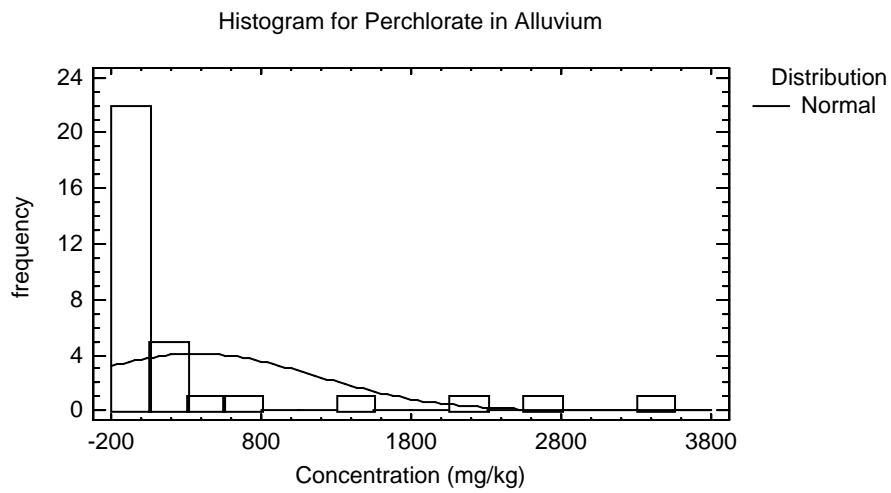
Data variable: Perchlorate

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

33 values ranging from 20.75 to 3310.0

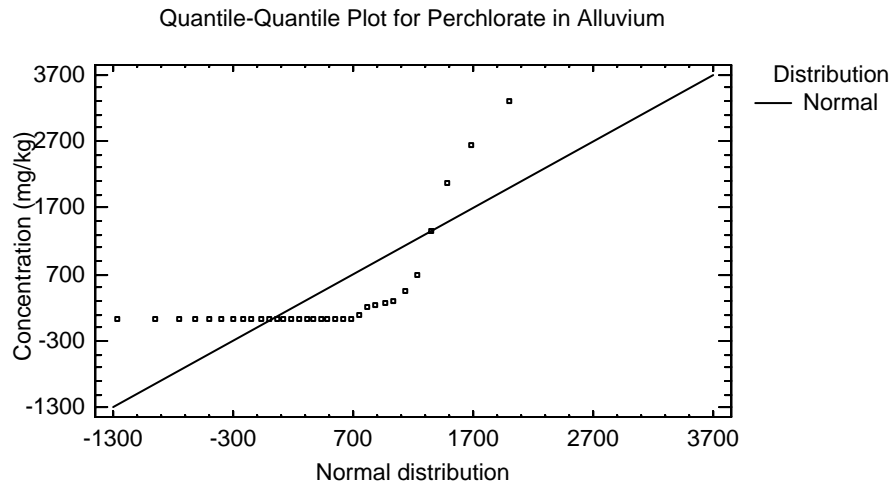
Fitted Distributions

<i>Normal</i>
mean = 368.788
standard deviation = 800.304



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.507488	1.50859E-11





**DRAFT**

**Uncensored Data - log(Perchlorate) (Data Set = "Tronox"&Geological Formation 1="Alluvium")**

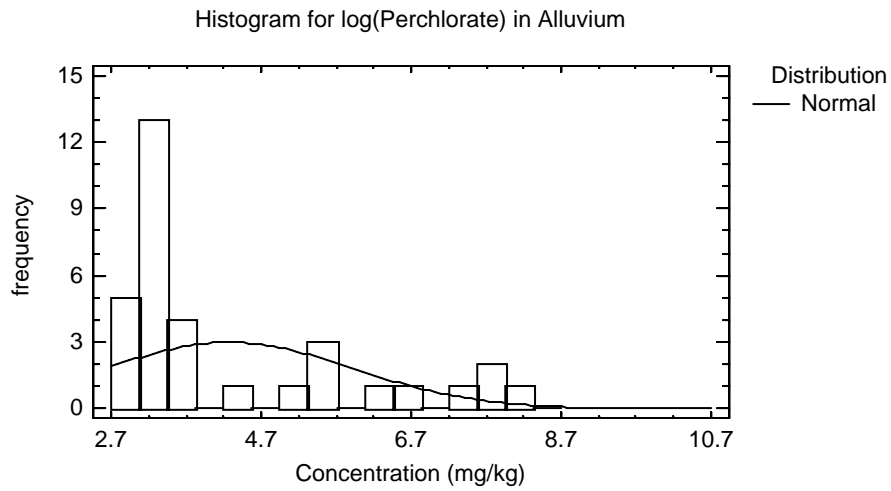
Data variable: log(Perchlorate)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Alluvium"

33 values ranging from 3.03255 to 8.1047

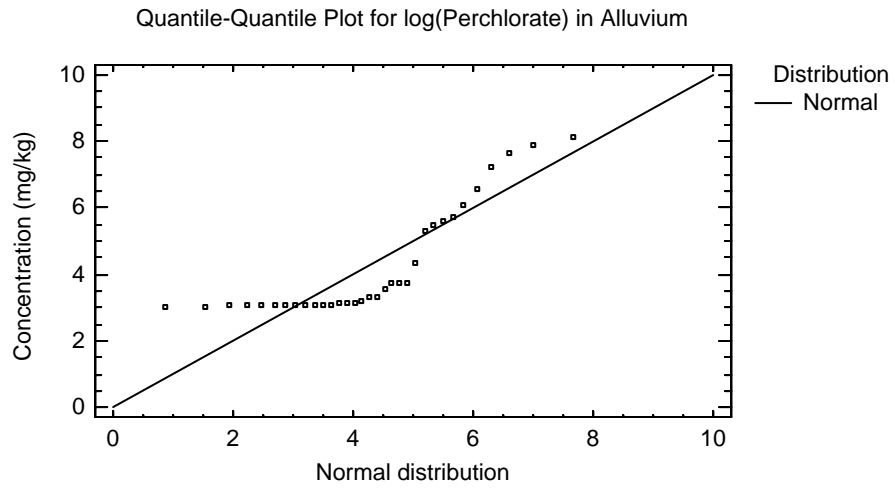
Fitted Distributions

<i>Normal</i>
mean = 4.26818
standard deviation = 1.65686



**Tests for Normality for log(Perchlorate)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.739104	4.09754E-7



**DRAFT**

**Uncensored Data - Perchlorate (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

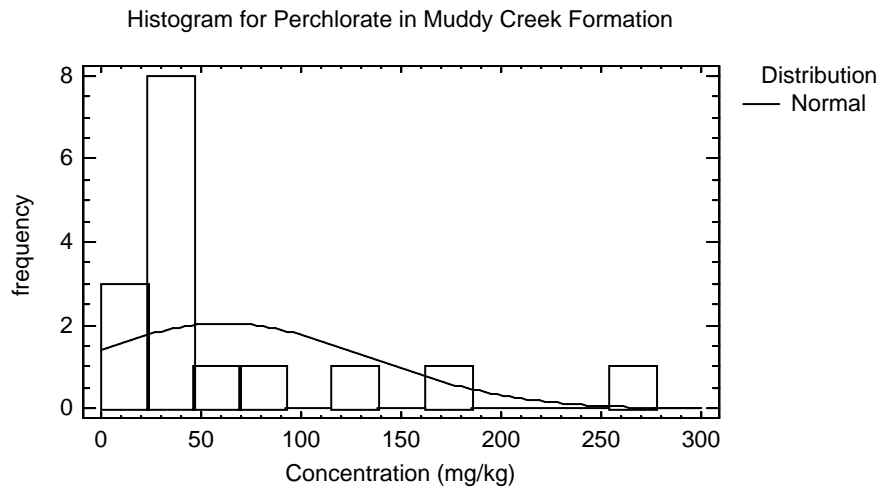
Data variable: Perchlorate

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 21.3 to 273.0

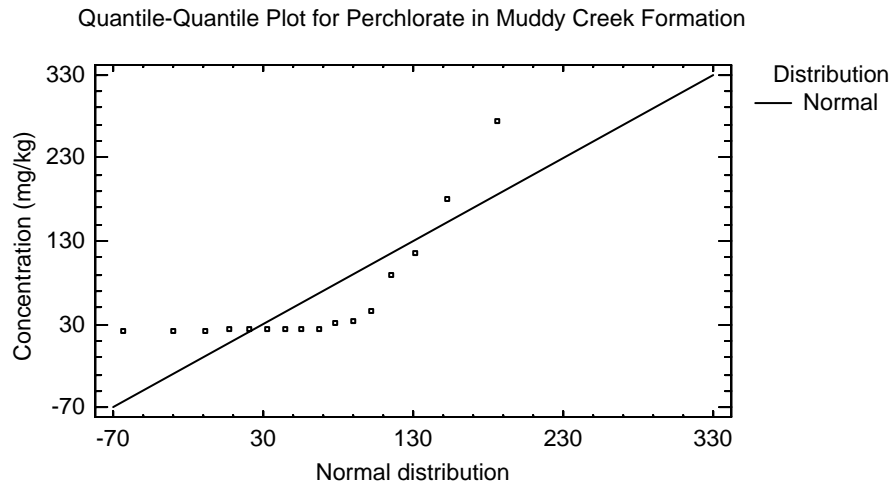
Fitted Distributions

<i>Normal</i>
mean = 61.3375
standard deviation = 71.9691



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.624283	0.0000112257



**DRAFT**

**Uncensored Data - log(Perchlorate) (Data Set = "Tronox"&Geological Formation 1="Muddy Creek")**

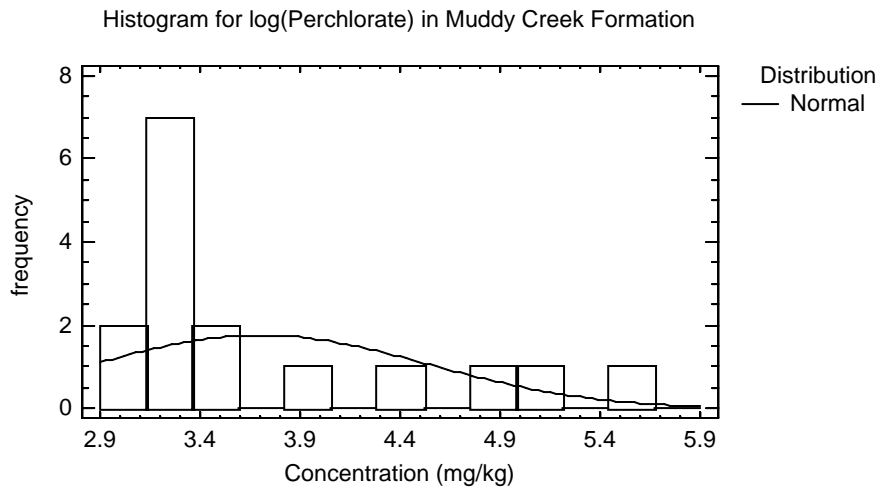
Data variable: log(Perchlorate)

Selection variable: Data Set = "Tronox"&Geological Formation 1="Muddy Creek"

16 values ranging from 3.05871 to 5.60947

Fitted Distributions

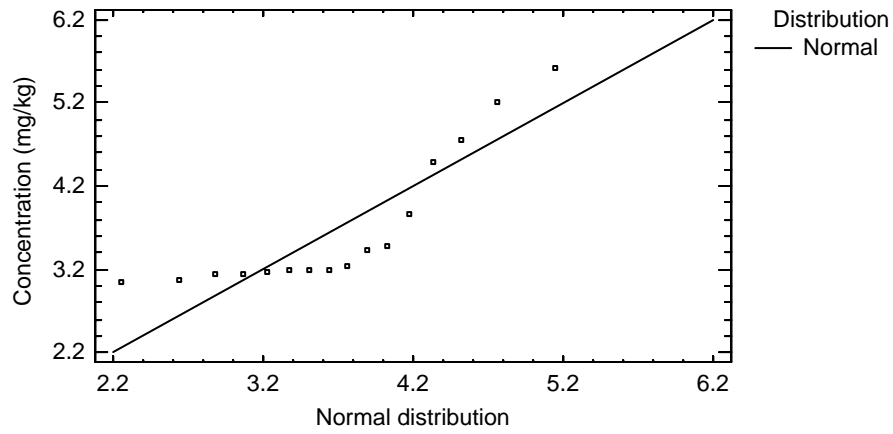
<i>Normal</i>
mean = 3.70202
standard deviation = 0.834367



**Tests for Normality for log(Perchlorate)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.74964	0.000443347

Quantile-Quantile Plot for log(Perchlorate) in Muddy Creek Formation



**DRAFT**

## Tronox Perchlorate by Geological Formation

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -0.607527705$   $p = 0.543500762$

Do not reject the null hypothesis for  $\alpha = 0.05$

### 3.0 COMPARISON OF TRONOX UPGRADIENT AND CITY OF HENDERSON BACKGROUND DATA FOR METALS AND PERCHLORATE IN SOIL

#### 3.1 Aluminum

##### Uncensored Data - Aluminum (Data Set="COH")

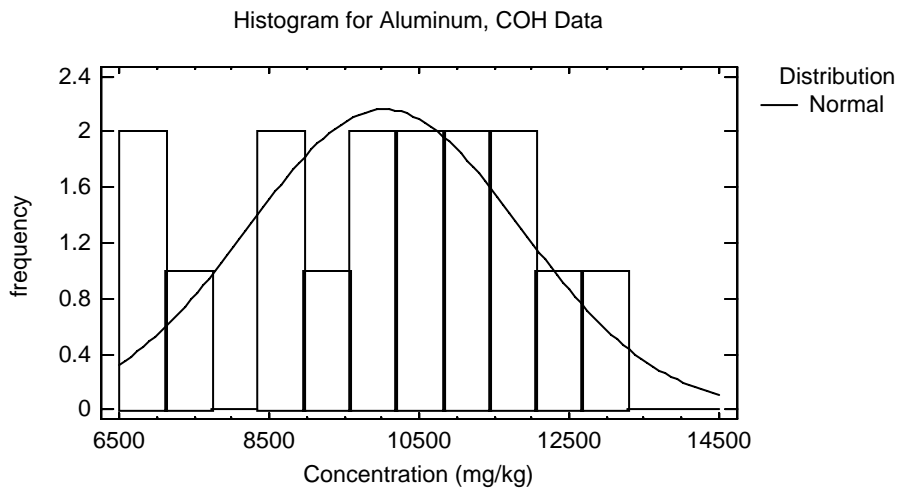
Data variable: Aluminum

Selection variable: Data Set="COH"

16 values ranging from 6820.0 to 12700.0

Fitted Distributions

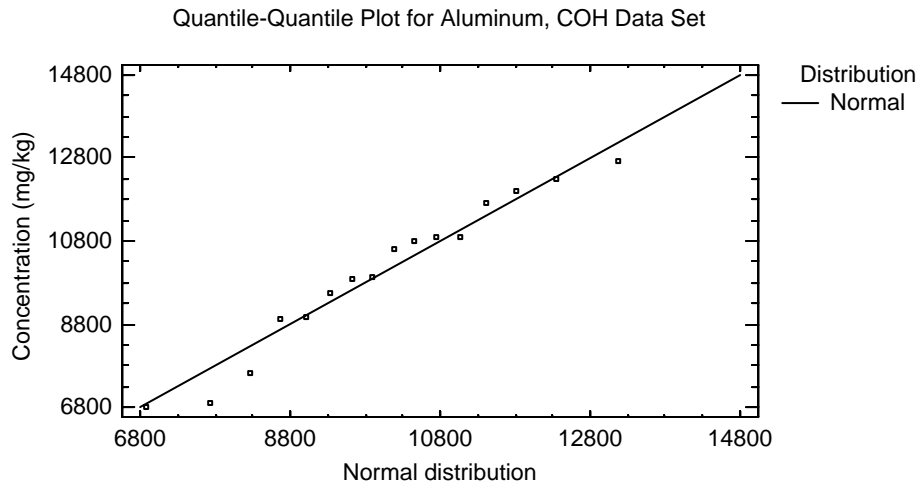
<i>Normal</i>
mean = 10036.3
standard deviation = 1817.68



##### Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.949248	0.466444





**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set="COH")**

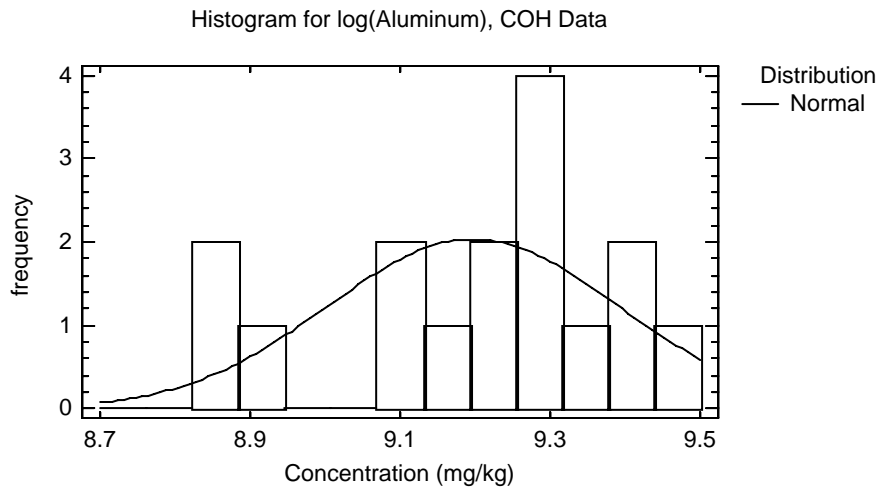
Data variable: log(Aluminum)

Selection variable: Data Set="COH"

16 values ranging from 8.82761 to 9.44936

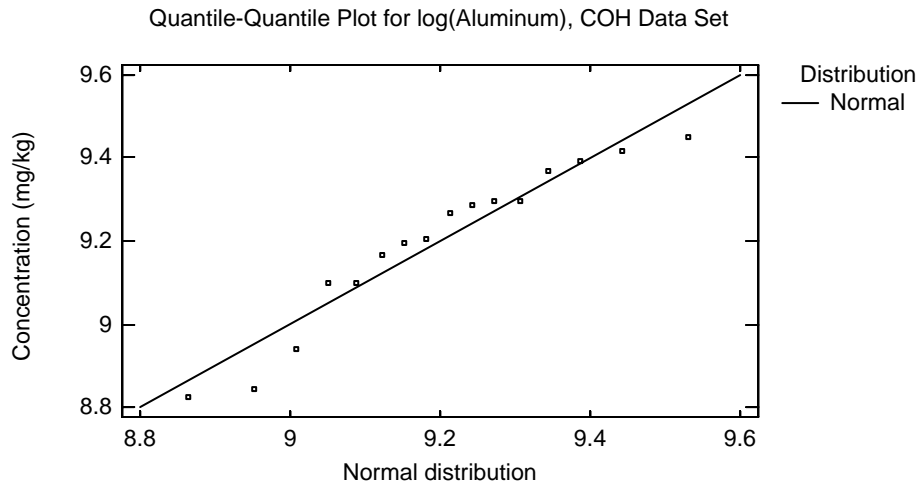
Fitted Distributions

<i>Normal</i>
mean = 9.19725
standard deviation = 0.19305



**Tests for Normality for log(Aluminum)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.920338	0.172354



**DRAFT**

**Two-Sample Comparison - Aluminum & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Aluminum**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 6820.0 to 12700.0

Sample 2: 24 values ranging from 6390.0 to 12100.0

**Comparison of Means for Aluminum**

95.0% confidence interval for mean of Data Set=COH: 10036.3 +/- 968.577 [9067.67, 11004.8]

95.0% confidence interval for mean of Data Set=Tronox: 8992.71 +/- 547.731 [8444.98, 9540.44]

95.0% confidence interval for the difference between the means

assuming equal variances: 1043.54 +/- 995.74 [**47.8018, 2039.28**]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 2.12158 P-value = **0.0404527**

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Aluminum**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	1817.68	1297.13
Variance	3.30397E6	1.68255E6
Df	15	23

Ratio of Variances = 1.96367

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [1342.73, 2813.21]

Standard deviation of Data Set=Tronox: [1008.15, 1819.56]

Ratio of Variances: [**0.796154, 5.32703**]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.96367 P-value = **0.140897**

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT****3.2 Antimony**

The City of Henderson data do not include antimony. Therefore, comparisons were not made.

**DRAFT**

### 3.3 Arsenic

#### Uncensored Data - Arsenic (Data Set="COH")

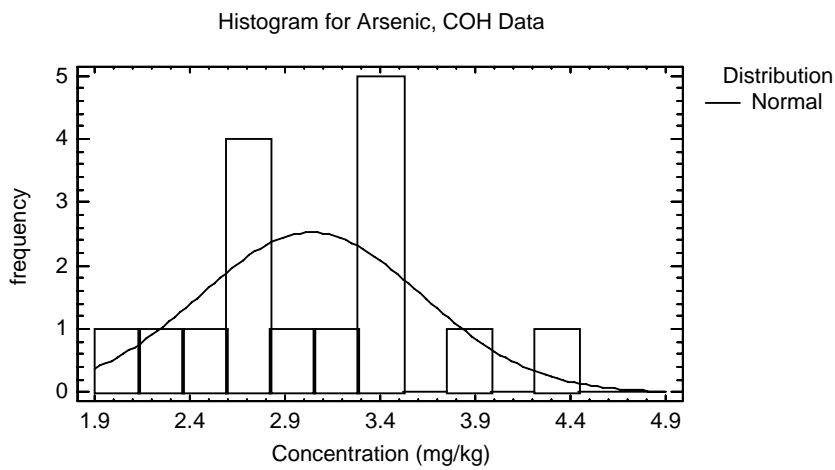
Data variable: Arsenic

Selection variable: Data Set="COH"

16 values ranging from 2.1 to 4.3

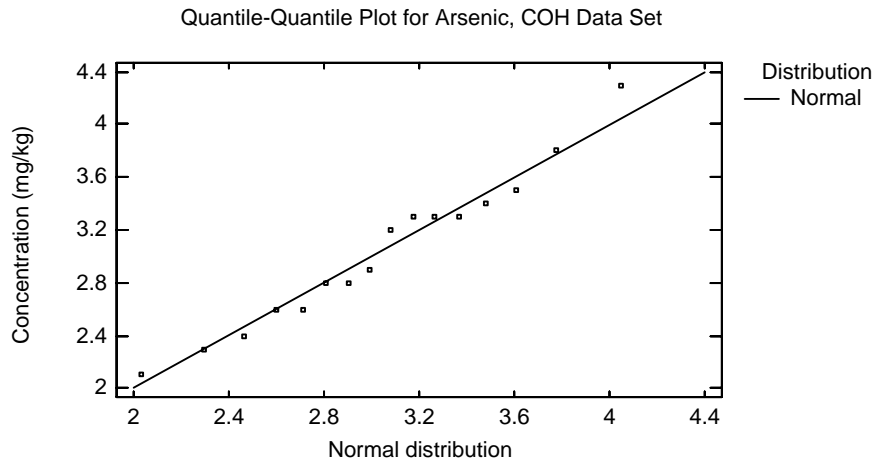
Fitted Distributions

<i>Normal</i>
mean = 3.0375
standard deviation = 0.582952



#### Tests for Normality for Arsenic

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.971722	0.834731



**DRAFT**

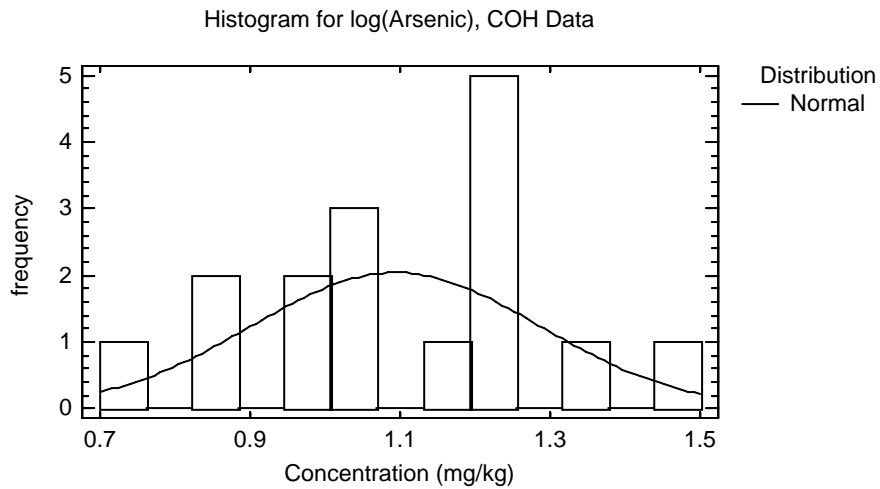
**Uncensored Data - log(Arsenic) (Data Set="COH")**

Data variable: log(Arsenic)  
 Selection variable: Data Set="COH"

16 values ranging from 0.741937 to 1.45862

Fitted Distributions

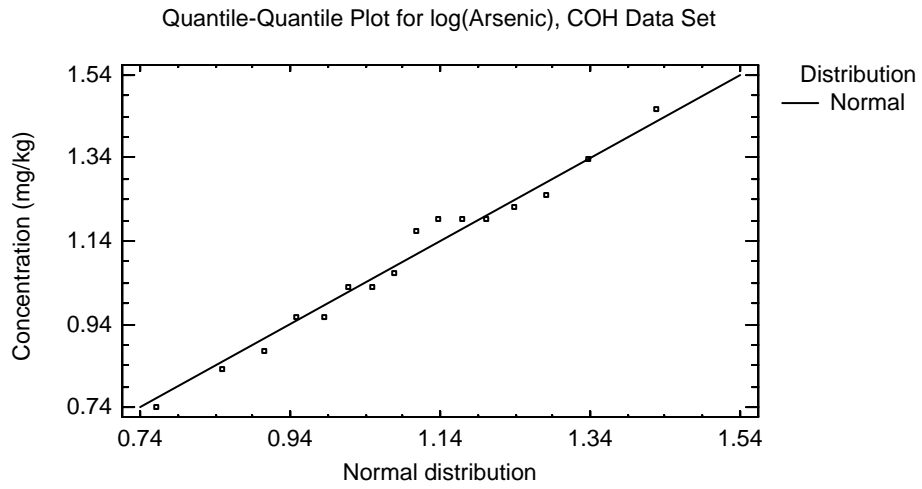
<i>Normal</i>
mean = 1.09377
standard deviation = 0.192386



**Tests for Normality for log(Arsenic)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.979684	0.938532





**DRAFT**

**Two-Sample Comparison - Arsenic & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Arsenic**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 2.1 to 4.3

Sample 2: 24 values ranging from 2.11 to 5.2

**Comparison of Means for Arsenic**

95.0% confidence interval for mean of Data Set=COH: 3.0375 +/- 0.310634 [2.72687, 3.34813]

95.0% confidence interval for mean of Data Set=Tronox: 3.30729 +/- 0.286752 [3.02054, 3.59404]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.269792 +/- 0.420024 [-0.689816, 0.150233]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -1.30032 P-value = 0.201323

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Arsenic**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.582952	0.679083
Variance	0.339833	0.461154
Df	15	23

Ratio of Variances = 0.736919

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.43063, 0.90223]

Standard deviation of Data Set=Tronox: [0.527793, 0.952591]

Ratio of Variances: [0.298777, 1.9991]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.736919 P-value = 0.548046

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.4 Barium

#### Uncensored Data - Barium (Data Set="COH")

Data variable: Barium

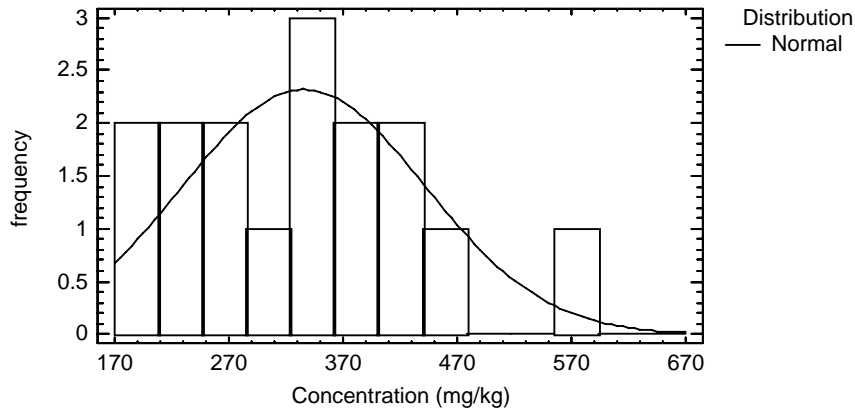
Selection variable: Data Set="COH"

16 values ranging from 198.0 to 561.0

Fitted Distributions

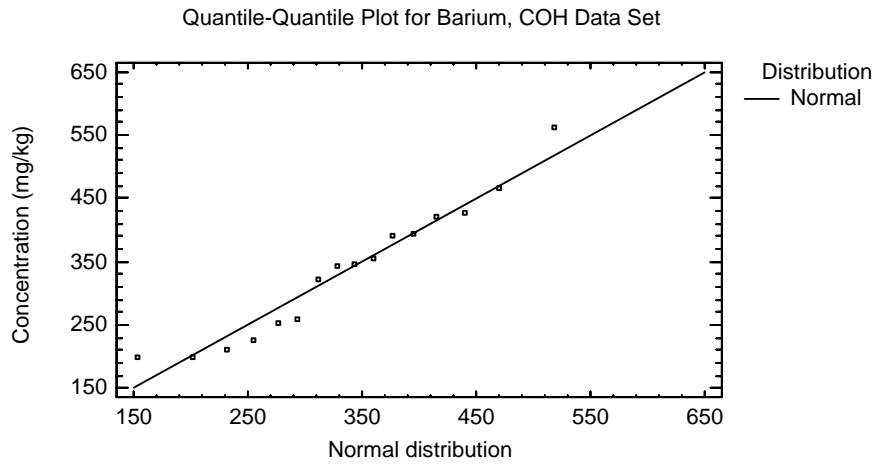
<i>Normal</i>
mean = 335.688
standard deviation = 105.791

Histogram for Barium, COH Data



#### Tests for Normality for Barium

Test	Statistic	P-Value
Shapiro-Wilk W	0.947096	0.43573



**DRAFT**

**Uncensored Data - log(Barium) (Data Set="COH")**

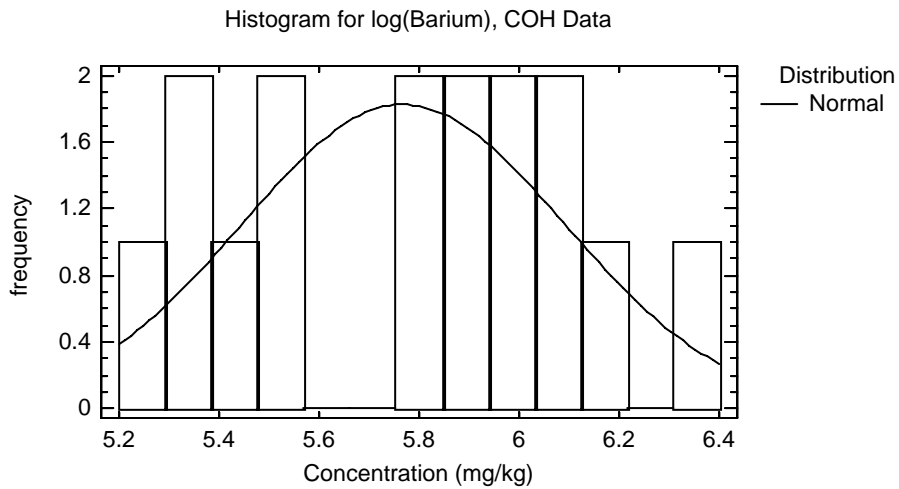
Data variable: log(Barium)

Selection variable: Data Set="COH"

16 values ranging from 5.28827 to 6.32972

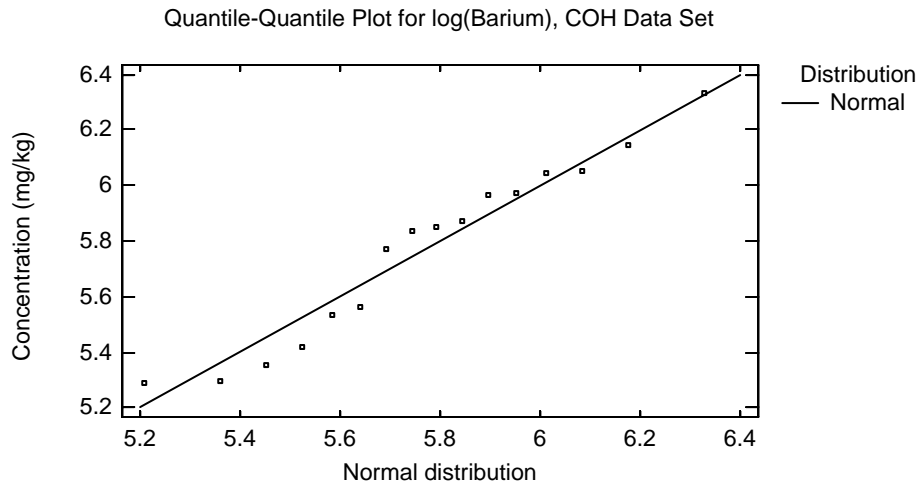
Fitted Distributions

<i>Normal</i>
mean = 5.76833
standard deviation = 0.322946



**Tests for Normality for log(Barium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.943168	0.383468



**DRAFT**

**Two-Sample Comparison - log(Barium) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Barium)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 5.28827 to 6.32972

Sample 2: 24 values ranging from 4.78749 to 5.6058

**Comparison of Means for log(Barium)**

95.0% confidence interval for mean of Data Set=COH: 5.76833 +/- 0.172086 [5.59624, 5.94041]

95.0% confidence interval for mean of Data Set=Tronox: 5.17199 +/- 0.0750377 [5.09696, 5.24703]

95.0% confidence interval for the difference between the means

not assuming equal variances: 0.596334 +/- 0.184012 [0.412322, 0.780346]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 6.73742 P-value = 0.00000112056

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Barium)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.322946	0.177703
Variance	0.104294	0.0315785
Df	15	23

Ratio of Variances = 3.30269

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.238562, 0.49982]

Standard deviation of Data Set=Tronox: [0.138114, 0.249275]

Ratio of Variances: [1.33904, 8.95948]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 3.30269 P-value = 0.00994849

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.5 Beryllium

#### Uncensored Data - Beryllium (Data Set="COH")

Data variable: Beryllium

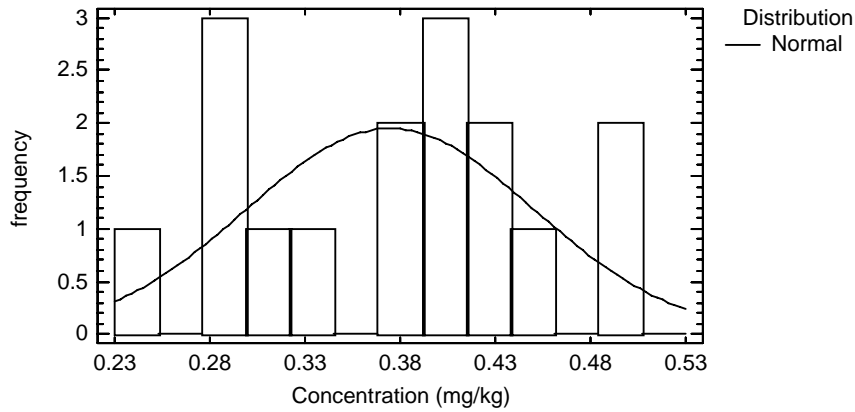
Selection variable: Data Set="COH"

16 values ranging from 0.25 to 0.5

Fitted Distributions

<i>Normal</i>
mean = 0.374687
standard deviation = 0.0755308

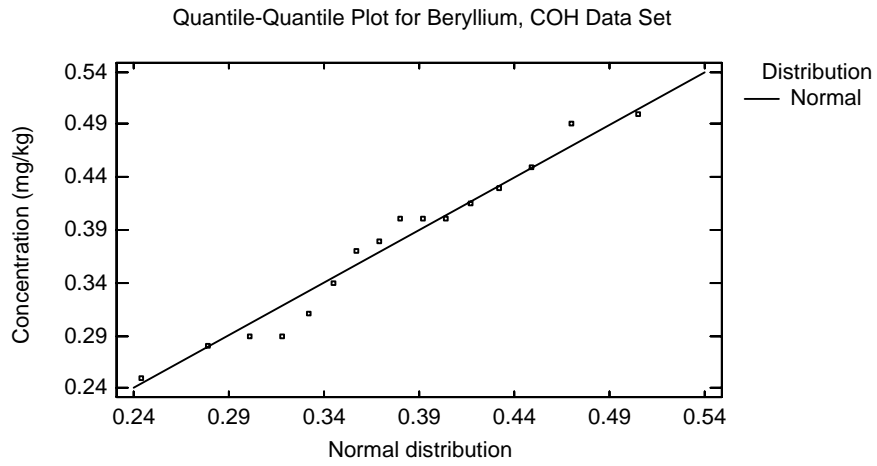
Histogram for Beryllium, COH Data



#### Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.959391	0.627991





**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set="COH")**

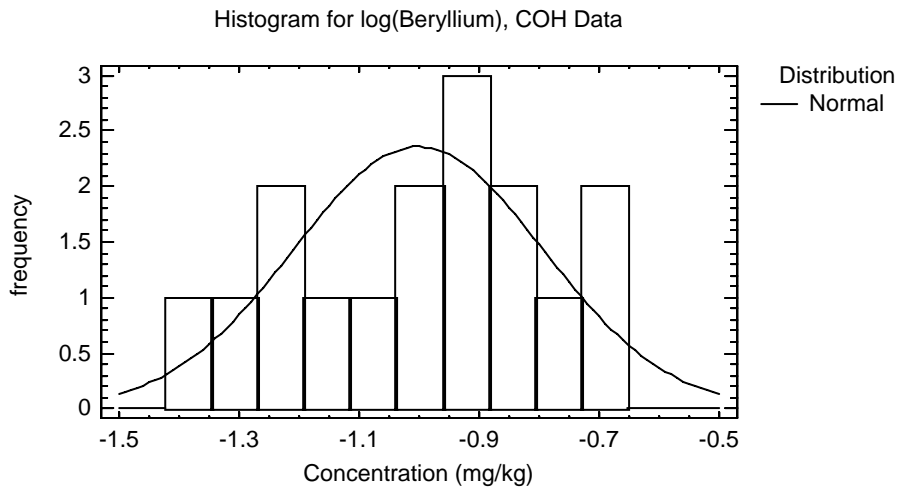
Data variable: log(Beryllium)

Selection variable: Data Set="COH"

16 values ranging from -1.38629 to -0.693147

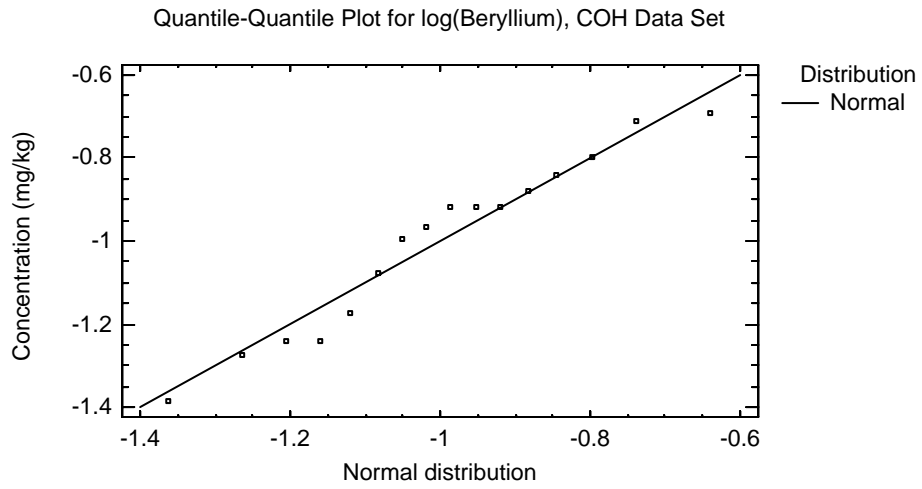
Fitted Distributions

<i>Normal</i>
mean = -1.00151
standard deviation = 0.208212



**Tests for Normality for log(Beryllium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.950842	0.490092



**DRAFT**

**Two-Sample Comparison - log(Beryllium) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Beryllium)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from -1.38629 to -0.693147

Sample 2: 24 values ranging from -0.931404 to -0.277072

**Comparison of Means for log(Beryllium)**

95.0% confidence interval for mean of Data Set=COH: -1.00151 +/- 0.110949 [-1.11246, -0.890562]

95.0% confidence interval for mean of Data Set=Tronox: -0.610769 +/- 0.0603311 [-0.6711, -0.550438]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.390741 +/- 0.11216 [-0.502901, -0.278582]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -7.05259 P-value = 2.08794E-8

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Beryllium)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.208212	0.142875
Variance	0.0433522	0.0204134
Df	15	23

Ratio of Variances = 2.12372

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.153807, 0.322248]

Standard deviation of Data Set=Tronox: [0.111045, 0.20042]

Ratio of Variances: [0.861042, 5.76119]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 2.12372 P-value = 0.100938

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### **3.6 Boron**

The City of Henderson data do not include antimony. Therefore, comparisons were not made.

**DRAFT**

### 3.7 Cadmium

#### Censored Data - Cadmium (Data Set="COH")

Data variable: Cadmium

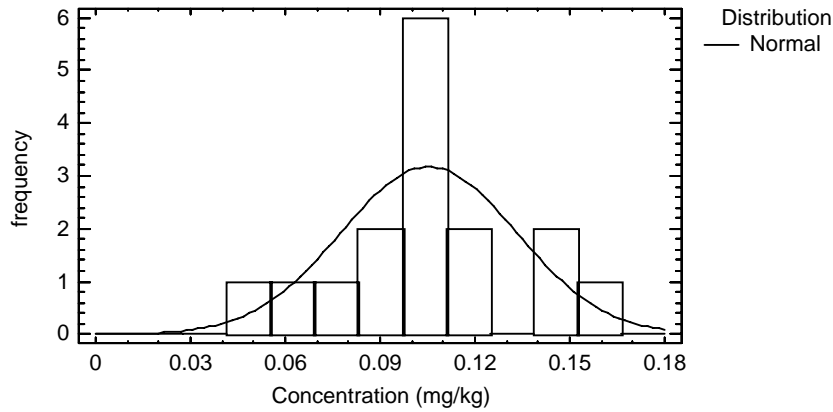
Selection variable: Data Set="COH"

16 values ranging from 0.052 to 0.16

Fitted Distributions

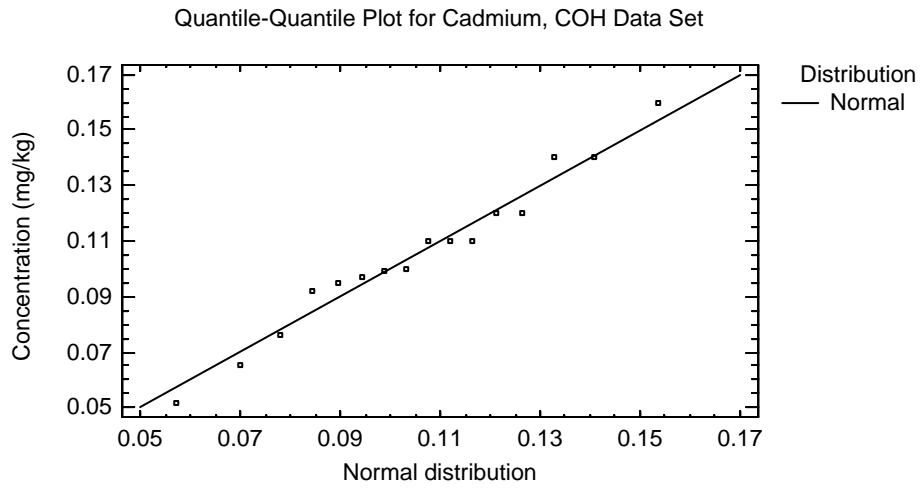
<i>Normal</i>
mean = 0.105375
standard deviation = 0.0278589

Histogram for Cadmium, COH Data



#### Tests for Normality for Cadmium

Test	Statistic	P-Value
Shapiro-Wilk W	0.976063	0.896627



**DRAFT**

**Uncensored Data - log(Cadmium) (Data Set="COH")**

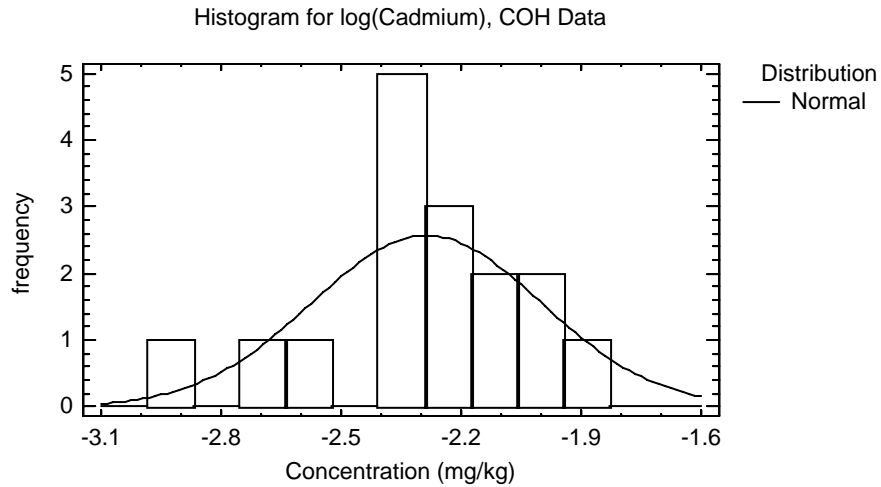
Data variable: log(Cadmium)

Selection variable: Data Set="COH"

16 values ranging from -2.95651 to -1.83258

Fitted Distributions

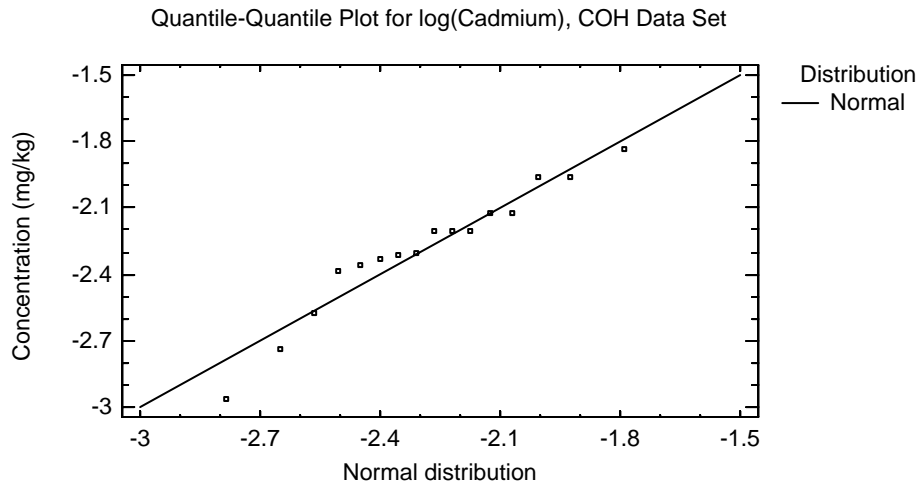
<i>Normal</i>
mean = -2.28639
standard deviation = 0.287053



**Tests for Normality for log(Cadmium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.944456	0.400052





**DRAFT**

**Two-Sample Comparison - Cadmium & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Cadmium**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 0.052 to 0.16

Sample 2: 24 values ranging from 0.284 to 0.729

**Comparison of Means for Cadmium**

95.0% confidence interval for mean of Data Set=COH: 0.105375 +/- 0.014845 [0.09053, 0.12022]

95.0% confidence interval for mean of Data Set=Tronox: 0.477083 +/- 0.0456414 [0.431442, 0.522725]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.371708 +/- 0.0474401 [-0.419148, -0.324268]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -16.066 P-value = 0.0

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Cadmium**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.0278589	0.108087
Variance	0.000776117	0.0116829
Df	15	23

Ratio of Variances = 0.0664321

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.0205795, 0.0431169]

Standard deviation of Data Set=Tronox: [0.0840069, 0.151621]

Ratio of Variances: [0.0269343, 0.180216]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.0664321 P-value = 0.00000225054

Reject the null hypothesis for alpha = 0.05.

**DRAFT****3.8 Calcium**

The City of Henderson data do not include calcium. Therefore, comparisons were not made.

**DRAFT**

### 3.9 Chromium

#### Uncensored Data - Chromium (Data Set="COH")

Data variable: Chromium

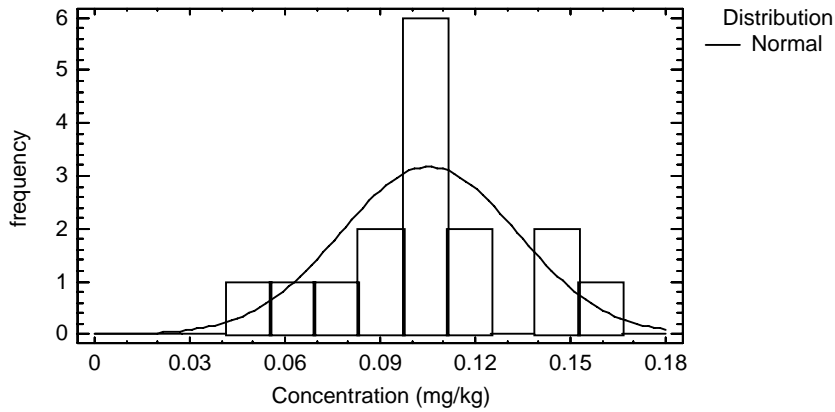
Selection variable: Data Set="COH"

16 values ranging from 0.052 to 0.16

Fitted Distributions

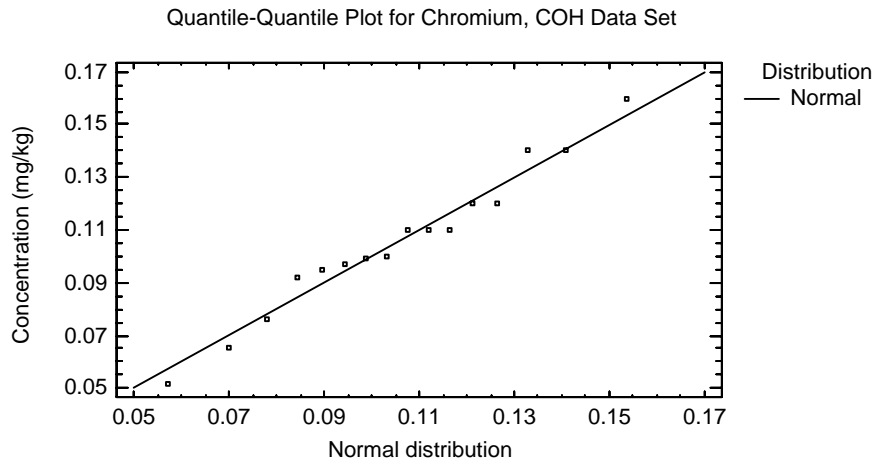
<i>Normal</i>
mean = 0.105375
standard deviation = 0.0278589

Histogram for Chromium, COH Data



#### Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.976063	0.896627



**DRAFT**

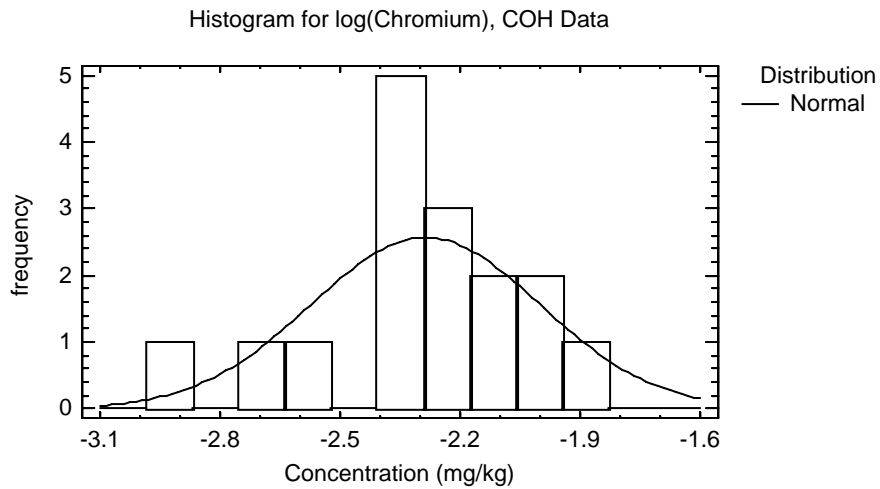
**Uncensored Data - log(Chromium) (Data Set="COH")**

Data variable: log(Chromium)  
 Selection variable: Data Set="COH"

16 values ranging from -2.95651 to -1.83258

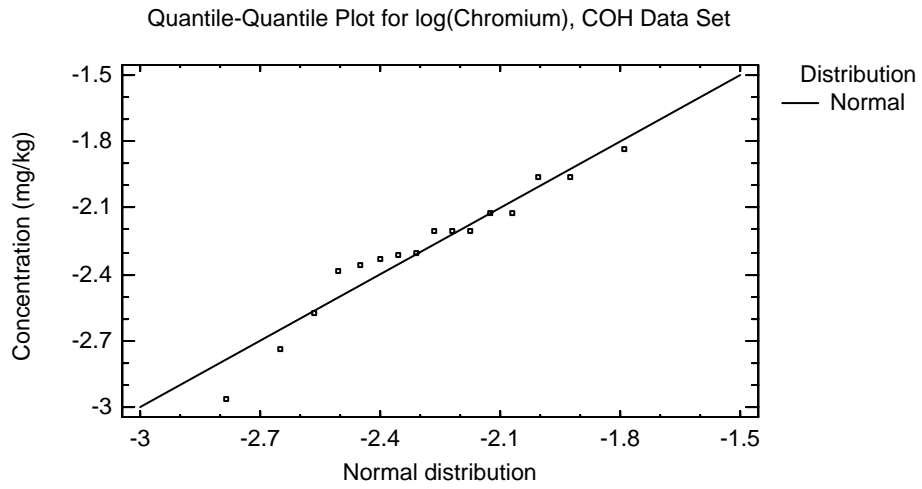
Fitted Distributions

<i>Normal</i>
mean = -2.28639
standard deviation = 0.287053



**Tests for Normality for log(Chromium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.944456	0.400052



**DRAFT**

**Two-Sample Comparison - log(Chromium) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Chromium)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from -2.95651 to -1.83258

Sample 2: 24 values ranging from 1.87641 to 2.60269

**Comparison of Means for log(Chromium)**

95.0% confidence interval for mean of Data Set=COH: -2.28639 +/- 0.15296 [-2.43935, -2.13343]

95.0% confidence interval for mean of Data Set=Tronox: 2.20293 +/- 0.0655819 [2.13735, 2.26851]

95.0% confidence interval for the difference between the means

not assuming equal variances: -4.48931 +/- 0.163198 [-4.65251, -4.32612]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -57.2224 P-value = 0.0

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Chromium)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.287053	0.15531
Variance	0.0823992	0.0241213
Df	15	23

Ratio of Variances = 3.41604

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.212047, 0.444269]

Standard deviation of Data Set=Tronox: [0.120709, 0.217863]

Ratio of Variances: [1.385, 9.26698]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 3.41604 P-value = 0.00809009

Reject the null hypothesis for alpha = 0.05.



**DRAFT**

**3.10 Cobalt**

**Uncensored Data - Cobalt (Data Set="COH")**

Data variable: Cobalt

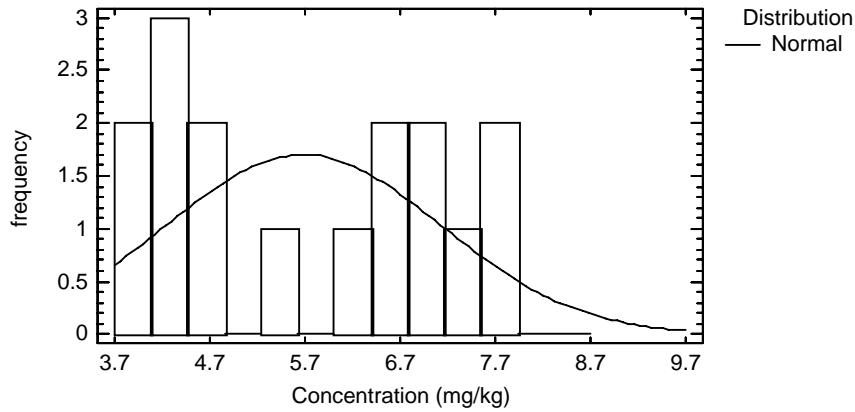
Selection variable: Data Set="COH"

16 values ranging from 3.9 to 7.8

Fitted Distributions

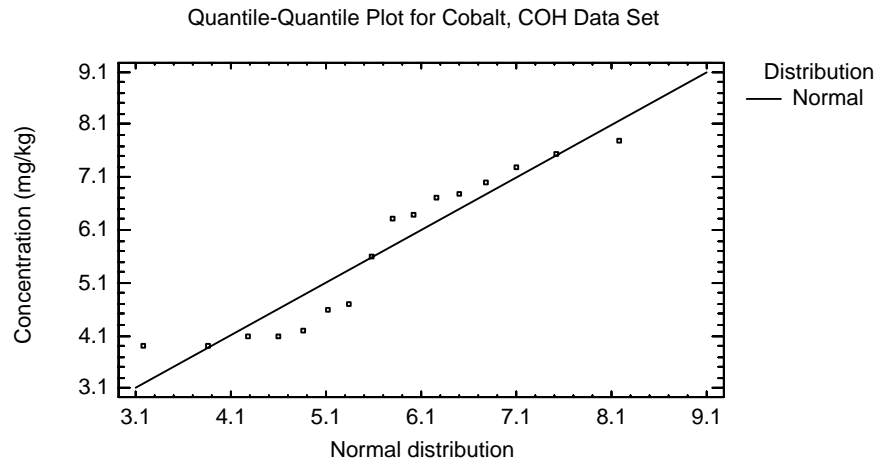
<i>Normal</i>
mean = 5.68437
standard deviation = 1.44242

Histogram for Cobalt, COH Data



**Tests for Normality for Cobalt**

Test	Statistic	P-Value
Shapiro-Wilk W	0.883466	0.0442253



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set="COH")**

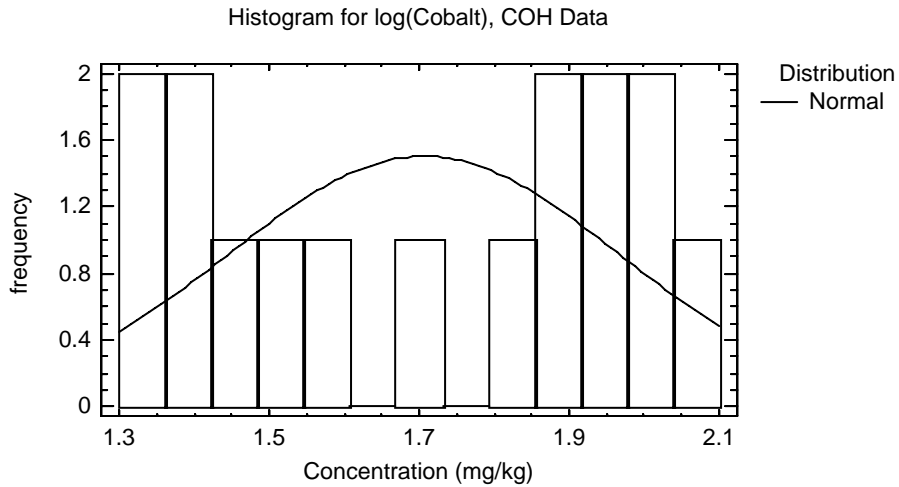
Data variable: log(Cobalt)

Selection variable: Data Set="COH"

16 values ranging from 1.36098 to 2.05412

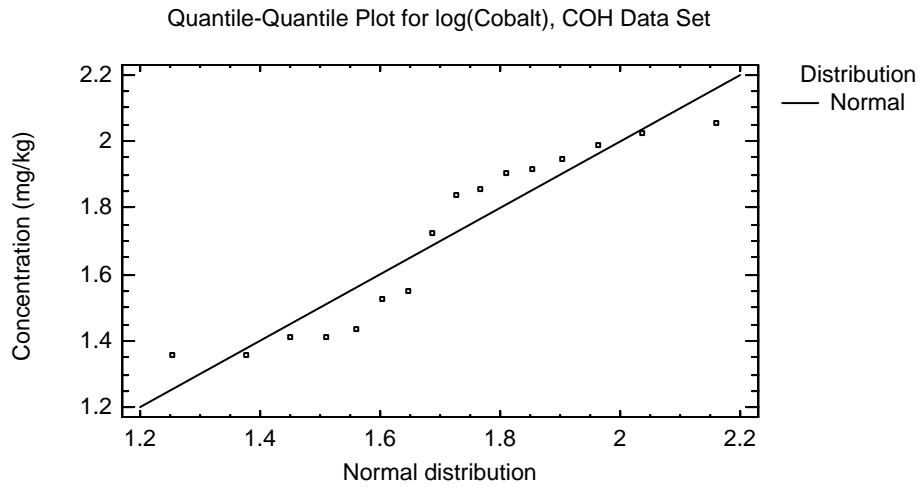
Fitted Distributions

<i>Normal</i>
mean = 1.7063
standard deviation = 0.26137



**Tests for Normality for log(Cobalt)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.87415	0.0313892



**DRAFT****Two-Sample Comparison - Cobalt & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Cobalt**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 3.9 to 7.8

Sample 2: 24 values ranging from 5.88 to 8.57

**Comparison of Medians for Cobalt**

Median of sample 1: 5.95

Median of sample 2: 7.0075

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 14.0

Average rank of sample 2: 24.8333

W = 104.0 P-value = 0.00426577

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.11 Copper

#### Uncensored Data - Copper (Data Set="COH")

Data variable: Copper

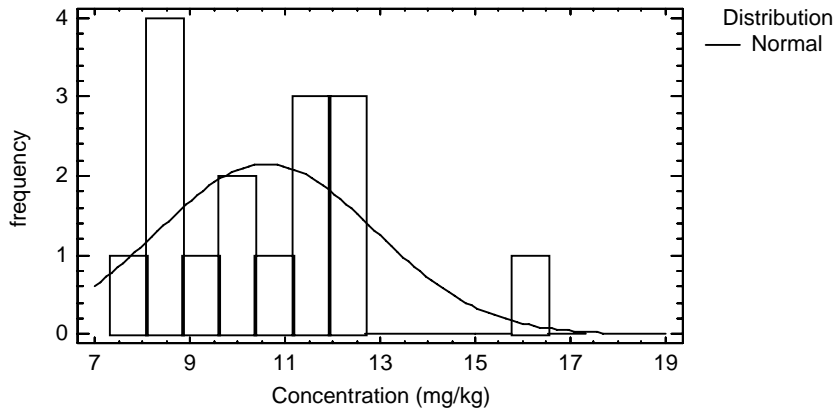
Selection variable: Data Set="COH"

16 values ranging from 7.8 to 16.3

Fitted Distributions

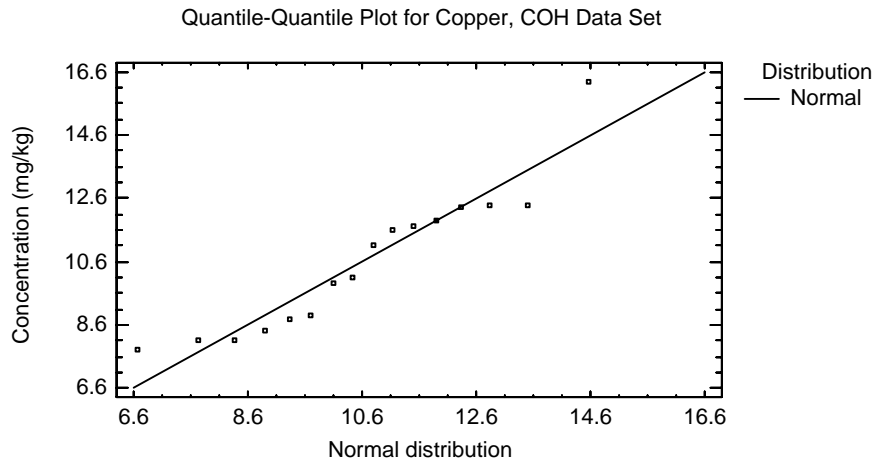
<i>Normal</i>
mean = 10.6125
standard deviation = 2.28119

Histogram for Copper, COH Data



#### Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.905379	0.0995062



**DRAFT**

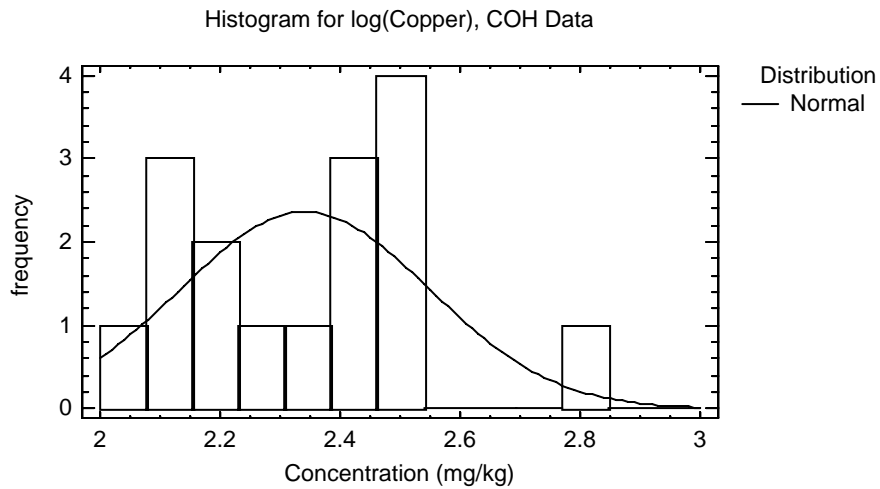
**Uncensored Data - log(Copper) (Data Set="COH")**

Data variable: log(Copper)  
 Selection variable: Data Set="COH"

16 values ranging from 2.05412 to 2.79117

Fitted Distributions

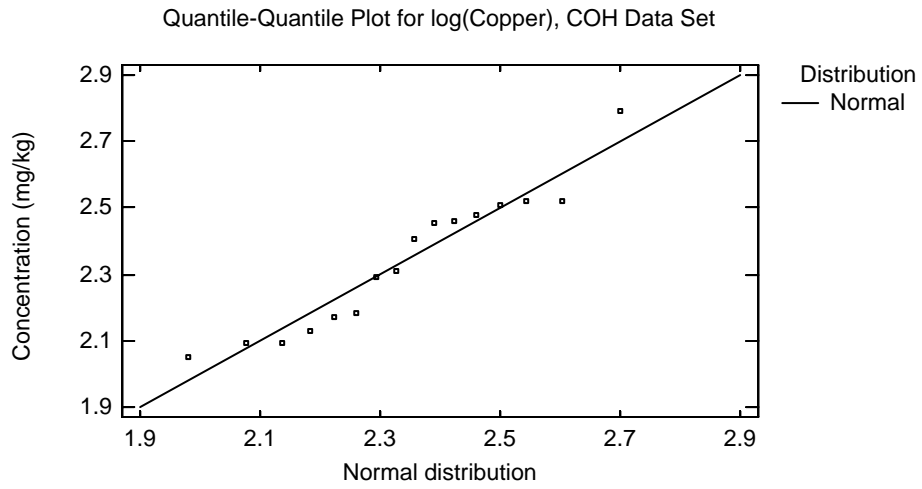
<i>Normal</i>
mean = 2.34139
standard deviation = 0.207992



**Tests for Normality for log(Copper)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.930313	0.246603





**DRAFT****Two-Sample Comparison - Copper & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Copper**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 7.8 to 16.3

Sample 2: 24 values ranging from 13.65 to 367.0

**Comparison of Medians for Copper**

Median of sample 1: 10.6

Median of sample 2: 26.3

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 8.75

Average rank of sample 2: 28.3333

W = 188.0 P-value = 2.25947E-7

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.12 Iron**

**Uncensored Data - Iron (Data Set="COH")**

Data variable: Iron

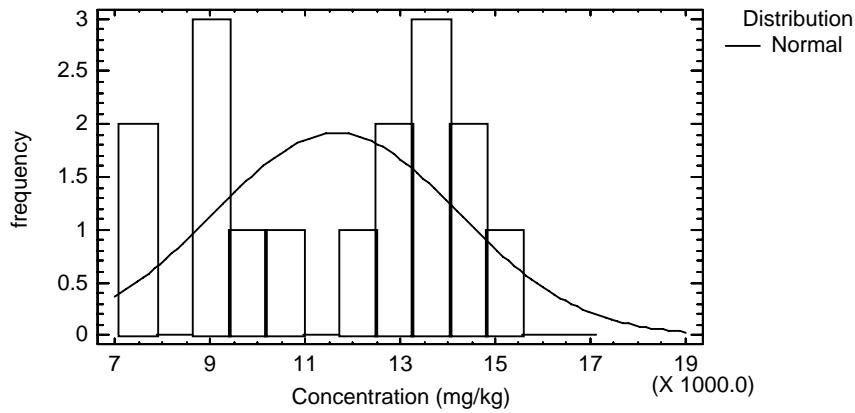
Selection variable: Data Set="COH"

16 values ranging from 7520.0 to 15000.0

Fitted Distributions

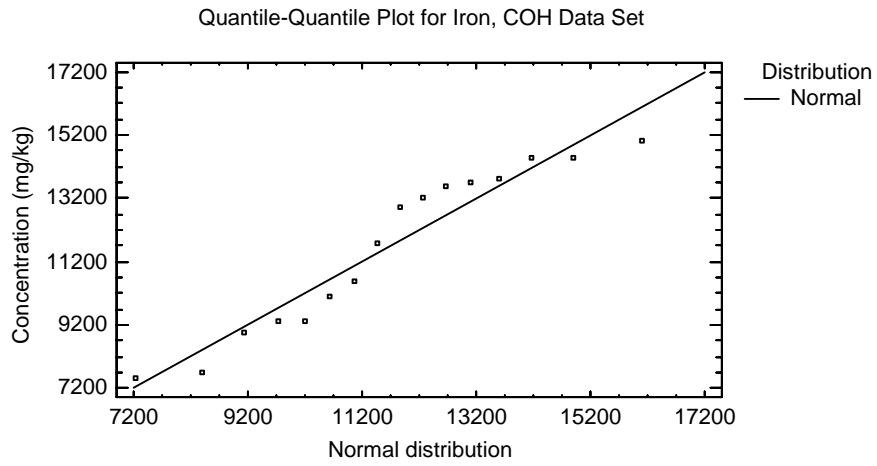
<i>Normal</i>
mean = 11656.3
standard deviation = 2562.54

Histogram for Iron, COH Data



**Tests for Normality for Iron**

Test	Statistic	P-Value
Shapiro-Wilk W	0.909208	0.114621



**DRAFT**

**Uncensored Data - log(Iron) (Data Set="COH")**

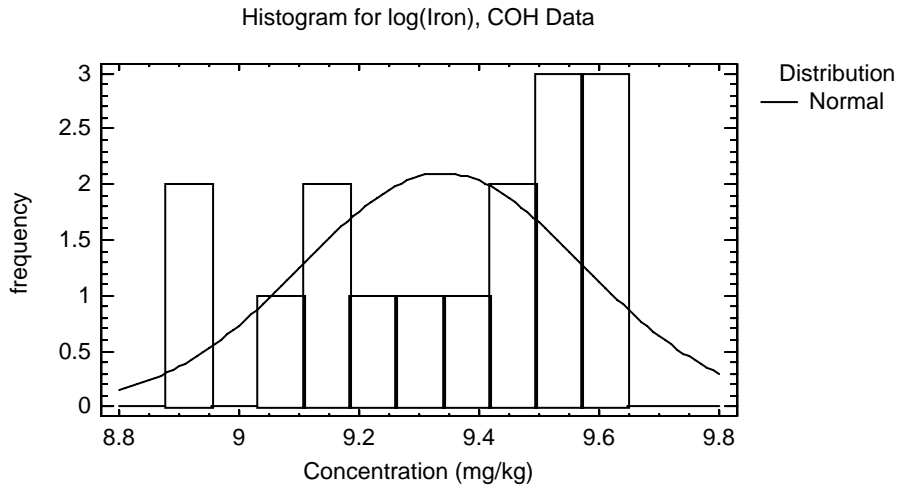
Data variable: log(Iron)

Selection variable: Data Set="COH"

16 values ranging from 8.92532 to 9.61581

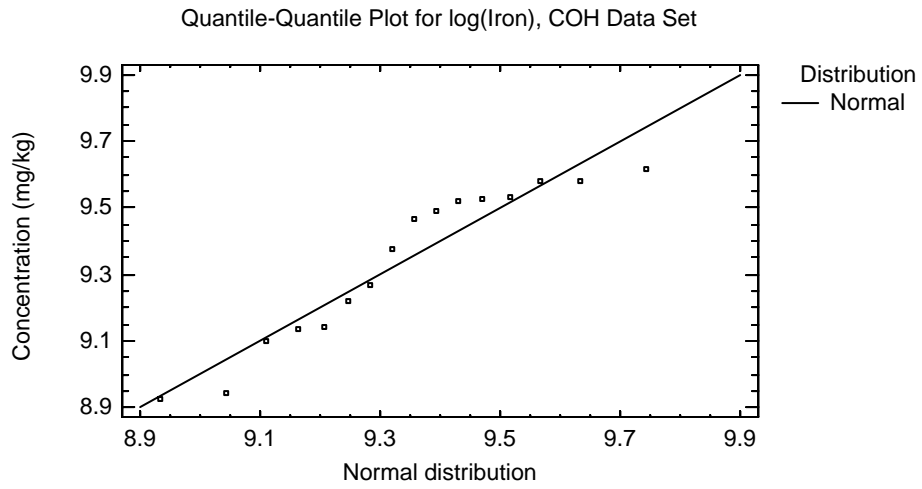
Fitted Distributions

<i>Normal</i>
mean = 9.33905
standard deviation = 0.233605



**Tests for Normality for log(Iron)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.897185	0.0734696



**DRAFT**

**Two-Sample Comparison - Iron & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Iron**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 7520.0 to 15000.0

Sample 2: 24 values ranging from 7390.0 to 14500.0

**Comparison of Means for Iron**

95.0% confidence interval for mean of Data Set=COH: 11656.3 +/- 1365.49 [10290.8, 13021.7]

95.0% confidence interval for mean of Data Set=Tronox: 10749.4 +/- 736.174 [10013.2, 11485.5]

95.0% confidence interval for the difference between the means

assuming equal variances: 906.875 +/- 1375.46 [-468.585, 2282.33]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 1.33474 P-value = 0.189905

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Iron**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	2562.54	1743.4
Variance	6.56663E6	3.03944E6
Df	15	23

Ratio of Variances = 2.16048

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [1892.96, 3966.02]

Standard deviation of Data Set=Tronox: [1354.99, 2445.57]

Ratio of Variances: [0.875945, 5.86091]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 2.16048 P-value = 0.093532

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.13 Lead**

**Uncensored Data - Lead (Data Set="COH")**

Data variable: Lead

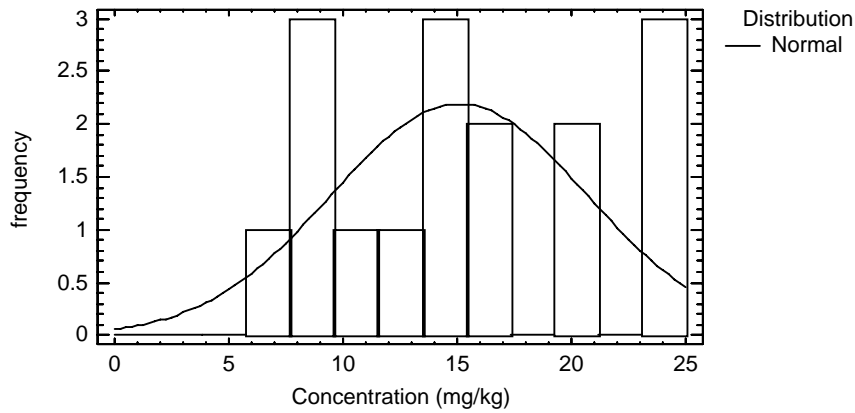
Selection variable: Data Set="COH"

16 values ranging from 7.0 to 23.5

Fitted Distributions

<i>Normal</i>
mean = 15.0813
standard deviation = 5.6005

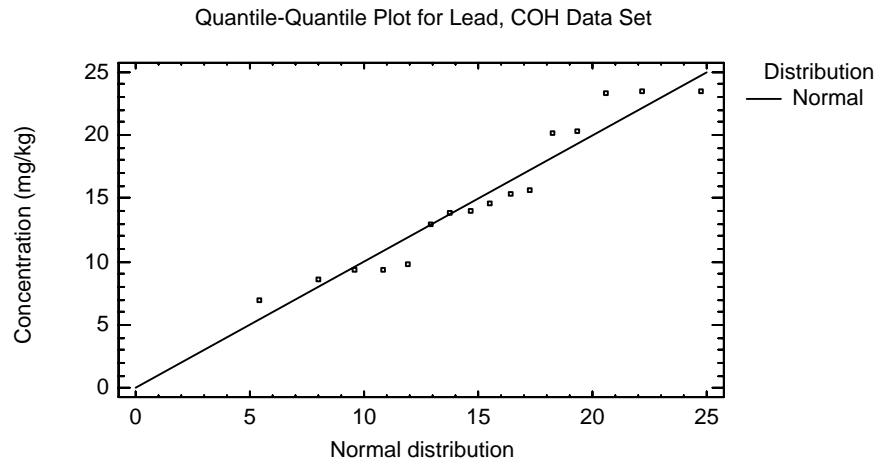
Histogram for Lead, COH Data



**Tests for Normality for Lead**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.917437	0.155062





**DRAFT**

**Uncensored Data - log(Lead) (Data Set="COH")**

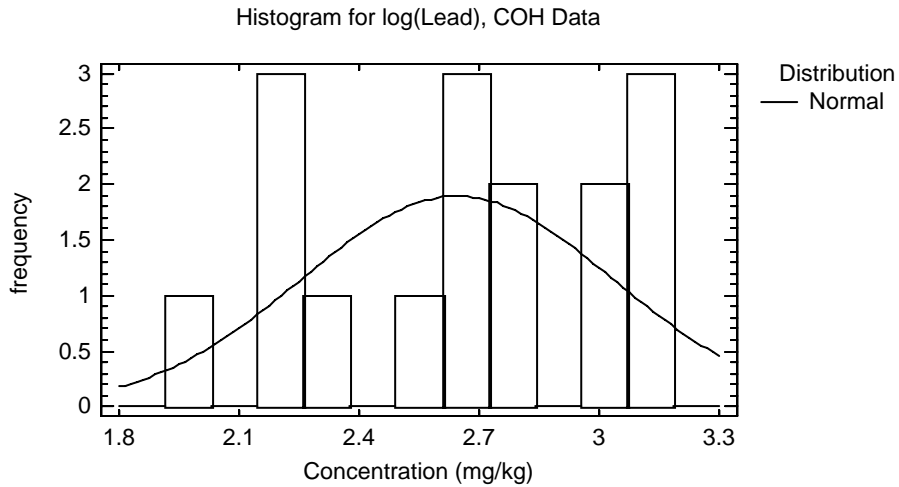
Data variable: log(Lead)

Selection variable: Data Set="COH"

16 values ranging from 1.94591 to 3.157

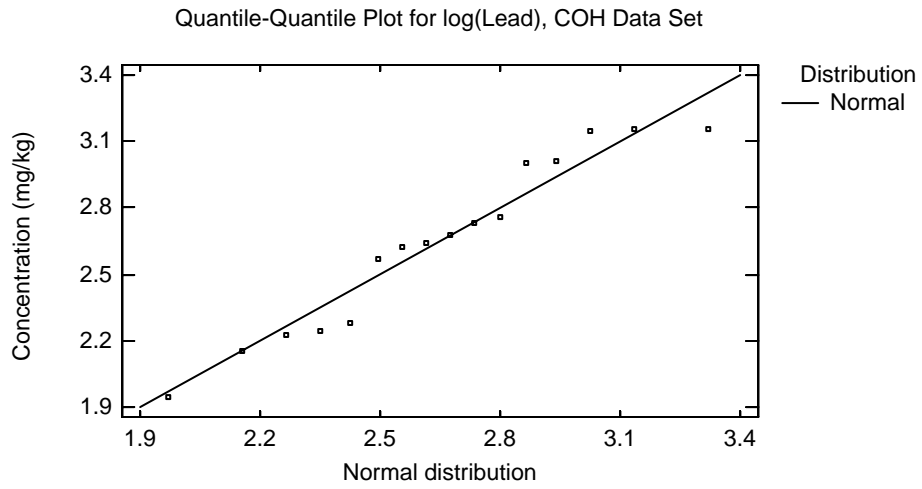
Fitted Distributions

<i>Normal</i>
mean = 2.64514
standard deviation = 0.388594



**Tests for Normality for log(Lead)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.935089	0.291543



**DRAFT****Two-Sample Comparison - Lead & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Lead**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 7.0 to 23.5

