# APPENDIX G

# Data Adequacy Analysis

# I. Introduction

This appendix explains ENVIRON's evaluation of the adequacy of the data set used in the risk assessment for the WRF expansion project. The data set is used to characterize the concentrations of chemicals in the media to which the populations of interest may be exposed. In general terms, the adequacy of the data set is determined by the level of uncertainty in the risk estimates that results from an incomplete characterization of these media. Complete characterization of the media is not practical; the question is whether the data set supports risk estimates that have an acceptable level of uncertainty.

In evaluating the adequacy of the data set, the critical question is whether the probabilities of the potential decision errors are acceptable. The application of the Data Quality Objectives (DQOs) process to the WRF expansion project is discussed in section I.C. of the risk assessment report. USEPA guidance for the DQOs process (USEPA 2000a) indicates that action levels and tolerable limits for decision errors should be selected by a planning team that includes regulators and stakeholders, as well as technical personnel. Because Step 5 of the process was not completed, the adequacy evaluation described in this appendix is based on assumed action levels for various types of cumulative risks. The action levels assumed in this report are $1 \times 10^{-6}$ for cumulative chemical cancer risks; a hazard index of one for cumulative chemical non-cancer risks; and $3 \times 10^{-4}$ for cumulative radionuclide cancer risks. These levels were selected because they are thresholds below which the various types of cumulative risks are generally considered to be insignificant. Because Step 6 of the DQOs process was not completed, the tolerable limits on decision errors have not been established.

This appendix describes the process by which the data set was analyzed to investigate and characterize the probabilities of decision errors that may result from incomplete sampling. These probabilities are estimated for each chemical that was found in soil at levels that contribute significantly to the cumulative risks. The probabilities are calculated as the likelihood that the true mean concentration is greater than the critical (minimum) concentration that corresponds to an assumed action level using the conservative risk assessment procedures described in this report. The adequacy of the ground water data is considered separately in a less quantitative manner because the numbers of samples and significant chemicals used in estimating the risks associated with exposure to ground water are much smaller than those used in estimating the risks associated with exposure to soils, and because it is not appropriate to treat the available ground water samples as independent observations of current and future conditions throughout the WRF expansion site.

The analyses presented in this appendix indicate that probability of decision error is quite small when the results of the risk assessment are accepted. The most likely exceedence of an assumed action level for a single chemical in soil is a cancer risk greater than $1 \times 10^{-6}$ due to

exposure to arsenic. The calculated probability of the most likely exceedence is about five percent, but the likelihood that the actual risk exceeds the assumed action level is far lower because of the many other conservative elements of the risk assessment process. Arsenic is present primarily (perhaps entirely) as a result of background conditions, and the assumed action level ($1 \times 10^{-6}$) represents the lower end of the range of cancer risks considered acceptable by the USEPA.

Because the probability of decision error due to inadequacy of the data set is small, we believe that the data set is adequate; it supports risk estimates that have a level of uncertainty that we consider acceptable. ENVIRON recognizes, however, that the final risk management decisions will be made by the appropriate regulatory agencies.

# II. Basis for Evaluating the Adequacy of the Data Set

This section of the appendix provides information about the data set that forms the basis for the evaluation of data adequacy. The focus of this section is on the soils data; the adequacy of the ground water data is addressed separately in a later section.

## A. Selection of Significant Chemicals in Soil

The adequacy of the soil data set was evaluated by conducting a variety of statistical analyses on the data obtained for individual chemicals. All of the chemicals detected in the soil samples were included in the calculating the cumulative risks, but the risk calculations indicate that there are only 14 chemicals with chemical-specific risk estimates that exceed one percent of the assumed action levels. These 14 significant chemicals were identified by comparing the chemical-specific risk estimates to the assumed action levels, as follows:

- The chemical-specific non-radionuclide cancer risk estimates for exposure to soils presented in Appendix M were compared to $1.0 \times 10^{-8}$ (one percent of the assumed action level of $1.0 \times 10^{-6}$ for cumulative non-radionuclide cancer risks). Arsenic and total dioxins and furans (quantified as the toxicity equivalent quotient, or TEQ) were identified as significant by this criterion.

- The chemical-specific non-cancer hazard index values for exposure to soils presented in Appendix M were compared to 0.01 (one percent of the assumed action level for cumulative non-cancer risks, which is a hazard index of one). Aluminum, arsenic, barium, iron, manganese, and perchlorate were identified as significant by this criterion.

- The chemical-specific radionuclide cancer risk estimates for exposure to soils presented in Appendix O were compared to $3.0 \times 10^{-6}$ (one percent of the assumed action level of $3.0 \times 10^{-4}$ for cumulative radionuclide cancer risks). The seven radionuclides that were identified as significant by this criterion are actinium 228, bismuth 214, potassium 40, radium 226, radium 228, thallium 208, and thorium 228. As explained in section VIII.A, some of the radionuclides considered in the cumulative risk calculations are decay products of other radionuclides and were not measured directly when the soil samples were analyzed. To perform the risk calculations, the concentration of each of the unmeasured decay products was assumed to be in secular equilibrium with the parent radionuclide. The parent radionuclides and decay products are identified in Table 35. The risks associated with many of the decay products (both measured and unmeasured) are included in the risk estimates for their parents because the toxicity factors used for the

parents include the short-lived decay products. The toxicity factors that account for the short-lived decay products are identified in Table 49 by the suffix, "+D". As indicated in that table, the toxicity factors used to calculate the risks associated with lead 210, radium 226, radium 228, thorium 228, uranium 235, and uranium 238 include the effects of short-lived decay products.

The risk estimates used to identify the 14 significant chemicals in soil were calculated using ½ the reported detection limit to represent each concentration reported as a non-detect. ENVIRON considered using a more sophisticated approach to the censored data, but concluded that this was not necessary. The most conservative way to represent the non-detects would be to use the reported detection limit for each as an observed value; this would maximize the values assigned to the censored samples and tend to maximize the values of the exposure point concentrations. Substituting the detection limit for ½ the detection limit would not increase any of the mean concentrations by more than a factor of two. The only additional chemical that would have been identified as significant in soil if the risk estimates associated with it were doubled is vanadium. Because vanadium was detected in all of the soil samples, the risks associated with it are not dependent on the protocol used to assign values to the non-detects. Thus, none of the chemicals that were not judged to be significant in soil were excluded because of the protocol used to represent non-detects.

The final list of significant chemicals, the abbreviations used to identify them in the statistical output in this appendix, and the number of non-detects reported for each is provided in Table G-1.

**Table G-1**
**Abbreviations and Number of Non-Detects Reported for the 14 Significant Chemicals at the 70 WRF Soil Sampling Locations**

| Chemical | Abbreviation | Non-Detects |
|---|---|---|
| Aluminum | Al | 0 |
| Arsenic | As | 0 |
| Barium | Ba | 0 |
| Iron | Fe | 0 |
| Manganese | Mn | 0 |
| Dioxin | TEQ | 41 |
| Perchlorate | Pclr | 2 |
| Actinium 228 | Ac228 | 4 |
| Bismuth 214 | Bi214 | 0 |
| Potassium 40 | K40 | 0 |
| Radium 226 | Ra226 | 20 |
| Radium 228 | Ra228 | 0 |
| Thallium 208 | Tl208 | 1 |
| Thorium 228 | Th228 | 0 |

## B. Soil Sampling Locations

The data set used in the risk assessment was generated by chemical analysis of soil samples collected at 70 sampling locations in the 26 borings shown in Figure 6 of the report. These locations were categorized by their previous use as (1) former ponds, (2) ditches, and (3) other (i.e., outside of the former ponds and ditches). The conceptual site model developed in section III.B of the report suggests that there may be significant differences in chemical concentrations among these three categories. In addition, differences in concentration with depth below the ground surface (bgs) are anticipated.

The 12 borings in the northern exposure area (NEA) include:

- One in each of seven former ponds (P-11 through P-17)
- Two in the Beta ditch (B-2 and B-3)
- Three that are outside of the former ponds and ditches, including two in the Eastern area (E-1 and E-2) and one in the future street alignment (S-2)

The NEA locations were generally sampled at two or three depth intervals: 0-1 foot bgs, 4-5 feet bgs, and (in some cases) deeper. The two upper sampling intervals were selected because the soils in the NEA will be re-graded to a depth of about five feet during the construction period. Thus, direct contact exposure to the soils that are currently in the uppermost five feet is likely both during and after construction. Soil samples were collected at depths greater than five feet at only 5 of the 12 NEA sample locations, and were not used to calculate exposure point concentrations (EPCs).

The 14 borings in the southern exposure area (SEA) include:

- One in each of ten ponds (P-1 through P-10)
- Two in the Alpha ditch (A-1 and A-2) and one in the Beta ditch (B-1)
- One in the future street alignment (S-1)

The SEA locations were generally sampled at three depth intervals: 0-1 foot bgs, 10-12 feet bgs, and immediately above the water table. The deepest sample was generally collected from a two-foot interval between 16 and 22 feet bgs.

These locations and depths were selected to represent the soils to which receptors may be exposed during and after construction of the WRF expansion project. The discussion of representativeness in Appendix F explains the selection of the final sampling locations in the

former ponds. The use of the data from various samples to derive representative exposure point concentrations (EPCs) is explained in detail in section V.B.

## C. Investigation of Homogeneity Within Ponds

One of the issues raised during development of the site characterization work plan concerns the homogeneity of the concentrations within each of the former ponds. ENVIRON's site characterization effort did not include sampling at multiple locations within each pond, so the data set generated from the May 2001 sampling cannot be used to address this issue. This issue was investigated using data obtained from an earlier investigation conducted by others, primarily in ponds that are not on the WRF expansion property. The results of this investigation are likely to be applicable to the WRF expansion site, although there are potential differences between on-site and off-site conditions.

Concentration data from six discrete soil samples in each of seven ponds was submitted in ERM's Discrete/Composite Data Analysis memo to NDEP dated 28 August 2000. Only one of the seven ponds (identified as LD-2 by ERM and represented by location P-11 in ENVIRON's May 2001 sampling effort) is located within the WRF expansion area. The data from pond LE-9 were excluded from ENVIRON's evaluation of homogeneity because this pond had been remediated; the others had not, and are more likely to represent conditions to be found in the former ponds in the WRF expansion area. Data are available for six samples in each of six ponds for four inorganic chemicals (arsenic, lead, manganese, and perchlorate). Three of these four (all but lead) were identified as significant chemicals for assessing risks in the WRF expansion area. Although discrete sample data were also available for some organic chemicals, these chemicals were not considered in ENVIRON's evaluation of homogeneity because none of them were among the 14 chemicals identified as significant.

The level of homogeneity within ponds was evaluated by using bubble plots to search for spatial patterns or trends and analysis of variance (ANOVA) to test the significance of the between-pond variation relative to the within-pond variation. A one-way ANOVA was performed for each of the four chemicals. Because the variation within the ponds did not appear to be normally distributed or homoscedastic, each ANOVA was performed using the Kruskal-Wallis test (a nonparametric procedure). The bubble plots and the statistical output from the ANOVA tests are provided at Tab 16 in the statistical analysis section of this appendix.

The ANOVA results generated using the data from all six ponds (which are summarized in Table G-2) indicate that the differences between the ponds are significantly greater than the variation within ponds for arsenic, lead, and perchlorate. The p-values for these parameters were all less than 0.01. For manganese, the p-value was about 0.4, which indicates that for this chemical, the differences among the ponds are not significant with respect to the within-pond variation. These findings are consistent with the bubble plots; the differences between the ponds

appear to be greater than the differences within the individual ponds for arsenic, lead, and perchlorate. Consistent patterns of variation within the individual ponds were not identified, and the ranking of the ponds by mean concentration differs from one chemical to another.

The bubble plots for this data set suggest that some of the differences between the ponds may be explained by location as well as by waste disposal history. The effects of these two potential controlling factors are confounded and cannot be separated with the limited data set available. The most striking differences for arsenic and lead are between the pond in the WRF expansion area (PLD-02) and the five ponds located near the base of the slope (PLG-04, PLG-05, PLG-06, PLH-03, and PLI-02). Compared to the ponds near the base of the slope, the pond at the WRF expansion site has lower concentrations of arsenic and higher concentrations of lead. The mechanism that caused these differences is not clear, but is likely associated with the waste disposal history of the various ponds. The perchlorate bubble plot indicates that high concentrations are limited to the two ponds (PLH-03 and PLI-02) located in the area identified as "wetlands vicinity" in Figure 1-3 of the draft closure plan for the pond area submitted on behalf of the Basic Remediation Company (ERM 2001). The high concentrations of perchlorate in these ponds are likely the result of historical periods in which the ground water table was at or very close to the soil surface. An ANOVA for perchlorate performed on the four ponds that are not in the "wetlands vicinity" indicates that the differences among the four ponds are significant relative to the variation within these ponds. The JMP output that supports this statement is provided at the end of Tab 16 in the statistical analysis section of this appendix.

This evaluation suggests that the concentrations within each of the former ponds for which multiple soil samples were analyzed are relatively homogeneous for some chemicals. Most importantly, the differences in the concentrations of arsenic and perchlorate (two of the most significant chemicals in the risk assessment) among the former ponds are significantly greater than the variation within the individual ponds. This observation is expected to be valid for the WRF expansion area, but cannot be tested conclusively with the available data sets.

**TABLE G-2**
**Summary of One-Way Analysis of Variance Performed with Discrete-Sample Data from Six Former Ponds**

| Chemical | p-value* |
|---|---|
| Arsenic | 0.0005 |
| Lead | 0.0043 |
| Manganese | 0.4038 |
| Perchlorate | <0.0001 |

* In this context, the p-value is a measure of the significance of the variation between groups relative to the variation within groups; p-values less than 0.05 (five percent) indicate that there are significant differences between the ponds.

## D. Statistical Characterization of the Soils Data Set

The data set obtained from the soil samples was analyzed to characterize the statistical distributions, identify outliers, calculate summary statistics, search for spatial trends and patterns, and determine whether there are significant differences among the historic land use categories and depth intervals. Most of these analyses are presented as output generated by the JMP© statistical software package (version 3.1, SAS Institute 1995). This output is organized by tabs (one for each of the 14 significant chemicals) in the statistical analysis section of this appendix. For each chemical, the output includes:

1. Evaluation of frequency distributions: quantiles, moments, histograms, quantile box plots, outlier box plots, and normal quantile plots are provided for both the concentration data and the natural logarithms of the concentration data. The symbols used in the plots are as follows:

   x – P (pond) sampling locations
   □ - D (ditch) sampling locations
   + - O (other) sampling locations

2. Illustration of spatial patterns: bubble plots for the 14 significant chemicals are provided in the tabbed sections. These are identical to the bubble plots provided for the same chemicals in Appendix D. The bubble plots were developed using the Surfer 7© software package (version 7.02, Golden Software 2000).

3. Evaluation of sources of variation in the data: one-way analysis of variance (ANOVA) and pairwise comparison tests (both parametric and nonparametric) are provided to examine the differences between categories defined by historical land use (pond, ditch, or other) and depth zones. The depth categories are identified in the JMP output as T (top, or 0-1 foot bgs), M (middle, which is 4-5 feet bgs in the NEA and 10-12 feet bgs in the SEA), and B (bottom, which is deeper than the middle sample). Similar ANOVAs were presented in Appendix D and discussed in section II.B of the report, but additional details (e.g., nonparametric pairwise comparisons) are provided in this appendix. The results of these tests are summarized in Table G-3 and Table G-4.

**TABLE G-3**
**Summary of One-Way ANOVA by Location Category**
**(Pond/Ditch/Other)**

| Chemical | Order of Means (high to low) | Parametric ANOVA p-value* | Nonparametric ANOVA p-value* | Pond vs. Ditch p-value* | Pond vs. Other p-value* | Ditch vs. Other p-value* |
|---|---|---|---|---|---|---|
| Aluminum | O – D – P | 0.3816 | 0.2463 | 0.4478 | 0.1100 | 0.4172 |
| Arsenic | D – P – O | 0.0301 | 0.0391 | 0.1700 | 0.0546 | 0.0204 D>O |
| Barium | O – D - P | 0.7256 | 0.1264 | 0.1645 | 0.1787 | 0.0821 |
| Iron | O – P – D | 0.1748 | 0.0942 | 0.3950 | 0.1035 | 0.0175 O>D |
| Manganese | D – O – P | 0.0346 | 0.0232 | 0.0856 | 0.0140 O>P | 0.5820 |
| Dioxin | P – D - O | 0.9121 | 0.2074 | 0.3145 | 0.1057 | 0.5052 |
| Perchlorate | D – P – O | 0.2957 | 0.0025 | 0.0504 | 0.0148 P>O | 0.0009 D>O |
| Actinium 228 | P – D – O | 0.6169 | 0.8805 | 0.9199 | 0.6060 | 0.7498 |
| Bismuth 214 | D – P – O | 0.0324 | 0.0322 | 0.1818 | 0.0586 | 0.0083 D>O |
| Potassium 40 | O – P – D | 0.2703 | 0.4293 | 0.6408 | 0.2659 | 0.2345 |
| Radium 226 | D – O – P | 0.5137 | 0.5231 | 0.4001 | 0.3844 | 0.3390 |
| Radium 228 | O – P – D | 0.7780 | 0.3531 | 0.9271 | 0.1853 | 0.1734 |
| Thallium 208 | O – P – D | 0.0907 | 0.0912 | 0.7483 | 0.0388 O>P | 0.0632 |
| Thorium 228 | O – P – D | 0.3635 | 0.1825 | 0.2724 | 0.1786 | 0.1045 |

Note:
* In this context, the p-value is a statistical measure of the significance of the difference in mean values; p-values less than 0.05 (five percent) are considered indicative of significant differences.

**TABLE G-4**
**Summary of One-Way ANOVA by Depth Category**
**(Top/Middle/Bottom)**

| Chemical | Order of Means (high to low) | Parametric ANOVA p-value* | Nonparametric ANOVA p-value* | Top vs. Middle p-value* | Top vs. Bottom p-value* | Middle vs. Bottom p-value* |
|---|---|---|---|---|---|---|
| Aluminum | T – M – B | 0.0003 | 0.0001 | 0.0211<br>T>M | 0.0002<br>T>B | 0.0024<br>M>B |
| Arsenic | B – M – T | 0.1100 | 0.0003 | 0.0138<br>M>T | 0.0003<br>B>T | 0.0169<br>B>M |
| Barium | T – M – B | 0.0338 | 0.0234 | 0.0502 | 0.0154<br>T>B | 0.2057 |
| Iron | T – M – B | <0.0001 | <0.0001 | 0.0545 | <0.0001<br>T>B | 0.0020<br>M>B |
| Manganese | T – M – B | 0.0028 | 0.0001 | 0.0244<br>T>M | 0.0002<br>T>B | 0.0013<br>M>B |
| Dioxin | T – M – B | 0.4361 | 0.6325 | 0.5581 | 0.3161 | 0.8113 |
| Perchlorate | T – M – B | 0.0200 | 0.2551 | 0.7557 | 0.2827 | 0.0626 |
| Actinium 228 | T – M – B | 0.0099 | 0.1127 | 0.7211 | 0.0388<br>T>B | 0.1150 |
| Bismuth 214 | B – M – T | <0.0001 | 0.0003 | 0.2131 | 0.0001<br>B>T | 0.0023<br>B>M |
| Potassium 40 | B – M – T | 0.9477 | 0.7720 | 0.9416 | 0.4812 | 0.5666 |
| Radium 226 | B – M – T | 0.8248 | 0.6309 | 0.8619 | 0.3771 | 0.4238 |
| Radium 228 | T – M – B | 0.1038 | 0.2315 | 0.1615 | 0.1266 | 1.0000 |
| Thallium 208 | T – M – B | 0.0943 | 0.1224 | 0.1962 | 0.0419<br>T>B | 0.4653 |
| Thorium 228 | M - T - B | 0.0032 | 0.0386 | 0.1051 | 0.2188 | 0.0169<br>M>B |

Note:
* In this context, the p-value is a statistical measure of the significance of the difference in mean values; p-values less than 0.05 (five percent) are considered indicative of significant differences.

4. Comparisons to background: the mean concentrations for each of five subsets of the soils data set are compared to the mean background concentrations in this appendix. These subsets are the exposure point concentration (EPC) groups used in the risk assessment. The comparisons provided here supplement the comparisons by exposure area that are presented in Appendix E. The additional comparisons are used to assess the likelihood that the risks associated with exposure to each of the significant chemicals in soil are attributable to background conditions. Each comparison is based on a nonparametric test for differences between the populations represented by the background samples and the samples collected at the WRF expansion site. The nonparametric test procedure used in this evaluation is the Wilcoxon Rank Sum test. This procedure is used to test whether the values in one population are consistently larger or smaller than the values in another population and can be interpreted as a test of the null hypothesis that the means of the two populations are equal (Gilbert 1987). In this context, each Wilcoxon Rank Sum test was interpreted as a test of the null hypothesis that the mean concentration in the soils represented by a specific EPC group is less than or equal to the mean background concentration. The results of these tests are summarized in Table G-5, and the details of each test are provided in this appendix in the last five pages of the statistical (JMP) output for each of the 14 significant chemicals. The statistical pages for the five EPC groups are presented in the order used for the EPC groups throughout this appendix (NEA 0-1, NEA 0-5, SEA 0-1, SEA 0-12, and SEA all). All of the hypothesis tests described in this report have been interpreted at a five percent level of significance by comparing the p-values to 0.05. The p-values reported for the Wilcoxon Rank Sum test in Table G-5 (and in other tables throughout this report) are appropriate for the number of samples in each of the data sets being compared. As shown in Gilbert (1987), the sample sizes are used in calculating the Wilcoxon Rank Sum test statistic; no adjustment of the p-values is necessary.

The statistical analyses in this appendix are presented separately for each significant chemical to facilitate the chemical-specific evaluation of the adequacy of the data set. ENVIRON considered characterizing the joint probability distributions of these 14 constituents, but concluded that the results of this approach would be subject to uncertainties that can be avoided by performing the evaluation separately for each chemical. Although the evaluation of adequacy does not depend on the correlations among the 14 significant chemicals, the JMP output that summarizes these correlations is provided at Tab 15.

## E. General Observations

When evaluated at the five percent level of significance, the statistical analyses presented at the tabs support the following general observations regarding the 14 significant chemicals.

- The concentration data for most of the chemicals do not appear to be consistent with a normal or lognormal distribution. Exceptions are aluminum (consistent with both); potassium 40 and thallium 208 (which are consistent with a normal distribution); and arsenic (which is consistent with a lognormal distribution).

- The number and nature of the outliers varies greatly from chemical to chemical. Most of the low outliers are associated with the deepest sampling intervals, but so are a number of the high outliers. Relatively few outliers of either type are associated with samples collected from the middle depth interval or at locations outside of the former ponds and ditches.

- The bubble plots do not reveal any consistent, gradual trends (e.g., a gradual increase from south to north across the site) in the values for these 14 chemicals.

- The values for most of these chemicals exhibit relatively little variation. The bubble plots for the chemicals that exhibit greater variation tend to be dominated by just a few relatively high values. These chemicals include perchlorate and (to a lesser degree) arsenic and radium 226. Dioxins were detected at only 29 of the 70 sample locations, but this observation applies to the total dioxin bubble plot as well although most of the information on the bubble plot reflects variations in the MDLs.

- The correlations among the chemicals suggest that aluminum, iron, and manganese vary in similar ways. Dioxins (TEQ) and perchlorate appear to vary independently of each other and of the other chemicals. Among the radionuclides, there appear to be two groups that vary in similar fashion (Ac228, K40, Tl208, and Th228 form one group; Bi214, Pb210, and Ra226 form the other). These groups represent the thorium series (plus potassium 40) and the uranium series, respectively.

**TABLE G-5**
**Comparisons to Background by EPC Group**
(summarized by p-value* and relationship of group mean to background (BG) mean)

| Chemical | NEA 0-1 | NEA 0-5 | NEA all** | SEA 0-1 | SEA 0-12 | SEA all |
|---|---|---|---|---|---|---|
| Aluminum | 0.0410<br>NEA>BG | 0.0345<br>NEA>BG | 0.0489<br>NEA>BG | 0.0011<br>SEA>BG | 0.0087<br>SEA>BG | 0.2746 |
| Arsenic | 0.3646 | 0.0632 | 0.0136<br>NEA>BG | 0.6471 | 0.0111<br>SEA>BG | 0.0003<br>SEA>BG |
| Barium | 0.1042 | 0.0152<br>BG>NEA | 0.0069<br>BG>NEA | 0.1291 | 0.0152<br>BG>SEA | 0.0021<br>BG>SEA |
| Iron | <.0001<br>NEA>BG | <.0001<br>NEA>BG | <.0001<br>NEA>BG | <.0001<br>SEA>BG | <.0001<br>SEA>BG | <.0001<br>SEA>BG |
| Manganese | 0.8345 | 0.6580 | 0.4409 | 0.0844 | 0.6872 | 0.2826 |
| Dioxin | 0.0411<br>BG>NEA | 0.0241<br>NEA>BG | 0.0098<br>NEA>BG | 0.4543 | 0.0510 | 0.0090<br>SEA>BG |
| Perchlorate | 0.0006<br>NEA>BG | <.0001<br>NEA>BG | <.0001<br>NEA>BG | <.0001<br>SEA>BG | <.0001<br>SEA>BG | <.0001<br>SEA>BG |
| Actinium 228 | 0.0944 | 0.0192<br>BG>NEA | 0.0136<br>BG>NEA | 0.0844 | 0.0240<br>BG>SEA | 0.0042<br>BG>SEA |
| Bismuth 214 | 0.5615 | 0.7318 | 0.8868 | 0.2986 | 0.0570 | 0.0050<br>SEA>BG |
| Potassium 40 | 0.0007<br>BG>NEA | <.0001<br>BG>NEA | <.0001<br>BG>NEA | 0.0006<br>BG>SEA | <.0001<br>BG>SEA | 0.0003<br>BG>SEA |
| Radium 226 | 0.2854 | 0.1162 | 0.0369<br>BG>NEA | 0.7709 | 0.3537 | 0.6506 |
| Radium 228 | 0.0258<br>NEA>BG | 0.2416 | 0.4622 | 0.0672 | 0.0218<br>BG>SEA | 0.0209<br>BG>SEA |
| Thallium 208 | 0.3896 | 0.0535 | 0.0423<br>BG>NEA | 0.0303<br>BG>SEA | 0.0171<br>BG>SEA | 0.0067<br>BG>SEA |
| Thorium 228 | 0.0434<br>BG>NEA | 0.0815 | 0.0490<br>BG>NEA | 0.0199<br>BG>SEA | 0.0111<br>BG>SEA | 0.0021<br>BG>SEA |

Notes:
* In this context, the p-value is a statistical measure of the significance of the difference in mean values; p-values less than 0.05 (five percent) are considered indicative of significant differences.
** NEA all is not an EPC group, but is included in this table for convenience.

- The results of the comparisons between categories based on historical land use (summarized in Table G-3) indicate that there are no significant differences between the Pond samples and the Ditch samples. The Pond and Ditch groups both have higher mean concentrations than the Other group for perchlorate. The Other group means are greater than the Pond group means for manganese and thallium 208 and greater than the Ditch group mean for iron. The Ditch group has higher means than the Other group for arsenic, perchlorate, and bismuth 214. The differences between the Pond and Ditch groups and the Other group are not consistent or readily explained. Three of the difference identified as significant by the nonparametric pairwise comparisons involve the group with the middle value; the greater difference between the highest and lowest values is not identified as significant. These differences are between the Pond group (represented by 46 samples) and the Other group (represented by only 11 samples) for perchlorate, manganese, and thallium 208. These results illustrate the problems that can occur when all non-independent comparisons are performed using the same data set. The pairwise differences identified in Table G-3 were not consistent or significant enough to require the development of separate exposure point concentrations for sub-areas defined on the basis of historical land use.

- The results of the comparisons between categories based on sampling depth interval (summarized in Table G-4) indicate that concentration decreases with depth for aluminum, iron, and manganese, but increases with depth for arsenic. There are no significant differences with depth for dioxins (TEQ) or perchlorate. Some of the differences for the radionuclides are statistically significant, but no general patterns are apparent.

- The only chemicals that are significantly elevated relative to background for all of the subsets of the WRF data set are iron and perchlorate. The levels of potassium 40 are significantly lower than background at all depths in both exposure areas. The data for manganese and radium 226 are consistent with background for all five EPC groups. A more detailed discussion of the results of the comparison to background is provided in section II.G of this appendix.

## F. Determination of Exposure Point Concentrations

Exposure point concentrations (EPCs) for the risk assessment were calculated as 95 percent upper confidence limits (UCL) on the mean concentrations for each of five subsets of the WRF soils data set. The two subsets (EPC groups) considered for the NEA are:

- surface only (0-1 foot bgs)

- surface and subsurface (0-1 and 4-5 feet bgs)

The three EPC groups for the SEA are:

- surface only (0-1 foot bgs)
- surface and subsurface (0-1 and 10-12 feet bgs)
- all depths

The selection of the EPC group used to evaluate the risks for each receptor population and pathway is explained in detail in section V.B of the report. For each chemical and exposure area, the relevant group with the highest EPC was used. This procedure increases the conservatism of the risk assessment.

EPCs were determined for each chemical and EPC group by a multi-step process. The first step was to develop a 95 percent UCL for the mean concentration using the nonparametric percentile bootstrapping procedure described in *An Introduction to the Bootstrap* by Efron and Tibshirani (Chapman & Hall, New York, 1993). The bootstrapping procedure involves repeated random sampling (with replacement) of the available data set for each chemical and EPC group. Each random sample includes the same number of observations as the available data set; but because the random sampling is performed with replacement, the same observation may appear more than once in the same random sample. Therefore, the mean concentration in any random sample may differ from the mean concentration in the available data set from which the random samples were drawn. In this study, the bootstrap UCL for each chemical and EPC group was obtained by drawing 1,000 random samples from the available data set. The mean concentration was calculated for each of the random samples, and the sample means were put in order by value from lowest to highest. The $950^{th}$ of the 1,000 ordered sample means (i.e., the $50^{th}$ highest) was used as a 95 percent UCL on the mean concentration for the chemical and EPC group represented by the data set from which the random samples were selected. This procedure was discussed with and recommended by representatives of the NDEP during and after a meeting in September 2002.

The data for each chemical and EPC group were used to test the null hypothesis of normality at the five percent level of significance. Where the null hypothesis was not rejected, the bootstrapped UCL was replaced by the UCL calculated using the normal distribution formula presented in *Supplemental Guidance to RAGS: Calculating the Concentration Term* (USEPA 1992a). The final step in determining the EPC was to compare the UCL to the maximum concentration value. USEPA guidance (1992a) indicates that the highest measured or modeled value may be used as the EPC if it is lower than the 95 percent UCL and additional data cannot be obtained. All of the EPCs used in this risk assessment were calculated as 95 percent UCLs because the UCL for each chemical and EPC group was less than the maximum concentration.

In calculating the EPCs, non-detects were set equal to ½ the method detection limit (MDL) reported by the laboratory. The MDL for each chemical varies from sample to sample. ENVIRON considered using a more sophisticated approach to the censored data, but concluded that this was not necessary. One alternative way to represent the non-detects would be to use the MDL for each as an observed value; this would maximize the value assigned to each non-detect and (as a result) maximize the mean value. Other alternative procedures could be applied, but these generally require distributional assumptions that cannot be reliably verified for the infrequently-detected chemicals. Therefore, ENVIRON evaluated the effects of using ½ the MDL by comparing the resulting EPCs to those derived using the MDL to represent each non-detect. Although the MDL alternative may reduce the standard deviation relative to that calculated using ½ the MDL and is not necessarily the most conservative alternative (in that it may not produce the highest possible EPCs), it tends to produce conservative estimates of the exposure point concentrations.

Representing non-detects by the MDL instead of by ½ the MDL would not increase any of the mean concentrations by more than a factor of two, and would have little effect for chemicals with few non-detects. Table G-1 shows that all but two of the 14 significant chemicals (dioxin and radium 226) were detected in all or nearly all of the soil samples. Table G-6 provides the ratios of the EPCs derived for all 14 significant chemicals using the two alternative methods (i.e., ½ the MDL and the MDL) of assigning values to the non-detects. The deviations of the ratios from the expected value of one for chemicals that were detected in all samples are due to the random nature of the bootstrapping process. The ratios of the EPCs obtained by the two methods are close to one for all of the chemicals except dioxins (TEQ). The TEQ values used in the comparison for dioxins were obtained by applying the two alternatives (½ the MDL and MDL) to the data obtained for the individual congeners, then calculating the TEQ for each soil sample as explained in section VI.B.1 of the risk assessment report. The ratios for dioxins in Table G-6 suggest that the use of ½ the MDL for non-detects could result in underestimation of the actual TEQ values if the individual congeners are typically present at levels lower than the MDL, but higher than ½ the MDL. In the most extreme case (i.e., when all undetected congeners are present at the MDL) the actual TEQ would be underestimated by a factor of less than two. The ratios for the other chemicals indicate that the EPCs are not sensitive to the method used to assign values to the non-detects.

**TABLE G-6**
**Comparison of EPCs Calculated by Two Alternative Methods for Assigning Values to Non-Detects:**
**(a) equal to 1/2 of the MDL**
**(b) equal to the MDL**

| Chemical | Ratio (b)/(a) | | | | |
|---|---|---|---|---|---|
| | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All |
| Aluminum | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Barium | 1.00 | 1.00 | 1.01 | 1.01 | 1.02 |
| Arsenic | 1.02 | 1.03 | 1.01 | 1.02 | 1.04 |
| Iron | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Manganese | 1.00 | 1.00 | 1.00 | 1.03 | 1.02 |
| Dioxins/Furans TEQ | 1.95 | 1.72 | 1.66 | 1.69 | 1.76 |
| Perchlorate | 1.07 | 1.04 | 1.00 | 1.05 | 0.97 |
| Actinium 228 | 1.00 | 1.00 | 1.00 | 1.00 | 1.01 |
| Bismuth 214 | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 |
| Potassium 40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Radium 226 | 1.01 | 1.00 | 1.04 | 1.04 | 0.97 |
| Radium 228 | 1.01 | 1.00 | 1.00 | 1.00 | 1.00 |
| Thallium 208 | 1.00 | 1.00 | 1.00 | 1.00 | 1.01 |
| Thorium 228 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

## G. Comparison of the EPC Groups to Background

Background concentrations of the 14 chemicals of interest were established through the sampling and analysis program described in Appendix E. Table E-5 summarizes the comparison of the mean concentration in each exposure area (northern and southern) to the background mean concentration for the 39 chemicals that were detected in most of the background samples. The comparison in Appendix E supports the site characterization, but the risk calculations are based on the EPCs. Therefore, a more detailed comparison to background for the 14 significant chemicals is presented here to support the risk assessment and data adequacy evaluation.

Table G-7 shows the mean concentration of each chemical calculated from the available data for each EPC group expressed as a percentage of the mean concentration for the same chemical in the background samples. These percentages compare the mean concentrations calculated from the available data (i.e., the sample means), and are not necessarily indicative of significant differences between the mean concentrations in the soils represented by the various data sets (i.e., the population means). A percentage that is less than 100 occurs when the mean concentration in the soil samples collected at the WRF expansion site is lower than the mean concentration in the background soil samples. This result could be due to random variation; the calculated means of the various data sets are expected to differ to some extent even if all of the soil samples represent the same population. Alternately, percentages less than 100 may be due to the impact of waste disposal activities at the WRF expansion site. Waste disposal activities may have reduced the concentrations of some chemicals by leaching them from native soils, or by mixing or replacement of native soils with waste solids that have concentrations that are lower than the background concentrations. Similarly, percentages greater than 100 may be due to random variation, or (alternately) to adsorption of chemicals from waste liquids or mixing or replacement of native soils with waste materials that have concentrations greater than the background concentrations. By themselves, the percentages do not identify the situations in which the mean concentration of a chemical in the soils represented by the available data for a particular EPC group is significantly different from the mean background concentration. The cases in which the differences in population means are significant were identified by the pairwise comparisons described in section II.D of this appendix and summarized in Table G-5. Table G-7 uses bold italic text to identify the percentages that correspond to the significant differences identified in Table G-5. All of the percentages in Table G-7 are discussed in the following paragraphs.

For many of the chemicals, the percentages of the background mean are consistent across the EPC groups. This consistency suggests that the concentration is relatively uniform throughout the area and depth zones of interest. Iron is present at about 150 percent of background in all of the EPC groups, and all of the differences are statistically significant. Aluminum is present at about 120 percent of background in all groups, and the only group for

which the difference is not significant is SEA all. The mean concentrations for six other chemicals (barium and five of the seven radionuclides) are consistently lower than background, and many of these differences are statistically significant. Although the percentages for manganese are less consistent than those for these other chemicals, the mean concentrations for manganese and radium 226 are consistent with background for all five EPC groups according to the hypothesis tests in Table G-5. The percentages for bismuth 214 are less than 100 in the NEA groups, but greater than 100 for the SEA groups; the only statistically significant difference is for SEA all. For radium 228, the percentages for both NEA groups are greater than 100 but only the difference for NEA 0-1 is statistically significant. The percentages for the SEA groups are less than 100 and the differences for SEA 0-12 and SEA all are statistically significant.

The highest percentages in Table G-7 are all for perchlorate, which is elevated relative to background for all of the EPC groups. The perchlorate concentrations in the surface samples are nearly 140 times higher than background, but the mean concentrations in the EPC groups that include sub-surface samples are as low as 73 times background.

The mean levels of arsenic exceed the background mean by substantial margins (147 to 216 percent) in the data sets for all EPC groups, but the hypothesis tests indicate that the only population means for arsenic that are greater than background are in the SEA groups that include sub-surface samples. The maximum depth of the background soil samples was four feet and the middle and deep samples collected in both exposure areas at the WRF site were at depths greater than four feet. The concentrations of arsenic increase significantly with depth (as shown in Table G-4), so the EPC groups that include the deeper samples are likely to have higher mean concentrations. These facts suggest that if the characterization of background had included samples collected at depths greater than four feet, the statistical comparisons may have indicated that none of the mean concentrations of arsenic are significantly greater than background.

The percentages of background calculated for dioxin range from 75 percent in the NEA surface samples to 448 percent in the SEA surface samples. The dioxin concentrations appear to increase with depth in the NEA and decrease with depth in the SEA. Although the two highest percentages are for SEA 0-1 (448 percent) and SEA 0-12 (266 percent), neither of these differences is significant. This indicates that the dioxin concentrations within these EPC groups are quite variable.

**TABLE G-7**
**Mean Concentrations for EPC Groups**
**Expressed as Percentages of Background Means**

| Chemical | NEA 0-1 | NEA 0-5 | SEA 0-1 | SEA 0-12 | SEA all |
|---|---|---|---|---|---|
| Aluminum | ***122*** | ***118*** | ***122*** | ***115*** | 107 |
| Arsenic | 147 | 192 | 181 | ***173*** | ***216*** |
| Barium | 79 | ***75*** | 94 | ***81*** | ***74*** |
| Iron | ***169*** | ***163*** | ***163*** | ***154*** | ***141*** |
| Manganese | 102 | 96 | 135 | 114 | 97 |
| Dioxin | ***75*** | ***157*** | 448 | 266 | ***195*** |
| Perchlorate | ***13,873*** | ***9,342*** | ***13,299*** | ***9,323*** | ***7,332*** |
| Actinium 228 | 88 | ***85*** | 85 | ***86*** | ***80*** |
| Bismuth 214 | 97 | 98 | 109 | 116 | ***146*** |
| Potassium 40 | ***86*** | ***85*** | ***87*** | ***88*** | ***88*** |
| Radium 226 | 80 | 78 | 85 | 87 | 95 |
| Radium 228 | ***115*** | 107 | 93 | ***91*** | ***90*** |
| Thallium 208 | 95 | 90 | ***91*** | ***91*** | ***88*** |
| Thorium 228 | ***87*** | 90 | ***84*** | ***86*** | ***82*** |

Note:
BOLD italic text indicates a case in which the pairwise comparisons in Section II.D of this appendix indicate that the EPC group mean differs significantly from the background mean; if the percentage is greater than 100, the EPC group mean is significantly higher than background according to the hypothesis tests summarized in Table G-5.

## H. Development of Critical Concentrations

To facilitate the evaluation of the adequacy of the data set, critical concentrations were established for each of the chemicals included in the cumulative risk calculations for soils. In many risk assessments, the critical concentrations can be set equal to benchmarks such as the USEPA soil screening levels (SSLs) or the Region IX preliminary remediation goals (PRGs). Benchmarks based on exposure to soils are available for only seven of the 14 chemicals that may be significant in determining the cumulative risks associated with exposure to soils in the WRF expansion area. Furthermore, these benchmarks were developed under assumed exposure patterns that are different from those expected to occur during and after development of the WRF expansion site. Therefore, the critical concentrations used in evaluating the adequacy of the data set were developed specifically for the WRF expansion project.

The critical concentration for each chemical is derived as the minimum concentration that would result in a risk equal to a relevant cumulative risk action level. For example, potassium 40 contributes to the cumulative radionuclide cancer risk but not to the non-radionuclide cancer or non-cancer risks. The threshold for cumulative radionuclide cancer risk is $3 \times 10^{-4}$, and (as shown in Table G-8) the concentration of potassium 40 that corresponds to this risk in the most intensive exposure scenario is 358 pCi/g. Therefore, the action level for potassium 40 is 358 pCi/g. In the case of arsenic, which has both carcinogenic and non-carcinogenic toxicity, the critical value is set to the lower of the two critical concentrations. The threshold for cumulative non-radionuclide cancer risk is $1 \times 10^{-6}$, and the concentration of arsenic that corresponds to this risk for the most intensive exposure scenario is 9.8 mg/kg. The threshold for cumulative non-cancer risk is a hazard index of one, and the concentration of arsenic that corresponds to this risk for the most intensive exposure scenario is 261 mg/kg. Therefore, the critical concentration for arsenic for the WRF expansion project is set at 9.8 mg/kg.

The critical concentrations for all of the chemicals included in the cumulative risk calculations are shown in Table G-8. This table also lists the EPC values for each chemical and data grouping. The ratios of the EPCs to the critical values are multiplied by the assumed action levels to provide 95 percent UCLs on the risk associated with each chemical and data grouping. With one exception, all of the 95 percent UCLs for the chemical-specific risks are lower than the cumulative risk action levels. The exception is for arsenic in the SEA 0-1 EPC group, where the 95 percent UCL on carcinogenic risk is $1.01 \times 10^{-6}$, just one percent higher than the assumed action level.

**TABLE G-8**
**95% UCLs of the Chemical Cancer Risk Associated with Chemicals Included in the Cumulative Risk Calculations**

| Chemical | Critical Value (µg/kg) | 95% UCL of the Mean Concentration (µg/kg) | | | | | 95% UCL of the Chemical-Specific Cancer Risk | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All |
| Aluminum | NA | 13,677,414 | 12,713,043 | 13,121,429 | 12,252,255 | 11,371,569 | NA | NA | NA | NA | NA |
| Antimony | NA | 85 | 86 | 344 | 219 | 180 | NA | NA | NA | NA | NA |
| Arsenic | 9,800 | 6,133 | 7,930 | 9,854 | 7,661 | 8,479 | 6.26E-07 | 8.09E-07 | 1.01E-06 | 7.82E-07 | 8.65E-07 |
| Barium | NA | 290,078 | 271,962 | 430,607 | 334,481 | 288,885 | NA | NA | NA | NA | NA |
| Beryllium | 174,013 | 636 | 589 | 643 | 598 | 566 | 3.65E-09 | 3.39E-09 | 3.70E-09 | 3.44E-09 | 3.25E-09 |
| Cadmium | 232,018 | 156 | 141 | 179 | 147 | 141 | 6.72E-10 | 6.09E-10 | 7.71E-10 | 6.33E-10 | 6.06E-10 |
| Chromium (total) | NA | 14,617 | 11,661 | 14,311 | 12,281 | 12,631 | NA | NA | NA | NA | NA |
| Cobalt | NA | 8,577 | 7,895 | 8,479 | 7,880 | 7,173 | NA | NA | NA | NA | NA |
| Copper | NA | 21,292 | 18,048 | 18,461 | 16,083 | 14,433 | NA | NA | NA | NA | NA |
| Iron | NA | 21,127,003 | 19,898,377 | 20,198,836 | 18,936,953 | 17,442,863 | NA | NA | NA | NA | NA |
| Magnesium | NA | 11,807,587 | 11,594,371 | 11,185,714 | 10,920,000 | 16,397,949 | NA | NA | NA | NA | NA |
| Manganese | NA | 551,899 | 485,050 | 819,143 | 621,815 | 520,090 | NA | NA | NA | NA | NA |
| Mercury | NA | 30 | 27 | 28 | 28 | 31 | NA | NA | NA | NA | NA |
| Molybdenum | NA | 1,344 | 1,038 | 2,255 | 1,560 | 1,533 | NA | NA | NA | NA | NA |
| Nickel | NA | 14,682 | 13,622 | 13,936 | 13,398 | 13,038 | NA | NA | NA | NA | NA |
| Selenium | NA | 382 | 340 | 444 | 584 | 492 | NA | NA | NA | NA | NA |
| Silver | NA | 170 | 157 | 251 | 178 | 157 | NA | NA | NA | NA | NA |
| Thallium | NA | 116 | 95 | 301 | 188 | 160 | NA | NA | NA | NA | NA |
| Thorium | NA | 7,625 | 6,893 | 7,198 | 7,348 | 7,013 | NA | NA | NA | NA | NA |
| Titanium | NA | 563,816 | 553,838 | 757,143 | 642,944 | 574,654 | NA | NA | NA | NA | NA |
| Vanadium | NA | 28,149 | 27,812 | 33,814 | 31,519 | 31,246 | NA | NA | NA | NA | NA |
| Zinc | NA | 55,930 | 49,978 | 58,514 | 49,685 | 44,731 | NA | NA | NA | NA | NA |
| Dioxins/Furans TEQ | 0.0335 | 0.0023 | 0.0046 | 0.0190 | 0.0107 | 0.0077 | 6.83E-08 | 1.37E-07 | 5.67E-07 | 3.20E-07 | 2.28E-07 |
| 4,4'-DDD | 22,789 | 0.7046 | 0.5320 | 1.1363 | 0.8124 | 0.6937 | 3.09E-11 | 2.33E-11 | 4.99E-11 | 3.56E-11 | 3.04E-11 |
| 4,4'-DDE | 16,087 | 19.1250 | 10.8193 | 9.3564 | 5.1767 | 3.9815 | 1.19E-09 | 6.73E-10 | 5.82E-10 | 3.22E-10 | 2.48E-10 |
| 4,4'-DDT | 16,086 | 17.7888 | 9.4633 | 10.1836 | 5.5235 | 4.1232 | 1.11E-09 | 5.88E-10 | 6.33E-10 | 3.43E-10 | 2.56E-10 |
| alpha-Chlordane | 15,627 | 0.5046 | 0.3789 | 1.1946 | 0.7746 | 0.6190 | 3.23E-11 | 2.42E-11 | 7.64E-11 | 4.96E-11 | 3.96E-11 |
| beta-BHC | 3,039 | 5.2825 | 3.1857 | 2.3659 | 1.5469 | 1.1853 | 1.74E-09 | 1.05E-09 | 7.79E-10 | 5.09E-10 | 3.90E-10 |
| Dieldrin | 342 | 0.6425 | 0.4848 | 1.6780 | 1.1147 | 0.8494 | 1.88E-09 | 1.42E-09 | 4.91E-09 | 3.26E-09 | 2.48E-09 |
| Endosulfan II | NA | 0.6996 | 0.5289 | 1.2066 | 0.8430 | 0.6945 | NA | NA | NA | NA | NA |
| Endosulfan sulfate | NA | 0.5858 | 0.4412 | 2.0854 | 1.2656 | 0.9726 | NA | NA | NA | NA | NA |
| Endrin | NA | 5.4723 | 2.9995 | 0.3048 | 0.4475 | 0.4104 | NA | NA | NA | NA | NA |
| Endrin aldehyde | NA | 3.9208 | 2.2326 | 1.0107 | 1.0167 | 0.9026 | NA | NA | NA | NA | NA |
| Endrin ketone | NA | 0.5856 | 0.4423 | 0.8229 | 0.6117 | 0.5168 | NA | NA | NA | NA | NA |
| gamma-Chlordane | 15,627 | 1.0525 | 0.7930 | 1.2979 | 1.0259 | 0.8824 | 6.74E-11 | 5.07E-11 | 8.31E-11 | 6.57E-11 | 5.65E-11 |
| Heptachlor epoxide | 601 | 0.5242 | 0.3935 | 0.2555 | 0.3737 | 0.3434 | 8.72E-10 | 6.55E-10 | 4.25E-10 | 6.22E-10 | 5.71E-10 |
| Methoxychlor | NA | 7.2708 | 4.1326 | 2.0214 | 1.5093 | 1.2814 | NA | NA | NA | NA | NA |
| Perchlorate | NA | 16,506 | 10,318 | 11,955 | 7,850 | 6,327 | NA | NA | NA | NA | NA |

**TABLE G-8**
**95% UCLs of the Chemical Noncancer Hazard Quotient Associated with Chemicals Included in the Hazard Index Calculations**

| Chemical | Critical Value (µg/kg) | 95% UCL of the Mean Concentration (µg/kg) | | | | | 95% UCL of the Chemical-Specific Noncancer HQ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All |
| Aluminum | 80,771,316 | 13,677,414 | 12,713,043 | 13,121,429 | 12,252,255 | 11,371,569 | 1.69E-01 | 1.57E-01 | 1.62E-01 | 1.52E-01 | 1.41E-01 |
| Antimony | 408,800 | 85 | 86 | 344 | 219 | 180 | 2.08E-04 | 2.10E-04 | 8.42E-04 | 5.36E-04 | 4.41E-04 |
| Arsenic | 261,158 | 6,133 | 7,930 | 9,854 | 7,661 | 8,479 | 2.35E-02 | 3.04E-02 | 3.77E-02 | 2.93E-02 | 3.25E-02 |
| Barium | 7,812,513 | 290,078 | 271,962 | 430,607 | 334,481 | 288,885 | 3.71E-02 | 3.48E-02 | 5.51E-02 | 4.28E-02 | 3.70E-02 |
| Beryllium | 303,973 | 636 | 589 | 643 | 598 | 566 | 2.09E-03 | 1.94E-03 | 2.12E-03 | 1.97E-03 | 1.86E-03 |
| Cadmium | 457,885 | 156 | 141 | 179 | 147 | 141 | 3.41E-04 | 3.09E-04 | 3.91E-04 | 3.21E-04 | 3.07E-04 |
| Chromium (total) | 1,533,000,000 | 14,617 | 11,661 | 14,311 | 12,281 | 12,631 | 9.53E-06 | 7.61E-06 | 9.34E-06 | 8.01E-06 | 8.24E-06 |
| Cobalt | 61,320,000 | 8,577 | 7,895 | 8,479 | 7,880 | 7,173 | 1.40E-04 | 1.29E-04 | 1.38E-04 | 1.29E-04 | 1.17E-04 |
| Copper | 37,814,000 | 21,292 | 18,048 | 18,461 | 16,083 | 14,433 | 5.63E-04 | 4.77E-04 | 4.88E-04 | 4.25E-04 | 3.82E-04 |
| Iron | 306,600,000 | 21,127,003 | 19,898,377 | 20,198,836 | 18,936,953 | 17,442,863 | 6.89E-02 | 6.49E-02 | 6.59E-02 | 6.18E-02 | 5.69E-02 |
| Magnesium | NA | 11,807,587 | 11,594,371 | 11,185,714 | 10,920,000 | 16,397,949 | NA | NA | NA | NA | NA |
| Manganese | 846,750 | 551,899 | 485,050 | 819,143 | 621,815 | 520,090 | 6.52E-01 | 5.73E-01 | 9.67E-01 | 7.34E-01 | 6.14E-01 |
| Mercury | 306,600 | 30 | 27 | 28 | 28 | 31 | 9.85E-05 | 8.69E-05 | 9.27E-05 | 9.06E-05 | 9.96E-05 |
| Molybdenum | 5,110,000 | 1,344 | 1,038 | 2,255 | 1,560 | 1,533 | 2.63E-04 | 2.03E-04 | 4.41E-04 | 3.05E-04 | 3.00E-04 |
| Nickel | 20,440,000 | 14,682 | 13,622 | 13,936 | 13,398 | 13,038 | 7.18E-04 | 6.66E-04 | 6.82E-04 | 6.55E-04 | 6.38E-04 |
| Selenium | 5,110,000 | 382 | 340 | 444 | 584 | 492 | 7.48E-05 | 6.65E-05 | 8.68E-05 | 1.14E-04 | 9.62E-05 |
| Silver | 5,110,000 | 170 | 157 | 251 | 178 | 157 | 3.32E-05 | 3.07E-05 | 4.92E-05 | 3.49E-05 | 3.07E-05 |
| Thallium | 67,452 | 116 | 95 | 301 | 188 | 160 | 1.72E-03 | 1.41E-03 | 4.47E-03 | 2.78E-03 | 2.37E-03 |
| Thorium | NA | 7,625 | 6,893 | 7,198 | 7,348 | 7,013 | NA | NA | NA | NA | NA |
| Titanium | 476,012,800 | 563,816 | 553,838 | 757,143 | 642,944 | 574,654 | 1.18E-03 | 1.16E-03 | 1.59E-03 | 1.35E-03 | 1.21E-03 |
| Vanadium | 7,154,000 | 28,149 | 27,812 | 33,814 | 31,519 | 31,246 | 3.93E-03 | 3.89E-03 | 4.73E-03 | 4.41E-03 | 4.37E-03 |
| Zinc | 306,600,000 | 55,930 | 49,978 | 58,514 | 49,685 | 44,731 | 1.82E-04 | 1.63E-04 | 1.91E-04 | 1.62E-04 | 1.46E-04 |
| Dioxins/Furans TEQ | NA | 0.0023 | 0.0046 | 0.0190 | 0.0107 | 0.0077 | NA | NA | NA | NA | NA |
| 4,4'-DDD | NA | 0.7046 | 0.5320 | 1.1363 | 0.8124 | 0.6937 | NA | NA | NA | NA | NA |
| 4,4'-DDE | NA | 19.1250 | 10.8193 | 9.3564 | 5.1767 | 3.9815 | NA | NA | NA | NA | NA |
| 4,4'-DDT | 482,987 | 17.7888 | 9.4633 | 10.1836 | 5.5235 | 4.1232 | 3.68E-05 | 1.96E-05 | 2.11E-05 | 1.14E-05 | 8.54E-06 |
| alpha-Chlordane | 465,059 | 0.5046 | 0.3789 | 1.1946 | 0.7746 | 0.6190 | 1.08E-06 | 8.15E-07 | 2.57E-06 | 1.67E-06 | 1.33E-06 |
| beta-BHC | NA | 5.2825 | 3.1857 | 2.3659 | 1.5469 | 1.1853 | NA | NA | NA | NA | NA |
| Dieldrin | 48,299 | 0.6425 | 0.4848 | 1.6780 | 1.1147 | 0.8494 | 1.33E-05 | 1.00E-05 | 3.47E-05 | 2.31E-05 | 1.76E-05 |
| Endosulfan II | 5,795,841 | 0.6996 | 0.5289 | 1.2066 | 0.8430 | 0.6945 | 1.21E-07 | 9.13E-08 | 2.08E-07 | 1.45E-07 | 1.20E-07 |
| Endosulfan sulfate | 5,795,841 | 0.5858 | 0.4412 | 2.0854 | 1.2656 | 0.9726 | 1.01E-07 | 7.61E-08 | 3.60E-07 | 2.18E-07 | 1.68E-07 |
| Endrin | 78,615 | 5.4723 | 2.9995 | 0.3048 | 0.4475 | 0.4104 | 6.96E-05 | 3.82E-05 | 3.88E-06 | 5.69E-06 | 5.22E-06 |
| Endrin aldehyde | 78,615 | 3.9208 | 2.2326 | 1.0107 | 1.0167 | 0.9026 | 4.99E-05 | 2.84E-05 | 1.29E-05 | 1.29E-05 | 1.15E-05 |
| Endrin ketone | 78,615 | 0.5856 | 0.4423 | 0.8229 | 0.6117 | 0.5168 | 7.45E-06 | 5.63E-06 | 1.05E-05 | 7.78E-06 | 6.57E-06 |
| gamma-Chlordane | 465,059 | 1.0525 | 0.7930 | 1.2979 | 1.0259 | 0.8824 | 2.26E-06 | 1.71E-06 | 2.79E-06 | 2.21E-06 | 1.90E-06 |
| Heptachlor epoxide | 12,558 | 0.5242 | 0.3935 | 0.2555 | 0.3737 | 0.3434 | 4.17E-05 | 3.13E-05 | 2.03E-05 | 2.98E-05 | 2.73E-05 |
| Methoxychlor | 4,829,868 | 7.2708 | 4.1326 | 2.0214 | 1.5093 | 1.2814 | 1.51E-06 | 8.56E-07 | 4.19E-07 | 3.12E-07 | 2.65E-07 |
| Perchlorate | 30,660 | 16,506 | 10,318 | 11,955 | 7,850 | 6,327 | 5.38E-01 | 3.37E-01 | 3.90E-01 | 2.56E-01 | 2.06E-01 |

**TABLE G-8**
**95% UCLs of the Radionuclide Cancer Risk Associated with Radionuclides Included in the Cumulative Risk Calculations**

| Radionuclide | Critical Value (pCi/kg) | 95% UCL of the Mean Concentration (pCi/kg) | | | | | 95% UCL of the Radionuclide-Specific Cancer Risk | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All | NEA 0-1' | NEA 0-5' | SEA 0-1' | SEA 0-12' | SEA All |
| Actinium 228 | 64,435 | 1,500 | 1,441 | 1,509 | 1,455 | 1,373 | 6.98E-06 | 6.71E-06 | 7.03E-06 | 6.77E-06 | 6.39E-06 |
| Bismuth 212 | 328,999 | 1,559 | 1,312 | 1,377 | 1,217 | 1,204 | 1.42E-06 | 1.20E-06 | 1.26E-06 | 1.11E-06 | 1.10E-06 |
| Bismuth 214 | 39,035 | 918 | 897 | 1,018 | 1,091 | 1,505 | 7.05E-06 | 6.89E-06 | 7.82E-06 | 8.38E-06 | 1.16E-05 |
| Lead 210 | 140,838 | 1,067 | 1,180 | 1,379 | 1,352 | 1,827 | 2.27E-06 | 2.51E-06 | 2.94E-06 | 2.88E-06 | 3.89E-06 |
| Lead 212 | 551,587 | 1,290 | 1,211 | 1,252 | 1,252 | 1,209 | 7.02E-07 | 6.59E-07 | 6.81E-07 | 6.81E-07 | 6.58E-07 |
| Lead 214 | 297,274 | 835 | 832 | 918 | 1,017 | 1,444 | 8.43E-07 | 8.39E-07 | 9.26E-07 | 1.03E-06 | 1.46E-06 |
| Potassium 40 | 357,932 | 25,615 | 24,719 | 25,659 | 25,563 | 25,724 | 2.15E-05 | 2.07E-05 | 2.15E-05 | 2.14E-05 | 2.16E-05 |
| Radium 224 | 1,673,363 | 3,406 | 3,602 | 3,671 | 3,274 | 3,803 | 6.11E-07 | 6.46E-07 | 6.58E-07 | 5.87E-07 | 6.82E-07 |
| Radium 226 | 33,516 | 1,729 | 1,526 | 1,716 | 1,659 | 1,721 | 1.55E-05 | 1.37E-05 | 1.54E-05 | 1.49E-05 | 1.54E-05 |
| Radium 228 | 55,868 | 1,800 | 1,628 | 1,352 | 1,311 | 1,299 | 9.66E-06 | 8.74E-06 | 7.26E-06 | 7.04E-06 | 6.98E-06 |
| Thallium 208 | 16,591 | 495 | 456 | 455 | 452 | 440 | 8.95E-06 | 8.24E-06 | 8.23E-06 | 8.18E-06 | 7.95E-06 |
| Thorium 228 | 36,470 | 1,461 | 1,482 | 1,417 | 1,423 | 1,360 | 1.20E-05 | 1.22E-05 | 1.17E-05 | 1.17E-05 | 1.12E-05 |
| Thorium 230 | 4,681,164 | 1,148 | 1,166 | 1,152 | 1,357 | 1,674 | 7.36E-08 | 7.47E-08 | 7.38E-08 | 8.69E-08 | 1.07E-07 |
| Thorium 232 | 4,125,330 | 1,549 | 1,492 | 1,392 | 1,409 | 1,364 | 1.13E-07 | 1.09E-07 | 1.01E-07 | 1.02E-07 | 9.92E-08 |
| Thorium 234 | 7,960,895 | 1,026 | 994 | 1,066 | 1,046 | 1,258 | 3.87E-08 | 3.75E-08 | 4.02E-08 | 3.94E-08 | 4.74E-08 |
| Uranium 234 | 6,038,407 | 1,291 | 1,263 | 1,209 | 1,393 | 1,624 | 6.41E-08 | 6.27E-08 | 6.00E-08 | 6.92E-08 | 8.07E-08 |
| Uranium 235 | 532,847 | 97 | 97 | 55 | 62 | 78 | 5.48E-08 | 5.44E-08 | 3.10E-08 | 3.51E-08 | 4.38E-08 |
| Uranium 238 | 634,172 | 1,026 | 1,036 | 1,058 | 1,192 | 1,457 | 4.86E-07 | 4.90E-07 | 5.00E-07 | 5.64E-07 | 6.89E-07 |

## III. Evaluating the Adequacy of the Data Set

The adequacy of the data set is determined by the probabilities of errors that could occur when the data are used to make decisions. The general decision rule proposed for the WRF expansion project is "If the cumulative risk estimates for each of the potentially-exposed populations are deemed acceptable by the risk manager, then no further action will be required before proceeding with construction of the WRF expansion facility. If the risk estimates are not deemed acceptable, the alternative actions that may be required include further investigation, implementation of appropriate measures to protect the health and safety of potentially-exposed populations, removal of some high-concentration materials, and selection of another site for the WRF expansion." The general decision rule is written with action levels expressed in terms of risk, rather than in terms of concentration. This facilitates a decision based on cumulative risks, rather than on the concentrations of individual chemicals, but complicates the evaluation of the adequacy of the data set.