Sample 2: 24 values ranging from 5.81 to 50.8

**Comparison of Medians for Lead**

Median of sample 1: 14.3

Median of sample 2: 7.86

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 29.125

Average rank of sample 2: 14.75

W = -138.0 P-value = 0.000146732

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.14 Magnesium

#### **Uncensored Data - Magnesium (Data Set="COH")**

Data variable: Magnesium

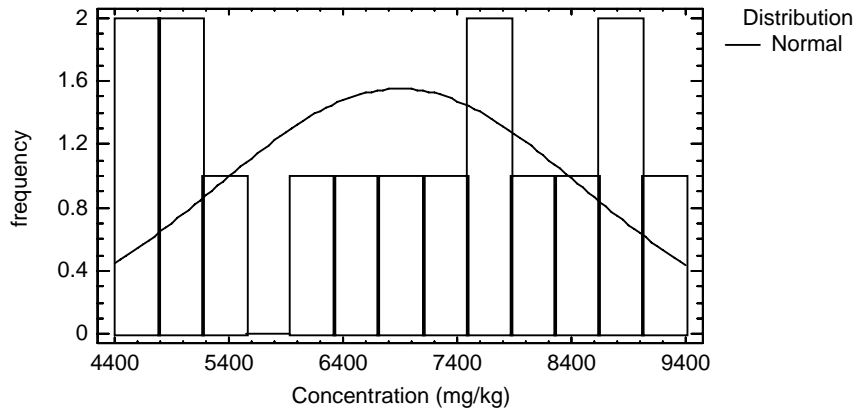
Selection variable: Data Set="COH"

16 values ranging from 4630.0 to 9090.0

Fitted Distributions

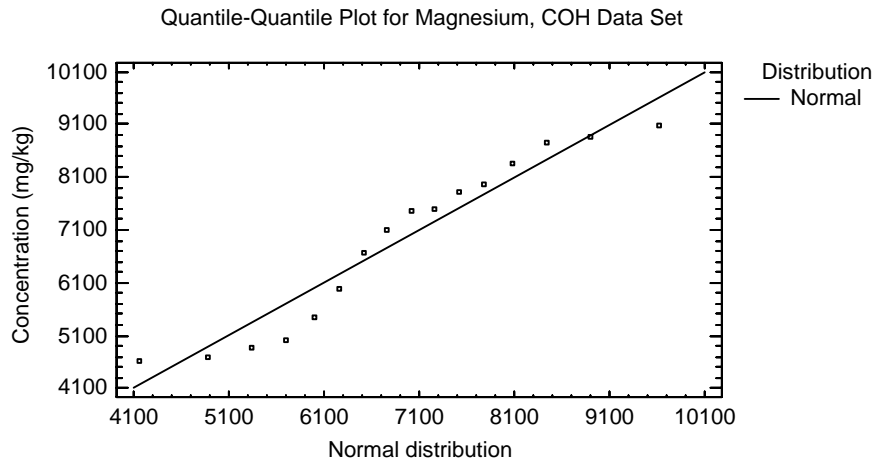
<i>Normal</i>
mean = 6890.63
standard deviation = 1582.17

Histogram for Magnesium, COH Data



#### **Tests for Normality for Magnesium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.916444	0.149536



**DRAFT**

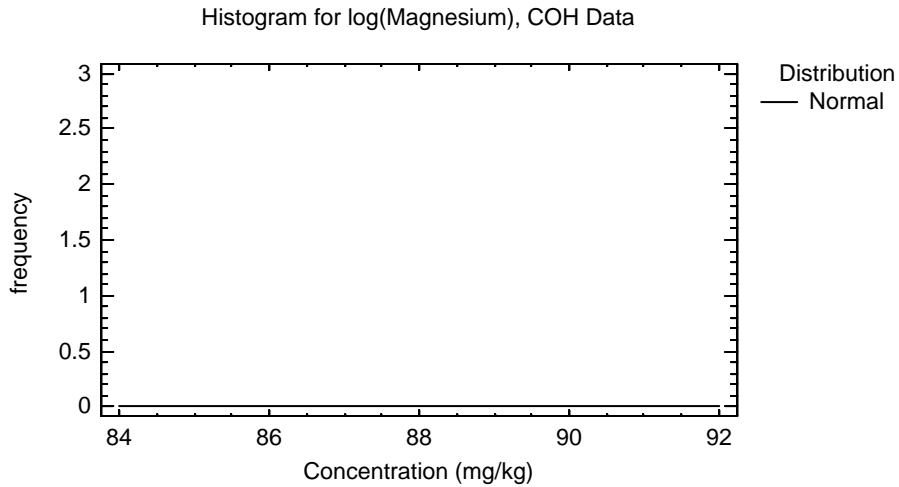
**Uncensored Data - log(Magnesium) (Data Set="COH")**

Data variable: log(Magnesium)  
 Selection variable: Data Set="COH"

16 values ranging from 8.44031 to 9.11493

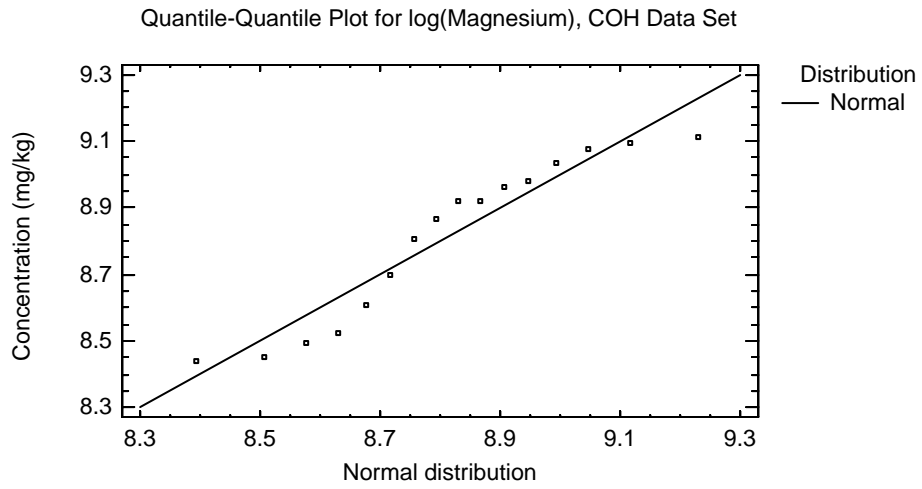
Fitted Distributions

<i>Normal</i>
mean = 8.81149
standard deviation = 0.24151



**Tests for Normality for log(Magnesium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.900085	<b>0.081803</b>





**DRAFT**

**Two-Sample Comparison - log(Magnesium) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Magnesium)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 8.44031 to 9.11493

Sample 2: 24 values ranging from 8.76717 to 9.60912

**Comparison of Means for log(Magnesium)**

95.0% confidence interval for mean of Data Set=COH: 8.81149 +/- 0.128692 [8.6828, 8.94018]

95.0% confidence interval for mean of Data Set=Tronox: 9.14214 +/- 0.0778429 [9.0643, 9.21998]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.330647 +/- 0.136417 [-0.467064, -0.19423]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -4.90674 P-value = 0.0000177589

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Magnesium)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.24151	0.184347
Variance	0.0583269	0.0339837
Df	15	23

Ratio of Variances = 1.71632

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.178404, 0.373782]

Standard deviation of Data Set=Tronox: [0.143277, 0.258594]

Ratio of Variances: [0.695868, 4.65602]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.71632 P-value = 0.236533

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.15 Manganese

#### Uncensored Data - Manganese (Data Set="COH")

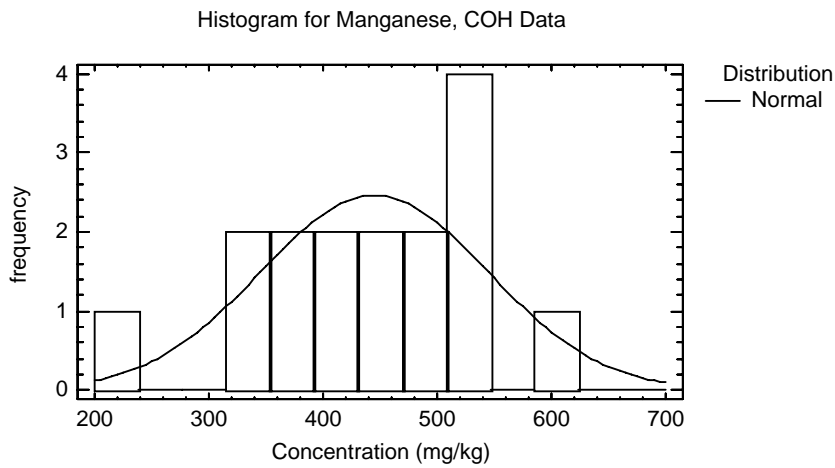
Data variable: Manganese

Selection variable: Data Set="COH"

16 values ranging from 223.0 to 615.0

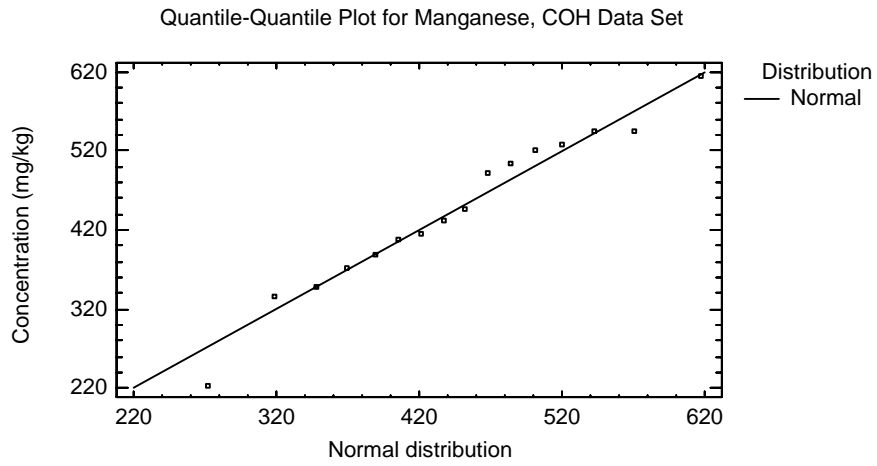
Fitted Distributions

<i>Normal</i>
mean = 445.0
standard deviation = 99.6969



#### Tests for Normality for Manganese

Test	Statistic	P-Value
Shapiro-Wilk W	0.974298	0.872775



**DRAFT**

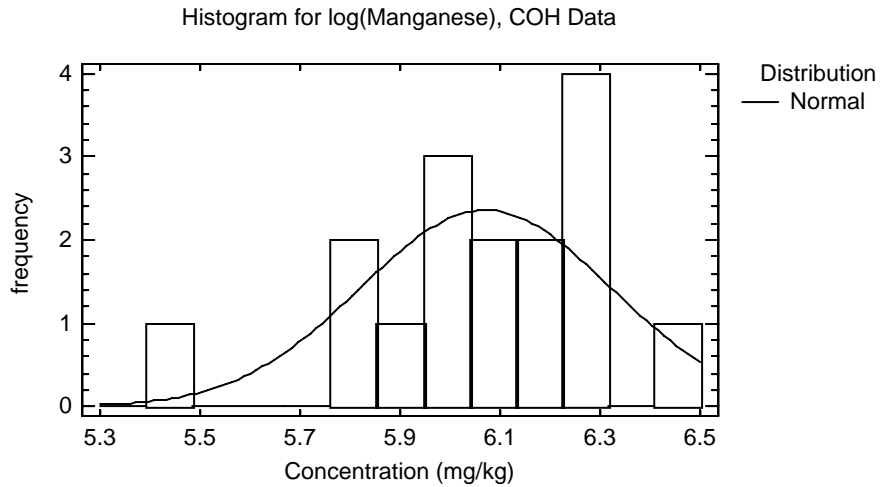
**Uncensored Data - log(Manganese) (Data Set="COH")**

Data variable: log(Manganese)  
 Selection variable: Data Set="COH"

16 values ranging from 5.40717 to 6.42162

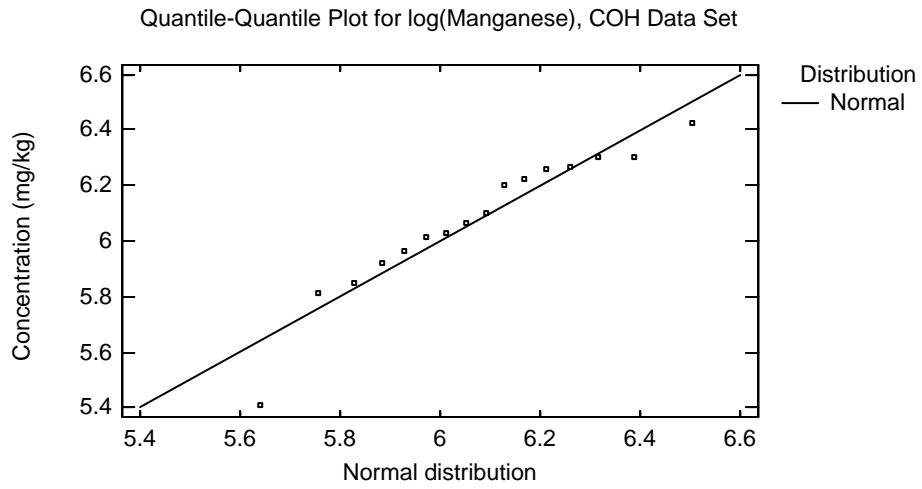
Fitted Distributions

<i>Normal</i>
mean = 6.0711
standard deviation = 0.249953



**Tests for Normality for log(Manganese)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.92013	0.17106



**DRAFT****Two-Sample Comparison - Manganese & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Manganese**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 223.0 to 615.0

Sample 2: 24 values ranging from 252.0 to 710.5

**Comparison of Medians for Manganese**

Median of sample 1: 439.0

Median of sample 2: 349.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 25.75

Average rank of sample 2: 17.0

W = -84.0 P-value = 0.021152

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 3.16 Molybdenum

#### **Uncensored Data - Molybdenum (Data Set="COH")**

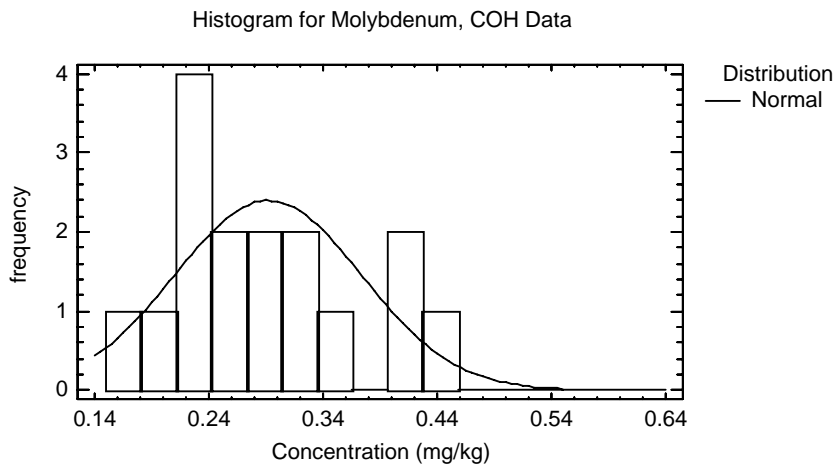
Data variable: Molybdenum

Selection variable: Data Set="COH"

16 values ranging from 0.17 to 0.44

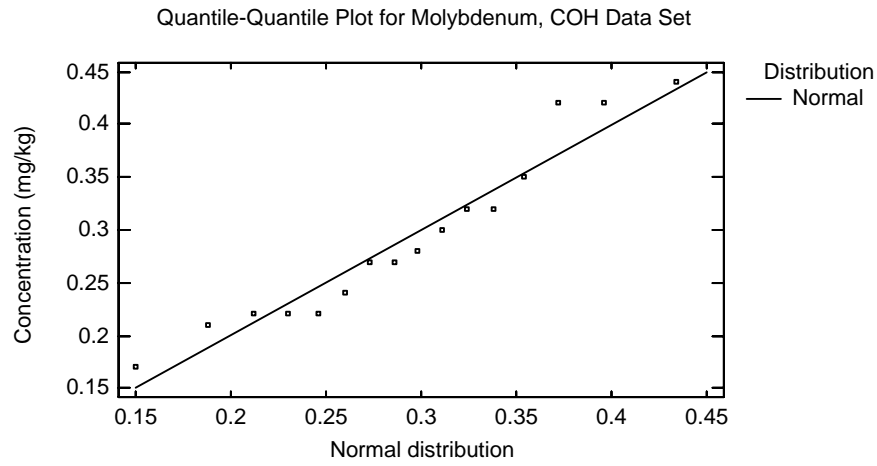
Fitted Distributions

<i>Normal</i>
mean = 0.291875
standard deviation = 0.081912



#### **Tests for Normality for Molybdenum**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.929718	0.24146





**DRAFT**

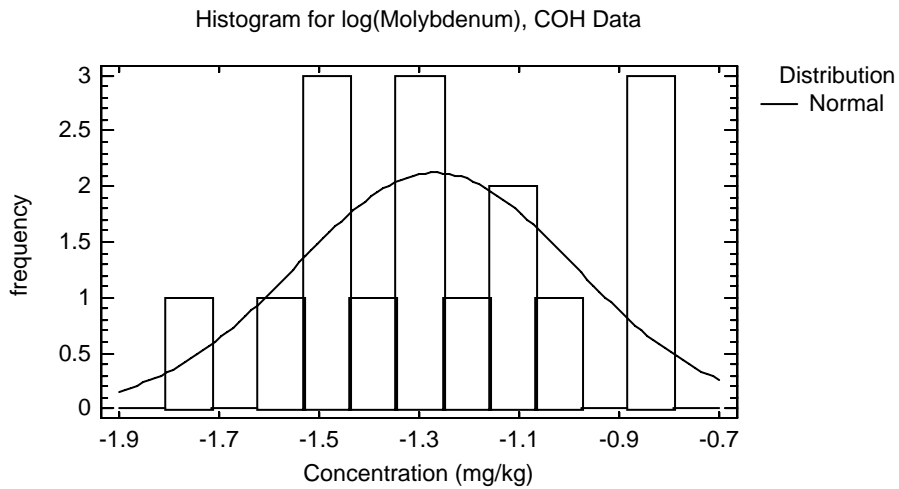
**Uncensored Data - log(Molybdenum) (Data Set="COH")**

Data variable: log(Molybdenum)  
 Selection variable: Data Set="COH"

16 values ranging from -1.77196 to -0.820981

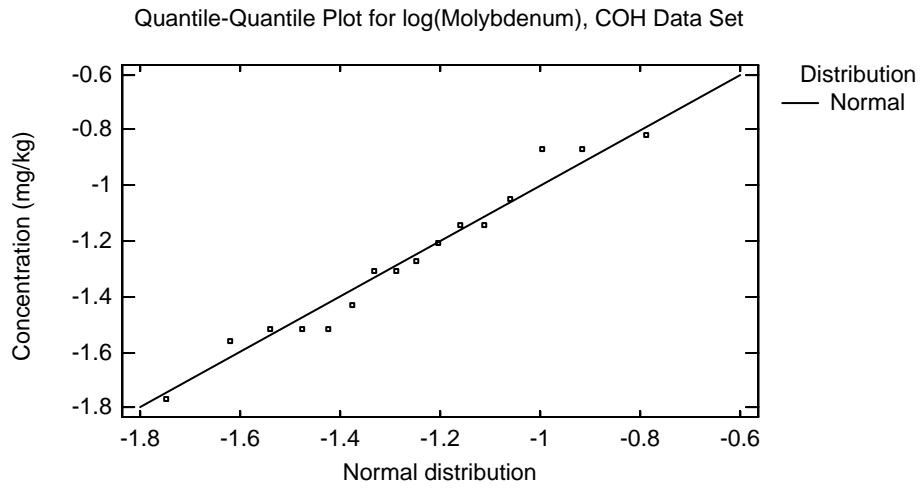
Fitted Distributions

<i>Normal</i>
mean = -1.26765
standard deviation = 0.277548



**Tests for Normality for log(Molybdenum)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.958856	0.618935



**DRAFT**

**Two-Sample Comparison - log(Molybdenum) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Molybdenum)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from -1.77196 to -0.820981

Sample 2: 24 values ranging from -1.86111 to 0.198851

**Comparison of Means for log(Molybdenum)**

95.0% confidence interval for mean of Data Set=COH: -1.26765 +/- 0.147895 [-1.41554, -1.11975]

95.0% confidence interval for mean of Data Set=Tronox: -0.95903 +/- 0.238419 [-1.19745, -0.720611]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.308619 +/- 0.27296 [-0.581579, -0.0356593]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -2.29409 P-value = 0.0278063

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Molybdenum)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.277548	0.564621
Variance	0.077033	0.318797
Df	15	23

Ratio of Variances = 0.241636

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.205026, 0.429559]

Standard deviation of Data Set=Tronox: [0.438831, 0.792028]

Ratio of Variances: [0.0979693, 0.655508]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.241636 P-value = 0.00648506

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.17 Nickel**

**Uncensored Data - Nickel (Data Set="COH")**

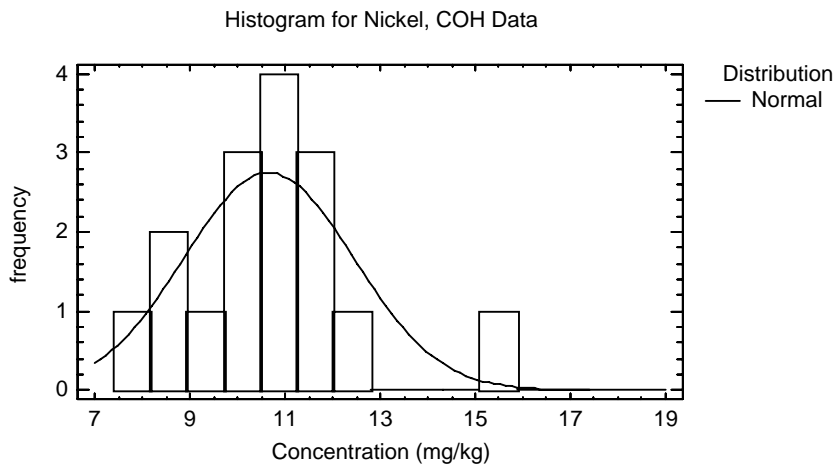
Data variable: Nickel

Selection variable: Data Set="COH"

16 values ranging from 7.8 to 15.4

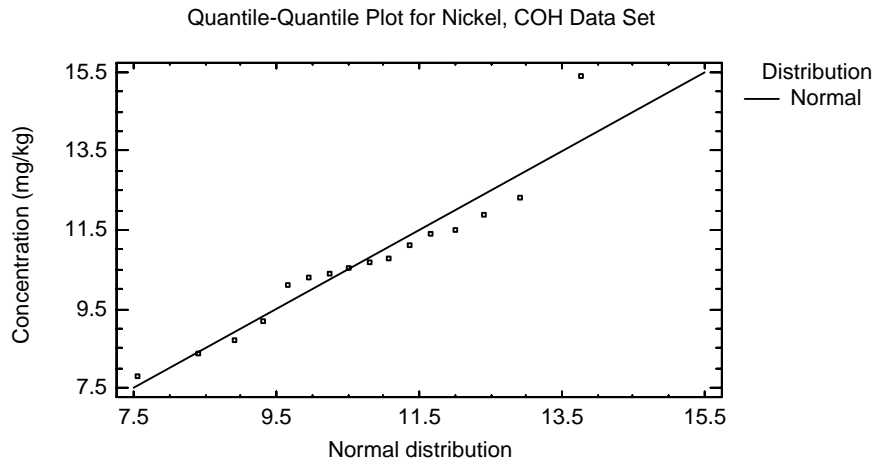
Fitted Distributions

<i>Normal</i>
mean = 10.6594
standard deviation = 1.78785



**Tests for Normality for Nickel**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.927963	0.226854



**DRAFT**

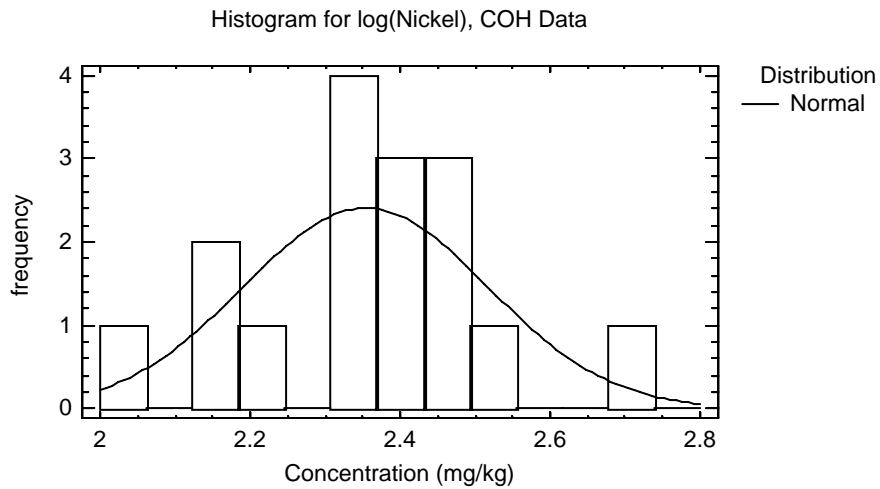
**Uncensored Data - log(Nickel) (Data Set="COH")**

Data variable: log(Nickel)  
 Selection variable: Data Set="COH"

16 values ranging from 2.05412 to 2.73437

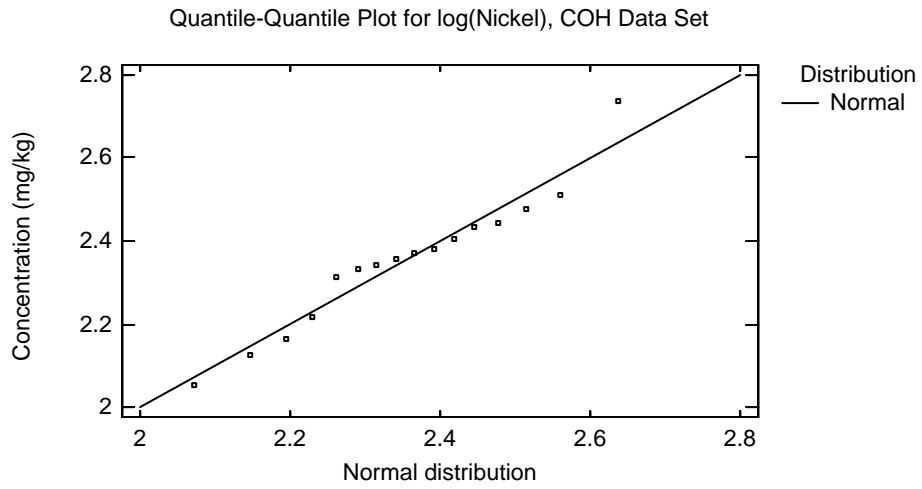
Fitted Distributions

<i>Normal</i>
mean = 2.35379
standard deviation = 0.163206



**Tests for Normality for log(Nickel)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.958858	0.618969



**DRAFT**

**Two-Sample Comparison - log(Nickel) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Nickel)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 2.05412 to 2.73437

Sample 2: 24 values ranging from 2.54945 to 2.93386

**Comparison of Means for log(Nickel)**

95.0% confidence interval for mean of Data Set=COH: 2.35379 +/- 0.0869666 [2.26683, 2.44076]

95.0% confidence interval for mean of Data Set=Tronox: 2.7189 +/- 0.0473181 [2.67158, 2.76622]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.365104 +/- 0.0879377 [-0.453041, -0.277166]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -8.40499 P-value = 3.37898E-10

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Nickel)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.163206	0.112058
Variance	0.0266363	0.012557
Df	15	23

Ratio of Variances = 2.12122

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.120561, 0.252593]

Standard deviation of Data Set=Tronox: [0.0870932, 0.157191]

Ratio of Variances: [0.860029, 5.75442]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 2.12122 P-value = 0.101463

Do not reject the null hypothesis for alpha = 0.05.



**DRAFT****3.18 Platinum**

The City of Henderson background data do not include platinum. Therefore, comparisons were not made.

**DRAFT****3.19 Potassium**

The City of Henderson background data do not include potassium. Therefore, comparisons were not made.

**DRAFT**

**3.20 Selenium**

**Uncensored Data - Selenium (Data Set="COH")**

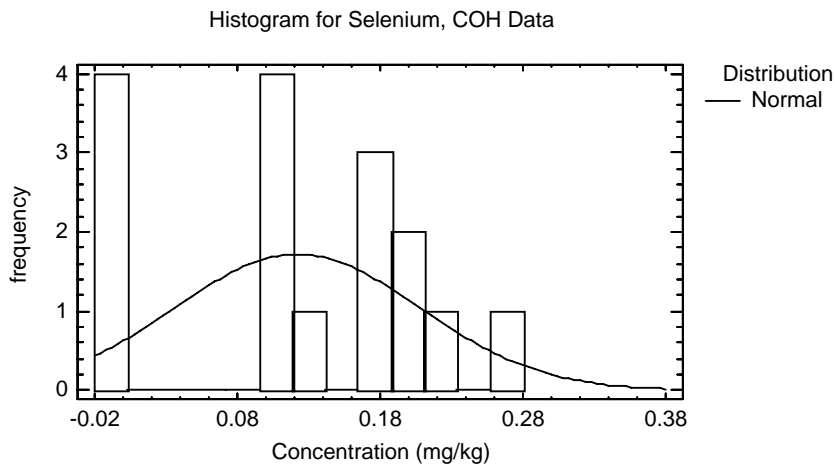
Data variable: Selenium

Selection variable: Data Set="COH"

16 values ranging from 0.0 to 0.26

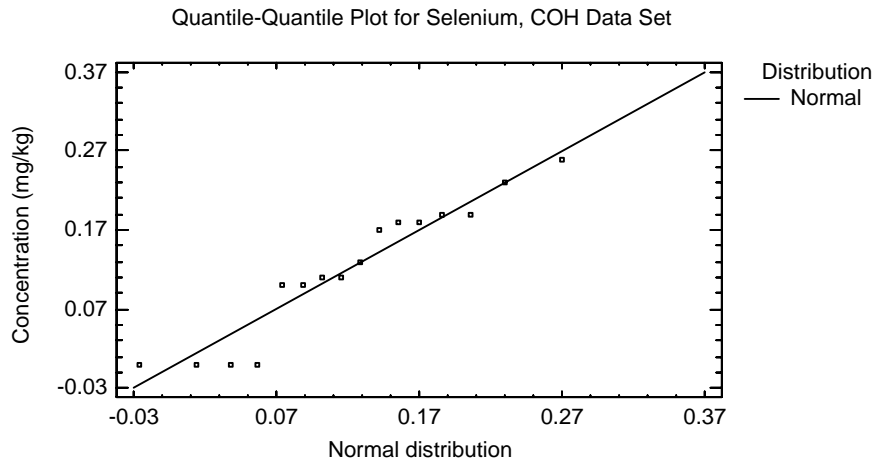
Fitted Distributions

<i>Normal</i>
mean = 0.121875
standard deviation = 0.085574



**Tests for Normality for Selenium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.907291	0.10679



**DRAFT**

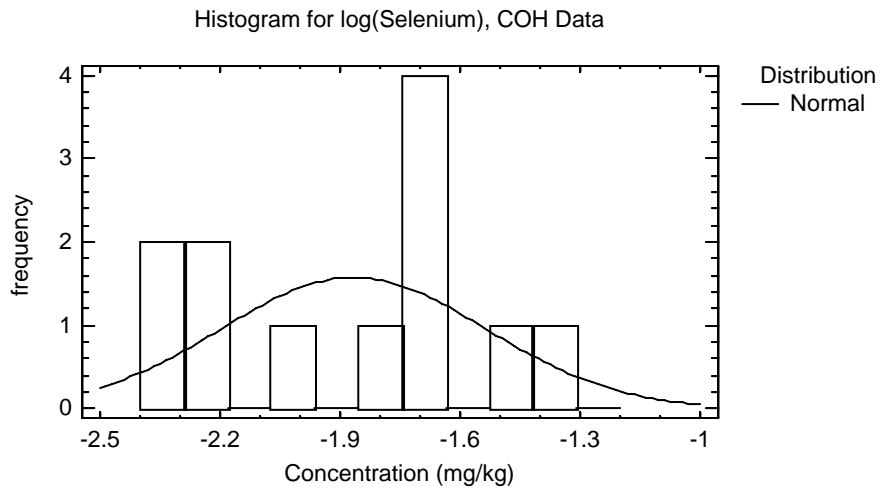
**Uncensored Data - log(Selenium) (Data Set="COH")**

Data variable: log(Selenium)  
 Selection variable: Data Set="COH"

12 values ranging from -2.30259 to -1.34707

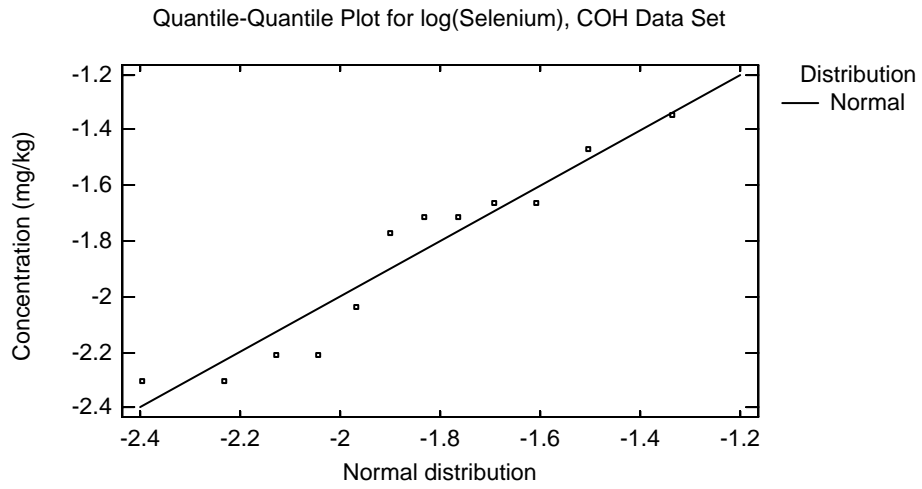
Fitted Distributions

<i>Normal</i>
mean = -1.86664
standard deviation = 0.331621



**Tests for Normality for log(Selenium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.909785	0.201848



**DRAFT**

**Two-Sample Comparison - log(Selenium) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for log(Selenium)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 12 values ranging from -2.30259 to -1.34707

Sample 2: 24 values ranging from -2.09557 to -1.28013

**Comparison of Means for log(Selenium)**

95.0% confidence interval for mean of Data Set=COH: -1.86664 +/- 0.210702 [-2.07734, -1.65594]

95.0% confidence interval for mean of Data Set=Tronox: -1.6824 +/- 0.0948576 [-1.77726, -1.58754]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.184244 +/- 0.189714 [-0.373958, 0.00546985]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -1.97365 P-value = 0.0565924

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Selenium)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.331621	0.224641
Variance	0.109972	0.0504634
Df	11	23

Ratio of Variances = 2.17925

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.234918, 0.563051]

Standard deviation of Data Set=Tronox: [0.174594, 0.315117]

Ratio of Variances: [0.833296, 6.93933]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 2.17925 P-value = 0.111209

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.21 Silver**

**Uncensored Data - Silver (Data Set="COH")**

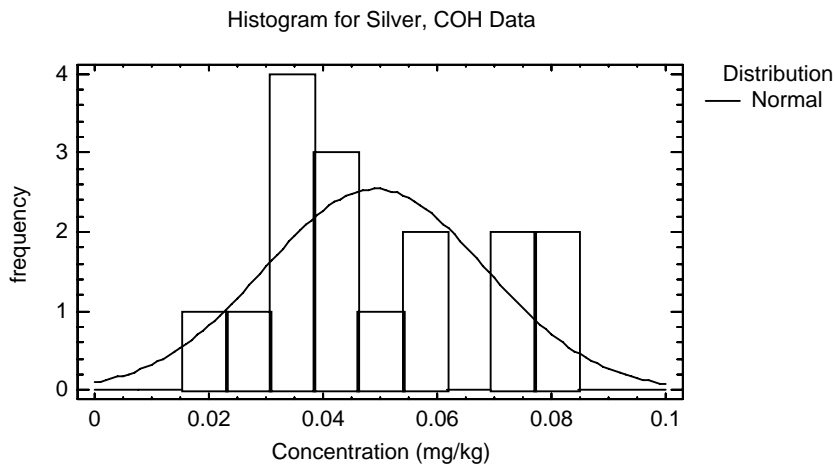
Data variable: Silver

Selection variable: Data Set="COH"

16 values ranging from 0.019 to 0.083

Fitted Distributions

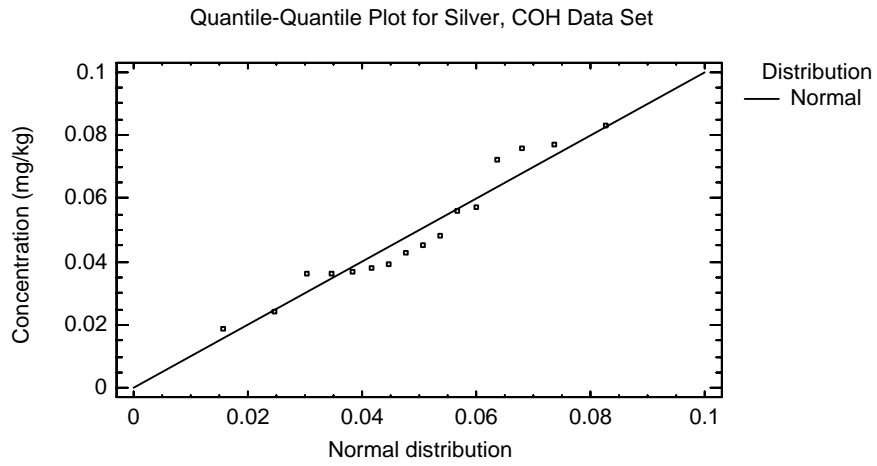
<i>Normal</i>
mean = 0.049125
standard deviation = 0.0193076



**Tests for Normality for Silver**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.931476	0.256939





**DRAFT**

**Uncensored Data - log(Silver) (Data Set="COH")**

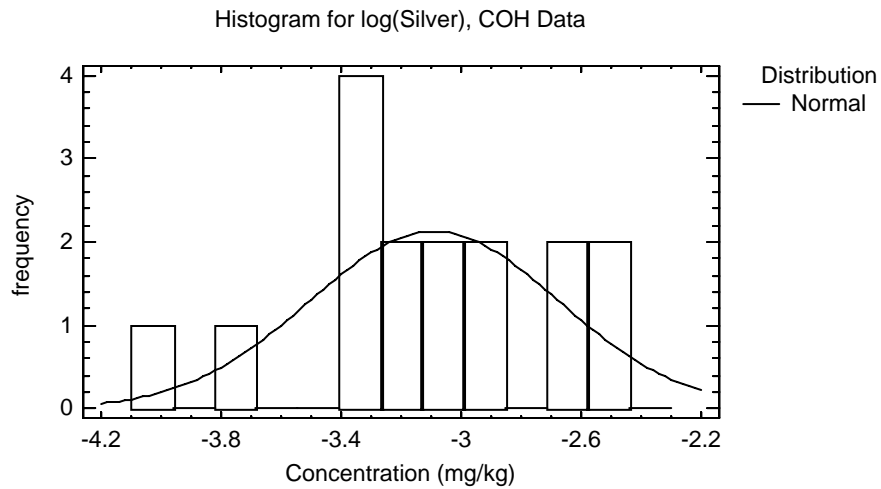
Data variable: log(Silver)

Selection variable: Data Set="COH"

16 values ranging from -3.96332 to -2.48891

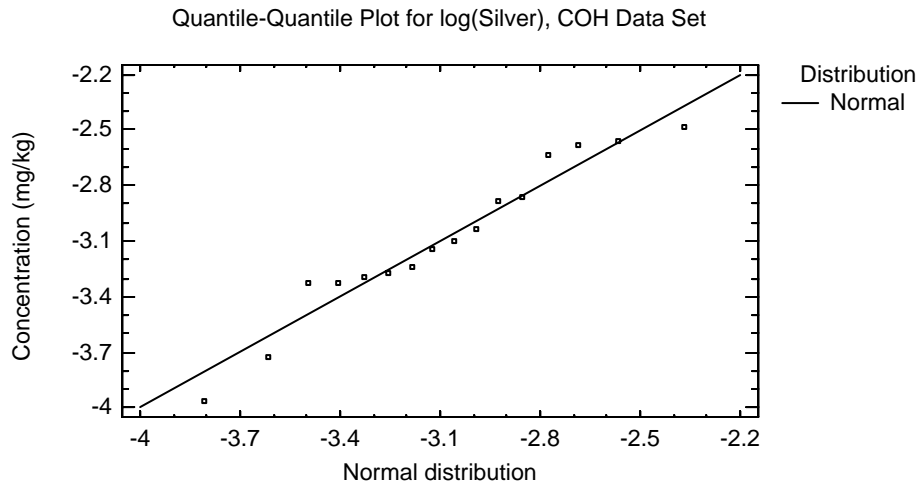
Fitted Distributions

<i>Normal</i>
mean = -3.09031
standard deviation = 0.415729



**Tests for Normality for log(Silver)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.946909	0.433134



**DRAFT**

## Tronox Silver vs. COH Silver

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -2.026144901$   $p = 0.042749938$

Reject the null hypothesis for  $\alpha = 0.05$

**DRAFT****3.22 Sodium**

The City of Henderson background data do not include sodium. Therefore, comparisons were not made.

**DRAFT****3.23 Strontium**

The City of Henderson background data do not include sodium. Therefore, comparisons were not made.

**DRAFT**

**3.24 Thallium**

**Uncensored Data - Thallium (Data Set="COH")**

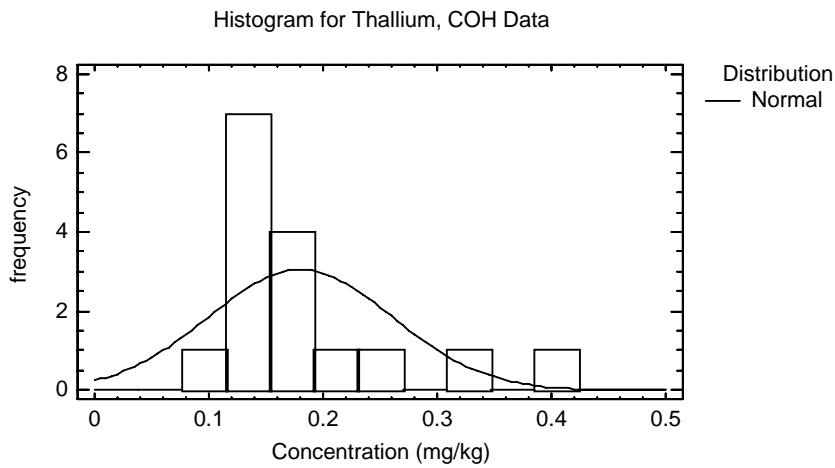
Data variable: Thallium

Selection variable: Data Set="COH"

16 values ranging from 0.1 to 0.4

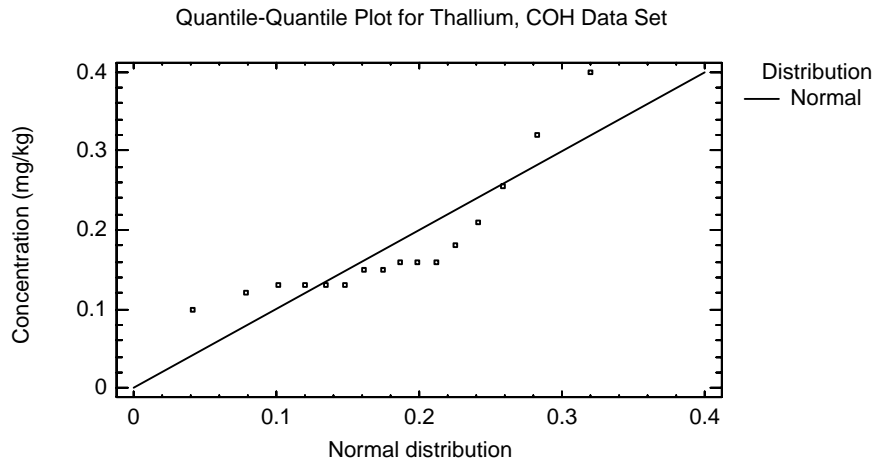
Fitted Distributions

<i>Normal</i>
mean = 0.180312
standard deviation = 0.0806323



**Tests for Normality for Thallium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.777622	0.0010905





**DRAFT**

**Uncensored Data - log(Thallium) (Data Set="COH")**

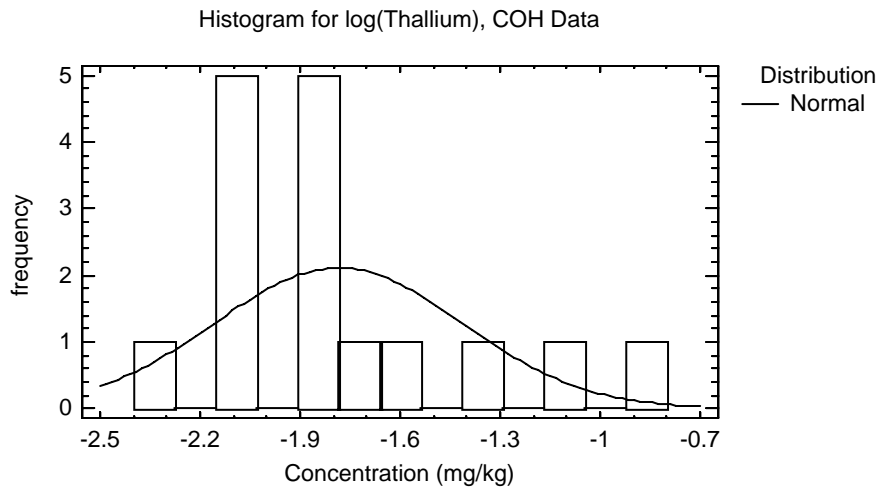
Data variable: log(Thallium)

Selection variable: Data Set="COH"

16 values ranging from -2.30259 to -0.916291

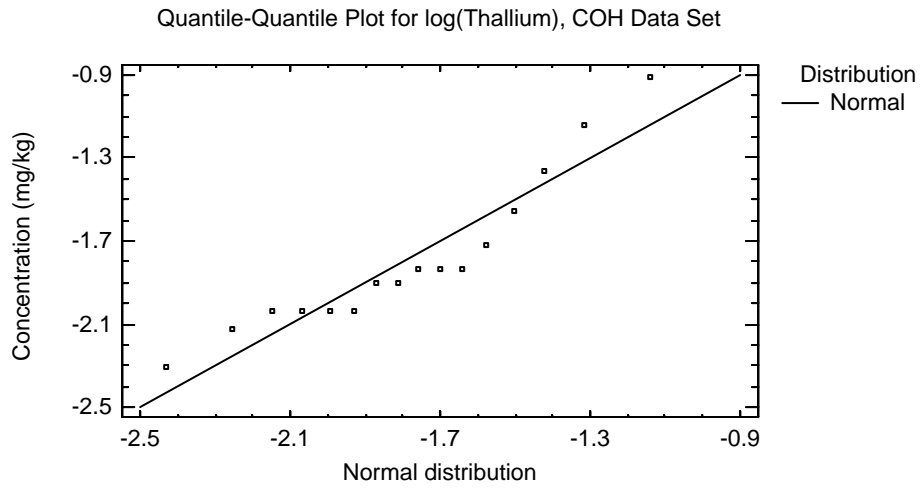
Fitted Distributions

<i>Normal</i>
mean = -1.78584
standard deviation = 0.371895



**Tests for Normality for log(Thallium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.890524	0.0574078



**DRAFT**

## Tronox Thallium vs. COH Thallium

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -1.086041979$   $p = 0.27746042$

Do not reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

### 3.25 Titanium

#### Uncensored Data - Titanium (Data Set="COH")

Data variable: Titanium

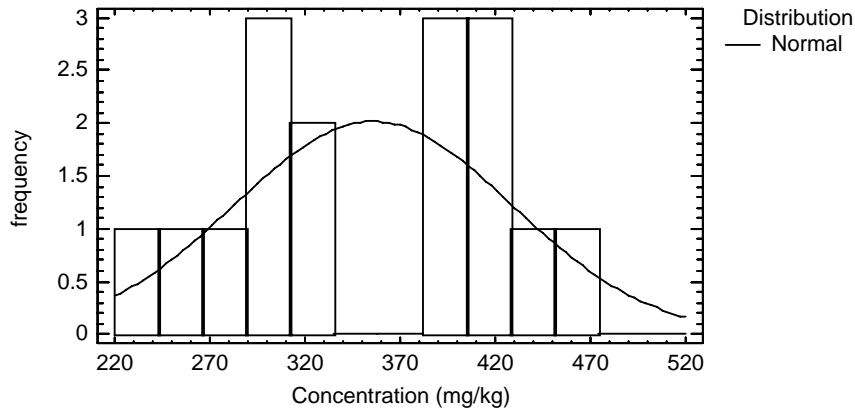
Selection variable: Data Set="COH"

16 values ranging from 235.0 to 473.0

Fitted Distributions

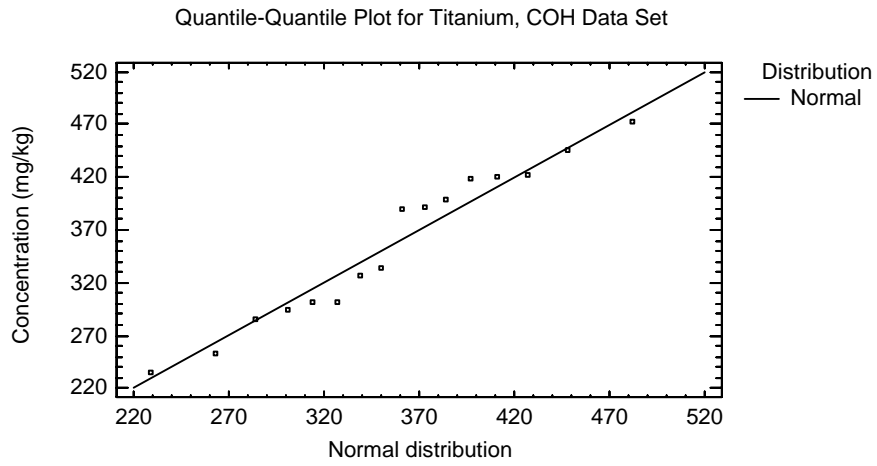
<i>Normal</i>
mean = 355.719
standard deviation = 73.0552

Histogram for Titanium, COH Data



#### Tests for Normality for Titanium

Test	Statistic	P-Value
Shapiro-Wilk W	0.945007	0.40732



**DRAFT**

**Uncensored Data - log(Titanium) (Data Set="COH")**

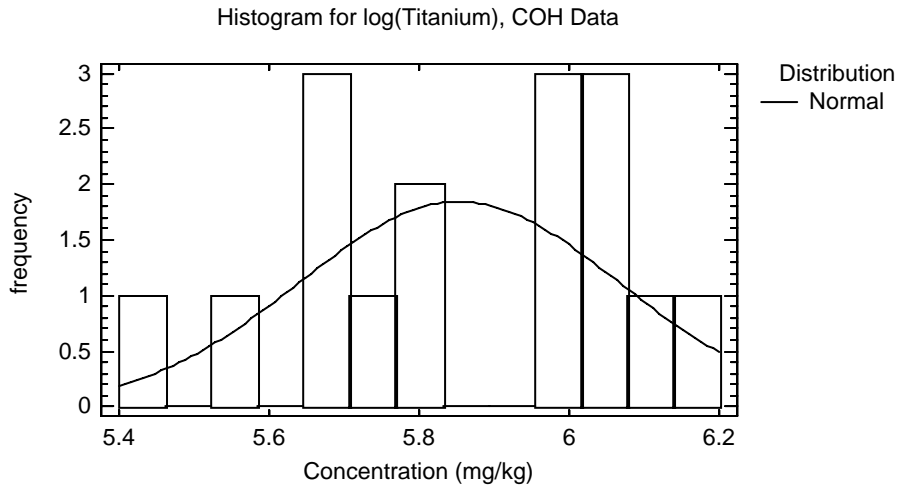
Data variable: log(Titanium)

Selection variable: Data Set="COH"

16 values ranging from 5.45959 to 6.1591

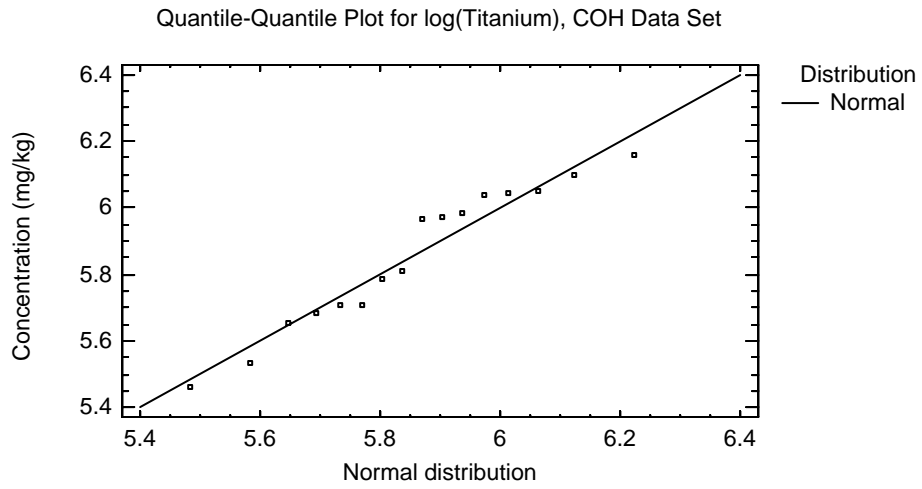
Fitted Distributions

<i>Normal</i>
mean = 5.85342
standard deviation = 0.212972



**Tests for Normality for log(Titanium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.93871	0.330184



**DRAFT**

**Two-Sample Comparison - Titanium & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Titanium**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=20

Sample 1: 16 values ranging from 235.0 to 473.0

Sample 2: 24 values ranging from 241.0 to 820.0

**Comparison of Means for Titanium**

95.0% confidence interval for mean of Data Set=COH: 355.719 +/- 38.9285 [316.79, 394.647]

95.0% confidence interval for mean of Data Set=Tronox: 592.917 +/- 47.0152 [545.901, 639.932]

95.0% confidence interval for the difference between the means

assuming equal variances: -237.198 +/- 64.0506 [-301.249, -173.147]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -7.49693 P-value = 5.28262E-9

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Titanium**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	73.0552	111.341
Variance	5337.07	12396.8
Df	15	23

Ratio of Variances = 0.43052

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [53.9662, 113.067]

Standard deviation of Data Set=Tronox: [86.5357, 156.185]

Ratio of Variances: [0.17455, 1.16791]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.43052 P-value = 0.0955995

Do not reject the null hypothesis for alpha = 0.05.



**DRAFT****3.26 Tungsten**

The City of Henderson background data do not include tungsten. Therefore, comparisons were not made.

**DRAFT****3.27 Uranium**

The City of Henderson background data do not include uranium. Therefore, comparisons were not made.

**DRAFT**

**3.28 Vanadium**

**Uncensored Data - Vanadium (Data Set="COH")**

Data variable: Vanadium

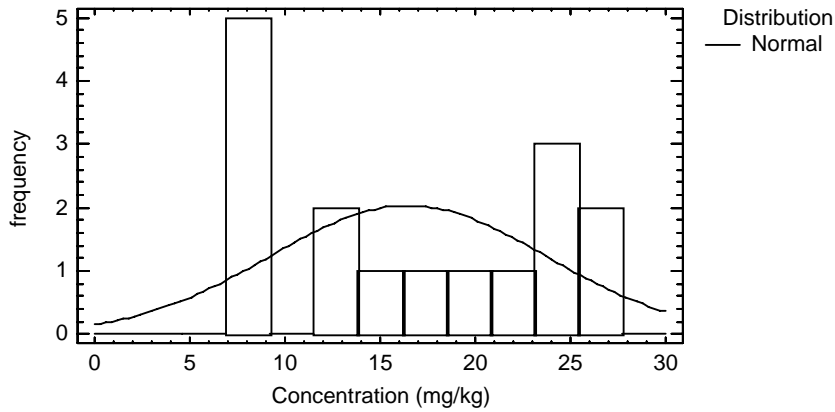
Selection variable: Data Set="COH"

16 values ranging from 7.3 to 25.5

Fitted Distributions

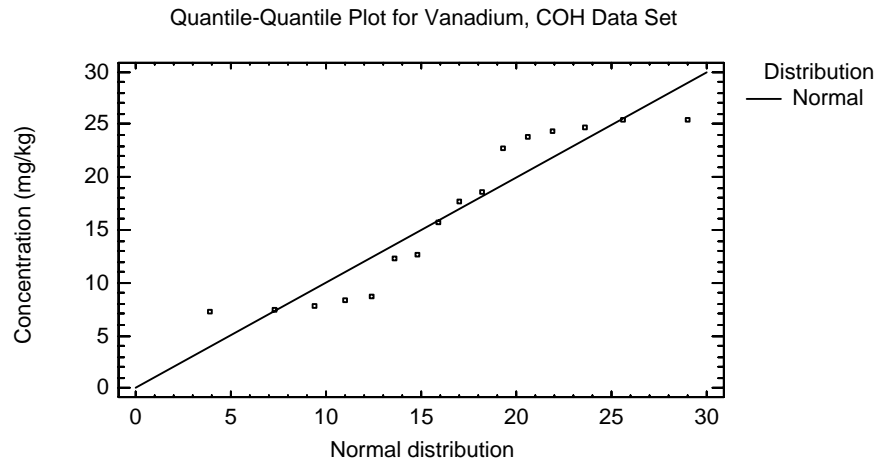
<i>Normal</i>
mean = 16.4719
standard deviation = 7.24323

Histogram for Vanadium, COH Data



**Tests for Normality for Vanadium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.865584	0.0229494



**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set="COH")**

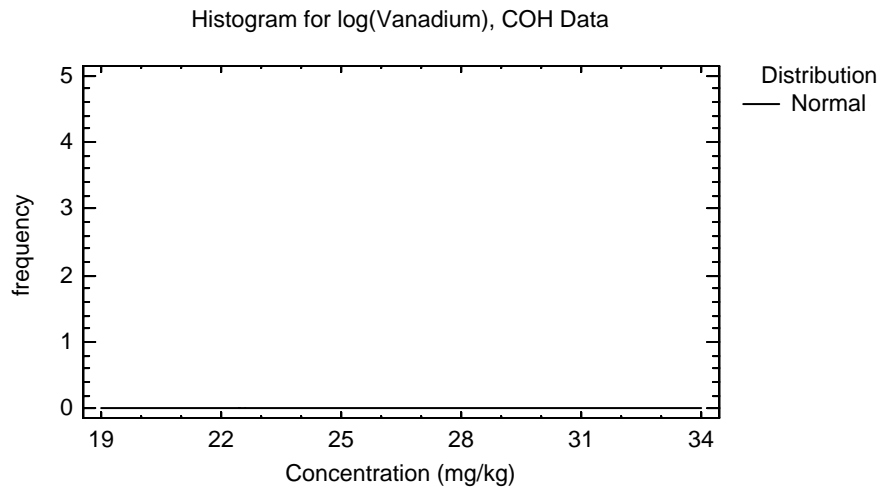
Data variable: log(Vanadium)

Selection variable: Data Set="COH"

16 values ranging from 1.98787 to 3.23868

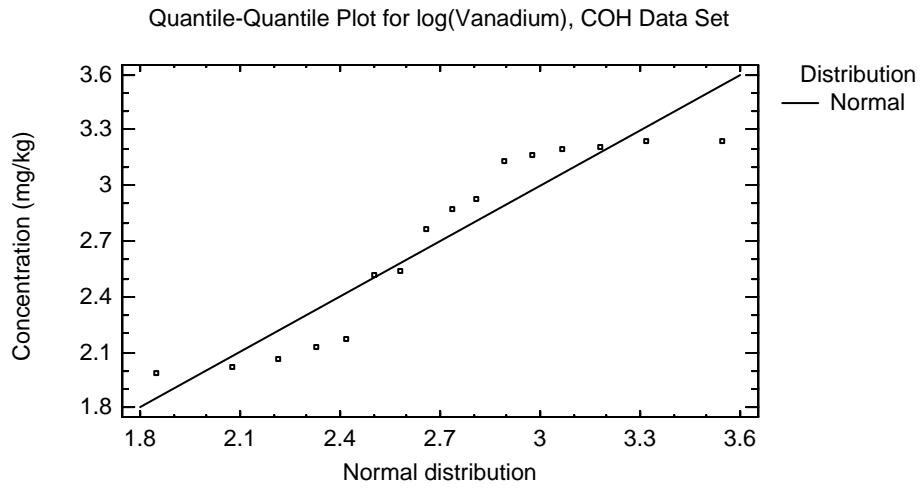
Fitted Distributions

<i>Normal</i>
mean = 2.69649
standard deviation = 0.491102



**Tests for Normality for log(Vanadium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.859633	0.018489



**DRAFT****Two-Sample Comparison - Vanadium & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Vanadium**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 7.3 to 25.5

Sample 2: 24 values ranging from 17.0 to 36.3

**Comparison of Medians for Vanadium**

Median of sample 1: 16.75

Median of sample 2: 25.925

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 11.125

Average rank of sample 2: 26.75

W = 150.0 P-value = 0.000036682

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.29 Zinc**

**Uncensored Data - Zinc (Data Set="COH")**

Data variable: Zinc

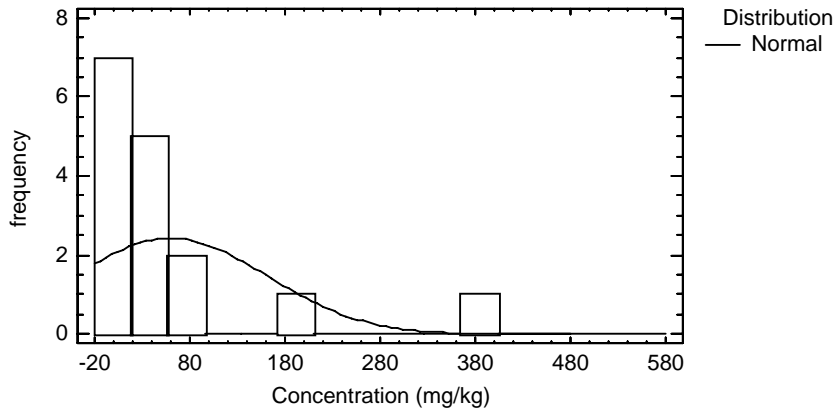
Selection variable: Data Set="COH"

16 values ranging from 9.35 to 402.5

Fitted Distributions

<i>Normal</i>
mean = 60.0438
standard deviation = 101.25

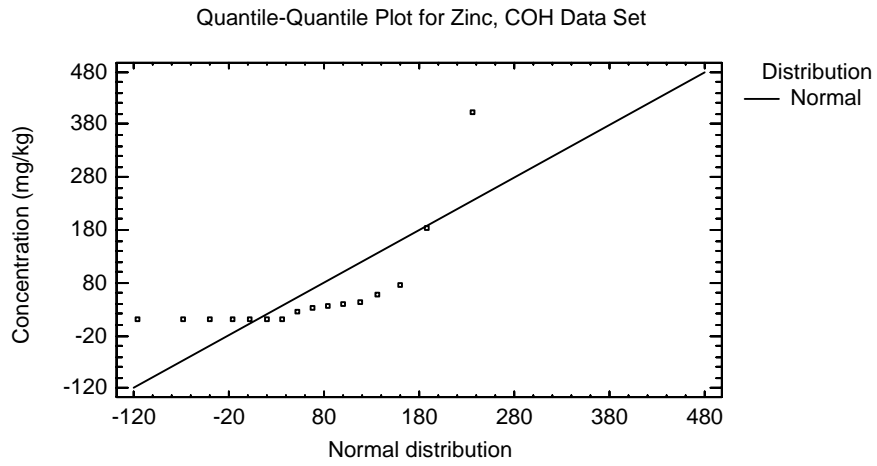
Histogram for Zinc, COH Data



**Tests for Normality for Zinc**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.550024	0.00000159523





**DRAFT**

**Uncensored Data - log(Zinc) (Data Set="COH")**

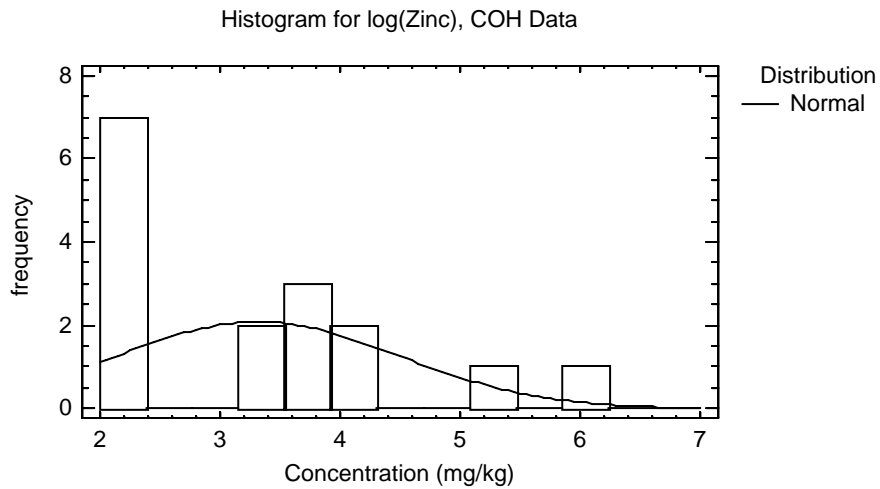
Data variable: log(Zinc)

Selection variable: Data Set="COH"

16 values ranging from 2.23538 to 5.9977

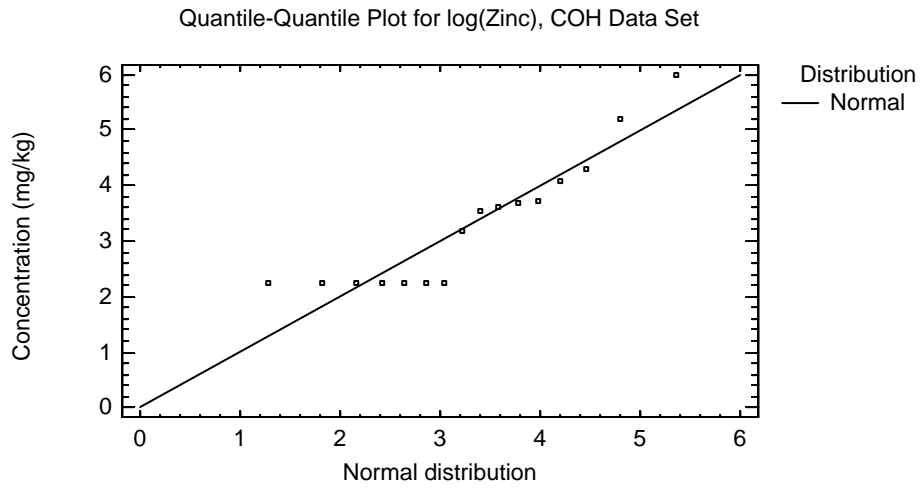
Fitted Distributions

<i>Normal</i>
mean = 3.31357
standard deviation = 1.17865



**Tests for Normality for log(Zinc)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.848242	0.0122687



**DRAFT****Two-Sample Comparison - Zinc & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Zinc**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 9.35 to 402.5

Sample 2: 24 values ranging from 26.6 to 72.1

**Comparison of Medians for Zinc**

Median of sample 1: 28.8

Median of sample 2: 39.875

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 16.875

Average rank of sample 2: 22.9167

W = 58.0 P-value = 0.112342

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**3.30 Perchlorate**

**Uncensored Data - Perchlorate (Data Set="COH")**

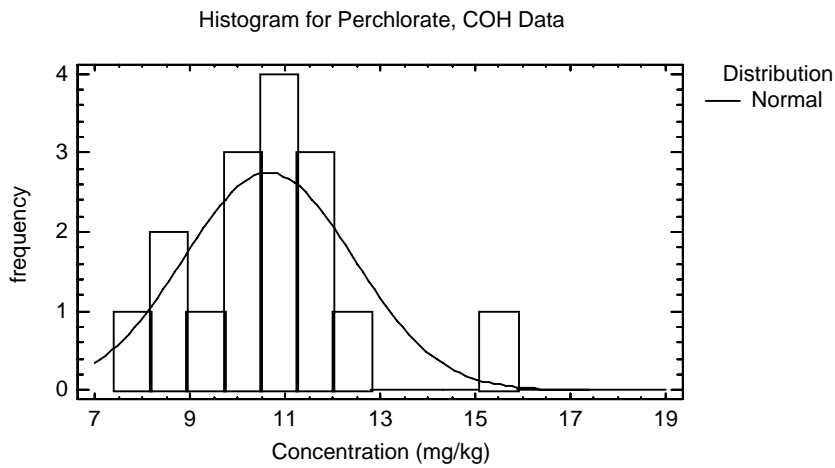
Data variable: Perchlorate

Selection variable: Data Set="COH"

16 values ranging from 7.8 to 15.4

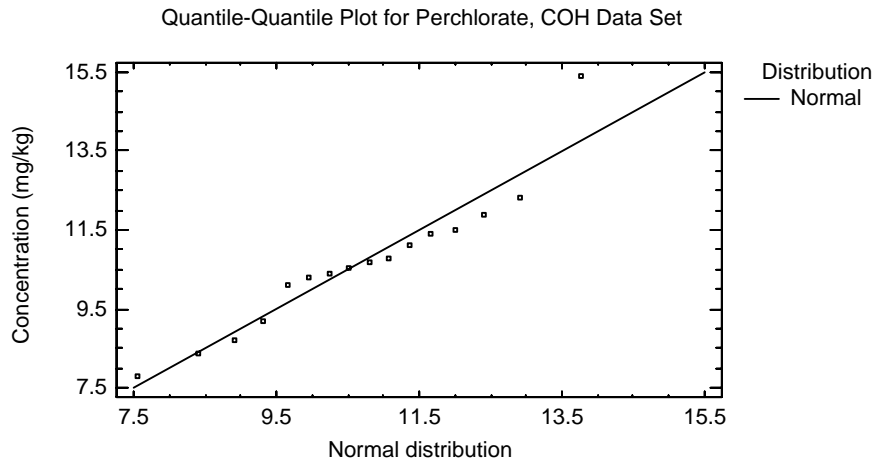
Fitted Distributions

<i>Normal</i>
mean = 10.6594
standard deviation = 1.78785



**Tests for Normality for Perchlorate**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.927963	0.226854



**DRAFT**

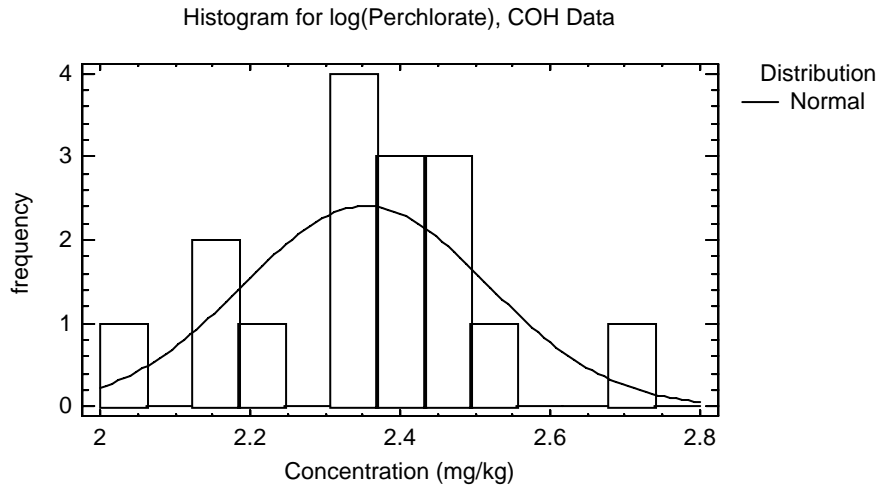
**Uncensored Data - log(Perchlorate) (Data Set="COH")**

Data variable: log(Perchlorate)  
 Selection variable: Data Set="COH"

16 values ranging from 2.05412 to 2.73437

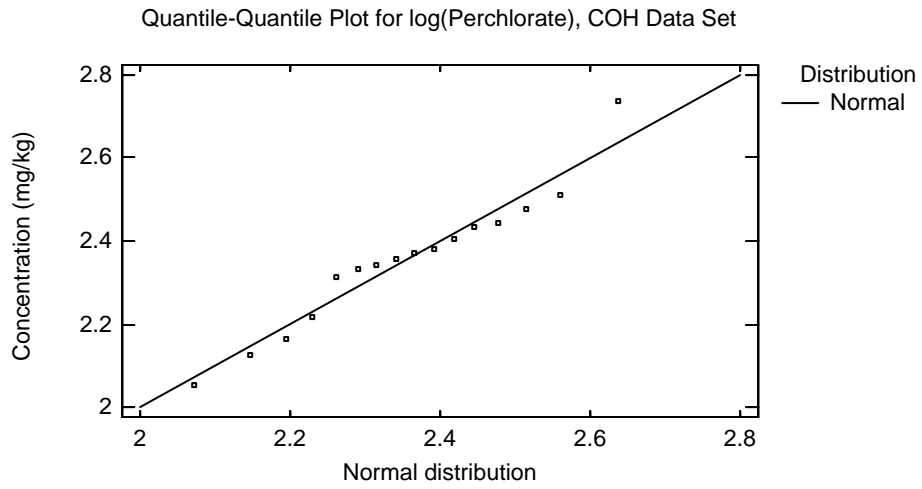
Fitted Distributions

<i>Normal</i>
mean = 2.35379
standard deviation = 0.163206



**Tests for Normality for log(Perchlorate)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.958858	0.618969





**DRAFT**

## Tronox Perchlorate vs. COH Perchlorate

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -6.108984621 p= 1.00267E-09

Reject the null hypothesis for alpha=0.05

## 4.0 COMPARISON OF TRONOX UPGRADIENT AND BRC/TIMET BACKGROUND DATA FOR METALS IN SOIL

### 4.1 Aluminum

#### Uncensored Data - Aluminum (Data Set="BRC/TIMET")

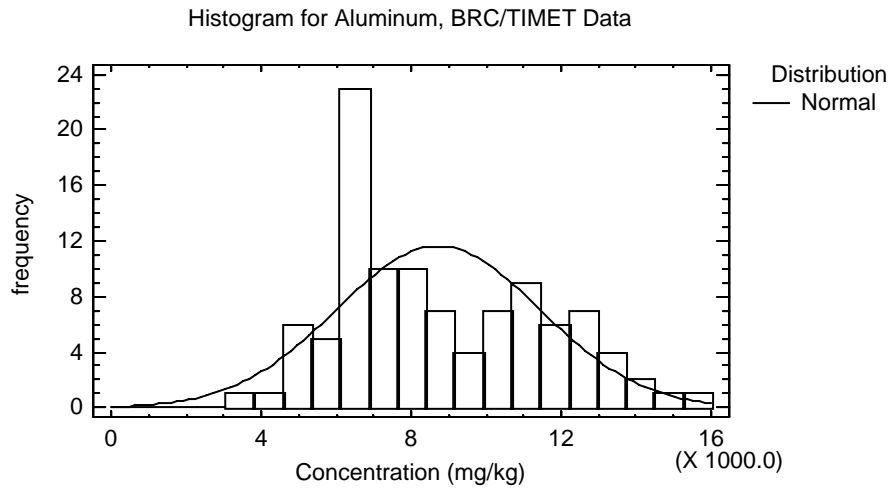
Data variable: Aluminum

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 3740.0 to 15300.0

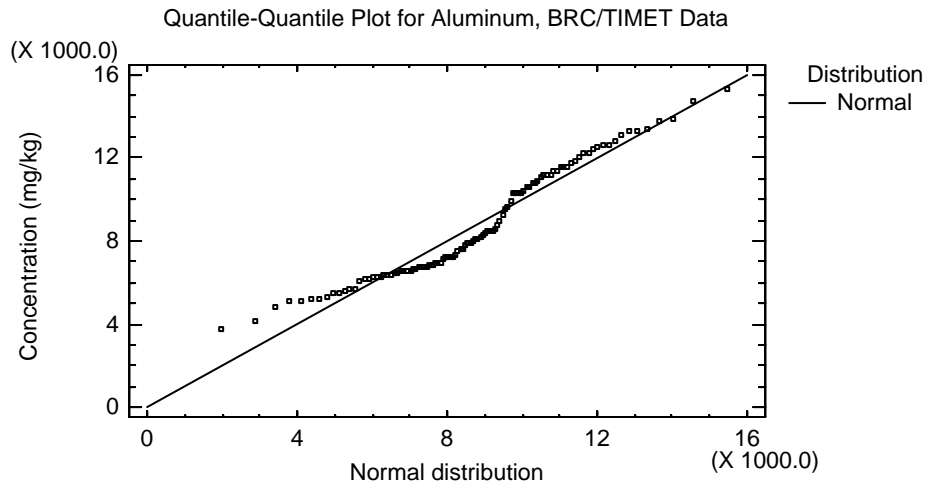
Fitted Distributions

<i>Normal</i>
mean = 8718.65
standard deviation = 2717.9



#### Tests for Normality for Aluminum

Test	Statistic	P-Value
Shapiro-Wilk W	0.932186	0.0000218009



**DRAFT**

**Uncensored Data - log(Aluminum) (Data Set="BRC/TIMET")**

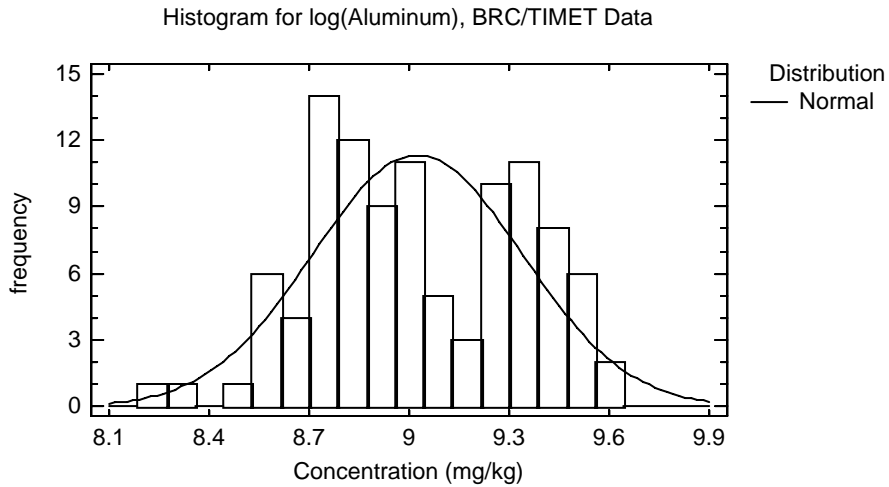
Data variable: log(Aluminum)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 8.22684 to 9.63561

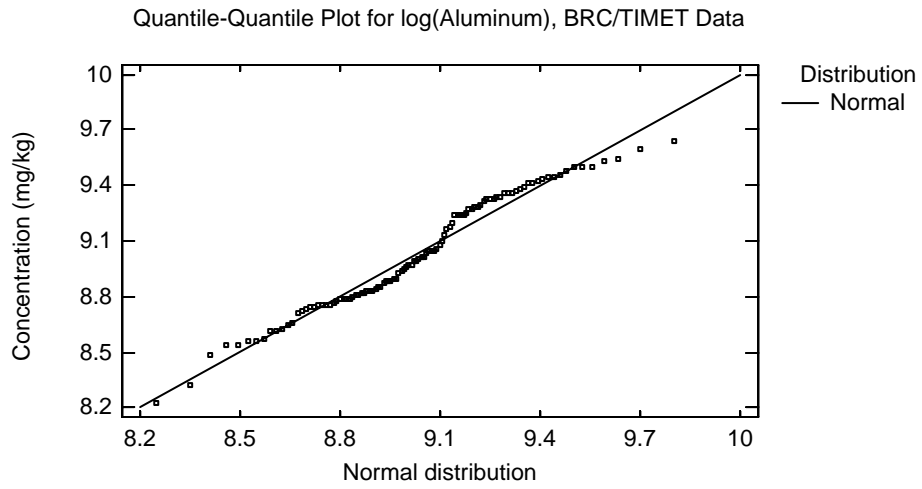
Fitted Distributions

<i>Normal</i>
mean = 9.02487
standard deviation = 0.314198



**Tests for Normality for log(Aluminum)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.954885	0.00621774



**DRAFT****Two-Sample Comparison - Aluminum & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Aluminum**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 3740.0 to 15300.0

Sample 2: 24 values ranging from 6390.0 to 12100.0

**Comparison of Medians for Aluminum**

Median of sample 1: 8045.0

Median of sample 2: 8855.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 62.5962

Average rank of sample 2: 72.75

W = 198.0 P-value = 0.227906

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

## 4.2 Antimony

### Uncensored Data - Antimony (Data Set="BRC/TIMET")

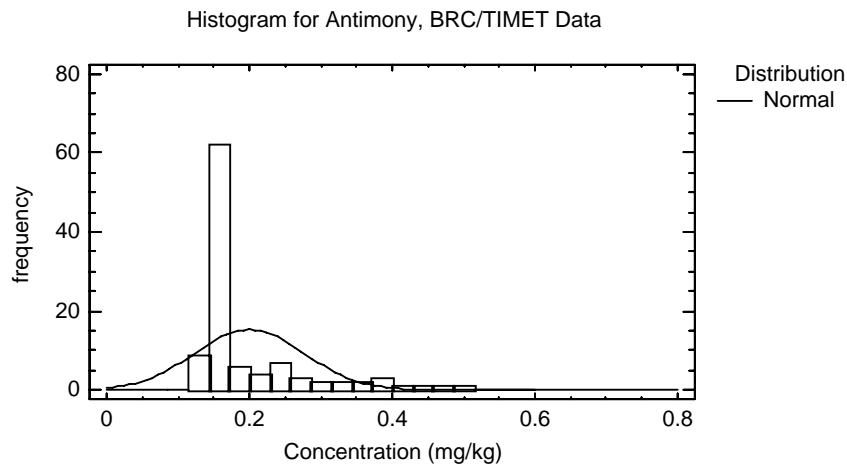
Data variable: Antimony

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.12 to 0.5

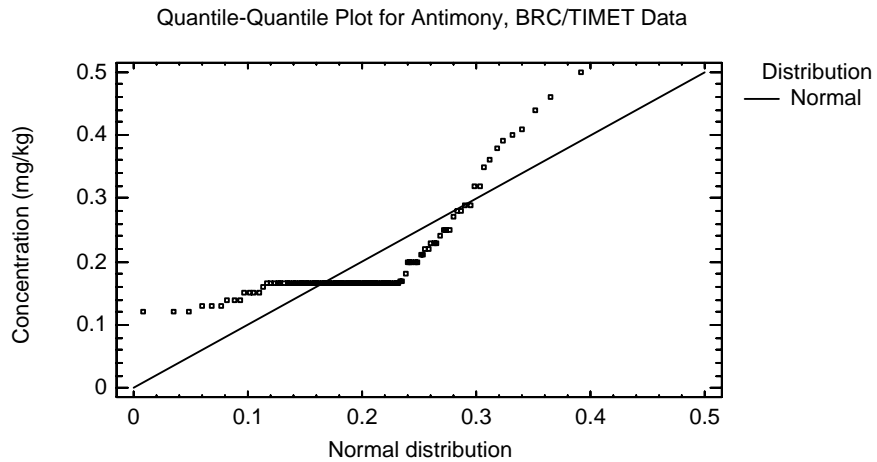
Fitted Distributions

<i>Normal</i>
mean = 0.199995
standard deviation = 0.0774384



### Tests for Normality for Antimony

Test	Statistic	P-Value
Shapiro-Wilk W	0.689685	0.0





**DRAFT**

**Uncensored Data - log(Antimony) (Data Set="BRC/TIMET")**

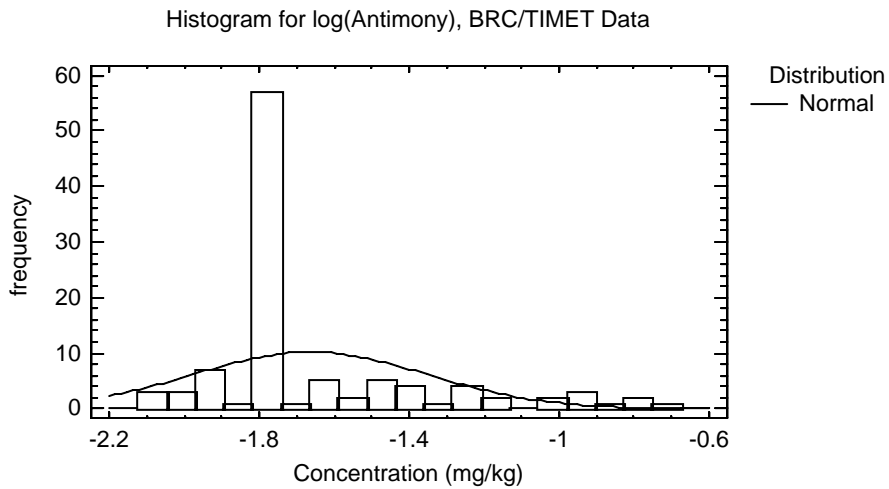
Data variable: log(Antimony)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -2.12026 to -0.693147

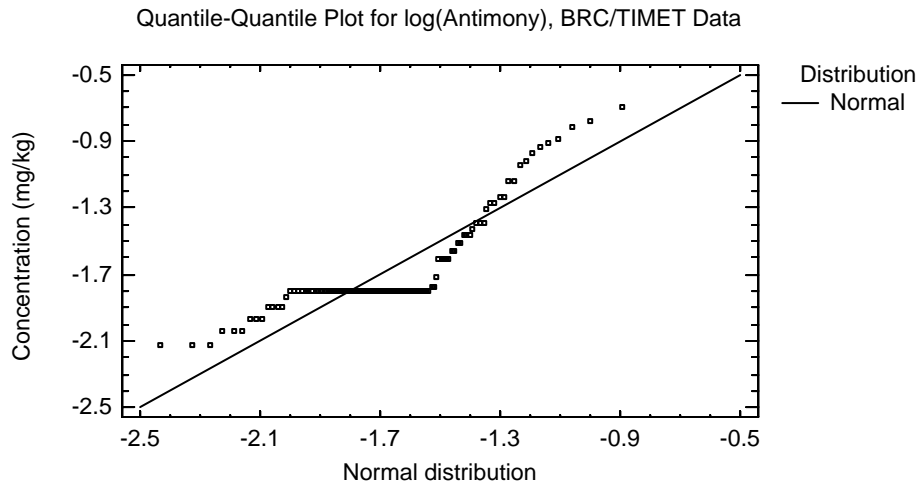
Fitted Distributions

<i>Normal</i>
mean = -1.66417
standard deviation = 0.309535



**Tests for Normality for log(Antimony)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.777588	0.0



**DRAFT**

**Tronox Antimony vs. BRC/TIMET Antimony**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -4.432949995 p= 9.29524E-06

Reject the null hypothesis for alpha=0.05

**DRAFT**

**4.3 Arsenic**

**Uncensored Data - Arsenic (Data Set="BRC/TIMET")**

Data variable: Arsenic

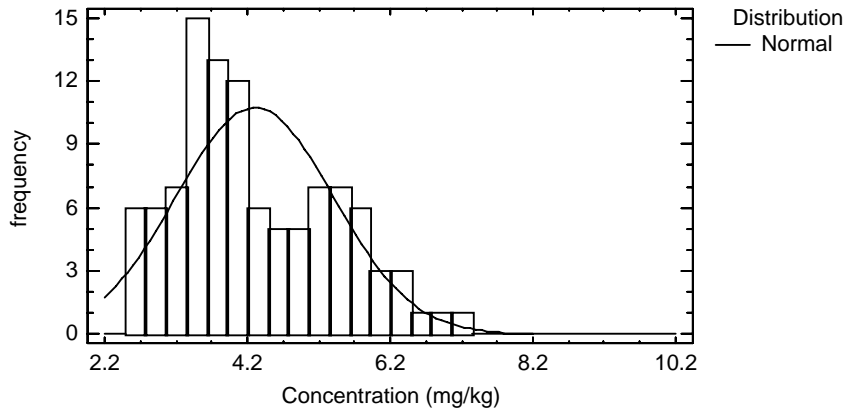
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.5 to 7.2

Fitted Distributions

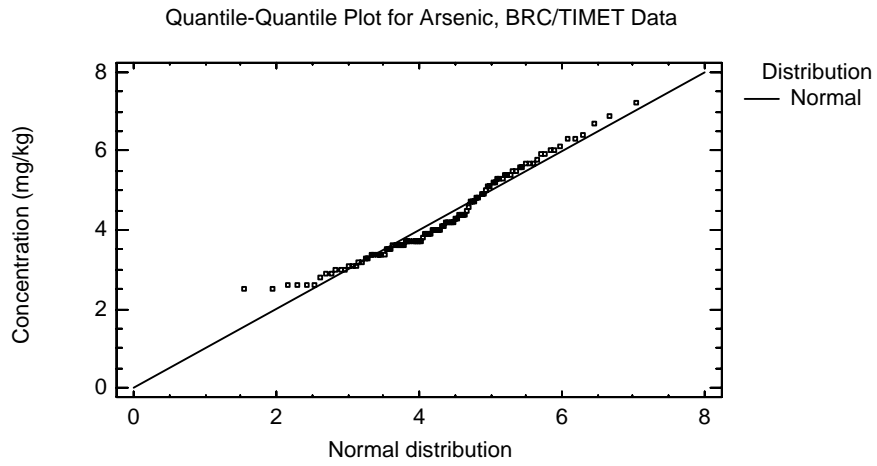
<i>Normal</i>
mean = 4.30096
standard deviation = 1.10537

Histogram for Arsenic, BRC/TIMET Data



**Tests for Normality for Arsenic**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.946467	0.000852622



**DRAFT**

**Uncensored Data - log(Arsenic) (Data Set="BRC/TIMET")**

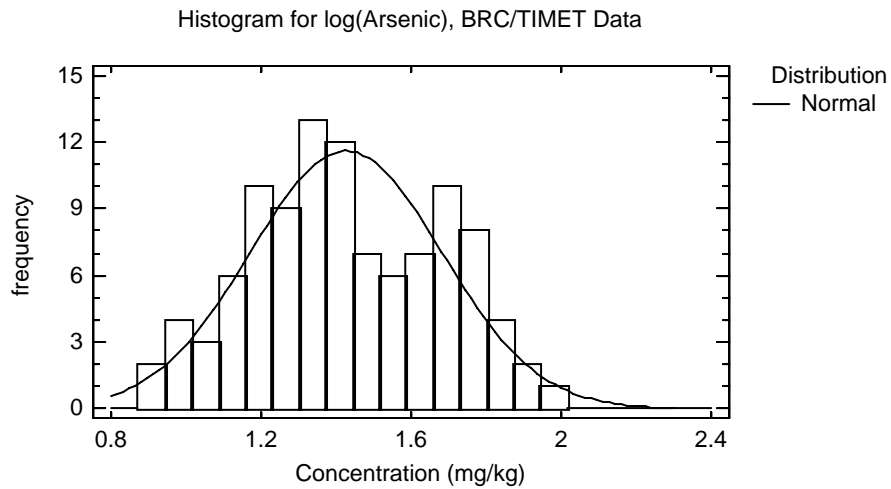
Data variable: log(Arsenic)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.916291 to 1.97408

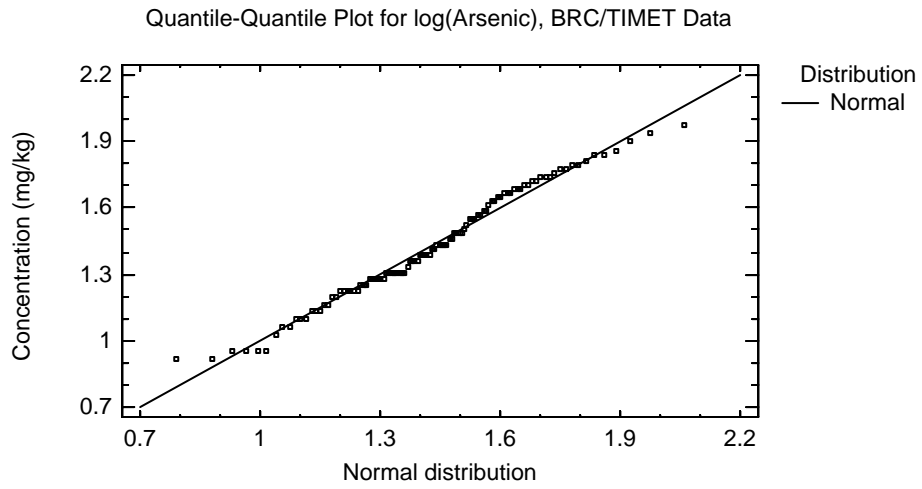
Fitted Distributions

<i>Normal</i>
mean = 1.42654
standard deviation = 0.255568



**Tests for Normality for log(Arsenic)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.963188	0.0365809



**DRAFT****Two-Sample Comparison - Arsenic & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Arsenic**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 2.5 to 7.2

Sample 2: 24 values ranging from 2.11 to 5.2

**Comparison of Medians for Arsenic**

Median of sample 1: 4.05

Median of sample 2: 3.385

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 71.2212

Average rank of sample 2: 35.375

W = -699.0 P-value = 0.0000199075

Reject the null hypothesis for alpha = 0.05.