In this appendix, a quantitative evaluation of adequacy of the soils data set is performed separately for each of the 14 chemicals that may contribute significantly to the cumulative risks. Evaluating the adequacy of the data set for all 14 chemicals at once would require characterizing the joint probability distributions of these constituents. This approach would be subject to uncertainties that are not encountered when the evaluation is performed separately for each important constituent. The adequacy of the ground water data is also considered separately. The results of these evaluations should be considered together to evaluate the overall adequacy of the data set to support the decision rule for cumulative risks.

The critical question addressed in this evaluation of adequacy is whether there is a substantial probability of error resulting from use of the data set as a basis for risk management decisions. A decision error would occur if the NDEP allowed construction of the WRF expansion to proceed although the actual human health risks exceed levels considered acceptable by the risk managers. This type of error may be referred to as a false acceptance error. As shown in Table G-8, all but one of the conservative (95 percent UCL) estimates of the chemical-specific risks are lower than the assumed action levels[1].

The adequacy of the soils data set for each significant chemical is characterized in this appendix by calculating the probability that the actual mean concentration for each EPC group exceeds the critical concentration that corresponds to the assumed risk-based action levels. Conceptually, the resulting exceedence probability may be viewed as an index of the chemical-specific probability of a false acceptance decision error. The actual probability of a false acceptance decision error for any specific chemical, however, is much lower than the calculated

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[1] The exception is for arsenic in the SEA 0-1 EPC group.

exceedence probability because the procedures used to derive the critical values are very conservative. For this reason, the exceedence probabilities developed in this appendix should be interpreted as conservative estimates of the likelihood of chemical-specific false acceptance decision errors. The fact that most of the 14 significant chemicals in soil are present at levels that are comparable to background should also be considered in evaluating the exceedence probabilities.

## A. Chemical-Specific Evaluations of the Adequacy of the Soils Data

The exceedence probabilities presented in Table G-9 quantify the adequacy of the soil data set for each of the 14 significant chemicals. This table lists the probability (in percent) that the actual mean concentration exceeds various percentages of the critical concentration for each chemical and EPC data grouping. The critical concentrations correspond to the cumulative risk action levels, and the mean concentration is the parameter of interest for the exposure patterns considered in this risk assessment. Therefore, the probabilities in Table G-9 also represent the likelihood that the risks associated with the individual chemicals exceed various percentages of the cumulative risk action levels. The 14 chemicals are grouped in Table G-9 as carcinogens, noncarcinogens, and radionuclides. Because arsenic has both carcinogenic and noncarcinogenic toxicity, it appears in two columns based on different critical concentrations. As explained above, the exceedence probabilities in Table G-9 should be viewed as conservative estimates of the likelihood of chemical-specific false acceptance decision errors. These exceedence probabilities are specific to the action levels assumed throughout this report.

The probabilities in Table G-9 establish that the likelihood of a false acceptance error is very low for each of these 14 chemicals under the assumed action levels. Most of the probabilities are reported as zero (meaning less than 0.05 percent, or 0.0005). The probabilities of exceeding 10 percent of the critical concentration that are reported as greater than zero are all associated with aluminum, arsenic (as a carcinogen only), manganese, perchlorate, and total dioxins (TEQ). The probability that the mean concentration of arsenic exceeds 25 percent of the critical value is nearly 100 percent for each data grouping, but the probabilities of exceeding 100 percent of the critical value are less than one percent for all of the EPC groups except SEA 0-1. The worst-case probability that the actual mean arsenic concentration exceeds the critical value is 4.6 percent. The exceedence probabilities for manganese exhibit a similar pattern with a worst-case probability of 2.7 percent. Perchlorate and total dioxins (TEQ) are the only other chemicals for which the probability of exceeding 50 percent of the critical value is greater than one percent in any EPC group.

**TABLE G-9**
**Exceedence Probabilities for Significant Chemicals in Soil**
**Calculated by Exposure Point Concentration Group**

| | Carcinogens | | Noncarcinogens | | | | | | Radionuclides | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEA 0-1** | **As** | **TEQ** | **Al** | **As(HQ)** | **Ba** | **Fe** | **Mn** | **Perchlor** | **Ac228** | **Bi214** | **K40** | **Ra226** | **Ra228** | **Tl208** | **Th228** |
| 1% | 99.9 | 95.2 | 100.0 | 95.1 | 100.0 | 100.0 | 100.0 | 92.9 | 100.0 | 100.0 | 100.0 | 99.1 | 100.0 | 100.0 | 100.0 |
| 10% | 99.7 | 0.1 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 83.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25% | 96.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 55.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50% | 33.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 73.2 | 9.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75% | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90% | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **NEA 0-5** | | | | | | | | | | | | | | | |
| 1% | 100.0 | 96.9 | 100.0 | 99.0 | 100.0 | 100.0 | 100.0 | 97.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 10% | 100.0 | 29.8 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 82.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25% | 99.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 22.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50% | 76.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75% | 12.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90% | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100% | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **SEA 0-1** | | | | | | | | | | | | | | | |
| 1% | 98.0 | 89.0 | 100.0 | 87.9 | 99.9 | 100.0 | 100.0 | 99.8 | 100.0 | 100.0 | 100.0 | 99.5 | 100.0 | 100.0 | 100.0 |
| 10% | 96.1 | 77.0 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 97.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25% | 89.1 | 45.5 | 0.0 | 0.0 | 0.0 | 0.0 | 99.8 | 55.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50% | 60.0 | 6.9 | 0.0 | 0.0 | 0.0 | 0.0 | 92.8 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75% | 22.5 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 39.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90% | 9.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100% | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **SEA 0-12** | | | | | | | | | | | | | | | |
| 1% | 100.0 | 92.3 | 100.0 | 98.3 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 10% | 99.9 | 66.4 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 97.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25% | 98.7 | 10.2 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 5.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50% | 61.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 91.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75% | 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90% | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **SEA all** | | | | | | | | | | | | | | | |
| 1% | 100.0 | 93.2 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 10% | 100.0 | 50.3 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 92.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25% | 100.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50% | 94.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75% | 22.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90% | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100% | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

The probabilities in Table G-9 were calculated using the student-t distribution under the assumption that the distribution of the sample mean is approximately normal. As described in the tabs at the end of this appendix, the sample data sets for most of the 14 significant chemicals contain outliers and are not consistent with a normal distribution. Under these circumstances, the probabilities in Table G-9 should be viewed as estimates rather than as exact values. Table G-8 provides a 95 percent UCL on the risk associated with each chemical. In cases where the data are not consistent with a normal distribution, these UCLs were derived by bootstrapping, rather than by using the student-t distribution. Except for arsenic in the SEA 0-1 EPC group, these UCLs (which are expected to be unbiased) are all lower than the cumulative risk action levels. These risk UCLs demonstrate that the probability that the actual mean concentration exceeds the critical value is less than five percent for each chemical and EPC group except arsenic in the SEA 0-1 group, where the risk UCL is very slightly (one percent) greater than the assumed cumulative risk action level.

The results summarized in Table G-9 indicate that the probability of decision error due to data inadequacy is very low (about 5 percent) when concluding that further action is not required on the basis of any individual chemical. Because the procedures used to derive the critical values are very conservative, the exceedence probabilities in Table G-9 are conservative estimates of the likelihood of chemical-specific false acceptance decision errors. For this reason, ENVIRON believes that the soils data set for each of the 14 chemicals is adequate.

## B. Adequacy of the Soils Data Set for the Cumulative Decision Rule

The general decision rule proposed for the WRF expansion project is written with action levels expressed in terms of cumulative risk. The possibility exists that some combination of chemicals could pose cumulative risks that exceed one of the action levels even though the risks from each individual chemical do not. The probabilities associated with combinations of chemicals with concentrations high enough to generate cumulative risks greater than the assumed action levels have not been calculated. If calculated, these probabilities would be based on a combination of reasonable worst-case exposure patterns and combinations of mean concentrations that are highly unlikely. Estimates of the exceedence probabilities for groups of chemicals would be subject to sources of uncertainty related to possible correlations among the chemicals, which cannot be reliably quantified. The results would be excessively conservative and could be misinterpreted as unbiased estimates of the probability of a false acceptance decision error.

The adequacy of the data set to support decisions based on cumulative risks can be evaluated in general terms by considering the exceedence probabilities for individual chemicals in Table G-9. There are two chemicals (arsenic and total dioxins) that contribute significantly to

the cumulative cancer risk. The probabilities in Table G-9 suggest that a combined risk that exceeds the assumed action level is most likely to occur for the SEA 0-1 EPC group. The population comparisons (hypothesis tests) reported in Table G-5 indicate that the mean concentrations of arsenic and dioxin in the soils represented by the SEA 0-1 data set are not significantly higher than the mean background concentrations of these chemicals. Even if the assumed action level of $1 \times 10^{-6}$ were exceeded by an order of magnitude, which is extremely unlikely, the cumulative cancer risk would be well within the acceptable risk range established in the National Contingency Plan. Therefore, we believe the data set is adequate to support a decision based on the cumulative cancer risk associated with chemicals in soil at the WRF expansion site.

With respect to the cumulative noncancer risk, the action level could be exceeded by the combination of risks associated with exposure to aluminum and manganese. These risks are additive because aluminum and manganese both affect the central nervous system; the noncarcinogenic effects of the other chemicals affect different target organs. A combination of aluminum and manganese risks that exceeds the assumed action level (a target-organ-specific hazard index of one) is most likely to occur for the SEA 0-1 EPC group. The population comparisons (hypothesis tests) summarized in Table G-5 indicate that the mean concentrations of manganese in the soils represented by the data for the EPC groups are not significantly greater than the mean background concentration. The percentages in Table G-7 indicate that, although the mean aluminum concentrations are higher than background, most of the aluminum is attributable to background conditions. In light of the conservative assumptions made in the risk assessment, we believe the data set is adequate to support a decision based on the cumulative noncancer risk associated with chemicals in soil at the WRF expansion site.

Although the cumulative action level for radiological risk could be exceeded by the combined risks associated with the seven significant radionuclides, the probabilities in Table G-9 suggest that this is very unlikely. The probability that any one of the radionuclide concentrations exceeds even 10 percent of its critical value is essentially zero. In addition, only a few of the mean radionuclide activities are significantly greater than background. On this basis, we believe the data set is adequate to support a decision based on the cumulative radiological cancer risk associated with soils at the WRF expansion site.

## C. Adequacy of the Ground Water Data

The adequacy of the ground water data is discussed in this section, but cannot be evaluated by the quantitative process applied to the soils data set. The number of measurements used in estimating the risks associated with exposure to ground water is very small, and only a few chemicals contribute significantly to the ground water risks. Also, it is not appropriate to

treat the available ground water data as independent observations of current and future conditions throughout the WRF expansion site.

The risk tables in Appendix M and Appendix O indicate that the greatest risks associated with ground water exposure are due to ingestion by construction workers. These risks are represented by hazard index values that exceed the assumed action level of one, primarily due to perchlorate in the ground water. As explained in section VII.C of the report, these risks can be addressed by the use of appropriate personal protective equipment during dewatering activities. Because this will prevent the potential exposure, uncertainty regarding the concentration of perchlorate in ground water should not determine whether construction of the WRF expansion can proceed. In this sense, the perchlorate ground water data set is adequate.

All of the other risks associated with ground water are lower than the assumed action levels. The only other ground water risks that approach the action levels are due to inhalation of vapors from carbon tetrachloride and chloroform. The estimated cancer risks associated with exposure to vapors are as high as $8 \times 10^{-7}$ for NEA indoor workers under RME assumptions. This worst-case risk estimate is based on a hypothetical case that may never occur; at present, there are no plans for development of the NEA. The estimates of vapor exposure were derived using very conservative, screening-level vapor transport and dispersion models. The actual exposure levels are expected to be much lower than these estimates. Although the estimates of the risks associated with inhalation of vapors are extremely conservative, they are still below the lower end of the range of acceptable cancer risks established in the National Contingency Plan.

Ground water concentrations are expected to vary both temporally and spatially, so the actual ground water concentrations to which individual may be exposed cannot be determined with certainty. The estimates of the risks associated with inhalation of vapors are based on very few observations. As explained in section X.A.2 of the report, the exposure point concentrations used in assessing the risks from exposure to ground water are the maximum concentrations detected in ground water wells located on or near the site in May 2001. The chloroform and carbon tetrachloride measurements collected in May 2001 are generally consistent with the historical data obtained from wells on and immediately upgradient of the WRF expansion site, but may not be representative of long-term conditions throughout the site.

At present, the adequacy of the ground water data set cannot be evaluated quantitatively. Due to the degree of conservatism of other elements of the process used to assess the risks associated with exposure to vapors emanating from ground water, it is unlikely that these risks have been underestimated. Therefore, ENVIRON believes that the lack of ground water data should not prevent construction of the WRF expansion project. Further investigations of ground water conditions will be conducted on a regional basis, resulting in a larger data set and a better understanding of the temporal and spatial variation that can be expected.

# IV. Conclusion

In light of the preceding discussion, ENVIRON believes that the data set is adequate to support the general decision rule. The highest exceedence probability for any individual chemical in soil is about five percent. This exceedence probability is calculated for arsenic in the surface soils at the southern exposure area; the mean arsenic concentration in this group is not significantly greater than background. Because the exceedence probabilities are based on RME exposure patterns, the actual decision error probabilities are expected to be considerably lower. The worst-case (5 percent) probability relates to a carcinogenic risk action level of $1 \times 10^{-6}$, which is the lower end of the range of acceptable risk established in the National Contingency Plan. If the NDEP decides that no further action is required before proceeding with construction of the WRF expansion project, the probability that construction workers will be exposed to chemicals in soils at levels that generate unacceptable risks is very small.

The probability of a decision error is very high if the NDEP decides that the risks at the site are too high to allow the City of Henderson to proceed with the WRF expansion project. The consequences of this error would be the unnecessary delays and expenditures associated with additional sampling, analysis, and possibly remediation before construction is allowed to begin. In addition to the severe financial consequences for the City of Henderson, a delay in expanding the capacity of the WRF could also have negative effects on the health of the environment and the entire community served by this municipal utility.

# STATISTICAL ANALYSES

# TAB 1

# Aluminum

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 9221111 | 2378096 | 560523 |
| M | 26 | 11189231 | 1897166 | 372065 |
| T | 26 | 12242308 | 2558722 | 501807 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0 | 1053077 | 3021197 |
| M | -1053077 | 0 | 1968120 |
| B | -3021197 | -1968120 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -1264919 | -211842 | 1622776 |
| M | -211842 | -1264919 | 569699 |
| B | 1622776 | 569699 | -1520244 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -1518965 | -465889 | 1341917 |
| M | -465889 | -1518965 | 288840 |
| B | 1341917 | 288840 | -1825569 |

Positive values show pairs of means that are significantly different.

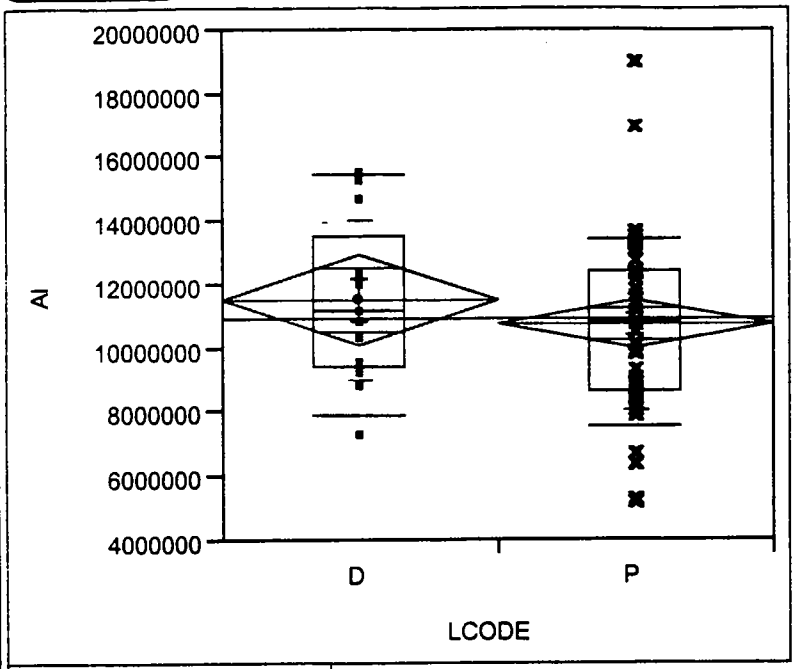
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 355.5 | 19.7500 | -3.804 |
| M | 26 | 924 | 35.5385 | 0.006 |
| T | 26 | 1205.5 | 46.3654 | 3.428 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 18.2012 | 2 | 0.0001 |

Al By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7340000 | 7932000 | 9435000 | 11200000 | 13550000 | 15480000 | 15600000 |
| P | 5260000 | 7585000 | 8640000 | 10850000 | 12500000 | 13460000 | 19000000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 11517692 | 2545402 | 705967 |
| P | 46 | 10773043 | 2703812 | 398655 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 431.5 | 33.1923 | 0.750 |
| P | 46 | 1338.5 | 29.0978 | -0.750 |

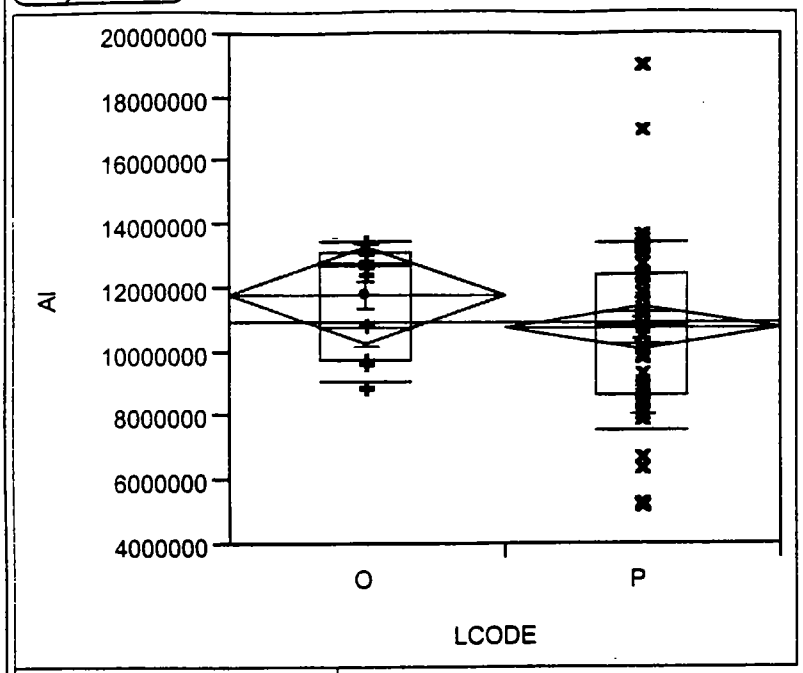
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 431.5 | 0.74995 | 0.4533 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.5762 | 1 | 0.4478 |

Al By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 8920000 | 9066000 | 9740000 | 12700000 | 13100000 | 13440000 | 13500000 |
| P | 5260000 | 7585000 | 8640000 | 10850000 | 12500000 | 13460000 | 19000000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 11810000 | 1673900 | 504700 |
| P | 46 | 10773043 | 2703812 | 398655 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 398 | 36.1818 | 1.588 |
| P | 46 | 1255 | 27.2826 | -1.588 |

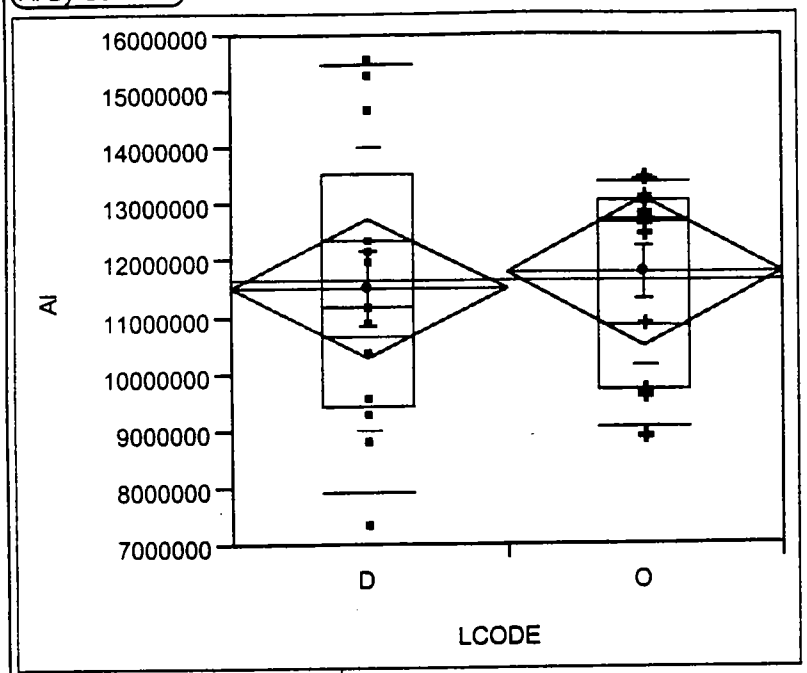
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 398 | 1.58794 | 0.1123 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.5538 | 1 | 0.1100 |

Al By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7340000 | 7932000 | 9435000 | 11200000 | 13550000 | 15480000 | 15600000 |
| O | 8920000 | 9066000 | 9740000 | 12700000 | 13100000 | 13440000 | 13500000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 11517692 | 2545402 | 705967 |
| O | 11 | 11810000 | 1673900 | 504700 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 148.5 | 11.4231 | -0.782 |
| O | 11 | 151.5 | 13.7727 | 0.782 |

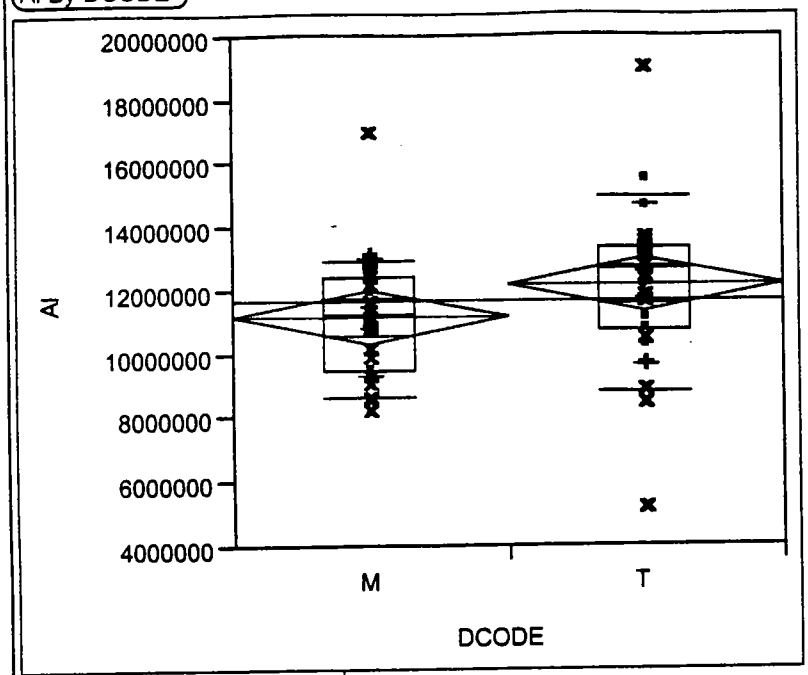
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 151.5 | 0.78231 | 0.4340 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.6582 | 1 | 0.4172 |

AI By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 8270000 | 8638000 | 9507500 | 11300000 | 12425000 | 12990000 | 17000000 |
| T | 5260000 | 8807000 | 10800000 | 12750000 | 13425000 | 14970000 | 19000000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 11189231 | 1897166 | 372065 |
| T | 26 | 12242308 | 2558722 | 501807 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 563 | 21.6538 | -2.298 |
| T | 26 | 815 | 31.3462 | 2.298 |

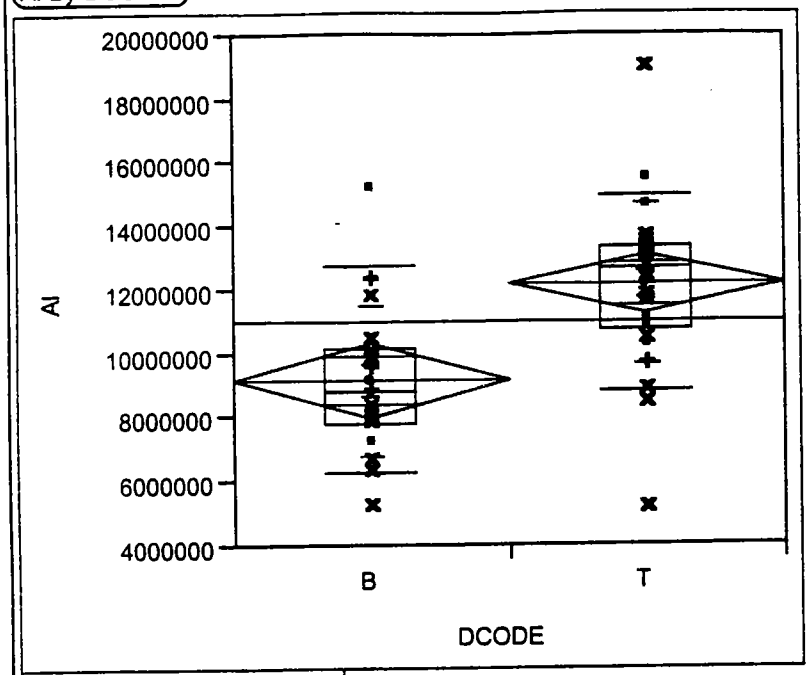
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 815 | 2.29778 | 0.0216 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.3219 | 1 | 0.0211 |

AI By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 5300000 | 6290000 | 7805000 | 8870000 | 10200000 | 12780000 | 15300000 |
| T | 5260000 | 8807000 | 10800000 | 12750000 | 13425000 | 14970000 | 19000000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 9221111 | 2378096 | 560523 |
| T | 26 | 12242308 | 2558722 | 501807 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 248.5 | 13.8056 | -3.725 |
| T | 26 | 741.5 | 28.5192 | 3.725 |

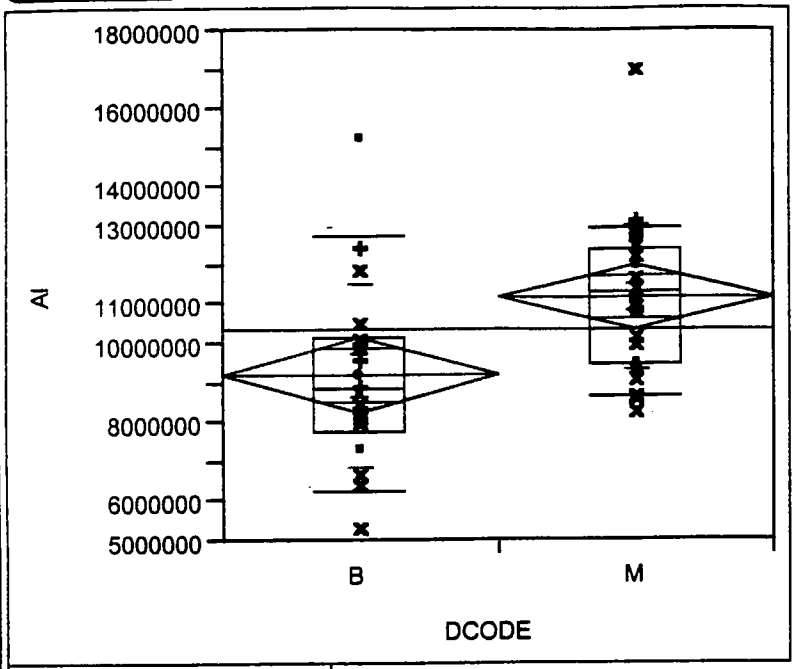
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 248.5 | -3.72485 | 0.0002 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.9636 | 1 | 0.0002 |

AI By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 5300000 | 6290000 | 7805000 | 8870000 | 10200000 | 12780000 | 15300000 |
| M | 8270000 | 8638000 | 9507500 | 11300000 | 12425000 | 12990000 | 17000000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 9221111 | 2378096 | 560523 |
| M | 26 | 11189231 | 1897166 | 372065 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 278 | 15.4444 | -3.020 |
| M | 26 | 712 | 27.3846 | 3.020 |

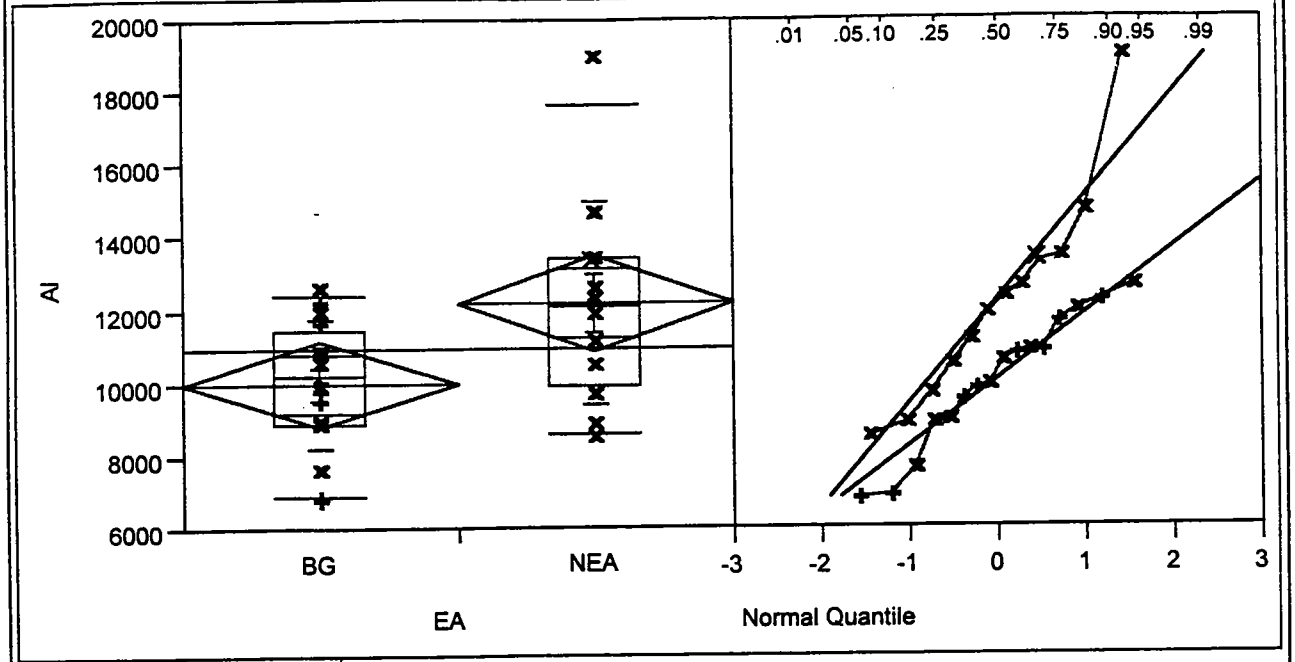
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 278 | -3.02036 | 0.0025 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 9.1948 | 1 | 0.0024 |

Al By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 6820 | 6897 | 8937.5 | 10275 | 11500 | 12420 | 12700 |
| NEA | 8520 | 8643 | 9930 | 12125 | 13450 | 17710 | 19000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 10036.3 | 1817.68 | 454.42 |
| NEA | 12 | 12195.0 | 2859.26 | 825.40 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 188 | 11.7500 | -2.020 |
| NEA | 12 | 218 | 18.1667 | 2.020 |

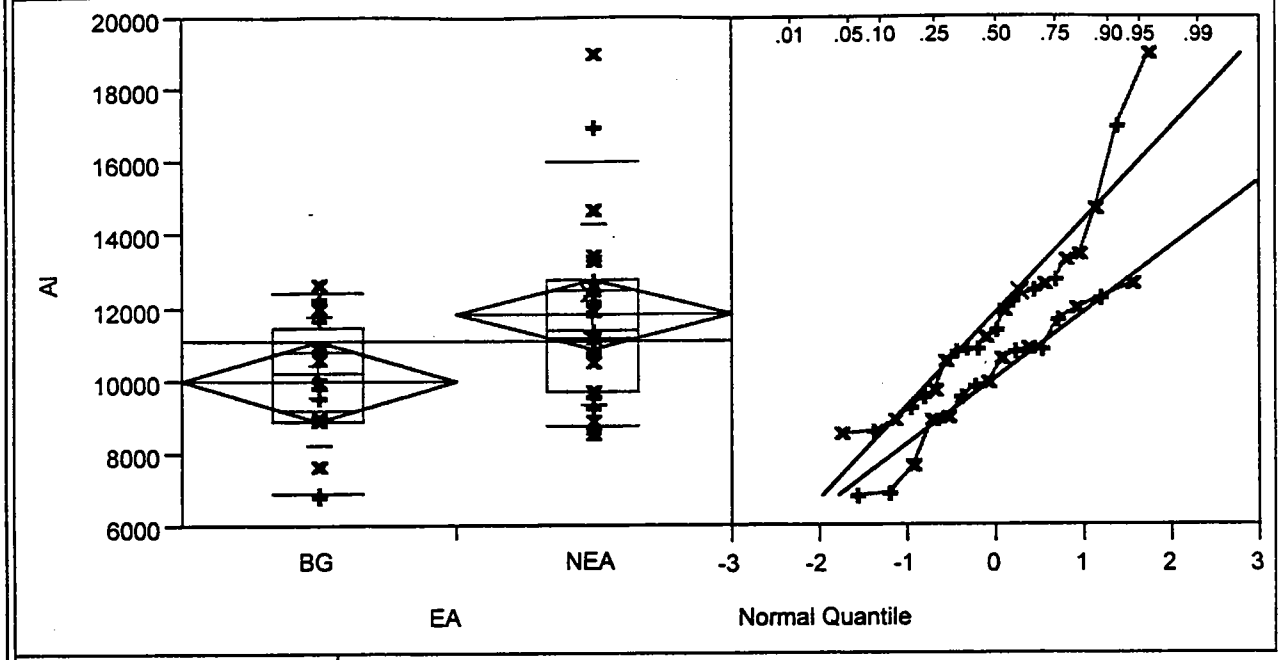
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 218 | 2.02027 | 0.0434 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.1758 | 1 | 0.0410 |

Al By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 6820 | 6897 | 8937.5 | 10275 | 11500 | 12420 | 12700 |
| NEA | 8520 | 8762 | 9740 | 11400 | 12800 | 16080 | 19000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 10036.3 | 1817.68 | 454.42 |
| NEA | 23 | 11841.7 | 2561.75 | 534.16 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 246 | 15.3750 | -2.100 |
| NEA | 23 | 534 | 23.2174 | 2.100 |

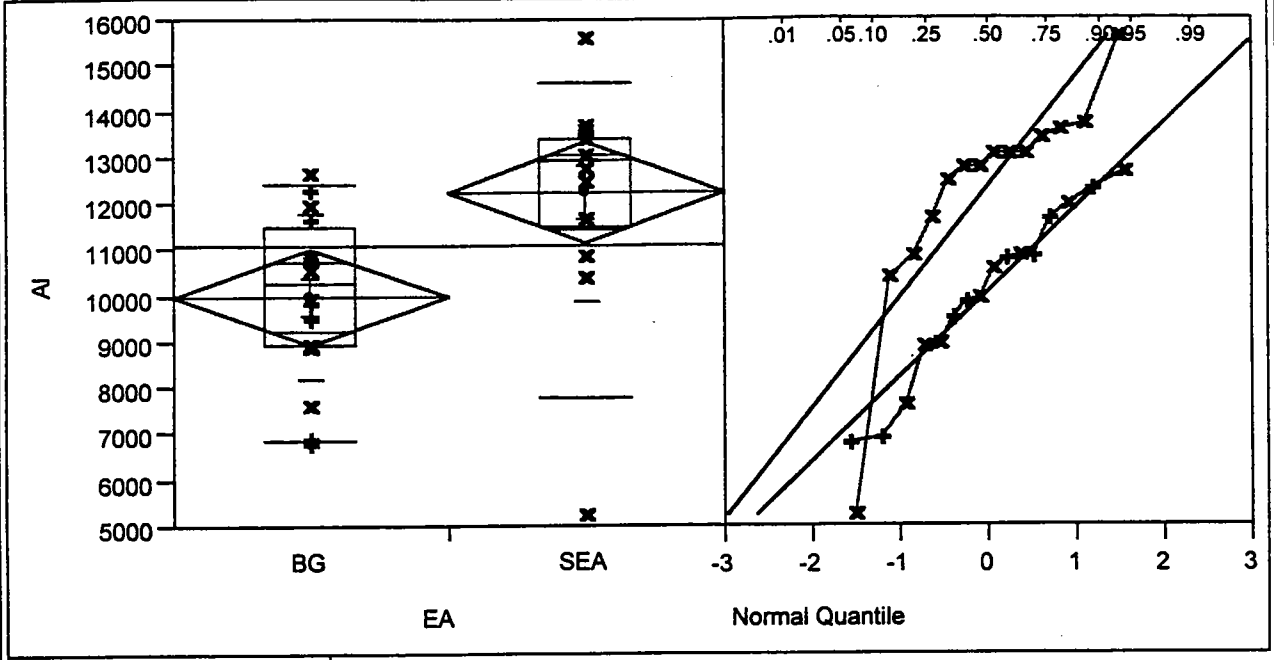
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 246 | -2.10006 | 0.0357 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.4705 | 1 | 0.0345 |

AI By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 6820 | 6897 | 8937.5 | 10275 | 11500 | 12420 | 12700 |
| SEA | 5260 | 7830 | 11500 | 12950 | 13450 | 14650 | 15600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 10036.3 | 1817.68 | 454.42 |
| SEA | 14 | 12282.9 | 2380.97 | 636.34 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 169.5 | 10.5938 | -3.246 |
| SEA | 14 | 295.5 | 21.1071 | 3.246 |

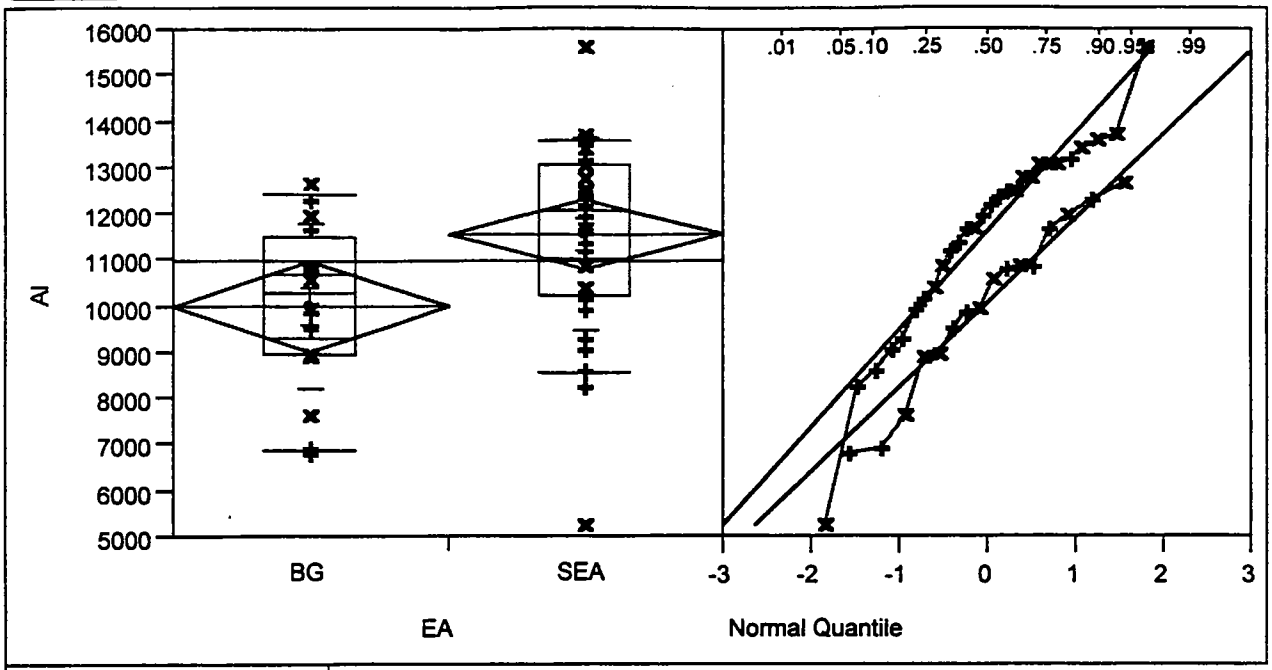
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 295.5 | 3.24612 | 0.0012 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 10.6728 | 1 | 0.0011 |

AI By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 6820 | 6897 | 8937.5 | 10275 | 11500 | 12420 | 12700 |
| SEA | 5260 | 8576 | 10250 | 12100 | 13100 | 13610 | 15600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 10036.3 | 1817.68 | 454.42 |
| SEA | 28 | 11570.0 | 2119.88 | 400.62 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 252.5 | 15.7813 | -2.612 |
| SEA | 28 | 737.5 | 26.3393 | 2.612 |

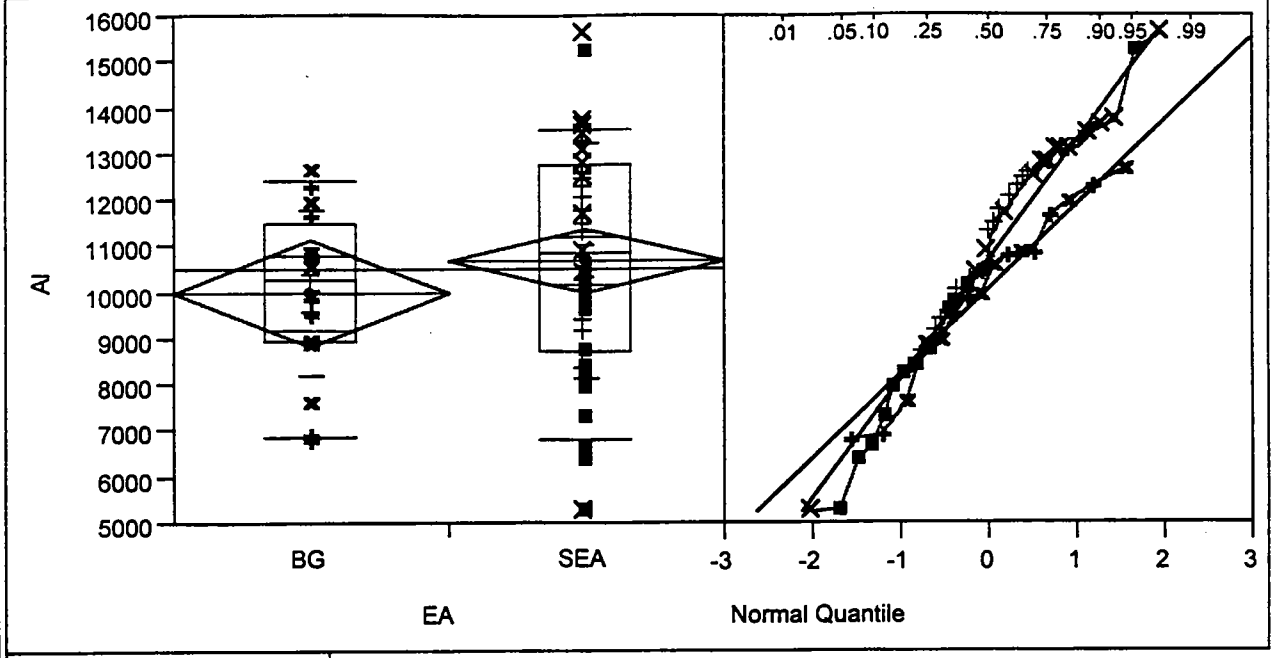
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 252.5 | -2.61191 | 0.0090 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.8860 | 1 | 0.0087 |

Al By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 6820 | 6897 | 8937.5 | 10275 | 11500 | 12420 | 12700 |
| SEA | 5260 | 6836 | 8715 | 10900 | 12800 | 13560 | 15600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 10036.3 | 1817.68 | 454.42 |
| SEA | 41 | 10697.3 | 2563.73 | 400.39 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 402.5 | 25.1563 | -1.084 |
| SEA | 41 | 1250.5 | 30.5000 | 1.084 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 402.5 | -1.08358 | 0.2786 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.1935 | 1 | 0.2746 |

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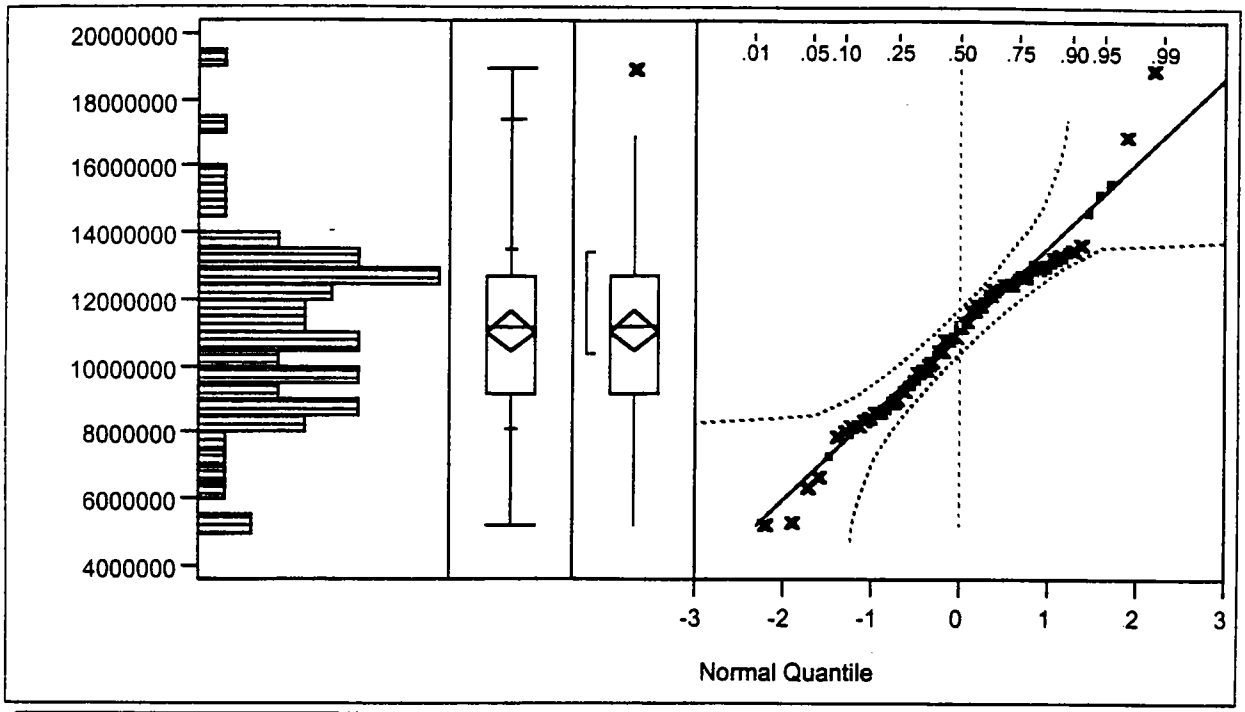



**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 1.9e+7 |
| | 99.5% | 1.9e+7 |
| | 97.5% | 1.745e7 |
| | 90.0% | 1.359e7 |
| quartile | 75.0% | 1.28e+7 |
| median | 50.0% | 1.12e+7 |
| quartile | 25.0% | 9240000 |
| | 10.0% | 8133000 |
| | 2.5% | 5291000 |
| | 0.5% | 5260000 |
| minimum | 0.0% | 5260000 |

**Moments**

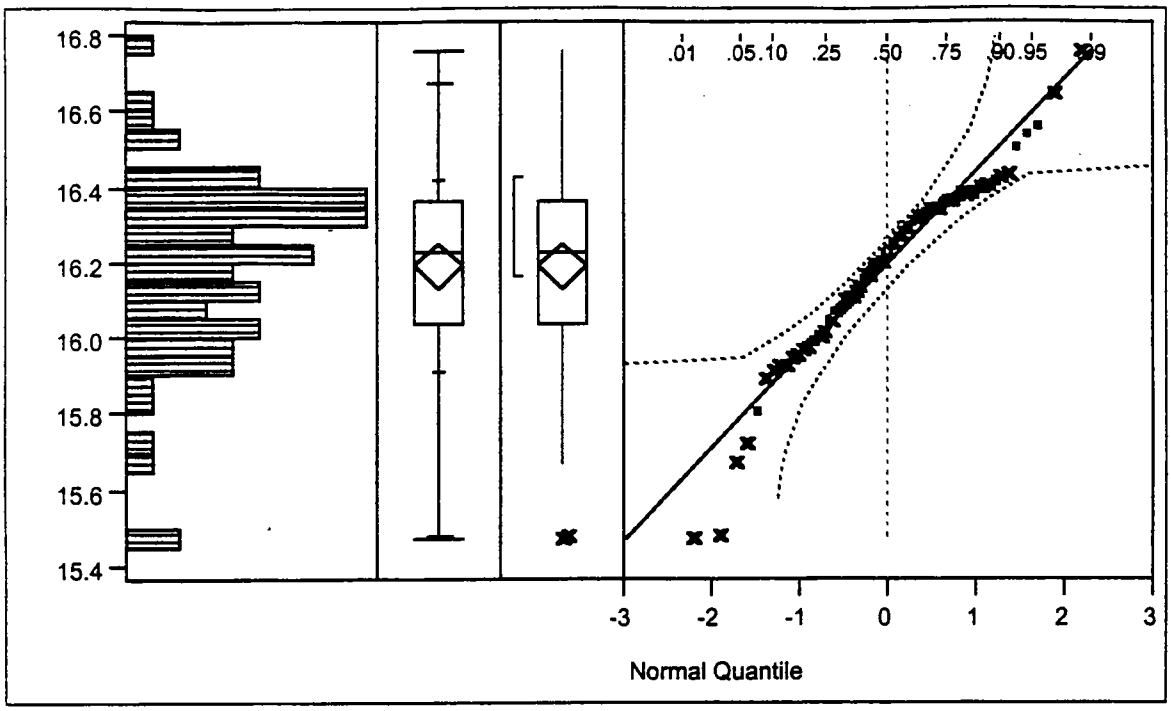
| | |
|---|---|
| Mean | 11074286 |
| Std Dev | 2546465 |
| Std Error Mean | 304361 |
| Upper 95% Mean | 11681470 |
| Lower 95% Mean | 10467101 |
| N | 70 |
| Sum Weights | 70 |
| Sum | 775200000 |
| Variance | 6.4845e12 |
| Skewness | 0 |
| Kurtosis | 1 |
| CV | 23 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.980446 | 0.6517 |

lnAl




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 16.760 |
| | 99.5% | 16.760 |
| | 97.5% | 16.674 |
| | 90.0% | 16.425 |
| quartile | 75.0% | 16.365 |
| median | 50.0% | 16.231 |
| quartile | 25.0% | 16.039 |
| | 10.0% | 15.911 |
| | 2.5% | 15.482 |
| | 0.5% | 15.476 |
| minimum | 0.0% | 15.476 |

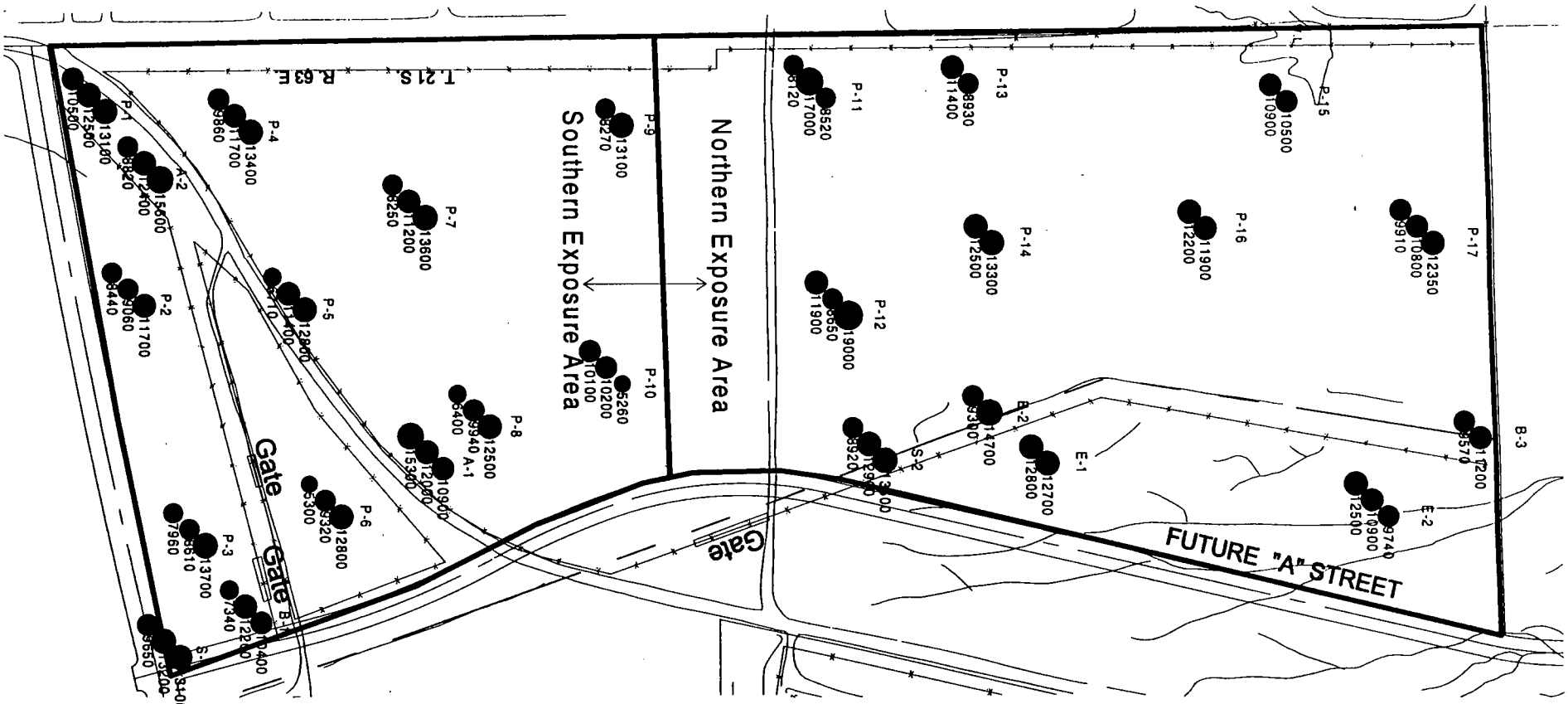
**Moments**

| | |
|---|---|
| Mean | 16.19233 |
| Std Dev | 0.24362 |
| Std Error Mean | 0.02912 |
| Upper 95% Mean | 16.25042 |
| Lower 95% Mean | 16.13424 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 1133.4632 |
| Variance | 0.05935 |
| Skewness | -0.68061 |
| Kurtosis | 1.00466 |
| CV | 1.50455 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.959416 | 0.0657 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

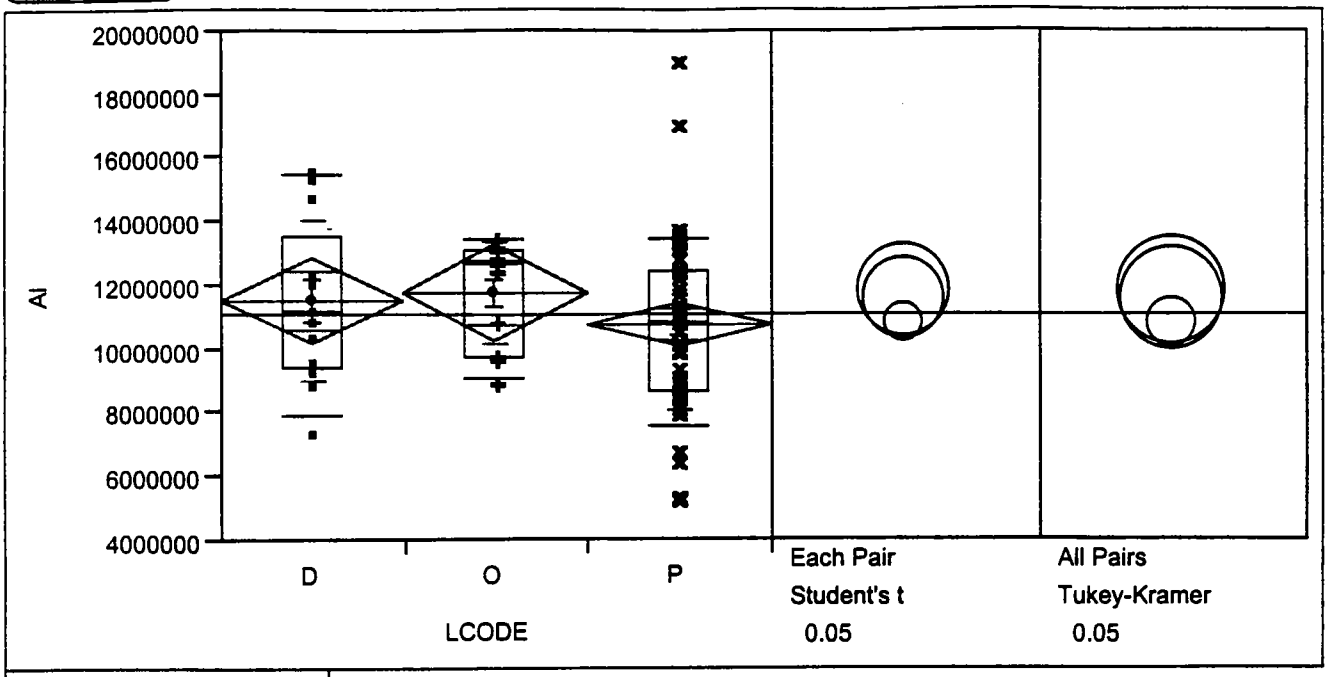
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Aluminum mg/kg**

Al By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7340000 | 7932000 | 9435000 | 11200000 | 13550000 | 15480000 | 15600000 |
| O | 8920000 | 9066000 | 9740000 | 12700000 | 13100000 | 13440000 | 13500000 |
| P | 5260000 | 7585000 | 8640000 | 10850000 | 12500000 | 13460000 | 19000000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.028349 |
| RSquare Adj | -0.00066 |
| Root Mean Square Error | 2547299 |
| Mean of Response | 11074286 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 1.26843e13 | 6.342e12 | 0.9774 |
| Error | 67 | 4.34745e14 | 6.489e12 | Prob>F |
| C Total | 69 | 4.4743e+14 | 6.484e12 | 0.3816 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 11517692 | 706494 |
| O | 11 | 11810000 | 768040 |
| P | 46 | 10773043 | 375579 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 11517692 | 2545402 | 705967 |
| O | 11 | 11810000 | 1673900 | 504700 |
| P | 46 | 10773043 | 2703812 | 398655 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | D | P |
|---|---|---|---|
| O | 0 | 292308 | 1036957 |
| D | -292308 | 0 | 744649 |
| P | -1036957 | -744649 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | D | P |
|---|---|---|---|
| O | -2168012 | -1790651 | -669539 |
| D | -1790651 | -1994281 | -852401 |
| P | -669539 | -852401 | -1060179 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | D | P |
|---|---|---|---|
| O | -2603436 | -2208992 | -1012272 |
| D | -2208992 | -2394812 | -1173152 |
| P | -1012272 | -1173152 | -1273105 |

Positive values show pairs of means that are significantly different.