**DRAFT**

**4.4 Barium**

**Uncensored Data - Barium (Data Set="BRC/TIMET")**

Data variable: Barium

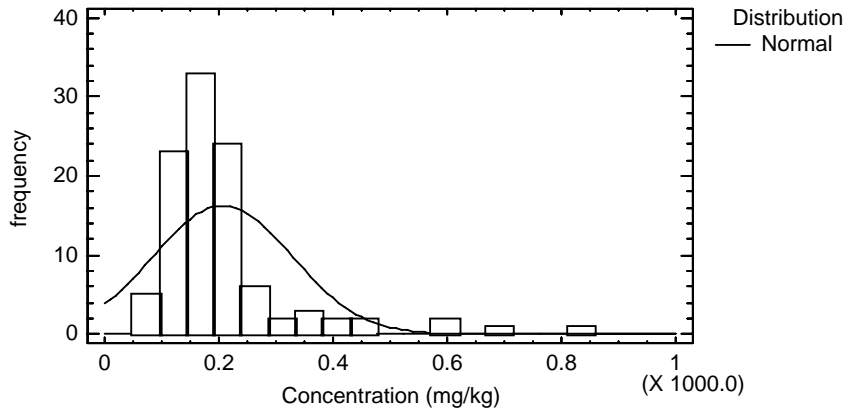
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 73.0 to 836.0

Fitted Distributions

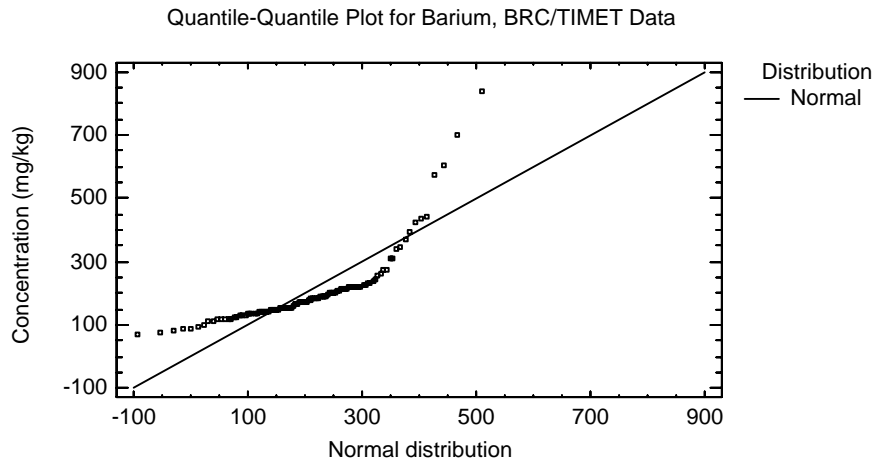
<i>Normal</i>
mean = 206.988
standard deviation = 121.483

Histogram for Barium, BRC/TIMET Data



**Tests for Normality for Barium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.721368	0.0



**DRAFT**

**Uncensored Data - log(Barium) (Data Set="BRC/TIMET")**

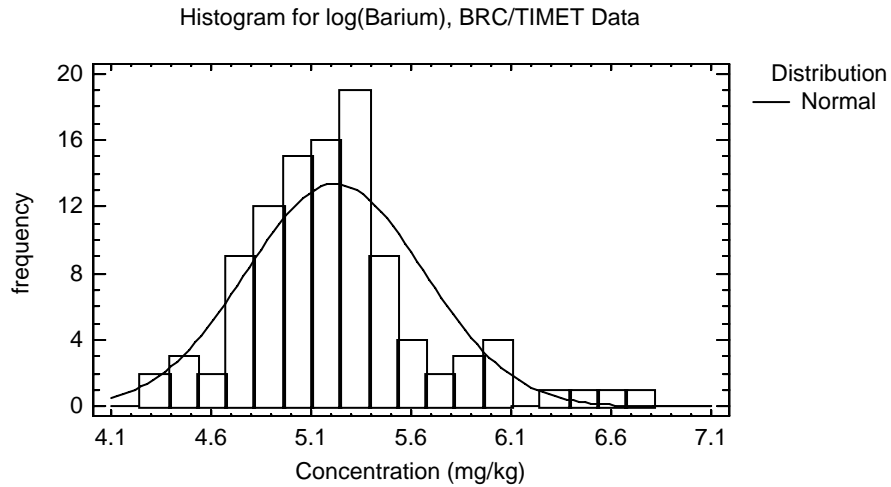
Data variable: log(Barium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 4.29046 to 6.72863

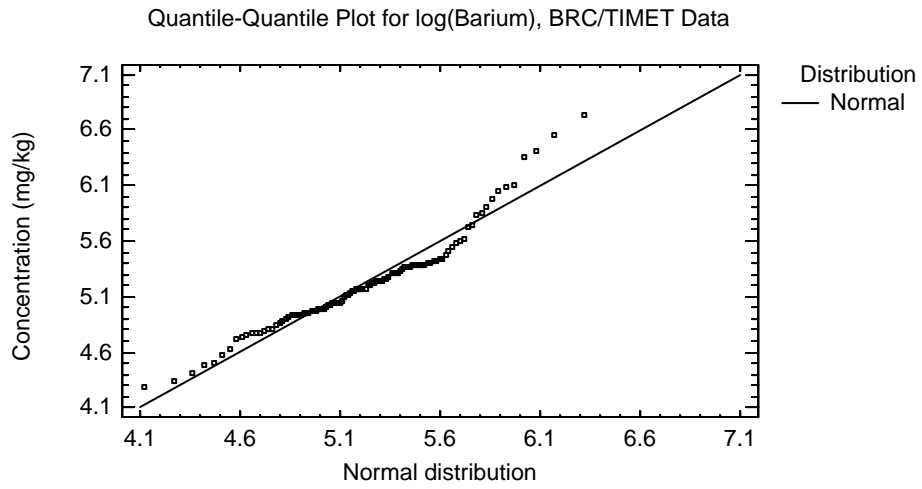
Fitted Distributions

<i>Normal</i>
mean = 5.22031
standard deviation = 0.443258



**Tests for Normality for log(Barium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.941645	0.000256063



**DRAFT****Two-Sample Comparison - Barium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Barium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 73.0 to 836.0

Sample 2: 24 values ranging from 120.0 to 272.0

**Comparison of Medians for Barium**

Median of sample 1: 177.0

Median of sample 2: 183.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 64.6971

Average rank of sample 2: 63.6458

W = -20.5 P-value = 0.902809

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 4.5 Beryllium

#### Uncensored Data - Beryllium (Data Set="BRC/TIMET")

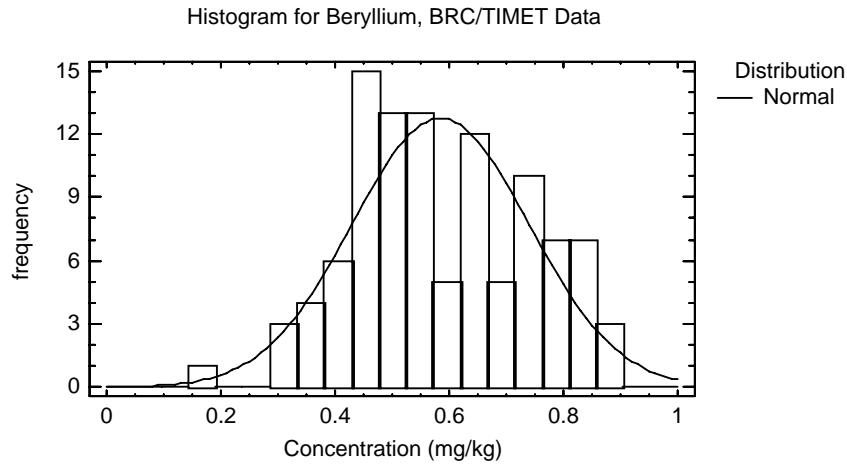
Data variable: Beryllium

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.16 to 0.89

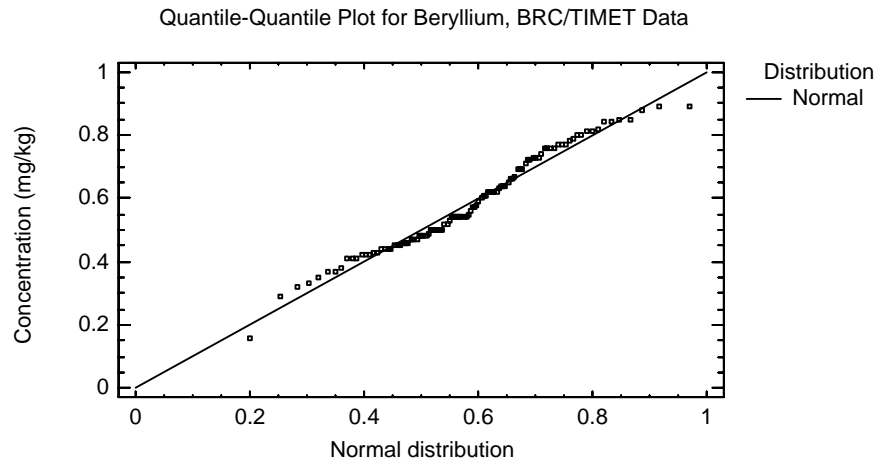
Fitted Distributions

<i>Normal</i>
mean = 0.584615
standard deviation = 0.155088



#### Tests for Normality for Beryllium

Test	Statistic	P-Value
Shapiro-Wilk W	0.962964	0.0349799



**DRAFT**

**Uncensored Data - log(Beryllium) (Data Set="BRC/TIMET")**

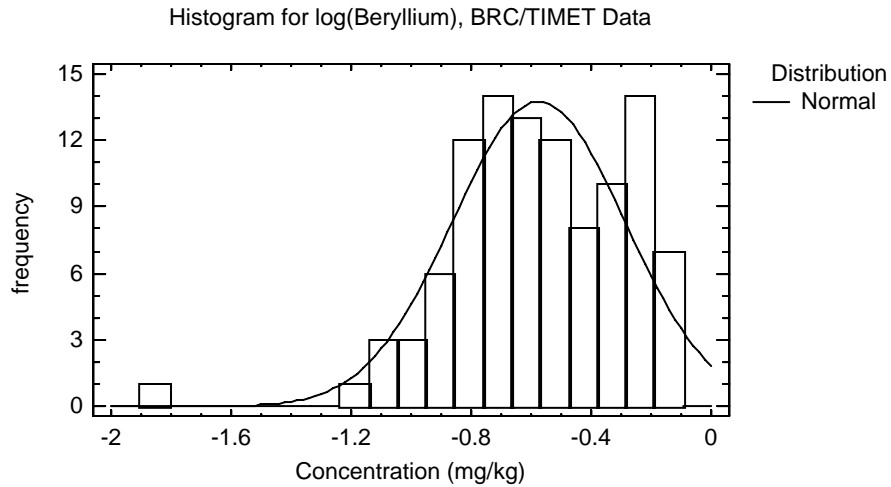
Data variable: log(Beryllium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -1.83258 to -0.116534

Fitted Distributions

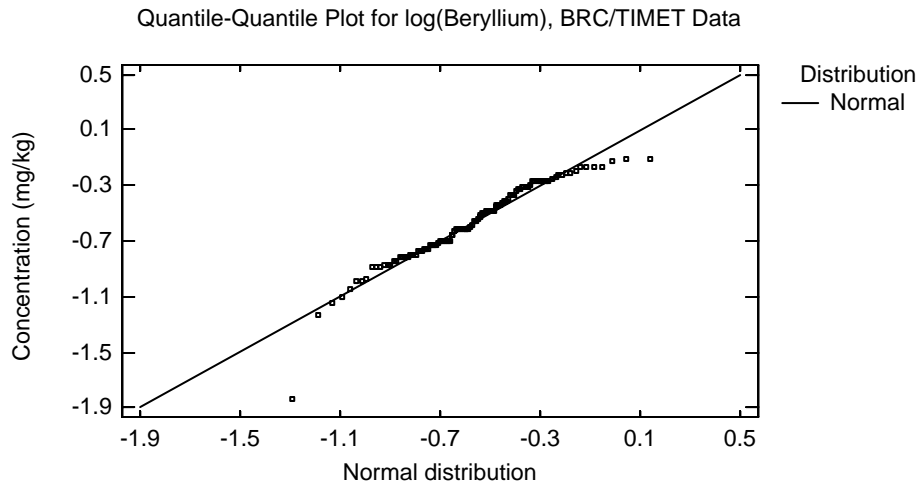
<i>Normal</i>
mean = -0.574961
standard deviation = 0.287744



**Tests for Normality for log(Beryllium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.947579	0.00111836





**DRAFT****Two-Sample Comparison - Beryllium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Beryllium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 0.16 to 0.89

Sample 2: 24 values ranging from 0.394 to 0.758

**Comparison of Medians for Beryllium**

Median of sample 1: 0.555

Median of sample 2: 0.554

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 65.8413

Average rank of sample 2: 58.6875

W = -139.5 P-value = 0.395947

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.6 Boron**

**Uncensored Data - Boron (Data Set="BRC/TIMET")**

Data variable: Boron

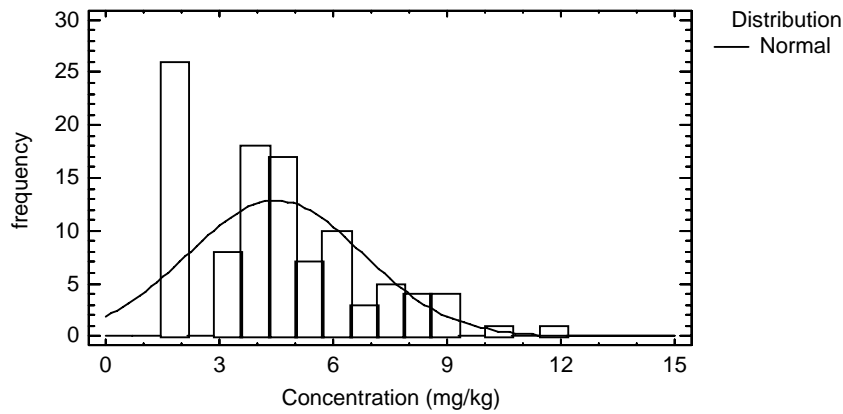
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 1.6 to 11.6

Fitted Distributions

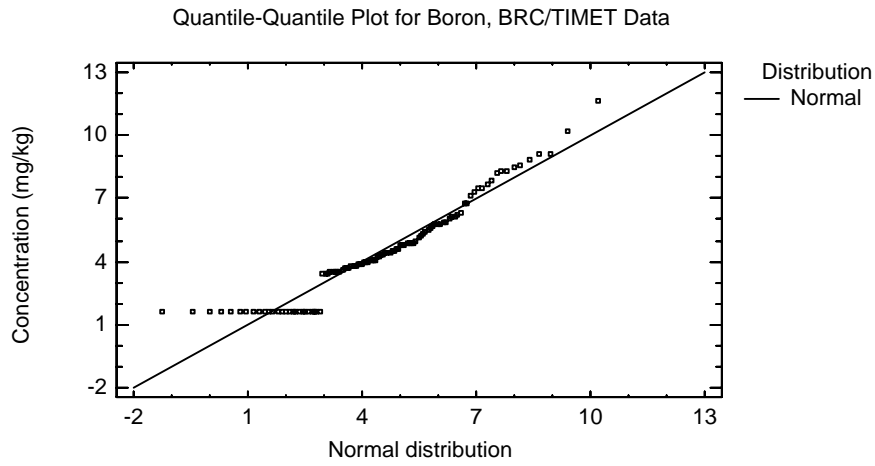
<i>Normal</i>
mean = 4.47788
standard deviation = 2.30462

Histogram for Boron, BRC/TIMET Data



**Tests for Normality for Boron**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.913305	1.1952E-7



**DRAFT**

**Uncensored Data - log(Boron) (Data Set="BRC/TIMET")**

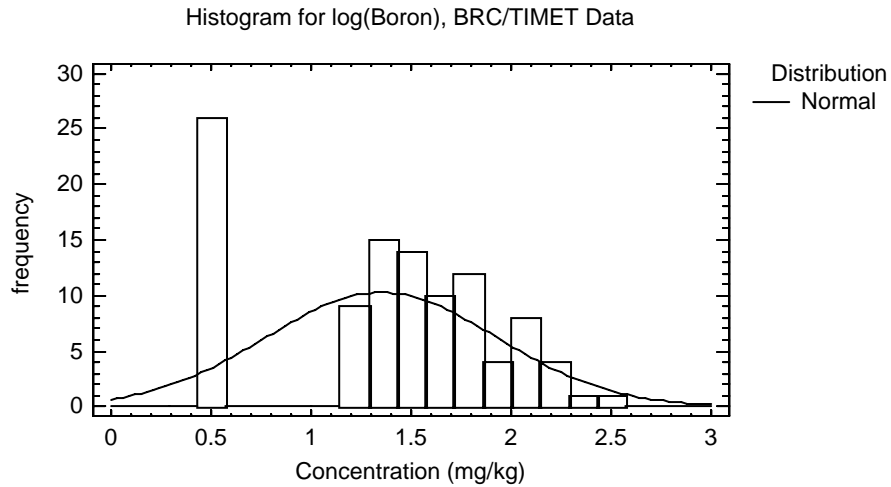
Data variable: log(Boron)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.470004 to 2.45101

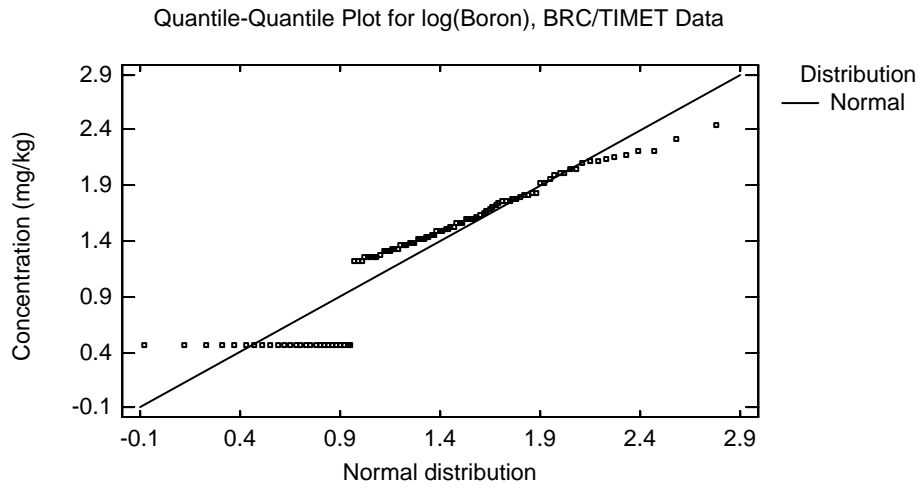
Fitted Distributions

<i>Normal</i>
mean = 1.35003
standard deviation = 0.576525



**Tests for Normality for log(Boron)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.867189	1.5854E-13



**DRAFT**

**Tronox Boron vs. BRC/TIMET Boron**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -16.16677477 p= 0

Reject the null hypothesis for alpha=0.05

**DRAFT****4.7 Cadmium**

Cadmium was not detected in any of the BRC/TIMET background samples. Therefore, comparisons were not made.



**DRAFT**

**4.8 Calcium**

**Uncensored Data - Calcium (Data Set="BRC/TIMET")**

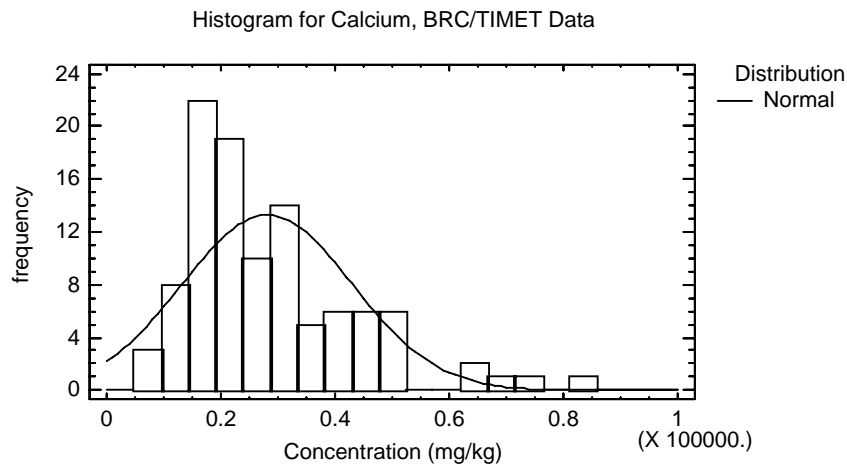
Data variable: Calcium

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 8160.0 to 82800.0

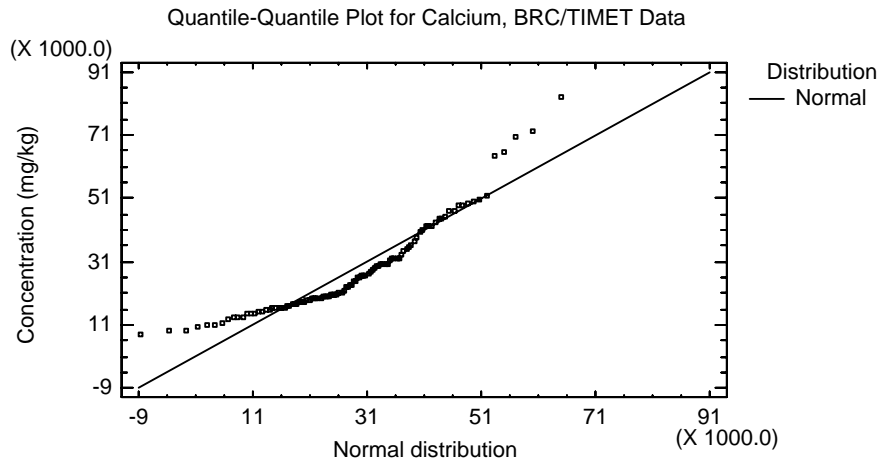
Fitted Distributions

<i>Normal</i>
mean = 28134.0
standard deviation = 14860.7



**Tests for Normality for Calcium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.882533	1.54703E-11



**DRAFT**

**Uncensored Data - log(Calcium) (Data Set="BRC/TIMET")**

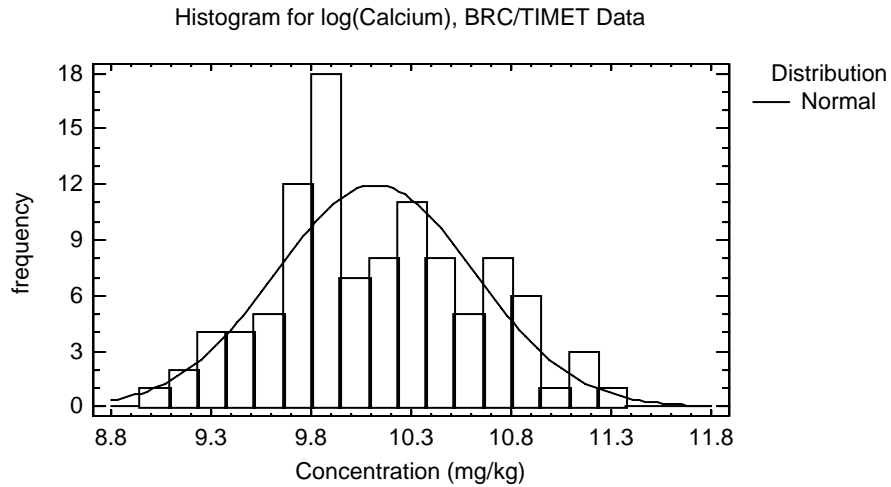
Data variable: log(Calcium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 9.007 to 11.3242

Fitted Distributions

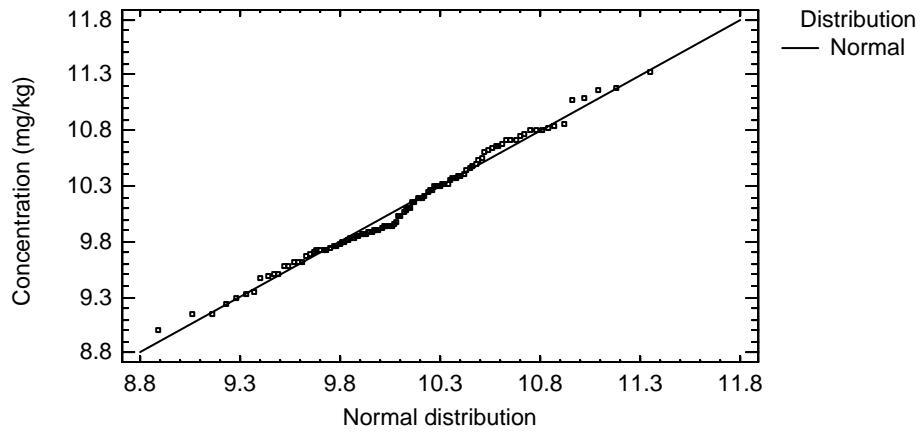
<i>Normal</i>
mean = 10.121
standard deviation = 0.495276



**Tests for Normality for log(Calcium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.974753	0.270295

Quantile-Quantile Plot for log(Calcium), BRC/TIMET Data



**DRAFT**

**Two-Sample Comparison - log(Calcium) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for log(Calcium)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 9.007 to 11.3242

Sample 2: 24 values ranging from 9.34137 to 10.9569

**Comparison of Means for log(Calcium)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 10.121 +/- 0.096319 [10.0247, 10.2174]

95.0% confidence interval for mean of Data Set=Tronox: 10.1973 +/- 0.172899 [10.0244, 10.3702]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.0762203 +/- 0.21545 [-0.29167, 0.13923]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -0.700107 P-value = 0.485151

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Calcium)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.495276	0.409457
Variance	0.245298	0.167655
Df	103	23

Ratio of Variances = 1.46311

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.43589, 0.573557]

Standard deviation of Data Set=Tronox: [0.318236, 0.574371]

Ratio of Variances: [0.712604, 2.62494]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.46311 P-value = 0.296032

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 4.9 Chromium

#### Uncensored Data - Chromium (Data Set="BRC/TIMET")

Data variable: Chromium

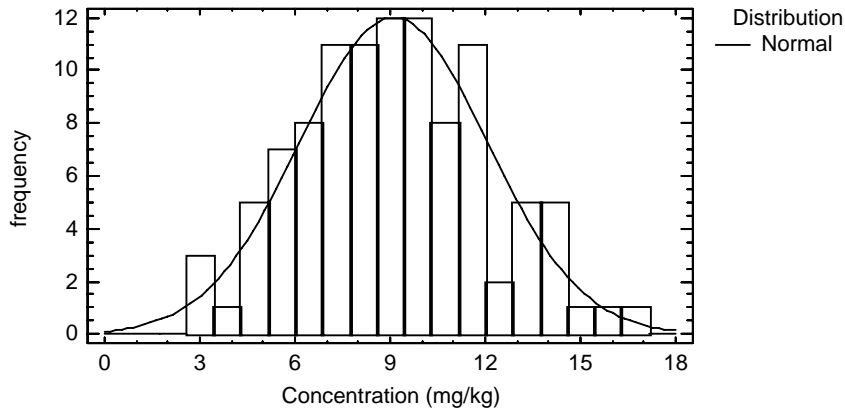
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.6 to 16.7

Fitted Distributions

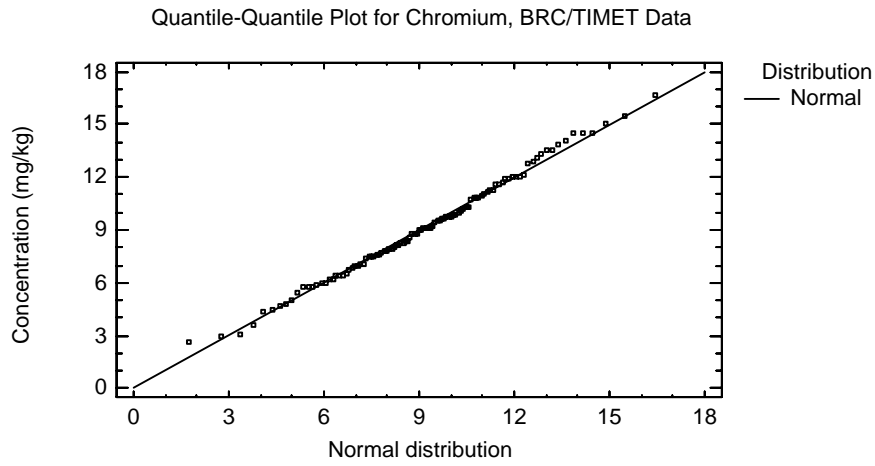
<i>Normal</i>
mean = 9.11058
standard deviation = 2.96418

Histogram for Chromium, BRC/TIMET Data



#### Tests for Normality for Chromium

Test	Statistic	P-Value
Shapiro-Wilk W	0.98099	0.56901



**DRAFT**

**Uncensored Data - log(Chromium) (Data Set="BRC/TIMET")**

Data variable: log(Chromium)

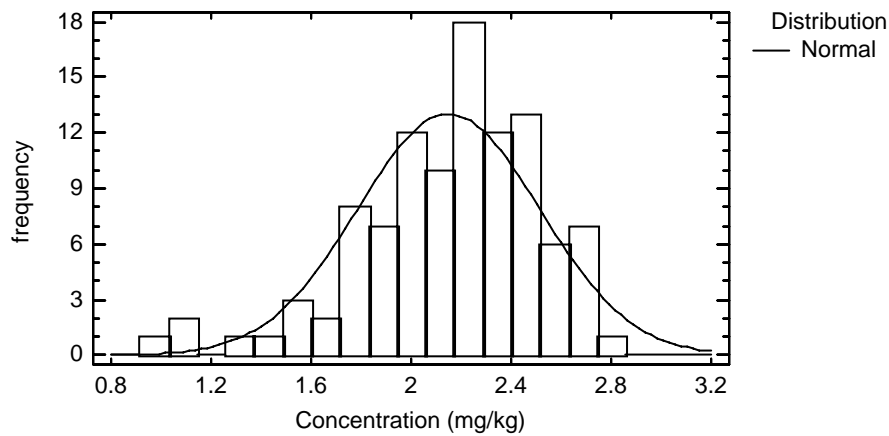
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.955511 to 2.81541

Fitted Distributions

<i>Normal</i>
mean = 2.14987
standard deviation = 0.364013

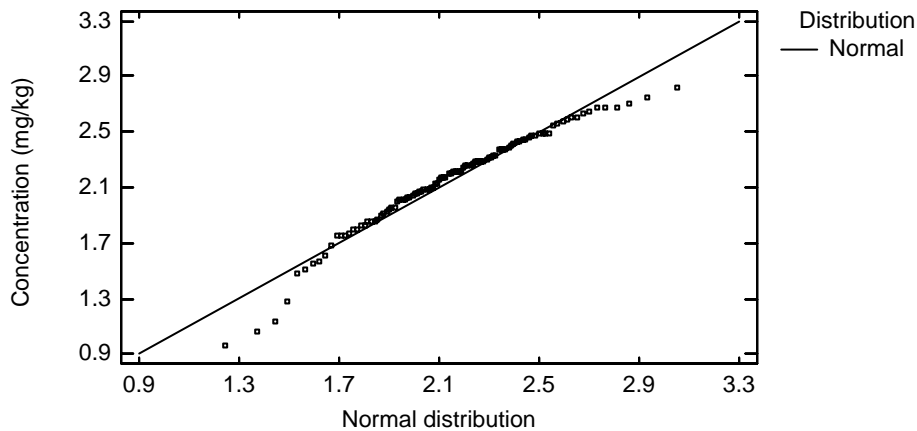
Histogram for log(Chromium), BRC/TIMET Data



**Tests for Normality for log(Chromium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.949265	0.00167946

Quantile-Quantile Plot for log(Chromium), BRC/TIMET Data





**DRAFT****Two-Sample Comparison - Chromium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Chromium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 2.6 to 16.7

Sample 2: 24 values ranging from 6.53 to 13.5

**Comparison of Medians for Chromium**

Median of sample 1: 9.05

Median of sample 2: 9.1325

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 64.0769

Average rank of sample 2: 66.3333

W = 44.0 P-value = 0.790555

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.10 Cobalt**

**Uncensored Data - Cobalt (Data Set="BRC/TIMET")**

Data variable: Cobalt

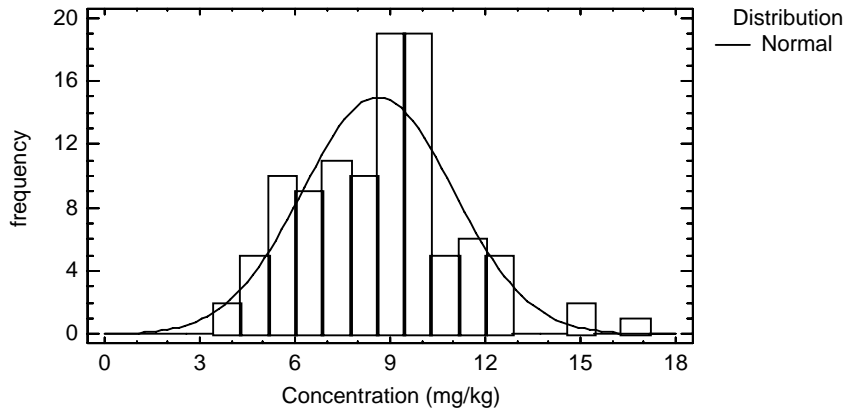
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 3.7 to 16.3

Fitted Distributions

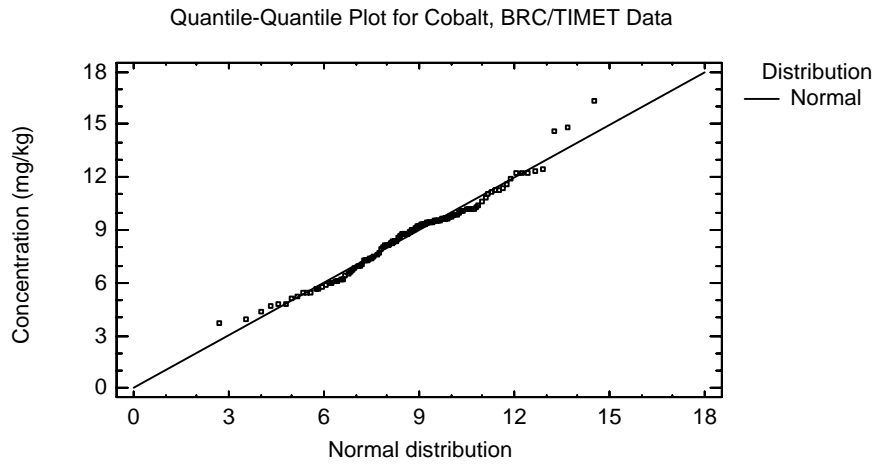
<i>Normal</i>
mean = 8.61827
standard deviation = 2.37412

Histogram for Cobalt, BRC/TIMET Data



**Tests for Normality for Cobalt**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.974308	0.25365



**DRAFT**

**Uncensored Data - log(Cobalt) (Data Set="BRC/TIMET")**

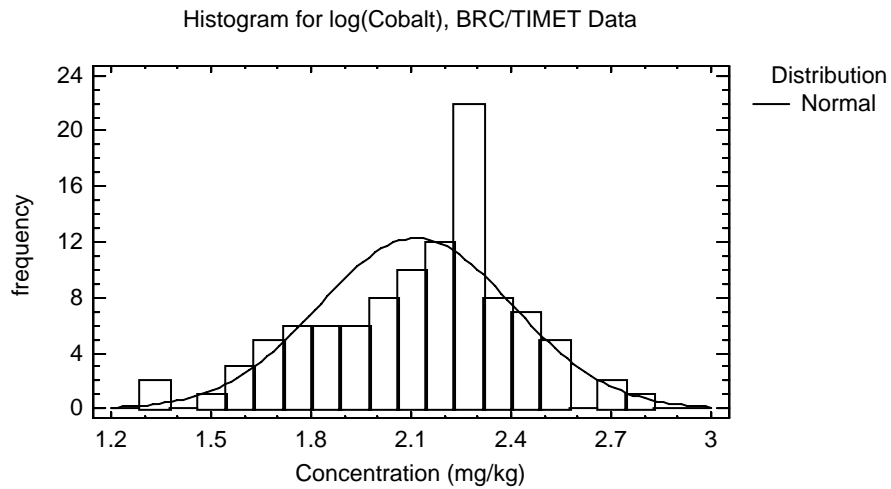
Data variable: log(Cobalt)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 1.30833 to 2.79117

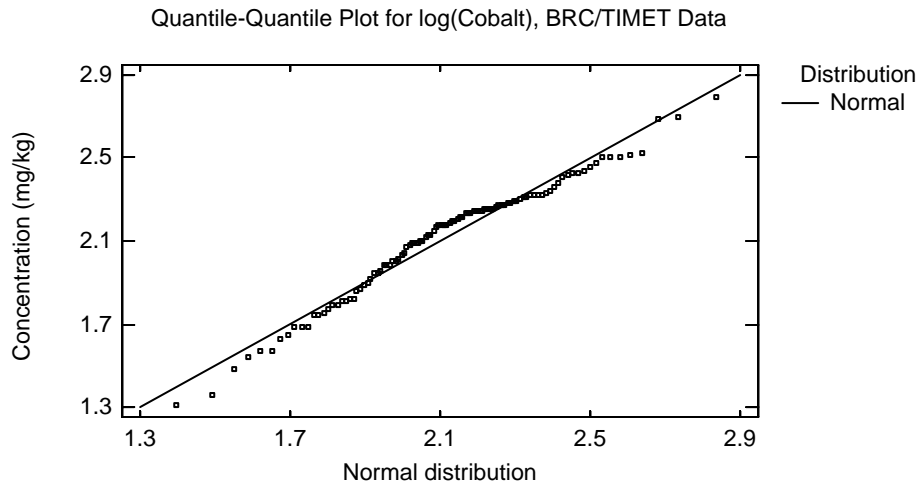
Fitted Distributions

<i>Normal</i>
mean = 2.11418
standard deviation = 0.289832



**Tests for Normality for log(Cobalt)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.965701	0.0596308



**DRAFT**

**Two-Sample Comparison - log(Cobalt) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for log(Cobalt)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 1.30833 to 2.79117

Sample 2: 24 values ranging from 1.77156 to 2.14827

**Comparison of Means for log(Cobalt)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 2.11418 +/- 0.0563652 [2.05781, 2.17054]

95.0% confidence interval for mean of Data Set=Tronox: 1.95407 +/- 0.0413545 [1.91272, 1.99543]

95.0% confidence interval for the difference between the means

not assuming equal variances: 0.160107 +/- 0.0688621 [0.0912448, 0.228969]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 4.60779 P-value = 0.0000115905

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Cobalt)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.289832	0.0979352
Variance	0.0840026	0.0095913
Df	103	23

Ratio of Variances = 8.75821

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.25508, 0.335642]

Standard deviation of Data Set=Tronox: [0.0761165, 0.13738]

Ratio of Variances: [4.26567, 15.713]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 8.75821 P-value = 2.34509E-7

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 4.11 Copper

#### Uncensored Data - Copper (Data Set="BRC/TIMET")

Data variable: Copper

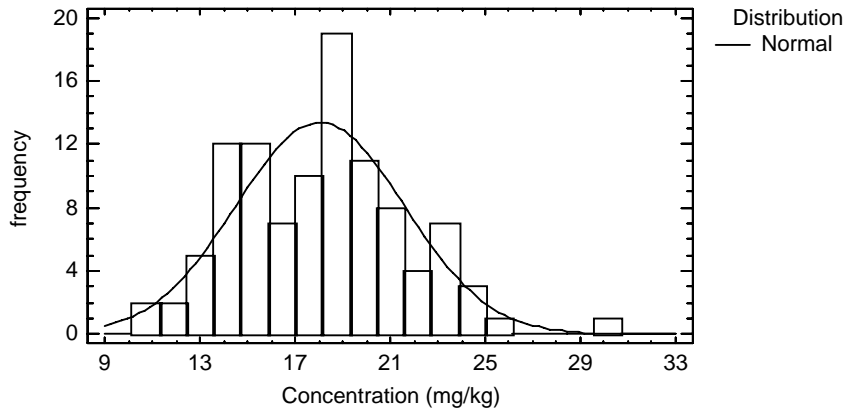
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 10.2 to 30.5

Fitted Distributions

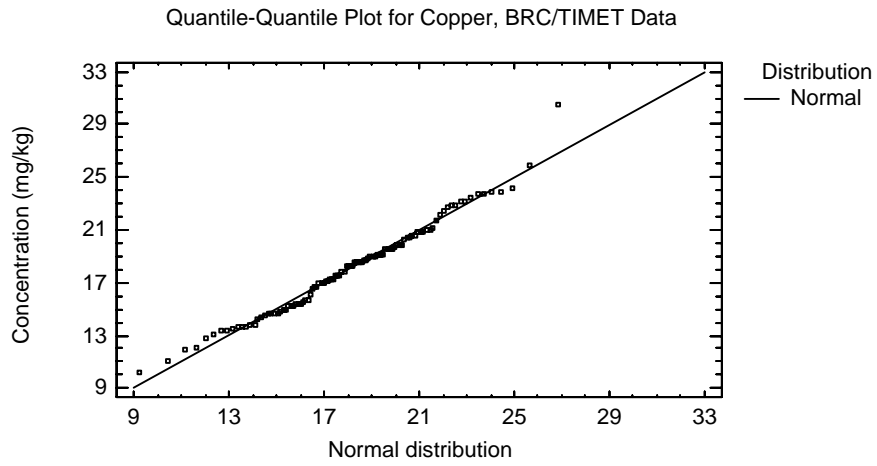
<i>Normal</i>
mean = 18.0538
standard deviation = 3.54302

Histogram for Copper, BRC/TIMET Data



#### Tests for Normality for Copper

Test	Statistic	P-Value
Shapiro-Wilk W	0.982152	0.632225





**DRAFT**

**Uncensored Data - log(Copper) (Data Set="BRC/TIMET")**

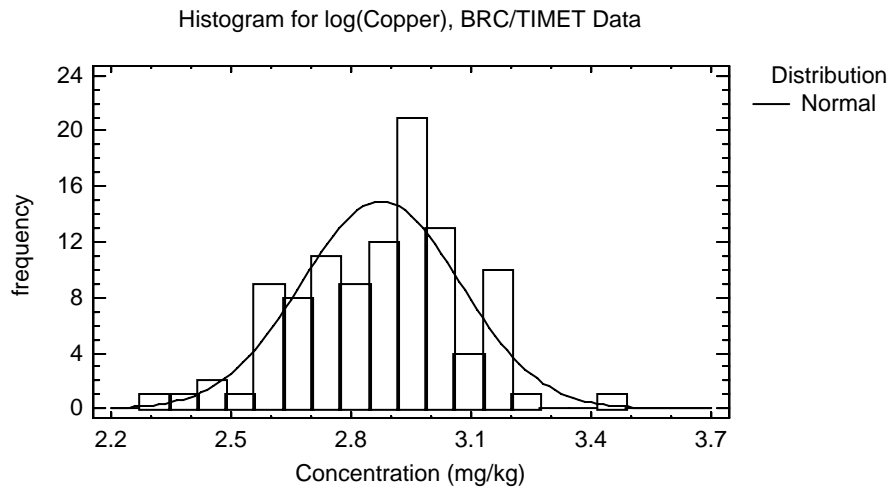
Data variable: log(Copper)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.32239 to 3.41773

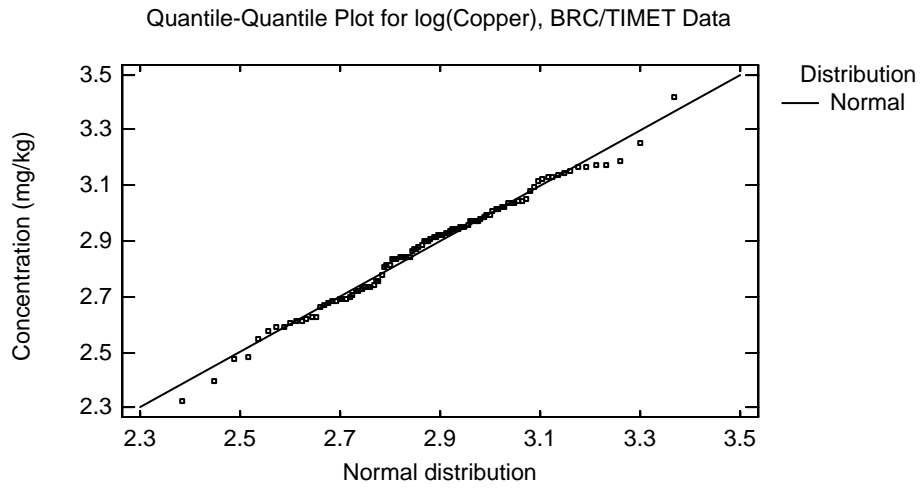
Fitted Distributions

<i>Normal</i>
mean = 2.87414
standard deviation = 0.198298



**Tests for Normality for log(Copper)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.986201	0.83341



**DRAFT****Two-Sample Comparison - Copper & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Copper**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 10.2 to 30.5

Sample 2: 24 values ranging from 13.65 to 367.0

**Comparison of Medians for Copper**

Median of sample 1: 18.2

Median of sample 2: 26.3

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 56.6298

Average rank of sample 2: 98.6042

W = 818.5 P-value = 5.91949E-7

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.12 Iron**

**Uncensored Data - Iron (Data Set="BRC/TIMET")**

Data variable: Iron

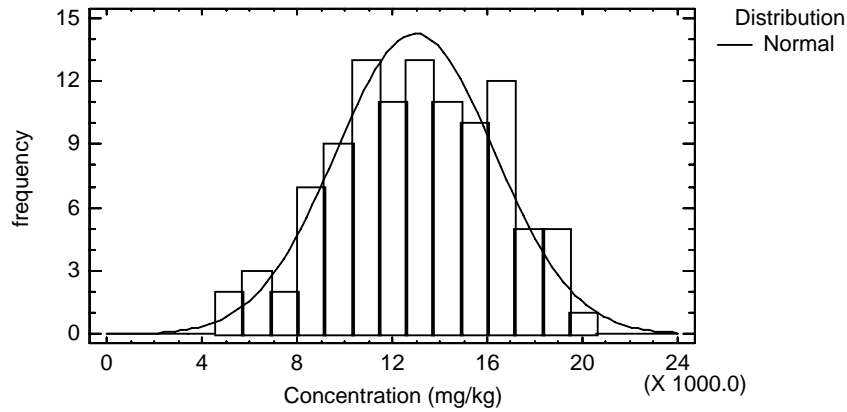
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 5410.0 to 19700.0

Fitted Distributions

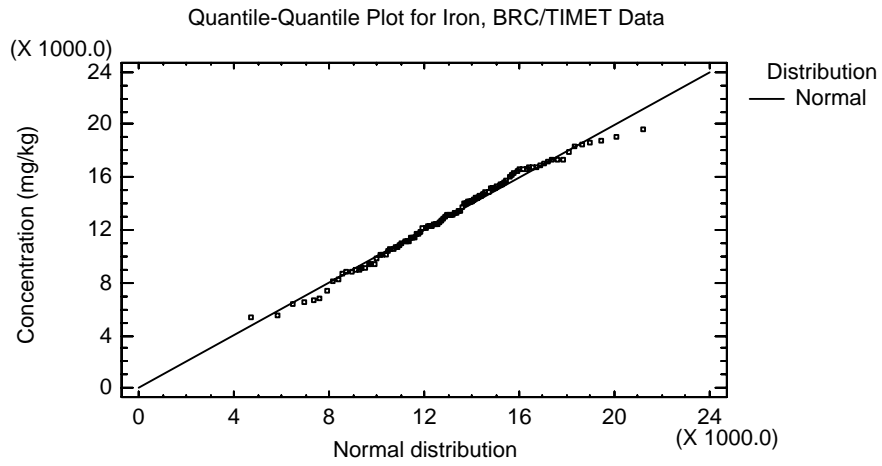
<i>Normal</i>
mean = 12973.8
standard deviation = 3330.08

Histogram for Iron, BRC/TIMET Data



**Tests for Normality for Iron**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.970129	<b>0.1318</b>



**DRAFT**

**Uncensored Data - log(Iron) (Data Set="BRC/TIMET")**

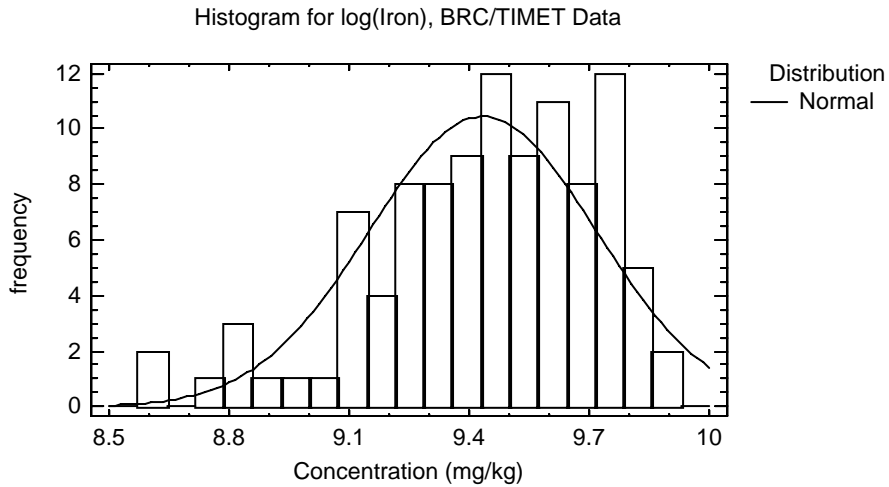
Data variable: log(Iron)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 8.596 to 9.88837

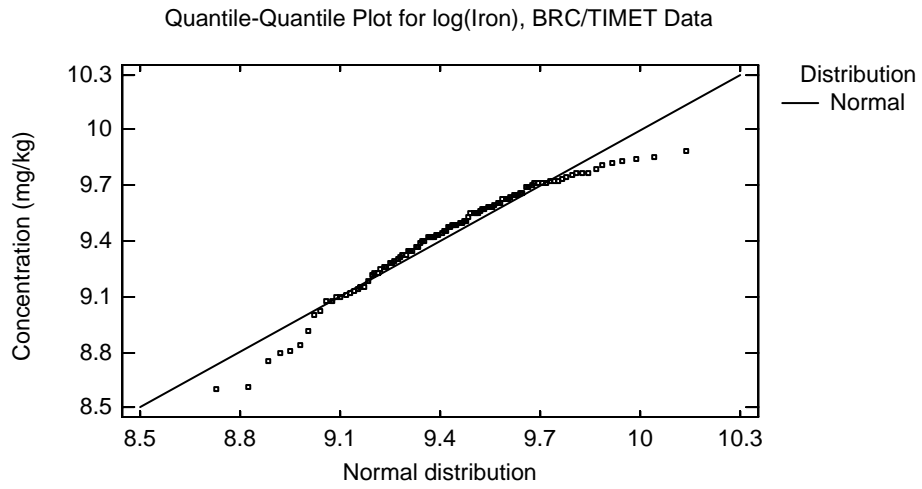
Fitted Distributions

<i>Normal</i>
mean = 9.43377
standard deviation = 0.283694



**Tests for Normality for log(Iron)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.936856	0.000074702



**DRAFT**

**Two-Sample Comparison - Iron & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Iron**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 5410.0 to 19700.0

Sample 2: 24 values ranging from 7390.0 to 14500.0

**Comparison of Means for Iron**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 12973.8 +/- 647.619 [12326.2, 13621.5]

95.0% confidence interval for mean of Data Set=Tronox: 10749.4 +/- 736.174 [10013.2, 11485.5]

95.0% confidence interval for the difference between the means

not assuming equal variances: 2224.47 +/- 963.942 [1260.53, 3188.41]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 4.6057 P-value = 0.0000186542

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Iron**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	3330.08	1743.4
Variance	1.10894E7	3.03944E6
Df	103	23

Ratio of Variances = 3.64851

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [2930.79, 3856.42]

Standard deviation of Data Set=Tronox: [1354.99, 2445.57]

Ratio of Variances: [1.777, 6.54574]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 3.64851 P-value = 0.000784839

Reject the null hypothesis for alpha = 0.05.



**DRAFT**

**4.13 Lead**

**Uncensored Data - Lead (Data Set="BRC/TIMET")**

Data variable: Lead

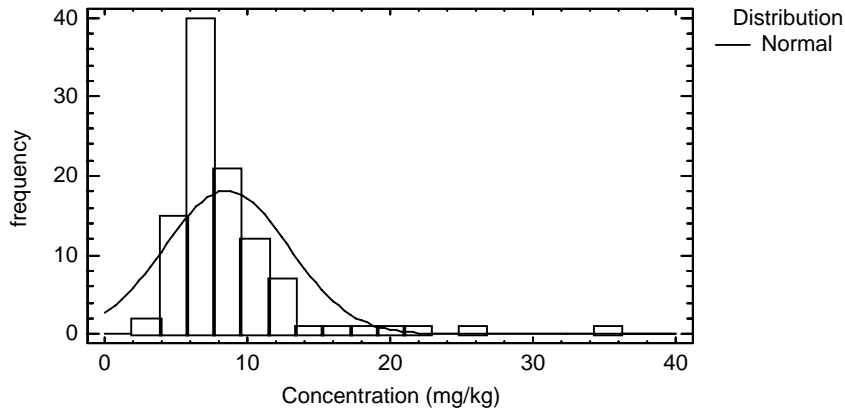
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 3.0 to 35.1

Fitted Distributions

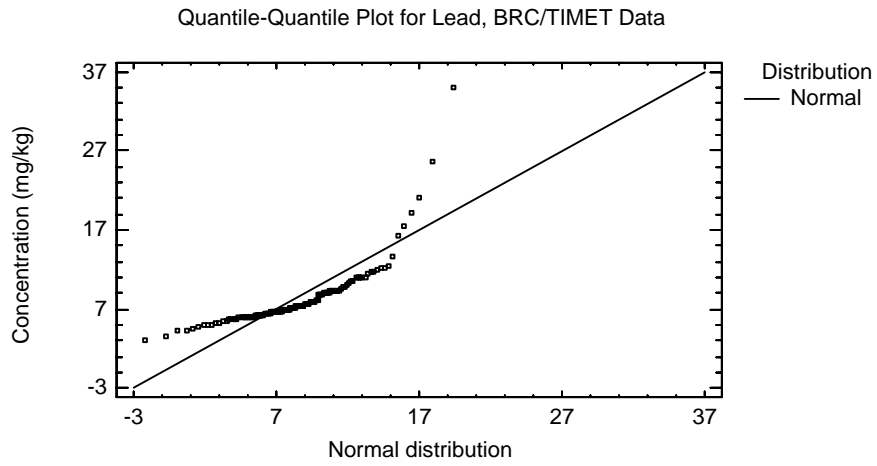
<i>Normal</i>
mean = 8.55385
standard deviation = 4.35437

Histogram for Lead, BRC/TIMET Data



**Tests for Normality for Lead**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.724373	0.0



**DRAFT**

**Uncensored Data - log(Lead) (Data Set="BRC/TIMET")**

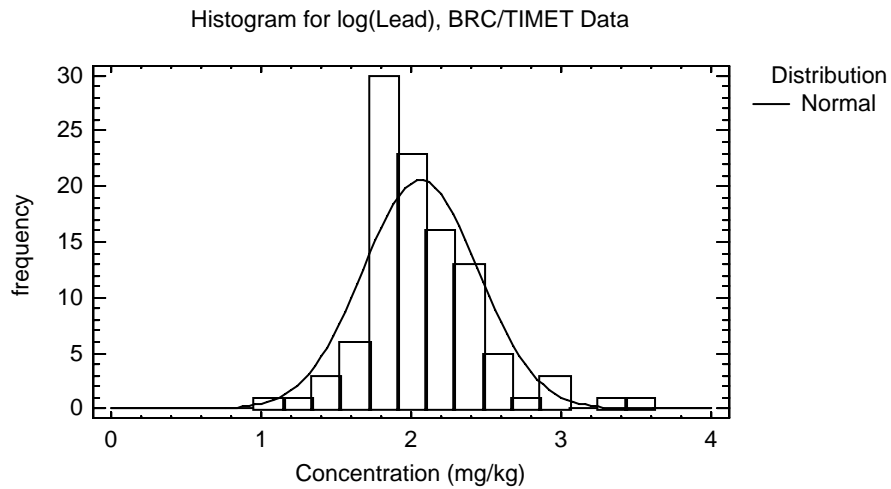
Data variable: log(Lead)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 1.09861 to 3.5582

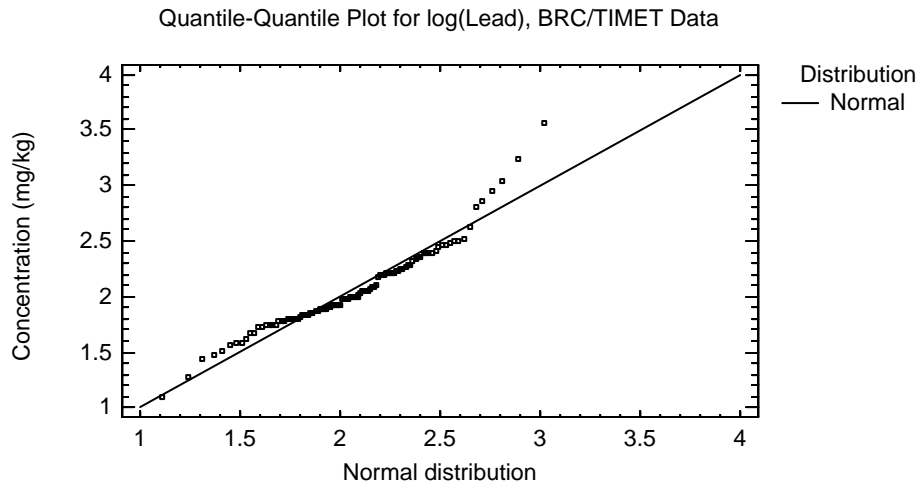
Fitted Distributions

<i>Normal</i>
mean = 2.06228
standard deviation = 0.384259



**Tests for Normality for log(Lead)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.950586	0.00229955



**DRAFT****Two-Sample Comparison - Lead & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Lead**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 3.0 to 35.1

Sample 2: 24 values ranging from 5.81 to 50.8

**Comparison of Medians for Lead**

Median of sample 1: 7.3

Median of sample 2: 7.86

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 63.4279

Average rank of sample 2: 69.1458

W = 111.5 P-value = 0.497934

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.14 Magnesium**

**Uncensored Data - Magnesium (Data Set="BRC/TIMET")**

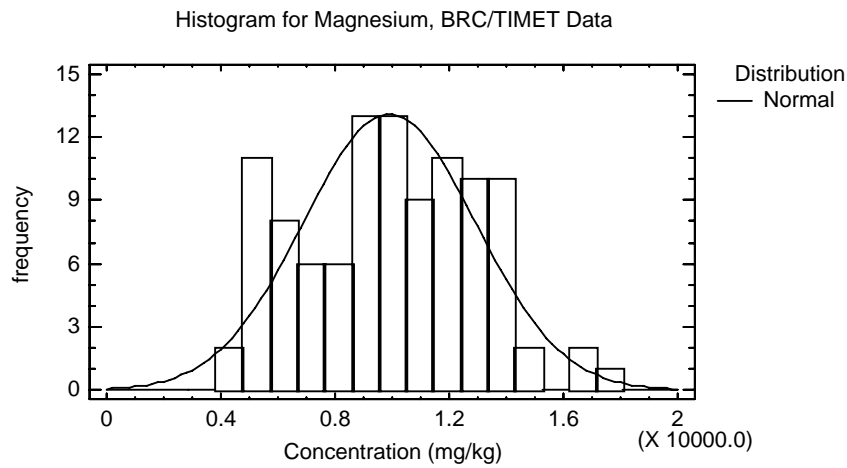
Data variable: Magnesium

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 4580.0 to 17500.0

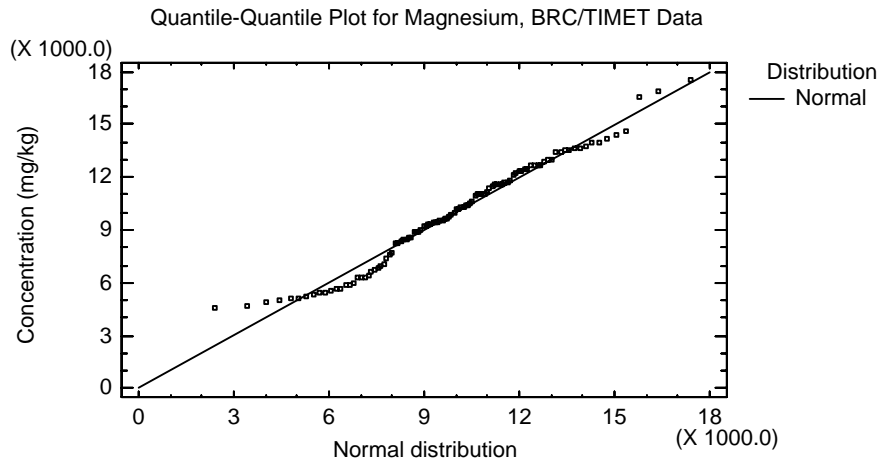
Fitted Distributions

<i>Normal</i>
mean = 9903.27
standard deviation = 3023.82



**Tests for Normality for Magnesium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.957826	0.0119404



**DRAFT**

**Uncensored Data - log(Magnesium) (Data Set="BRC/TIMET")**

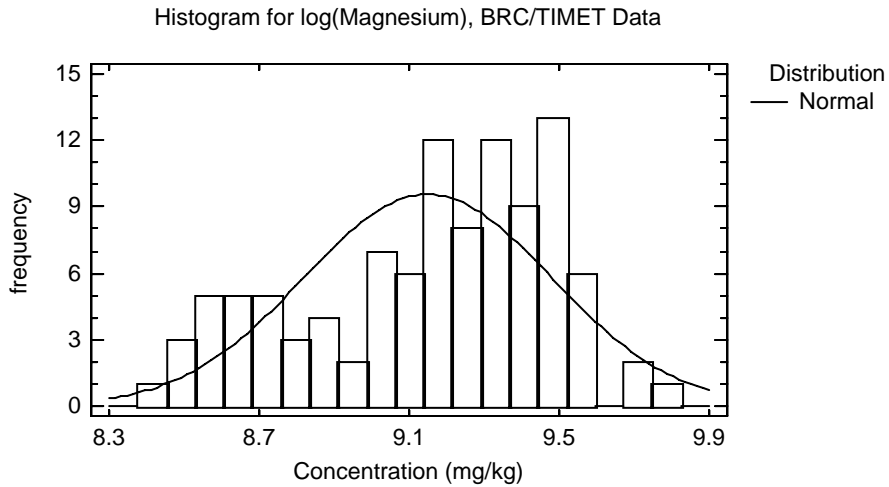
Data variable: log(Magnesium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 8.42945 to 9.76996

Fitted Distributions

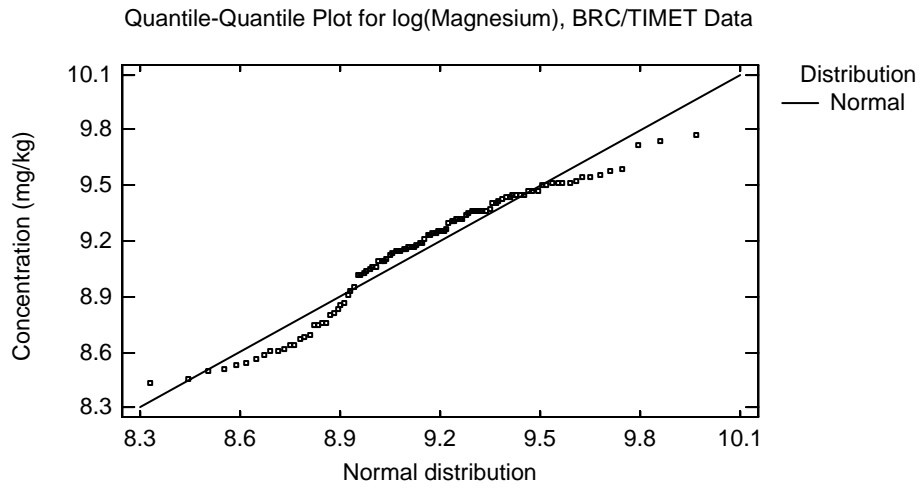
<i>Normal</i>
mean = 9.14969
standard deviation = 0.330599



**Tests for Normality for log(Magnesium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.932451	0.0000233983





**DRAFT****Two-Sample Comparison - Magnesium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Magnesium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 4580.0 to 17500.0

Sample 2: 24 values ranging from 6420.0 to 14900.0

**Comparison of Medians for Magnesium**

Median of sample 1: 9915.0

Median of sample 2: 9125.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 65.976

Average rank of sample 2: 58.1042

W = -153.5 P-value = 0.350252

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.15 Manganese**

**Uncensored Data - Manganese (Data Set="COH")**

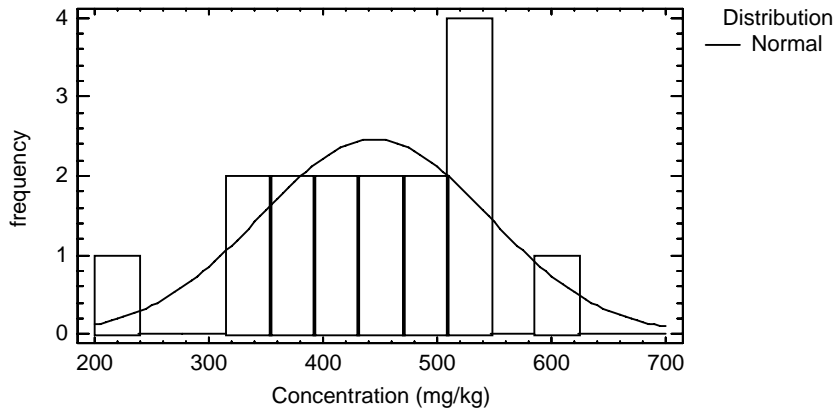
Data variable: Manganese  
 Selection variable: Data Set="COH"

16 values ranging from 223.0 to 615.0

Fitted Distributions

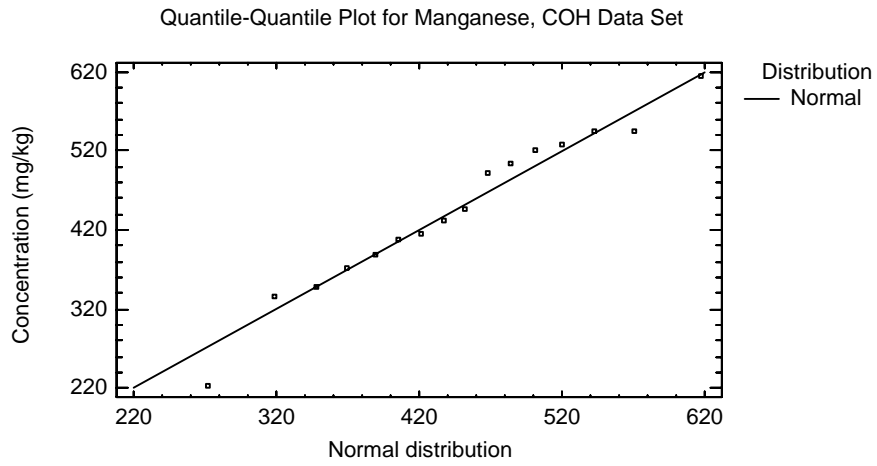
<i>Normal</i>
mean = 445.0
standard deviation = 99.6969

Histogram for Manganese, COH Data



**Tests for Normality for Manganese**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.974298	0.872775



**DRAFT**

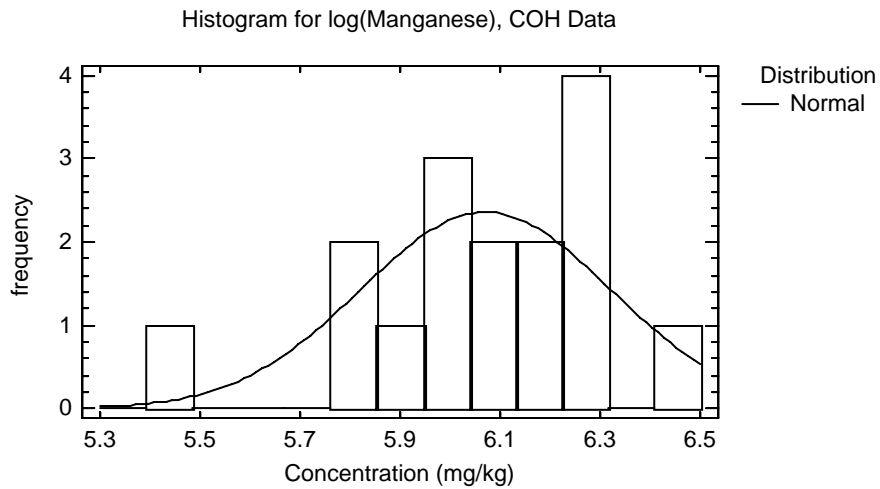
**Uncensored Data - log(Manganese) (Data Set="COH")**

Data variable: log(Manganese)  
 Selection variable: Data Set="COH"

16 values ranging from 5.40717 to 6.42162

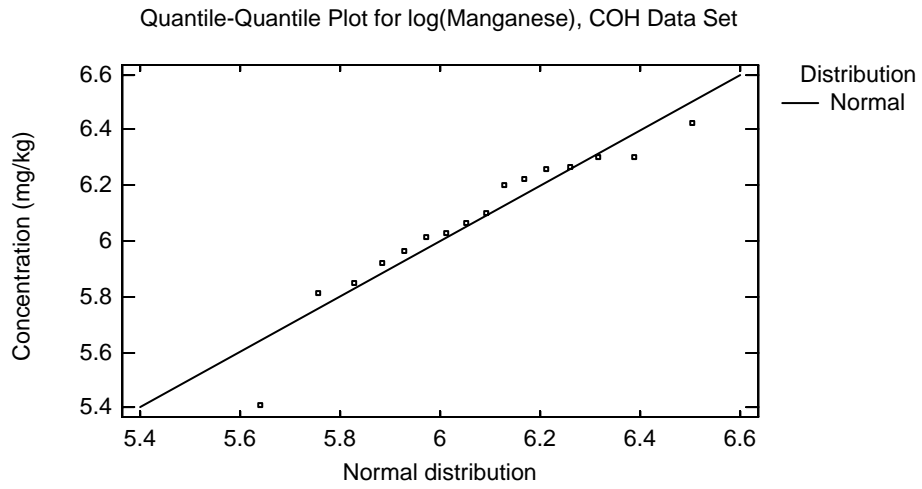
Fitted Distributions

<i>Normal</i>
mean = 6.0711
standard deviation = 0.249953



**Tests for Normality for log(Manganese)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.92013	0.17106



**DRAFT****Two-Sample Comparison - Manganese & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=20) for Manganese**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=20

Sample 1: 16 values ranging from 223.0 to 615.0

Sample 2: 24 values ranging from 252.0 to 710.5

**Comparison of Medians for Manganese**

Median of sample 1: 439.0

Median of sample 2: 349.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 25.75

Average rank of sample 2: 17.0

W = -84.0 P-value = 0.021152

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.16 Molybdenum**

**Uncensored Data - Molybdenum (Data Set="BRC/TIMET")**

Data variable: Molybdenum

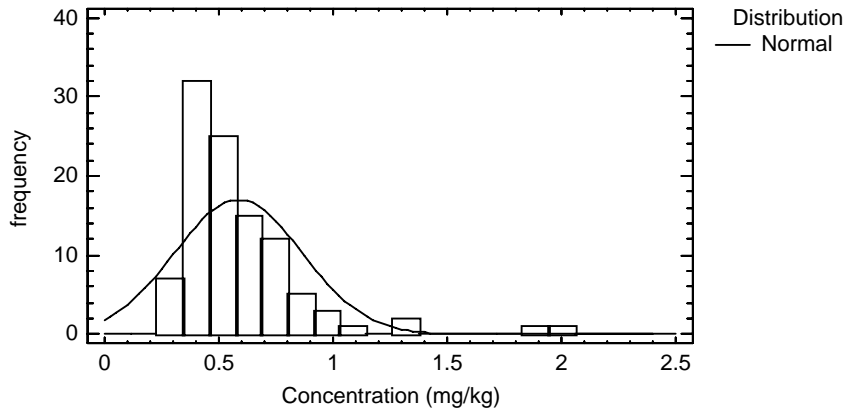
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.3 to 2.0

Fitted Distributions

<i>Normal</i>
mean = 0.585385
standard deviation = 0.278801

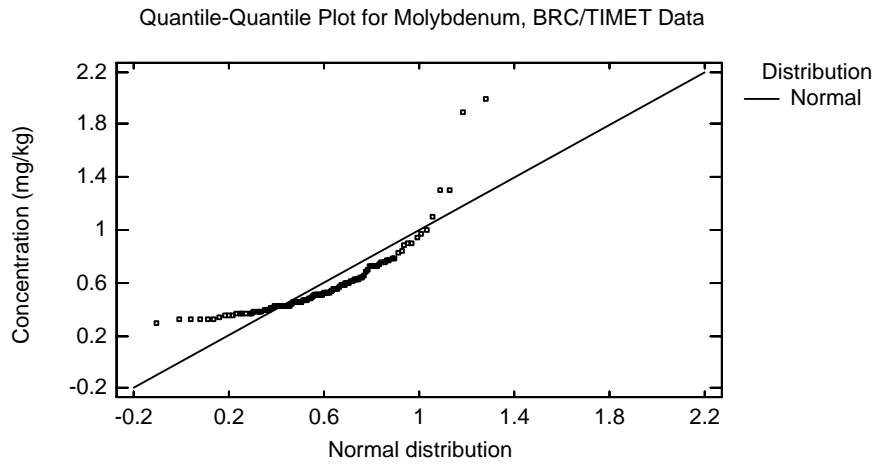
Histogram for Molybdenum, BRC/TIMET Data



**Tests for Normality for Molybdenum**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.753139	0.0





**DRAFT**

**Uncensored Data - log(Molybdenum) (Data Set="BRC/TIMET")**

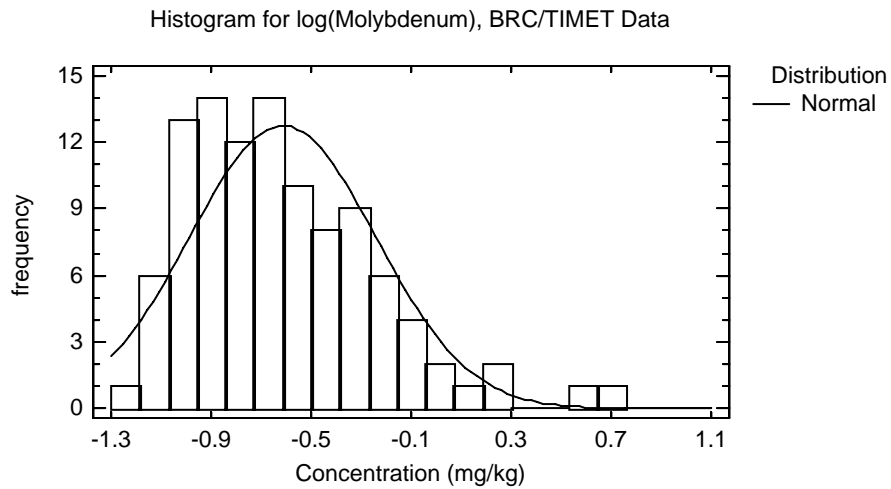
Data variable: log(Molybdenum)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -1.20397 to 0.693147

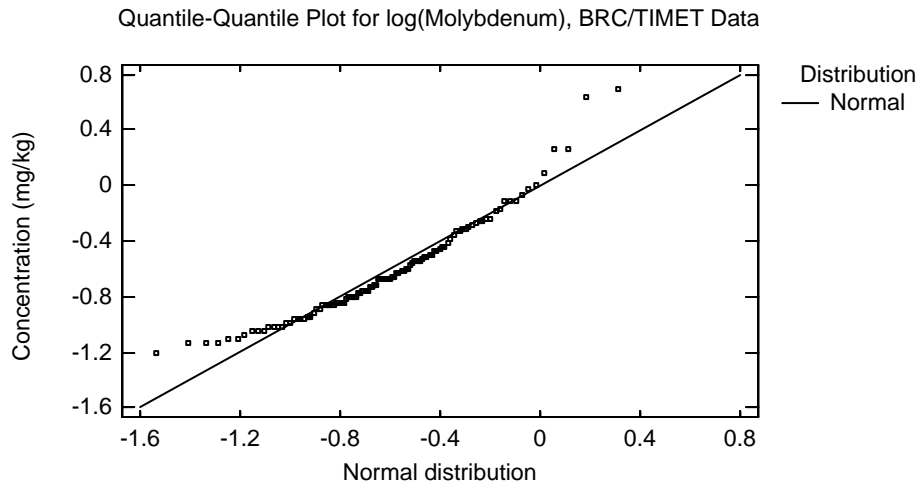
Fitted Distributions

<i>Normal</i>
mean = -0.613916
standard deviation = 0.372472



**Tests for Normality for log(Molybdenum)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.930998	0.0000158701



**DRAFT**

**Tronox Molybdenum vs. BRC/TIMET Molybdenum**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -16.24257574$   $p = 0$

Reject the null hypothesis for  $\alpha=0.05$

**DRAFT**

**4.17 Nickel**

**Uncensored Data - Nickel (Data Set="BRC/TIMET")**

Data variable: Nickel

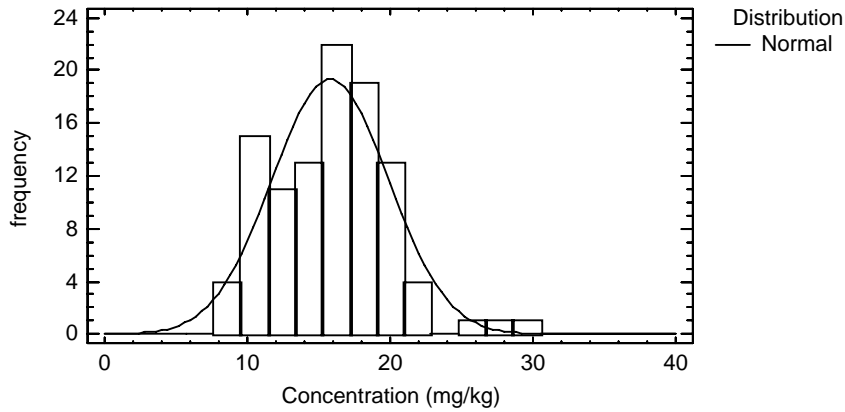
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 7.9 to 30.0

Fitted Distributions

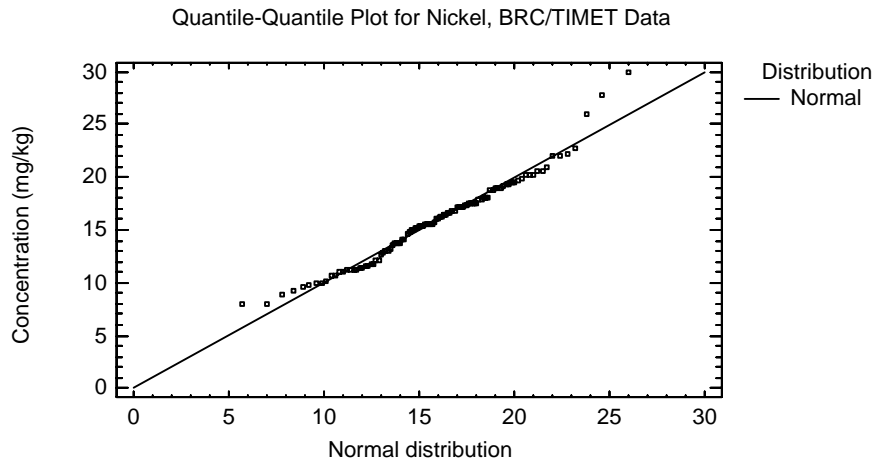
<i>Normal</i>
mean = 15.8077
standard deviation = 4.09285

Histogram for Nickel, BRC/TIMET Data



**Tests for Normality for Nickel**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.966623	0.070858



**DRAFT**

**Uncensored Data - log(Nickel) (Data Set="BRC/TIMET")**

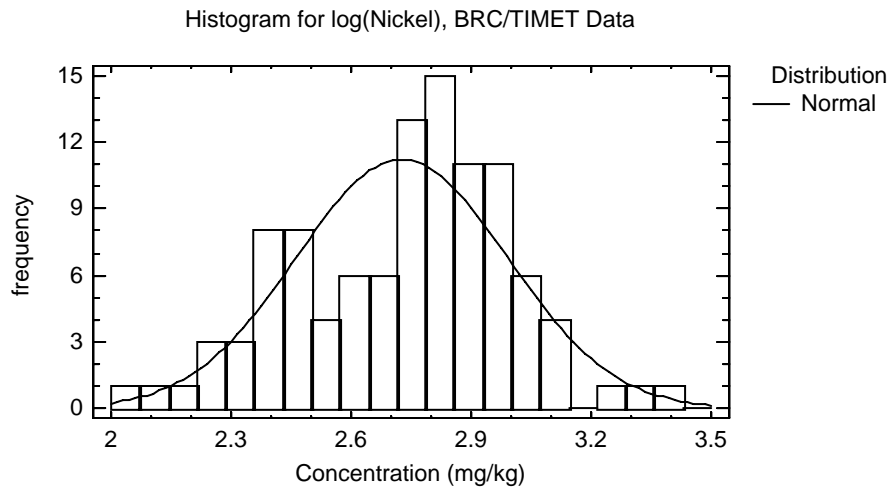
Data variable: log(Nickel)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.06686 to 3.4012

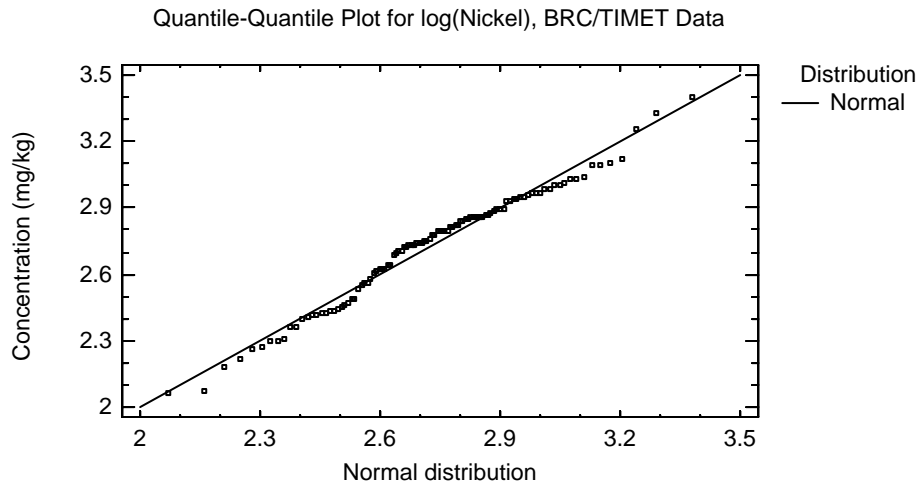
Fitted Distributions

<i>Normal</i>
mean = 2.72678
standard deviation = 0.264094



**Tests for Normality for log(Nickel)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.972066	0.180774





**DRAFT**

**Two-Sample Comparison - log(Nickel) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for log(Nickel)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 2.06686 to 3.4012

Sample 2: 24 values ranging from 2.54945 to 2.93386

**Comparison of Means for log(Nickel)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 2.72678 +/- 0.0513597 [2.67542, 2.77814]

95.0% confidence interval for mean of Data Set=Tronox: 2.7189 +/- 0.0473181 [2.67158, 2.76622]

95.0% confidence interval for the difference between the means

not assuming equal variances: 0.00788551 +/- 0.0686692 [-0.0607837, 0.0765547]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 0.228222 P-value = 0.820006

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Nickel)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.264094	0.112058
Variance	0.0697454	0.012557
Df	103	23

Ratio of Variances = 5.55429

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.232427, 0.305835]

Standard deviation of Data Set=Tronox: [0.0870932, 0.157191]

Ratio of Variances: [2.7052, 9.96486]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 5.55429 P-value = 0.0000195052

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.18 Platinum**

**Uncensored Data - Platinum (Data Set="BRC/TIMET")**

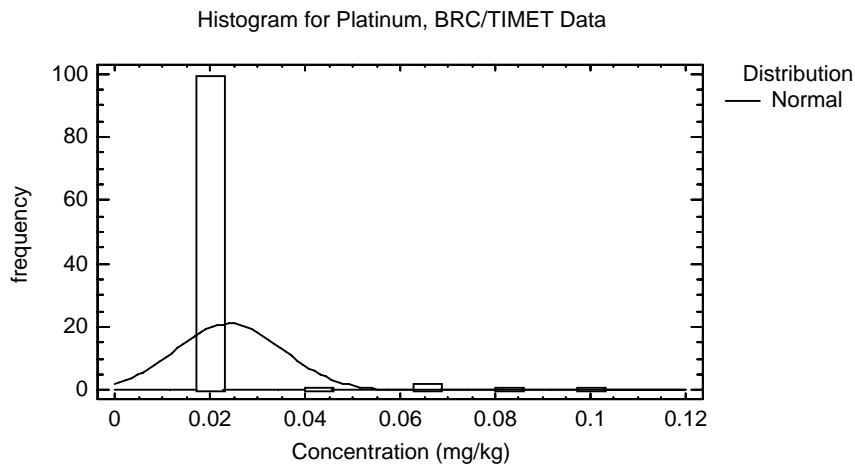
Data variable: Platinum

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.02175 to 0.099

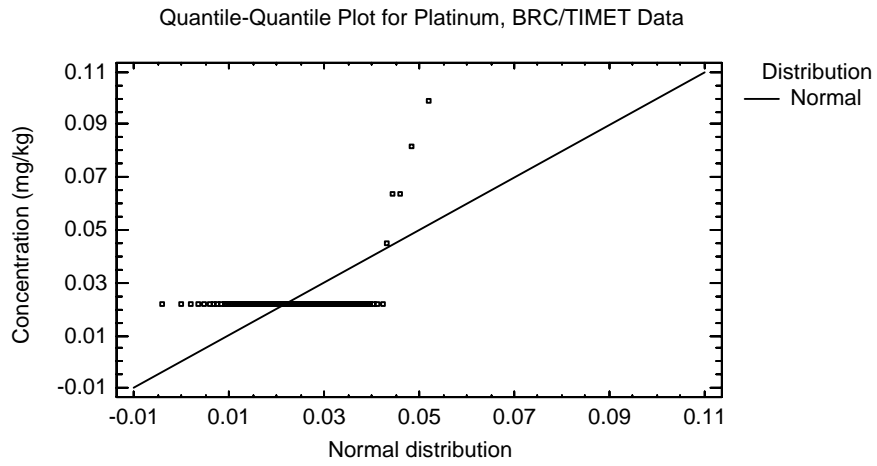
Fitted Distributions

<i>Normal</i>
mean = 0.0241082
standard deviation = 0.0112905



**Tests for Normality for Platinum**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.235456	0.0



**DRAFT**

**Uncensored Data - log(Platinum) (Data Set="BRC/TIMET")**

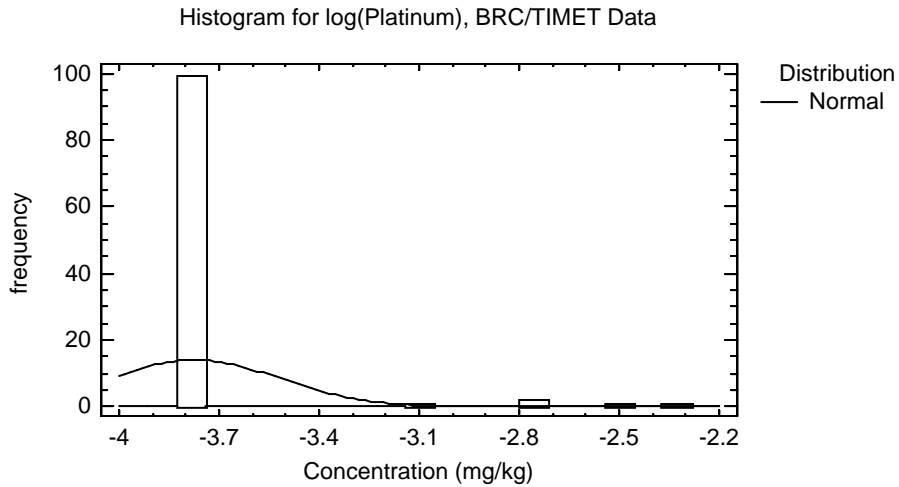
Data variable: log(Platinum)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -3.82814 to -2.31264

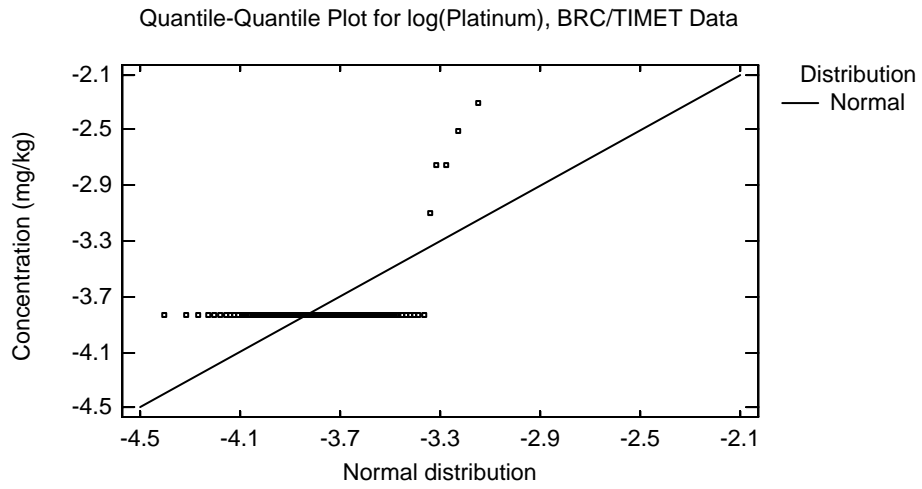
Fitted Distributions

<i>Normal</i>
mean = -3.77306
standard deviation = 0.253149



**Tests for Normality for log(Platinum)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.238639	0.0



**DRAFT**

## Tronox Platinum vs. BRC/TIMET Platinum

### **Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

$G = -12.85569685$   $p = 0$

Reject the null hypothesis for  $\alpha = 0.05$

**DRAFT**

**4.19 Potassium**

**Uncensored Data - Potassium (Data Set="BRC/TIMET")**

Data variable: Potassium

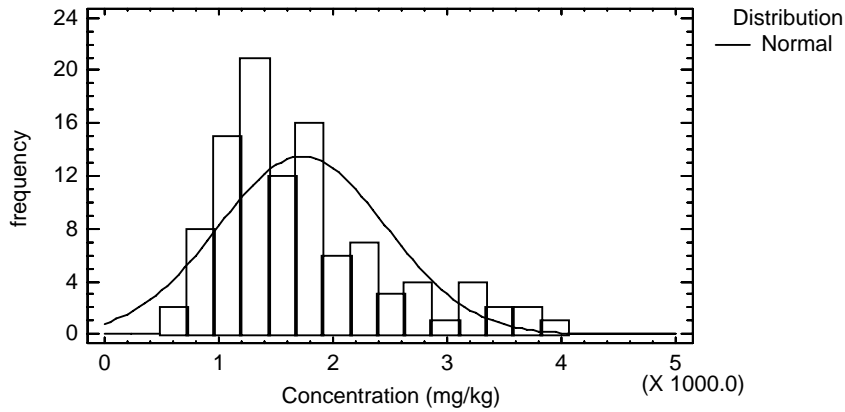
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 625.0 to 3890.0

Fitted Distributions

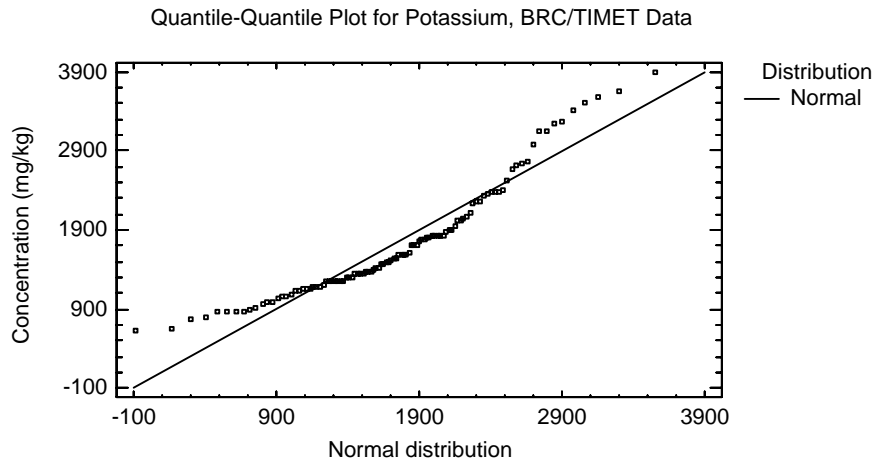
<i>Normal</i>
mean = 1730.12
standard deviation = 732.797

Histogram for Potassium, BRC/TIMET Data



**Tests for Normality for Potassium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.902122	4.85077E-9





**DRAFT**

**Uncensored Data - log(Potassium) (Data Set="BRC/TIMET")**

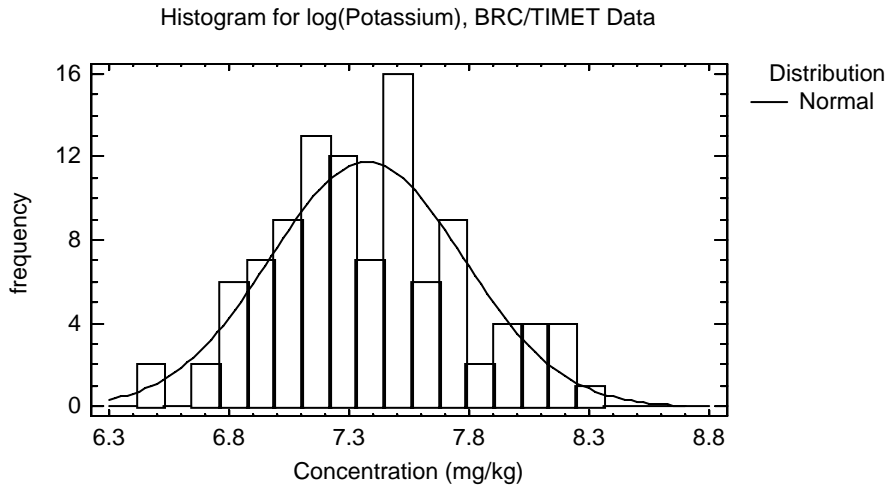
Data variable: log(Potassium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 6.43775 to 8.26616

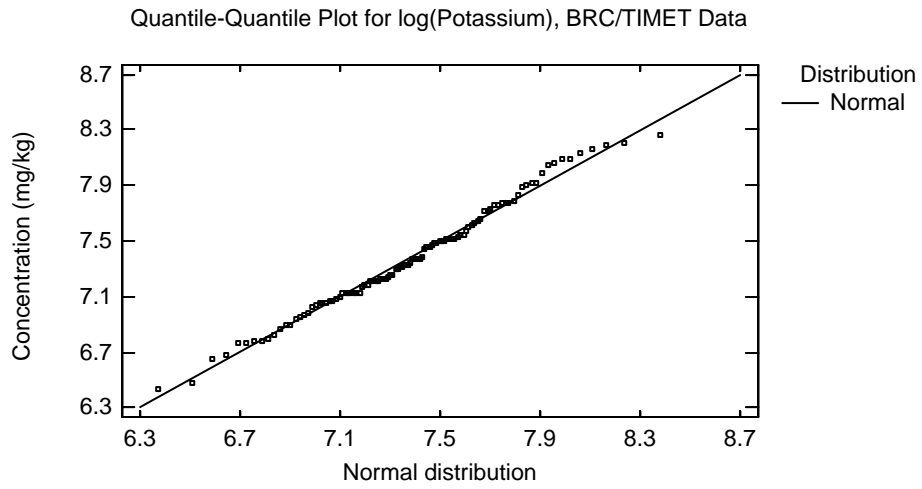
Fitted Distributions

<i>Normal</i>
mean = 7.3739
standard deviation = 0.404002



**Tests for Normality for log(Potassium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.973578	0.227934



**DRAFT****Two-Sample Comparison - Potassium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Potassium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 625.0 to 3890.0

Sample 2: 24 values ranging from 1040.0 to 2630.0

**Comparison of Medians for Potassium**

Median of sample 1: 1535.0

Median of sample 2: 2000.0

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 61.0721

Average rank of sample 2: 79.3542

W = 356.5 P-value = 0.0297437

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.20 Selenium**

**Uncensored Data - Selenium (Data Set="BRC/TIMET")**

Data variable: Selenium

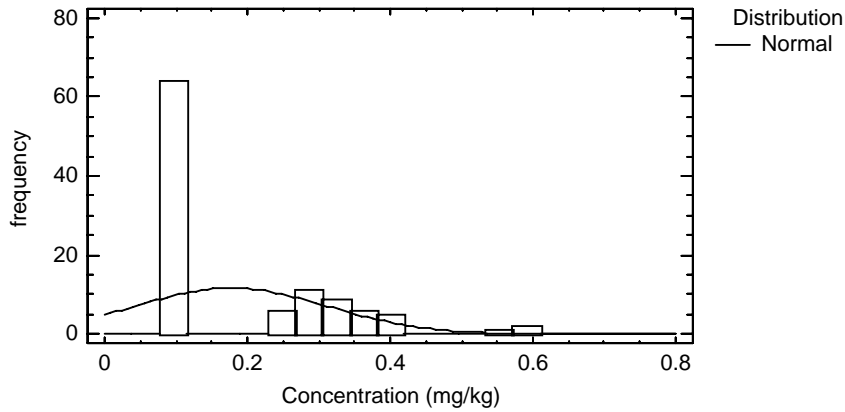
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.07895 to 0.6

Fitted Distributions

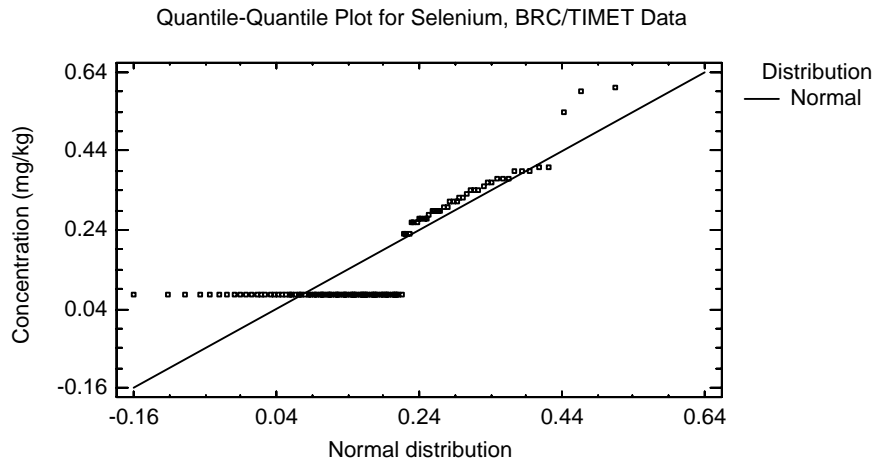
<i>Normal</i>
mean = 0.177335
standard deviation = 0.135585

Histogram for Selenium, BRC/TIMET Data



**Tests for Normality for Selenium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.715453	0.0



**DRAFT**

**Uncensored Data - log(Selenium) (Data Set="BRC/TIMET")**

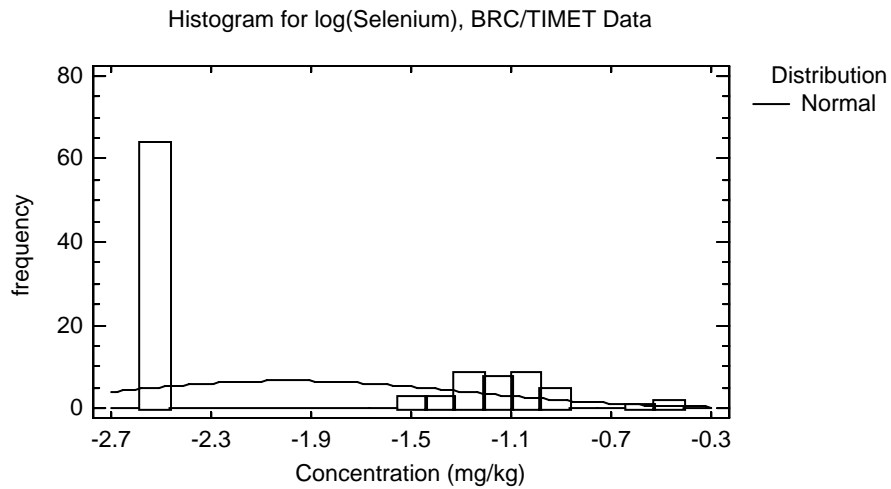
Data variable: log(Selenium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -2.53894 to -0.510826

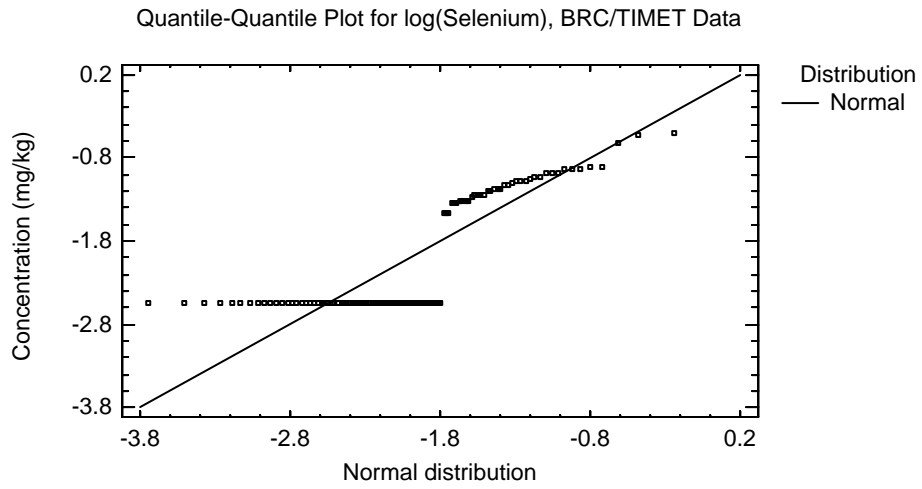
Fitted Distributions

<i>Normal</i>
mean = -1.99363
standard deviation = 0.706962



**Tests for Normality for log(Selenium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.680951	0.0



**DRAFT**

**Tronox Selenium vs. BRC/TIMET Selenium**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -15.21516787 p= 0

Reject the null hypothesis for alpha=0.05



**DRAFT****4.21 Silver**

Silver was not detected in the BRC/TIMET background data. Therefore, comparisons were not made.

**DRAFT**

**4.22 Sodium**

**Uncensored Data - Sodium (Data Set="BRC/TIMET")**

Data variable: Sodium

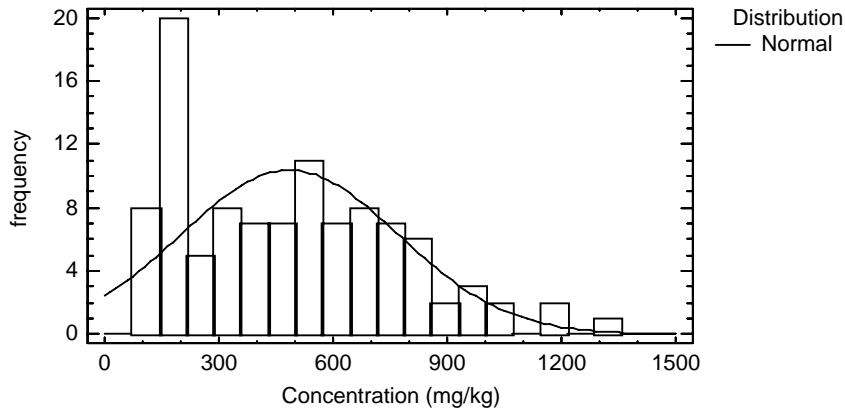
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 111.0 to 1320.0

Fitted Distributions

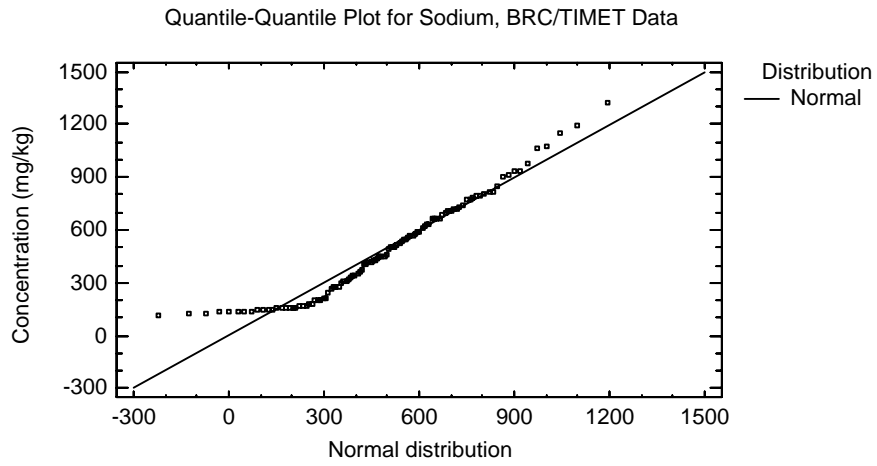
<i>Normal</i>
mean = 485.721
standard deviation = 285.925

Histogram for Sodium, BRC/TIMET Data



**Tests for Normality for Sodium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.924539	0.00000275057



**DRAFT**

**Uncensored Data - log(Sodium) (Data Set="BRC/TIMET")**

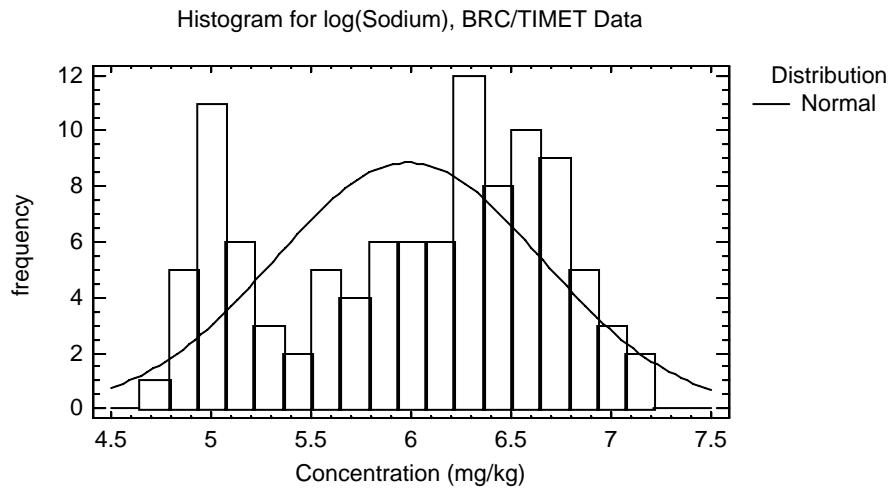
Data variable: log(Sodium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 4.70953 to 7.18539

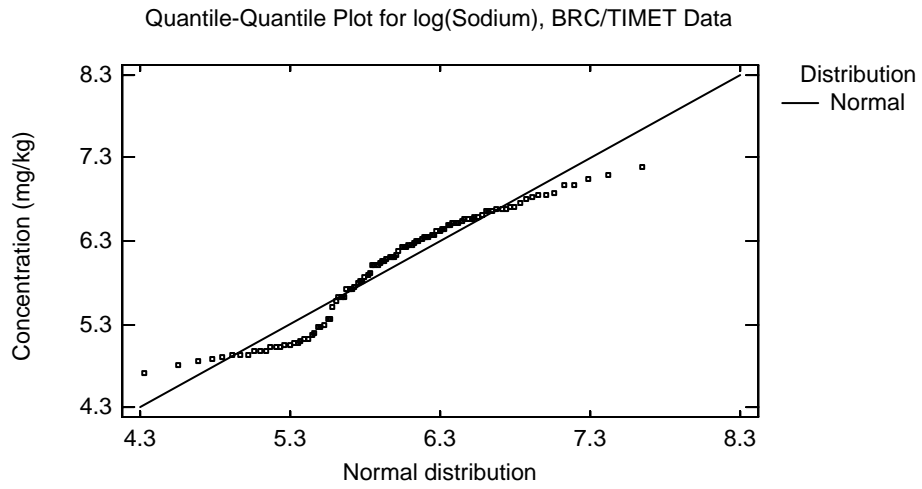
Fitted Distributions

<i>Normal</i>
mean = 5.98634
standard deviation = 0.668783



**Tests for Normality for log(Sodium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.917435	3.82869E-7



**DRAFT****Two-Sample Comparison - Sodium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Sodium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 104 values ranging from 111.0 to 1320.0

Sample 2: 24 values ranging from 376.0 to 1230.0

**Comparison of Medians for Sodium**

Median of sample 1: 452.0

Median of sample 2: 792.75

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 58.0577

Average rank of sample 2: 92.4167

W = 670.0 P-value = 0.0000436743

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.23 Strontium**

**Uncensored Data - Strontium (Data Set="BRC/TIMET")**

Data variable: Strontium

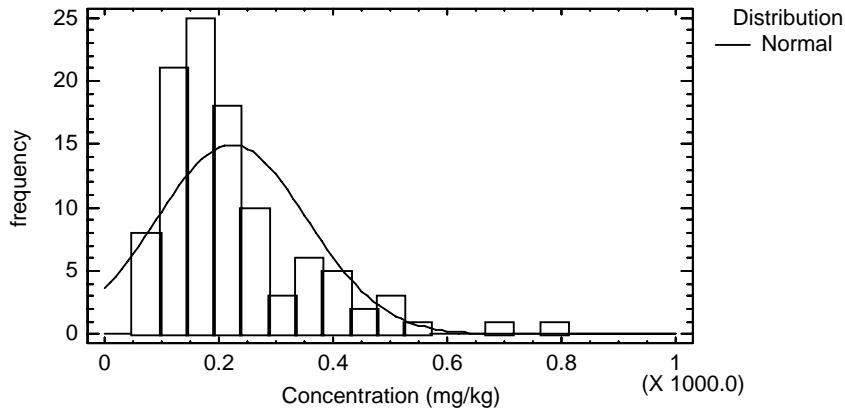
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 69.0 to 808.0

Fitted Distributions

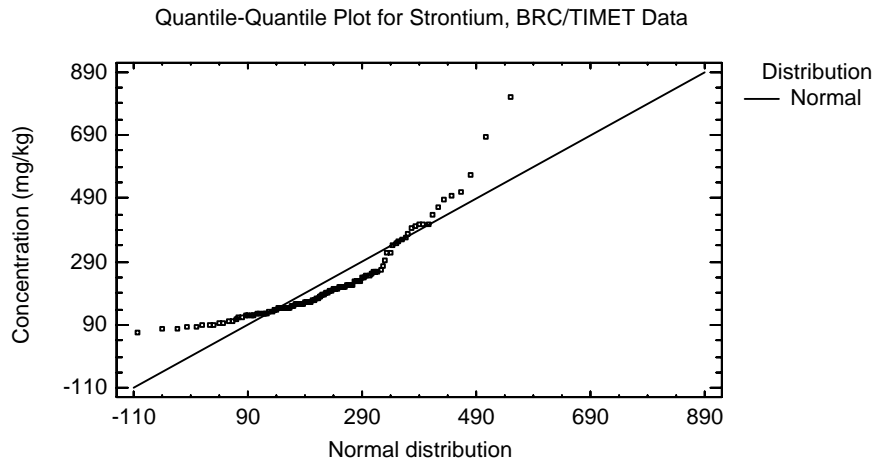
<i>Normal</i>
mean = 222.94
standard deviation = 132.11

Histogram for Strontium, BRC/TIMET Data



**Tests for Normality for Strontium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.835315	0.0





**DRAFT**

**Uncensored Data - log(Strontium) (Data Set="BRC/TIMET")**

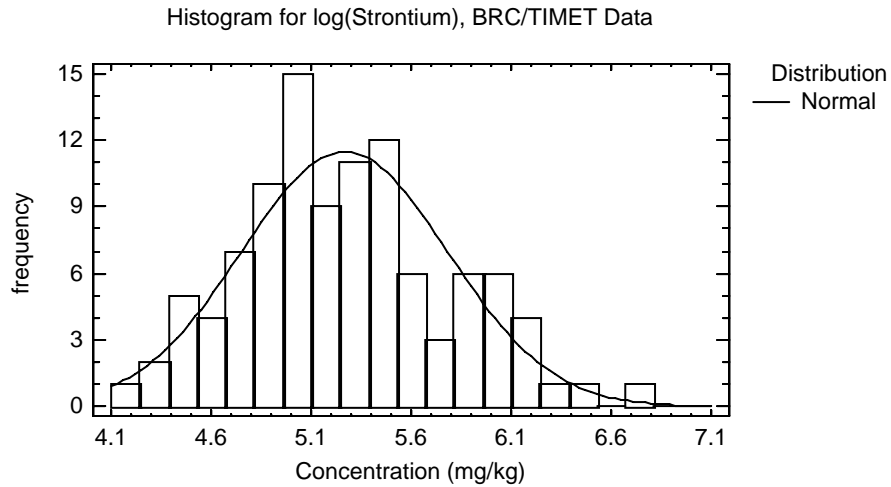
Data variable: log(Strontium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 4.23411 to 6.69456

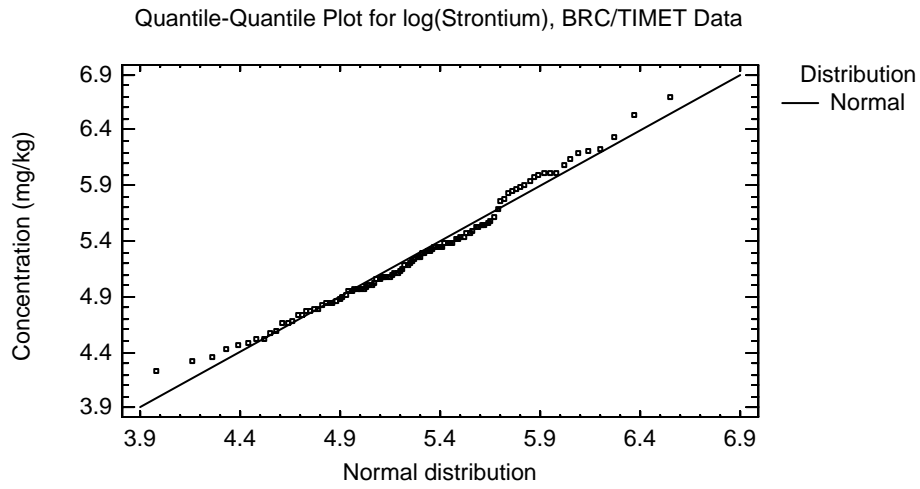
Fitted Distributions

<i>Normal</i>
mean = 5.2666
standard deviation = 0.516556



**Tests for Normality for log(Strontium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.970978	0.15177



**DRAFT**

**Two-Sample Comparison - log(Strontium) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for log(Strontium)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 4.23411 to 6.69456

Sample 2: 24 values ranging from 4.98361 to 5.88888

**Comparison of Means for log(Strontium)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 5.2666 +/- 0.100457 [5.16614, 5.36706]

95.0% confidence interval for mean of Data Set=Tronox: 5.38519 +/- 0.103976 [5.28121, 5.48917]

95.0% confidence interval for the difference between the means

not assuming equal variances: -0.118589 +/- 0.142124 [-0.260713, 0.0235348]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -1.66189 P-value = 0.100658

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Strontium)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.516556	0.246235
Variance	0.26683	0.0606317
Df	103	23

Ratio of Variances = 4.40083

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.454618, 0.598201]

Standard deviation of Data Set=Tronox: [0.191377, 0.345409]

Ratio of Variances: [2.14341, 7.89546]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 4.40083 P-value = 0.000159573

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.24 Thallium**

**Uncensored Data - Thallium (Data Set="BRC/TIMET")**

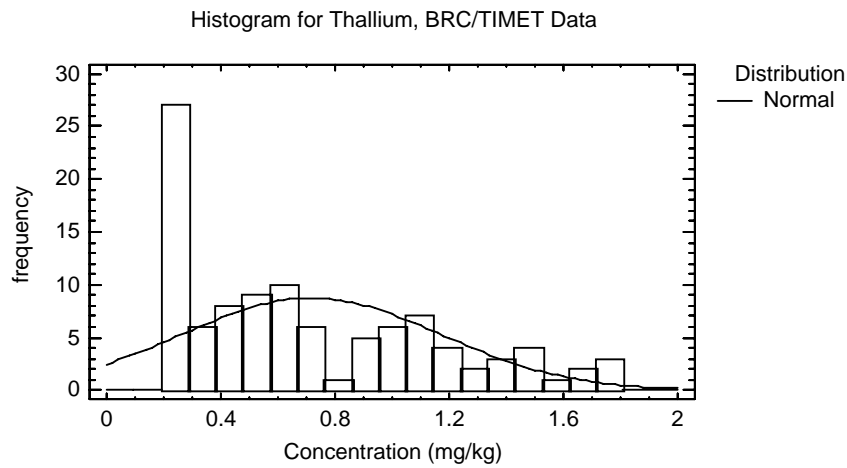
Data variable: Thallium

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.2 to 1.8

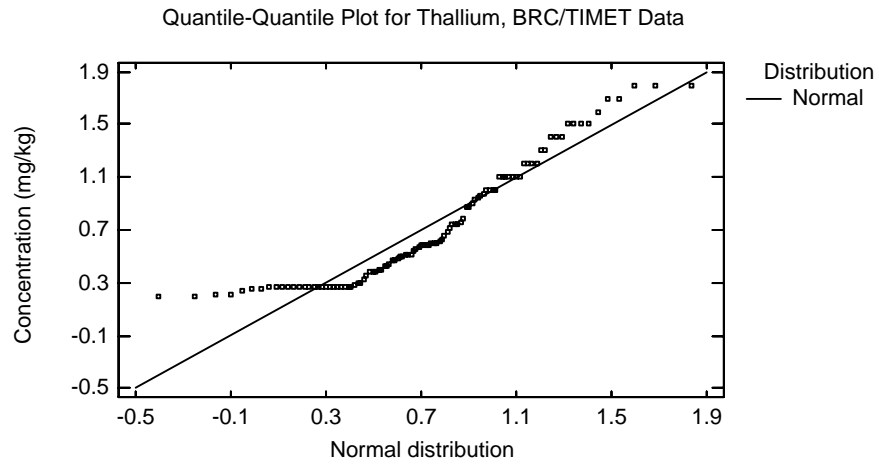
Fitted Distributions

<i>Normal</i>
mean = 0.716602
standard deviation = 0.452232



**Tests for Normality for Thallium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.87019	<b>3.8991E-13</b>



**DRAFT**

**Uncensored Data - log(Thallium) (Data Set="BRC/TIMET")**

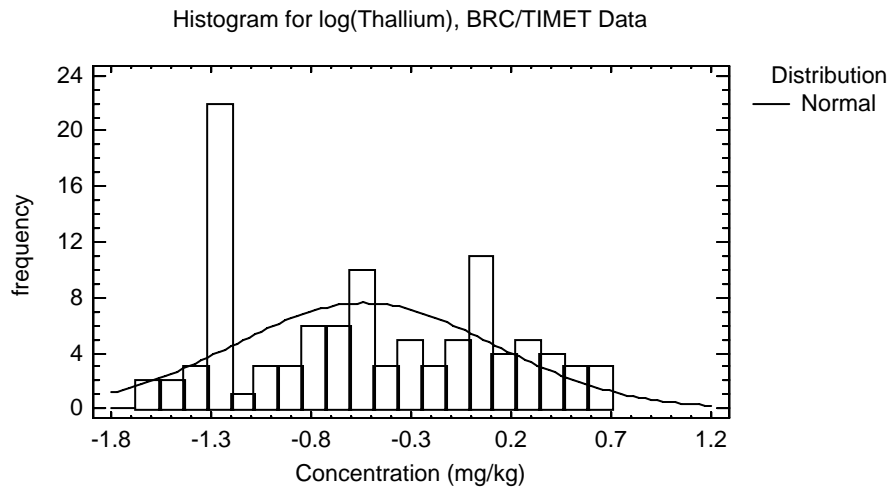
Data variable: log(Thallium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -1.60944 to 0.587787

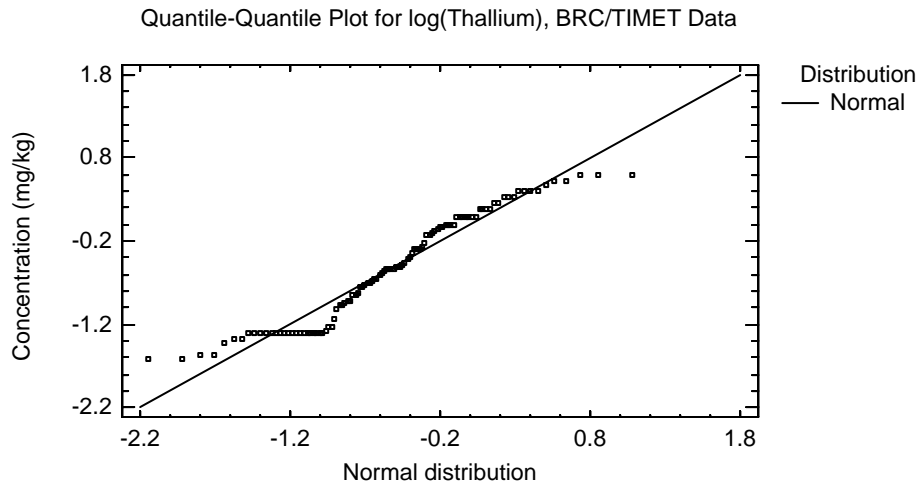
Fitted Distributions

<i>Normal</i>
mean = -0.535562
standard deviation = 0.648974



**Tests for Normality for log(Thallium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.912433	9.33416E-8



**DRAFT**

**Tronox Thallium vs. BRC/TIMET Thallium**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -10.04142948 p= 0

Reject the null hypothesis for alpha=0.05



**DRAFT**

**4.25 Titanium**

**Uncensored Data - Titanium (Data Set="BRC/TIMET")**

Data variable: Titanium

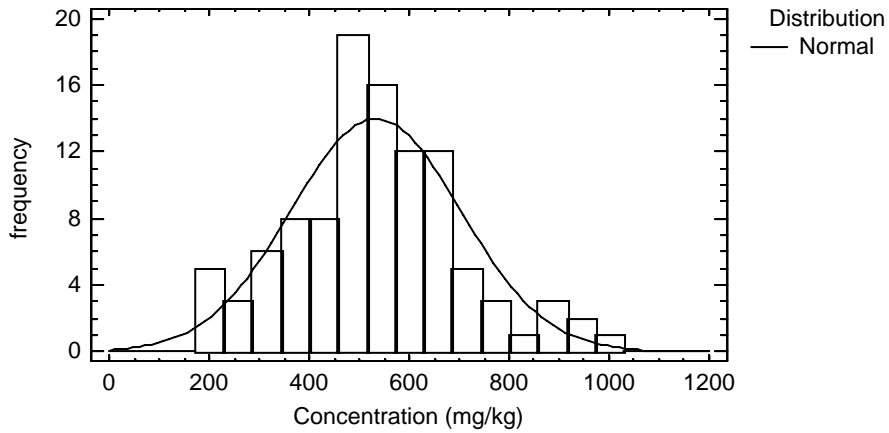
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 200.0 to 1010.0

Fitted Distributions

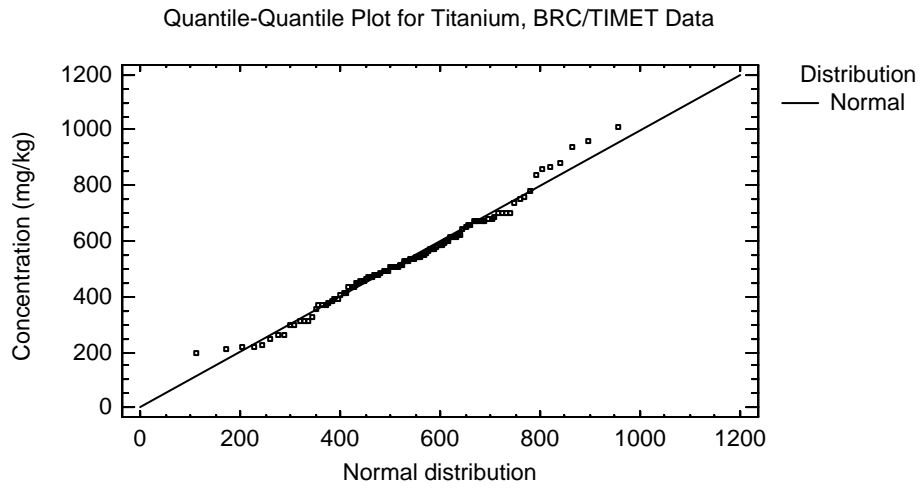
<i>Normal</i>
mean = 533.5
standard deviation = 169.651

Histogram for Titanium, BRC/TIMET Data



**Tests for Normality for Titanium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.972275	0.186814



**DRAFT**

**Uncensored Data - log(Titanium) (Data Set="BRC/TIMET")**

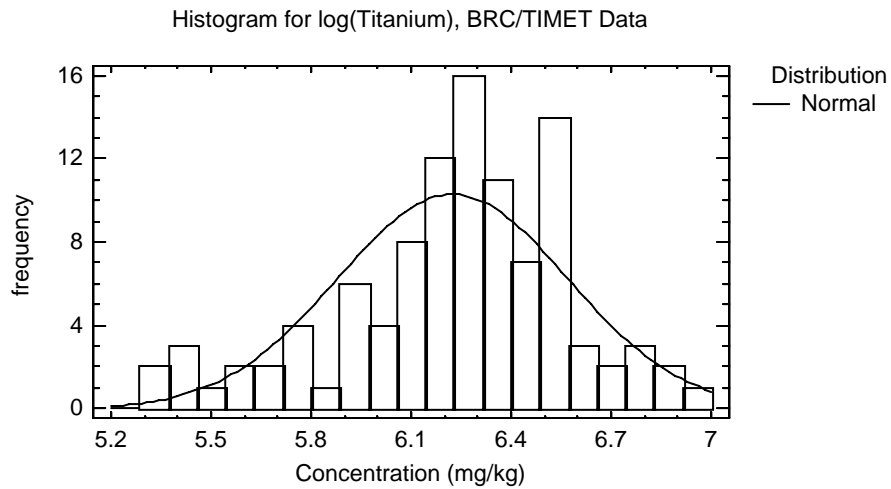
Data variable: log(Titanium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 5.29832 to 6.91771

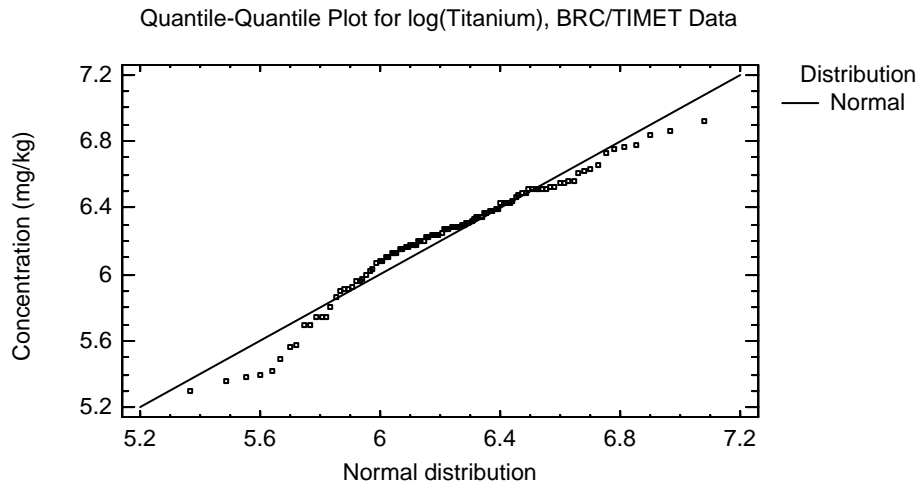
Fitted Distributions

<i>Normal</i>
mean = 6.22445
standard deviation = 0.345966



**Tests for Normality for log(Titanium)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.949012	0.00158086



**DRAFT**

**Two-Sample Comparison - Titanium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Titanium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 200.0 to 1010.0

Sample 2: 24 values ranging from 241.0 to 820.0

**Comparison of Means for Titanium**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 533.5 +/- 32.9929 [500.507, 566.493]

95.0% confidence interval for mean of Data Set=Tronox: 592.917 +/- 47.0152 [545.901, 639.932]

95.0% confidence interval for the difference between the means

not assuming equal variances: -59.4167 +/- 56.5446 [-115.961, -2.87206]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = -2.10958 P-value = 0.0398249

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Titanium**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	169.651	111.341
Variance	28781.4	12396.8
Df	103	23

Ratio of Variances = 2.32168

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [149.309, 196.465]

Standard deviation of Data Set=Tronox: [86.5357, 156.185]

Ratio of Variances: [1.13077, 4.16529]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 2.32168 P-value = 0.0229298

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.26 Tungsten**

**Uncensored Data - Tungsten (Data Set="BRC/TIMET")**

Data variable: Tungsten

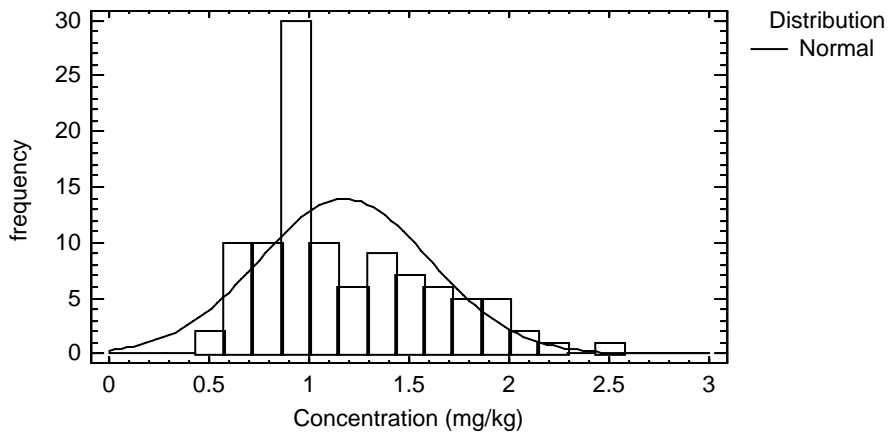
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 0.49 to 2.5

Fitted Distributions

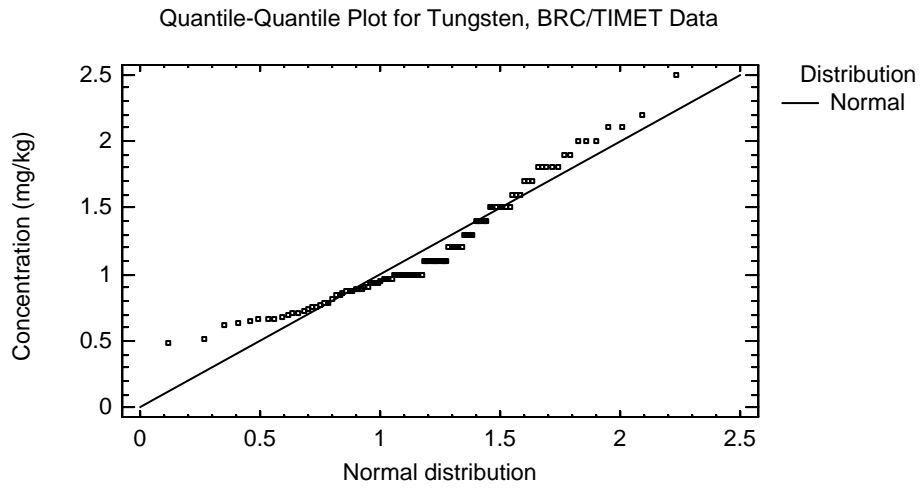
<i>Normal</i>
mean = 1.1776
standard deviation = 0.426005

Histogram for Tungsten, BRC/TIMET Data



**Tests for Normality for Tungsten**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.922932	0.00000176714



**DRAFT**

**Uncensored Data - log(Tungsten) (Data Set="BRC/TIMET")**

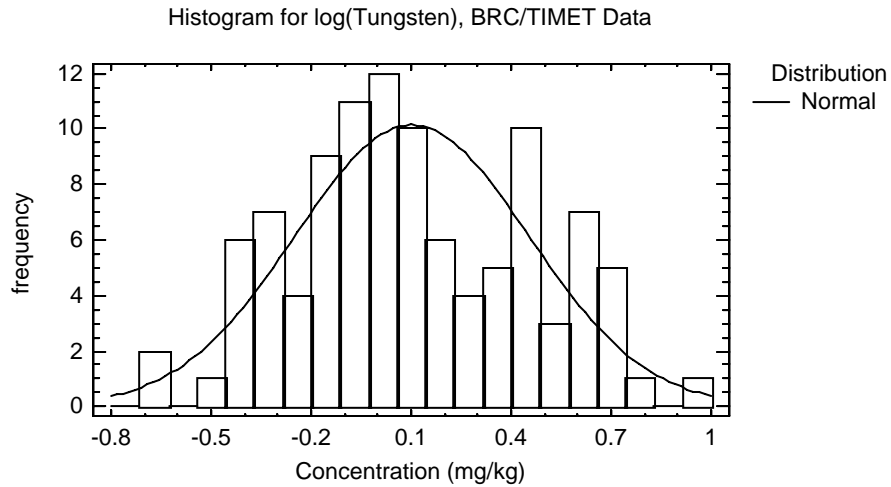
Data variable: log(Tungsten)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from -0.71335 to 0.916291

Fitted Distributions

<i>Normal</i>
mean = 0.101966
standard deviation = 0.350632

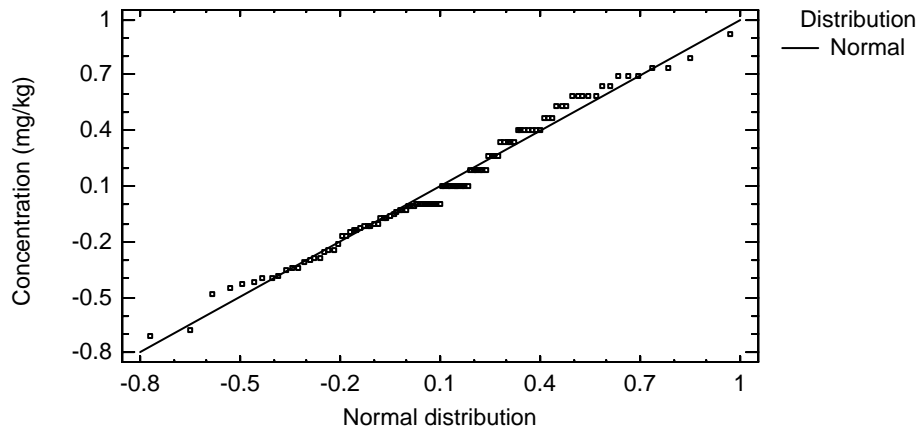


**Tests for Normality for log(Tungsten)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.969622	0.120945



Quantile-Quantile Plot for log(Tungsten), BRC/TIMET Data



**DRAFT**

**Tronox Tungsten vs. BRC/TIMET Tungsten**

**Gehan Modification to Wilcoxon Rank Sum Test**

Null Hypothesis:

median 1 = median 2

Alternate Hypothesis:

median 1 NE median 2

G = -12.73407252 p= 0

Reject the null hypothesis for alpha=0.05

**DRAFT**

**4.27 Uranium**

**Uncensored Data - Uranium (Data Set="BRC/TIMET")**

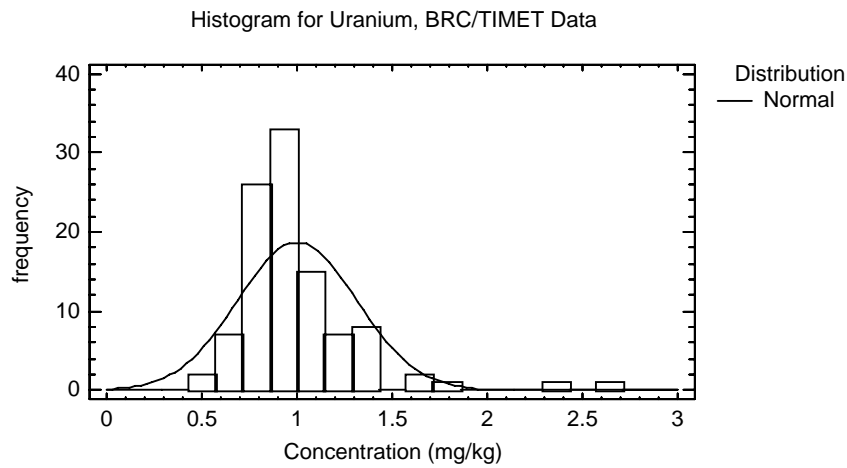
Data variable: Uranium

Selection variable: Data Set="BRC/TIMET"

103 values ranging from 0.43 to 2.7

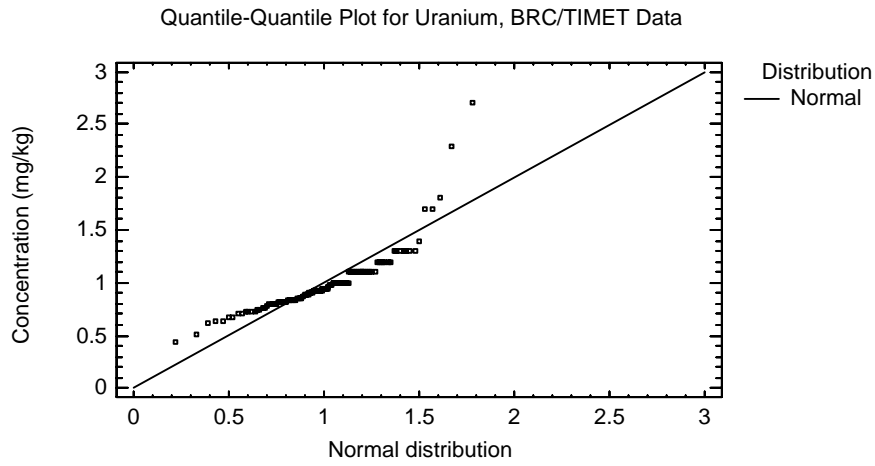
Fitted Distributions

<i>Normal</i>
mean = 1.00087
standard deviation = 0.314288



**Tests for Normality for Uranium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.81692	0.0



**DRAFT**

**Uncensored Data - Uranium (Data Set="BRC/TIMET")**

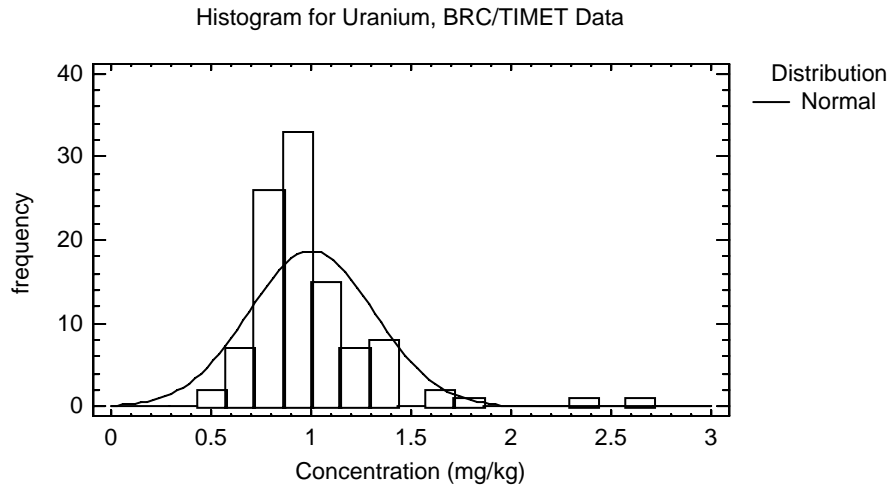
Data variable: Uranium

Selection variable: Data Set="BRC/TIMET"

103 values ranging from 0.43 to 2.7

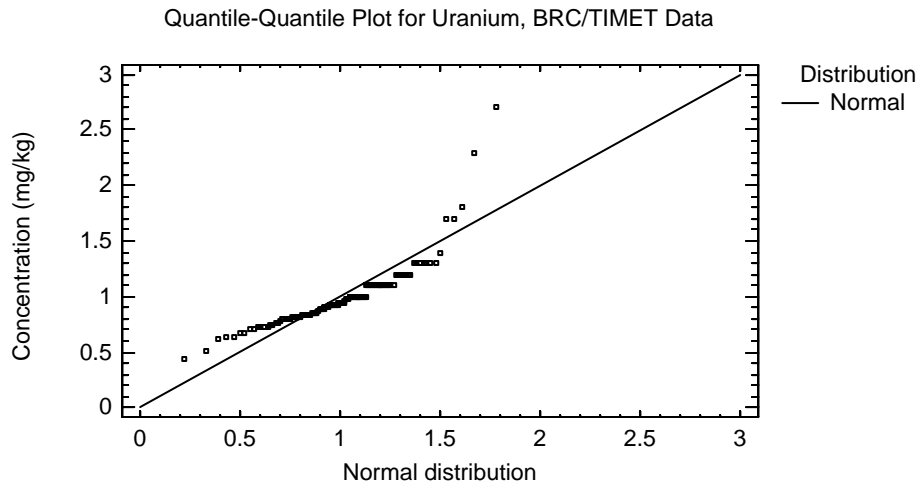
Fitted Distributions

<i>Normal</i>
mean = 1.00087
standard deviation = 0.314288



**Tests for Normality for Uranium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.81692	0.0



**DRAFT****Two-Sample Comparison - Uranium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Uranium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=20

Sample 1: 103 values ranging from 0.43 to 2.7

Sample 2: 24 values ranging from 0.619 to 1.48

**Comparison of Medians for Uranium**

Median of sample 1: 0.94

Median of sample 2: 0.989

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 63.5922

Average rank of sample 2: 65.75

W = 42.0 P-value = 0.798019

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.28 Vanadium**

**Uncensored Data - Vanadium (Data Set="BRC/TIMET")**

Data variable: Vanadium

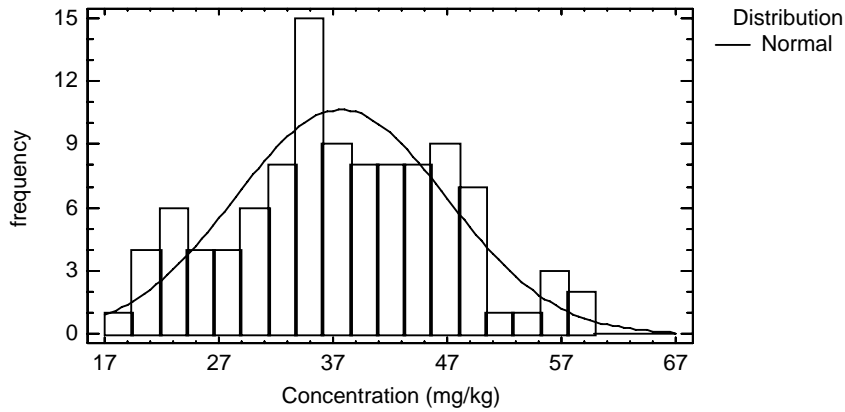
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 19.2 to 59.1

Fitted Distributions

<i>Normal</i>
mean = 37.6827
standard deviation = 9.29507

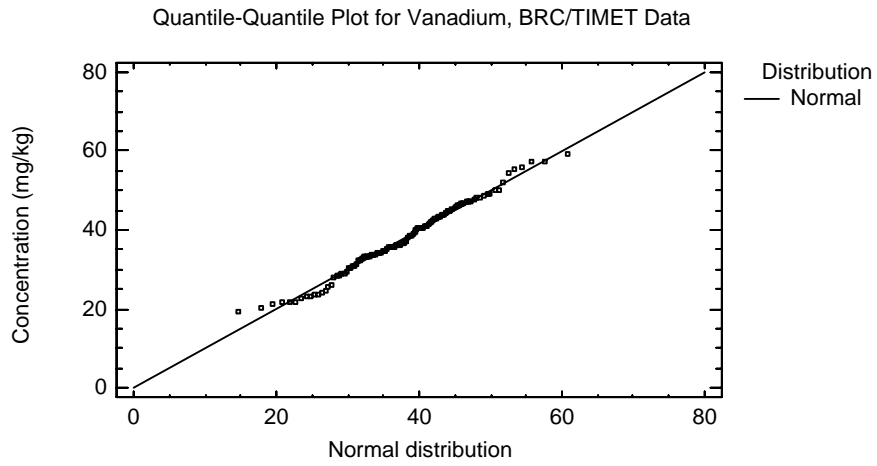
Histogram for Vanadium, BRC/TIMET Data



**Tests for Normality for Vanadium**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.968735	0.103725





**DRAFT**

**Uncensored Data - log(Vanadium) (Data Set="BRC/TIMET")**

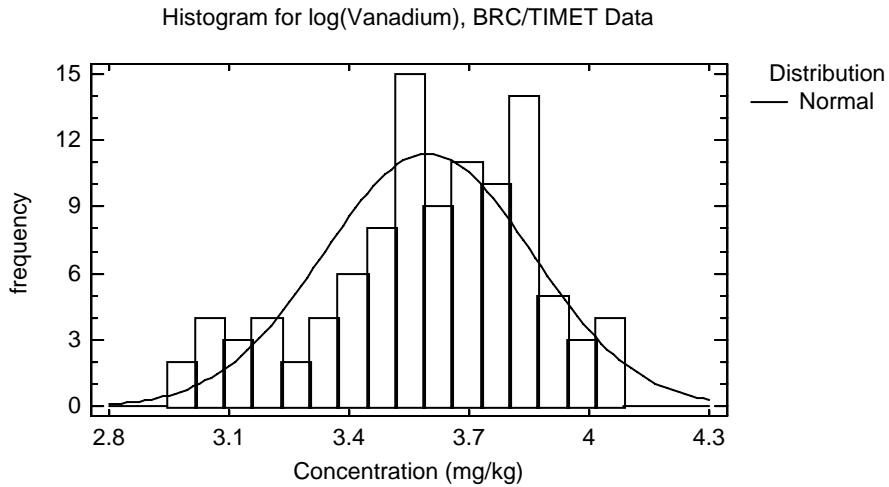
Data variable: log(Vanadium)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.95491 to 4.07923

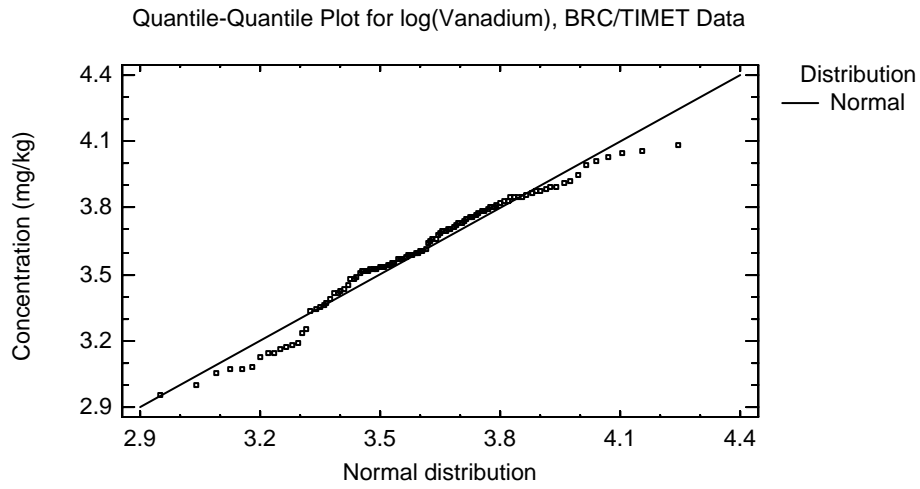
Fitted Distributions

<i>Normal</i>
mean = 3.59702
standard deviation = 0.26054



**Tests for Normality for log(Vanadium)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.952939	0.00398652



**DRAFT**

**Two-Sample Comparison - Vanadium & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for Vanadium**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 19.2 to 59.1

Sample 2: 24 values ranging from 17.0 to 36.3

**Comparison of Means for Vanadium**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 37.6827 +/- 1.80766 [35.875, 39.4904]

95.0% confidence interval for mean of Data Set=Tronox: 26.6646 +/- 1.78522 [24.8794, 28.4498]

95.0% confidence interval for the difference between the means

not assuming equal variances: 11.0181 +/- 2.49765 [8.52046, 13.5158]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 8.77806 P-value = 5.45345E-7

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Vanadium**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	9.29507	4.22774
Variance	86.3983	17.8738
Df	103	23

Ratio of Variances = 4.8338

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [8.18054, 10.7642]

Standard deviation of Data Set=Tronox: [3.28586, 5.93051]

Ratio of Variances: [2.35429, 8.67224]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 4.8338 P-value = 0.0000694355

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**4.29 Zinc**

**Uncensored Data - Zinc (Data Set="BRC/TIMET")**

Data variable: Zinc

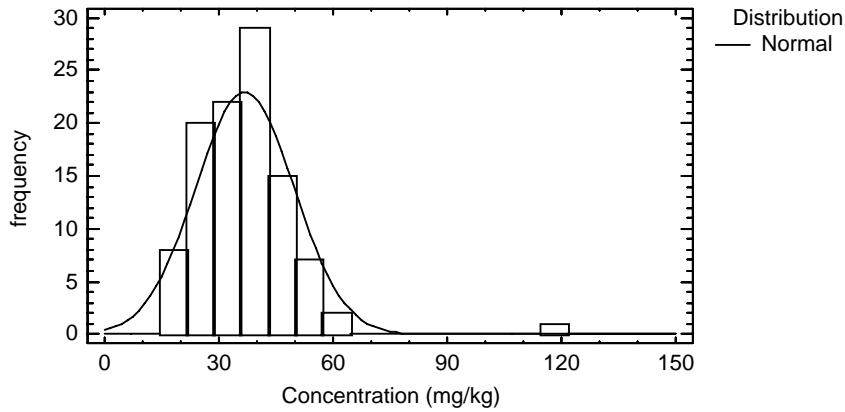
Selection variable: Data Set="BRC/TIMET"

104 values ranging from 15.4 to 121.0

Fitted Distributions

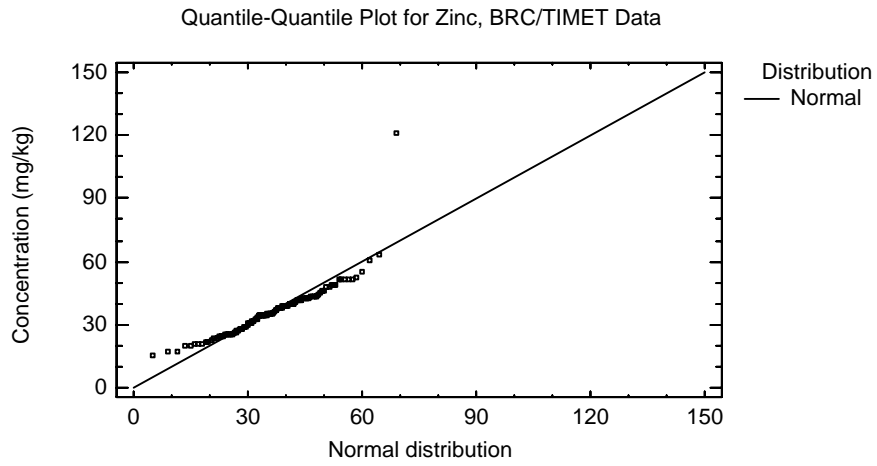
<i>Normal</i>
mean = 36.8413
standard deviation = 12.9108

Histogram for Zinc, BRC/TIMET Data



**Tests for Normality for Zinc**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.842941	1.11022E-16



**DRAFT**

**Uncensored Data - log(Zinc) (Data Set="BRC/TIMET")**

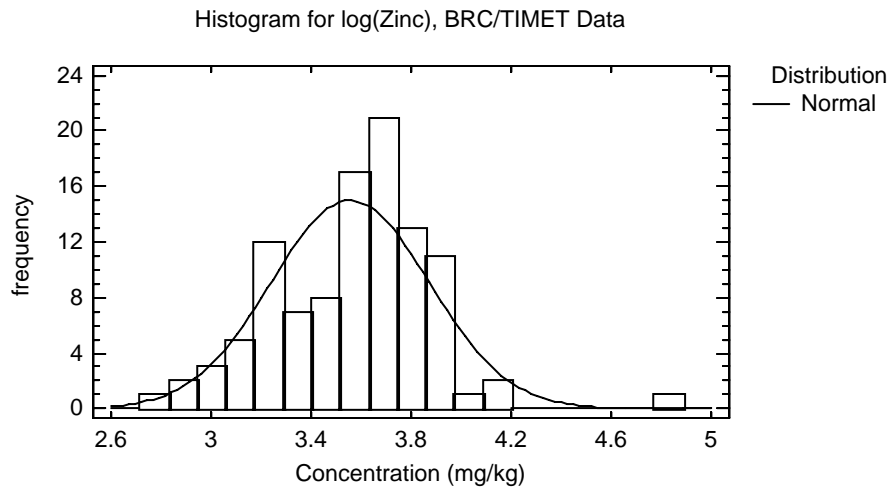
Data variable: log(Zinc)

Selection variable: Data Set="BRC/TIMET"

104 values ranging from 2.73437 to 4.79579

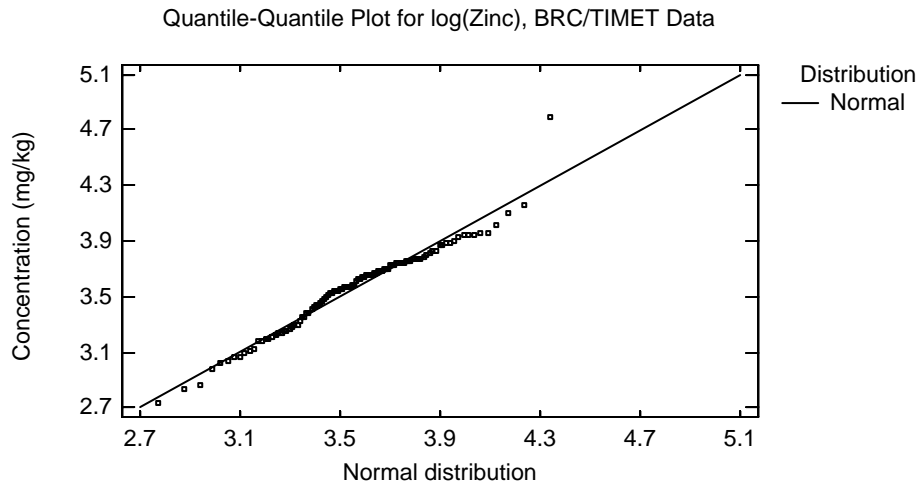
Fitted Distributions

<i>Normal</i>
mean = 3.55594
standard deviation = 0.315994



**Tests for Normality for log(Zinc)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.973949	0.240753





**DRAFT**

**Two-Sample Comparison - log(Zinc) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20) for log(Zinc)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=20

Sample 1: 104 values ranging from 2.73437 to 4.79579

Sample 2: 24 values ranging from 3.28091 to 4.27805

**Comparison of Means for log(Zinc)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 3.55594 +/- 0.0614532 [3.49449, 3.61739]

95.0% confidence interval for mean of Data Set=Tronox: 3.72169 +/- 0.113803 [3.60789, 3.83549]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.16575 +/- 0.138045 [-0.303795, -0.0277055]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -2.37615 P-value = 0.0190006

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Zinc)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.315994	0.269507
Variance	0.0998525	0.0726339
Df	103	23

Ratio of Variances = 1.37474

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.278105, 0.365939]

Standard deviation of Data Set=Tronox: [0.209464, 0.378053]

Ratio of Variances: [0.669563, 2.46639]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.37474 P-value = 0.384886

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT****4.30 Perchlorate**

Perchlorate was not measured in the BRC/TIMET data. Therefore, comparisons were not made.