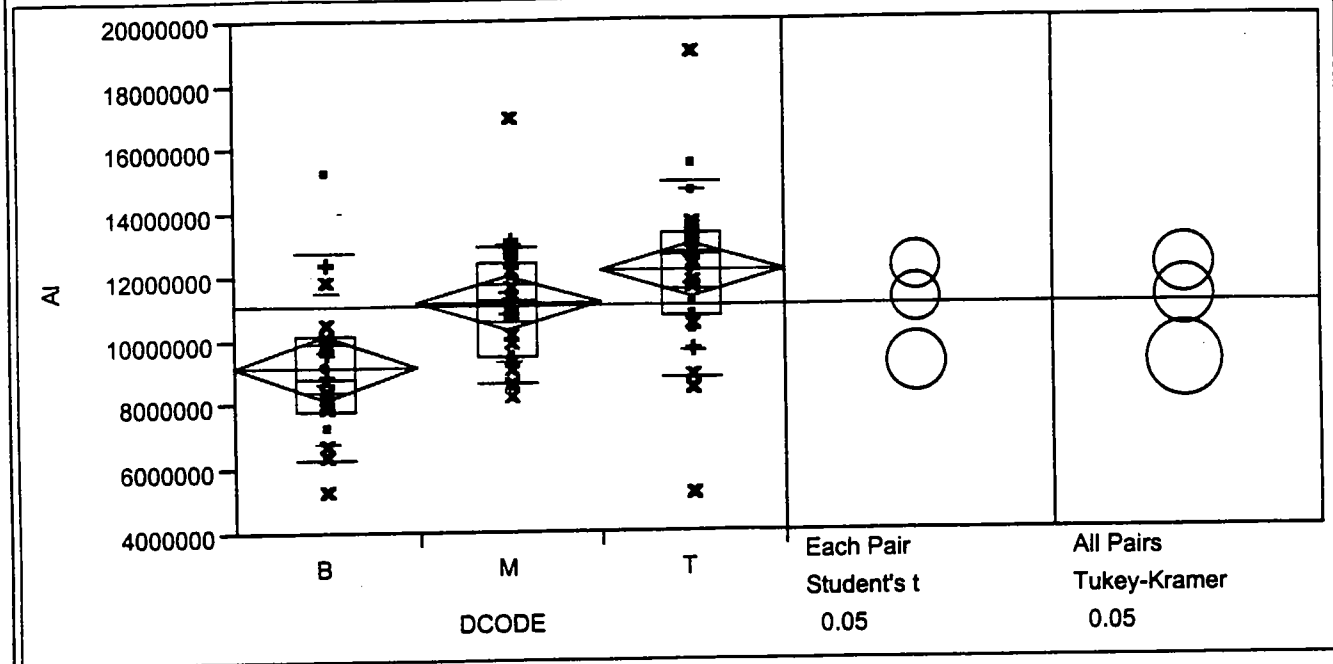
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 489 | 37.6154 | 0.408 |
| O | 11 | 483.5 | 43.9545 | 1.493 |
| P | 46 | 1512.5 | 32.8804 | -1.485 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.8024 | 2 | 0.2463 |

AI By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 5300000 | 6290000 | 7805000 | 8870000 | 10200000 | 12780000 | 15300000 |
| M | 8270000 | 8638000 | 9507500 | 11300000 | 12425000 | 12990000 | 17000000 |
| T | 5260000 | 8807000 | 10800000 | 12750000 | 13425000 | 14970000 | 19000000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.218205 |
| RSquare Adj | 0.194868 |
| Root Mean Square Error | 2284922 |
| Mean of Response | 11074286 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 9.76313e13 | 4.882e13 | 9.3501 |
| Error | 67 | 3.49798e14 | 5.221e12 | Prob>F |
| C Total | 69 | 4.4743e+14 | 6.484e12 | 0.0003 |

Means for Oneway Anova

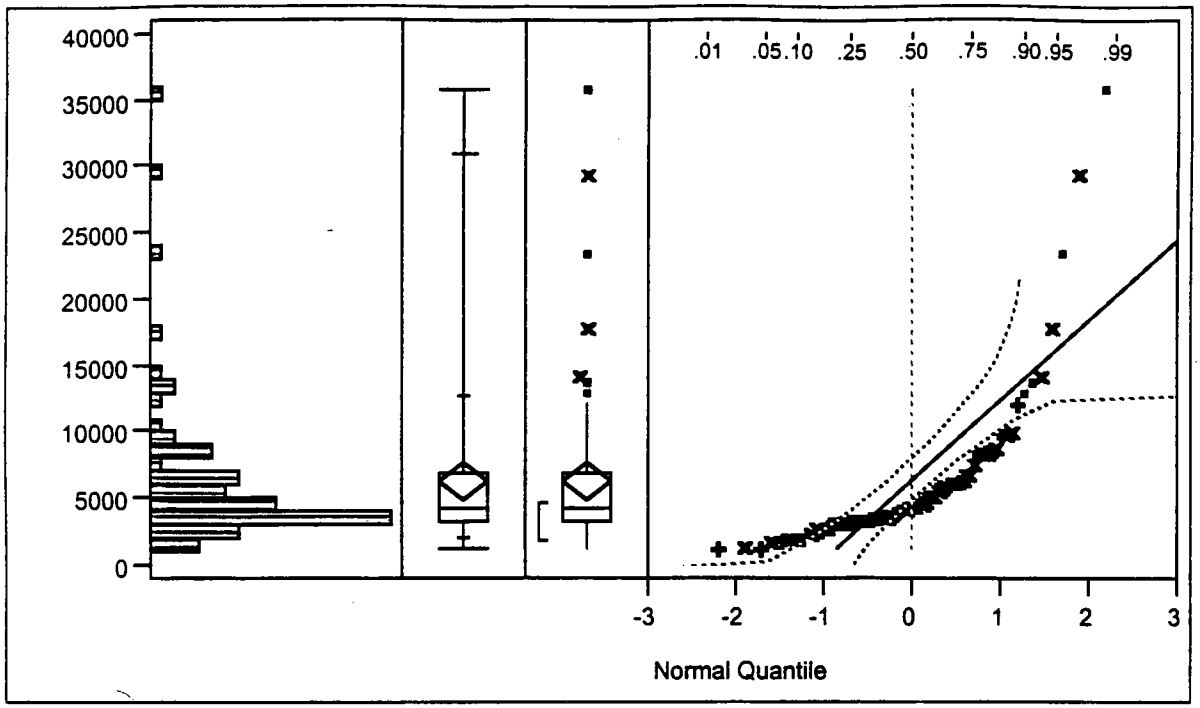
| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 9221111 | 538561 |
| M | 26 | 11189231 | 448110 |
| T | 26 | 12242308 | 448110 |

Std Error uses a pooled estimate of error variance

# TAB 2

# Arsenic

As




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 35900 |
| | 99.5% | 35900 |
| | 97.5% | 30940 |
| | 90.0% | 12920 |
| quartile | 75.0% | 6925 |
| median | 50.0% | 4350 |
| quartile | 25.0% | 3275 |
| | 10.0% | 2020 |
| | 2.5% | 1300 |
| | 0.5% | 1300 |
| minimum | 0.0% | 1300 |

**Moments**

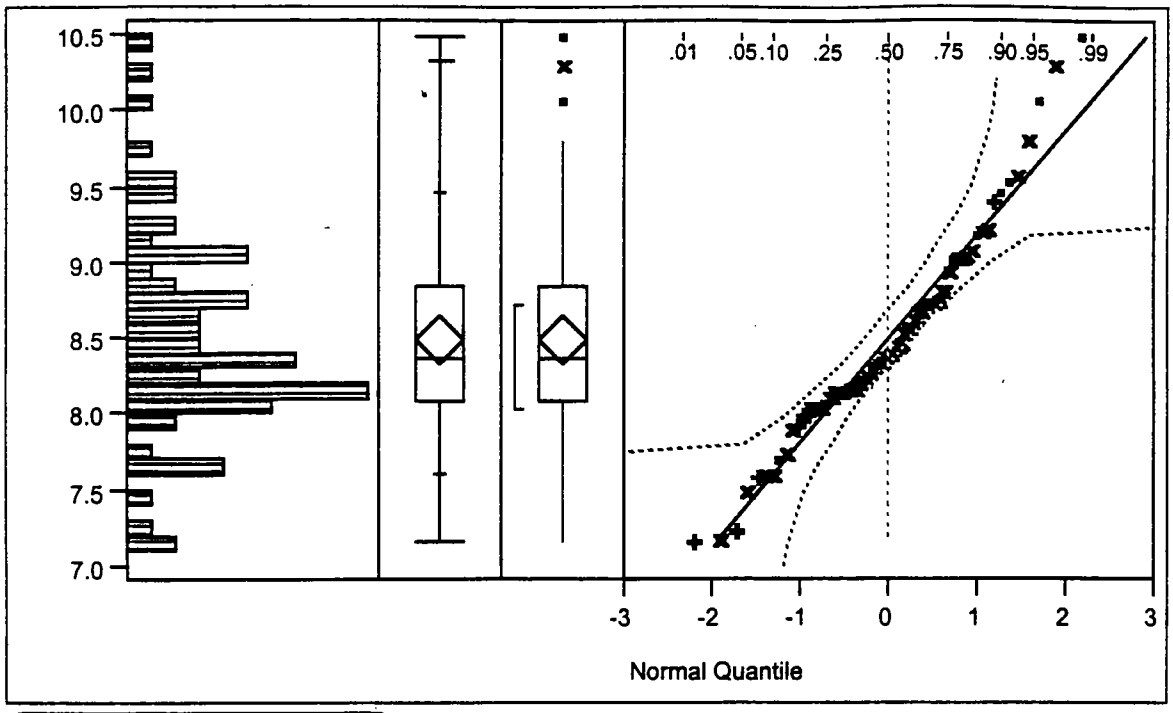
| | |
|---|---|
| Mean | 6375.714 |
| Std Dev | 6048.911 |
| Std Error Mean | 722.983 |
| Upper 95% Mean | 7818.029 |
| Lower 95% Mean | 4933.399 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 446300 |
| Variance | 36589329 |
| Skewness | 3.011 |
| Kurtosis | 10.641 |
| CV | 94.874 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.668558 | 0.0000 |

lnAs




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 10.488 |
| | 99.5% | 10.488 |
| | 97.5% | 10.336 |
| | 90.0% | 9.466 |
| quartile | 75.0% | 8.841 |
| median | 50.0% | 8.378 |
| quartile | 25.0% | 8.094 |
| | 10.0% | 7.610 |
| | 2.5% | 7.170 |
| | 0.5% | 7.170 |
| minimum | 0.0% | 7.170 |

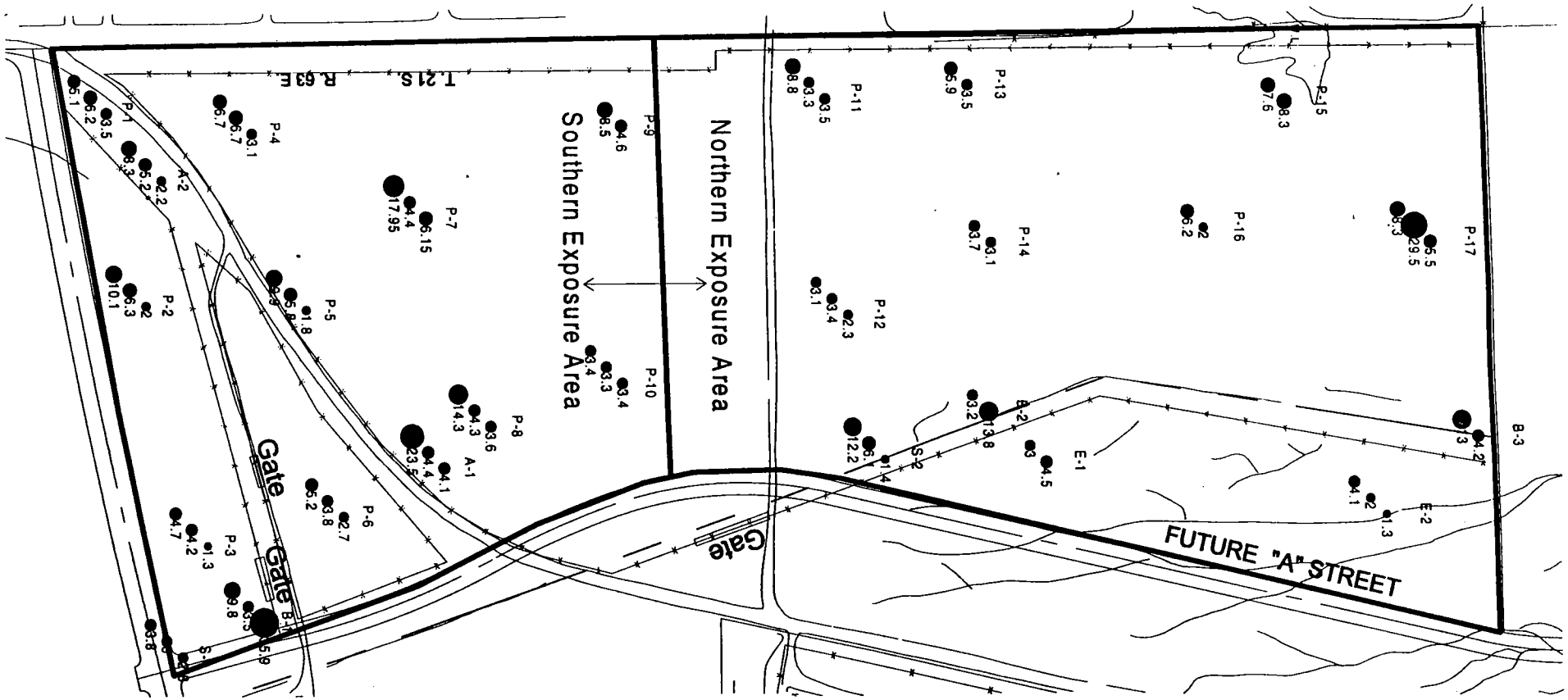
**Moments**

| | |
|---|---|
| Mean | 8.49306 |
| Std Dev | 0.68492 |
| Std Error Mean | 0.08186 |
| Upper 95% Mean | 8.65637 |
| Lower 95% Mean | 8.32975 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 594.51421 |
| Variance | 0.46911 |
| Skewness | 0.64805 |
| Kurtosis | 0.71346 |
| CV | 8.06442 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.959095 | 0.0629 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

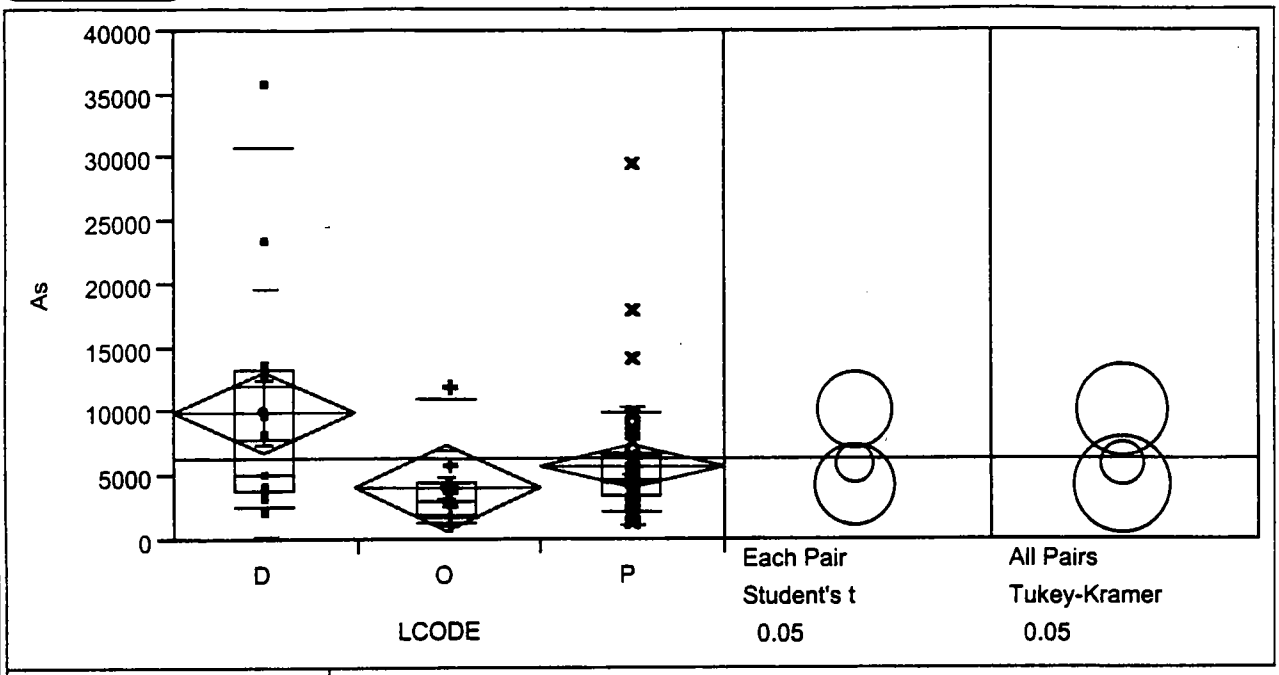
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

# ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Arsenic mg/kg**

As By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 2200 | 2600 | 3800 | 5200 | 13400 | 30940 | 35900 |
| O | 1300 | 1320 | 2000 | 3000 | 4500 | 10980 | 12200 |
| P | 1300 | 2210 | 3375 | 4500 | 6700 | 9960 | 29500 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.099324 |
| RSquare Adj | 0.072438 |
| Root Mean Square Error | 5825.708 |
| Mean of Response | 6375.714 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 250758906 | 1.2538e8 | 3.6943 |
| Error | 67 | 2273904808 | 33938878 | Prob>F |
| C Total | 69 | 2524663714 | 36589329 | 0.0301 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 10084.6 | 1615.8 |
| O | 11 | 4018.2 | 1756.5 |
| P | 46 | 5891.3 | 859.0 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 10084.6 | 9795.90 | 2716.9 |
| O | 11 | 4018.2 | 3056.74 | 921.6 |
| P | 46 | 5891.3 | 4781.80 | 705.0 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | D | P | O |
|---|---|---|---|
| D | 0.00 | 4193.31 | 6066.43 |
| P | -4193.31 | 0.00 | 1873.12 |
| O | -6066.43 | -1873.12 | 0.00 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -4560.95 | 540.84 | 1302.68 |
| P | 540.84 | -2424.64 | -2029.66 |
| O | 1302.68 | -2029.66 | -4958.27 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -5476.97 | -192.73 | 345.93 |
| P | -192.73 | -2911.61 | -2813.49 |
| O | 345.93 | -2813.49 | -5954.09 |

Positive values show pairs of means that are significantly different.

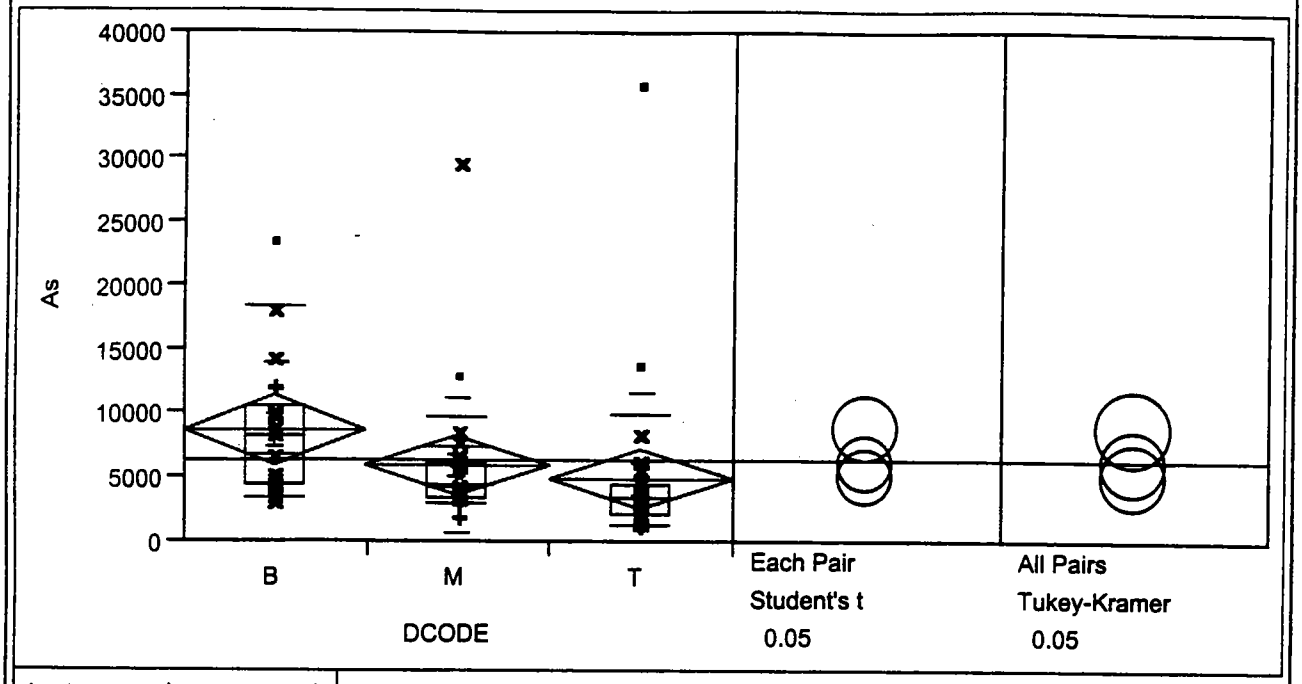
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 576.5 | 44.3462 | 1.730 |
| O | 11 | 255.5 | 23.2273 | -2.171 |
| P | 46 | 1653 | 35.9348 | 0.241 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.4817 | 2 | 0.0391 |

As By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 3100 | 3370 | 4550 | 8300 | 10625 | 18505 | 23500 |
| M | 2000 | 3000 | 3375 | 4400 | 6225 | 9850 | 29500 |
| T | 1300 | 1370 | 2150 | 3450 | 4525 | 9950 | 35900 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.063755 |
| RSquare Adj | 0.035807 |
| Root Mean Square Error | 5939.626 |
| Mean of Response | 6375.714 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 160960103 | 80480052 | 2.2812 |
| Error | 67 | 2363703611 | 35279158 | Prob>F |
| C Total | 69 | 2524663714 | 36589329 | 0.1100 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 8847.22 | 1400.0 |
| M | 26 | 6019.23 | 1164.9 |
| T | 26 | 5021.15 | 1164.9 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 8847.22 | 5437.30 | 1281.6 |
| M | 26 | 6019.23 | 5299.89 | 1039.4 |
| T | 26 | 5021.15 | 6808.50 | 1335.3 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | B | M | T |
|---|---|---|---|
| B | 0.00 | 2827.99 | 3826.07 |
| M | -2827.99 | 0.00 | 998.08 |
| T | -3826.07 | -998.08 | 0.00 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -3951.85 | -807.19 | 190.89 |
| M | -807.19 | -3288.14 | -2290.06 |
| T | 190.89 | -2290.06 | -3288.14 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -4745.54 | -1537.27 | -539.20 |
| M | -1537.27 | -3948.53 | -2950.45 |
| T | -539.20 | -2950.45 | -3948.53 |

Positive values show pairs of means that are significantly different.

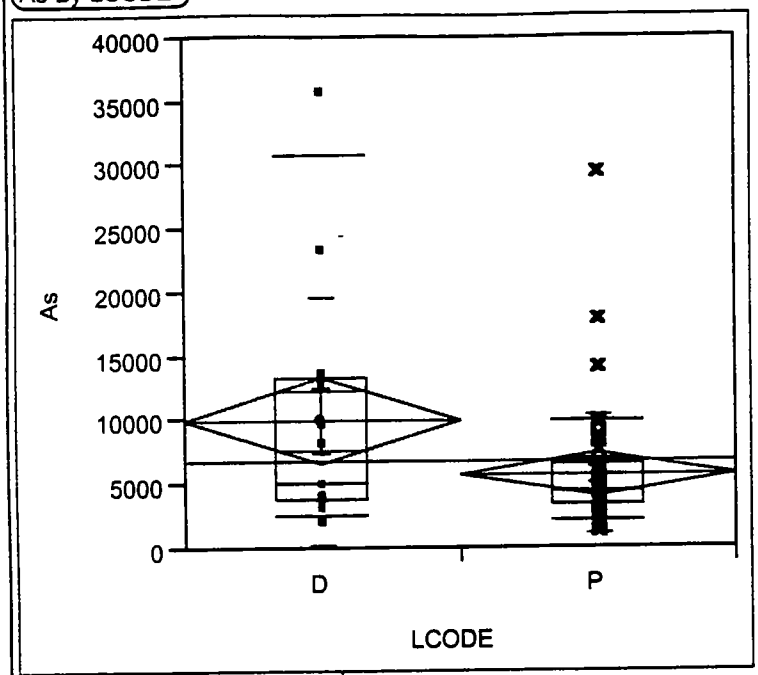
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 891 | 49.5000 | 3.381 |
| M | 26 | 957.5 | 36.8269 | 0.413 |
| T | 26 | 636.5 | 24.4808 | -3.477 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 16.2616 | 2 | 0.0003 |

As By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 2200 | 2600 | 3800 | 5200 | 13400 | 30940 | 35900 |
| P | 1300 | 2210 | 3375 | 4500 | 6700 | 9960 | 29500 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 10084.6 | 9795.90 | 2716.9 |
| P | 46 | 5891.3 | 4781.80 | 705.0 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 465 | 35.7692 | 1.363 |
| P | 46 | 1305 | 28.3696 | -1.363 |

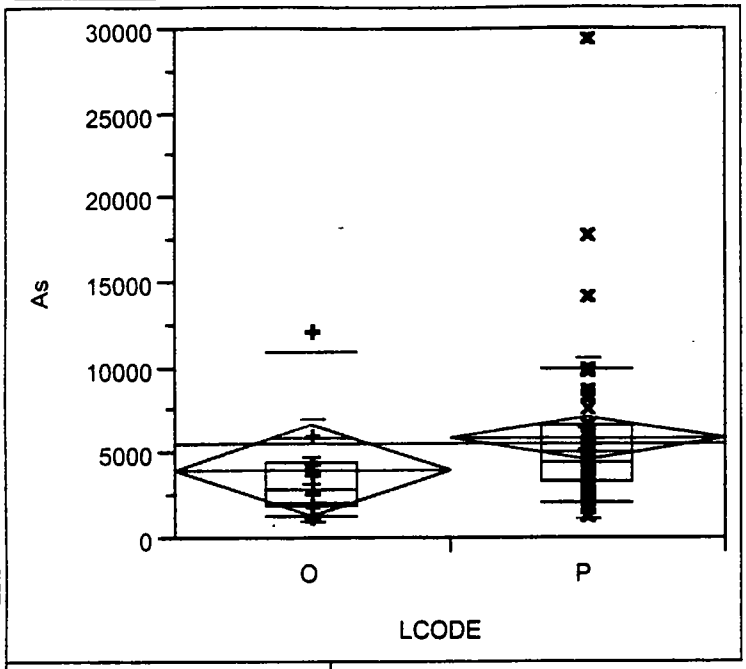
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 465 | 1.36303 | 0.1729 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.8829 | 1 | 0.1700 |

As By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 1300 | 1320 | 2000 | 3000 | 4500 | 10980 | 12200 |
| P | 1300 | 2210 | 3375 | 4500 | 6700 | 9960 | 29500 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 4018.18 | 3056.74 | 921.64 |
| P | 46 | 5891.30 | 4781.80 | 705.04 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 224 | 20.3636 | -1.912 |
| P | 46 | 1429 | 31.0652 | 1.912 |

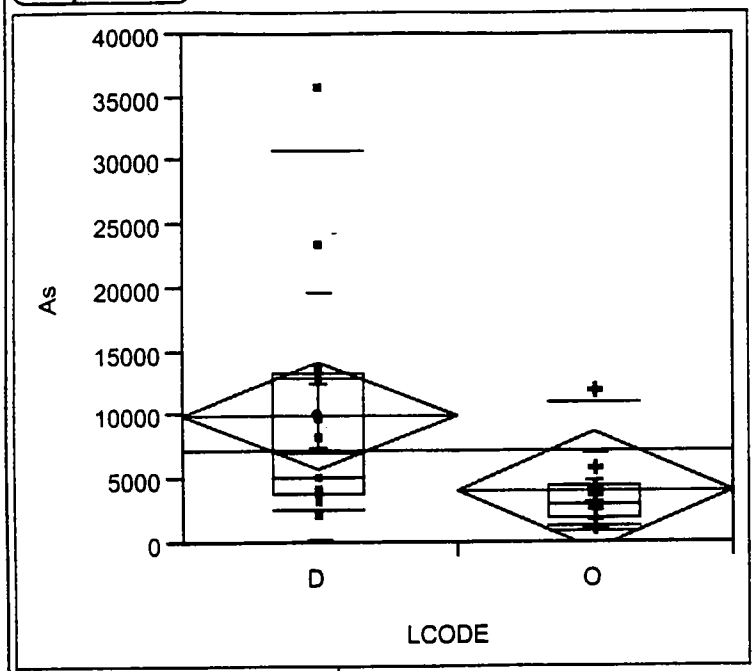
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 224 | -1.91159 | 0.0559 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.6930 | 1 | 0.0546 |

As By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 2200 | 2600 | 3800 | 5200 | 13400 | 30940 | 35900 |
| O | 1300 | 1320 | 2000 | 3000 | 4500 | 10980 | 12200 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 10084.6 | 9795.90 | 2716.9 |
| O | 11 | 4018.2 | 3056.74 | 921.6 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 202.5 | 15.5769 | 2.289 |
| O | 11 | 97.5 | 8.8636 | -2.289 |

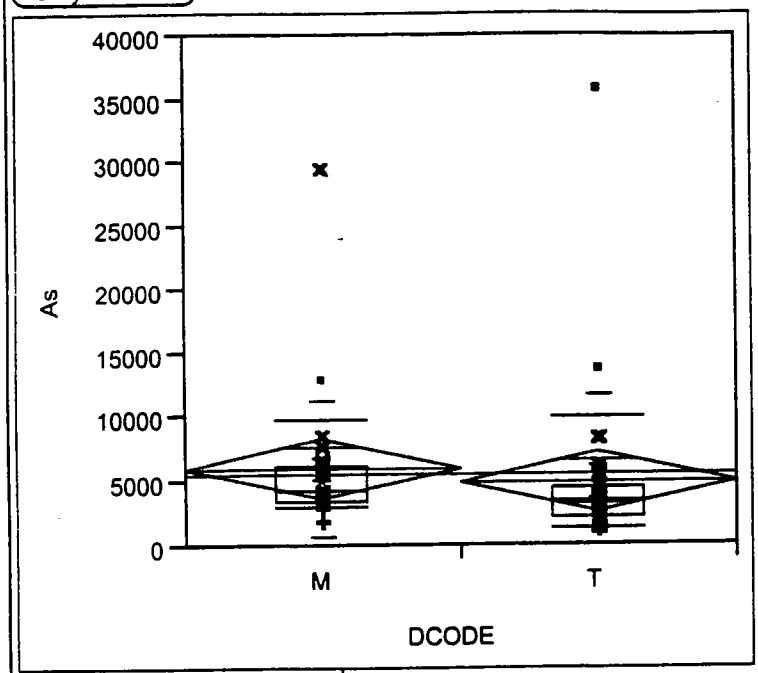
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 97.5 | -2.28949 | 0.0221 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.3753 | 1 | 0.0204 |

As By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 2000 | 3000 | 3375 | 4400 | 6225 | 9850 | 29500 |
| T | 1300 | 1370 | 2150 | 3450 | 4525 | 9950 | 35900 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 6019.23 | 5299.89 | 1039.4 |
| T | 26 | 5021.15 | 6808.50 | 1335.3 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 823.5 | 31.6731 | 2.454 |
| T | 26 | 554.5 | 21.3269 | -2.454 |

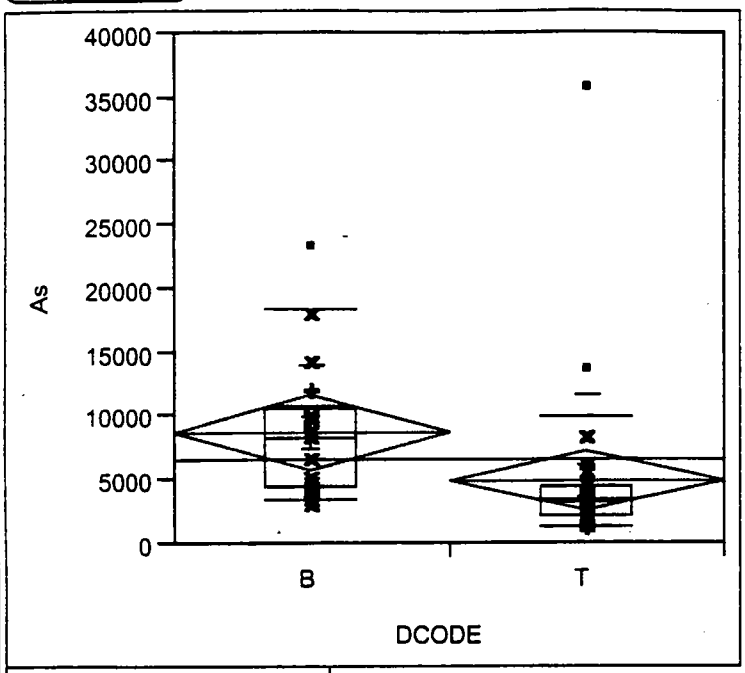
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 554.5 | -2.45351 | 0.0141 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.0647 | 1 | 0.0138 |