## 5.0 ANALYSIS OF TRONOX UPGRADIENT DATA FOR RADIONUCLIDES IN SOIL

### 5.1 Total Natural Uranium

#### Uncensored Data - Uranium Total (Data Set="Tronox")

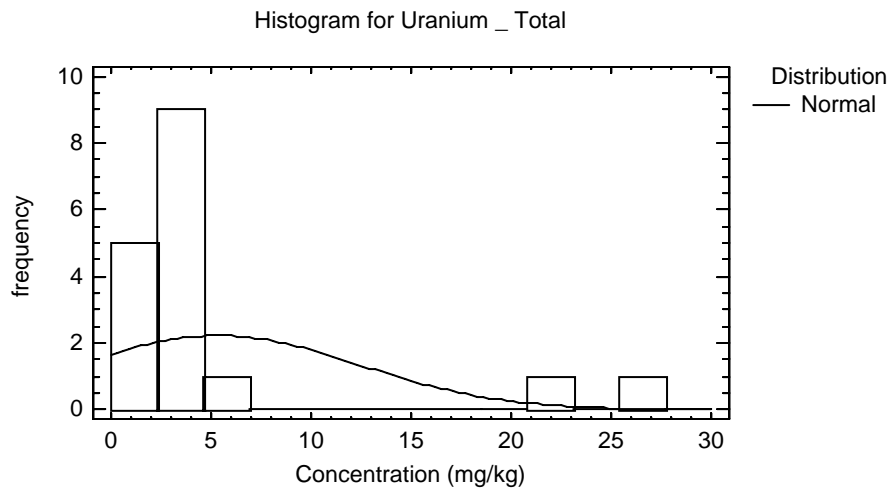
Data variable: Uranium \_ Total

Selection variable: Data Set="Tronox"

17 values ranging from 1.45 to 26.2

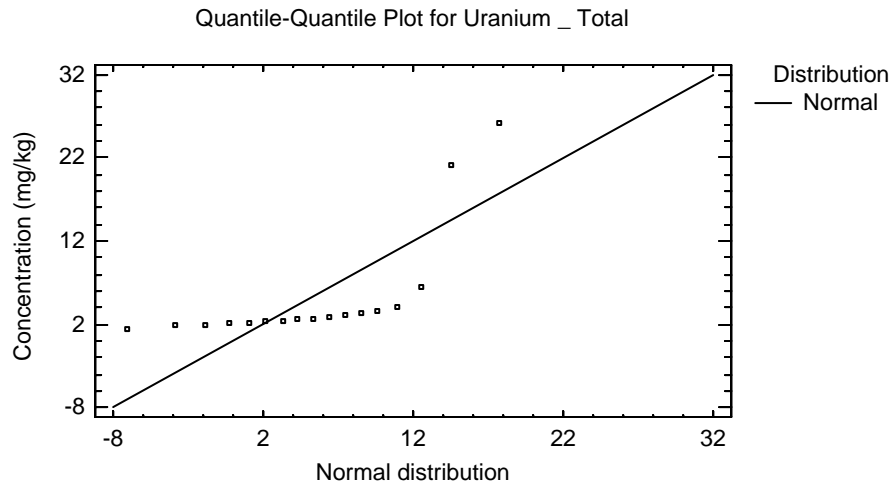
Fitted Distributions

<i>Normal</i>
mean = 5.34471
standard deviation = 7.03865



#### Tests for Normality for Uranium \_ Total

Test	Statistic	P-Value
Shapiro-Wilk W	0.525809	3.97625E-7



**DRAFT**

**Uncensored Data - log(Uranium Total) (Data Set="Tronox")**

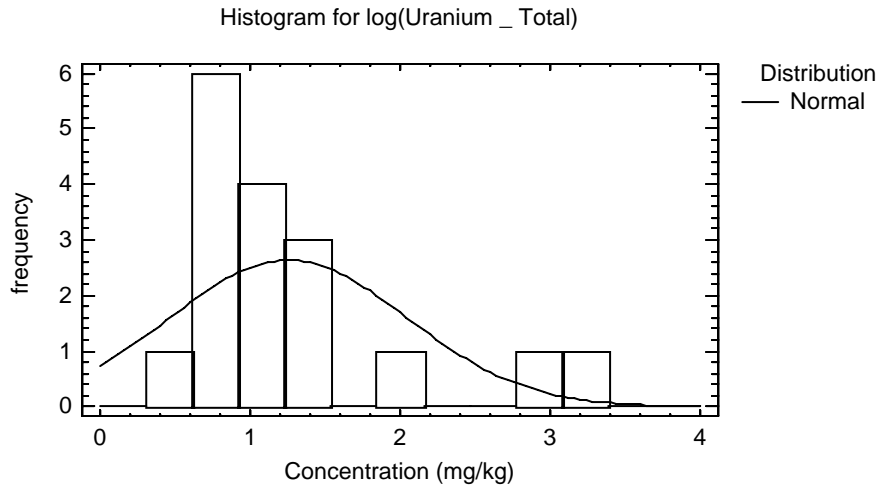
Data variable: log(Uranium \_ Total)

Selection variable: Data Set="Tronox"

17 values ranging from 0.371564 to 3.26576

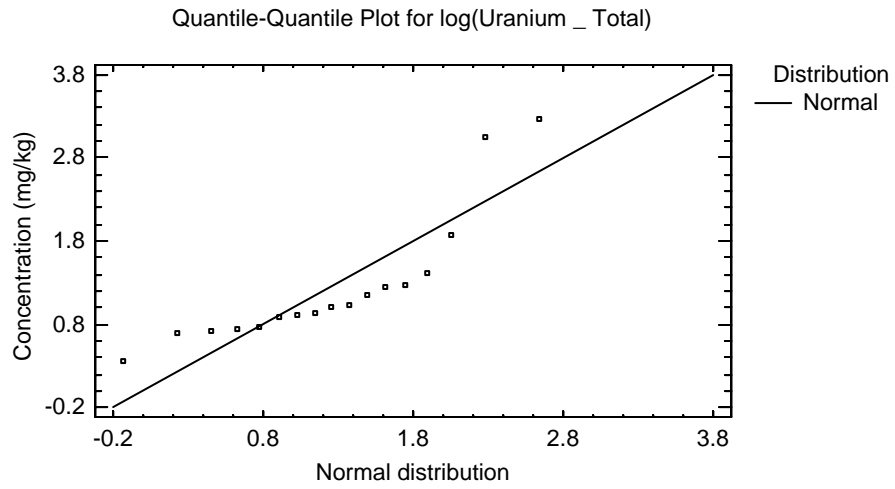
Fitted Distributions

<i>Normal</i>
mean = 1.25556
standard deviation = 0.790613



**Tests for Normality for log(Uranium \_ Total)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.764617	0.000461129



**DRAFT**

**Uncensored Data - Uranium Total (Data Set="Tronox"&Depth Value=0)**

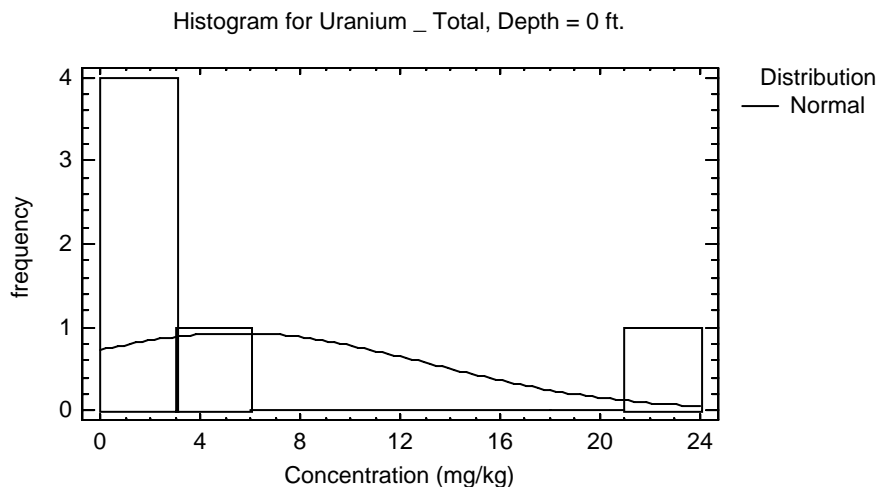
Data variable: Uranium \_ Total

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 1.45 to 21.1

Fitted Distributions

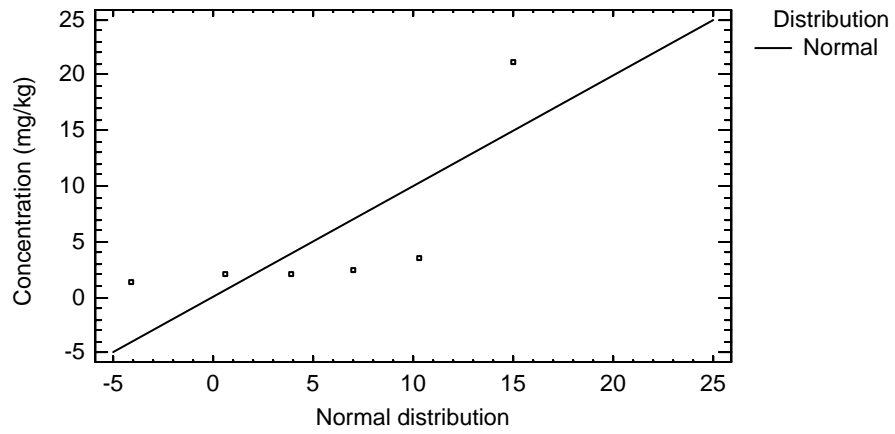
<i>Normal</i>
mean = 5.44167
standard deviation = 7.70483



**Tests for Normality for Uranium \_ Total**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.579994	0.0

Quantile-Quantile Plot for Uranium \_ Total, Depth = 0 ft.





**DRAFT**

**Uncensored Data - log(Uranium Total) (Data Set="Tronox"&Depth Value=0)**

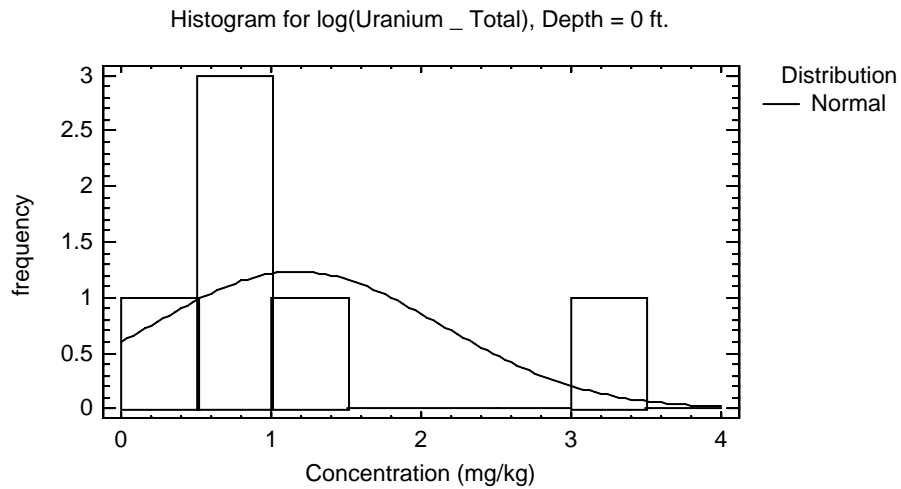
Data variable: log(Uranium \_ Total)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.371564 to 3.04927

Fitted Distributions

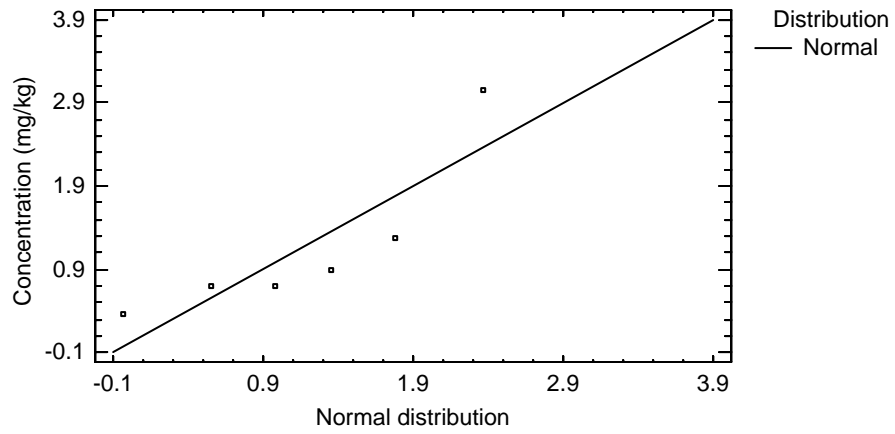
<i>Normal</i>
mean = 1.16798
standard deviation = 0.968565



**Tests for Normality for log(Uranium \_ Total)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.771407	0.0314359

Quantile-Quantile Plot for log(Uranium \_ Total), Depth = 0 ft.



**DRAFT**

**Uncensored Data - Uranium Total (Data Set="Tronox"&Depth Value=5)**

Data variable: Uranium \_ Total

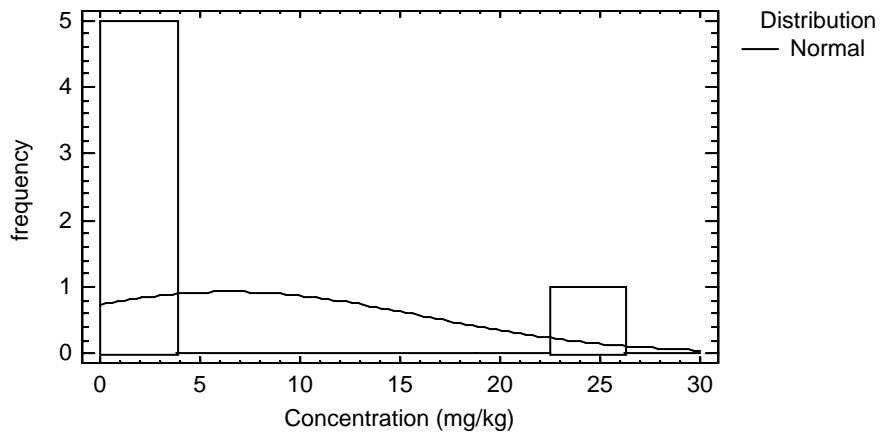
Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 2.11 to 26.2

Fitted Distributions

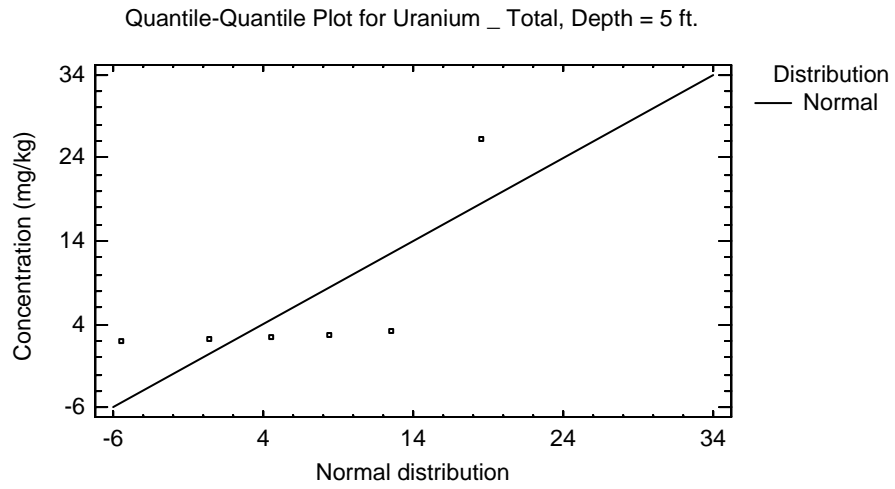
<i>Normal</i>
mean = 6.49333
standard deviation = 9.66219

Histogram for Uranium \_ Total, Depth = 5 ft.



**Tests for Normality for Uranium \_ Total**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.534292	0.0



**DRAFT**

**Uncensored Data - log(Uranium Total) (Data Set="Tronox"&Depth Value=5)**

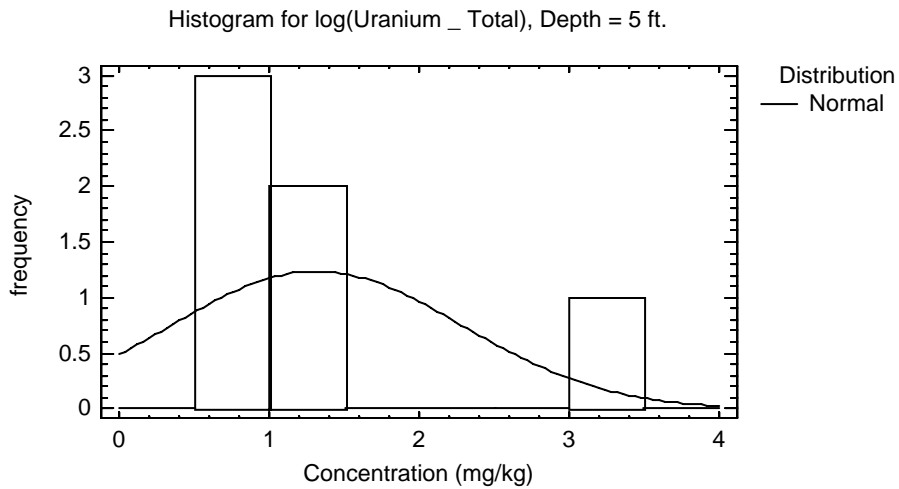
Data variable: log(Uranium \_ Total)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.746688 to 3.26576

Fitted Distributions

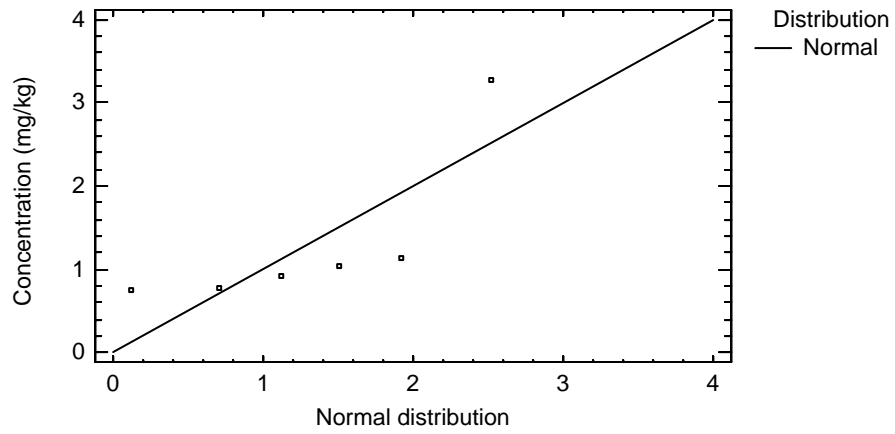
<i>Normal</i>
mean = 1.31537
standard deviation = 0.967458



**Tests for Normality for log(Uranium \_ Total)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.642365	0.000264084

Quantile-Quantile Plot for log(Uranium \_ Total), Depth = 5 ft.



**DRAFT****Two-Sample Comparison - Uranium \_ Total & Depth Name (Data Set="Tronox"&Depth Value <=5) for Uranium \_ Total**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&amp;Depth Value &lt;=5

Sample 1: 6 values ranging from 1.45 to 21.1

Sample 2: 6 values ranging from 2.11 to 26.2

**Comparison of Medians for Uranium \_ Total**

Median of sample 1: 2.2425

Median of sample 2: 2.66

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 5.5

Average rank of sample 2: 7.5

W = 6.0 P-value = 0.378476

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.2 Lead 212**

**Uncensored Data - Lead 212 (Data Set="Tronox")**

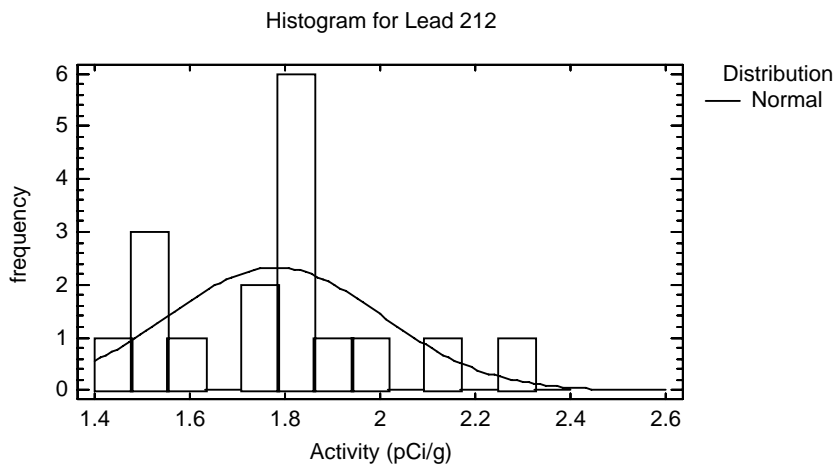
Data variable: Lead 212

Selection variable: Data Set="Tronox"

17 values ranging from 1.445 to 2.26

Fitted Distributions

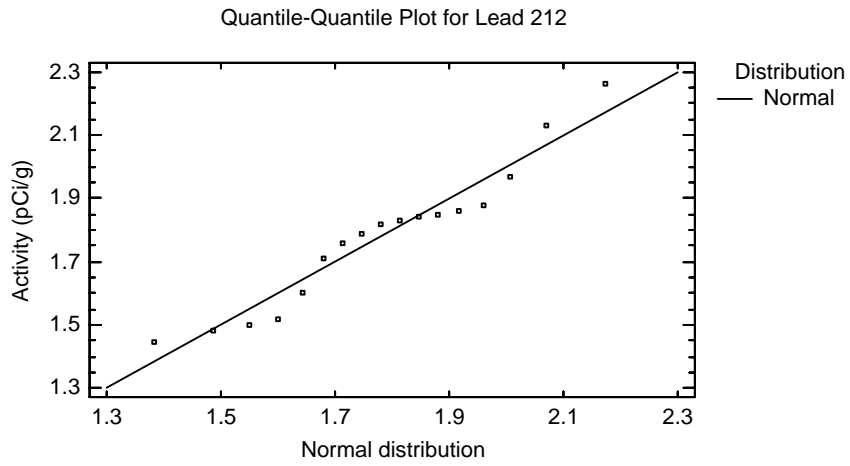
<i>Normal</i>
mean = 1.77941
standard deviation = 0.224255



**Tests for Normality for Lead 212**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.943281	0.3584





**DRAFT**

**Uncensored Data - log(Lead 212) (Data Set="Tronox")**

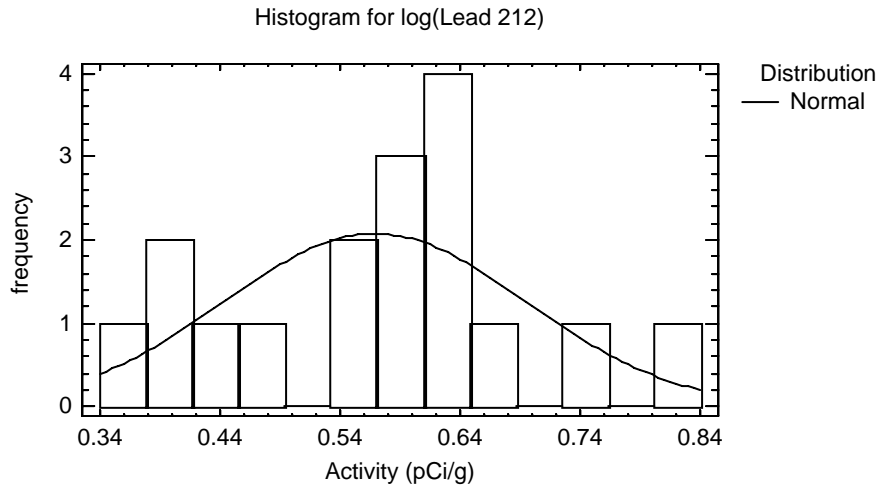
Data variable: log(Lead 212)

Selection variable: Data Set="Tronox"

17 values ranging from 0.368109 to 0.815365

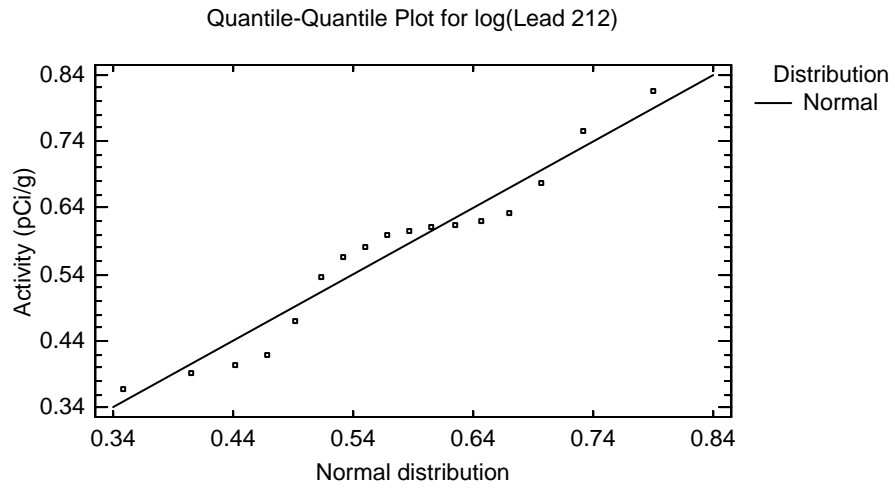
Fitted Distributions

<i>Normal</i>
mean = 0.568855
standard deviation = 0.125585



**Tests for Normality for log(Lead 212)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.946417	0.399829



**DRAFT**

**Uncensored Data - Lead 212 (Data Set="Tronox"&Depth Value=0)**

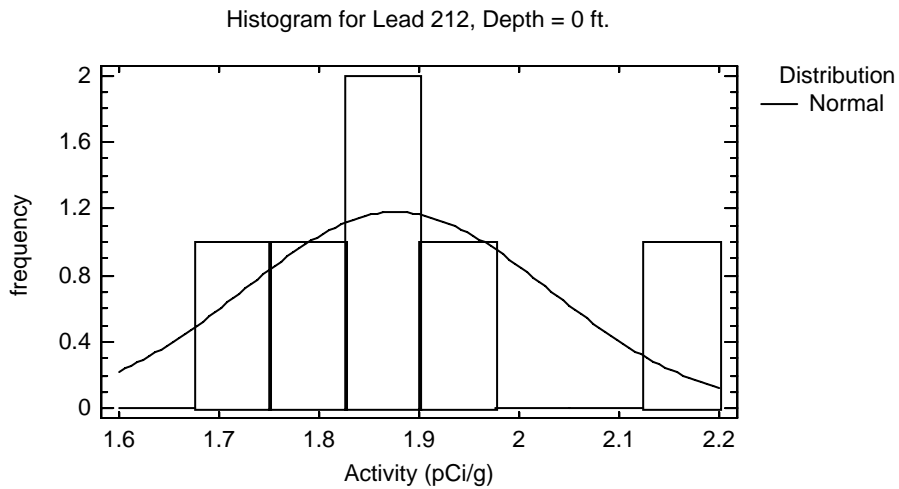
Data variable: Lead 212

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 1.71 to 2.13

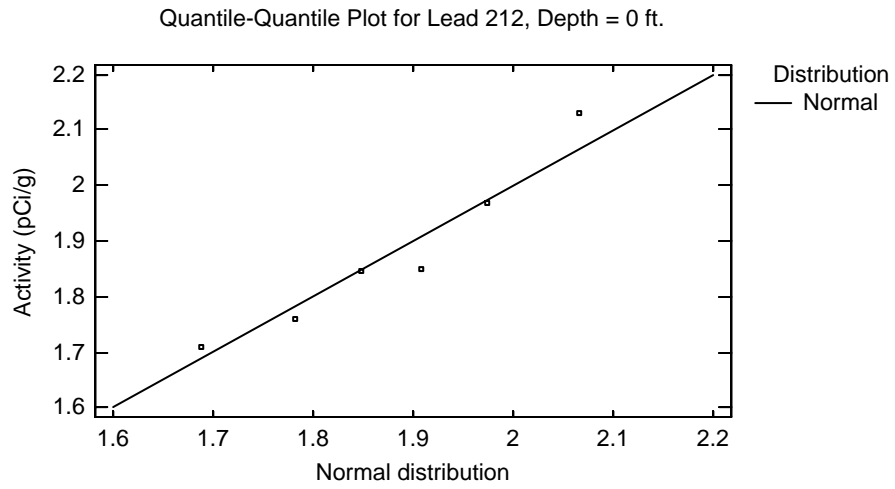
Fitted Distributions

<i>Normal</i>
mean = 1.8775
standard deviation = 0.152307



**Tests for Normality for Lead 212**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.935855	0.641304



**DRAFT**

**Uncensored Data - log(Lead 212) (Data Set="Tronox"&Depth Value=0)**

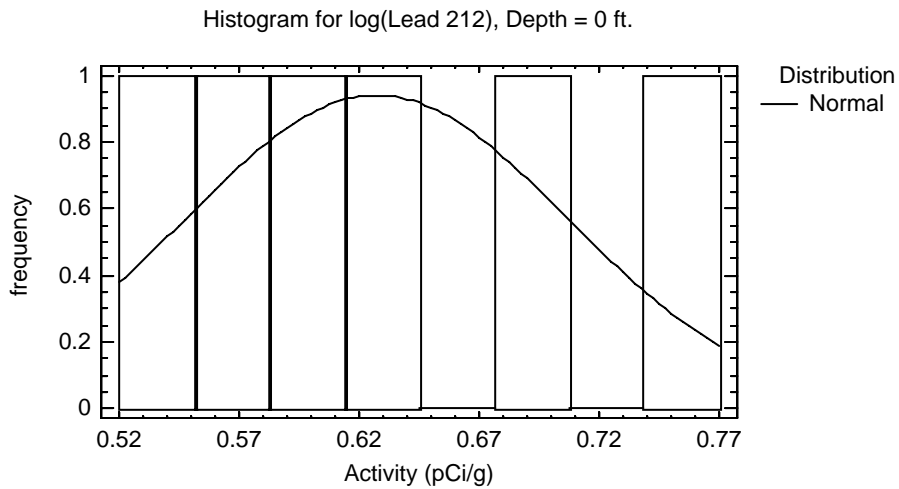
Data variable: log(Lead 212)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.536493 to 0.756122

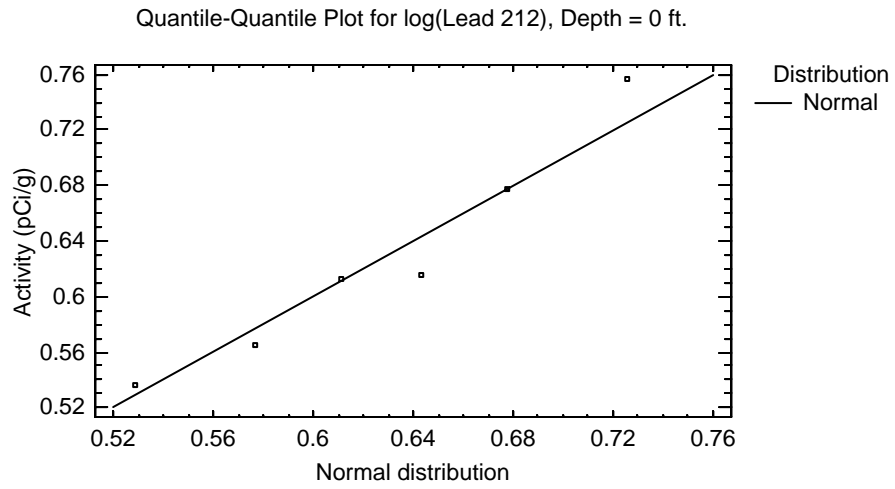
Fitted Distributions

<i>Normal</i>
mean = 0.627271
standard deviation = 0.079528



**Tests for Normality for log(Lead 212)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.94761	0.740164



**DRAFT**

**Uncensored Data - Lead 212 (Data Set="Tronox"&Depth Value=5)**

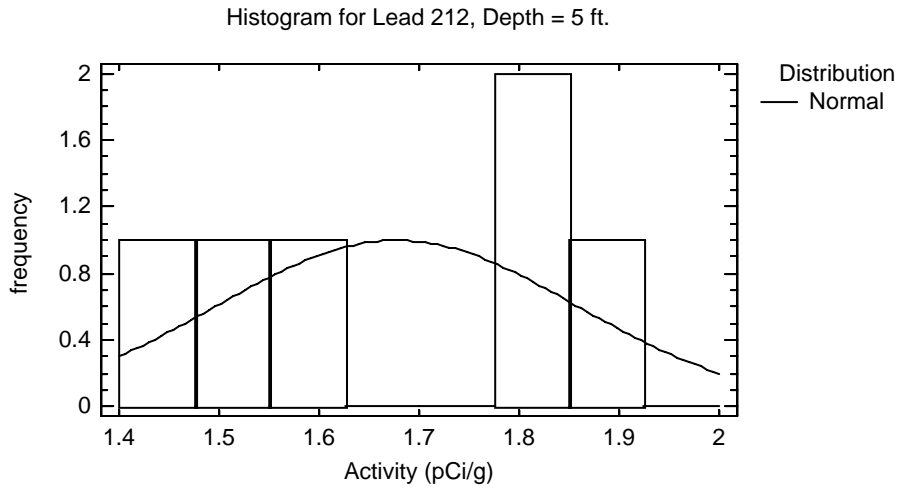
Data variable: Lead 212

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 1.445 to 1.88

Fitted Distributions

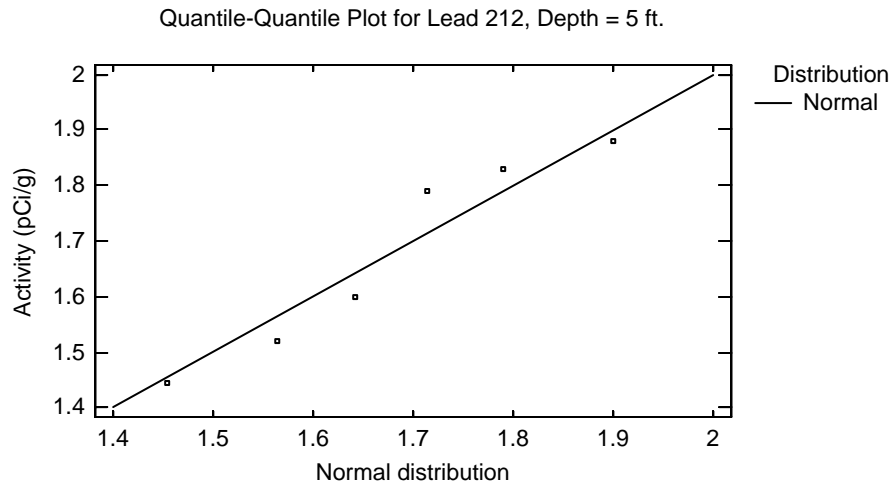
<i>Normal</i>
mean = 1.6775
standard deviation = 0.179882



**Tests for Normality for Lead 212**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.90838	0.408813





**DRAFT**

**Uncensored Data - log(Lead 212) (Data Set="Tronox"&Depth Value=5)**

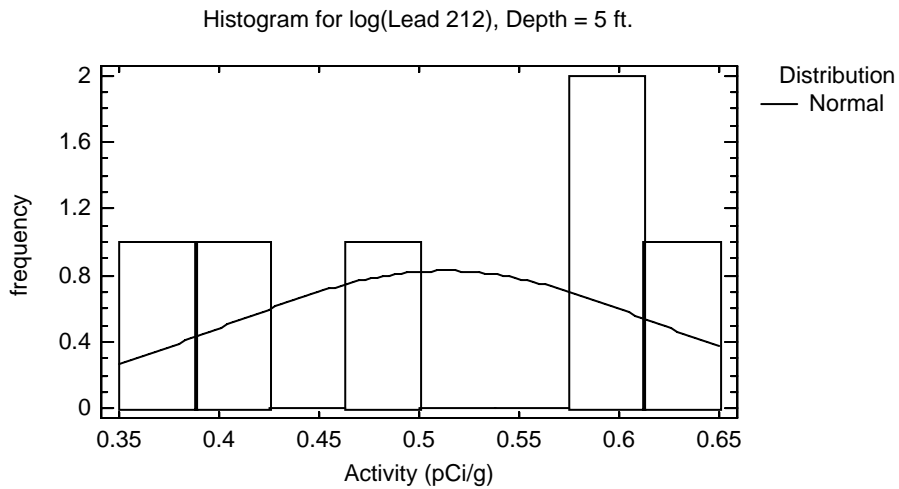
Data variable: log(Lead 212)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.368109 to 0.631272

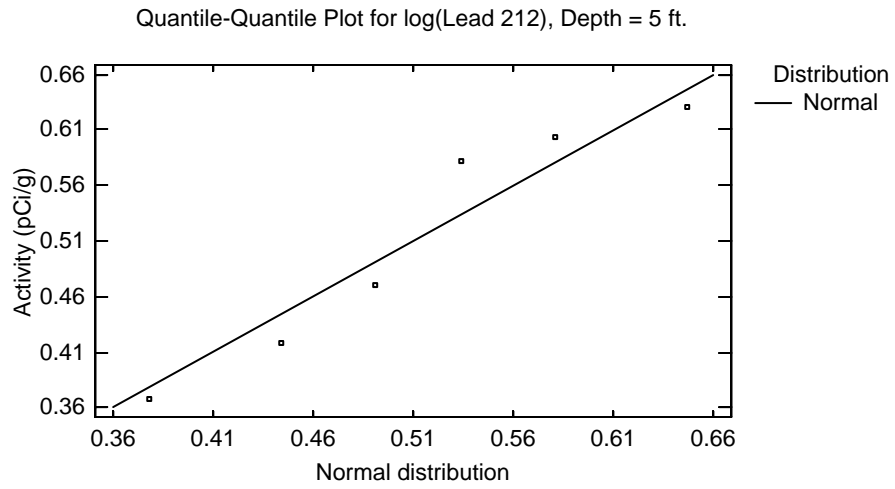
Fitted Distributions

<i>Normal</i>
mean = 0.512438
standard deviation = 0.108488



**Tests for Normality for log(Lead 212)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.907849	0.40546



**DRAFT**

**Two-Sample Comparison - Lead 212 & Depth Name (Data Set="Tronox"&Depth Value <=5) for Lead 212**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from 1.71 to 2.13

Sample 2: 6 values ranging from 1.445 to 1.88

**Comparison of Means for Lead 212**

95.0% confidence interval for mean of Depth Name=0 ft.: 1.8775 +/- 0.159837 [1.71766, 2.03734]

95.0% confidence interval for mean of Depth Name=05 ft.: 1.6775 +/- 0.188775 [1.48872, 1.86628]

95.0% confidence interval for the difference between the means

assuming equal variances: 0.2 +/- 0.214402 [-0.0144022, 0.414402]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 2.07847 P-value = 0.0643627

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Lead 212**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.152307	0.179882
Variance	0.0231975	0.0323575
Df	5	5

Ratio of Variances = 0.716913

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.0950714, 0.373551]

Standard deviation of Depth Name=05 ft.: [0.112284, 0.441181]

Ratio of Variances: [0.100318, 5.12336]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.716913 P-value = 0.723895

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.3 Radium 226**

**Uncensored Data - Radium 226 (Data Set="Tronox")**

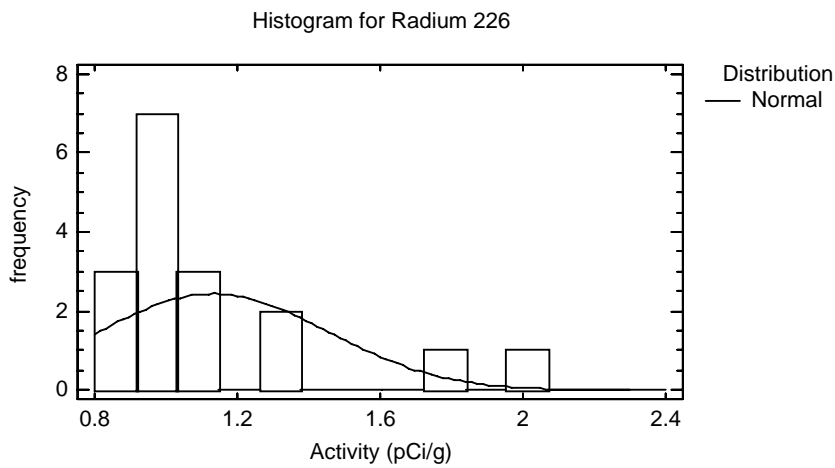
Data variable: Radium 226

Selection variable: Data Set="Tronox"

17 values ranging from 0.891 to 2.06

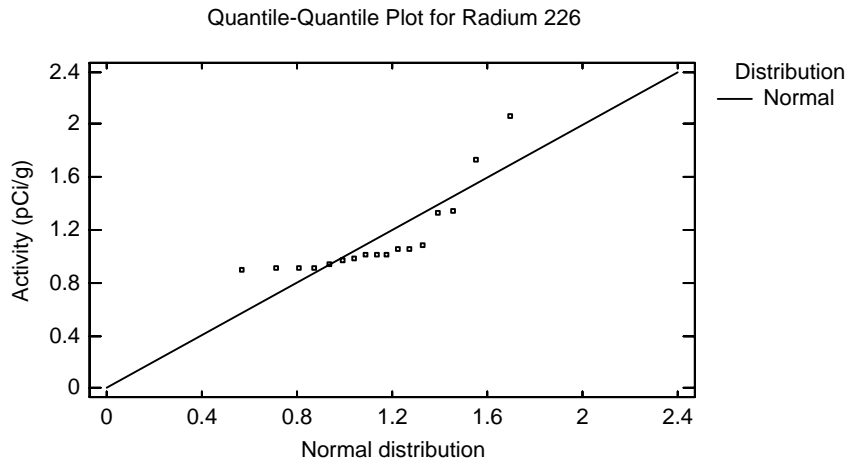
Fitted Distributions

<i>Normal</i>
mean = 1.13215
standard deviation = 0.320585



**Tests for Normality for Radium 226**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.710445	0.0000781425



**DRAFT**

**Uncensored Data - log(Radium 226) (Data Set="Tronox")**

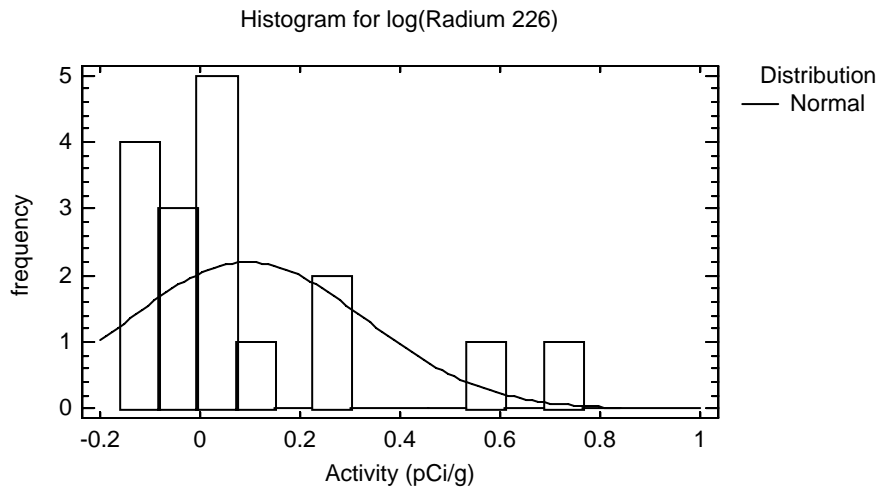
Data variable: log(Radium 226)

Selection variable: Data Set="Tronox"

17 values ranging from -0.115411 to 0.722706

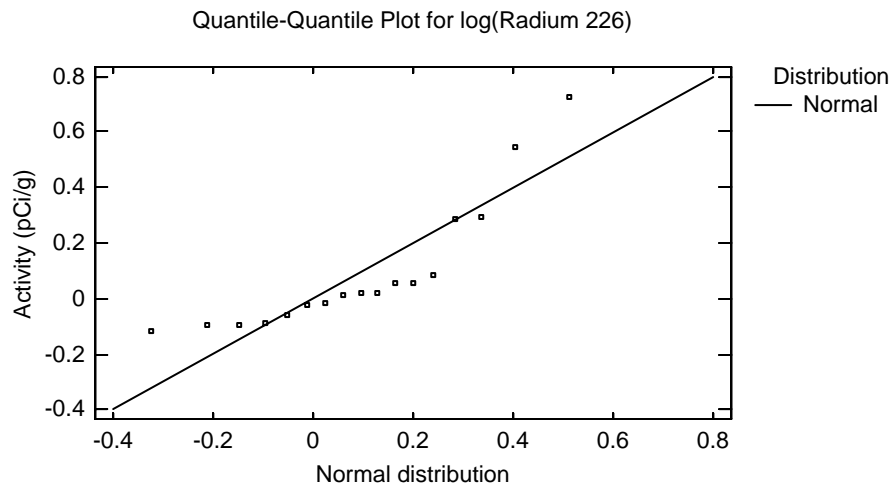
Fitted Distributions

<i>Normal</i>
mean = 0.0943815
standard deviation = 0.237221



**Tests for Normality for log(Radium 226)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.781708	0.000828841





**DRAFT**

**Uncensored Data - Radium 226 (Data Set="Tronox"&Depth Value=0)**

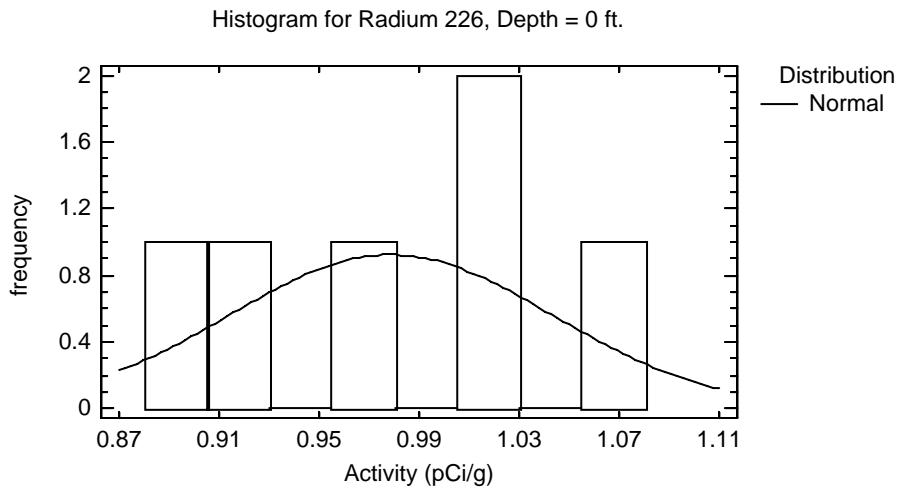
Data variable: Radium 226

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.891 to 1.06

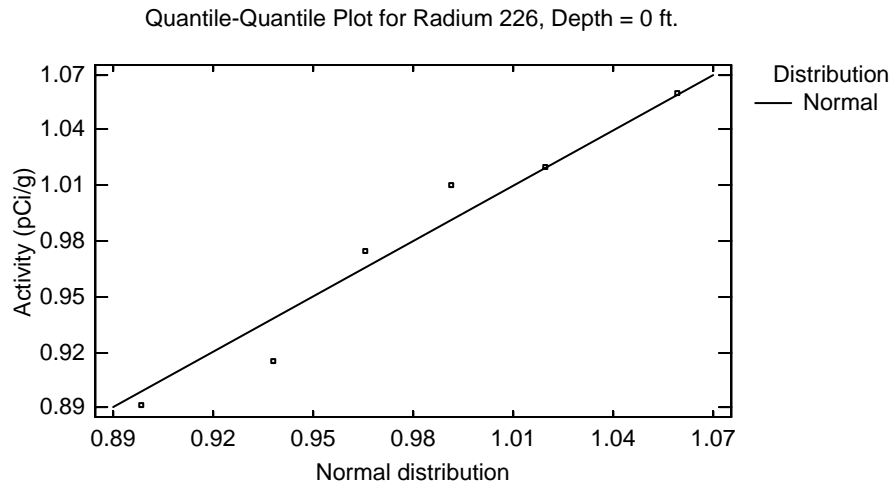
Fitted Distributions

<i>Normal</i>
mean = 0.978583
standard deviation = 0.0647985



**Tests for Normality for Radium 226**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.947904	0.742437



**DRAFT**

**Uncensored Data - log(Radium 226) (Data Set="Tronox"&Depth Value=0)**

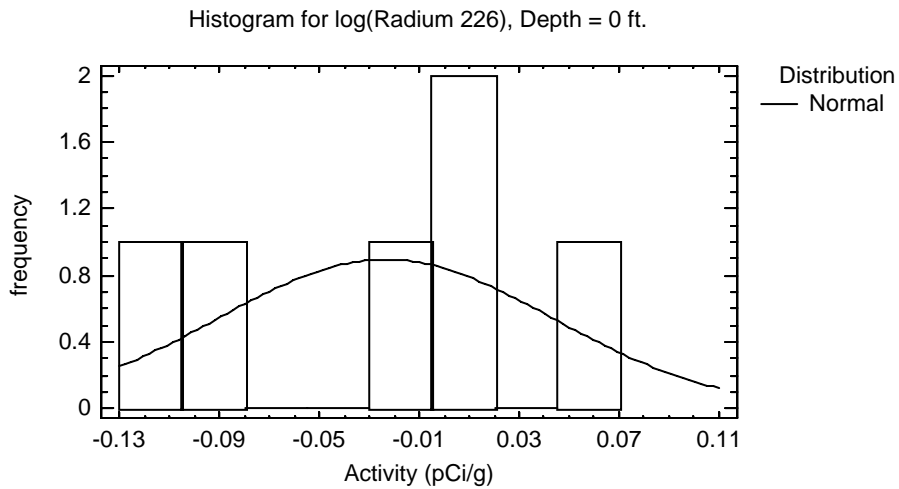
Data variable: log(Radium 226)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from -0.115411 to 0.0582689

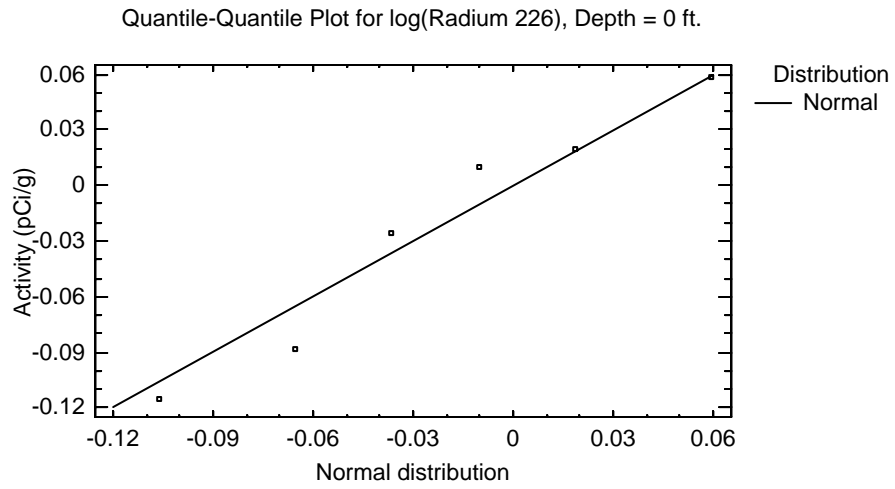
Fitted Distributions

<i>Normal</i>
mean = -0.0234986
standard deviation = 0.0668254



**Tests for Normality for log(Radium 226)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.943048	0.703587



**DRAFT**

**Uncensored Data - Radium 226 (Data Set="Tronox"&Depth Value=5)**

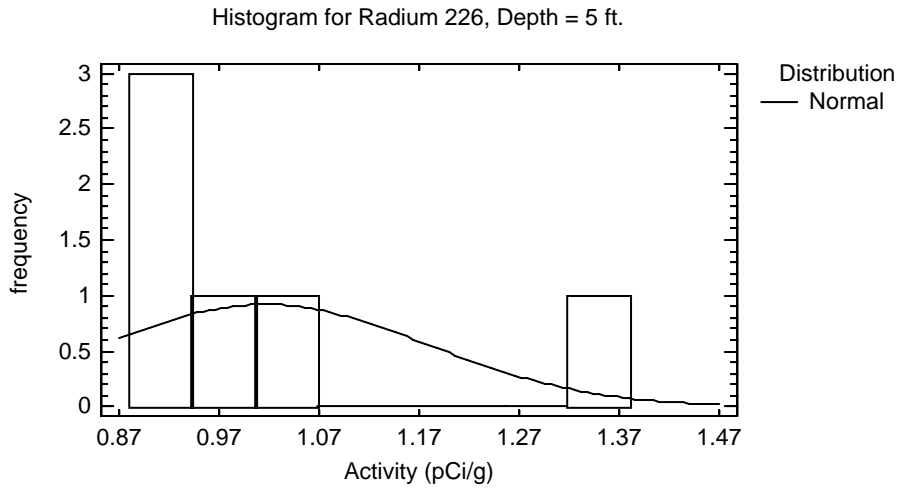
Data variable: Radium 226

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.907 to 1.335

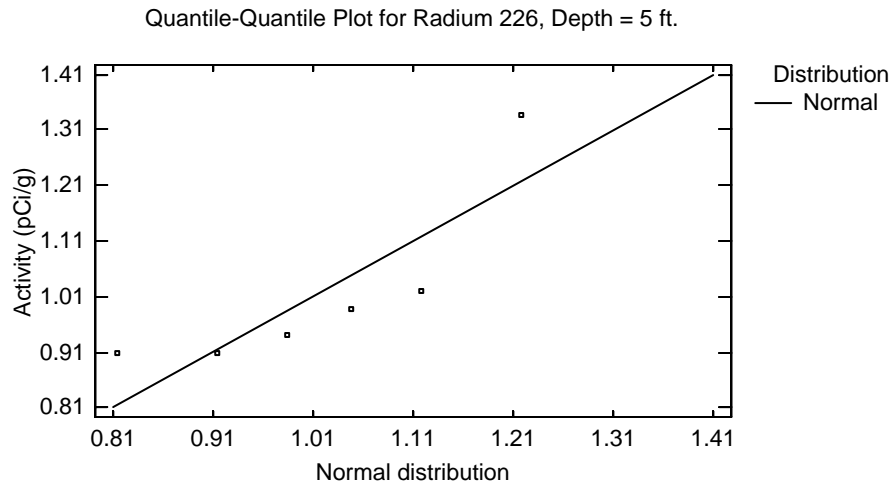
Fitted Distributions

<i>Normal</i>
mean = 1.01583
standard deviation = 0.162613



**Tests for Normality for Radium 226**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.731448	0.0134766



**DRAFT**

**Uncensored Data - log(Radium 226) (Data Set="Tronox"&Depth Value=5)**

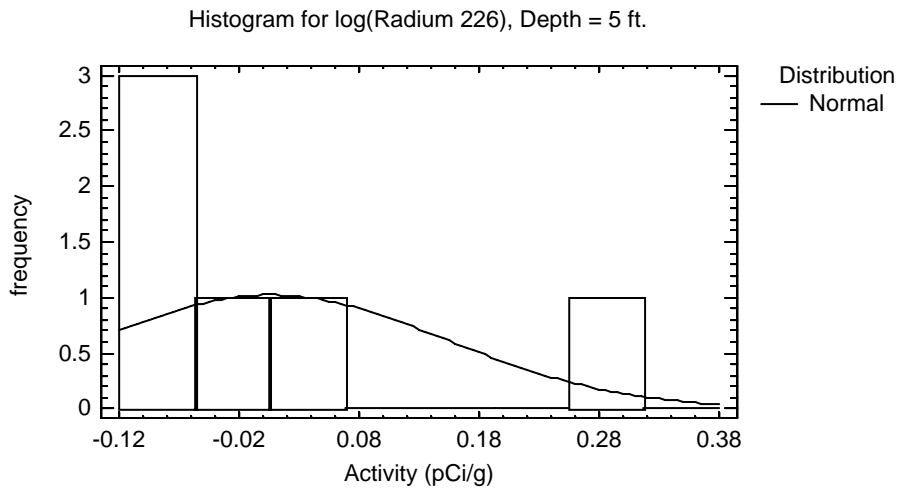
Data variable: log(Radium 226)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from -0.0976128 to 0.288931

Fitted Distributions

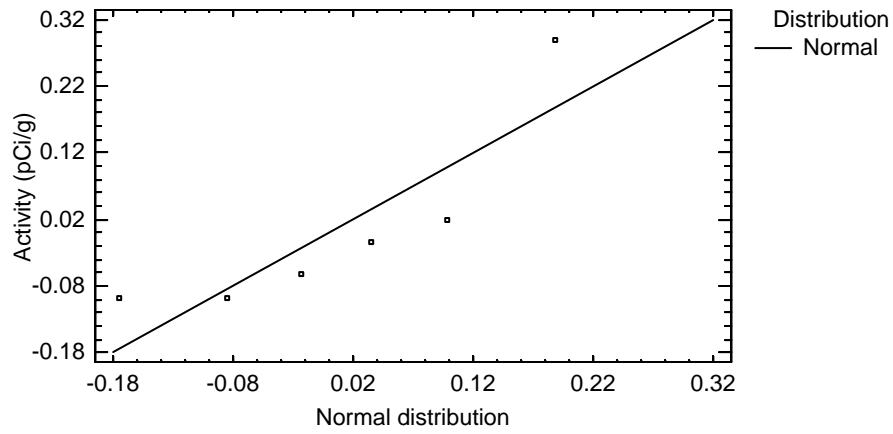
<i>Normal</i>
mean = 0.00625566
standard deviation = 0.146098



**Tests for Normality for log(Radium 226)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.764903	0.0276516

Quantile-Quantile Plot for log(Radium 226), Depth = 5 ft.





**DRAFT****Two-Sample Comparison - Radium 226 & Depth Name (Data Set="Tronox"&Depth Value <=5) for Radium 226**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&amp;Depth Value &lt;=5

Sample 1: 6 values ranging from 0.891 to 1.06

Sample 2: 6 values ranging from 0.907 to 1.335

**Comparison of Medians for Radium 226**

Median of sample 1: 0.9925

Median of sample 2: 0.963

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 6.58333

Average rank of sample 2: 6.41667

W = -0.5 P-value = 1.0

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.4 Radium 228**

**Uncensored Data - Radium 228 (Data Set="Tronox")**

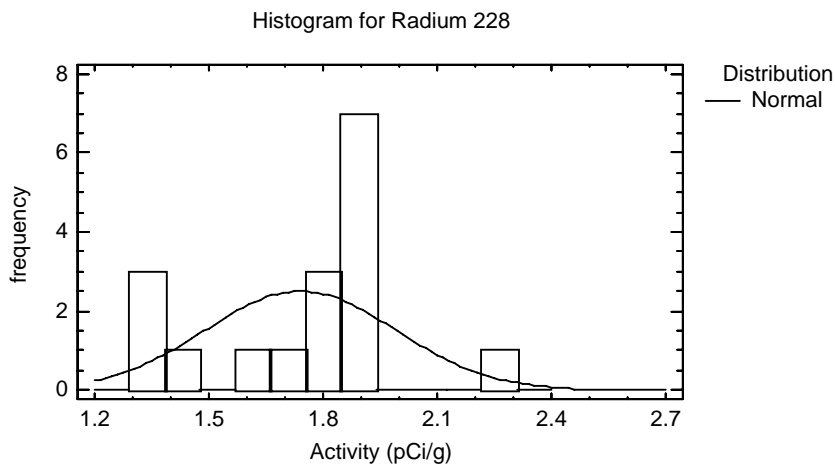
Data variable: Radium 228

Selection variable: Data Set="Tronox"

17 values ranging from 1.295 to 2.24

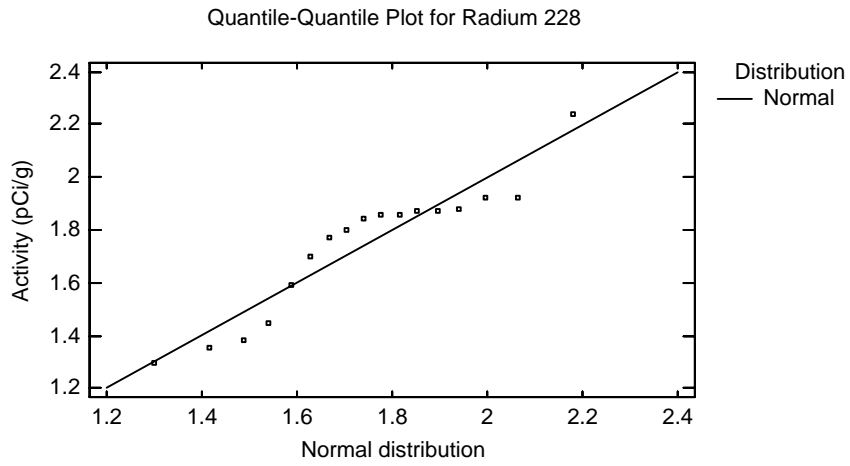
Fitted Distributions

<i>Normal</i>
mean = 1.74088
standard deviation = 0.249926



**Tests for Normality for Radium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.900972	0.0713819



**DRAFT**

**Uncensored Data - log(Radium 228) (Data Set="Tronox")**

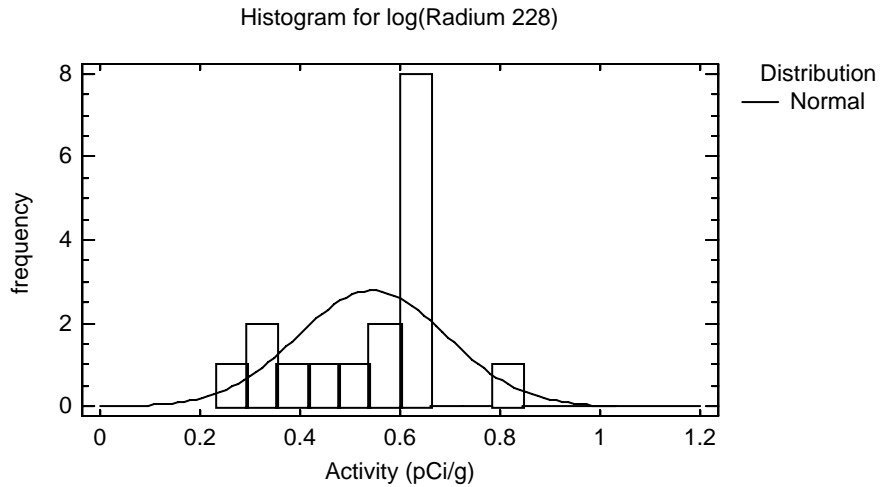
Data variable: log(Radium 228)

Selection variable: Data Set="Tronox"

17 values ranging from 0.258511 to 0.806476

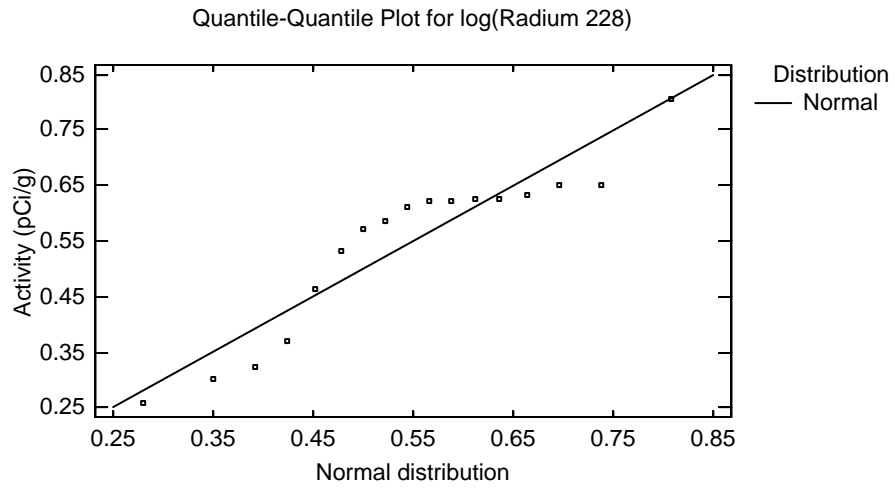
Fitted Distributions

<i>Normal</i>
mean = 0.544152
standard deviation = 0.149728



**Tests for Normality for log(Radium 228)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.883983	0.0366511



**DRAFT**

**Uncensored Data - Radium 228 (Data Set="Tronox"&Depth Value=0)**

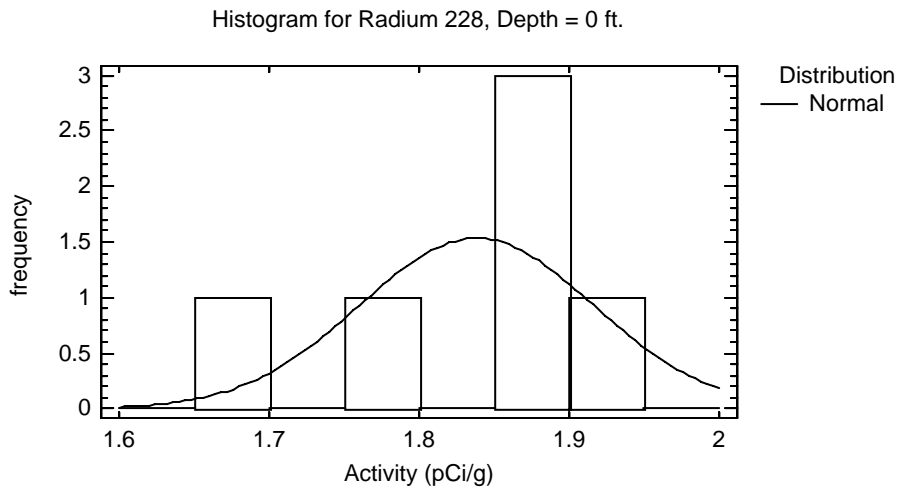
Data variable: Radium 228

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 1.7 to 1.92

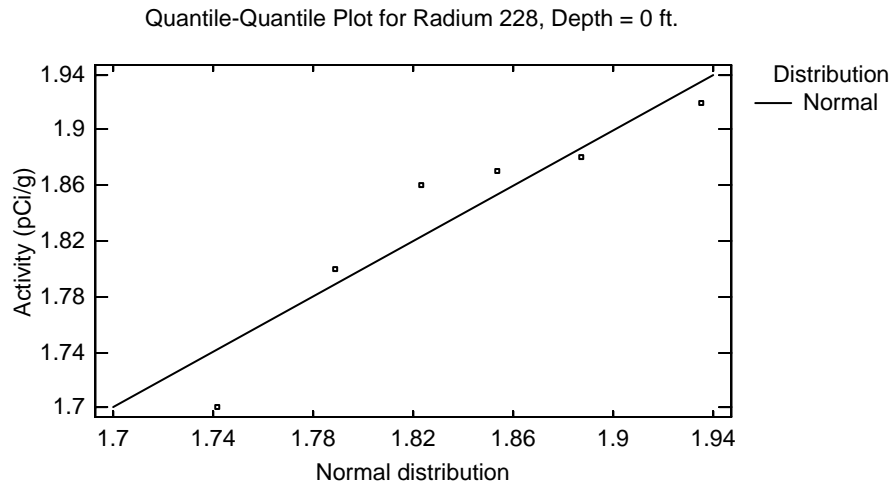
Fitted Distributions

<i>Normal</i>
mean = 1.83833
standard deviation = 0.0780812



**Tests for Normality for Radium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.891001	0.31893



**DRAFT**

**Uncensored Data - log(Radium 228) (Data Set="Tronox"&Depth Value=0)**

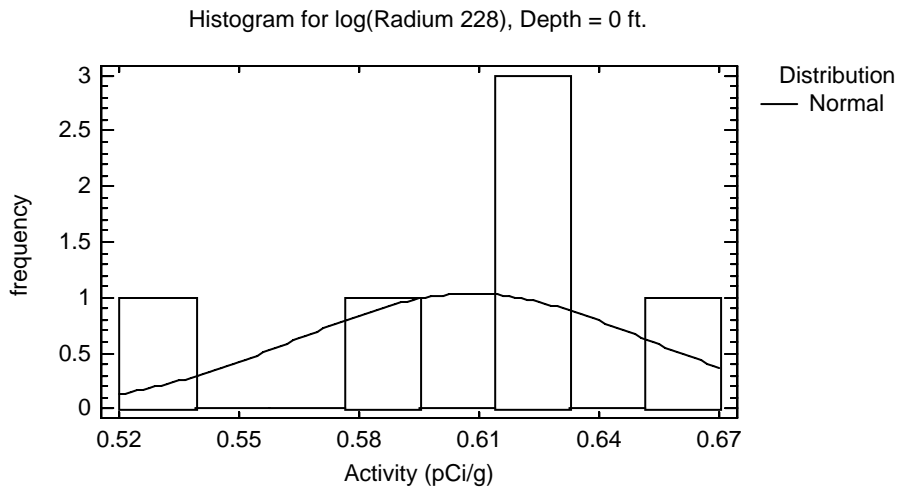
Data variable: log(Radium 228)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.530628 to 0.652325

Fitted Distributions

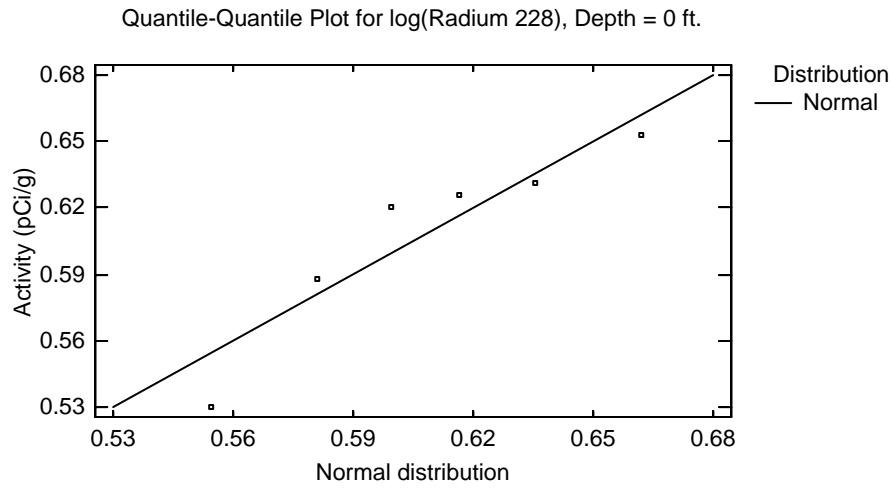
<i>Normal</i>
mean = 0.608088
standard deviation = 0.0433155



**Tests for Normality for log(Radium 228)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.881453	0.272712





**DRAFT**

**Uncensored Data - Radium 228 (Data Set="Tronox"&Depth Value=5)**

Data variable: Radium 228

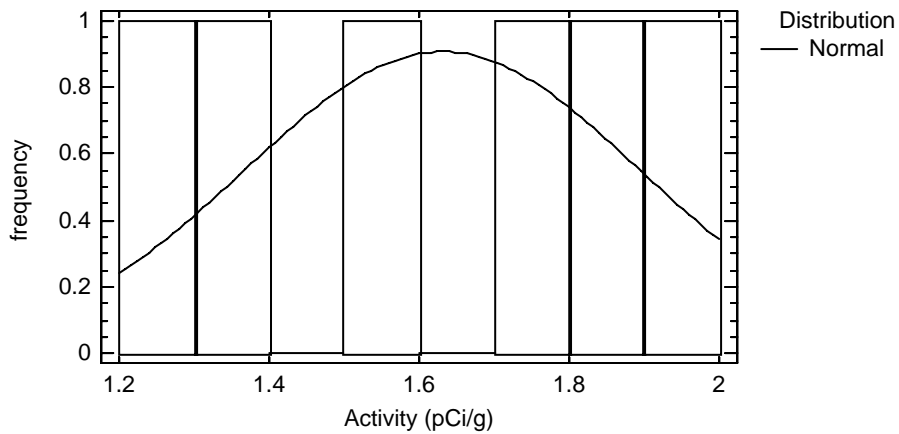
Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 1.295 to 1.92

Fitted Distributions

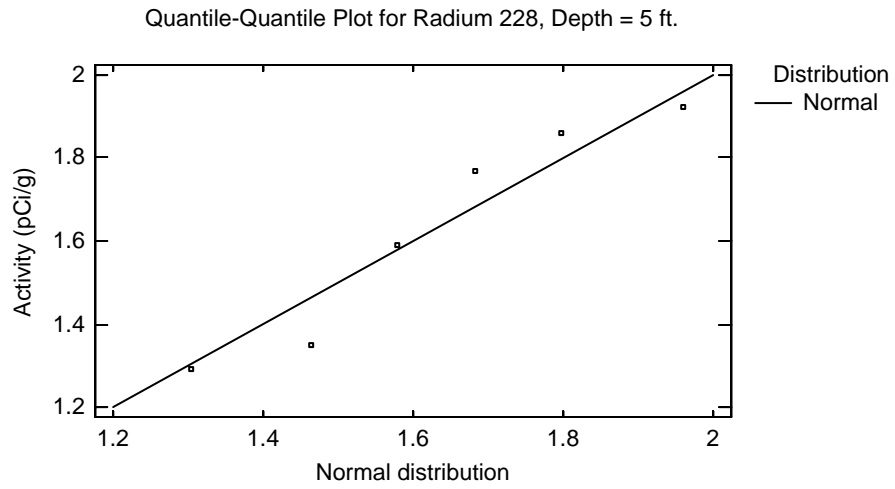
<i>Normal</i>
mean = 1.63083
standard deviation = 0.264129

Histogram for Radium 228, Depth = 5 ft.



**Tests for Normality for Radium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.901578	0.371



**DRAFT**

**Uncensored Data - log(Radium 228) (Data Set="Tronox"&Depth Value=5)**

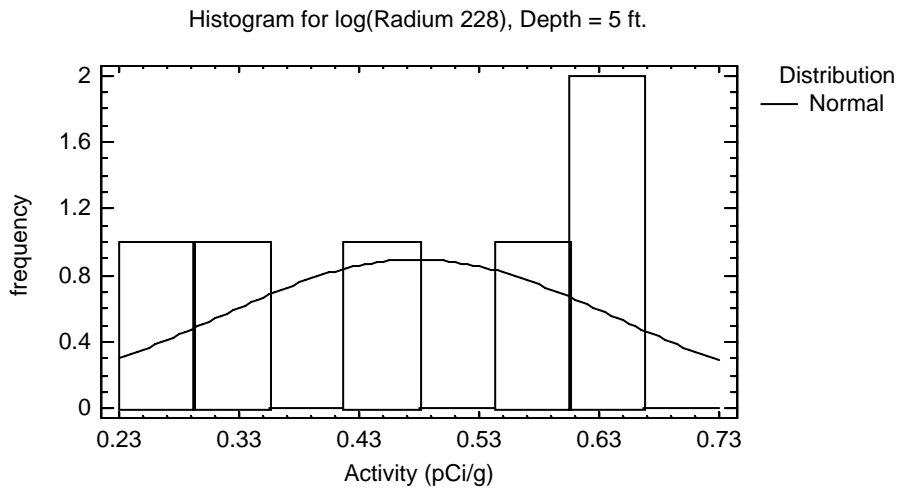
Data variable: log(Radium 228)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.258511 to 0.652325

Fitted Distributions

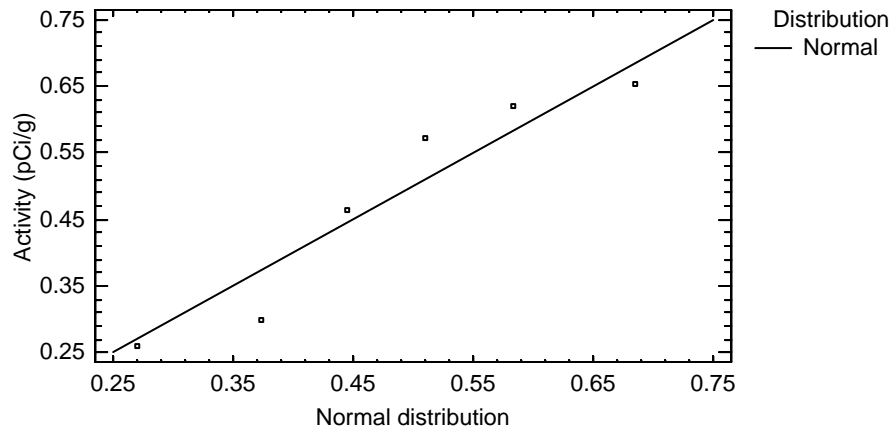
<i>Normal</i>
mean = 0.477705
standard deviation = 0.166966



**Tests for Normality for log(Radium 228)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.891799	0.322832

Quantile-Quantile Plot for log(Radium 228), Depth = 5 ft.



**DRAFT**

**Two-Sample Comparison - Radium 228 & Depth Name (Data Set="Tronox"&Depth Value <=5) for Radium 228**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from 1.7 to 1.92

Sample 2: 6 values ranging from 1.295 to 1.92

**Comparison of Means for Radium 228**

95.0% confidence interval for mean of Depth Name=0 ft.: 1.83833 +/- 0.0819414 [1.75639, 1.92027]

95.0% confidence interval for mean of Depth Name=05 ft.: 1.63083 +/- 0.277187 [1.35365, 1.90802]

95.0% confidence interval for the difference between the means

not assuming equal variances: 0.2075 +/- 0.276655 [-0.0691551, 0.484155]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 1.84538 P-value = 0.115631

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Radium 228**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.0780812	0.264129
Variance	0.00609667	0.0697642
Df	5	5

Ratio of Variances = 0.0873897

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.0487389, 0.191503]

Standard deviation of Depth Name=05 ft.: [0.164871, 0.647807]

Ratio of Variances: [0.0122285, 0.624523]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.0873897 P-value = 0.0182082

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.5 Thorium 228**

**Uncensored Data - Thorium 228 (Data Set="Tronox")**

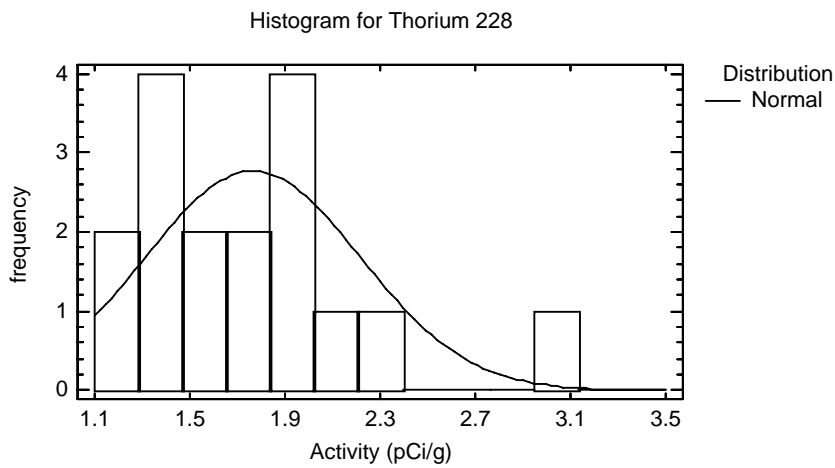
Data variable: Thorium 228

Selection variable: Data Set="Tronox"

17 values ranging from 1.24 to 3.04

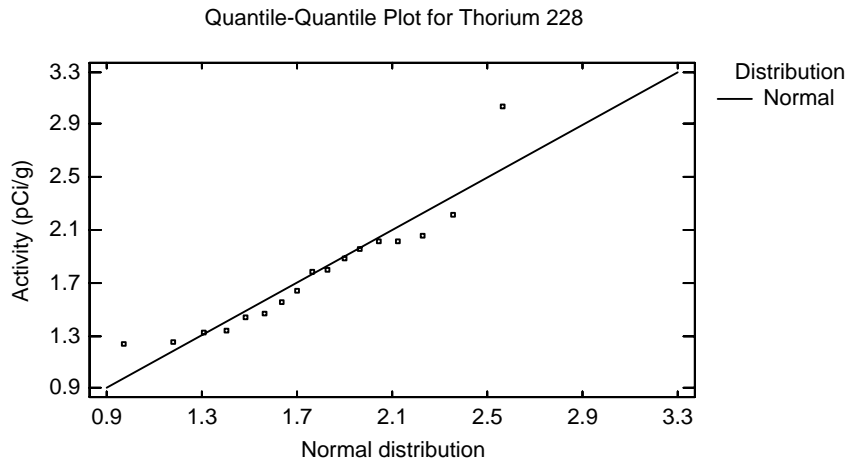
Fitted Distributions

<i>Normal</i>
mean = 1.76529
standard deviation = 0.452274



**Tests for Normality for Thorium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.888175	0.0431876





**DRAFT**

**Uncensored Data - log(Thorium 228) (Data Set="Tronox")**

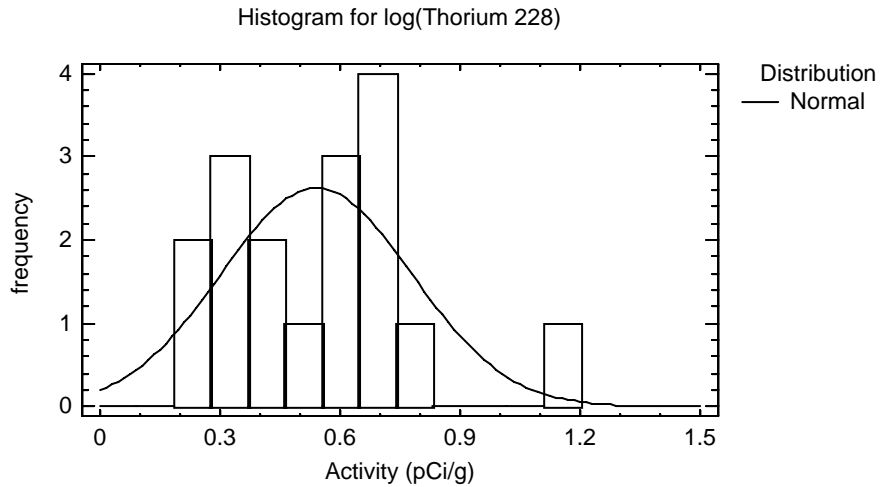
Data variable: log(Thorium 228)

Selection variable: Data Set="Tronox"

17 values ranging from 0.215111 to 1.11186

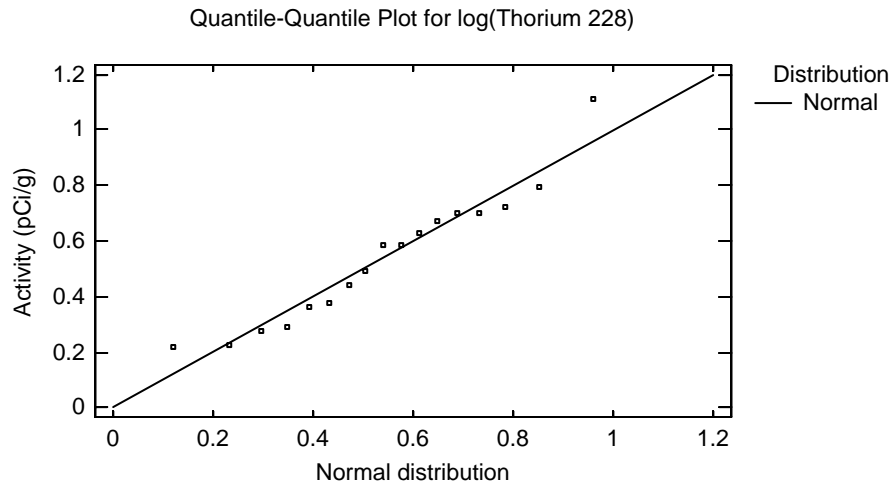
Fitted Distributions

<i>Normal</i>
mean = 0.54042
standard deviation = 0.238748



**Tests for Normality for log(Thorium 228)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.944557	0.374833



**DRAFT**

**Uncensored Data - Thorium 228 (Data Set="Tronox"&Depth Value=0)**

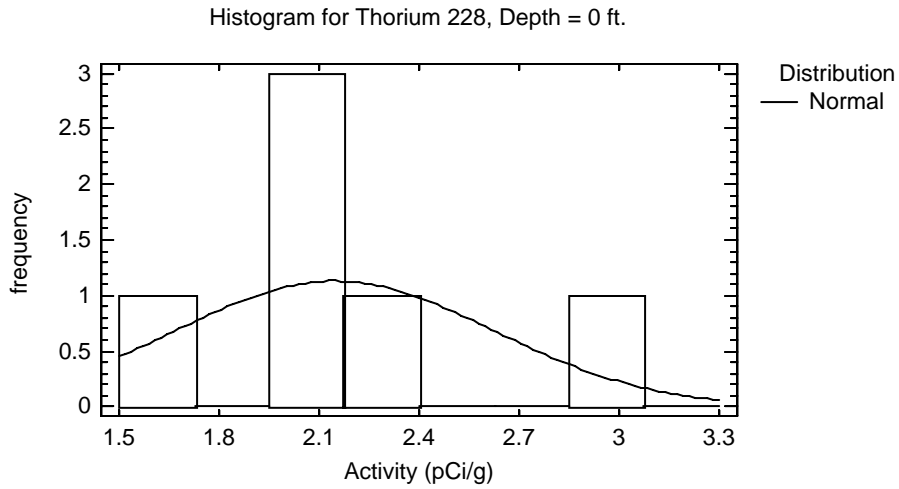
Data variable: Thorium 228

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 1.64 to 3.04

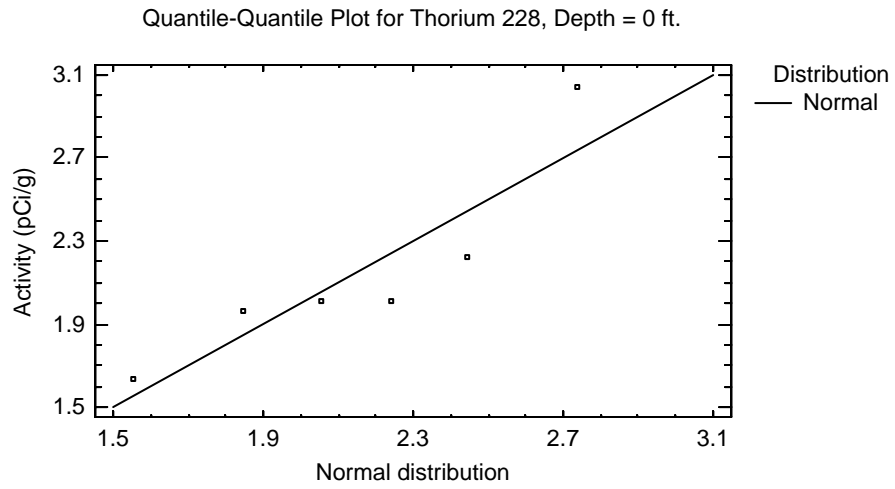
Fitted Distributions

<i>Normal</i>
mean = 2.14667
standard deviation = 0.475885



**Tests for Normality for Thorium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.836596	0.113335



**DRAFT**

**Uncensored Data - log(Thorium 228) (Data Set="Tronox"&Depth Value=0)**

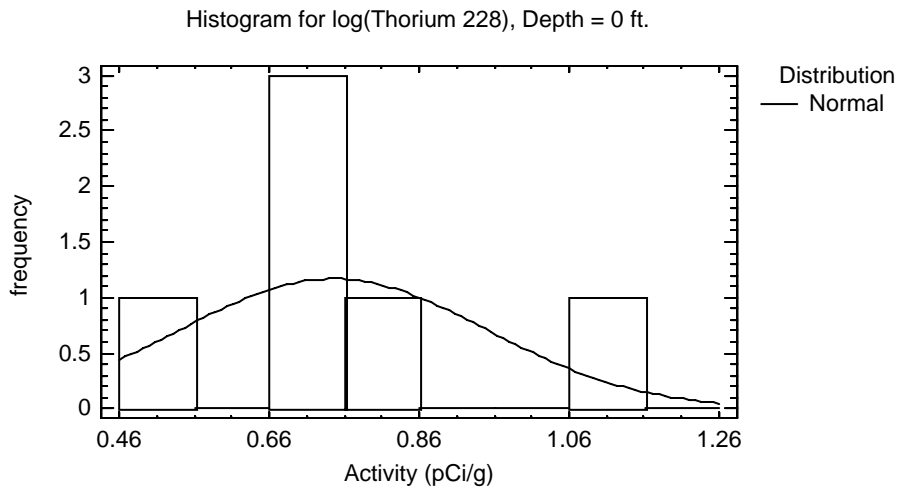
Data variable: log(Thorium 228)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.494696 to 1.11186

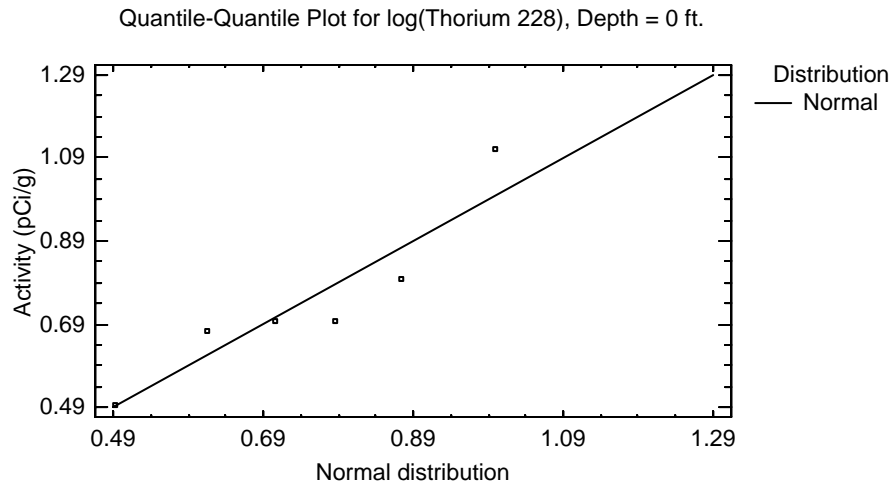
Fitted Distributions

<i>Normal</i>
mean = 0.745546
standard deviation = 0.204732



**Tests for Normality for log(Thorium 228)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.889859	0.313339



**DRAFT**

**Uncensored Data - Thorium 228 (Data Set="Tronox"&Depth Value=5)**

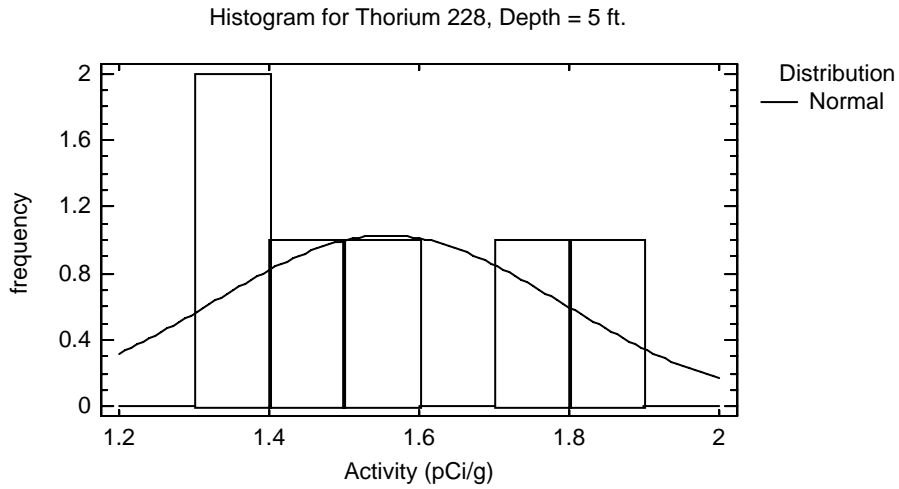
Data variable: Thorium 228

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 1.32 to 1.88

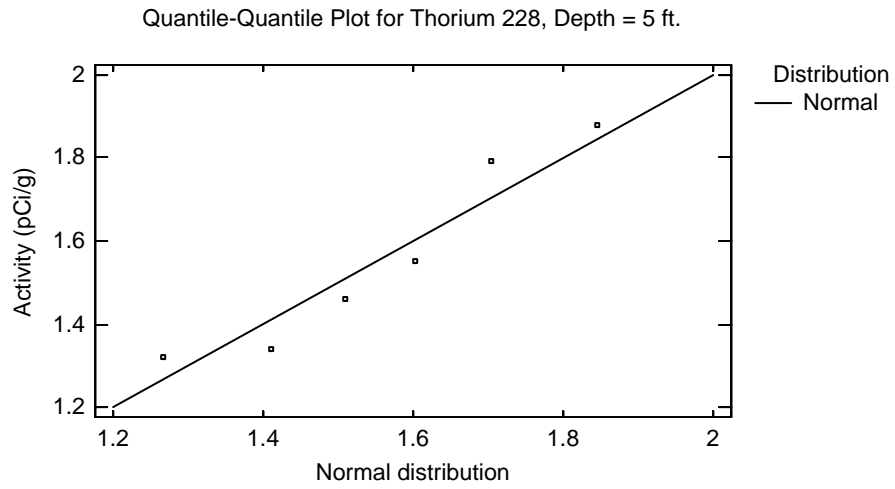
Fitted Distributions

<i>Normal</i>
mean = 1.55667
standard deviation = 0.232952



**Tests for Normality for Thorium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.900419	0.365675





**DRAFT**

**Uncensored Data - log(Thorium 228) (Data Set="Tronox"&Depth Value=5)**

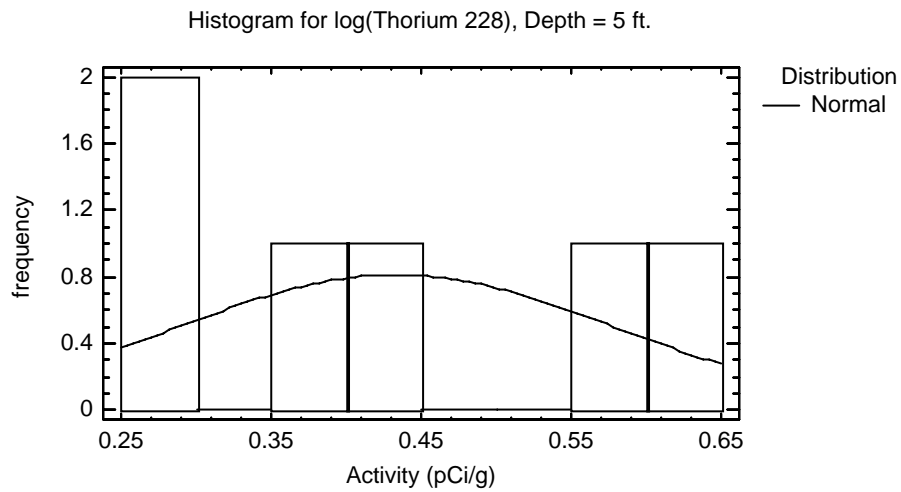
Data variable: log(Thorium 228)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.277632 to 0.631272

Fitted Distributions

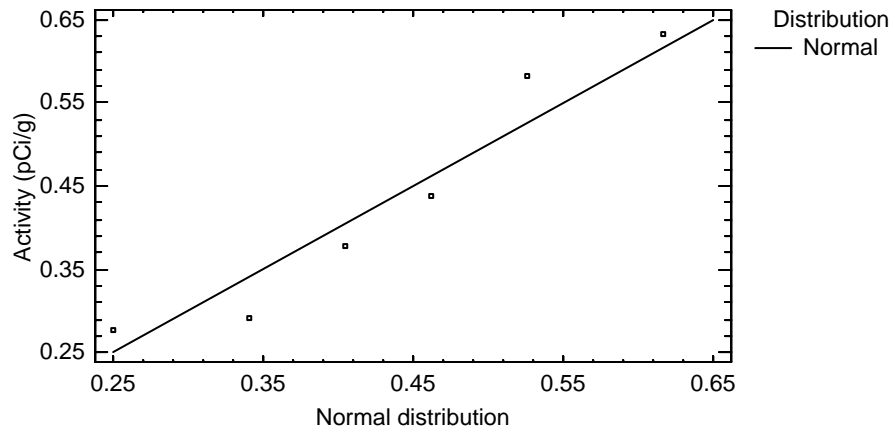
<i>Normal</i>
mean = 0.433413
standard deviation = 0.14725



**Tests for Normality for log(Thorium 228)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.90891	0.41223

Quantile-Quantile Plot for log(Thorium 228), Depth = 5 ft.



**DRAFT**

**Two-Sample Comparison - log(Thorium 228) & Depth Name (Data Set="Tronox"&Depth Value <=5) for log(Thorium 228)**

Sample 1: Depth Name=0 ft.  
 Sample 2: Depth Name=05 ft.  
 Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from 0.494696 to 1.11186  
 Sample 2: 6 values ranging from 0.277632 to 0.631272

**Comparison of Means for log(Thorium 228)**

95.0% confidence interval for mean of Depth Name=0 ft.: 0.745546 +/- 0.214854 [0.530692, 0.9604]  
 95.0% confidence interval for mean of Depth Name=05 ft.: 0.433413 +/- 0.15453 [0.278884, 0.587943]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: 0.312132 +/- 0.229398 [0.082735, 0.54153]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = 3.03175 P-value = 0.0126393  
 Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 228)**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.204732	0.14725
Variance	0.0419153	0.0216825
Df	5	5

Ratio of Variances = 1.93313

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.127795, 0.502129]  
 Standard deviation of Depth Name=05 ft.: [0.0919146, 0.361147]  
 Ratio of Variances: [0.270504, 13.815]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 1.93313 P-value = 0.486839  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.6 Thorium 230**

**Uncensored Data - Thorium 230 (Data Set="Tronox")**

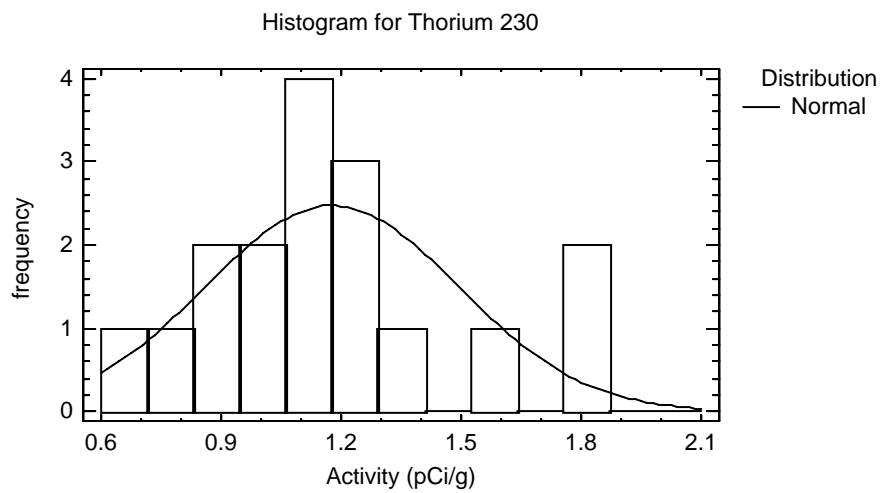
Data variable: Thorium 230

Selection variable: Data Set="Tronox"

17 values ranging from 0.687 to 1.85

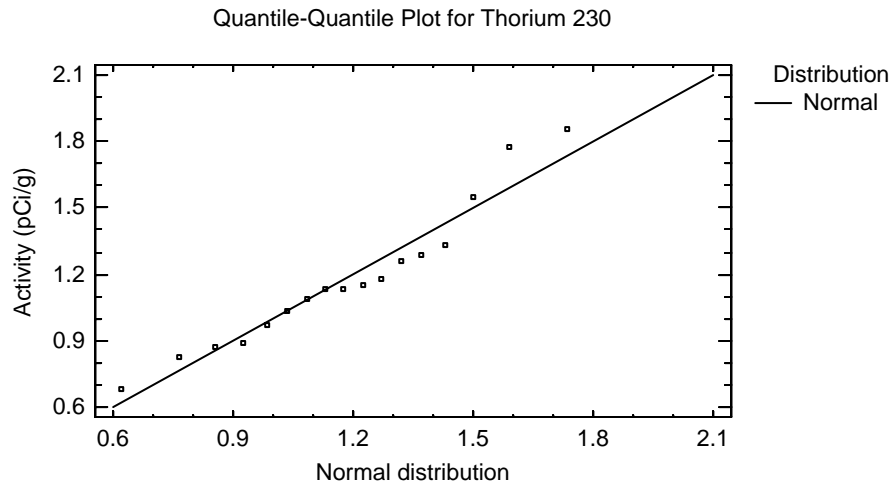
Fitted Distributions

<i>Normal</i>
mean = 1.17718
standard deviation = 0.31626



**Tests for Normality for Thorium 230**

Test	Statistic	P-Value
Shapiro-Wilk W	0.940598	0.325729



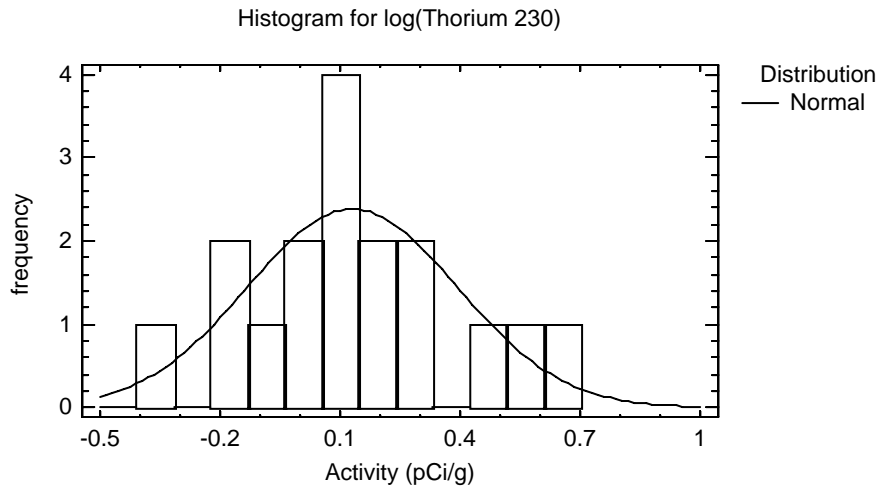
**DRAFT**

**Uncensored Data - log(Thorium 230) (Data Set="Tronox")**

Data variable: log(Thorium 230)  
 Selection variable: Data Set="Tronox"  
 17 values ranging from -0.375421 to 0.615186

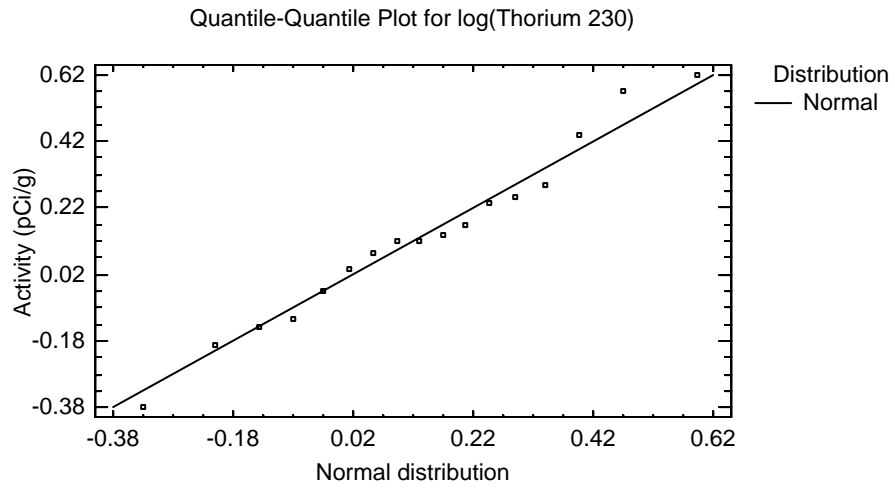
Fitted Distributions

<i>Normal</i>
mean = 0.130421
standard deviation = 0.262564



**Tests for Normality for log(Thorium 230)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.978412	0.91946



**DRAFT**

**Uncensored Data - Thorium 230 (Data Set="Tronox"&Depth Value=0)**

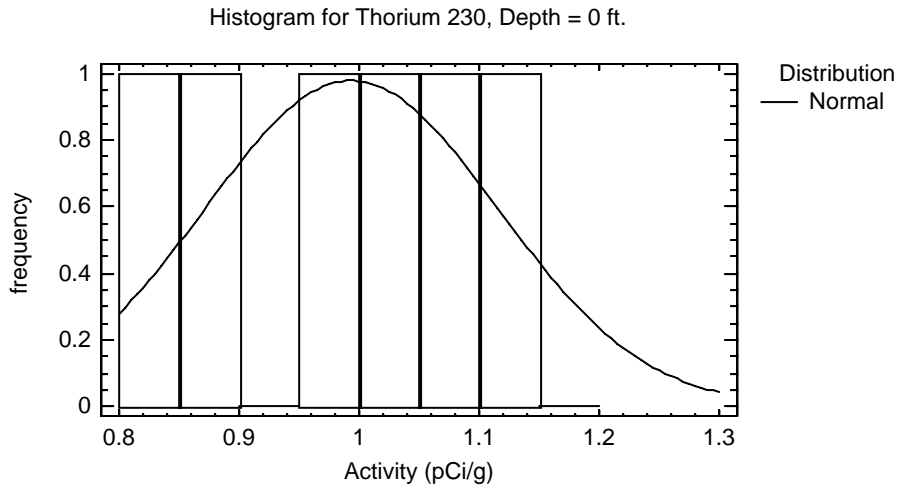
Data variable: Thorium 230

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.824 to 1.15

Fitted Distributions

<i>Normal</i>
mean = 0.993667
standard deviation = 0.122425

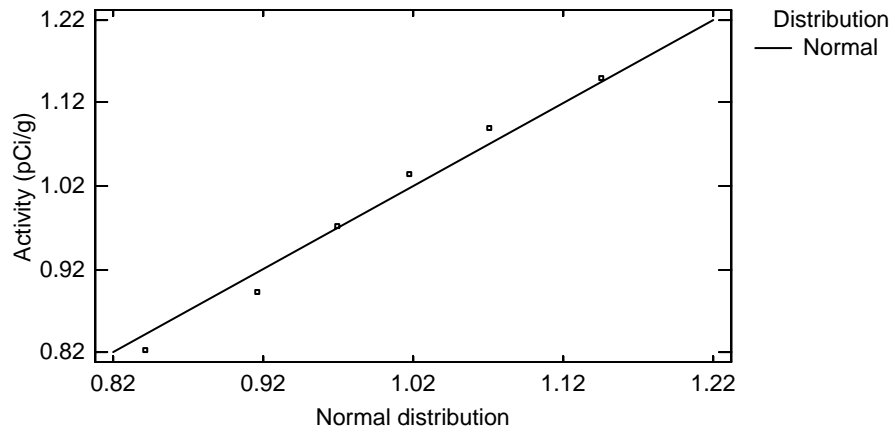


**Tests for Normality for Thorium 230**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.977364	0.929116



Quantile-Quantile Plot for Thorium 230, Depth = 0 ft.



**DRAFT**

**Uncensored Data - log(Thorium 230) (Data Set="Tronox"&Depth Value=0)**

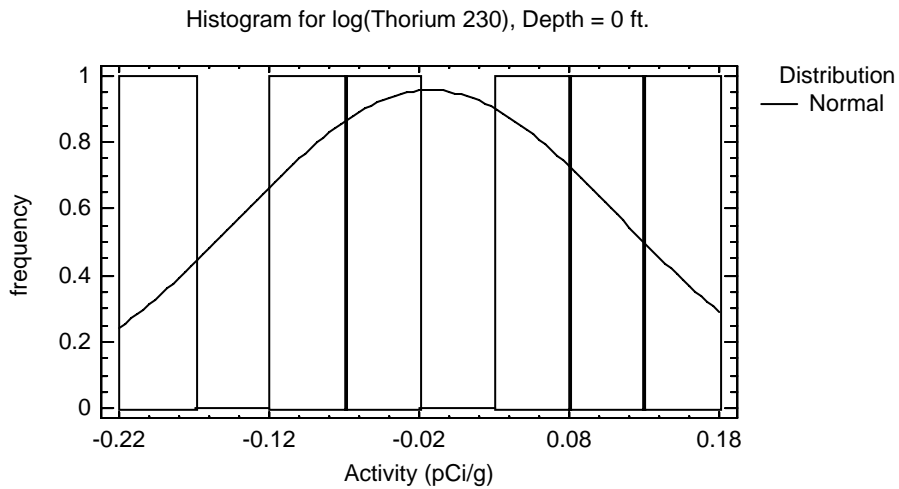
Data variable: log(Thorium 230)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from -0.193585 to 0.139762

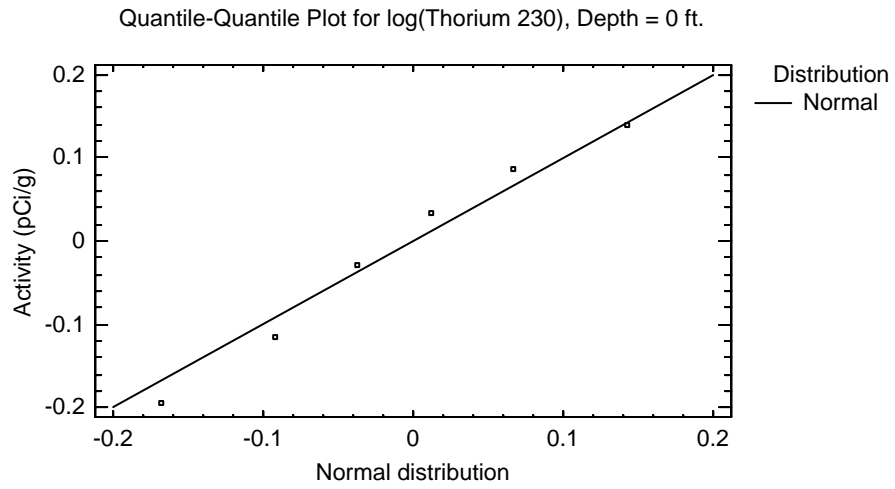
Fitted Distributions

<i>Normal</i>
mean = -0.0128165
standard deviation = 0.125248



**Tests for Normality for log(Thorium 230)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.971447	0.896419



**DRAFT**

**Uncensored Data - Thorium 230 (Data Set="Tronox"&Depth Value=5)**

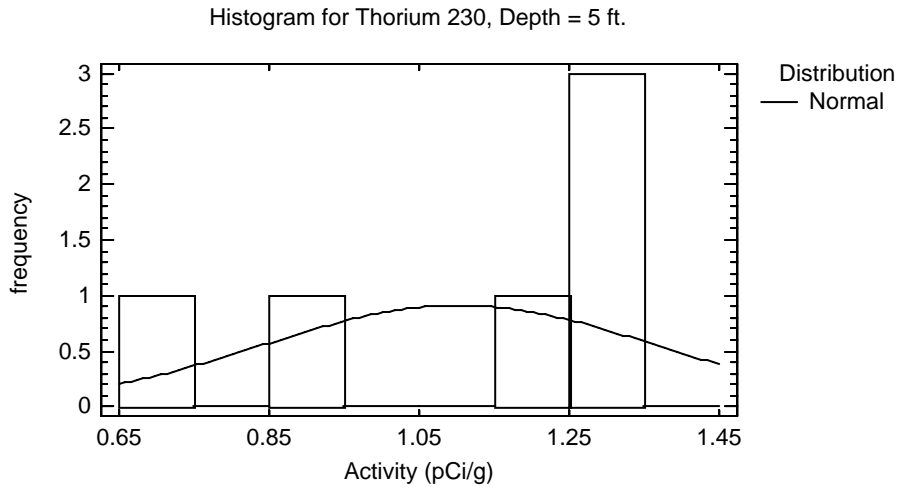
Data variable: Thorium 230

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.687 to 1.33

Fitted Distributions

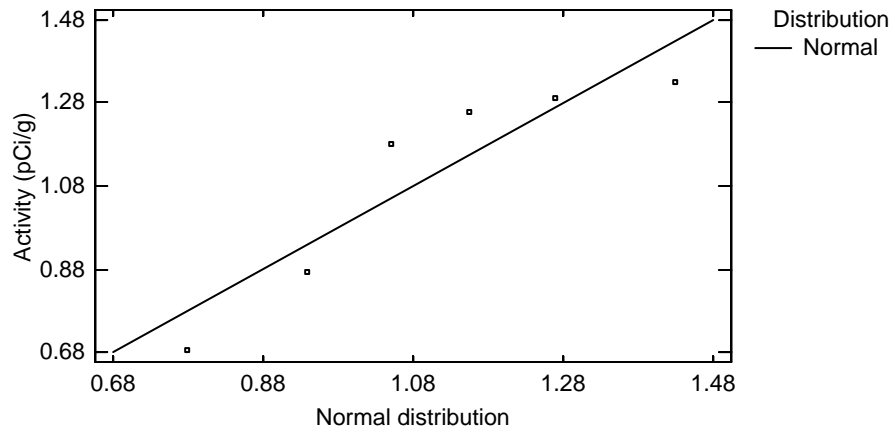
<i>Normal</i>
mean = 1.10333
standard deviation = 0.261928



**Tests for Normality for Thorium 230**

Test	Statistic	P-Value
Shapiro-Wilk W	0.842289	0.12727

Quantile-Quantile Plot for Thorium 230, Depth = 5 ft.



**DRAFT**

**Uncensored Data - log(Thorium 230) (Data Set="Tronox"&Depth Value=5)**

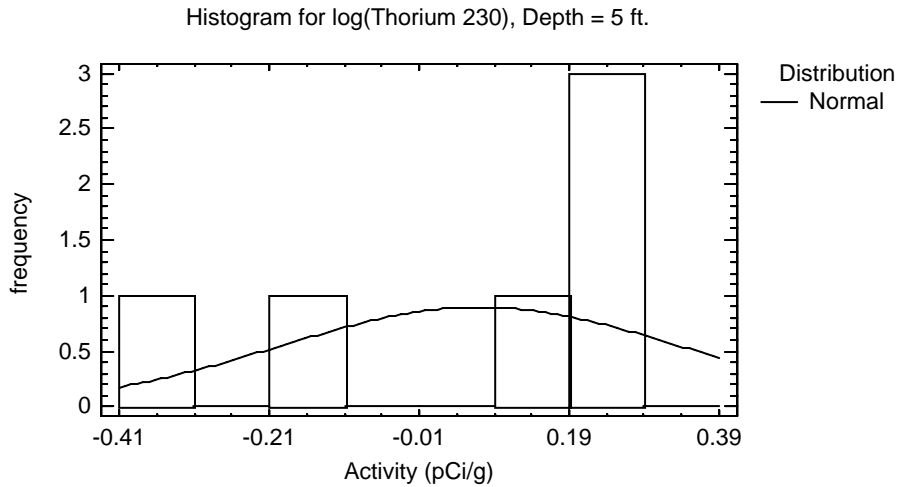
Data variable: log(Thorium 230)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from -0.375421 to 0.285179

Fitted Distributions

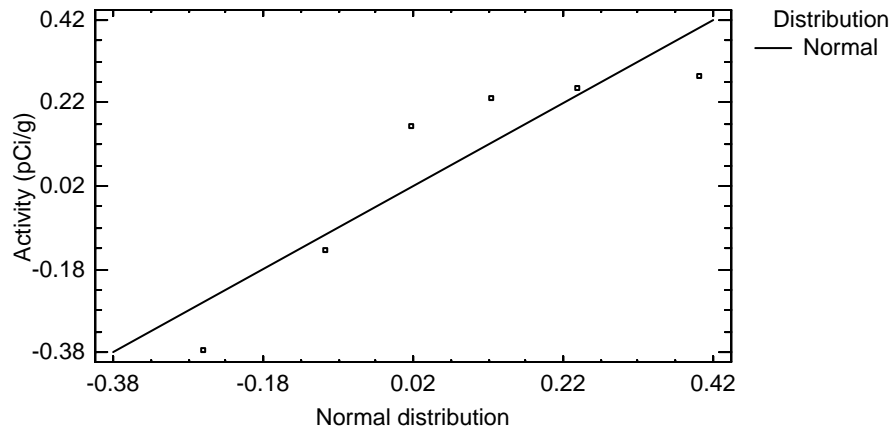
<i>Normal</i>
mean = 0.0708678
standard deviation = 0.26692



**Tests for Normality for log(Thorium 230)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.818978	0.0794483

Quantile-Quantile Plot for log(Thorium 230), Depth = 5 ft.



**DRAFT**

**Two-Sample Comparison - Thorium 230 & Depth Name (Data Set="Tronox"&Depth Value <=5) for Thorium 230**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from 0.824 to 1.15

Sample 2: 6 values ranging from 0.687 to 1.33

**Comparison of Means for Thorium 230**

95.0% confidence interval for mean of Depth Name=0 ft.: 0.993667 +/- 0.128477 [0.865189, 1.12214]

95.0% confidence interval for mean of Depth Name=05 ft.: 1.10333 +/- 0.274877 [0.828456, 1.37821]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.109667 +/- 0.263 [-0.372667, 0.153333]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -0.9291 P-value = 0.374721

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Thorium 230**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.122425	0.261928
Variance	0.0149879	0.0686063
Df	5	5

Ratio of Variances = 0.218462

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.0764186, 0.300261]

Standard deviation of Depth Name=05 ft.: [0.163498, 0.642408]

Ratio of Variances: [0.0305694, 1.56122]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.218462 P-value = 0.120499

Do not reject the null hypothesis for alpha = 0.05.



**DRAFT**

**5.7 Thorium 232**

**Uncensored Data - Thorium 232 (Data Set="Tronox")**

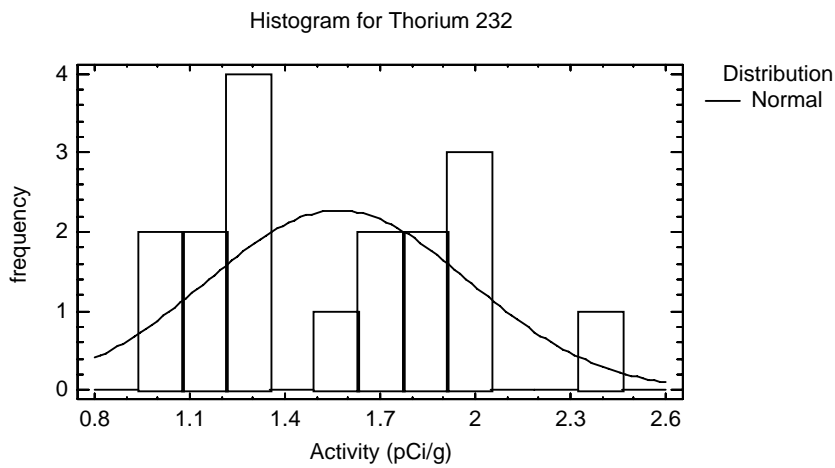
Data variable: Thorium 232

Selection variable: Data Set="Tronox"

17 values ranging from 0.965 to 2.42

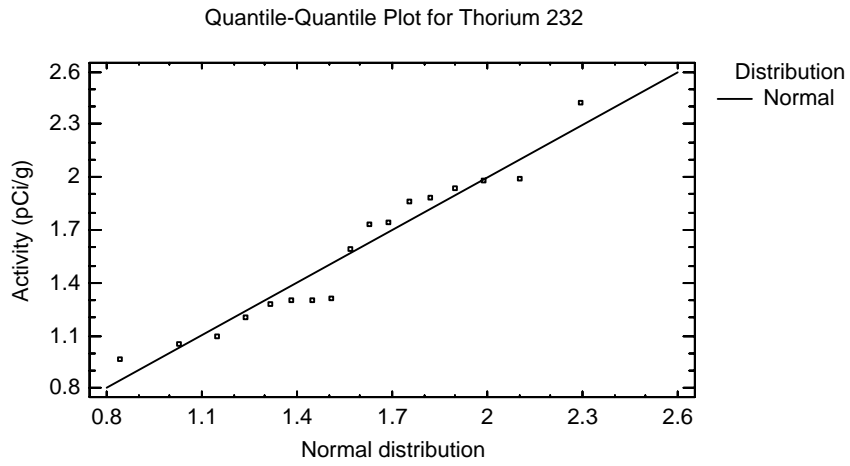
Fitted Distributions

<i>Normal</i>
mean = 1.56676
standard deviation = 0.413109



**Tests for Normality for Thorium 232**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.940312	0.322397



**DRAFT**

**Uncensored Data - log(Thorium 232) (Data Set="Tronox")**

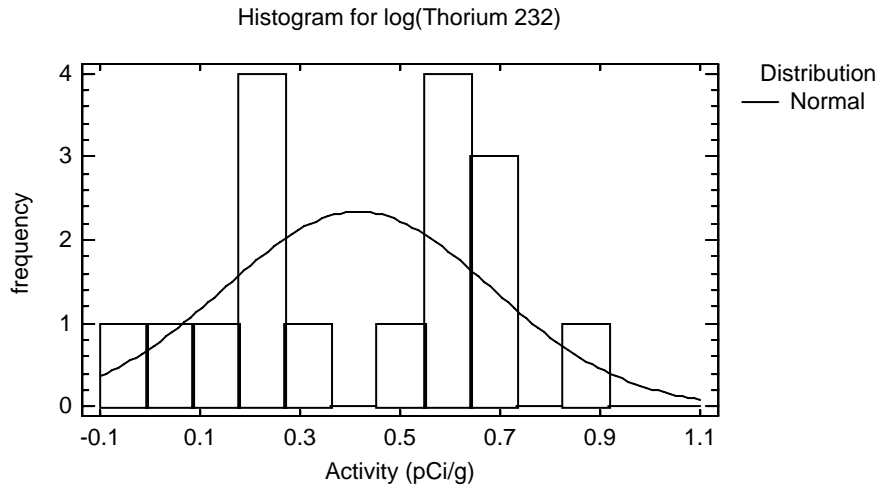
Data variable: log(Thorium 232)

Selection variable: Data Set="Tronox"

17 values ranging from -0.0356272 to 0.883768

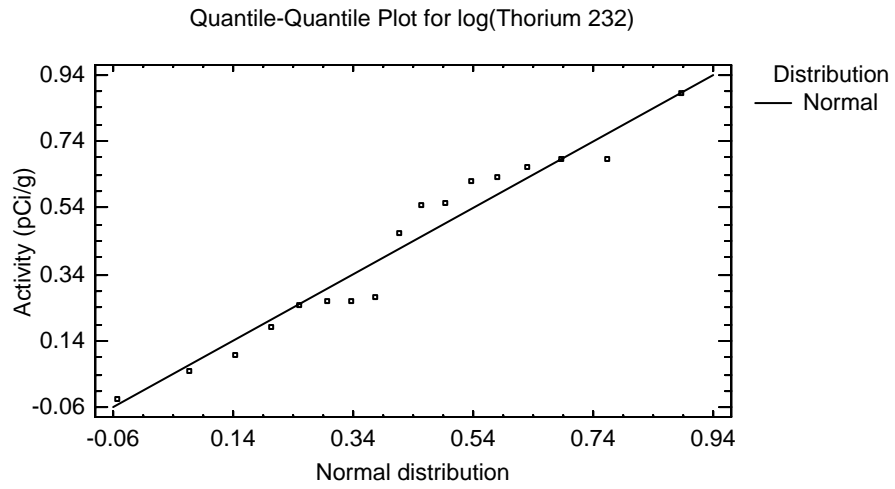
Fitted Distributions

<i>Normal</i>
mean = 0.415746
standard deviation = 0.267556



**Tests for Normality for log(Thorium 232)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.945566	0.388245



**DRAFT**

**Uncensored Data - Thorium 232 (Data Set="Tronox"&Depth Value=0)**

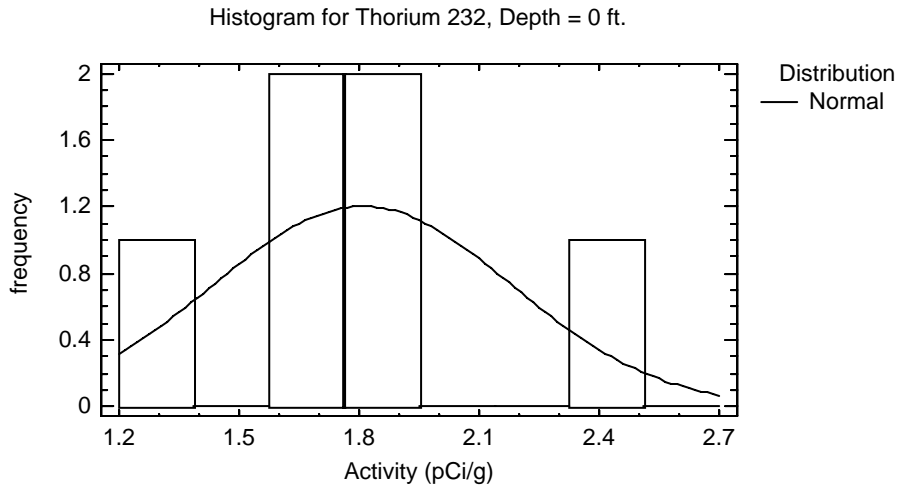
Data variable: Thorium 232

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 1.31 to 2.42

Fitted Distributions

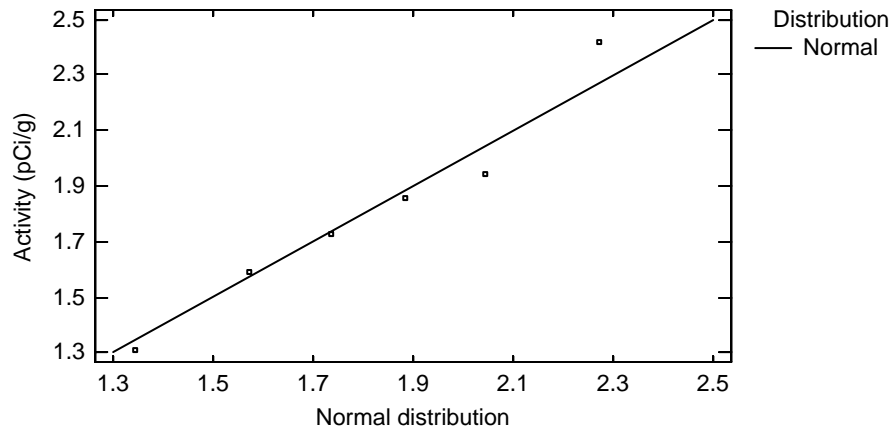
<i>Normal</i>
mean = 1.80833
standard deviation = 0.373171



**Tests for Normality for Thorium 232**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.973785	0.909567

Quantile-Quantile Plot for Thorium 232, Depth = 0 ft.



**DRAFT**

**Uncensored Data - log(Thorium 232) (Data Set="Tronox"&Depth Value=0)**

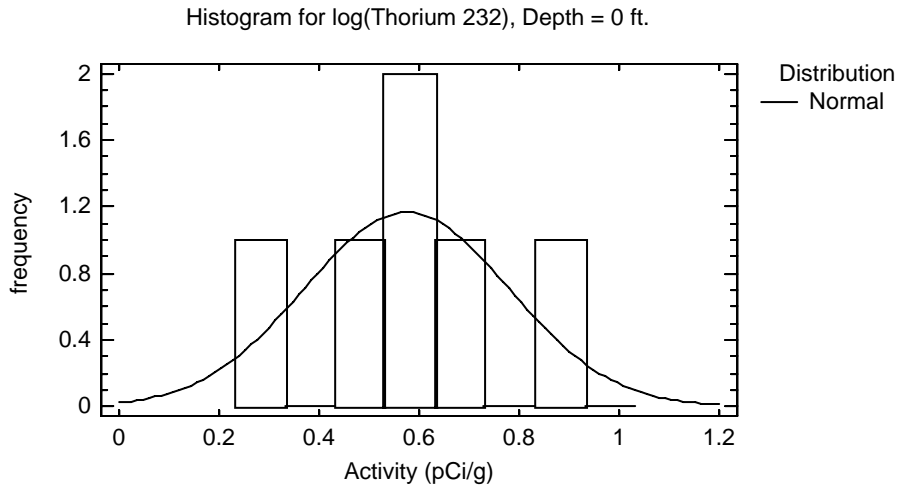
Data variable: log(Thorium 232)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.270027 to 0.883768

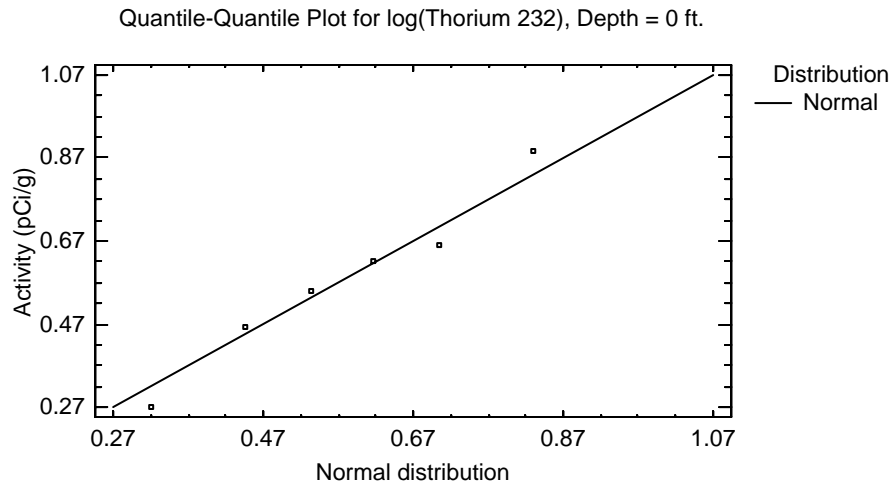
Fitted Distributions

<i>Normal</i>
mean = 0.574819
standard deviation = 0.205531



**Tests for Normality for log(Thorium 232)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.988206	0.980582





**DRAFT**

**Uncensored Data - Thorium 232 (Data Set="Tronox"&Depth Value=5)**

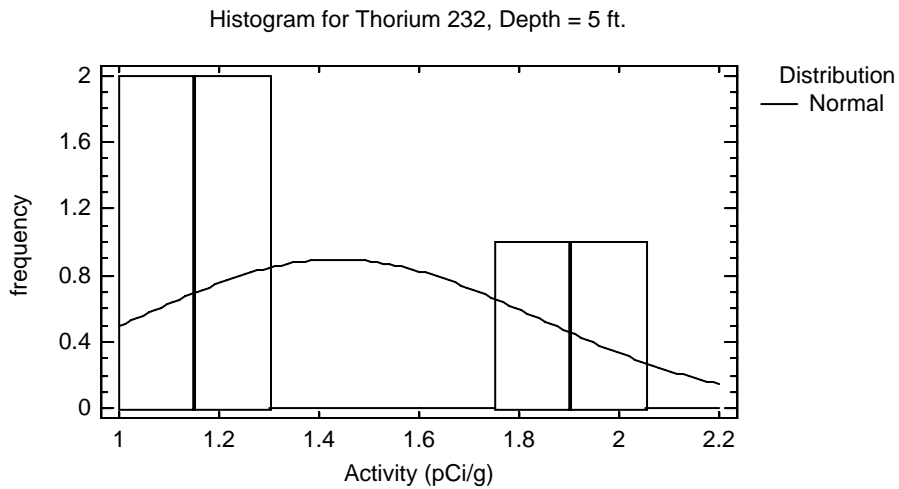
Data variable: Thorium 232

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 1.05 to 1.99

Fitted Distributions

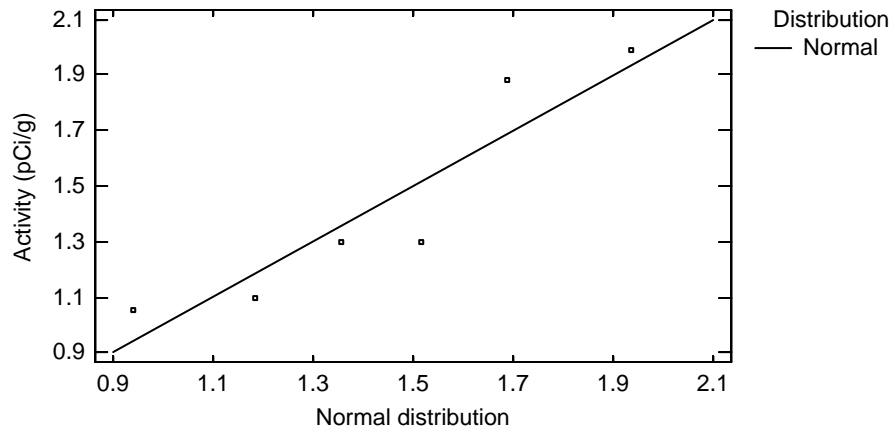
<i>Normal</i>
mean = 1.43667
standard deviation = 0.400733



**Tests for Normality for Thorium 232**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.844351	0.132733

Quantile-Quantile Plot for Thorium 232, Depth = 5 ft.



**DRAFT**

**Uncensored Data - log(Thorium 232) (Data Set="Tronox"&Depth Value=5)**

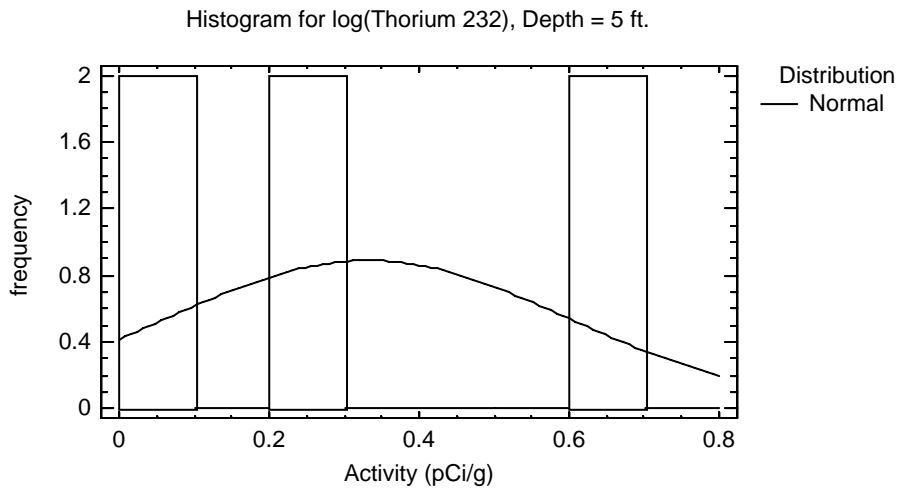
Data variable: log(Thorium 232)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.0487902 to 0.688135

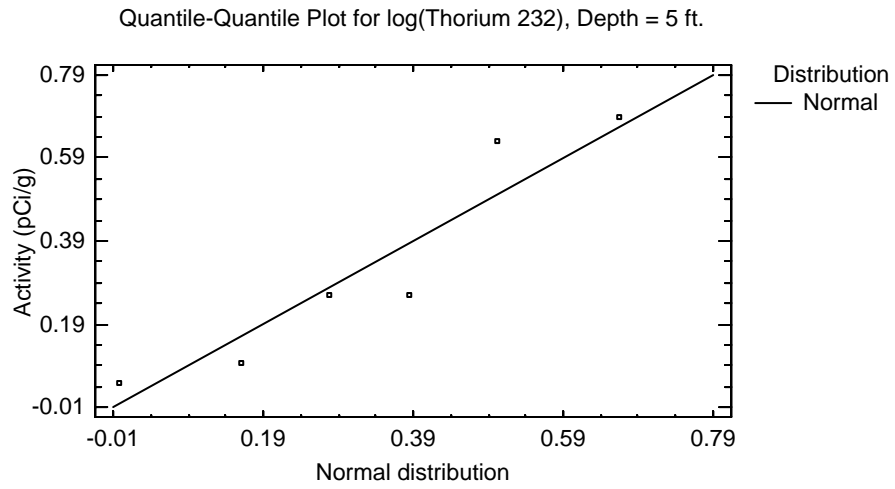
Fitted Distributions

<i>Normal</i>
mean = 0.331373
standard deviation = 0.269192



**Tests for Normality for log(Thorium 232)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.870338	0.222699



**DRAFT**

**Two-Sample Comparison - log(Thorium 232) & Depth Name (Data Set="Tronox"&Depth Value <=5) for log(Thorium 232)**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from 0.270027 to 0.883768

Sample 2: 6 values ranging from 0.0487902 to 0.688135

**Comparison of Means for log(Thorium 232)**

95.0% confidence interval for mean of Depth Name=0 ft.: 0.574819 +/- 0.215692 [0.359127, 0.790511]

95.0% confidence interval for mean of Depth Name=05 ft.: 0.331373 +/- 0.2825 [0.0488722, 0.613873]

95.0% confidence interval for the difference between the means

assuming equal variances: 0.243447 +/- 0.30808 [-0.064633, 0.551526]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 1.76069 P-value = 0.108781

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 232)**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.205531	0.269192
Variance	0.0422429	0.0724643
Df	5	5

Ratio of Variances = 0.582948

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.128294, 0.504088]

Standard deviation of Depth Name=05 ft.: [0.168032, 0.660224]

Ratio of Variances: [0.0815721, 4.16599]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.582948 P-value = 0.568102

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.8 Uranium 234**

**Uncensored Data - Uranium 234 (Data Set="Tronox")**

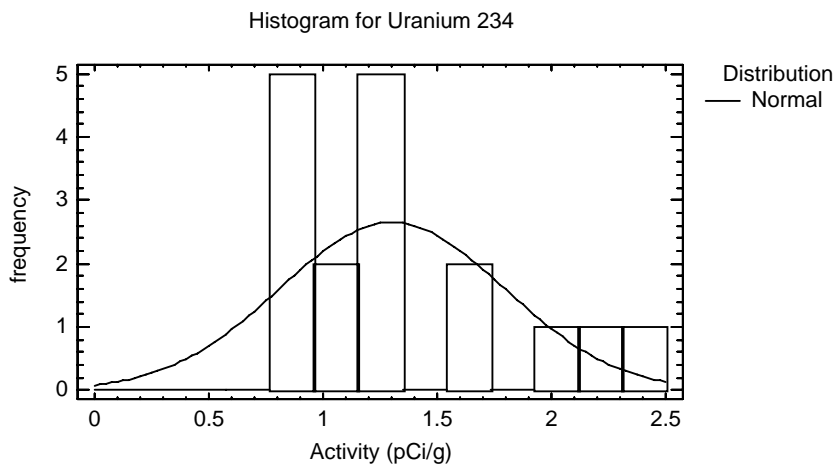
Data variable: Uranium 234

Selection variable: Data Set="Tronox"

17 values ranging from 0.775 to 2.36

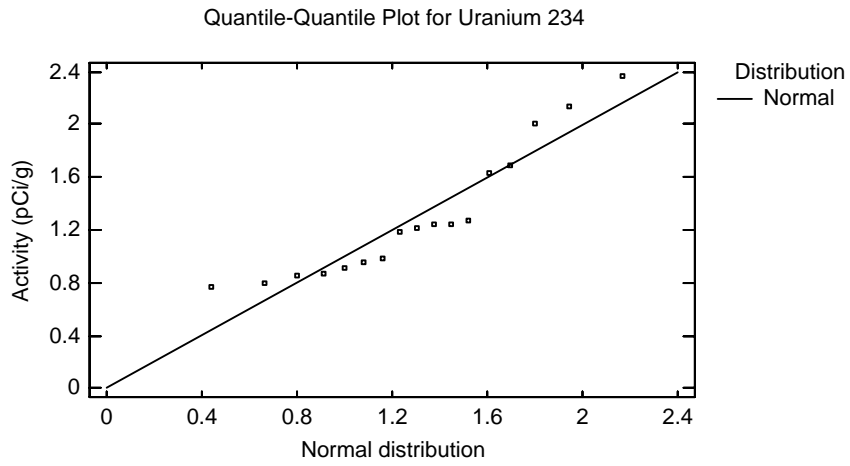
Fitted Distributions

<i>Normal</i>
mean = 1.30224
standard deviation = 0.49206



**Tests for Normality for Uranium 234**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.876218	0.0270733



**DRAFT**

**Uncensored Data - log(Uranium 234) (Data Set="Tronox")**

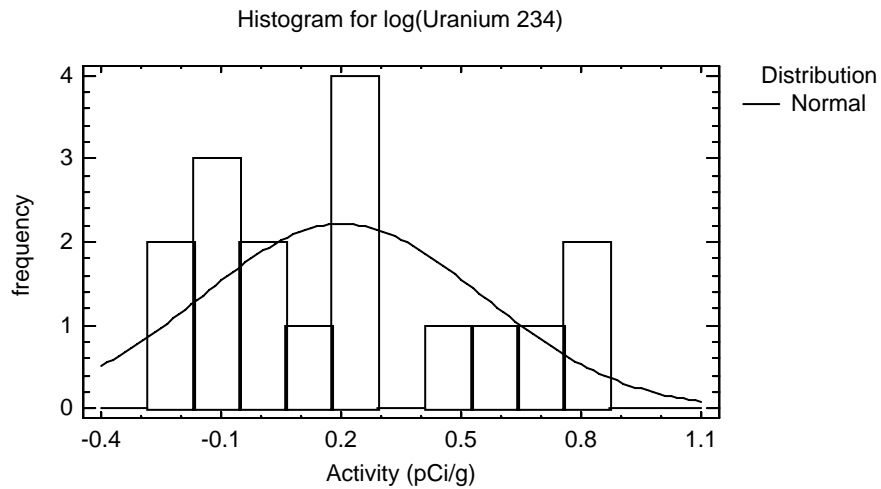
Data variable: log(Uranium 234)

Selection variable: Data Set="Tronox"

17 values ranging from -0.254892 to 0.858662

Fitted Distributions

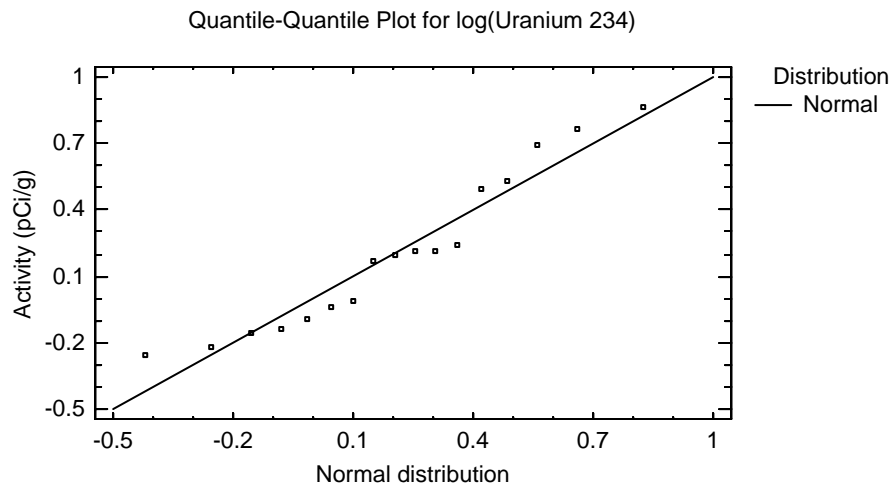
<i>Normal</i>
mean = 0.202938
standard deviation = 0.352944



**Tests for Normality for log(Uranium 234)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.92662	0.193707





**DRAFT**

**Uncensored Data - Uranium 234 (Data Set="Tronox"&Depth Value=0)**

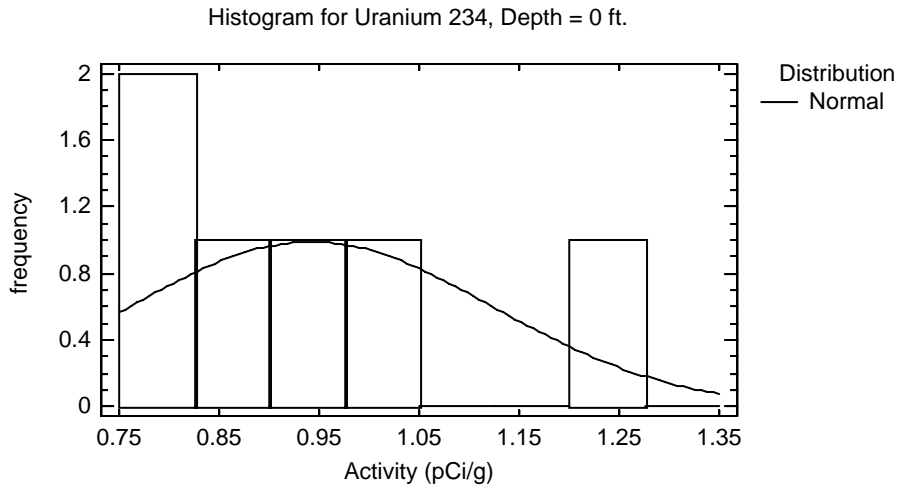
Data variable: Uranium 234

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.775 to 1.27

Fitted Distributions

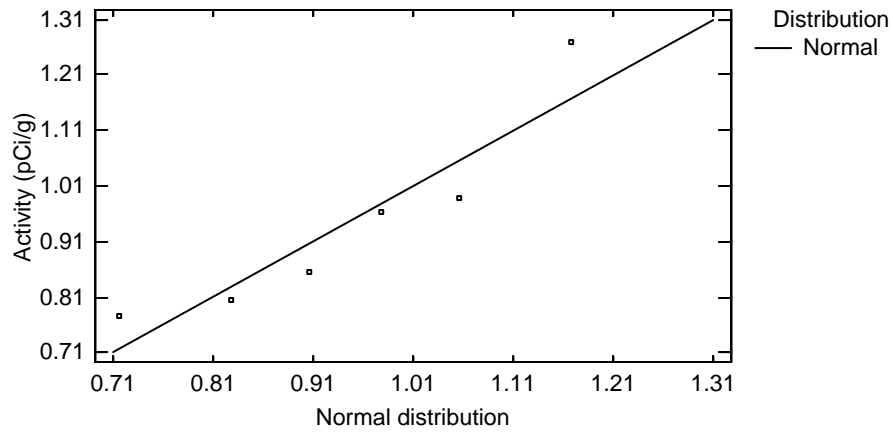
<i>Normal</i>
mean = 0.942
standard deviation = 0.181486



**Tests for Normality for Uranium 234**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.87283	0.233396

Quantile-Quantile Plot for Uranium 234, Depth = 0 ft.



**DRAFT**

**Uncensored Data - log(Uranium 234) (Data Set="Tronox"&Depth Value=0)**

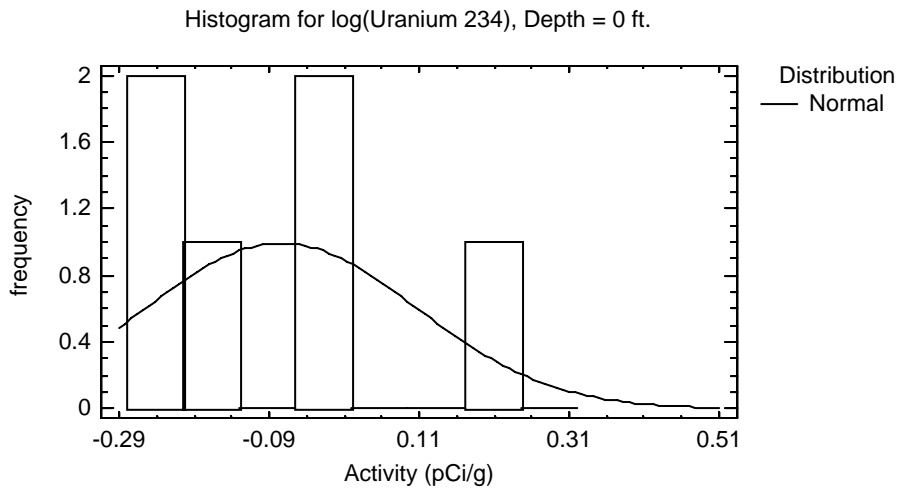
Data variable: log(Uranium 234)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from -0.254892 to 0.239017

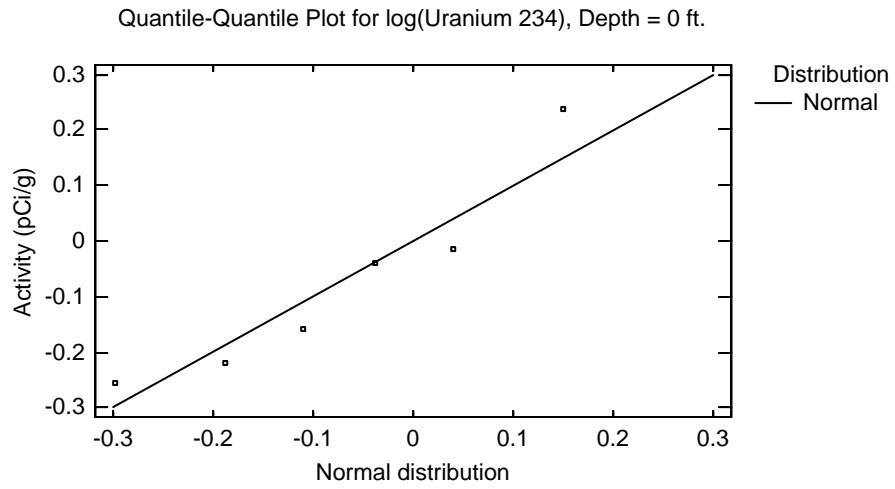
Fitted Distributions

<i>Normal</i>
mean = -0.0739469
standard deviation = 0.180811



**Tests for Normality for log(Uranium 234)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.909589	0.416702



**DRAFT**

**Uncensored Data - Uranium 234 (Data Set="Tronox"&Depth Value=5)**

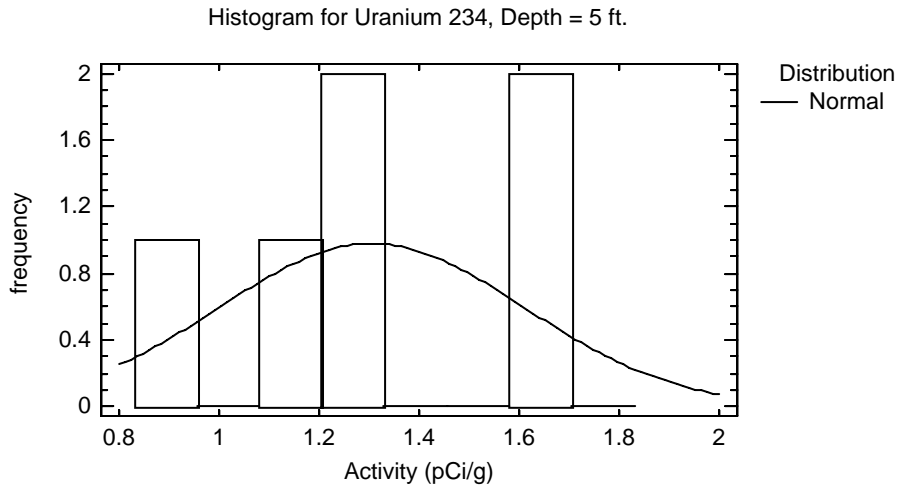
Data variable: Uranium 234

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.872 to 1.69

Fitted Distributions

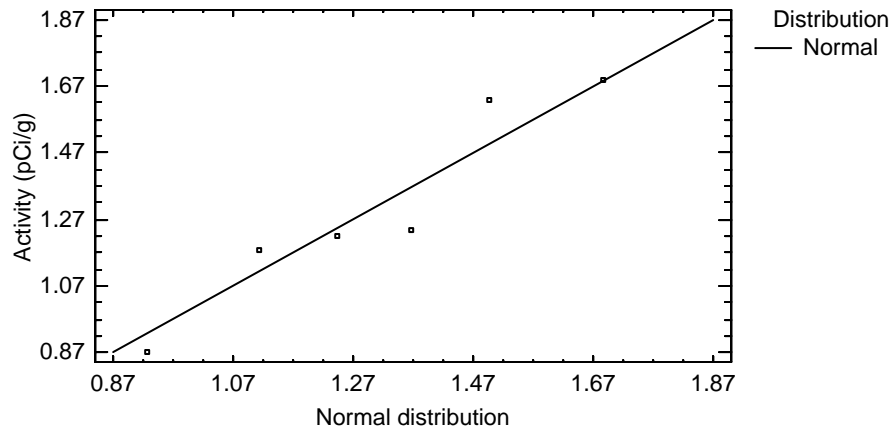
<i>Normal</i>
mean = 1.30533
standard deviation = 0.306076



**Tests for Normality for Uranium 234**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.913328	0.443199

Quantile-Quantile Plot for Uranium 234, Depth = 5 ft.



**DRAFT**

**Uncensored Data - log(Uranium 234) (Data Set="Tronox"&Depth Value=5)**

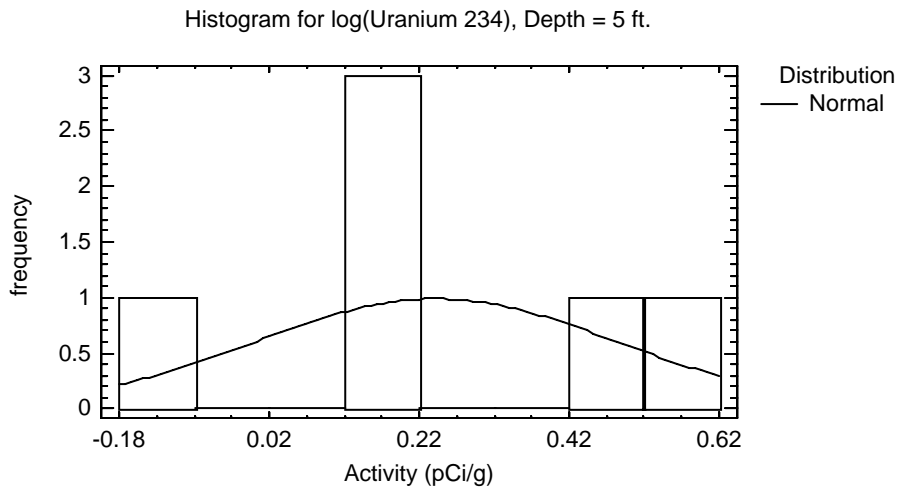
Data variable: log(Uranium 234)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from -0.136966 to 0.524729

Fitted Distributions

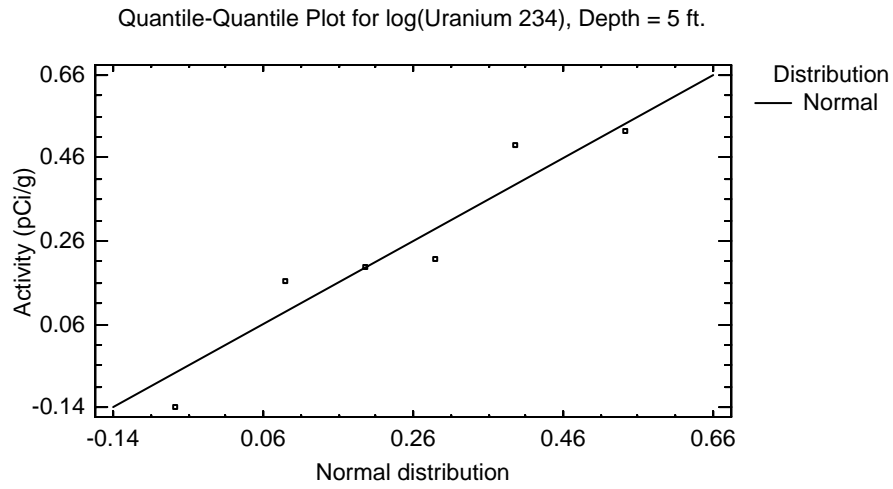
<i>Normal</i>
mean = 0.242637
standard deviation = 0.241985



**Tests for Normality for log(Uranium 234)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.915078	0.456611





**DRAFT**

**Two-Sample Comparison - log(Uranium 234) & Depth Name (Data Set="Tronox"&Depth Value <=5) for log(Uranium 234)**

Sample 1: Depth Name=0 ft.

Sample 2: Depth Name=05 ft.

Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from -0.254892 to 0.239017

Sample 2: 6 values ranging from -0.136966 to 0.524729

**Comparison of Means for log(Uranium 234)**

95.0% confidence interval for mean of Depth Name=0 ft.: -0.0739469 +/- 0.18975 [-0.263697, 0.115803]

95.0% confidence interval for mean of Depth Name=05 ft.: 0.242637 +/- 0.253949 [-0.0113123, 0.496585]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.316583 +/- 0.274779 [-0.591362, -0.0418049]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -2.56713 P-value = 0.0280281

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Uranium 234)**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.180811	0.241985
Variance	0.0326926	0.0585569
Df	5	5

Ratio of Variances = 0.558304

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.112864, 0.443459]

Standard deviation of Depth Name=05 ft.: [0.151049, 0.593497]

Ratio of Variances: [0.0781236, 3.98987]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.558304 P-value = 0.537913

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.9 Uranium 235**

**Uncensored Data - Uranium 235 (Data Set="Tronox")**

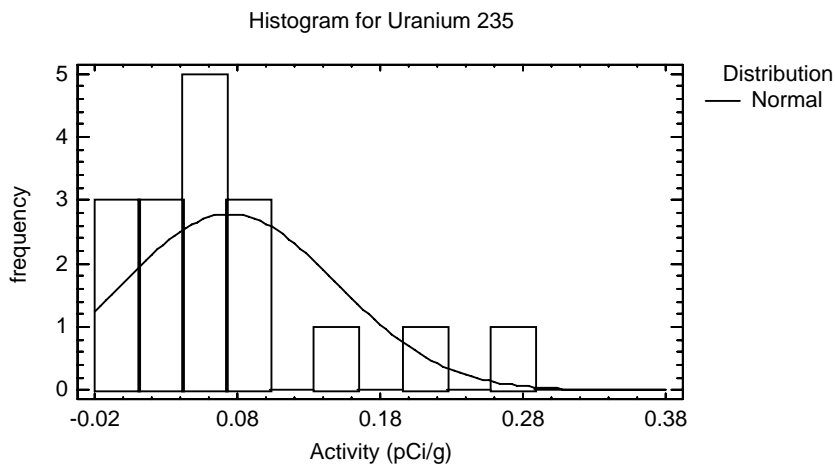
Data variable: Uranium 235

Selection variable: Data Set="Tronox"

17 values ranging from -0.004455 to 0.28

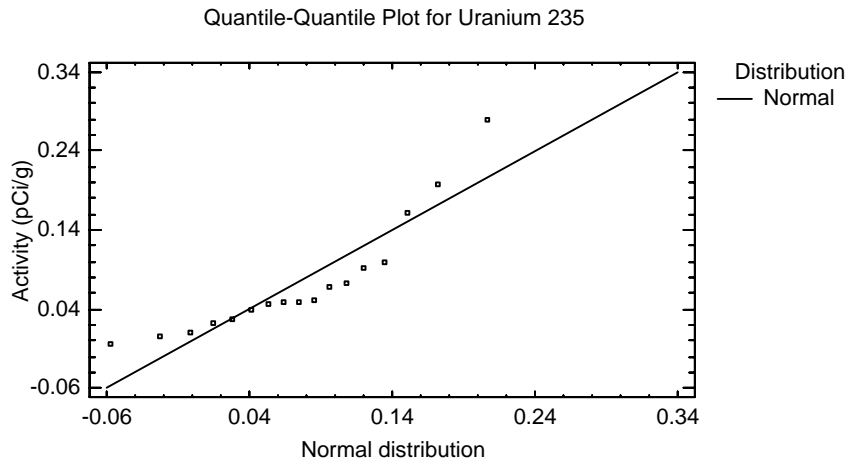
Fitted Distributions

<i>Normal</i>
mean = 0.0746453
standard deviation = 0.0749214



**Tests for Normality for Uranium 235**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.830579	0.00477758



**DRAFT**

**Uncensored Data - log(Uranium 235) (Data Set="Tronox")**

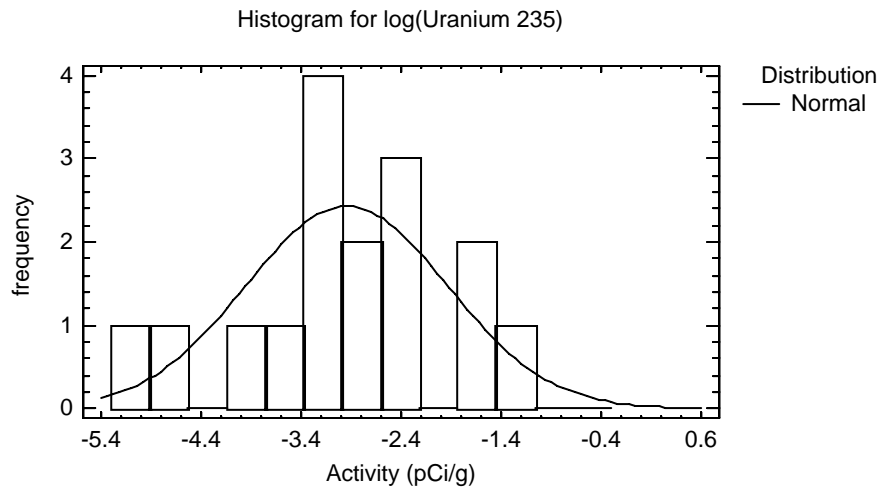
Data variable: log(Uranium 235)

Selection variable: Data Set="Tronox"

16 values ranging from -5.0913 to -1.27297

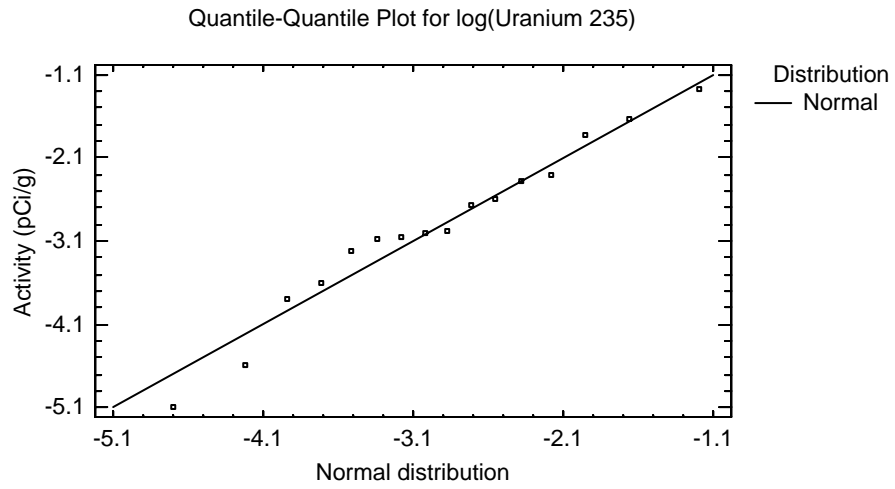
Fitted Distributions

<i>Normal</i>
mean = -2.94438
standard deviation = 1.01072



**Tests for Normality for log(Uranium 235)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.967448	0.765637



**DRAFT**

**Uncensored Data - Uranium 235 (Data Set="Tronox"&Depth Value=0)**

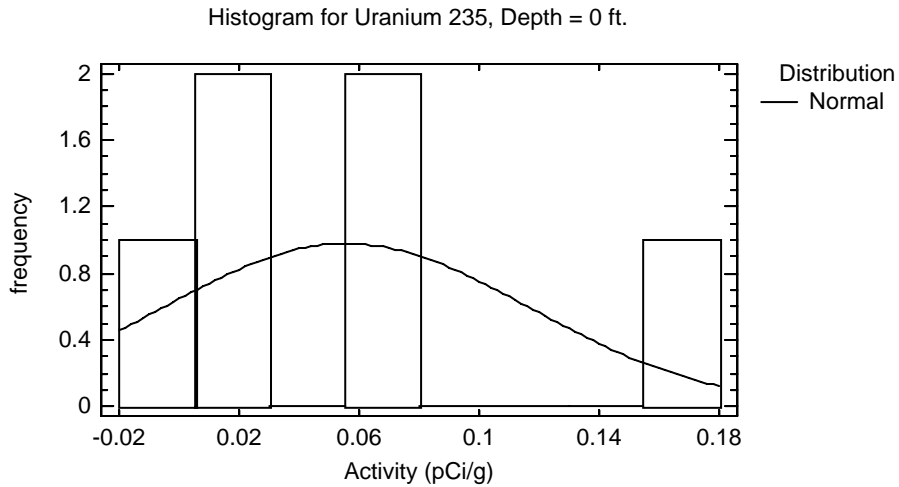
Data variable: Uranium 235

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from -0.004455 to 0.162

Fitted Distributions

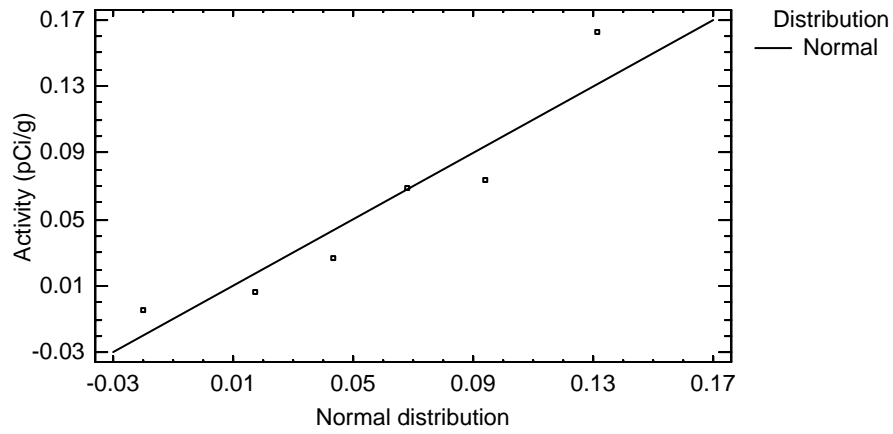
<i>Normal</i>
mean = 0.0556325
standard deviation = 0.0611608



**Tests for Normality for Uranium 235**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.900145	0.362913

Quantile-Quantile Plot for Uranium 235, Depth = 0 ft.





**DRAFT**

**Uncensored Data - log(Uranium 235) (Data Set="Tronox"&Depth Value=0)**

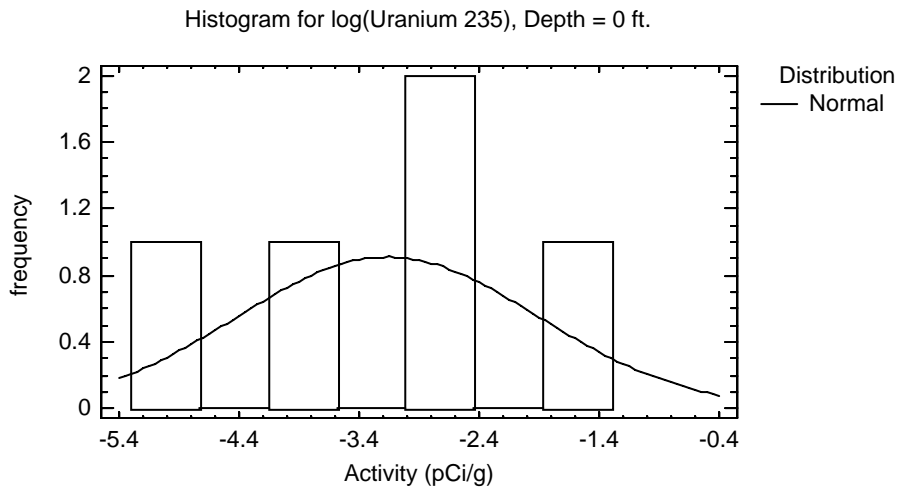
Data variable: log(Uranium 235)

Selection variable: Data Set="Tronox"&Depth Value=0

5 values ranging from -5.0913 to -1.82016

Fitted Distributions

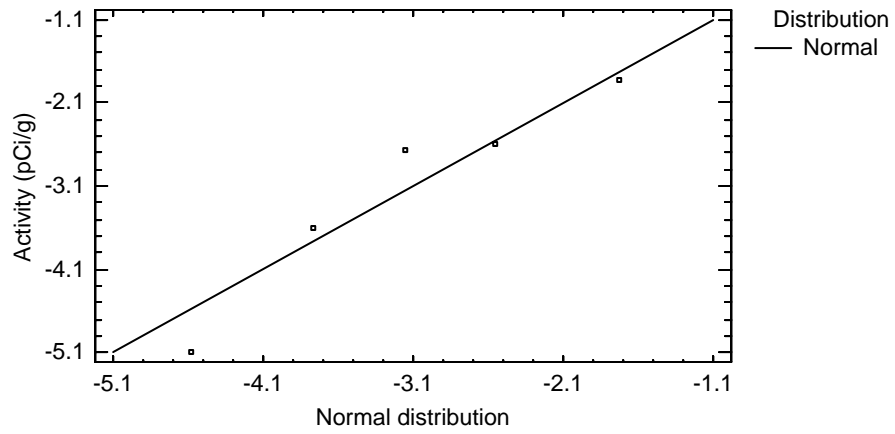
<i>Normal</i>
mean = -3.1594
standard deviation = 1.2522



**Tests for Normality for log(Uranium 235)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.931129	0.609978

Quantile-Quantile Plot for log(Uranium 235), Depth = 0 ft.



**DRAFT**

**Uncensored Data - Uranium 235 (Data Set="Tronox"&Depth Value=5)**

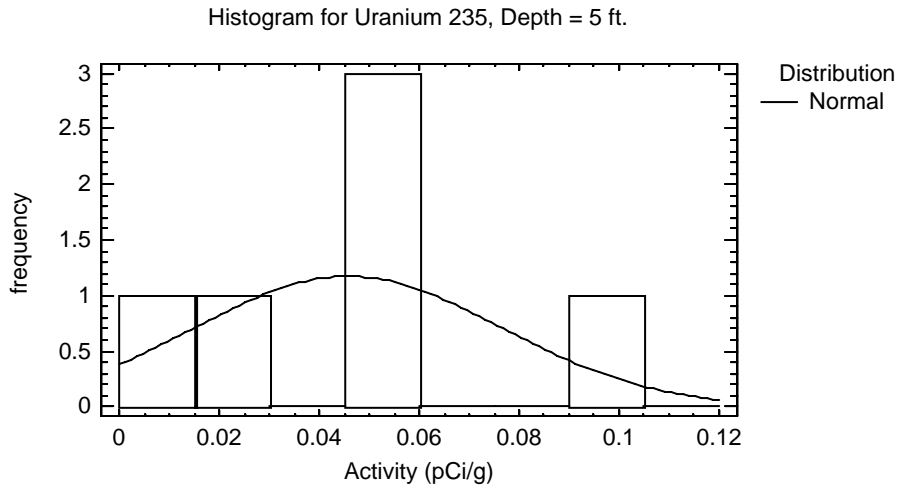
Data variable: Uranium 235

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.01015 to 0.099

Fitted Distributions

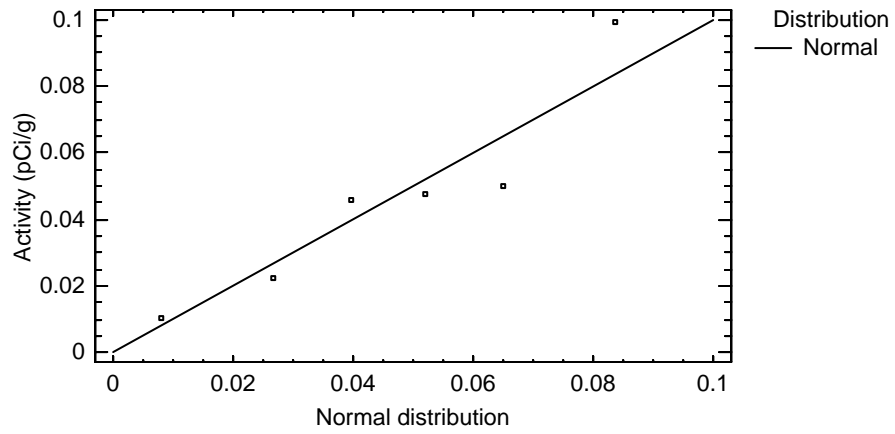
<i>Normal</i>
mean = 0.0458042
standard deviation = 0.0305831



**Tests for Normality for Uranium 235**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.905682	0.392467

Quantile-Quantile Plot for Uranium 235, Depth = 5 ft.



**DRAFT**

**Uncensored Data - log(Uranium 235) (Data Set="Tronox"&Depth Value=5)**

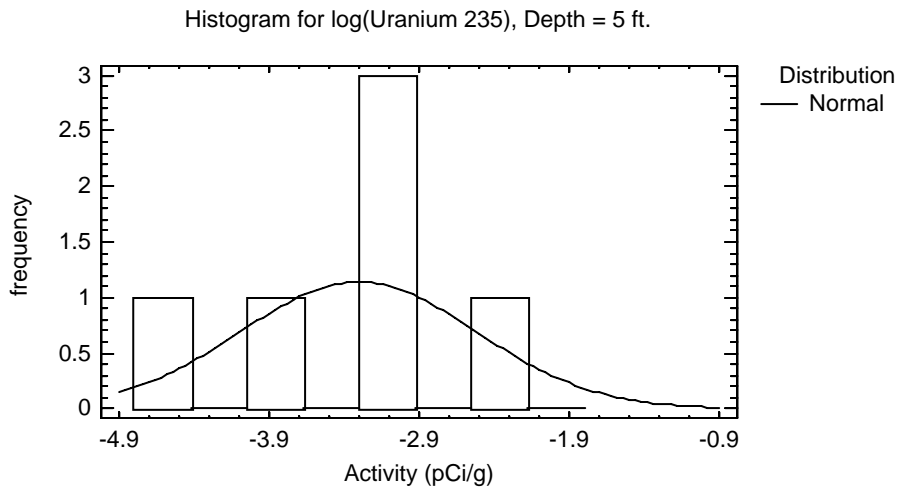
Data variable: log(Uranium 235)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from -4.59028 to -2.31264

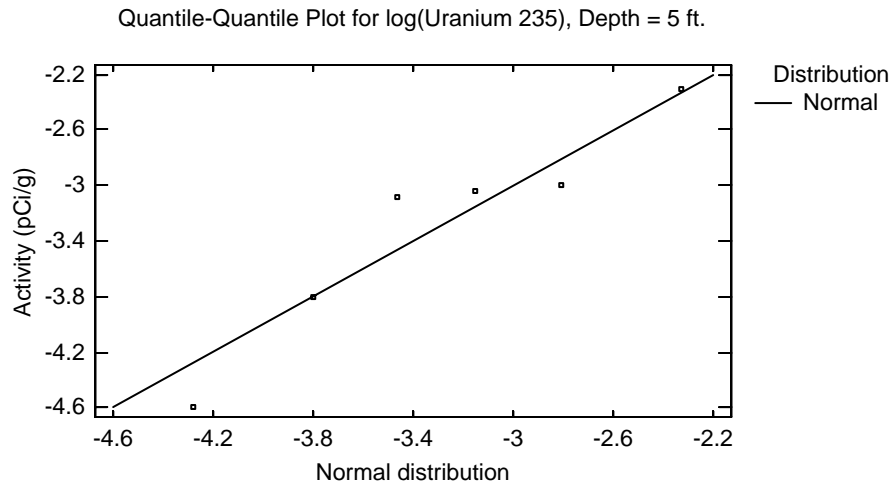
Fitted Distributions

<i>Normal</i>
mean = -3.30532
standard deviation = 0.787369



**Tests for Normality for log(Uranium 235)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.927158	0.561551



**DRAFT**

**Two-Sample Comparison - log(Uranium 235) & Depth Name (Data Set="Tronox"&Depth Value <=5) for log(Uranium 235)**

Sample 1: Depth Name=0 ft.  
 Sample 2: Depth Name=05 ft.  
 Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 5 values ranging from -5.0913 to -1.82016  
 Sample 2: 6 values ranging from -4.59028 to -2.31264

**Comparison of Means for log(Uranium 235)**

95.0% confidence interval for mean of Depth Name=0 ft.: -3.1594 +/- 1.55482 [-4.71422, -1.60459]  
 95.0% confidence interval for mean of Depth Name=05 ft.: -3.30532 +/- 0.826295 [-4.13161, -2.47902]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: 0.145913 +/- 1.39781 [-1.2519, 1.54373]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = 0.23614 P-value = 0.818611  
 Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Uranium 235)**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	1.2522	0.787369
Variance	1.56801	0.61995
Df	4	5

Ratio of Variances = 2.52925

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.750235, 3.59827]  
 Standard deviation of Depth Name=05 ft.: [0.491482, 1.93111]  
 Ratio of Variances: [0.342349, 23.6849]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 2.52925 P-value = 0.336368  
 Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**5.10 Uranium 238**

**Uncensored Data - Uranium 238 (Data Set="Tronox")**

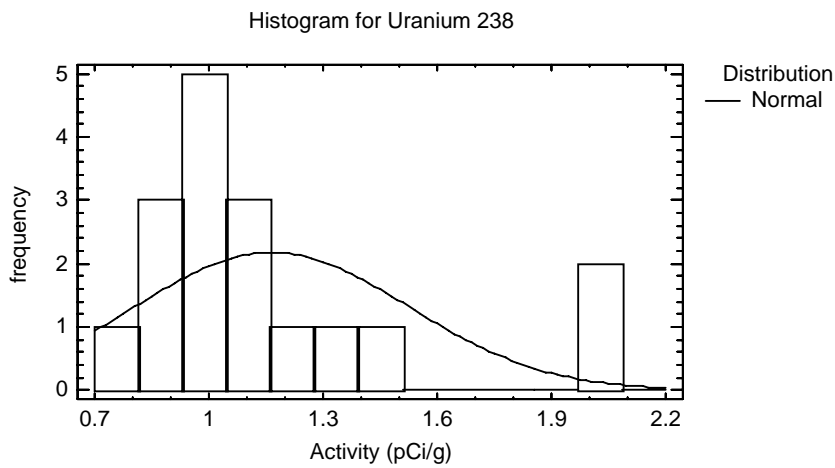
Data variable: Uranium 238

Selection variable: Data Set="Tronox"

17 values ranging from 0.812 to 2.02

Fitted Distributions

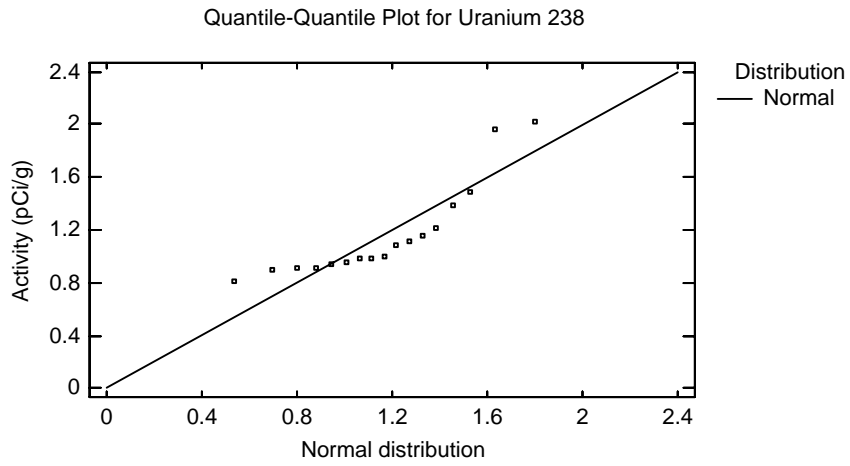
<i>Normal</i>
mean = 1.16576
standard deviation = 0.359262



**Tests for Normality for Uranium 238**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.781409	0.00082029





**DRAFT**

**Uncensored Data - log(Uranium 238) (Data Set="Tronox")**

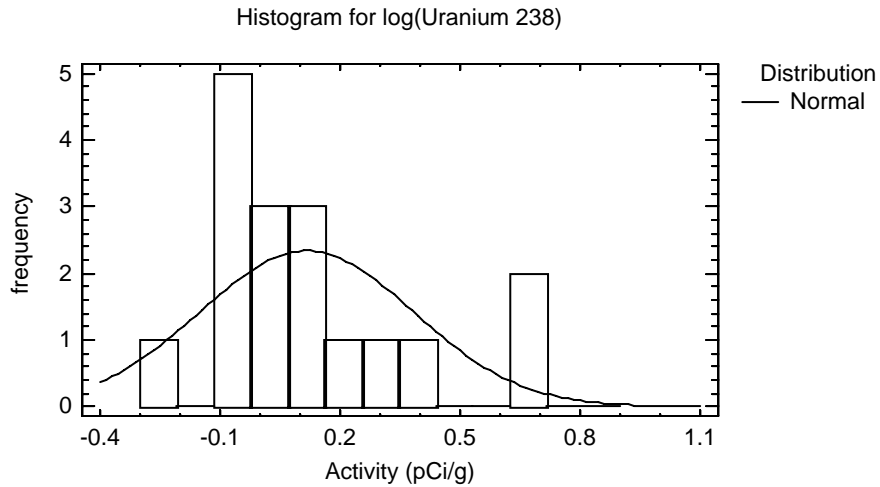
Data variable: log(Uranium 238)

Selection variable: Data Set="Tronox"

17 values ranging from -0.208255 to 0.703098

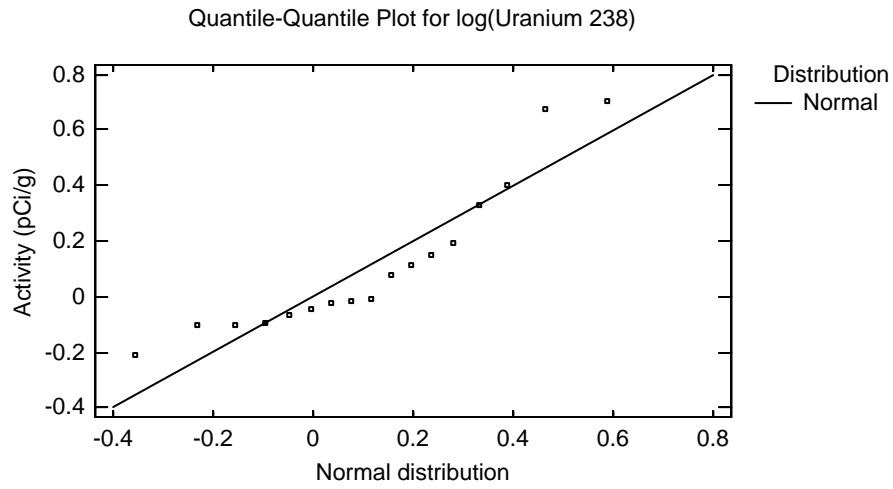
Fitted Distributions

<i>Normal</i>
mean = 0.116403
standard deviation = 0.267819



**Tests for Normality for log(Uranium 238)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.857083	0.0129446



**DRAFT**

**Uncensored Data - Uranium 238 (Data Set="Tronox"&Depth Value=0)**

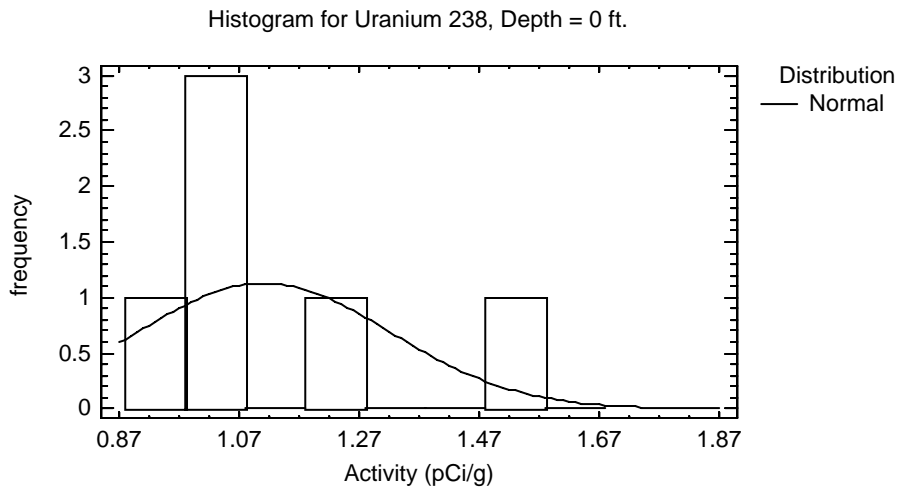
Data variable: Uranium 238

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from 0.911 to 1.49

Fitted Distributions

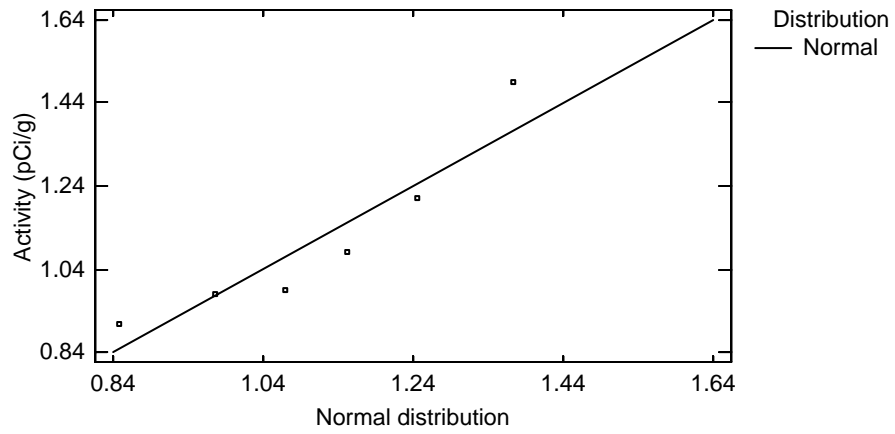
<i>Normal</i>
mean = 1.11092
standard deviation = 0.212168



**Tests for Normality for Uranium 238**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.875435	0.244924

Quantile-Quantile Plot for Uranium 238, Depth = 0 ft.



**DRAFT**

**Uncensored Data - log(Uranium 238) (Data Set="Tronox"&Depth Value=0)**

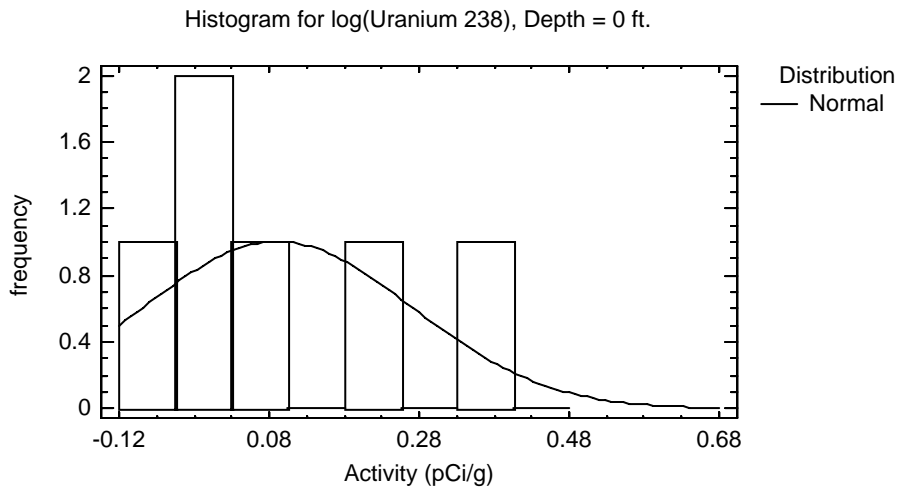
Data variable: log(Uranium 238)

Selection variable: Data Set="Tronox"&Depth Value=0

6 values ranging from -0.0932124 to 0.398776

Fitted Distributions

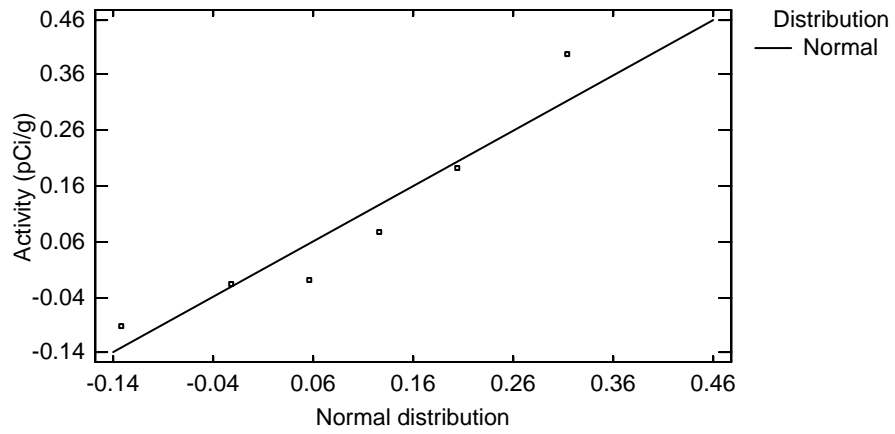
<i>Normal</i>
mean = 0.091243
standard deviation = 0.179106



**Tests for Normality for log(Uranium 238)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.9111	0.427039

Quantile-Quantile Plot for log(Uranium 238), Depth = 0 ft.



**DRAFT**

**Uncensored Data - Uranium 238 (Data Set="Tronox"&Depth Value=5)**

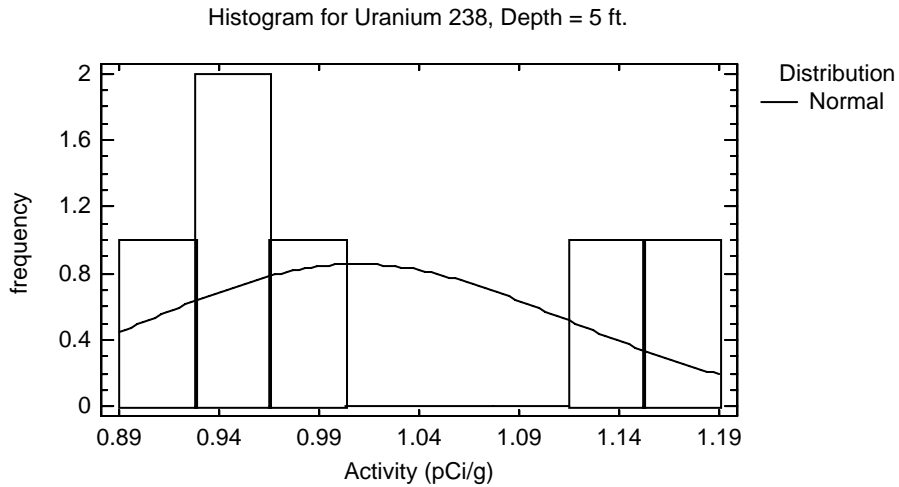
Data variable: Uranium 238

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from 0.904 to 1.16

Fitted Distributions

<i>Normal</i>
mean = 1.00925
standard deviation = 0.104936

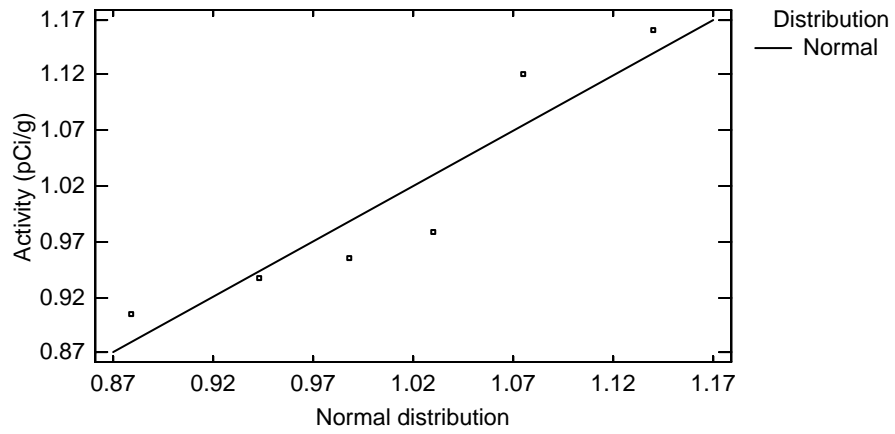


**Tests for Normality for Uranium 238**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.86195	0.189259



Quantile-Quantile Plot for Uranium 238, Depth = 5 ft.



**DRAFT**

**Uncensored Data - log(Uranium 238) (Data Set="Tronox"&Depth Value=5)**

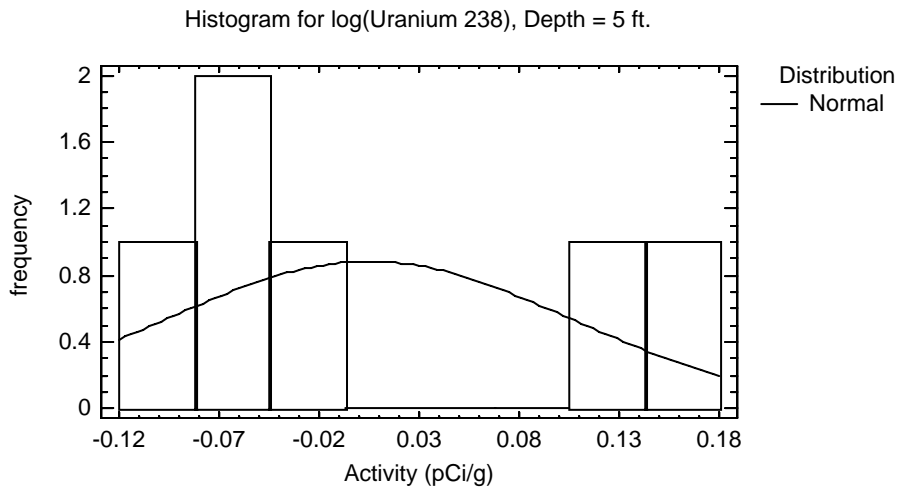
Data variable: log(Uranium 238)

Selection variable: Data Set="Tronox"&Depth Value=5

6 values ranging from -0.100926 to 0.14842

Fitted Distributions

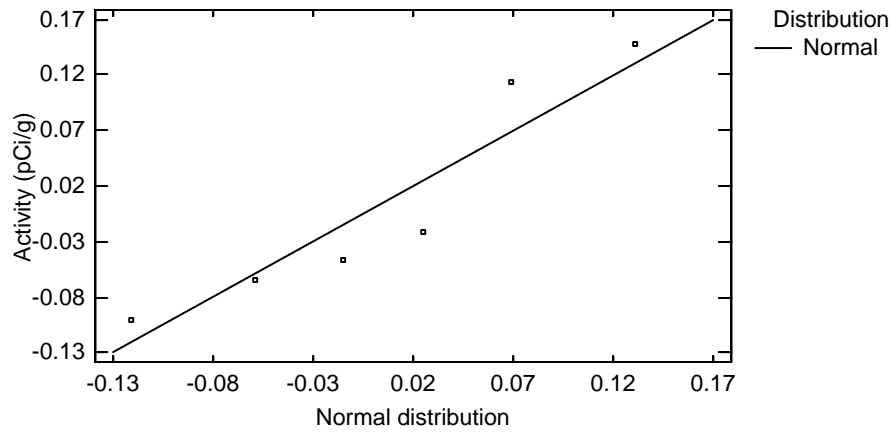
<i>Normal</i>
mean = 0.00483769
standard deviation = 0.10162



**Tests for Normality for log(Uranium 238)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.873176	0.234908

Quantile-Quantile Plot for log(Uranium 238), Depth = 5 ft.



**DRAFT**

**Two-Sample Comparison - log(Uranium 238) & Depth Name (Data Set="Tronox"&Depth Value <=5) for log(Uranium 238)**

Sample 1: Depth Name=0 ft.  
 Sample 2: Depth Name=05 ft.  
 Selection variable: Data Set="Tronox"&Depth Value <=5

Sample 1: 6 values ranging from -0.0932124 to 0.398776  
 Sample 2: 6 values ranging from -0.100926 to 0.14842

**Comparison of Means for log(Uranium 238)**

95.0% confidence interval for mean of Depth Name=0 ft.: 0.091243 +/- 0.187961 [-0.0967176, 0.279204]  
 95.0% confidence interval for mean of Depth Name=05 ft.: 0.00483769 +/- 0.106644 [-0.101806, 0.111482]  
 95.0% confidence interval for the difference between the means  
 assuming equal variances: 0.0864053 +/- 0.187318 [-0.100912, 0.273723]

t test to compare means

Null hypothesis: mean1 = mean2  
 Alt. hypothesis: mean1 NE mean2  
 assuming equal variances: t = 1.02779 P-value = 0.328267  
 Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Uranium 238)**

	<i>Depth Name=0 ft.</i>	<i>Depth Name=05 ft.</i>
Standard deviation	0.179106	0.10162
Variance	0.0320789	0.0103266
Df	5	5

Ratio of Variances = 3.10642

95.0% Confidence Intervals

Standard deviation of Depth Name=0 ft.: [0.111799, 0.439278]  
 Standard deviation of Depth Name=05 ft.: [0.0634321, 0.249235]  
 Ratio of Variances: [0.434683, 22.1998]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2  
 Alt. hypothesis: sigma1 NE sigma2  
 F = 3.10642 P-value = 0.239073  
 Do not reject the null hypothesis for alpha = 0.05.

## **6.0 COMPARISON OF TRONOX UPGRADIENT AND CITY OF HENDERSON BACKGROUND DATA FOR RADIONUCLIDES IN SOIL**

### **6.1 Total Natural Uranium**

Total natural uranium was not measured in the City of Henderson data set. Therefore, comparisons were not made.

**DRAFT**

**6.2 Lead 212**

**Uncensored Data - Lead 212 (Data Set="COH"&Depth Value <=5)**

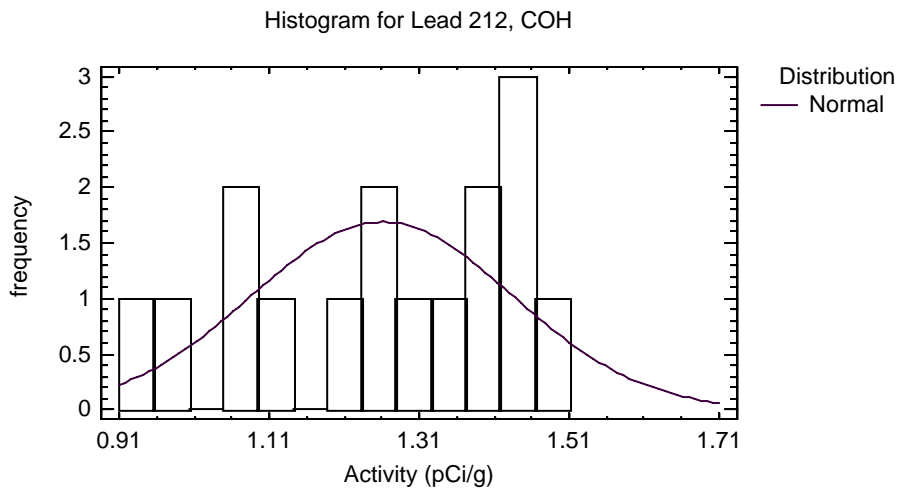
Data variable: Lead 212

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.94 to 1.47

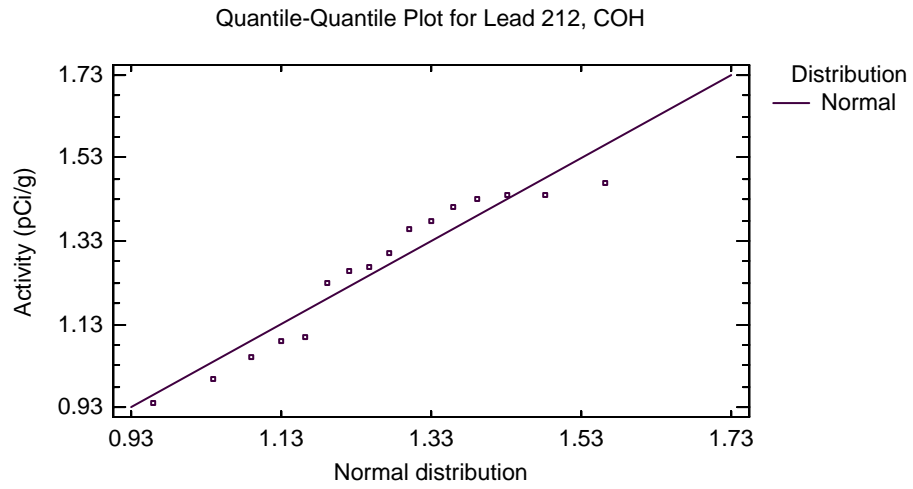
Fitted Distributions

<i>Normal</i>
mean = 1.26063
standard deviation = 0.174336



**Tests for Normality for Lead 212**

Test	Statistic	P-Value
Shapiro-Wilk W	0.909833	0.117294



**DRAFT**

**Uncensored Data - log(Lead 212) (Data Set="COH"&Depth Value <=5)**

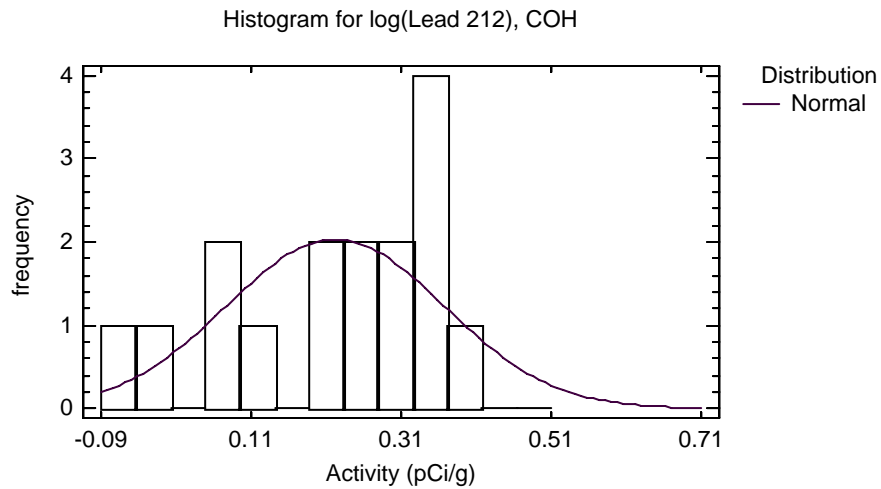
Data variable: log(Lead 212)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from -0.0618754 to 0.385262

Fitted Distributions

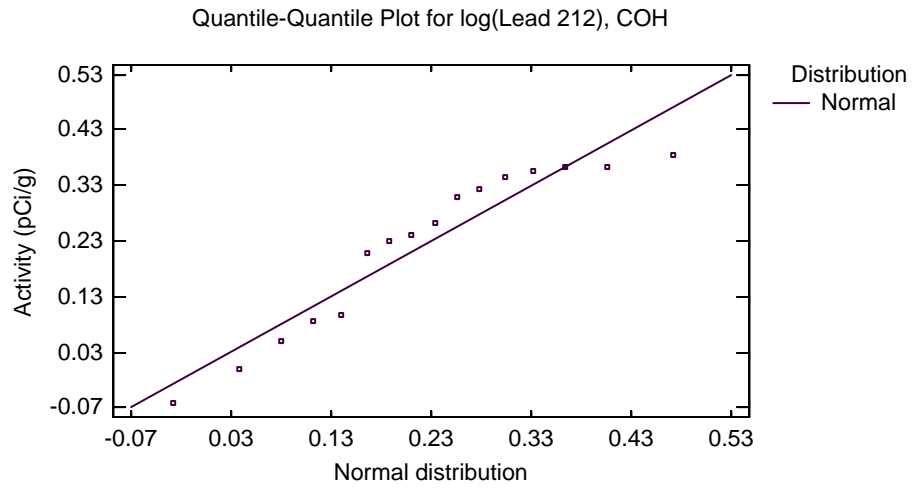
<i>Normal</i>
mean = 0.222081
standard deviation = 0.144789



**Tests for Normality for log(Lead 212)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.897456	0.074211





**DRAFT**

**Two-Sample Comparison - Lead 212 & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for Lead 212**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from 0.94 to 1.47

Sample 2: 12 values ranging from 1.445 to 2.13

**Comparison of Means for Lead 212**

95.0% confidence interval for mean of Data Set=COH: 1.26063 +/- 0.0928971 [1.16773, 1.35352]

95.0% confidence interval for mean of Data Set=Tronox: 1.7775 +/- 0.120823 [1.65668, 1.89832]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.516875 +/- 0.142236 [-0.659111, -0.374639]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -7.46963 P-value = 6.24531E-8

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Lead 212**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.174336	0.190161
Variance	0.0303929	0.0361614
Df	15	11

Ratio of Variances = 0.84048

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.128783, 0.269818]

Standard deviation of Data Set=Tronox: [0.134709, 0.322871]

Ratio of Variances: [0.252401, 2.52802]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.84048 P-value = 0.738483

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.3 Radium 226**

**Uncensored Data - Radium 226 (Data Set="COH"&Depth Value <=5)**

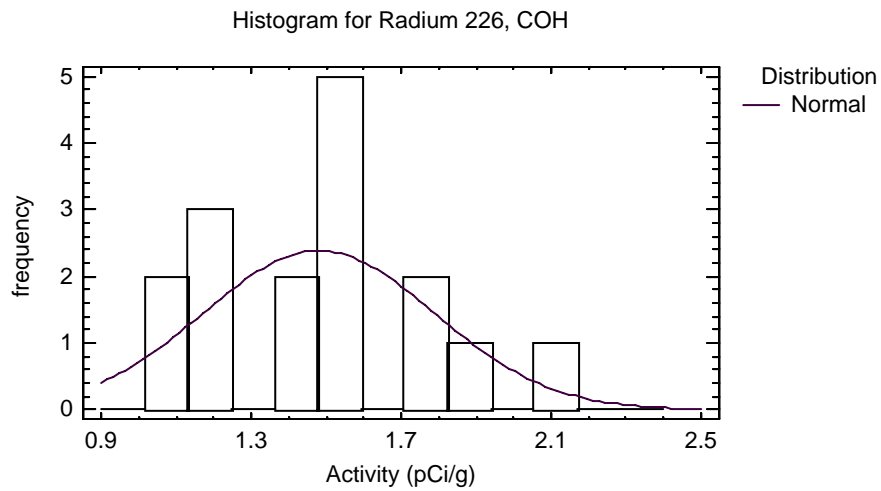
Data variable: Radium 226

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 1.03 to 2.15

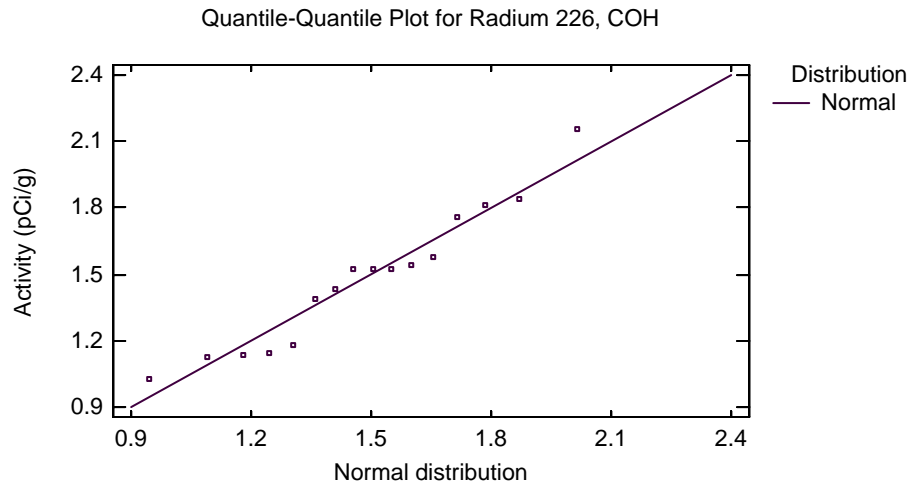
Fitted Distributions

<i>Normal</i>
mean = 1.48031
standard deviation = 0.308925



**Tests for Normality for Radium 226**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.947787	0.445431



**DRAFT**

**Uncensored Data - log(Radium 226) (Data Set="COH"&Depth Value <=5)**

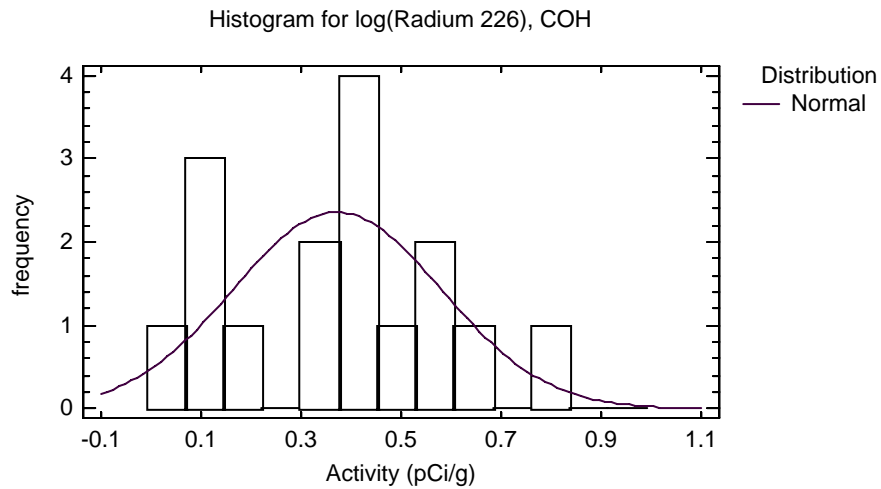
Data variable: log(Radium 226)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.0295588 to 0.765468

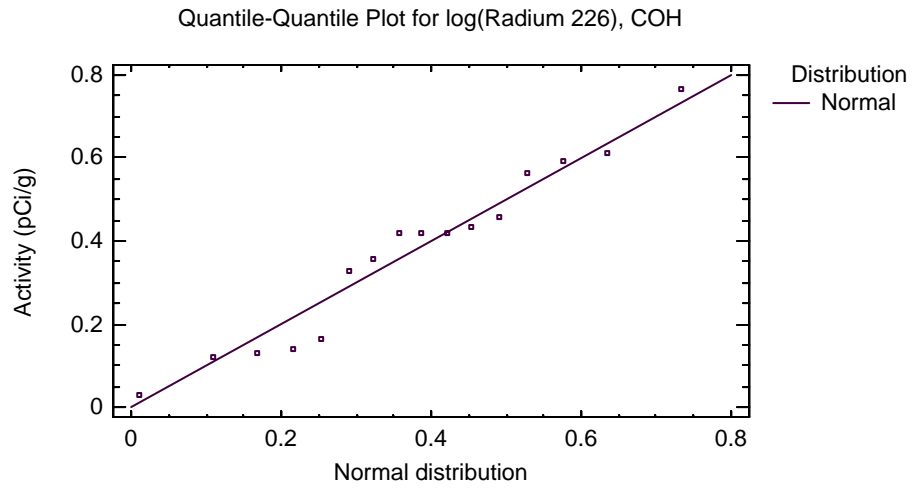
Fitted Distributions

<i>Normal</i>
mean = 0.371964
standard deviation = 0.208223



**Tests for Normality for log(Radium 226)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.953652	0.533547



**DRAFT****Two-Sample Comparison - Radium 226 & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for Radium 226**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=5

Sample 1: 16 values ranging from 1.03 to 2.15

Sample 2: 12 values ranging from 0.891 to 1.335

**Comparison of Medians for Radium 226**

Median of sample 1: 1.52

Median of sample 2: 0.9805

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 20.125

Average rank of sample 2: 7.0

W = -90.0 P-value = 0.0000320745

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.4 Radium 228**

**Uncensored Data - Radium 228 (Data Set="COH"&Depth Value <=5)**

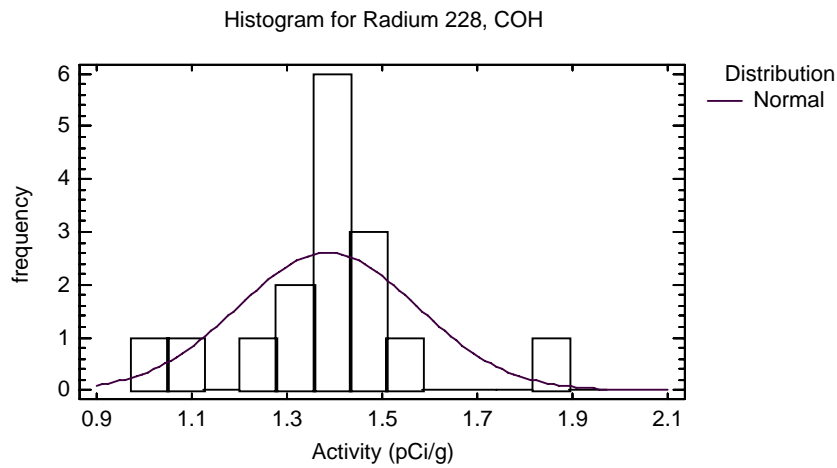
Data variable: Radium 228

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 1.02 to 1.88

Fitted Distributions

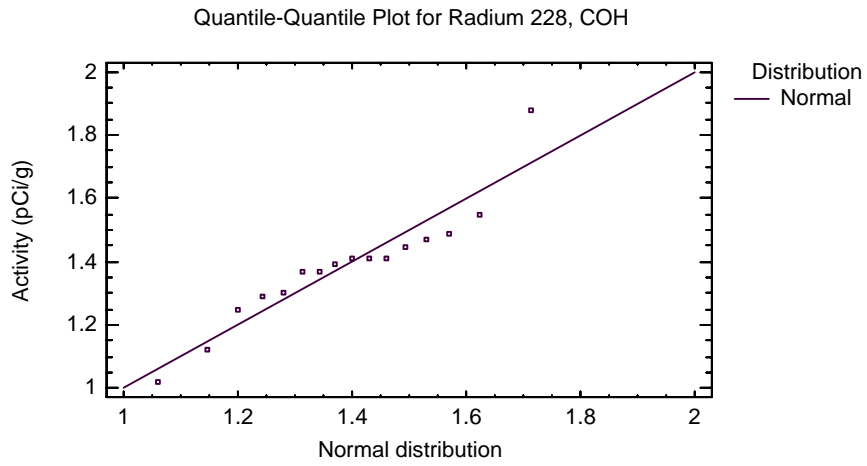
<i>Normal</i>
mean = 1.38594
standard deviation = 0.188743



**Tests for Normality for Radium 228**

Test	Statistic	P-Value
Shapiro-Wilk W	0.91373	0.135376





**DRAFT**

**Uncensored Data - log(Radium 228) (Data Set="COH"&Depth Value <=5)**

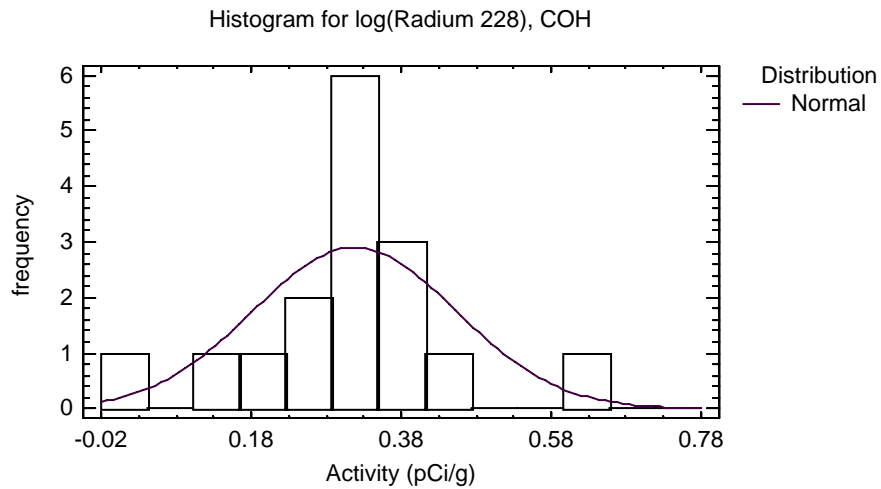
Data variable: log(Radium 228)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.0198026 to 0.631272

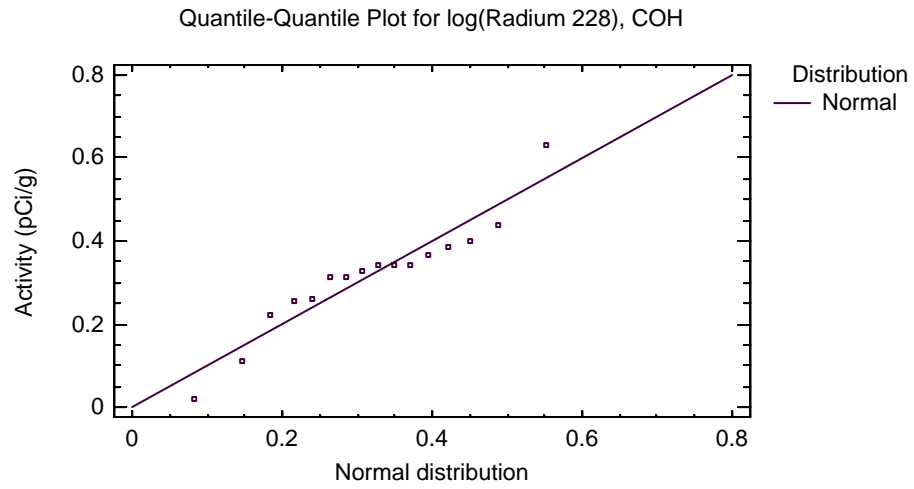
Fitted Distributions

<i>Normal</i>
mean = 0.317791
standard deviation = 0.135448



**Tests for Normality for log(Radium 228)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.928029	0.227385



**DRAFT**

**Two-Sample Comparison - Radium 228 & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for Radium 228**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from 1.02 to 1.88

Sample 2: 12 values ranging from 1.295 to 1.92

**Comparison of Means for Radium 228**

95.0% confidence interval for mean of Data Set=COH: 1.38594 +/- 0.100574 [1.28536, 1.48651]

95.0% confidence interval for mean of Data Set=Tronox: 1.73458 +/- 0.136605 [1.59798, 1.87119]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.348646 +/- 0.157208 [-0.505854, -0.191438]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -4.55864 P-value = 0.000107768

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Radium 228**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.188743	0.215
Variance	0.0356241	0.0462248
Df	15	11

Ratio of Variances = 0.77067

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.139426, 0.292116]

Standard deviation of Data Set=Tronox: [0.152305, 0.365043]

Ratio of Variances: [0.231437, 2.31804]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.77067 P-value = 0.626541

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

### 6.5 Thorium 228

#### Uncensored Data - Thorium 228 (Data Set="COH"&Depth Value <=5)

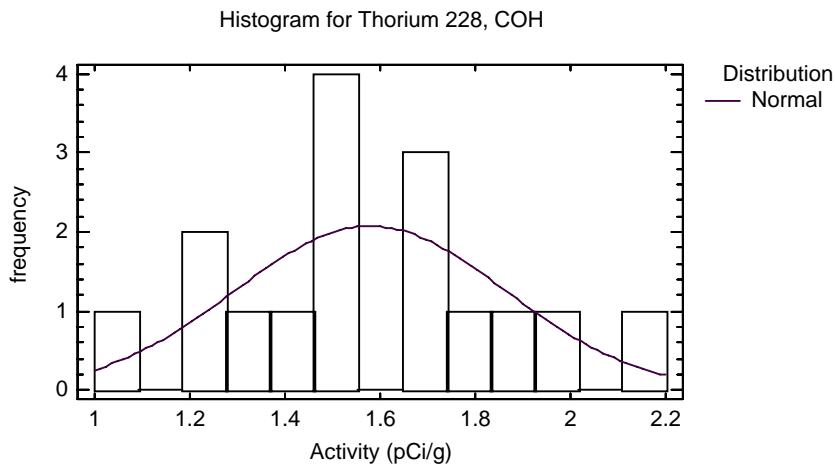
Data variable: Thorium 228

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 1.07 to 2.14

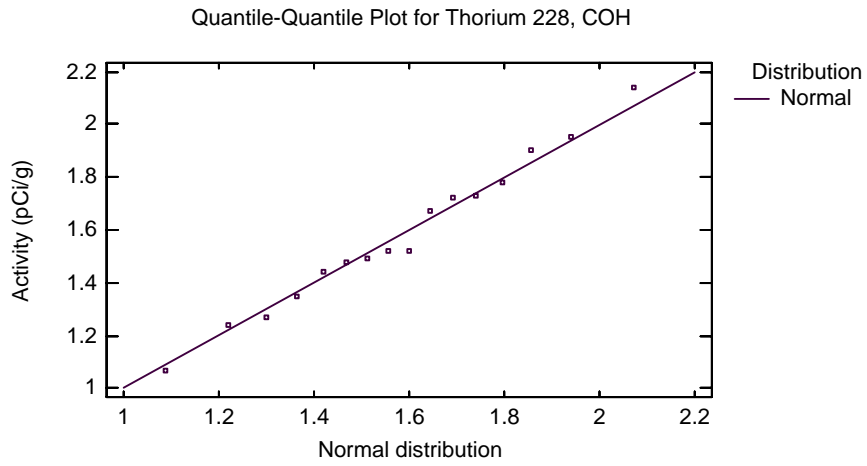
Fitted Distributions

<i>Normal</i>
mean = 1.57937
standard deviation = 0.284335



#### Tests for Normality for Thorium 228

Test	Statistic	P-Value
Shapiro-Wilk W	0.986478	0.986685



**DRAFT**

**Uncensored Data - log(Thorium 228) (Data Set="COH"&Depth Value <=5)**

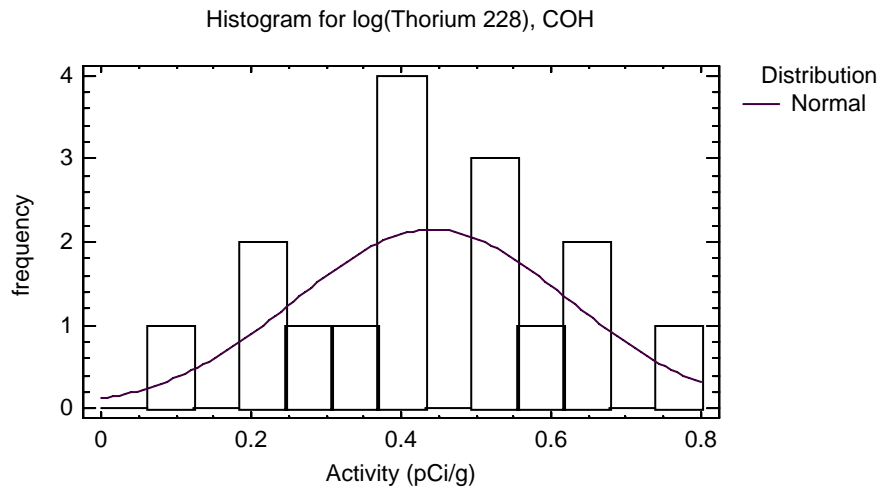
Data variable: log(Thorium 228)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.0676586 to 0.760806

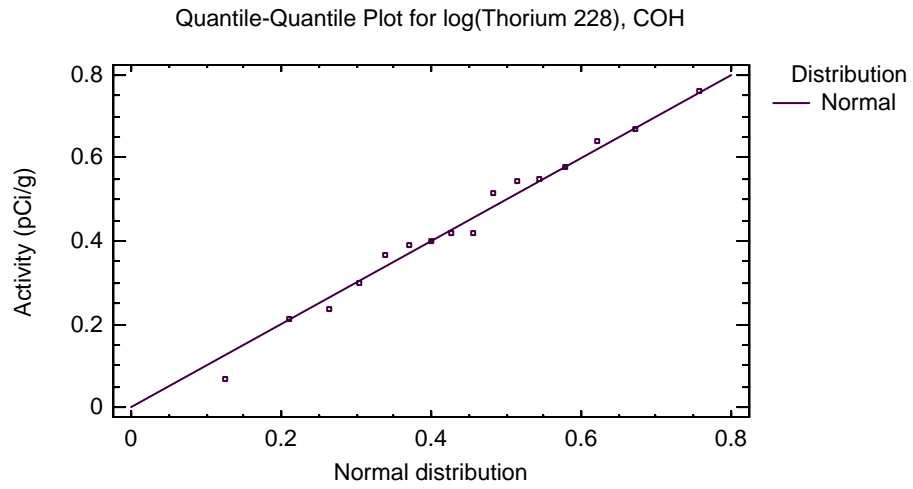
Fitted Distributions

<i>Normal</i>
mean = 0.441572
standard deviation = 0.182833



**Tests for Normality for log(Thorium 228)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.985915	0.984247





**DRAFT**

**Two-Sample Comparison - log(Thorium 228) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for log(Thorium 228)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from 0.0676586 to 0.760806

Sample 2: 12 values ranging from 0.277632 to 1.11186

**Comparison of Means for log(Thorium 228)**

95.0% confidence interval for mean of Data Set=COH: 0.441572 +/- 0.0974249 [0.344147, 0.538997]

95.0% confidence interval for mean of Data Set=Tronox: 0.58948 +/- 0.149655 [0.439824, 0.739135]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.147908 +/- 0.162315 [-0.310223, 0.0144066]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -1.87309 P-value = 0.0723406

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 228)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.182833	0.23554
Variance	0.0334278	0.055479
Df	15	11

Ratio of Variances = 0.602531

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.135059, 0.282969]

Standard deviation of Data Set=Tronox: [0.166855, 0.399918]

Ratio of Variances: [0.180944, 1.81231]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.602531 P-value = 0.357028

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.6 Thorium 230**

**Uncensored Data - Thorium 230 (Data Set="COH"&Depth Value <=5)**

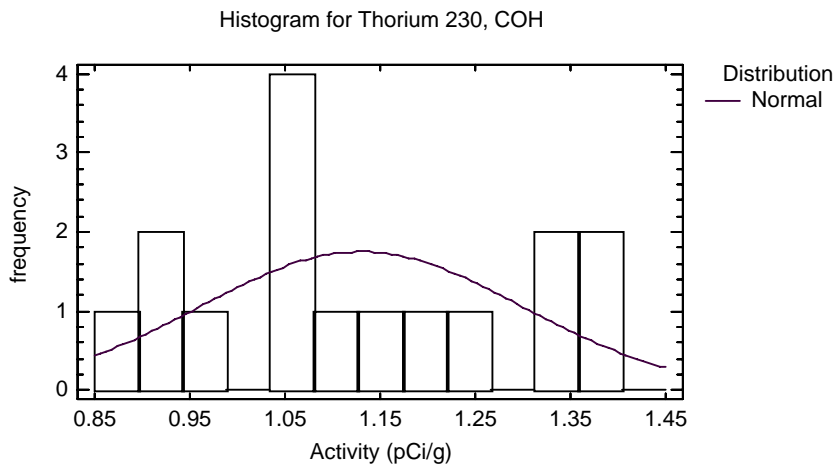
Data variable: Thorium 230

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.88 to 1.38

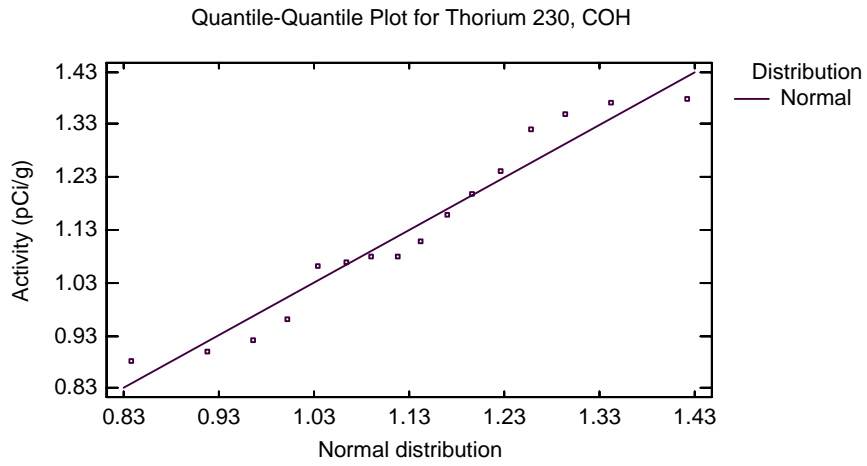
Fitted Distributions

<i>Normal</i>
mean = 1.13
standard deviation = 0.168285



**Tests for Normality for Thorium 230**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.936226	0.303236



**DRAFT**

**Uncensored Data - log(Thorium 230) (Data Set="COH"&Depth Value <=5)**

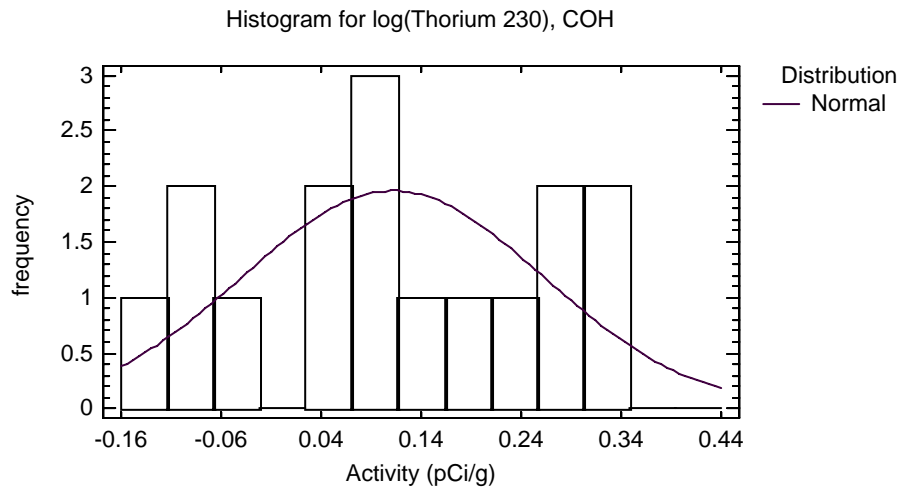
Data variable: log(Thorium 230)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from -0.127833 to 0.322083

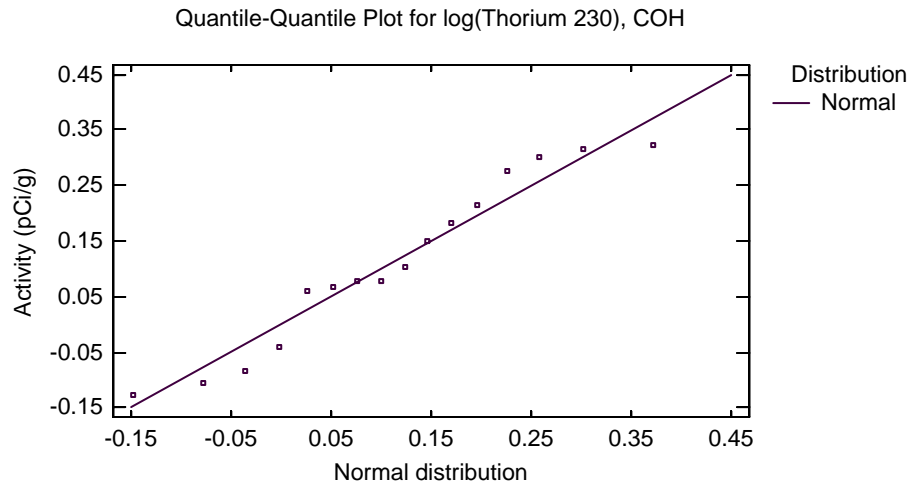
Fitted Distributions

<i>Normal</i>
mean = 0.111706
standard deviation = 0.150255



**Tests for Normality for log(Thorium 230)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.938038	0.322705



**DRAFT**

**Two-Sample Comparison - log(Thorium 230) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for log(Thorium 230)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from -0.127833 to 0.322083

Sample 2: 12 values ranging from -0.375421 to 0.285179

**Comparison of Means for log(Thorium 230)**

95.0% confidence interval for mean of Data Set=COH: 0.111706 +/- 0.0800653 [0.0316406, 0.191771]

95.0% confidence interval for mean of Data Set=Tronox: 0.0290256 +/- 0.129318 [-0.100293, 0.158344]

95.0% confidence interval for the difference between the means

assuming equal variances: 0.0826803 +/- 0.137204 [-0.0545232, 0.219884]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 1.23869 P-value = 0.226529

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 230)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.150255	0.203532
Variance	0.0225765	0.0414252
Df	15	11

Ratio of Variances = 0.544995

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.110994, 0.232548]

Standard deviation of Data Set=Tronox: [0.144181, 0.345572]

Ratio of Variances: [0.163665, 1.63925]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.544995 P-value = 0.272183

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.7 Thorium 232**

**Uncensored Data - Thorium 232 (Data Set="COH"&Depth Value <=5)**

Data variable: Thorium 232

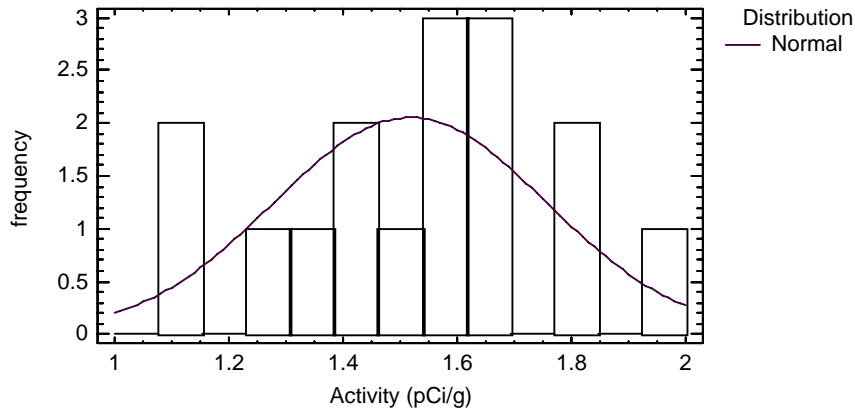
Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 1.1 to 1.93

Fitted Distributions

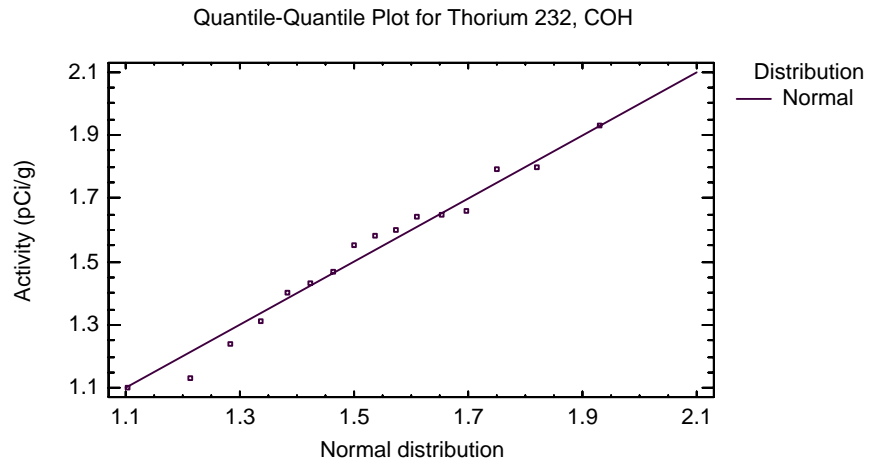
<i>Normal</i>
mean = 1.5175
standard deviation = 0.23904

Histogram for Thorium 232, COH



**Tests for Normality for Thorium 232**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.971437	0.830324





**DRAFT**

**Uncensored Data - log(Thorium 232) (Data Set="COH"&Depth Value <=5)**

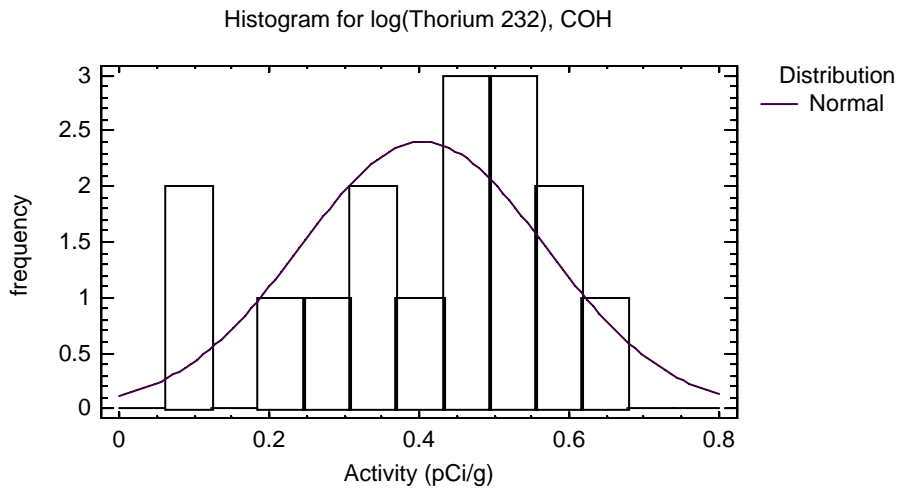
Data variable: log(Thorium 232)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.0953102 to 0.65752

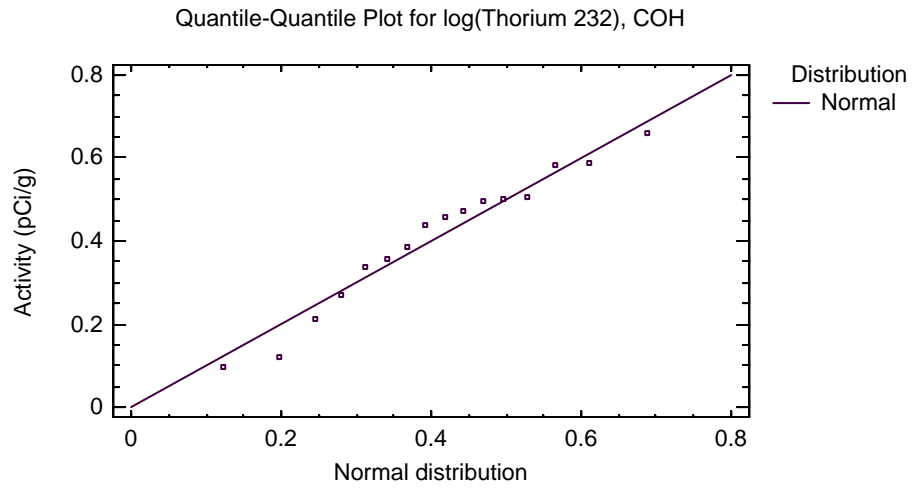
Fitted Distributions

<i>Normal</i>
mean = 0.404848
standard deviation = 0.16365



**Tests for Normality for log(Thorium 232)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.953847	0.53664



**DRAFT**

**Two-Sample Comparison - log(Thorium 232) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for log(Thorium 232)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from 0.0953102 to 0.65752

Sample 2: 12 values ranging from 0.0487902 to 0.883768

**Comparison of Means for log(Thorium 232)**

95.0% confidence interval for mean of Data Set=COH: 0.404848 +/- 0.0872033 [0.317645, 0.492051]

95.0% confidence interval for mean of Data Set=Tronox: 0.453096 +/- 0.166053 [0.287042, 0.619149]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.0482477 +/- 0.165307 [-0.213555, 0.117059]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -0.599942 P-value = 0.553738

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 232)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.16365	0.261349
Variance	0.0267814	0.0683031
Df	15	11

Ratio of Variances = 0.392097

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.120889, 0.25328]

Standard deviation of Data Set=Tronox: [0.185138, 0.443738]

Ratio of Variances: [0.117749, 1.17936]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.392097 P-value = 0.0939686

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.8 Uranium 234**

**Uncensored Data - Uranium 234 (Data Set="COH"&Depth Value <=5)**

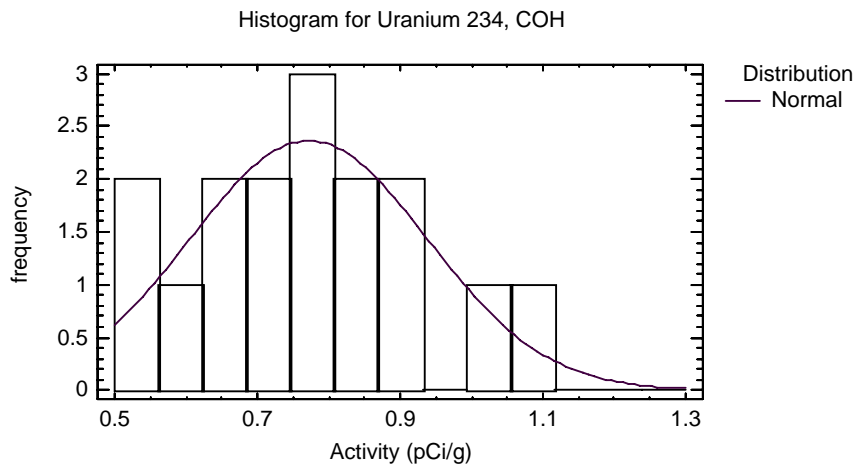
Data variable: Uranium 234

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.53 to 1.11

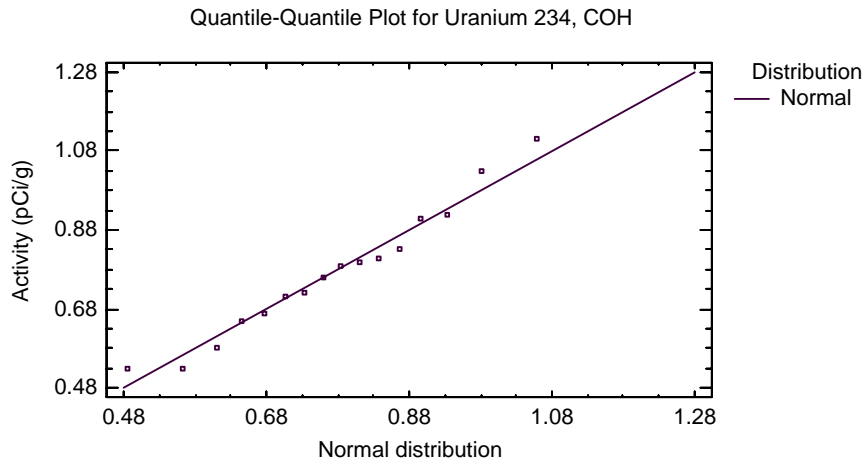
Fitted Distributions

<i>Normal</i>
mean = 0.771875
standard deviation = 0.166061



**Tests for Normality for Uranium 234**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.967197	0.761421



**DRAFT**

**Uncensored Data - log(Uranium 234) (Data Set="COH"&Depth Value <=5)**

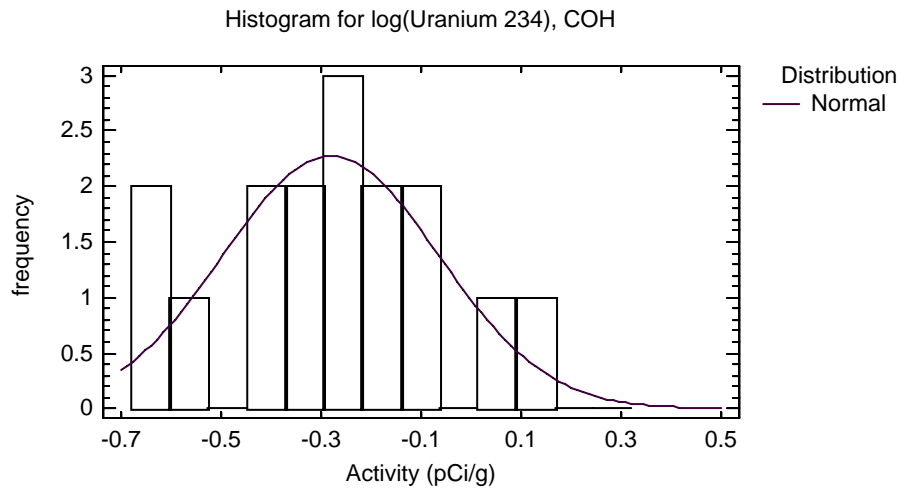
Data variable: log(Uranium 234)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from -0.634878 to 0.10436

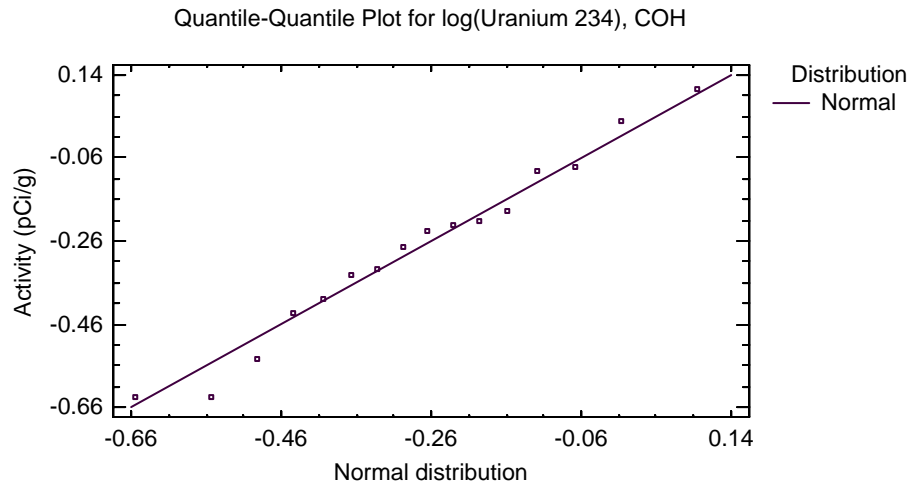
Fitted Distributions

<i>Normal</i>
mean = -0.280679
standard deviation = 0.216172



**Tests for Normality for log(Uranium 234)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.971786	0.83572



**DRAFT**

**Two-Sample Comparison - log(Uranium 234) & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for log(Uranium 234)**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&Depth Value <=5

Sample 1: 16 values ranging from -0.634878 to 0.10436

Sample 2: 12 values ranging from -0.254892 to 0.524729

**Comparison of Means for log(Uranium 234)**

95.0% confidence interval for mean of Data Set=COH: -0.280679 +/- 0.11519 [-0.395869, -0.165489]

95.0% confidence interval for mean of Data Set=Tronox: 0.0843448 +/- 0.16667 [-0.082325, 0.251015]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.365024 +/- 0.185878 [-0.550901, -0.179146]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -4.03663 P-value = 0.000424888

Reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Uranium 234)**

	<i>Data Set=COH</i>	<i>Data Set=Tronox</i>
Standard deviation	0.216172	0.262319
Variance	0.0467303	0.0688112
Df	15	11

Ratio of Variances = 0.679109

95.0% Confidence Intervals

Standard deviation of Data Set=COH: [0.159687, 0.334567]

Standard deviation of Data Set=Tronox: [0.185825, 0.445385]

Ratio of Variances: [0.203941, 2.04264]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.679109 P-value = 0.477828

Do not reject the null hypothesis for alpha = 0.05.