As By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 3100 | 3370 | 4550 | 8300 | 10625 | 18505 | 23500 |
| T | 1300 | 1370 | 2150 | 3450 | 4525 | 9950 | 35900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 8847.22 | 5437.30 | 1281.6 |
| T | 26 | 5021.15 | 6808.50 | 1335.3 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 557 | 30.9444 | 3.618 |
| T | 26 | 433 | 16.6538 | -3.618 |

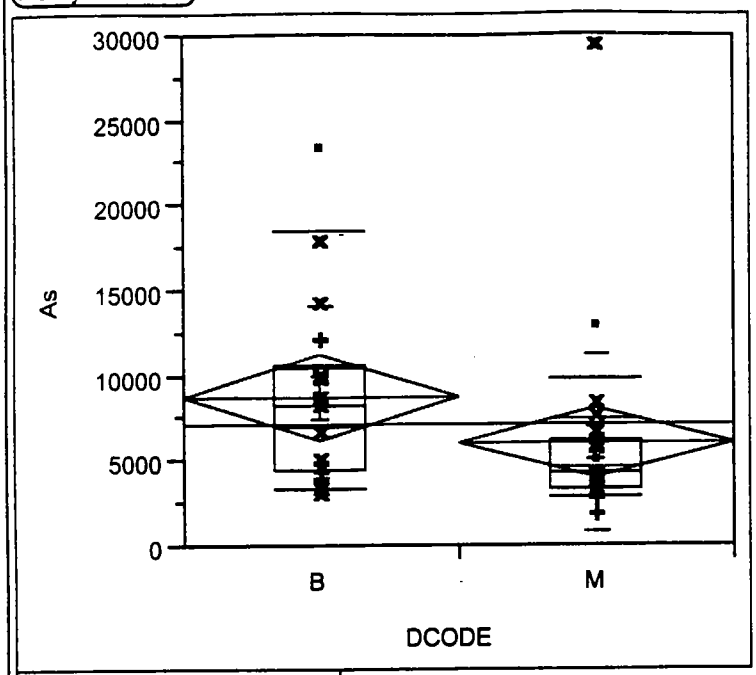
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 557 | 3.61842 | 0.0003 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.1795 | 1 | 0.0003 |

As By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 3100 | 3370 | 4550 | 8300 | 10625 | 18505 | 23500 |
| M | 2000 | 3000 | 3375 | 4400 | 6225 | 9850 | 29500 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 8847.22 | 5437.30 | 1281.6 |
| M | 26 | 6019.23 | 5299.89 | 1039.4 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 505 | 28.0556 | 2.376 |
| M | 26 | 485 | 18.6538 | -2.376 |

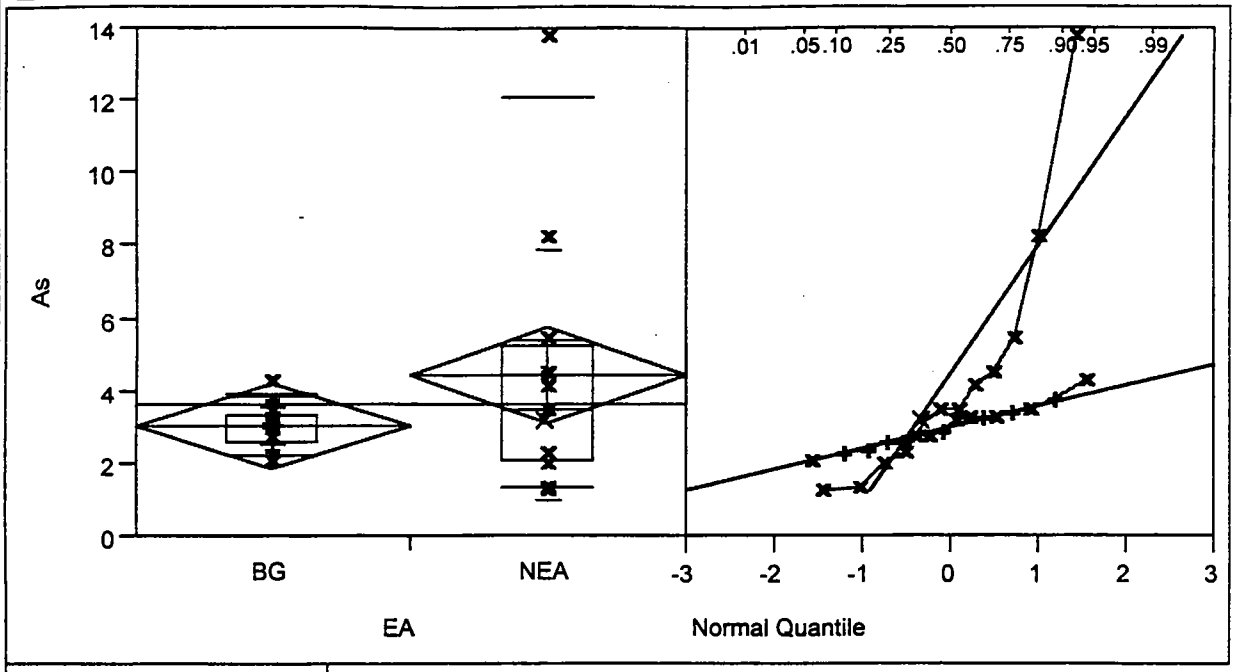
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 505 | 2.37587 | 0.0175 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.7016 | 1 | 0.0169 |

As By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 2.1 | 2.24 | 2.6 | 3.05 | 3.375 | 3.95 | 4.3 |
| NEA | 1.3 | 1.33 | 2.075 | 3.5 | 5.25 | 12.15 | 13.8 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 3.03750 | 0.58295 | 0.1457 |
| NEA | 12 | 4.45000 | 3.52768 | 1.0184 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 212.5 | 13.2813 | -0.883 |
| NEA | 12 | 193.5 | 16.1250 | 0.883 |

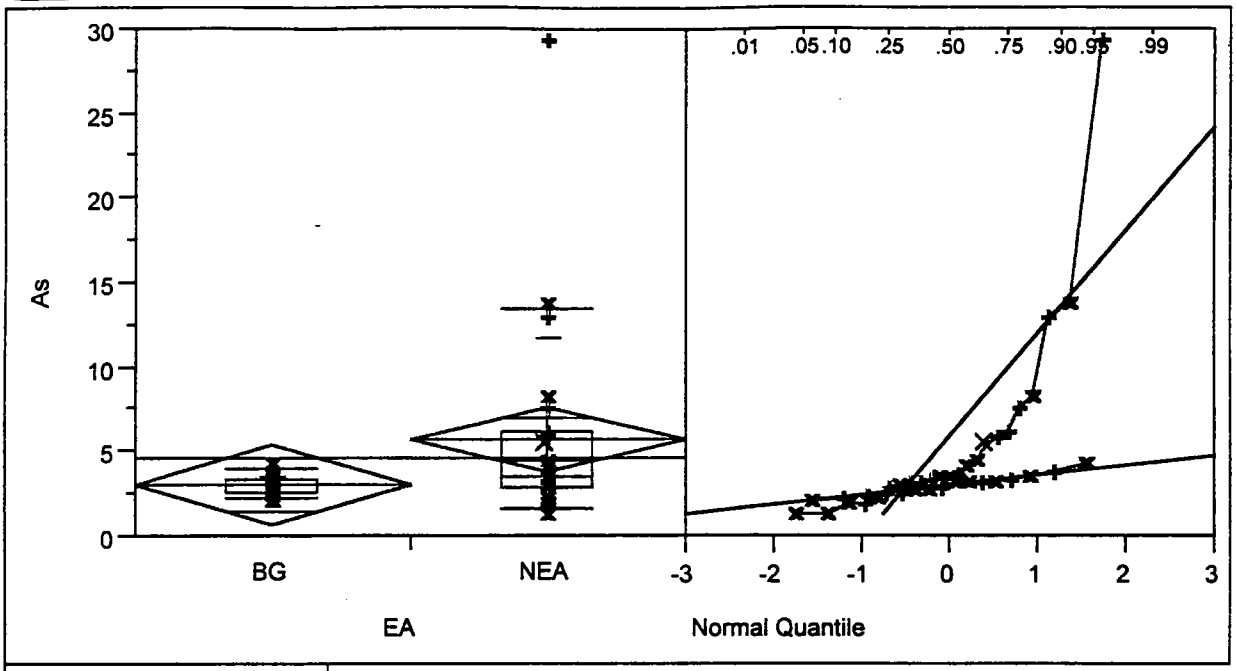
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 193.5 | 0.88338 | 0.3770 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.8220 | 1 | 0.3646 |

As By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 2.1 | 2.24 | 2.6 | 3.05 | 3.375 | 3.95 | 4.3 |
| NEA | 1.3 | 1.64 | 3 | 3.5 | 6.2 | 13.48 | 29.5 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 3.03750 | 0.58295 | 0.1457 |
| NEA | 23 | 5.83478 | 6.10935 | 1.2739 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 255 | 15.9375 | -1.843 |
| NEA | 23 | 525 | 22.8261 | 1.843 |

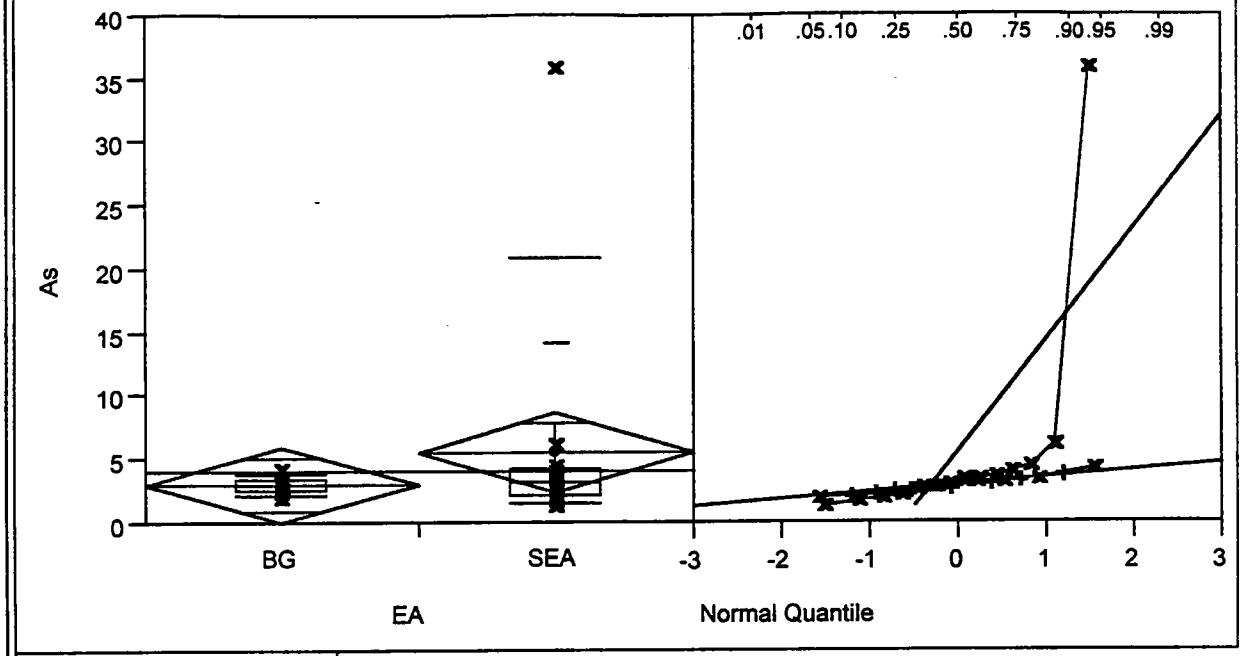
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 255 | -1.84347 | 0.0653 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.4513 | 1 | 0.0632 |

As By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 2.1 | 2.24 | 2.6 | 3.05 | 3.375 | 3.95 | 4.3 |
| SEA | 1.3 | 1.55 | 2.15 | 3.25 | 4.225 | 21.025 | 35.9 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 3.03750 | 0.58295 | 0.1457 |
| SEA | 14 | 5.51071 | 8.83494 | 2.3612 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 237 | 14.8125 | -0.437 |
| SEA | 14 | 228 | 16.2857 | 0.437 |

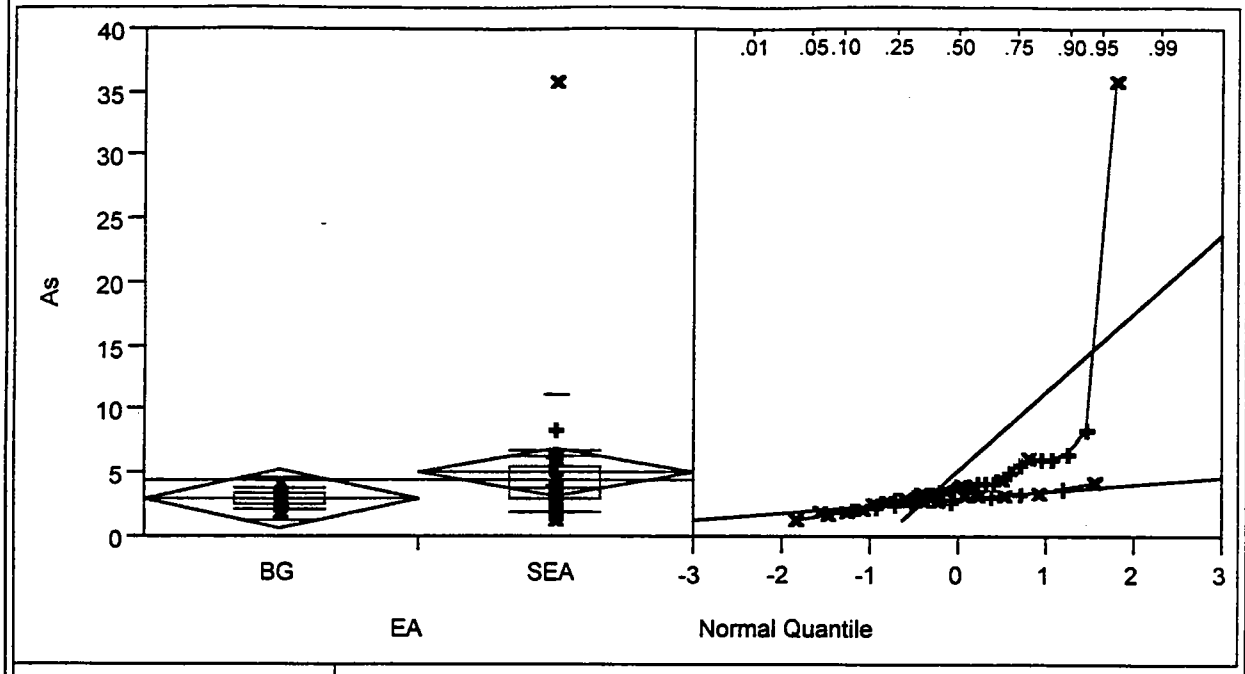
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 228 | 0.43703 | 0.6621 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.2096 | 1 | 0.6471 |

As By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 2.1 | 2.24 | 2.6 | 3.05 | 3.375 | 3.95 | 4.3 |
| SEA | 1.3 | 1.98 | 3.025 | 3.95 | 5.65 | 6.88 | 35.9 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 3.03750 | 0.58295 | 0.1457 |
| SEA | 28 | 5.24107 | 6.23056 | 1.1775 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 256 | 16.0000 | -2.527 |
| SEA | 28 | 734 | 26.2143 | 2.527 |

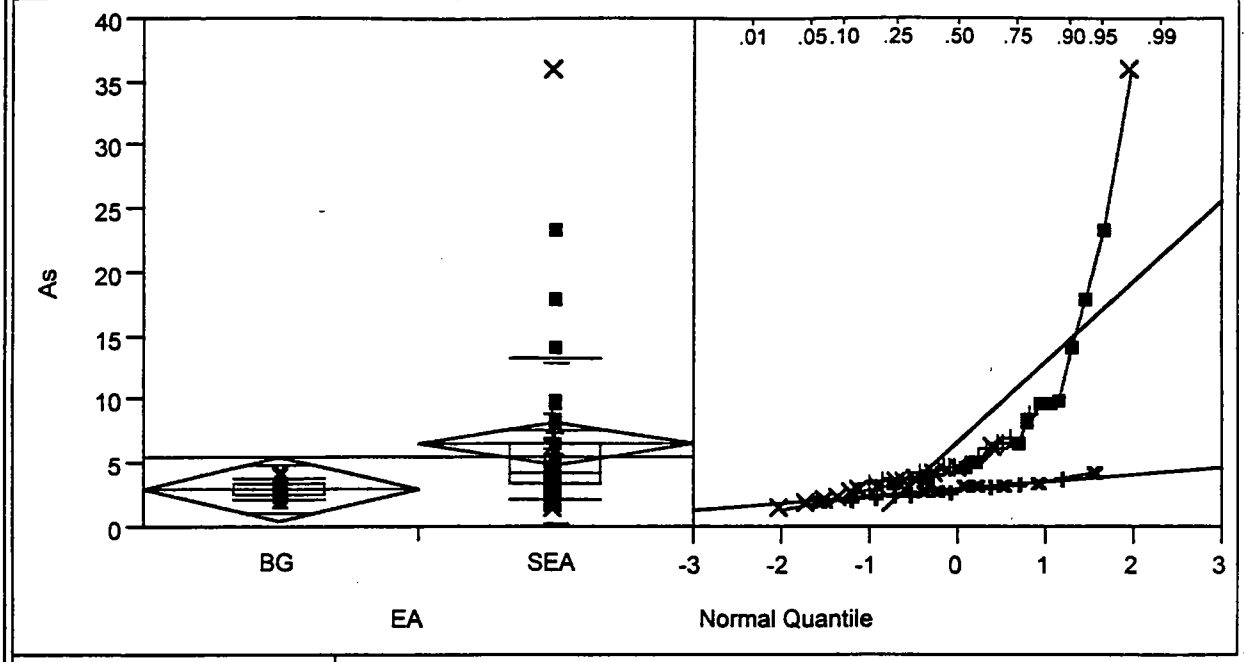
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 256 | -2.52719 | 0.0115 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.4485 | 1 | 0.0111 |

As By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 2.1 | 2.24 | 2.6 | 3.05 | 3.375 | 3.95 | 4.3 |
| SEA | 1.3 | 2.3 | 3.4 | 4.4 | 6.7 | 13.46 | 35.9 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 3.03750 | 0.58295 | 0.14574 |
| SEA | 41 | 6.57317 | 6.39475 | 0.99869 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 261 | 16.3125 | -3.598 |
| SEA | 41 | 1392 | 33.9512 | 3.598 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 261 | -3.59806 | 0.0003 |

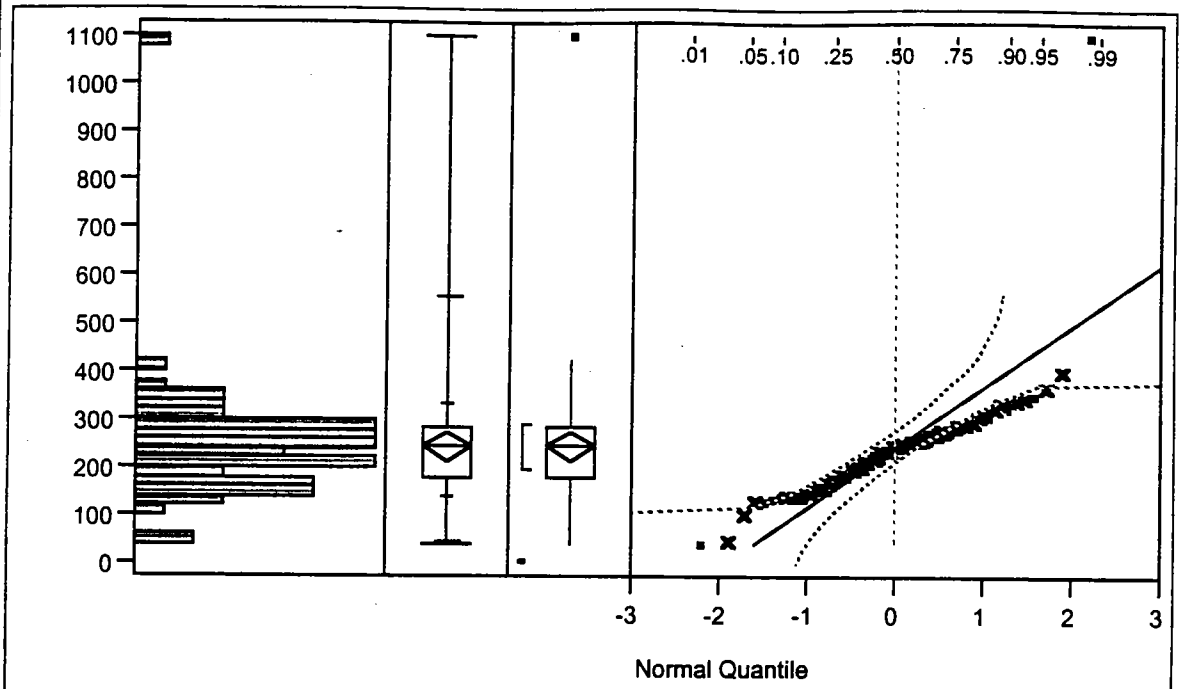
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.0100 | 1 | 0.0003 |

# TAB 3

# Barium

Ba




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 1100.0 |
| | 99.5% | 1100.0 |
| | 97.5% | 560.6 |
| | 90.0% | 334.9 |
| quartile | 75.0% | 285.5 |
| median | 50.0% | 246.0 |
| quartile | 25.0% | 178.0 |
| | 10.0% | 140.1 |
| | 2.5% | 44.5 |
| | 0.5% | 43.8 |
| minimum | 0.0% | 43.8 |

**Moments**

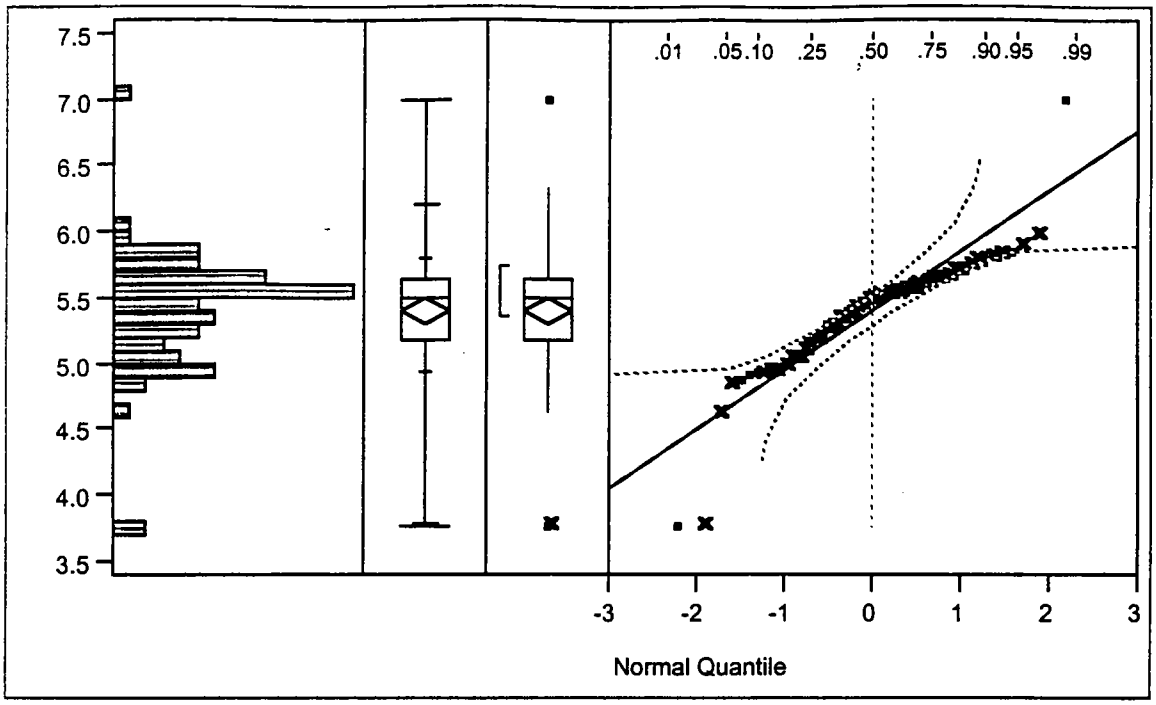
| | |
|---|---|
| Mean | 245.4429 |
| Std Dev | 127.3072 |
| Std Error Mean | 15.2161 |
| Upper 95% Mean | 275.7982 |
| Lower 95% Mean | 215.0875 |
| N | 70.0000 |
| Sum Weights | 70.0000 |
| Sum | 17181 |
| Variance | 16207.117 |
| Skewness | 4.3596 |
| Kurtosis | 29.3584 |
| CV | 51.8684 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.678161 | 0.0000 |

lnBa




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 7.0031 |
| | 99.5% | 7.0031 |
| | 97.5% | 6.2268 |
| | 90.0% | 5.8138 |
| quartile | 75.0% | 5.6542 |
| median | 50.0% | 5.5053 |
| quartile | 25.0% | 5.1818 |
| | 10.0% | 4.9424 |
| | 2.5% | 3.7954 |
| | 0.5% | 3.7796 |
| minimum | 0.0% | 3.7796 |

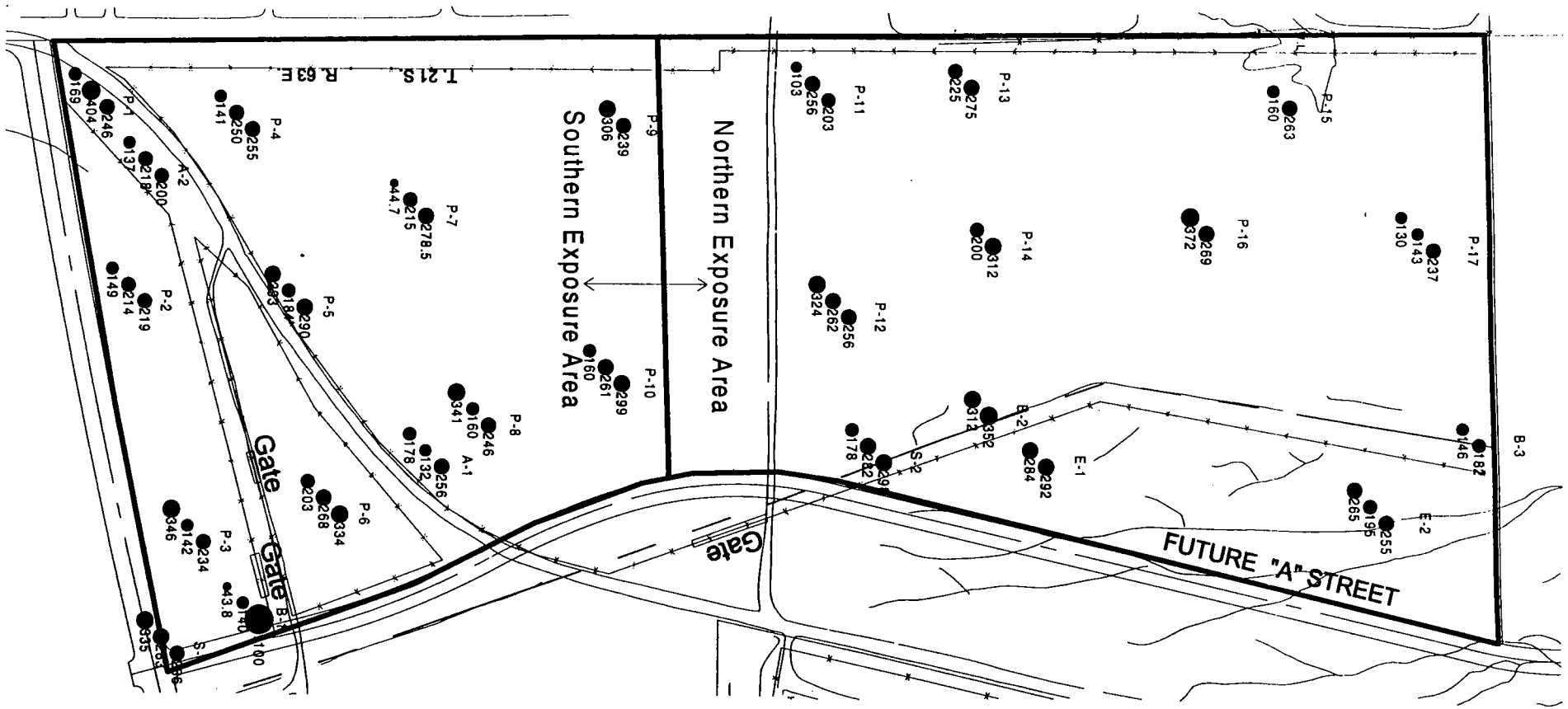
**Moments**

| | |
|---|---|
| Mean | 5.40734 |
| Std Dev | 0.44974 |
| Std Error Mean | 0.05375 |
| Upper 95% Mean | 5.51458 |
| Lower 95% Mean | 5.30010 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 378.51364 |
| Variance | 0.20227 |
| Skewness | -0.79845 |
| Kurtosis | 5.17317 |
| CV | 8.31727 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.895487 | <.0001 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

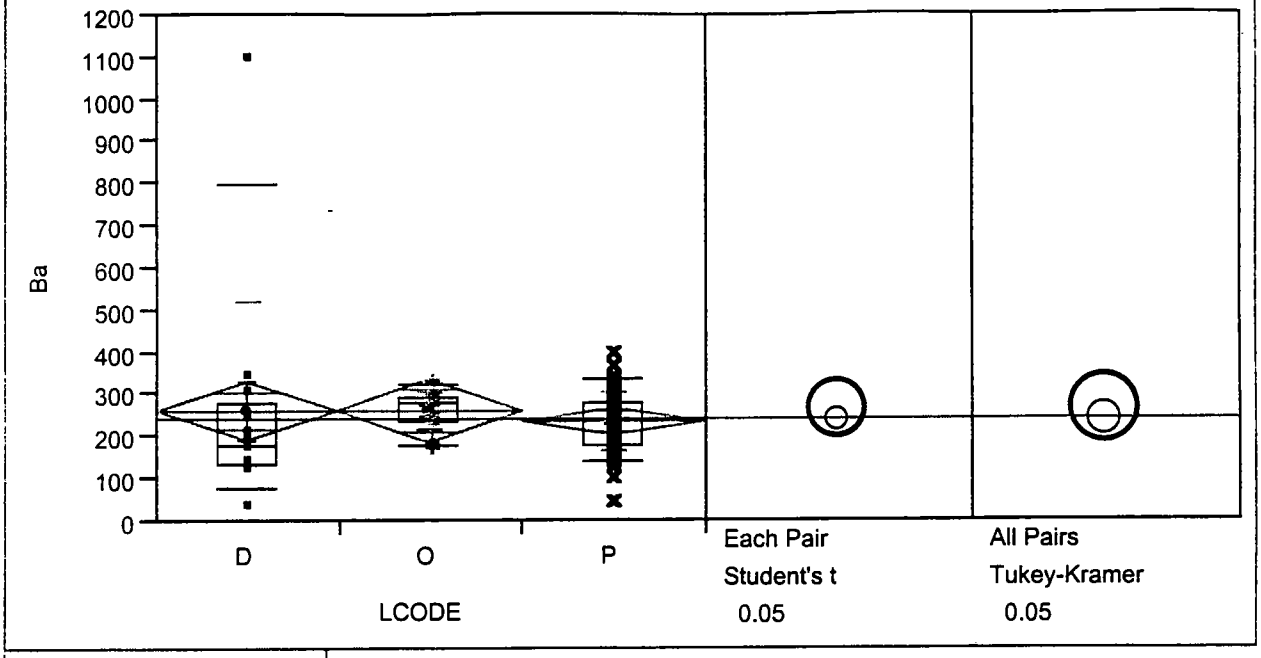
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

# ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Barium mg/kg**

Ba By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 43.8 | 79.08 | 138.5 | 182 | 284 | 800.8 | 1100 |
| O | 178 | 181.4 | 236 | 282 | 292 | 327.6 | 335 |
| P | 44.7 | 141.7 | 180.25 | 246 | 281.375 | 336.1 | 404 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.009529 |
| RSquare Adj | -0.02004 |
| Root Mean Square Error | 128.5763 |
| Mean of Response | 245.4429 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 10656.3 | 5328.1 | 0.3223 |
| Error | 67 | 1107634.8 | 16531.9 | Prob>F |
| C Total | 69 | 1118291.1 | 16207.1 | 0.7256 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 261.292 | 35.661 |
| O | 11 | 263.909 | 38.767 |
| P | 46 | 236.548 | 18.958 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 261.292 | 264.667 | 73.406 |
| O | 11 | 263.909 | 45.923 | 13.846 |
| P | 46 | 236.548 | 73.931 | 10.901 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | O | D | P |
|---|---|---|---|
| O | 0.0000 | 2.6168 | 27.3613 |
| D | -2.6168 | 0.0000 | 24.7445 |
| P | -27.3613 | -24.7445 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | D | P |
|---|---|---|---|
| O | -109.432 | -102.522 | -58.775 |
| D | -102.522 | -100.662 | -55.867 |
| P | -58.775 | -55.867 | -53.513 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | D | P |
|---|---|---|---|
| O | -131.410 | -123.638 | -76.075 |
| D | -123.638 | -120.879 | -72.058 |
| P | -76.075 | -72.058 | -64.261 |

Positive values show pairs of means that are significantly different.

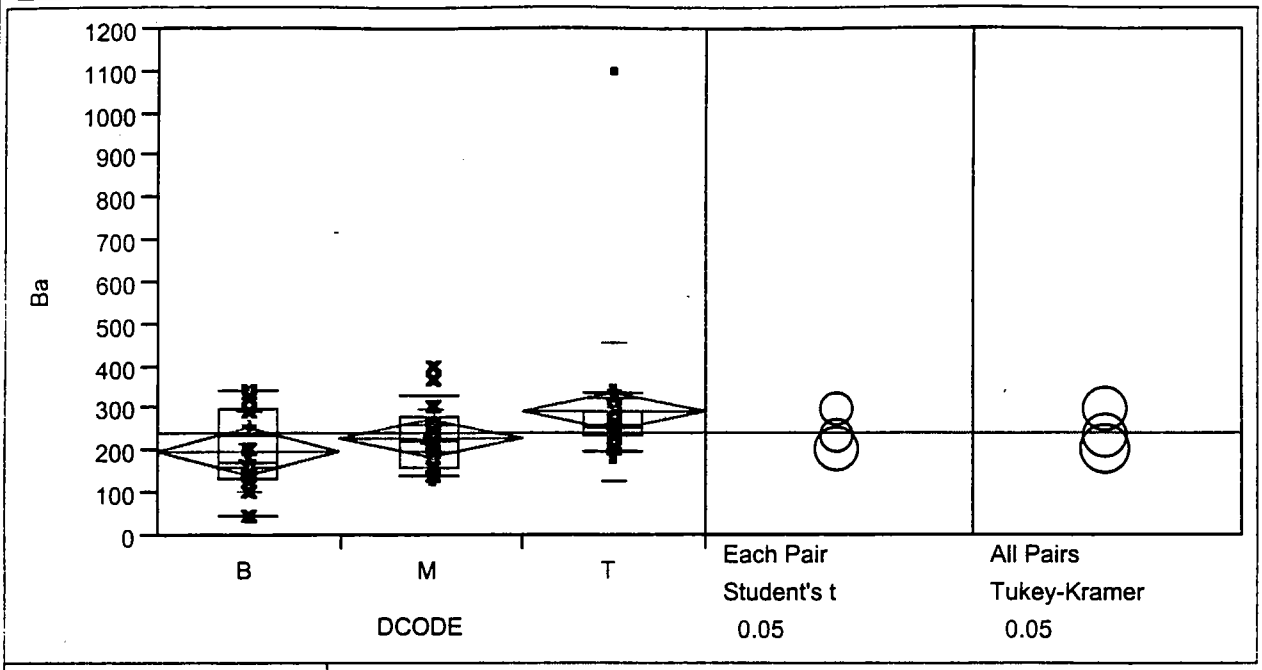
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 355.5 | 27.3462 | -1.594 |
| O | 11 | 487 | 44.2727 | 1.549 |
| P | 46 | 1642.5 | 35.7065 | 0.111 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.1366 | 2 | 0.1264 |

Ba By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 43.8 | 44.61 | 135.25 | 173.5 | 300.75 | 341.5 | 346 |
| M | 132 | 141.4 | 160 | 221.5 | 282.25 | 330 | 404 |
| T | 182 | 202.1 | 236.75 | 256 | 293.5 | 339.4 | 1100 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.096205 |
| RSquare Adj | 0.069226 |
| Root Mean Square Error | 122.8217 |
| Mean of Response | 245.4429 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 107585.2 | 53792.6 | 3.5659 |
| Error | 67 | 1010705.9 | 15085.2 | Prob>F |
| C Total | 69 | 1118291.1 | 16207.1 | 0.0338 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 196.694 | 28.949 |
| M | 26 | 231.308 | 24.087 |
| T | 26 | 293.327 | 24.087 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 196.694 | 98.186 | 23.143 |
| M | 26 | 231.308 | 72.275 | 14.174 |
| T | 26 | 293.327 | 169.260 | 33.195 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.0000 | 62.0192 | 96.6325 |
| M | -62.0192 | 0.0000 | 34.6132 |
| B | -96.6325 | -34.6132 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -67.9933 | -5.9741 | 21.4630 |
| M | -5.9741 | -67.9933 | -40.5562 |
| B | 21.4630 | -40.5562 | -81.7178 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -81.6491 | -19.6299 | 6.3660 |
| M | -19.6299 | -81.6491 | -55.6532 |
| B | 6.3660 | -55.6532 | -98.1300 |

Positive values show pairs of means that are significantly different.

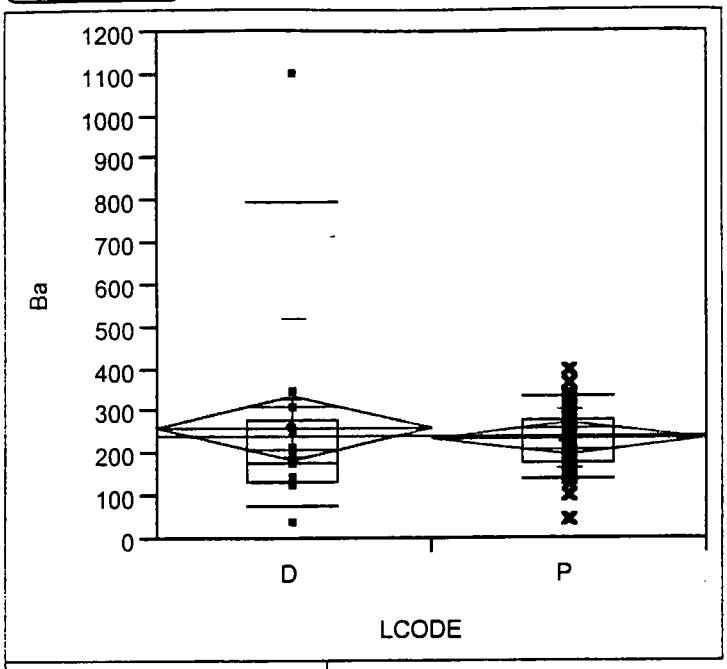
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 484.5 | 26.9167 | -2.070 |
| M | 26 | 869 | 33.4231 | -0.650 |
| T | 26 | 1131.5 | 43.5192 | 2.529 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 7.5116 | 2 | 0.0234 |

Ba By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 43.8 | 79.08 | 138.5 | 182 | 284 | 800.8 | 1100 |
| P | 44.7 | 141.7 | 180.25 | 246 | 281.375 | 336.1 | 404 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 261.292 | 264.667 | 73.406 |
| P | 46 | 236.548 | 73.931 | 10.901 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 314 | 24.1538 | -1.381 |
| P | 46 | 1456 | 31.6522 | 1.381 |

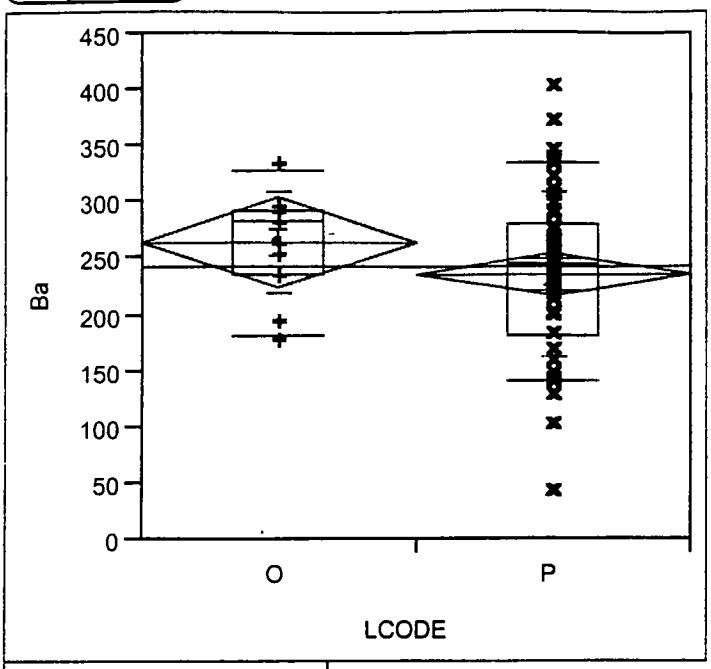
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 314 | -1.38098 | 0.1673 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.9325 | 1 | 0.1645 |

Ba By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 178 | 181.4 | 236 | 282 | 292 | 327.6 | 335 |
| P | 44.7 | 141.7 | 180.25 | 246 | 281.375 | 336.1 | 404 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 263.909 | 45.9227 | 13.846 |
| P | 46 | 236.548 | 73.9309 | 10.901 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 385.5 | 35.0455 | 1.335 |
| P | 46 | 1267.5 | 27.5543 | -1.335 |

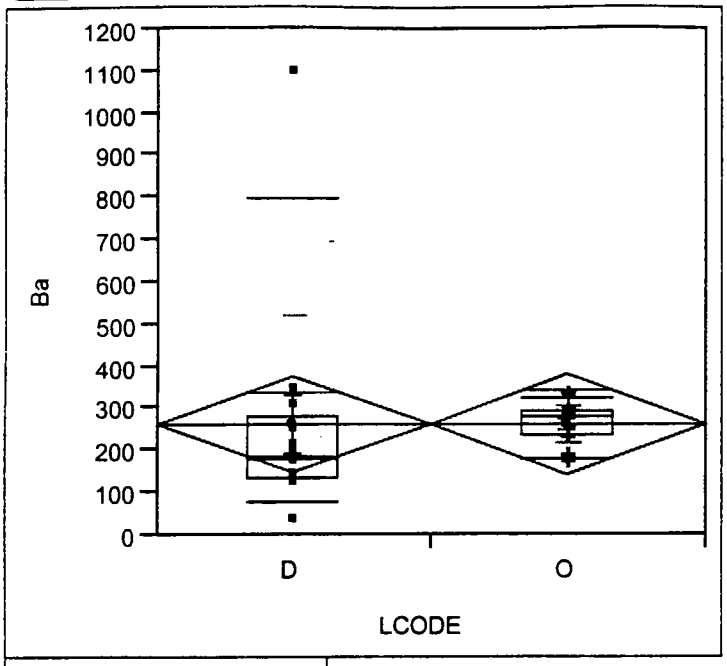
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 385.5 | 1.33476 | 0.1820 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.8087 | 1 | 0.1787 |

Ba By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 43.8 | 79.08 | 138.5 | 182 | 284 | 800.8 | 1100 |
| O | 178 | 181.4 | 236 | 282 | 292 | 327.6 | 335 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 261.292 | 264.667 | 73.406 |
| O | 11 | 263.909 | 45.923 | 13.846 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 132.5 | 10.1923 | -1.709 |
| O | 11 | 167.5 | 15.2273 | 1.709 |

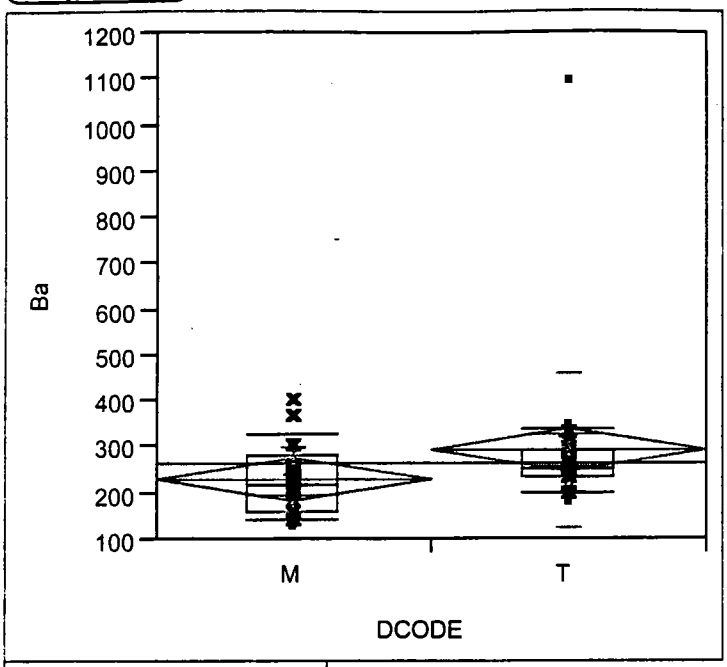
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 167.5 | 1.70950 | 0.0874 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.0223 | 1 | 0.0821 |

Ba By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 132 | 141.4 | 160 | 221.5 | 282.25 | 330 | 404 |
| T | 182 | 202.1 | 236.75 | 256 | 293.5 | 339.4 | 1100 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 231.308 | 72.275 | 14.174 |
| T | 26 | 293.327 | 169.260 | 33.195 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 582 | 22.3846 | -1.949 |
| T | 26 | 796 | 30.6154 | 1.949 |

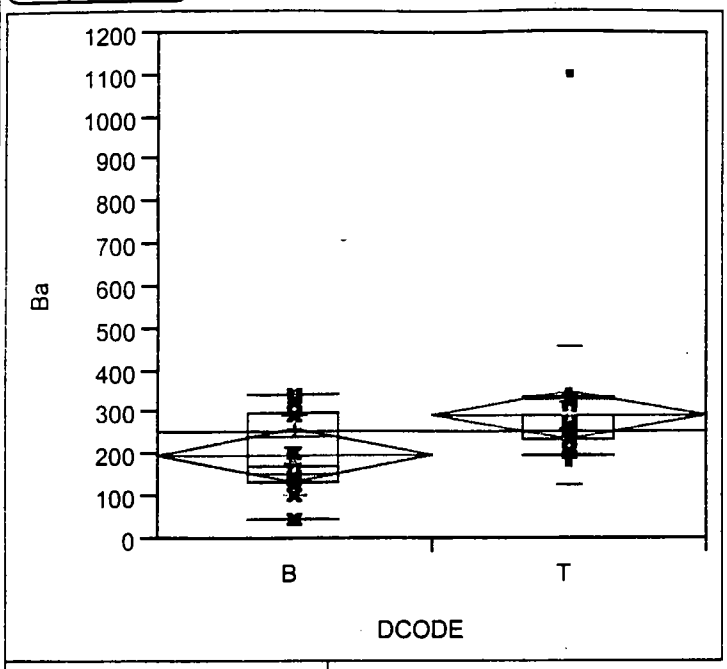
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 796 | 1.94945 | 0.0512 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.8361 | 1 | 0.0502 |

Ba By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 43.8 | 44.61 | 135.25 | 173.5 | 300.75 | 341.5 | 346 |
| T | 182 | 202.1 | 236.75 | 256 | 293.5 | 339.4 | 1100 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 196.694 | 98.186 | 23.143 |
| T | 26 | 293.327 | 169.260 | 33.195 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 303.5 | 16.8611 | -2.411 |
| T | 26 | 686.5 | 26.4038 | 2.411 |

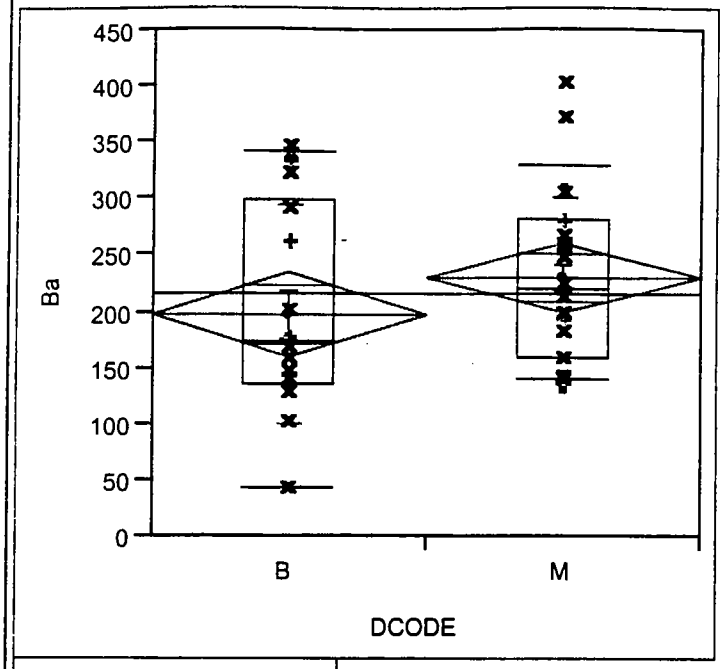
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 303.5 | -2.41134 | 0.0159 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.8723 | 1 | 0.0154 |

Ba By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 43.8 | 44.61 | 135.25 | 173.5 | 300.75 | 341.5 | 346 |
| M | 132 | 141.4 | 160 | 221.5 | 282.25 | 330 | 404 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 196.694 | 98.1865 | 23.143 |
| M | 26 | 231.308 | 72.2755 | 14.174 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 352 | 19.5556 | -1.253 |
| M | 26 | 638 | 24.5385 | 1.253 |

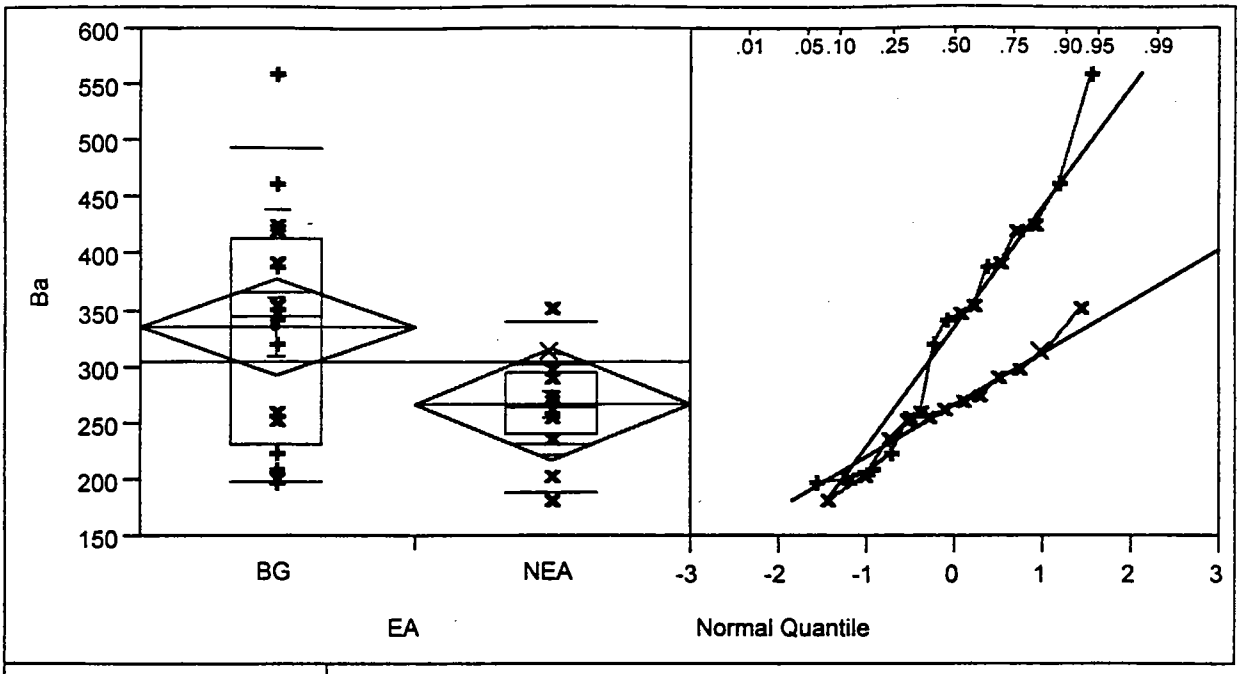
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 352 | -1.25342 | 0.2101 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.6011 | 1 | 0.2057 |

Ba By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 198 | 199.4 | 232 | 345 | 414.75 | 493.8 | 561 |
| NEA | 182 | 188.3 | 241.5 | 266 | 296.5 | 340 | 352 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 335.688 | 105.791 | 26.448 |
| NEA | 12 | 266.167 | 46.120 | 13.314 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 267 | 16.6875 | 1.602 |
| NEA | 12 | 139 | 11.5833 | -1.602 |

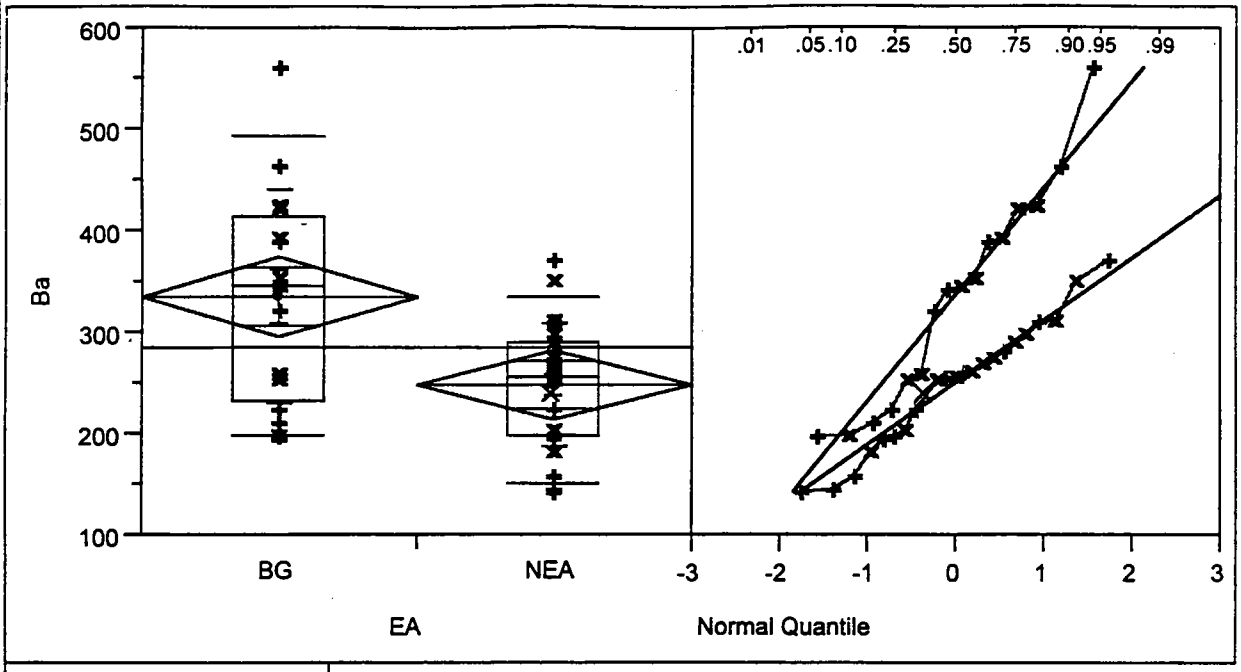
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 139 | -1.60162 | 0.1092 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.6401 | 1 | 0.1042 |

Ba By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 198 | 199.4 | 232 | 345 | 414.75 | 493.8 | 561 |
| NEA | 143 | 151.6 | 200 | 256 | 292 | 336 | 372 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 335.688 | 105.791 | 26.448 |
| NEA | 23 | 249.957 | 61.464 | 12.816 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 405 | 25.3125 | 2.413 |
| NEA | 23 | 375 | 16.3043 | -2.413 |

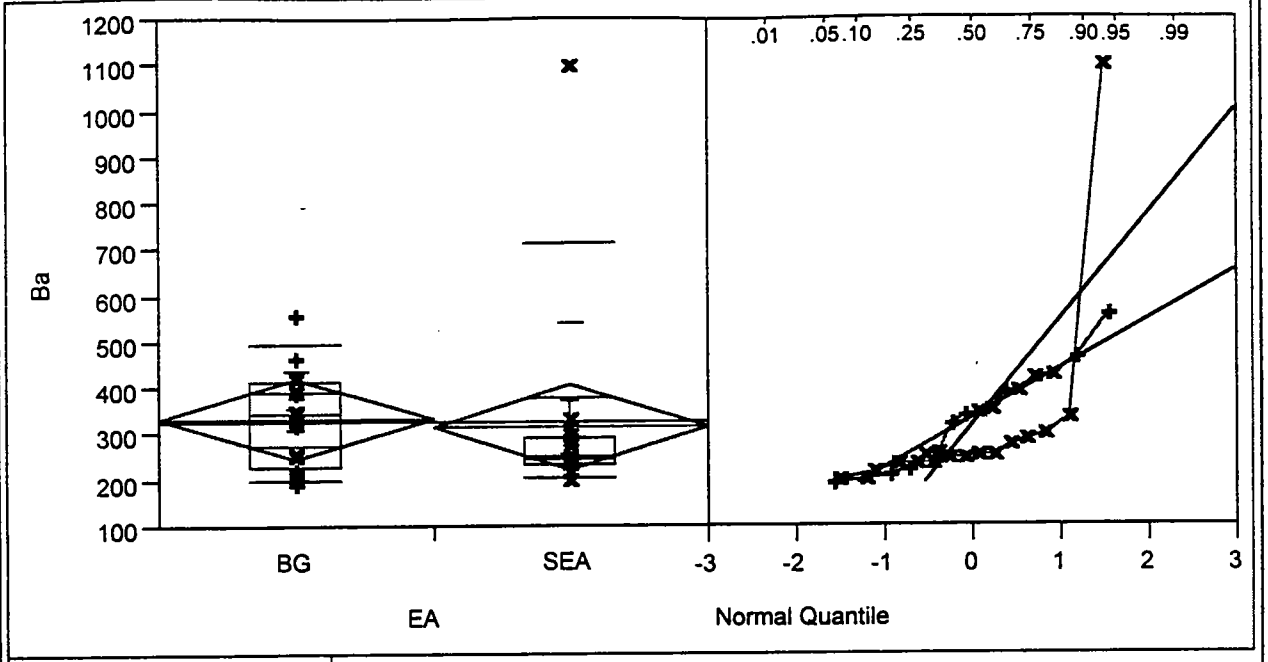
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 405 | 2.41313 | 0.0158 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.8923 | 1 | 0.0152 |

Ba By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 198 | 199.4 | 232 | 345 | 414.75 | 493.8 | 561 |
| SEA | 200 | 209.5 | 235.5 | 250.5 | 292.25 | 717 | 1100 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 335.688 | 105.791 | 26.448 |
| SEA | 14 | 316.607 | 228.100 | 60.962 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 284.5 | 17.7813 | 1.497 |
| SEA | 14 | 180.5 | 12.8929 | -1.497 |

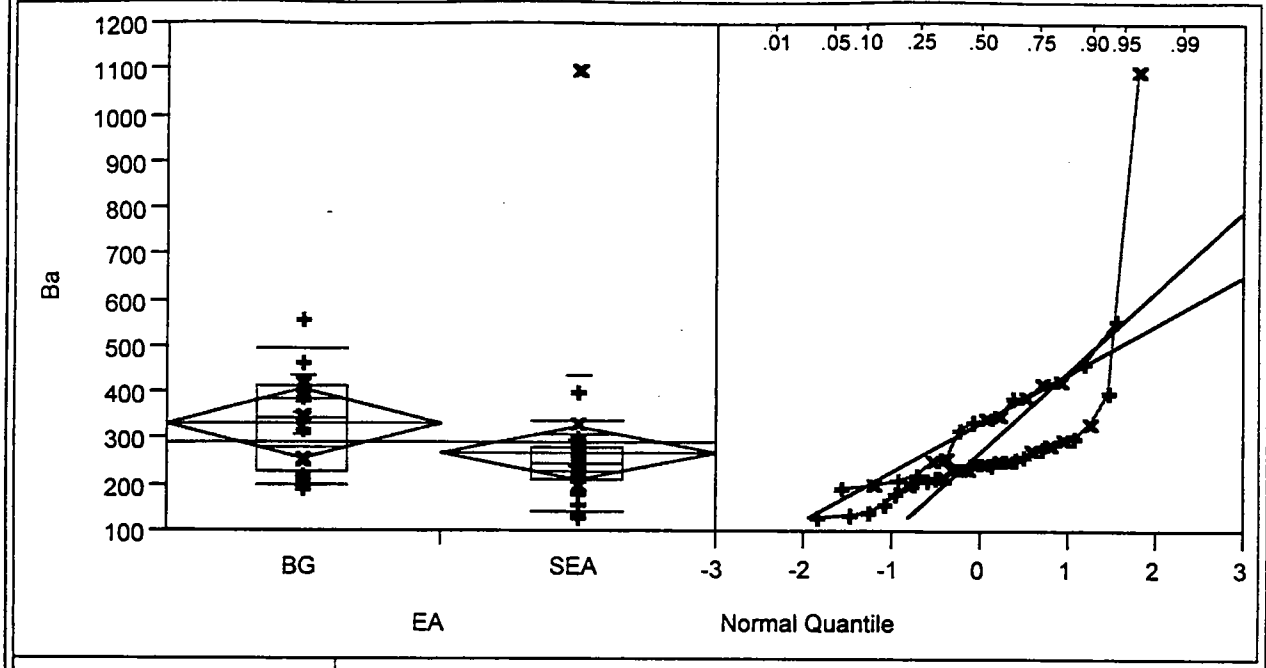
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 180.5 | -1.49687 | 0.1344 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.3033 | 1 | 0.1291 |