**DRAFT**

**6.9 Uranium 235**

**Uncensored Data - Uranium 235 (Data Set="COH"&Depth Value <=5)**

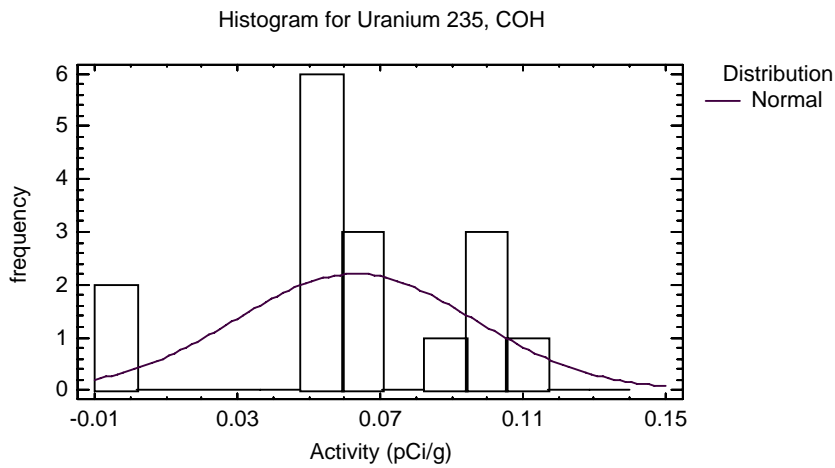
Data variable: Uranium 235

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.0 to 0.116

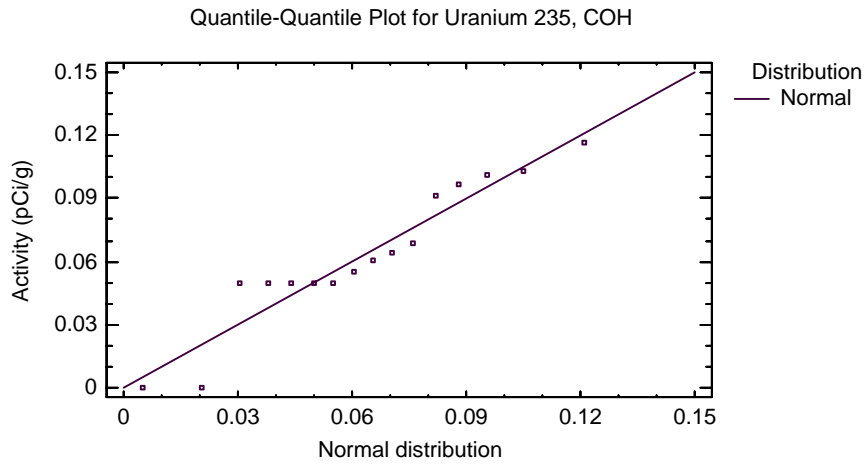
Fitted Distributions

<i>Normal</i>
mean = 0.0629688
standard deviation = 0.0333859



**Tests for Normality for Uranium 235**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.911116	0.122968



**DRAFT**

**Uncensored Data - log(Uranium 235) (Data Set="COH"&Depth Value <=5)**

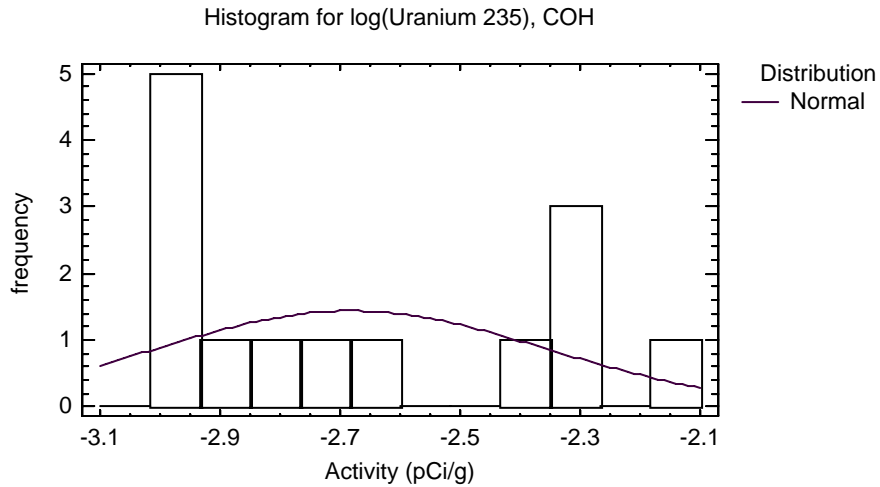
Data variable: log(Uranium 235)

Selection variable: Data Set="COH"&Depth Value <=5

14 values ranging from -2.99573 to -2.15417

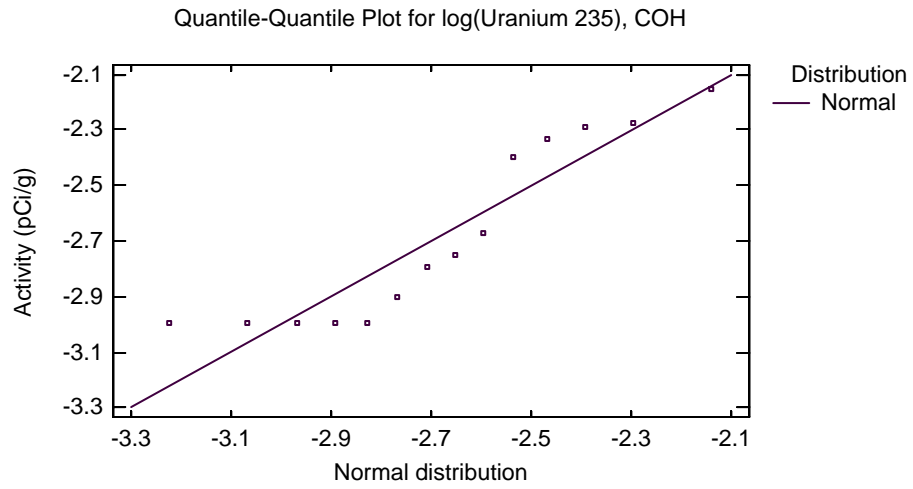
Fitted Distributions

<i>Normal</i>
mean = -2.68167
standard deviation = 0.323679



**Tests for Normality for log(Uranium 235)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.840372	0.0158613



**DRAFT****Two-Sample Comparison - Uranium 235 & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for Uranium 235**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=5

Sample 1: 16 values ranging from 0.0 to 0.116

Sample 2: 12 values ranging from -0.004455 to 0.162

**Comparison of Medians for Uranium 235**

Median of sample 1: 0.058

Median of sample 2: 0.046725

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 16.4688

Average rank of sample 2: 11.875

W = -31.5 P-value = 0.148882

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**6.10 Uranium 238**

**Uncensored Data - Uranium 238 (Data Set="COH"&Depth Value <=5)**

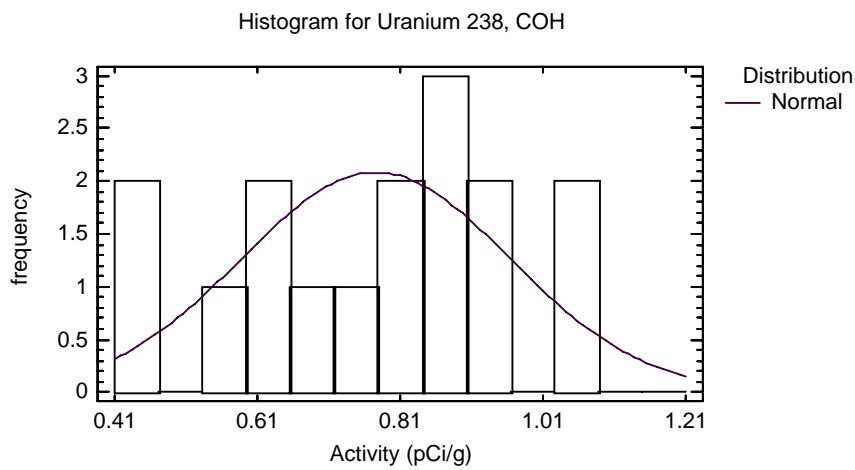
Data variable: Uranium 238

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from 0.45 to 1.07

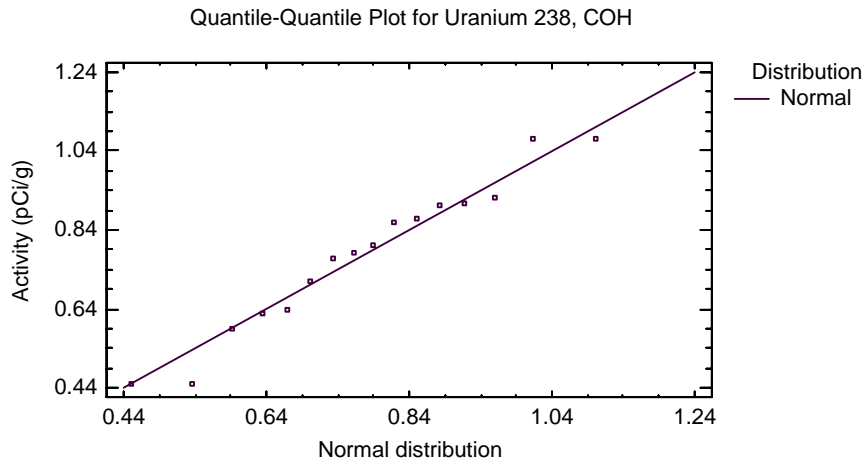
Fitted Distributions

<i>Normal</i>
mean = 0.775937
standard deviation = 0.188584



**Tests for Normality for Uranium 238**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.954572	0.54822



**DRAFT**

**Uncensored Data - log(Uranium 238) (Data Set="COH"&Depth Value <=5)**

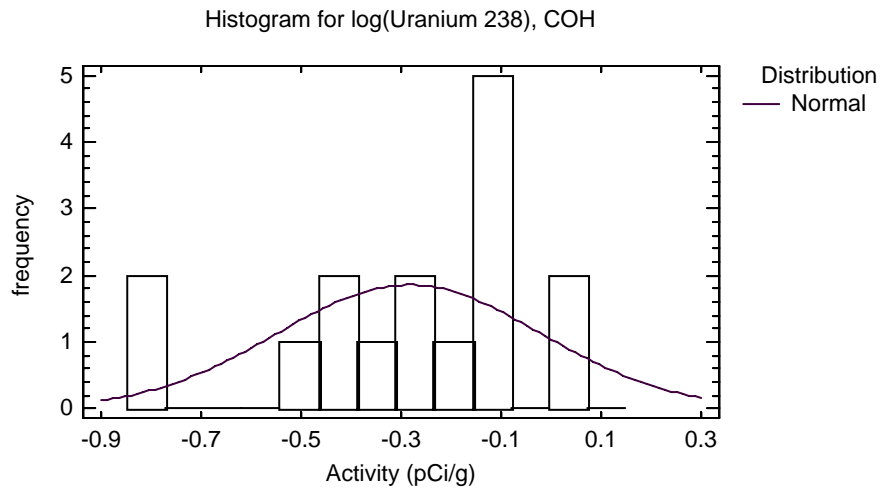
Data variable: log(Uranium 238)

Selection variable: Data Set="COH"&Depth Value <=5

16 values ranging from -0.798508 to 0.0676586

Fitted Distributions

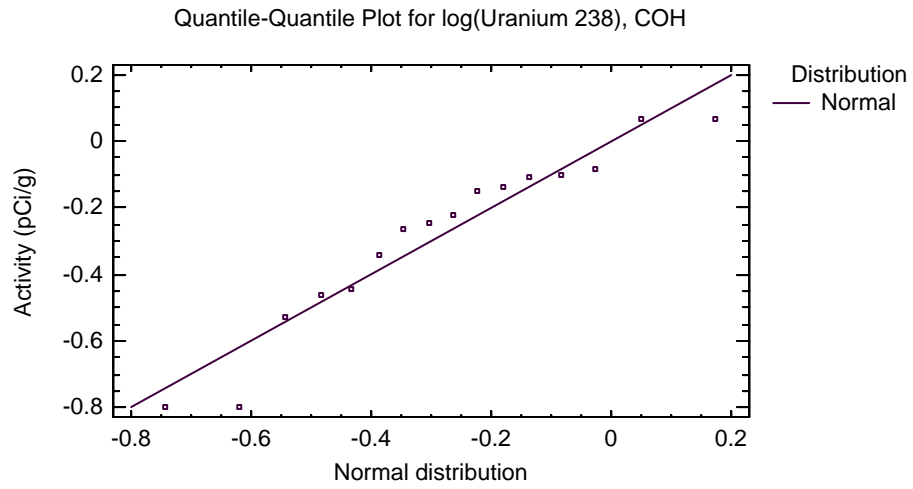
<i>Normal</i>
mean = -0.284485
standard deviation = 0.2643



**Tests for Normality for log(Uranium 238)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.920532	0.173575





**DRAFT****Two-Sample Comparison - Uranium 238 & Data Set ((Data Set="Tronox"|Data Set="COH")&Depth Value <=5) for Uranium 238**

Sample 1: Data Set=COH

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="COH")&amp;Depth Value &lt;=5

Sample 1: 16 values ranging from 0.45 to 1.07

Sample 2: 12 values ranging from 0.904 to 1.49

**Comparison of Medians for Uranium 238**

Median of sample 1: 0.79

Median of sample 2: 0.98725

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 9.5625

Average rank of sample 2: 21.0833

W = 79.0 P-value = 0.00026718

Reject the null hypothesis for alpha = 0.05.

## **7.0 COMPARISON OF TRONOX UPGRADIENT AND BRC/TIMET BACKGROUND DATA FOR RADIONUCLIDES IN SOIL**

### **7.1 Total Natural Uranium**

Total natural uranium was not measured in the BRC/TIMET data set. Therefore, comparisons were not made.

**DRAFT****7.2 Lead 212**

Lead 212 was not measured in the BRC/TIMET data set. Therefore, comparisons were not made.

**DRAFT**

**7.3 Radium 226**

**Uncensored Data - Radium 226 (Data Set="BRC/TIMET"&Depth Value <=5)**

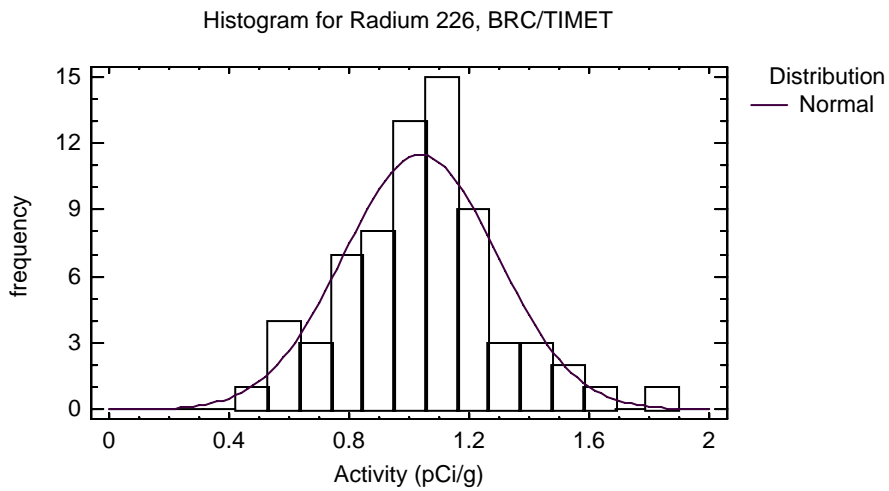
Data variable: Radium 226

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.494 to 1.82

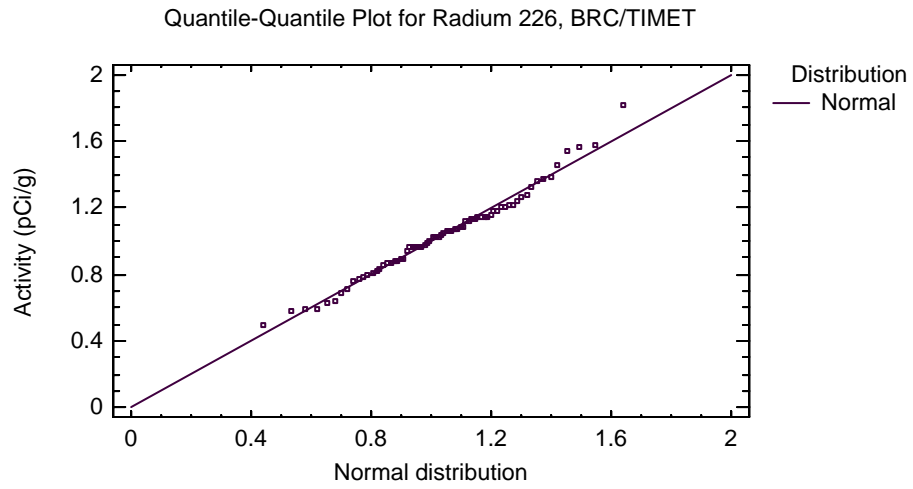
Fitted Distributions

<i>Normal</i>
mean = 1.0378
standard deviation = 0.256378



**Tests for Normality for Radium 226**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.980991	0.676017



**DRAFT**

**Uncensored Data - log(Radium 226) (Data Set="BRC/TIMET"&Depth Value <=5)**

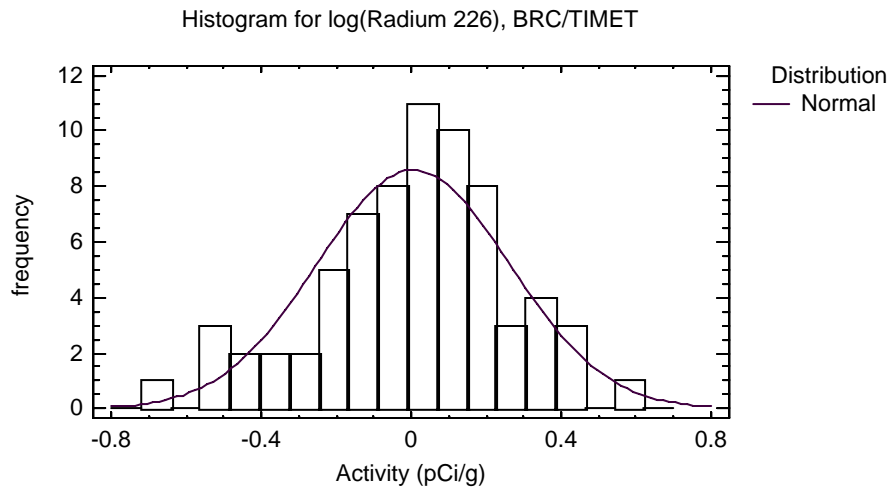
Data variable: log(Radium 226)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from -0.70522 to 0.598837

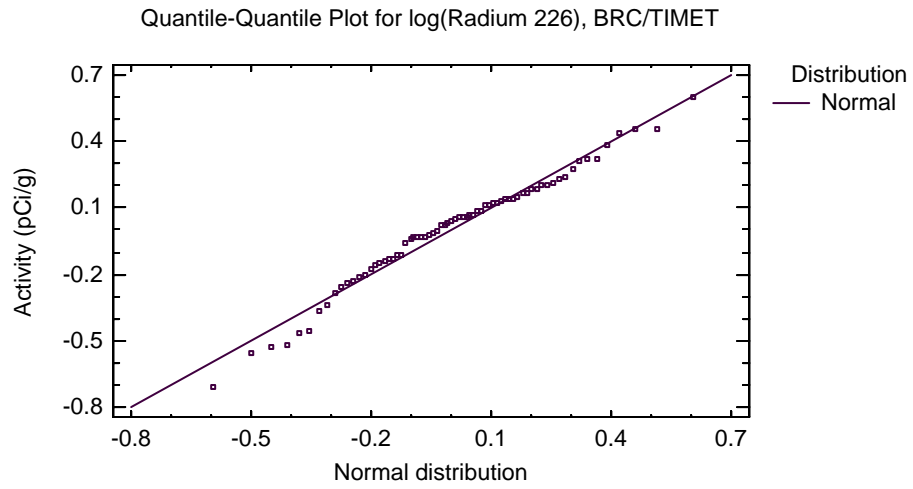
Fitted Distributions

<i>Normal</i>
mean = 0.00582028
standard deviation = 0.25663



**Tests for Normality for log(Radium 226)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.975028	0.417826





**DRAFT****Two-Sample Comparison - Radium 226 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Radium 226**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=5

Sample 1: 70 values ranging from 0.494 to 1.82

Sample 2: 12 values ranging from 0.891 to 1.335

**Comparison of Medians for Radium 226**

Median of sample 1: 1.045

Median of sample 2: 0.9805

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 42.35

Average rank of sample 2: 36.5417

W = -59.5 P-value = 0.438822

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**7.4 Radium 228**

**Uncensored Data - Radium 228 (Data Set="BRC/TIMET"&Depth Value <=5)**

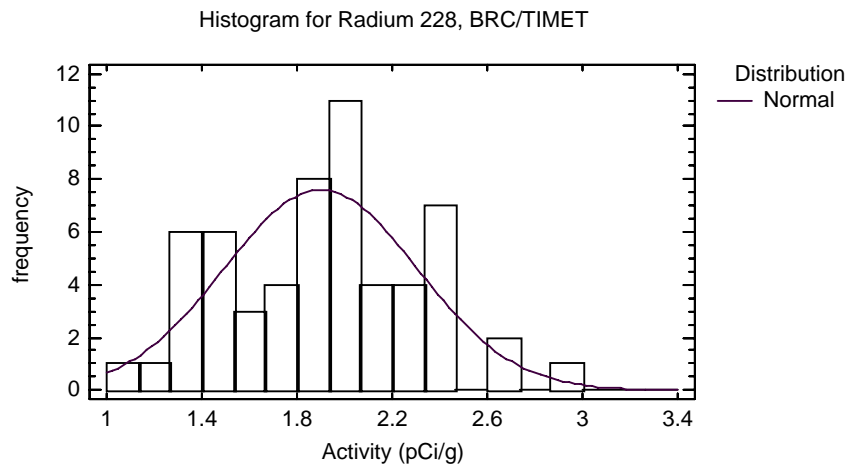
Data variable: Radium 228

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

58 values ranging from 1.11 to 2.94

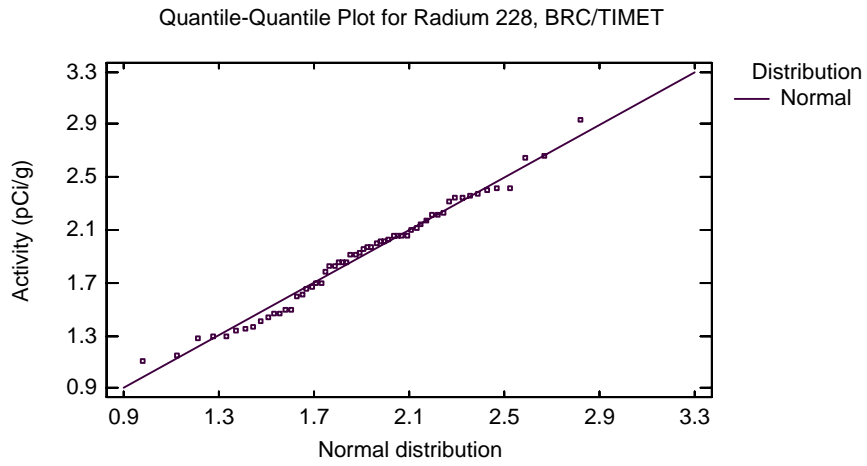
Fitted Distributions

<i>Normal</i>
mean = 1.89966
standard deviation = 0.406702



**Tests for Normality for Radium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.975409	0.502417



**DRAFT**

**Uncensored Data - log(Radium 228) (Data Set="BRC/TIMET"&Depth Value <=5)**

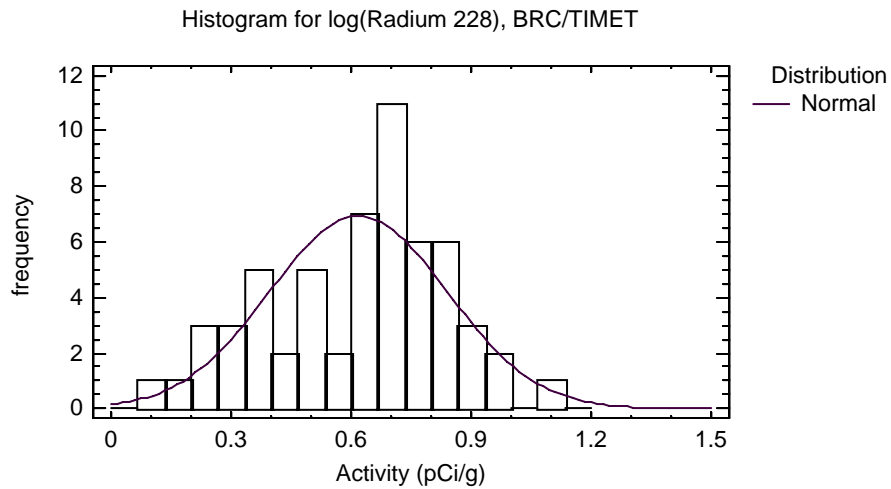
Data variable: log(Radium 228)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

58 values ranging from 0.10436 to 1.07841

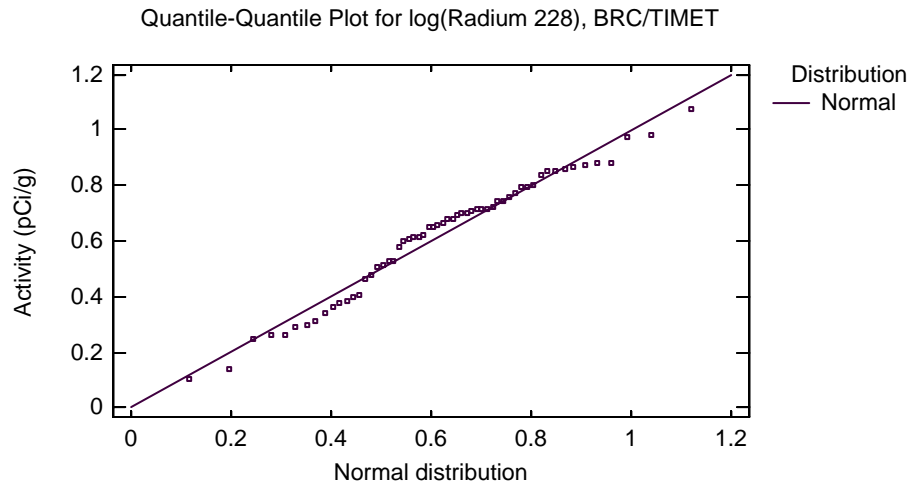
Fitted Distributions

<i>Normal</i>
mean = 0.618109
standard deviation = 0.222264



**Tests for Normality for log(Radium 228)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.963455	0.16525



**DRAFT**

**Two-Sample Comparison - Radium 228 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Radium 228**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5

Sample 1: 58 values ranging from 1.11 to 2.94

Sample 2: 12 values ranging from 1.295 to 1.92

**Comparison of Means for Radium 228**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 1.89966 +/- 0.106937 [1.79272, 2.00659]

95.0% confidence interval for mean of Data Set=Tronox: 1.73458 +/- 0.136605 [1.59798, 1.87119]

95.0% confidence interval for the difference between the means

not assuming equal variances: 0.165072 +/- 0.167186 [-0.00211431, 0.332258]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

not assuming equal variances: t = 2.01609 P-value = 0.0527831

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for Radium 228**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.406702	0.215
Variance	0.165407	0.0462248
Df	57	11

Ratio of Variances = 3.57831

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.343829, 0.497932]

Standard deviation of Data Set=Tronox: [0.152305, 0.365043]

Ratio of Variances: [1.18893, 7.97286]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 3.57831 P-value = 0.0251957

Reject the null hypothesis for alpha = 0.05.

**DRAFT**

**7.5 Thorium 228**

**Uncensored Data - Thorium 228 (Data Set="BRC/TIMET"&Depth Value <=5)**

Data variable: Thorium 228

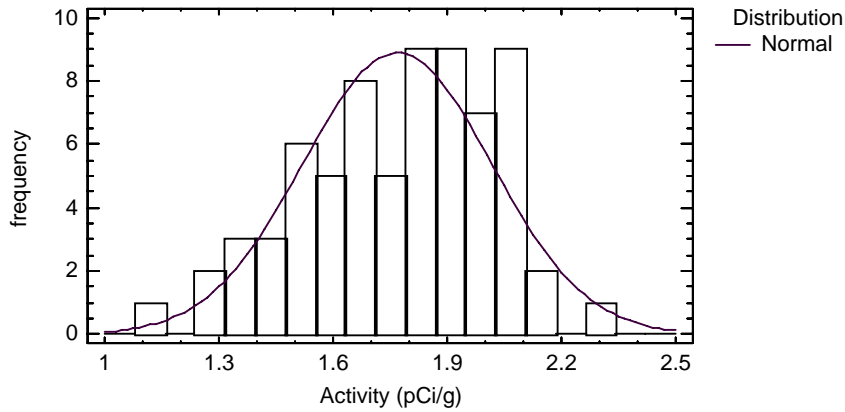
Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 1.15 to 2.28

Fitted Distributions

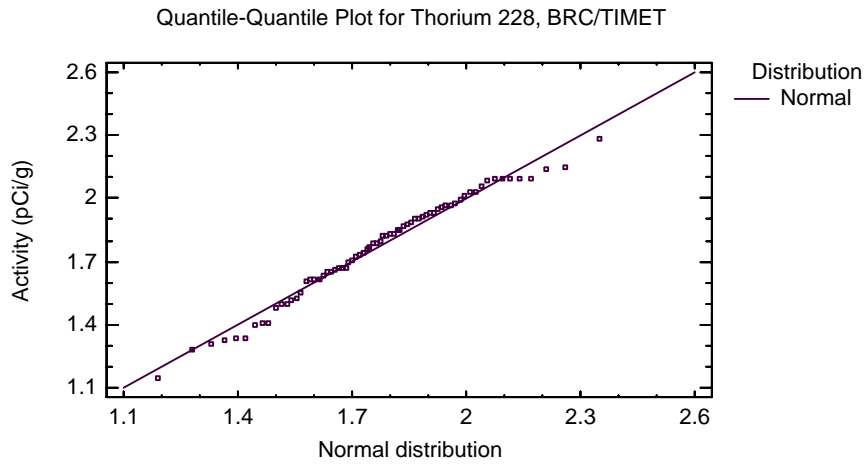
<i>Normal</i>
mean = 1.76871
standard deviation = 0.248146

Histogram for Thorium 228, BRC/TIMET



**Tests for Normality for Thorium 228**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.969599	0.237177





**DRAFT**

**Uncensored Data - log(Thorium 228) (Data Set="BRC/TIMET"&Depth Value <=5)**

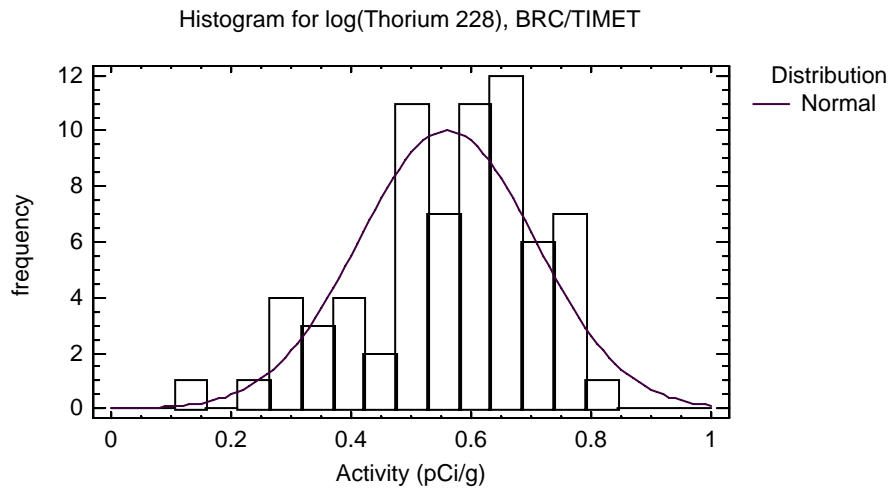
Data variable: log(Thorium 228)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.139762 to 0.824175

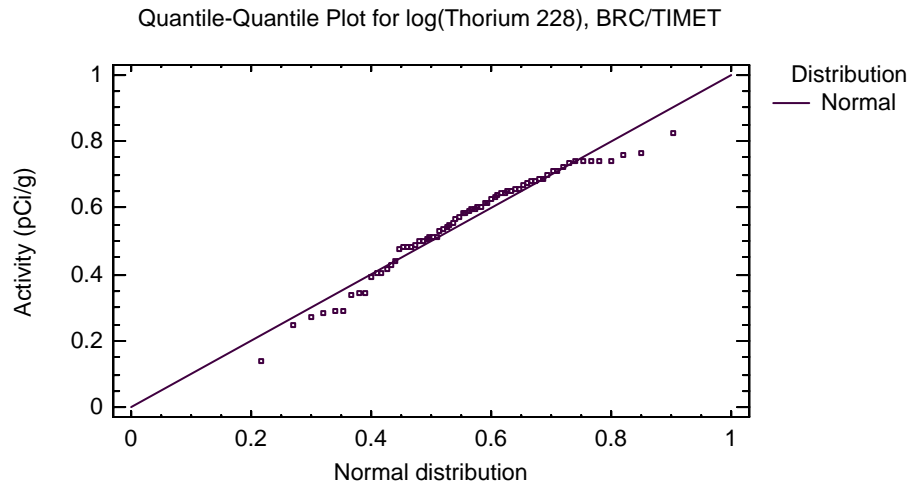
Fitted Distributions

<i>Normal</i>
mean = 0.55996
standard deviation = 0.146914



**Tests for Normality for log(Thorium 228)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.951063	0.0199607



**DRAFT****Two-Sample Comparison - Thorium 228 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Thorium 228**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=5

Sample 1: 70 values ranging from 1.15 to 2.28

Sample 2: 12 values ranging from 1.32 to 3.04

**Comparison of Medians for Thorium 228**

Median of sample 1: 1.795

Median of sample 2: 1.835

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 41.2786

Average rank of sample 2: 42.7917

W = 15.5 P-value = 0.843943

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**7.6 Thorium 230**

**Uncensored Data - Thorium 230 (Data Set="BRC/TIMET"&Depth Value <=5)**

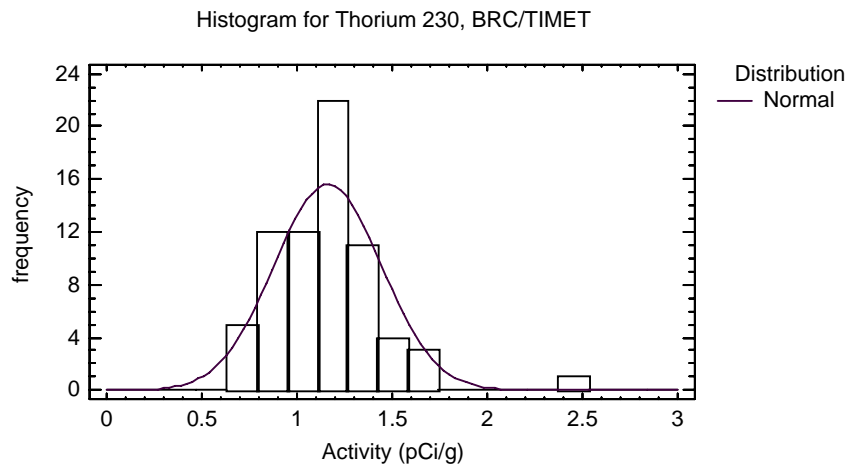
Data variable: Thorium 230

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.72 to 2.44

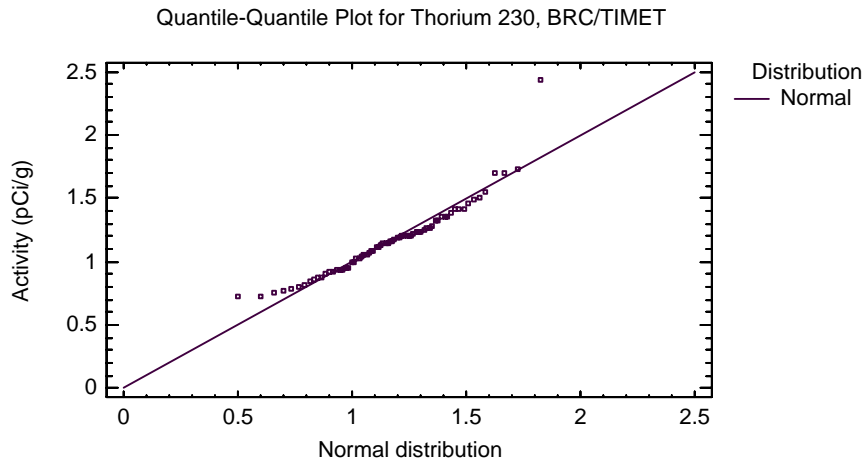
Fitted Distributions

<i>Normal</i>
mean = 1.16171
standard deviation = 0.283027



**Tests for Normality for Thorium 230**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.92	0.000148857



**DRAFT**

**Uncensored Data - log(Thorium 230) (Data Set="BRC/TIMET"&Depth Value <=5)**

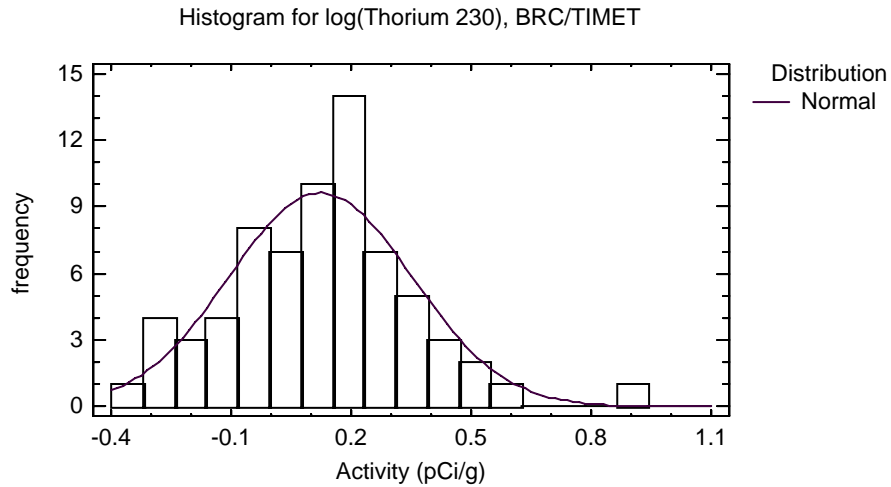
Data variable: log(Thorium 230)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from -0.328504 to 0.891998

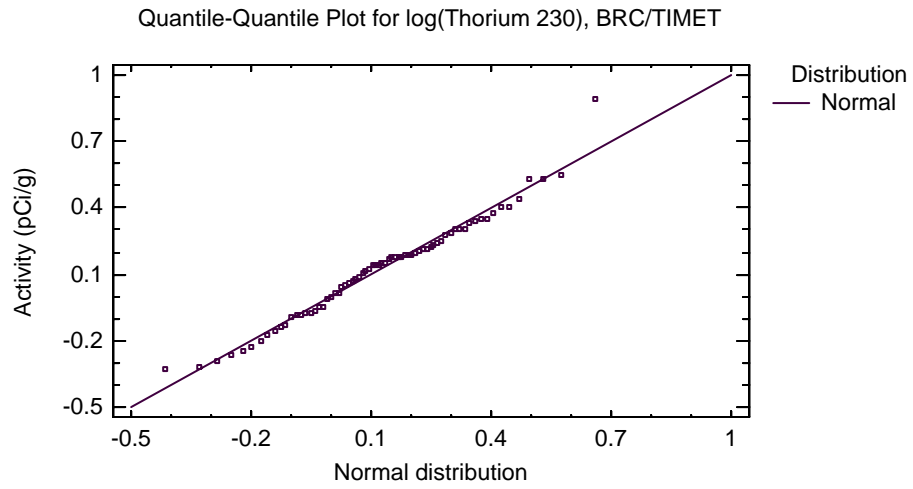
Fitted Distributions

<i>Normal</i>
mean = 0.123294
standard deviation = 0.22926



**Tests for Normality for log(Thorium 230)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.977719	0.530128



**DRAFT**

**Two-Sample Comparison - log(Thorium 230) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for log(Thorium 230)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5

Sample 1: 70 values ranging from -0.328504 to 0.891998

Sample 2: 12 values ranging from -0.375421 to 0.285179

**Comparison of Means for log(Thorium 230)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: 0.123294 +/- 0.0546653 [0.0686285, 0.177959]

95.0% confidence interval for mean of Data Set=Tronox: 0.0290256 +/- 0.129318 [-0.100293, 0.158344]

95.0% confidence interval for the difference between the means

assuming equal variances: 0.0942681 +/- 0.140457 [-0.0461892, 0.234725]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = 1.33564 P-value = 0.185456

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Thorium 230)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.22926	0.203532
Variance	0.0525603	0.0414252
Df	69	11

Ratio of Variances = 1.2688

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.196572, 0.275091]

Standard deviation of Data Set=Tronox: [0.144181, 0.345572]

Ratio of Variances: [0.424605, 2.77328]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 1.2688 P-value = 0.69833

Do not reject the null hypothesis for alpha = 0.05.



**DRAFT**

**7.7 Thorium 232**

**Uncensored Data - Thorium 232 (Data Set="BRC/TIMET"&Depth Value <=5)**

Data variable: Thorium 232

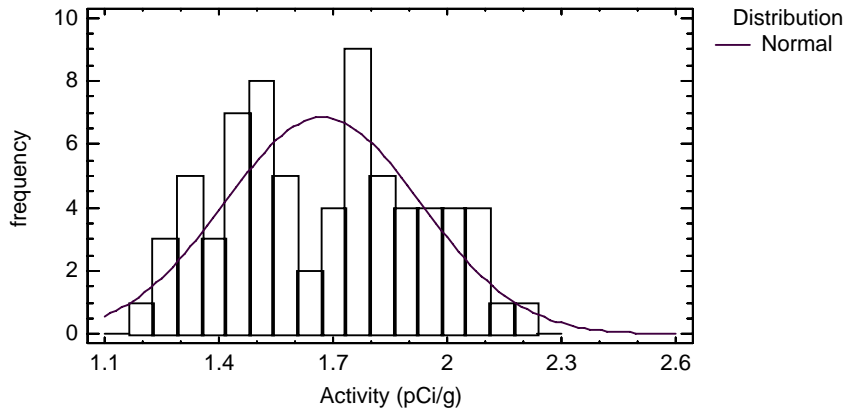
Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 1.22 to 2.23

Fitted Distributions

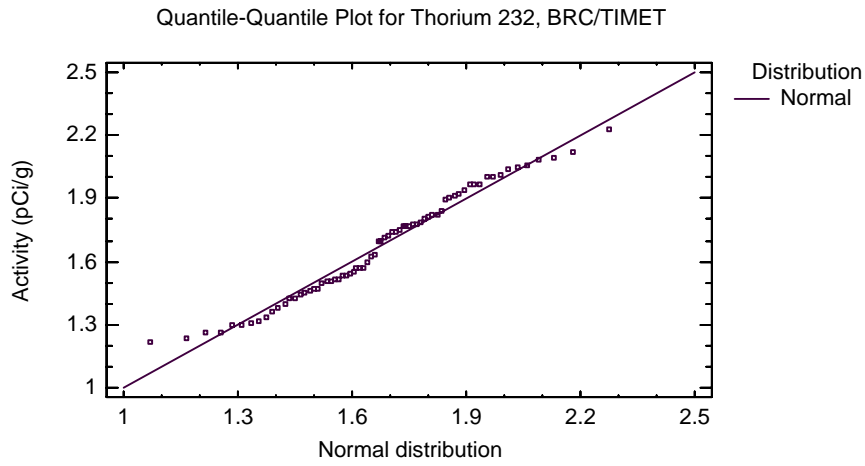
<i>Normal</i>
mean = 1.67243
standard deviation = 0.257611

Histogram for Thorium 232, BRC/TIMET



**Tests for Normality for Thorium 232**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.955072	0.0357647



**DRAFT**

**Uncensored Data - log(Thorium 232) (Data Set="BRC/TIMET"&Depth Value <=5)**

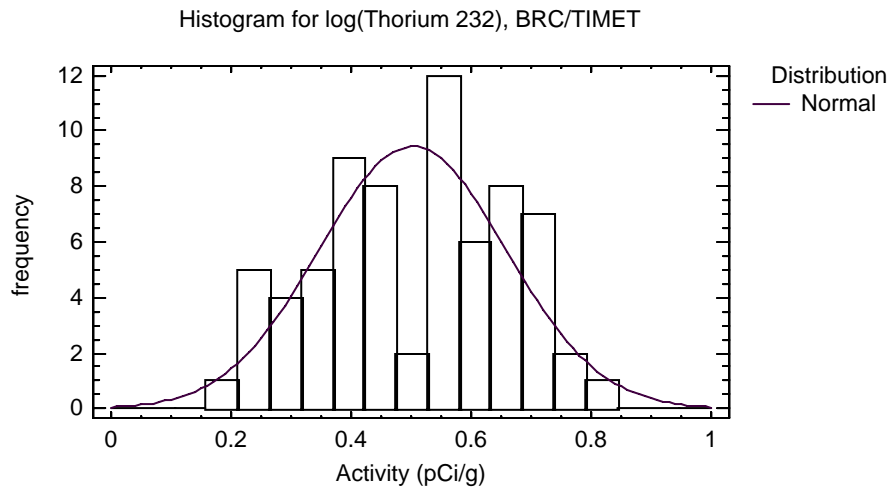
Data variable: log(Thorium 232)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.198851 to 0.802002

Fitted Distributions

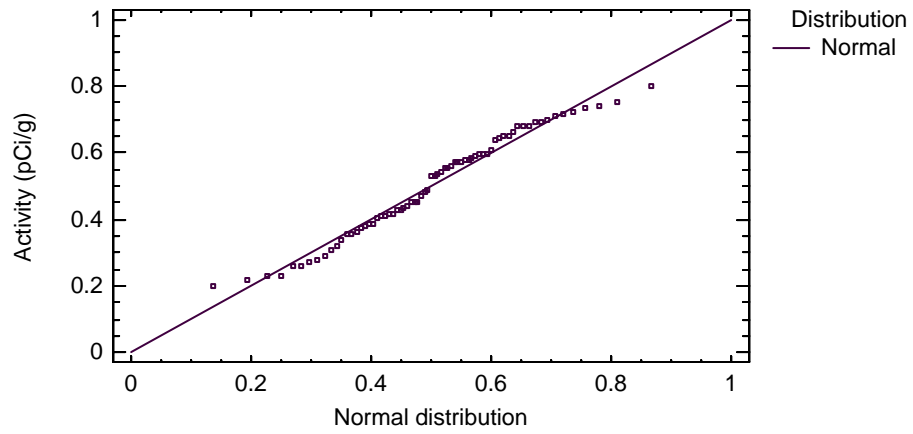
<i>Normal</i>
mean = 0.502423
standard deviation = 0.155761



**Tests for Normality for log(Thorium 232)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.953761	0.0296159

Quantile-Quantile Plot for log(Thorium 232), BRC/TIMET



**DRAFT****Two-Sample Comparison - Thorium 232 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Thorium 232**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=5

Sample 1: 70 values ranging from 1.22 to 2.23

Sample 2: 12 values ranging from 1.05 to 2.42

**Comparison of Medians for Thorium 232**

Median of sample 1: 1.7

Median of sample 2: 1.66

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 42.1286

Average rank of sample 2: 37.8333

W = -44.0 P-value = 0.568132

Do not reject the null hypothesis for alpha = 0.05.

x

**DRAFT**

**7.8 Uranium 234**

**Uncensored Data - Uranium 234 (Data Set="BRC/TIMET"&Depth Value <=5)**

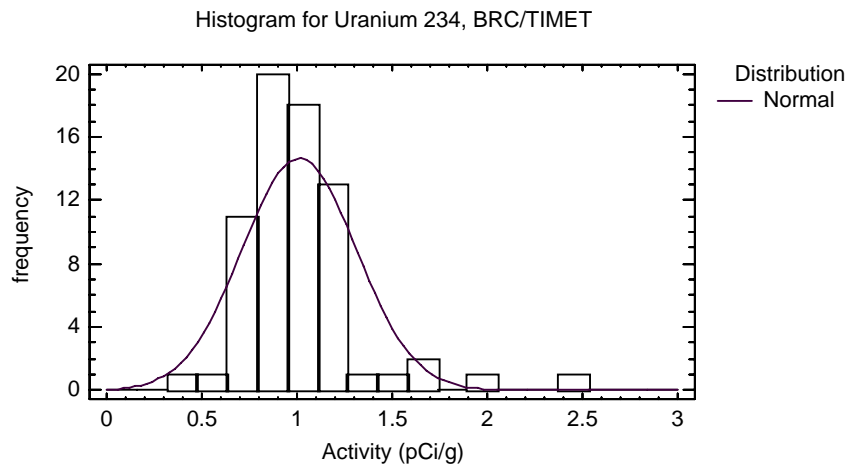
Data variable: Uranium 234

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.47 to 2.44

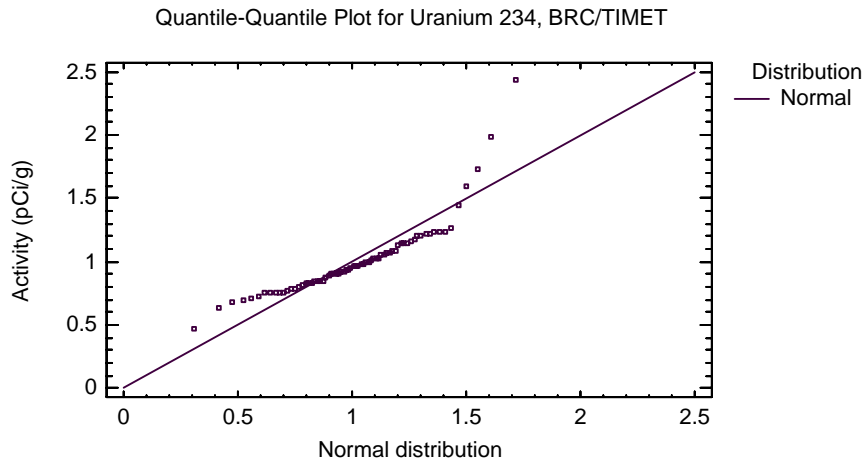
Fitted Distributions

<i>Normal</i>
mean = 1.01171
standard deviation = 0.30134



**Tests for Normality for Uranium 234**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.835651	1.61559E-10



**DRAFT**

**Uncensored Data - log(Uranium 234) (Data Set="BRC/TIMET"&Depth Value <=5)**

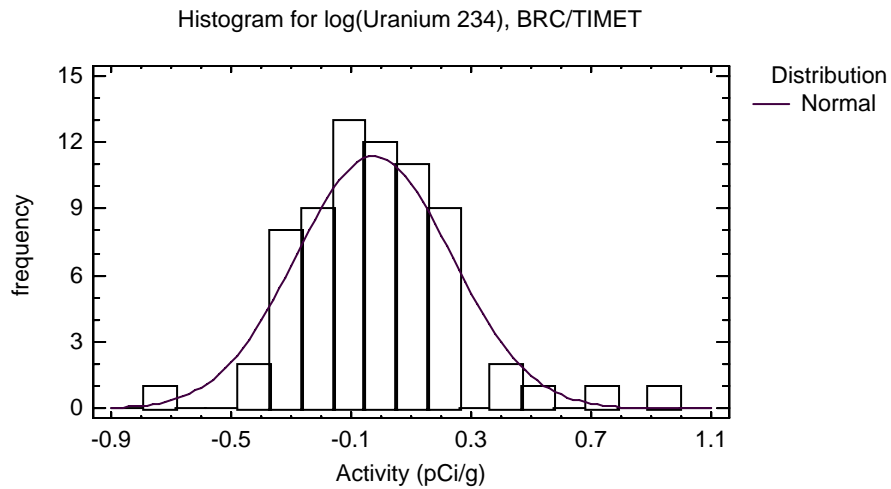
Data variable: log(Uranium 234)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from -0.755023 to 0.891998

Fitted Distributions

<i>Normal</i>
mean = -0.0238111
standard deviation = 0.25892

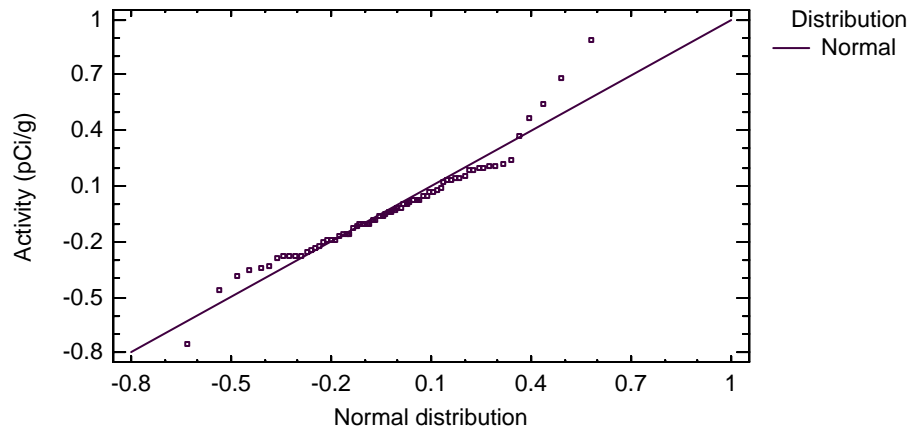


**Tests for Normality for log(Uranium 234)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.961023	0.0816209



Quantile-Quantile Plot for log(Uranium 234), BRC/TIMET



**DRAFT**

**Two-Sample Comparison - log(Uranium 234) & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for log(Uranium 234)**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5

Sample 1: 70 values ranging from -0.755023 to 0.891998

Sample 2: 12 values ranging from -0.254892 to 0.524729

**Comparison of Means for log(Uranium 234)**

95.0% confidence interval for mean of Data Set=BRC/TIMET: -0.0238111 +/- 0.0617375 [-0.0855487, 0.0379264]

95.0% confidence interval for mean of Data Set=Tronox: 0.0843448 +/- 0.16667 [-0.082325, 0.251015]

95.0% confidence interval for the difference between the means

assuming equal variances: -0.108156 +/- 0.161283 [-0.269439, 0.0531272]

t test to compare means

Null hypothesis: mean1 = mean2

Alt. hypothesis: mean1 NE mean2

assuming equal variances: t = -1.33453 P-value = 0.185815

Do not reject the null hypothesis for alpha = 0.05.

**Comparison of Standard Deviations for log(Uranium 234)**

	<i>Data Set=BRC/TIMET</i>	<i>Data Set=Tronox</i>
Standard deviation	0.25892	0.262319
Variance	0.0670398	0.0688112
Df	69	11

Ratio of Variances = 0.974258

95.0% Confidence Intervals

Standard deviation of Data Set=BRC/TIMET: [0.222003, 0.31068]

Standard deviation of Data Set=Tronox: [0.185825, 0.445385]

Ratio of Variances: [0.326036, 2.12948]

F-test to Compare Standard Deviations

Null hypothesis: sigma1 = sigma2

Alt. hypothesis: sigma1 NE sigma2

F = 0.974258 P-value = 0.86653

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**7.9 Uranium 235**

**Uncensored Data - Uranium 235 (Data Set="BRC/TIMET"&Depth Value <=5)**

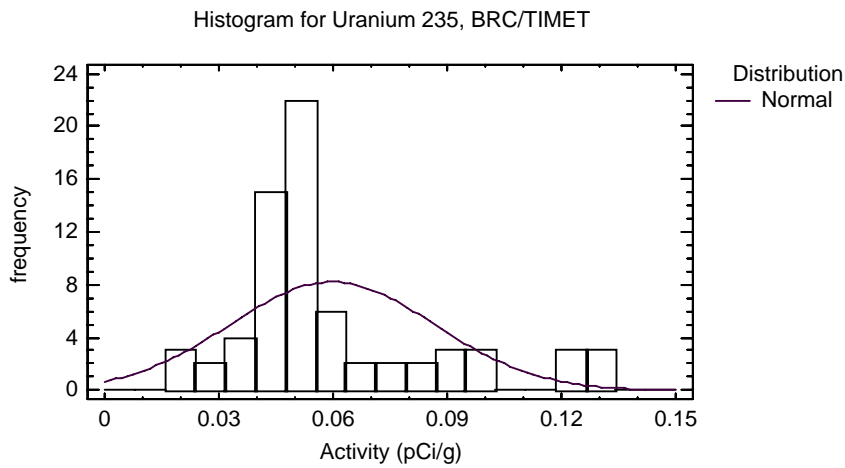
Data variable: Uranium 235

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.0195 to 0.13

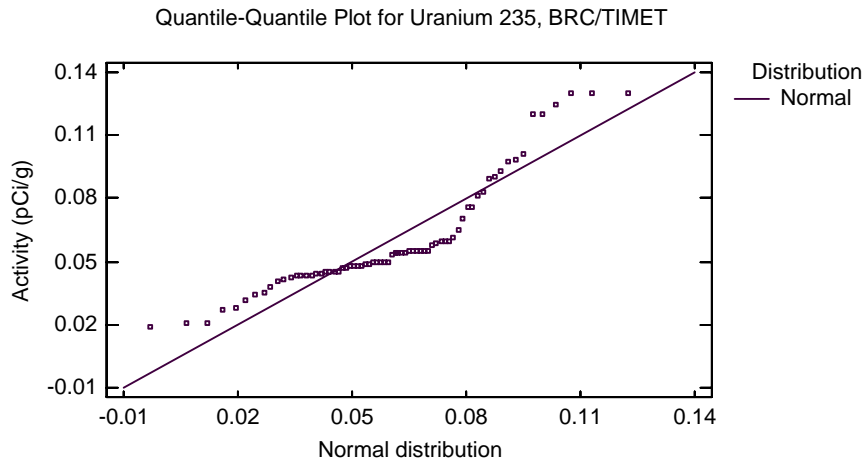
Fitted Distributions

<i>Normal</i>
mean = 0.0598214
standard deviation = 0.0268575



**Tests for Normality for Uranium 235**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.844601	<b>6.73362E-10</b>



**DRAFT**

**Uncensored Data - log(Uranium 235) (Data Set="BRC/TIMET"&Depth Value <=5)**

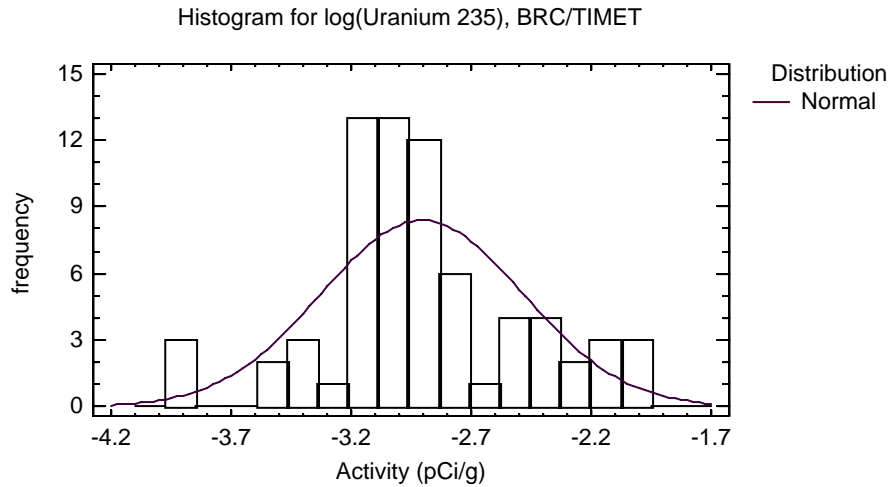
Data variable: log(Uranium 235)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from -3.93734 to -2.04022

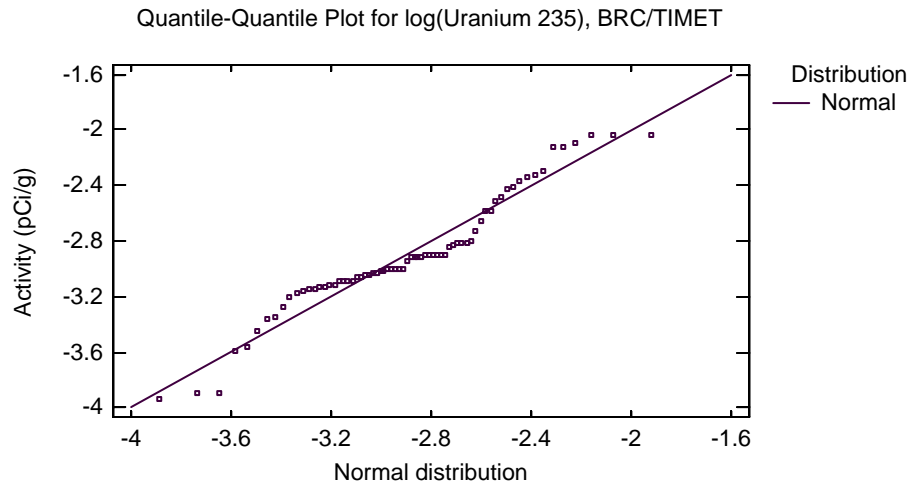
Fitted Distributions

<i>Normal</i>
mean = -2.90512
standard deviation = 0.420813



**Tests for Normality for log(Uranium 235)**

Test	Statistic	P-Value
Shapiro-Wilk W	0.936397	0.0020928



**DRAFT****Two-Sample Comparison - Uranium 235 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Uranium 235**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=5

Sample 1: 70 values ranging from 0.0195 to 0.13

Sample 2: 12 values ranging from -0.004455 to 0.162

**Comparison of Medians for Uranium 235**

Median of sample 1: 0.0515

Median of sample 2: 0.046725

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 42.8571

Average rank of sample 2: 33.5833

W = -95.0 P-value = 0.21485

Do not reject the null hypothesis for alpha = 0.05.

**DRAFT**

**7.10 Uranium 238**

**Uncensored Data - Uranium 238 (Data Set="BRC/TIMET"&Depth Value <=5)**

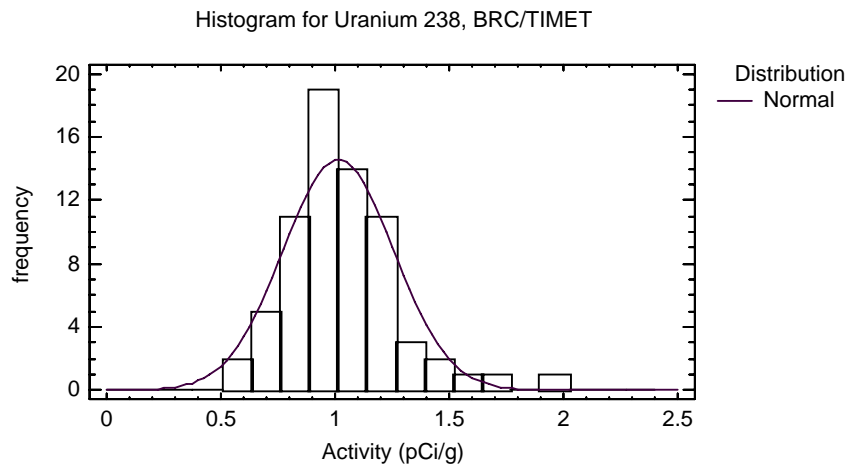
Data variable: Uranium 238

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from 0.57 to 1.95

Fitted Distributions

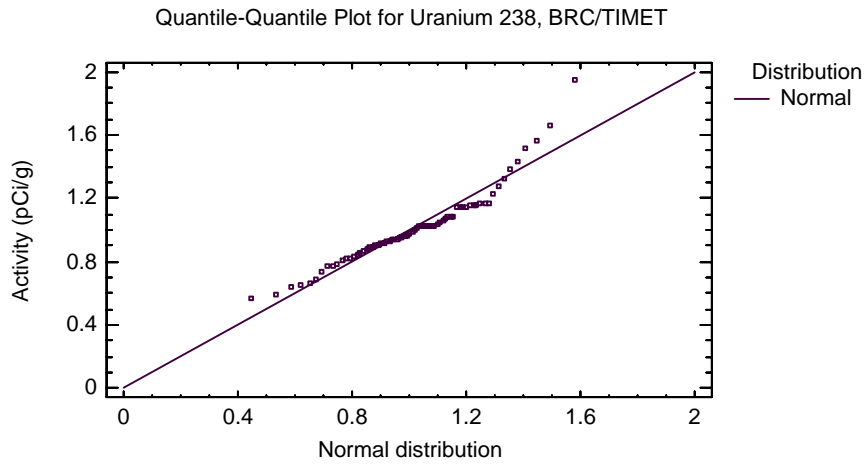
<i>Normal</i>
mean = 1.01457
standard deviation = 0.24267



**Tests for Normality for Uranium 238**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.931698	0.000989685





**DRAFT**

**Uncensored Data - log(Uranium 238) (Data Set="BRC/TIMET"&Depth Value <=5)**

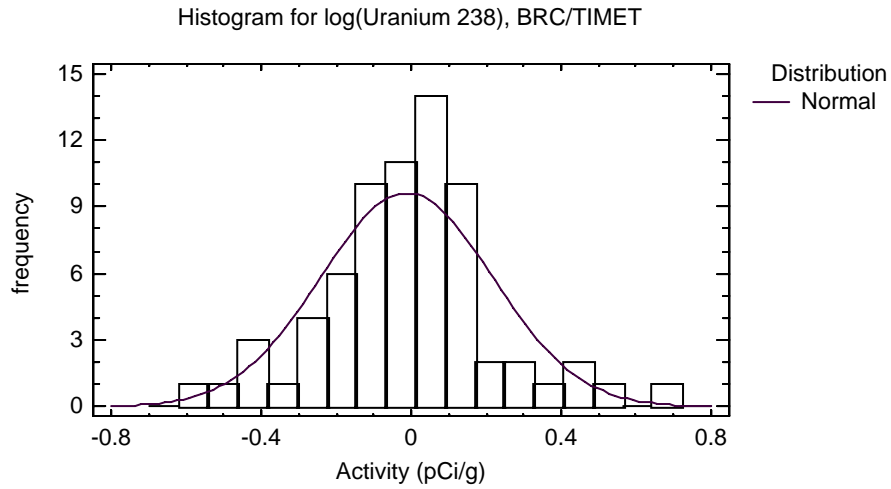
Data variable: log(Uranium 238)

Selection variable: Data Set="BRC/TIMET"&Depth Value <=5

70 values ranging from -0.562119 to 0.667829

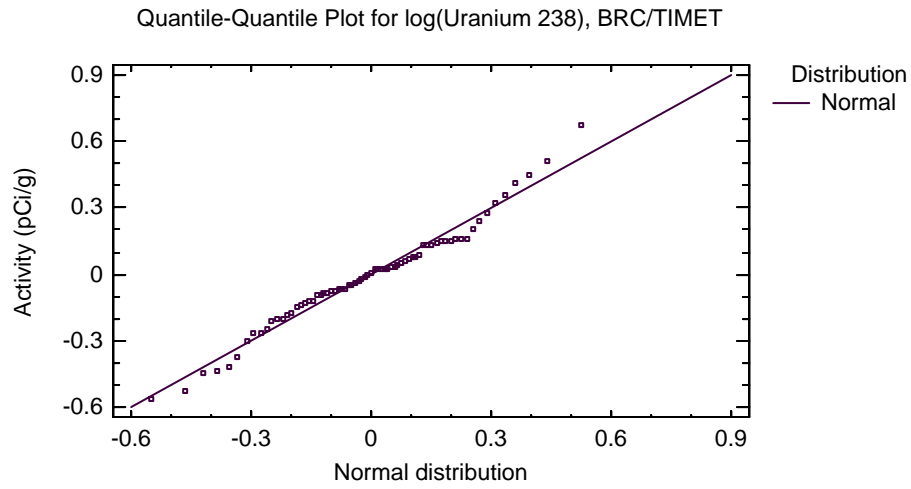
Fitted Distributions

<i>Normal</i>
mean = -0.0118452
standard deviation = 0.229362



**Tests for Normality for log(Uranium 238)**

<i>Test</i>	<i>Statistic</i>	<i>P-Value</i>
Shapiro-Wilk W	0.977865	0.536537



**DRAFT****Two-Sample Comparison - Uranium 238 & Data Set ((Data Set="Tronox"|Data Set="BRC/TIMET")&Depth Value <=5) for Uranium 238**

Sample 1: Data Set=BRC/TIMET

Sample 2: Data Set=Tronox

Selection variable: (Data Set="Tronox"|Data Set="BRC/TIMET")&amp;Depth Value &lt;=5

Sample 1: 70 values ranging from 0.57 to 1.95

Sample 2: 12 values ranging from 0.904 to 1.49

**Comparison of Medians for Uranium 238**

Median of sample 1: 0.995

Median of sample 2: 0.98725

Mann-Whitney (Wilcoxon) W test to compare medians

Null hypothesis: median1 = median2

Alt. hypothesis: median1 NE median2

Average rank of sample 1: 40.5786

Average rank of sample 2: 46.875

W = 64.5 P-value = 0.400971

Do not reject the null hypothesis for alpha = 0.05.

**Table - F-1**  
**Summary of Statistical Comparisons by Boring for Tonox**  
**Upgradient Data for Metals and Perchlorate in Soil**  
Upgradient Investigation, Tronox Facility – Henderson, Nevada

Chemical	Test Result <sup>1</sup>	
	Analysis of Variance	Kruskal-Wallis
Aluminum	--	--
Antimony	S	S
Arsenic	--	--
Barium	--	--
Beryllium	--	--
Boron	--	--
Cadmium	S	S
Calcium	--	--
Chromium	--	--
Cobalt	--	--
Copper	--	--
Iron	--	--
Lead	--	--
Magnesium	--	--
Manganese	--	--
Molybdenum	S	S
Nickel	--	--
Platinum	--	--
Potassium	--	--
Selenium	--	--
Silver	--	--
Sodium	S	S
Strontium	--	--
Thallium	--	--
Titanium	--	--
Tungsten	S	--
Uranium	--	--
Vanadium	--	--
Zinc	--	--
Perchlorate	--	--

**Notes:**  
1 Result from statistical test.  
S = statistically significant difference at 95% confidence level,  
-- = difference not statistically significant at 95% confidence level

**Table - F-2**  
**Summary of Statistical Comparisons for Tronox Upgradient Data for Metals and Perchlorate in Soil**  
Upgradient Investigation, Tronox Facility – Henderson, Nevada

Chemical	Comparison by Depth				Comparison by Geological Formation			
	Distribution <sup>1</sup>		Test <sup>2</sup>	Result <sup>3</sup>	Distribution <sup>1</sup>		Test <sup>2</sup>	Result <sup>3</sup>
	<=20 ft.	>=30 ft.			Alluvium	Muddy Creek		
Aluminum	N	N	t	S	LN	LN	t-log	S
Antimony	--	--	G	--	--	--	G	--
Arsenic	N	N	t	S	--	N	WRS	S
Barium	LN	LN	t-log	S	--	LN	WRS	S
Beryllium	LN	LN	t-log	--	LN	LN	t-log	--
Boron	--	LN	G	S	--	N	G	S
Cadmium	N	N	t	--	N	N	t	--
Calcium	LN	--	WRS	S	--	--	WRS	S
Chromium	LN	LN	t-log	S	--	LN	WRS	S
Cobalt	LN	LN	t-log	S	--	LN	WRS	S
Copper	--	LN	WRS	--	--	LN	WRS	--
Iron	N	N	t	--	N	N	t	--
Lead	--	N	WRS	--	--	N	WRS	--
Magnesium	LN	LN	t-log	S	--	LN	WRS	S
Manganese	--	LN	WRS	S	LN	LN	t-log	S
Molybdenum	LN	LN	t-log	--	--	LN	G	--
Nickel	LN	LN	t-log	--	N	N	t	--
Platinum	--	--	G	--	--	--	G	--
Potassium	N	N	t	S	N	N	t	S
Selenium	LN	--	G	S	LN	--	G	S
Silver	--	--	G	--	--	--	G	--
Sodium	N	N	t	--	N	N	t	--
Strontium	LN	LN	t-log	--	LN	LN	t-log	S
Thallium	--	--	G	--	--	N	G	--
Titanium	N	N	t	--	N	N	t	--
Tungsten	--	--	G	--	--	--	G	--
Uranium	LN	LN	t-log	S	--	LN	WRS	S
Vanadium	N	N	t	S	LN	LN	t-log	--
Zinc	LN	LN	t-log	--	LN	LN	t-log	--
Perchlorate	--	--	G	S	--	--	G	--

**Notes:**

- 1 Probability distribution for the data subset.
- N normal
- LN lognormal
- neither normal nor lognormal
- 2 Statistical test used for comparison.
- t t-test
- t-log t-test on logarithms of data
- WRS Wilcoxon Rank Sum,
- G Gehan modification to Wilcoxon Rank Sum Test
- 3 Result from statistical test.
- S statistically significant difference at 95% confidence level
- difference not statistically significant at 95% confidence level

**Table - F-3**  
**Summary of Statistical Comparisons between Tronox Upgradient and City of Henderson**  
**and BRC/TIMET Data for Metals and Perchlorate in Soil**  
 Upgradient Investigation, Tronox Facility – Henderson, Nevada

Chemical	Distribution for Tronox Data <= 20 ft.	Comparison to COH Data			Comparison to BRC/TIMET Data		
		Distribution <sup>1</sup>	Test <sup>2</sup>	Result <sup>3</sup>	Distribution <sup>1</sup>	Test <sup>2</sup>	Result <sup>3</sup>
Aluminum	N	N	t	S	--	WRS	--
Antimony	--	Not detected			--	G	S
Arsenic	N	N	t	--	--	WRS	S
Barium	LN	LN	t-log	S	--	WRS	--
Beryllium	LN	LN	t-log	S	--	WRS	--
Boron	--	Not measured			--	G	S
Cadmium	N	N	t	S	Not detected		
Calcium	LN	Not measured			LN	t-log	--
Chromium	LN	LN	t-log	S	N	WRS	--
Cobalt	LN	--	WRS	S	LN	t-log	S
Copper	--	LN	WRS	S	LN	WRS	S
Iron	N	N	t	--	N	t	S
Lead	--	LN	WRS	S	--	WRS	--
Magnesium	LN	LN	t-log	S	--	WRS	--
Manganese	--	N	WRS	S	LN	WRS	--
Molybdenum	LN	LN	t-log	S	--	G	S
Nickel	LN	LN	t-log	S	LN	t-log	--
Platinum	--	Not measured			--	G	S
Potassium	N	Not measured			LN	WRS	S
Selenium	LN	LN	t-log	--	--	G	S
Silver	--	LN	G	S	Not detected		
Sodium	N	Not measured			--	WRS	S
Strontium	LN	Not measured			LN	t-log	--
Thallium	--	LN	G	--	--	G	S
Titanium	N	N	t	S	N	t	S
Tungsten	--	Not measured			LN	G	S
Uranium	LN	Not measured			--	WRS	--
Vanadium	N	--	WRS	S	N	t	S
Zinc	LN	--	WRS	--	LN	t-log	S
Perchlorate	--	LN	G	S	Not measured		

**Notes:**

- 1 Probability distribution for the data subset.
- N normal
- L lognormal
- neither normal nor lognormal
- 2 Statistical test used for comparison.
- t t-test
- t-log t-test on logarithms of data
- WRS Wilcoxon Rank Sum
- G Gehan modification to Wilcoxon Rank Sum Test
- 3 Result from statistical test.
- S statistically significant difference at 95% confidence level
- difference not statistically significant at 95% confidence level

**Table - F-4**  
**Summary of Statistical Comparisons for Tronox**  
**Upgradient Data for Radionuclides in Soil**  
Upgradient Investigation, Tronox Facility – Henderson, Nevada

Radionuclide	Comparison by Depth			
	Distribution <sup>1</sup>		Test <sup>2</sup>	Result <sup>3</sup>
	0 ft.	5 ft.		
Uranium - Total	--	--	WRS	--
Lead 212	N	N	t	--
Radium 226	N	--	WRS	--
Radium 228	N	N	t	--
Thorium 228	LN	LN	t-log	S
Thorium 230	LN	N	t	--
Thorium 232	LN	LN	t-log	--
Uranium 234	LN	LN	t-log	S
Uranium 235	LN	LN	t-log	--
Uranium 238	LN	LN	t-log	--
<b>Notes:</b>				
1 Probability distribution for the data subset.				
N normal				
LN lognormal				
-- neither normal nor lognormal				
2 Statistical test used for comparison.				
t t-test				
t-log t-test on logarithms of data				
WRS Wilcoxon Rank Sum				
3 Result from statistical test.				
S statistically significant difference at 95% confidence level				
-- difference not statistically significant at 95% confidence level				



**Table - F-5**  
**Summary of Statistical Comparisons between Tronox Upgradient and**  
**City of Henderson and BRC/TIMET Data for Radionuclides in Soil**  
 Upgradient Investigation, Tronox Facility – Henderson, Nevada

Radionuclide	Distribution for Tronox Data <= 5 ft.	Comparison to COH Data			Comparison to BRC/TIMET Data		
		Distribution <sup>1</sup>	Test <sup>2</sup>	Result <sup>3</sup>	Distribution <sup>1</sup>	Test <sup>2</sup>	Result <sup>3</sup>
Uranium - Total	--	Not measured			Not measured		
Lead 212	N	N	t	S	Not measured		
Radium 226	--	LN	WRS	S	N	WRS	--
Radium 228	N	N	t	S	N	t	--
Thorium 228	LN	LN	t-log	--	N	WRS	--
Thorium 230	LN	LN	t-log	--	LN	t-log	--
Thorium 232	LN	LN	t-log	--	--	WRS	--
Uranium 234	LN	LN	t-log	S	LN	t-log	--
Uranium 235	LN	N	WRS	--	--	WRS	--
Uranium 238	--	N	WRS	S	LN	WRS	--

**Notes:**

1 Probability distribution for the data subset.  
 N normal  
 LN lognormal  
 -- neither normal nor lognormal

2 Statistical test used for comparison.  
 t t-test  
 t-log t-test on logarithms of data  
 WRS Wilcoxon Rank Sum

3 Result from statistical test.  
 S statistically significant difference at 95% confidence level  
 -- difference not statistically significant at 95% confidence level