Ba By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 198 | 199.4 | 232 | 345 | 414.75 | 493.8 | 561 |
| SEA | 132 | 141.8 | 214.25 | 246 | 281.875 | 341 | 1100 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 335.688 | 105.791 | 26.448 |
| SEA | 28 | 271.768 | 172.917 | 32.678 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 459.5 | 28.7188 | 2.416 |
| SEA | 28 | 530.5 | 18.9464 | -2.416 |

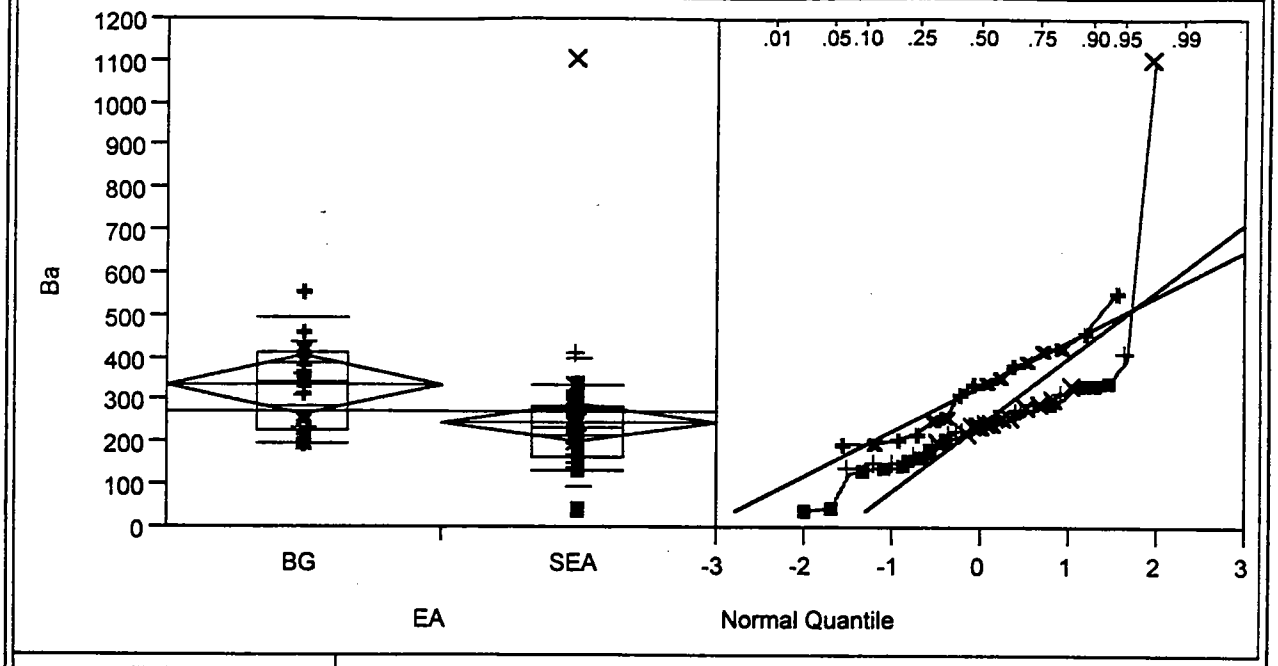
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 459.5 | 2.41552 | 0.0157 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.8938 | 1 | 0.0152 |

Ba By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 198 | 199.4 | 232 | 345 | 414.75 | 493.8 | 561 |
| SEA | 43.8 | 137.6 | 164.5 | 236 | 286.5 | 339.8 | 1100 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 335.688 | 105.791 | 26.448 |
| SEA | 41 | 247.561 | 157.200 | 24.550 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 637.5 | 39.8438 | 3.073 |
| SEA | 41 | 1015.5 | 24.7683 | -3.073 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 637.5 | 3.07250 | 0.0021 |

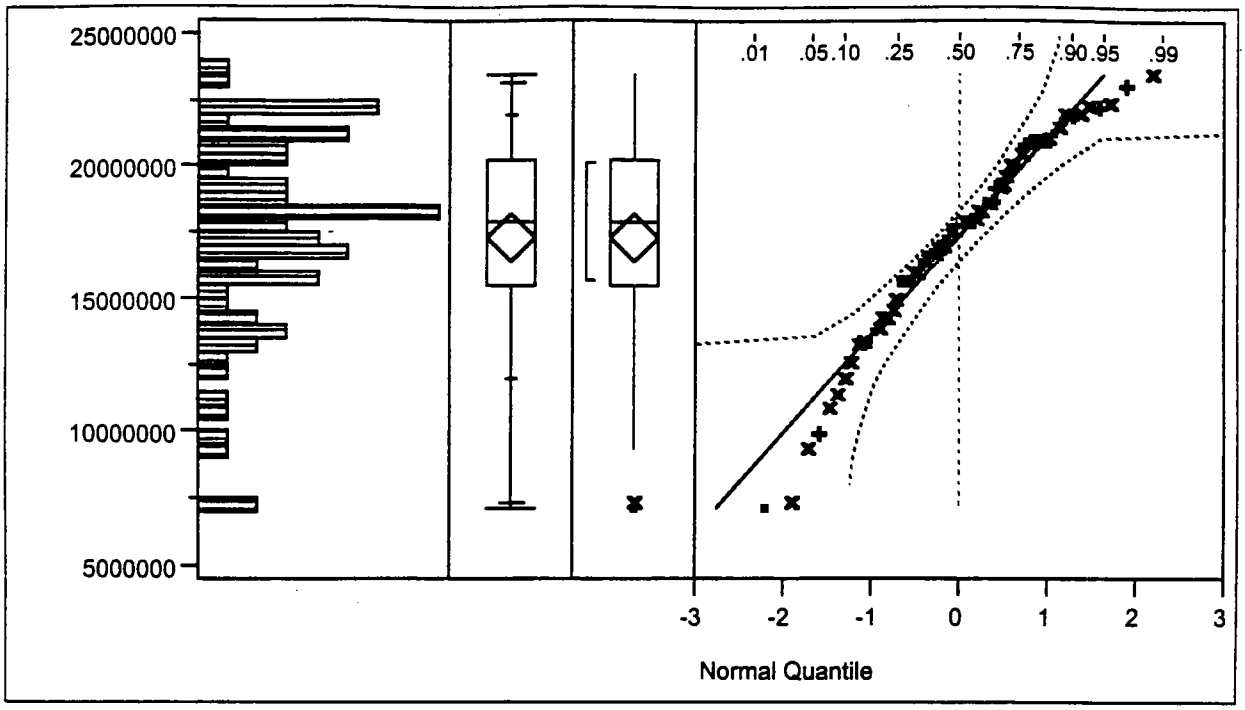
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 9.4949 | 1 | 0.0021 |

# TAB 4

# Iron

Fe




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 2.35e+7 |
| | 99.5% | 2.35e+7 |
| | 97.5% | 2.319e7 |
| | 90.0% | 2.2e+7 |
| quartile | 75.0% | 2.028e7 |
| median | 50.0% | 1.795e7 |
| quartile | 25.0% | 1.56e+7 |
| | 10.0% | 1.206e7 |
| | 2.5% | 7327250 |
| | 0.5% | 7180000 |
| minimum | 0.0% | 7180000 |

**Moments**

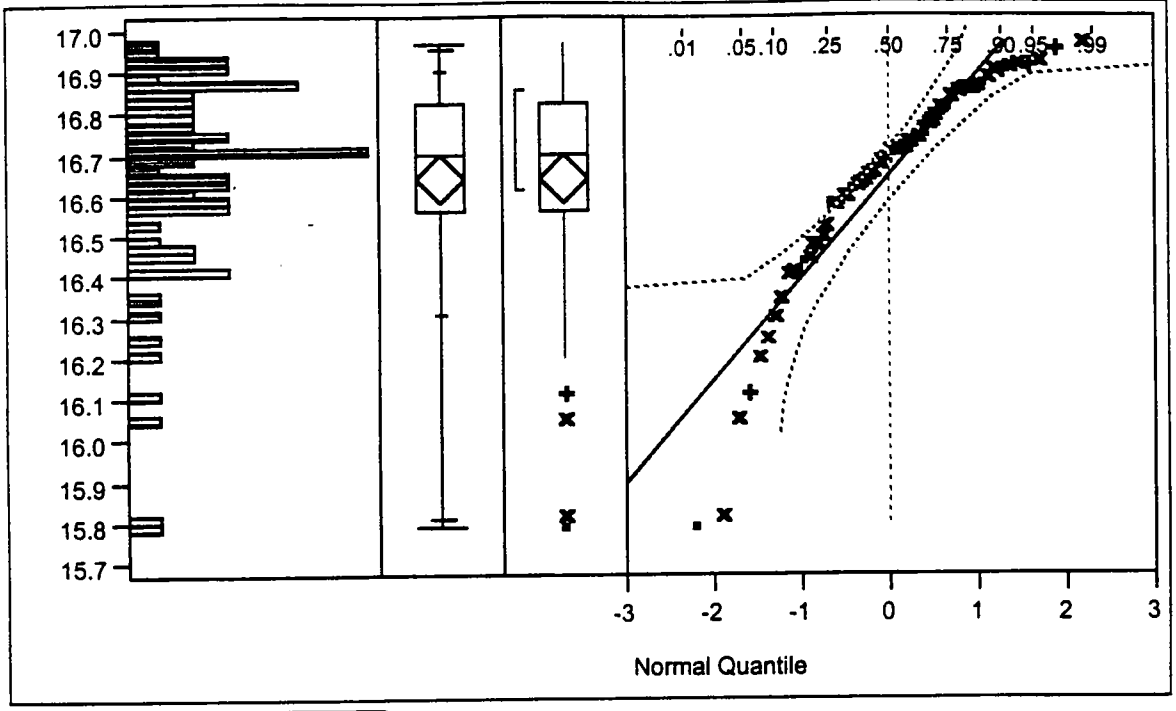
| | |
|---|---|
| Mean | 17363929 |
| Std Dev | 3714209 |
| Std Error Mean | 443933 |
| Upper 95% Mean | 18249552 |
| Lower 95% Mean | 16478305 |
| N | 70 |
| Sum Weights | 70 |
| Sum | 1.21548e9 |
| Variance | 1.3795e13 |
| Skewness | -1 |
| Kurtosis | 0 |
| CV | 21 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.948334 | 0.0133 |

lnFe




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 16.973 |
| | 99.5% | 16.973 |
| | 97.5% | 16.959 |
| | 90.0% | 16.907 |
| quartile | 75.0% | 16.825 |
| median | 50.0% | 16.703 |
| quartile | 25.0% | 16.563 |
| | 10.0% | 16.305 |
| | 2.5% | 15.807 |
| | 0.5% | 15.787 |
| minimum | 0.0% | 15.787 |

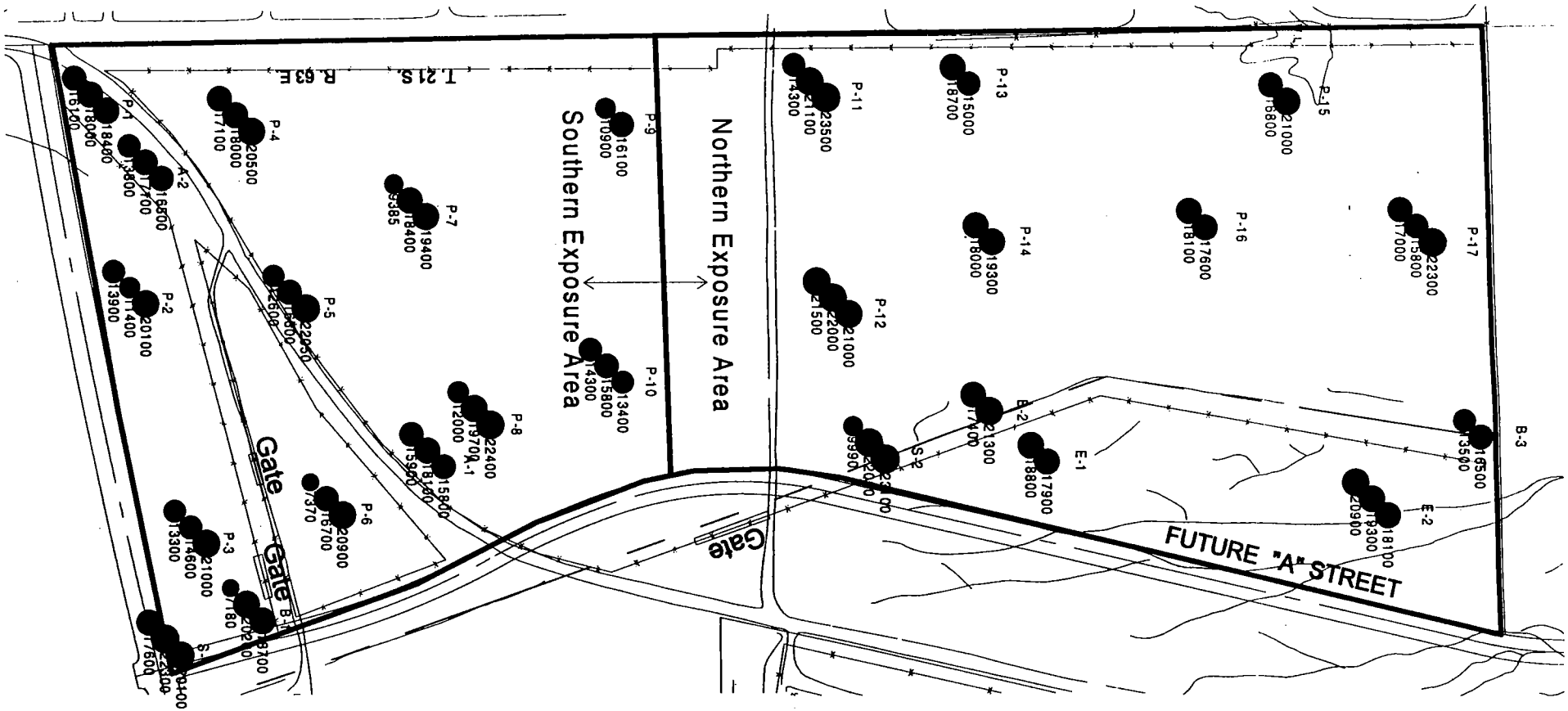
**Moments**

| | |
|---|---|
| Mean | 16.64259 |
| Std Dev | 0.24905 |
| Std Error Mean | 0.02977 |
| Upper 95% Mean | 16.70197 |
| Lower 95% Mean | 16.58320 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 1164.981 |
| Variance | 0.06203 |
| Skewness | -1.45782 |
| Kurtosis | 2.54508 |
| CV | 1.49646 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.878299 | <.0001 |




**Approximate Scale**

1 Inch = 265 Feet

N

**LEGEND**

Surface ( 0-1 foot ) Sampling Interval

Intermediate Sampling Interval

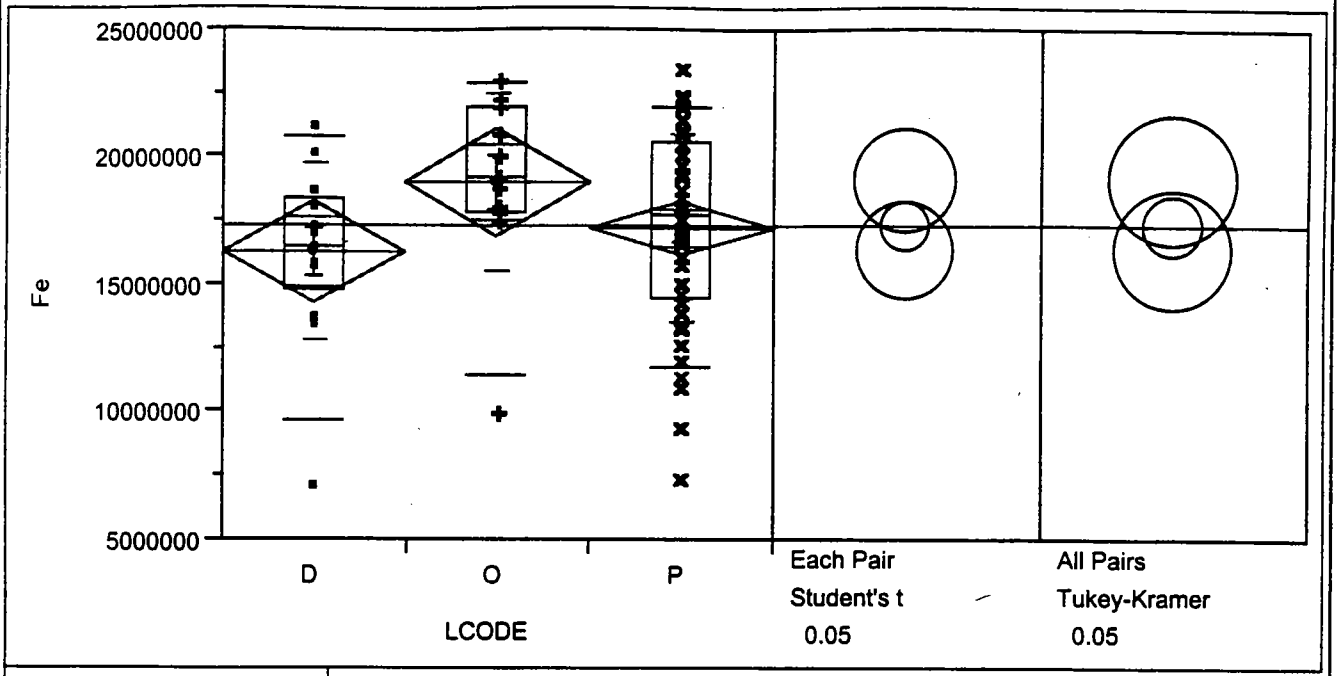
Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

Data from May 2001
Soil Sampling Event
Concentrations of Iron mg/kg

Fe By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7180000 | 9708000 | 14800000 | 16500000 | 18400000 | 20860000 | 21300000 |
| O | 9990000 | 11512000 | 17900000 | 19300000 | 22000000 | 22940000 | 23100000 |
| P | 7370000 | 11820000 | 14525000 | 17800000 | 20600000 | 22015000 | 23500000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.050724 |
| RSquare Adj | 0.022387 |
| Root Mean Square Error | 3672398 |
| Mean of Response | 17363929 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 4.82831e13 | 2.414e13 | 1.7901 |
| Error | 67 | 9.03596e14 | 1.349e13 | Prob>F |
| C Total | 69 | 9.51879e14 | 1.38e+13 | 0.1748 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 16306154 | 1018540 |
| O | 11 | 19099091 | 1107270 |
| P | 46 | 17247935 | 541466 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 16306154 | 3521528 | 976696 |
| O | 11 | 19099091 | 3559524 | 1073237 |
| P | 46 | 17247935 | 3735951 | 550836 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | P | D |
|---|---|---|---|
| O | 0 | 1851156 | 2792937 |
| P | -1851156 | 0 | 941781 |
| D | -2792937 | -941781 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -3125586 | -609070 | -210029 |
| P | -609070 | -1528442 | -1360658 |
| D | -210029 | -1360658 | -2875121 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -3753328 | -1103181 | -813144 |
| P | -1103181 | -1835414 | -1823080 |
| D | -813144 | -1823080 | -3452560 |

Positive values show pairs of means that are significantly different.

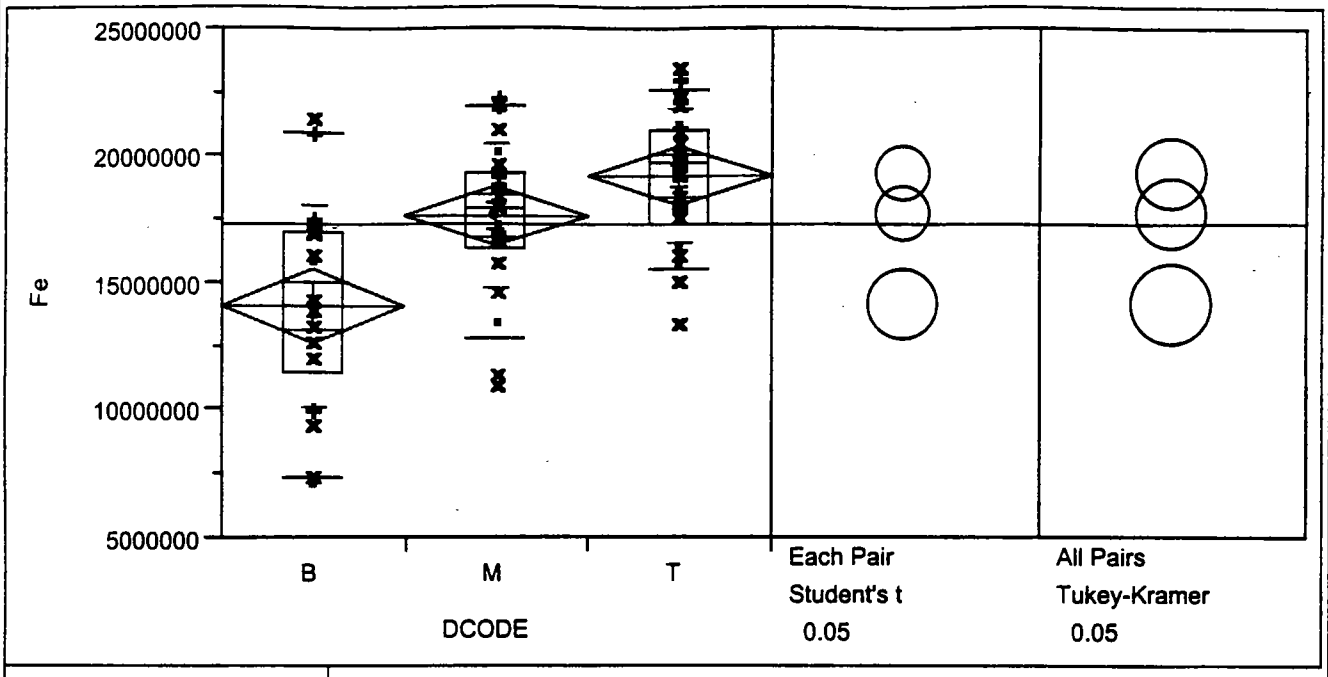
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 374 | 28.7692 | -1.314 |
| O | 11 | 512 | 46.5455 | 1.953 |
| P | 46 | 1599 | 34.7609 | -0.415 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.7253 | 2 | 0.0942 |

Fe By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 7180000 | 7351000 | 11497500 | 14100000 | 17025000 | 20960000 | 21500000 |
| M | 10900000 | 12870000 | 16400000 | 18000000 | 19400000 | 22000000 | 22300000 |
| T | 13400000 | 15560000 | 17325000 | 19750000 | 21075000 | 22610000 | 23500000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.304026 |
| RSquare Adj | 0.283251 |
| Root Mean Square Error | 3144488 |
| Mean of Response | 17363929 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 2.89396e14 | 1.447e14 | 14.6340 |
| Error | 67 | 6.62483e14 | 9.888e12 | Prob>F |
| C Total | 69 | 9.51879e14 | 1.38e+13 | <.0001 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 14123611 | 741163 |
| M | 26 | 17665385 | 616685 |
| T | 26 | 19305769 | 616685 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 14123611 | 4041713 | 952641 |
| M | 26 | 17665385 | 2895782 | 567910 |
| T | 26 | 19305769 | 2646822 | 519084 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0 | 1640385 | 5182158 |
| M | -1640385 | 0 | 3541774 |
| B | -5182158 | -3541774 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -1740770 | -100385 | 3257665 |
| M | -100385 | -1740770 | 1617280 |
| B | 3257665 | 1617280 | -2092145 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -2090386 | -450001 | 2871149 |
| M | -450001 | -2090386 | 1230765 |
| B | 2871149 | 1230765 | -2512331 |

Positive values show pairs of means that are significantly different.

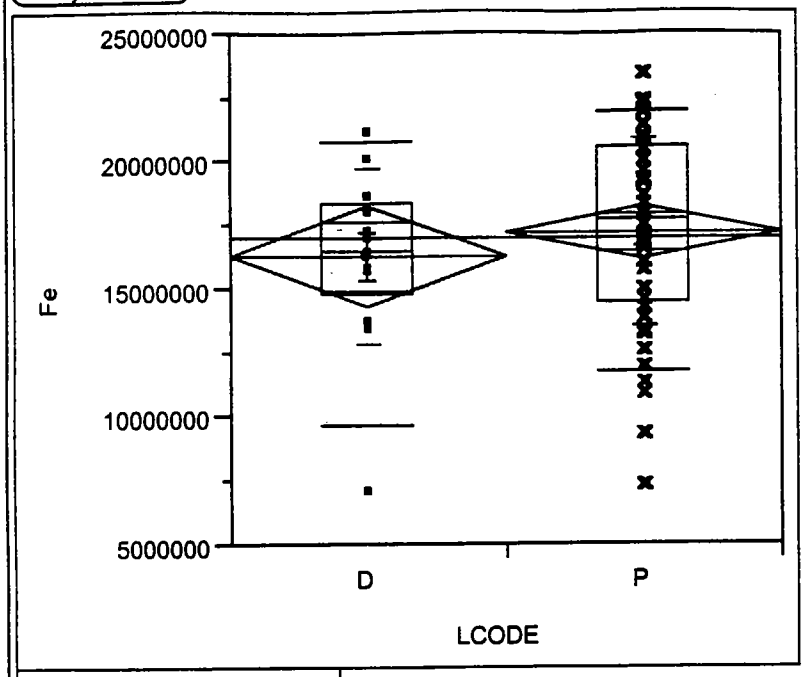
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 342 | 19.0000 | -3.985 |
| M | 26 | 947.5 | 36.4423 | 0.292 |
| T | 26 | 1195.5 | 45.9808 | 3.307 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 18.7929 | 2 | <.0001 |

Fe By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7180000 | 9708000 | 14800000 | 16500000 | 18400000 | 20860000 | 21300000 |
| P | 7370000 | 11820000 | 14525000 | 17800000 | 20600000 | 22015000 | 23500000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 16306154 | 3521528 | 976696 |
| P | 46 | 17247935 | 3735951 | 550836 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 343.5 | 26.4231 | -0.841 |
| P | 46 | 1426.5 | 31.0109 | 0.841 |

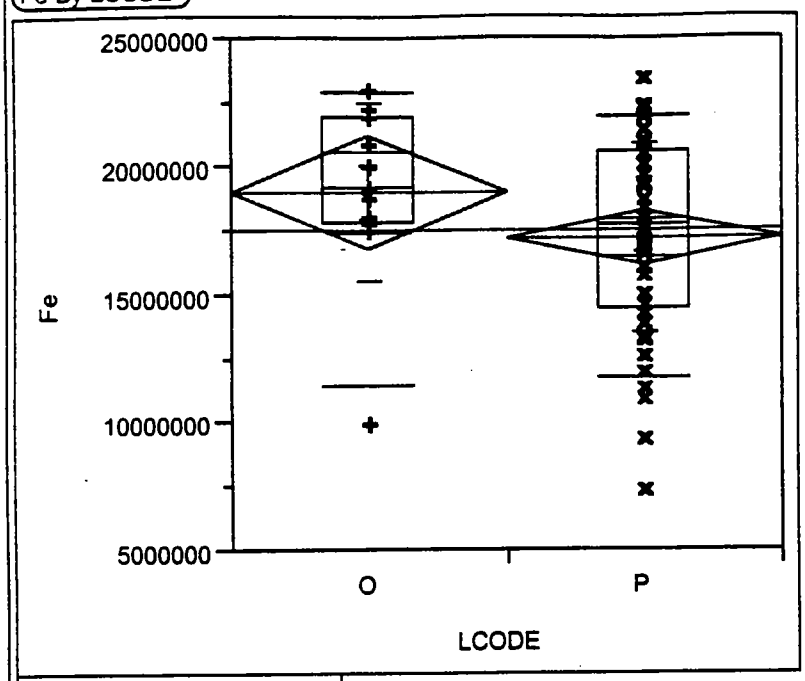
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 343.5 | -0.84148 | 0.4001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.7236 | 1 | 0.3950 |

Fe By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 9990000 | 11512000 | 17900000 | 19300000 | 22000000 | 22940000 | 23100000 |
| P | 7370000 | 11820000 | 14525000 | 17800000 | 20600000 | 22015000 | 23500000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 19099091 | 3559524 | 1073237 |
| P | 46 | 17247935 | 3735951 | 550836 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 399.5 | 36.3182 | 1.618 |
| P | 46 | 1253.5 | 27.2500 | -1.618 |

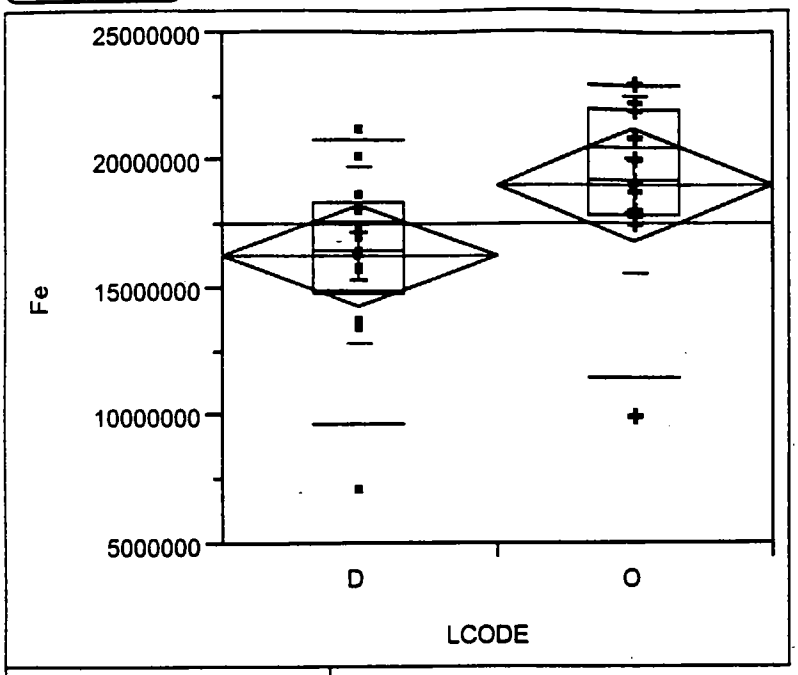
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 399.5 | 1.61817 | 0.1056 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.6513 | 1 | 0.1035 |

Fe By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 7180000 | 9708000 | 14800000 | 16500000 | 18400000 | 20860000 | 21300000 |
| O | 9990000 | 11512000 | 17900000 | 19300000 | 22000000 | 22940000 | 23100000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 16306154 | 3521528 | 976696 |
| O | 11 | 19099091 | 3559524 | 1073237 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 121.5 | 9.3462 | -2.347 |
| O | 11 | 178.5 | 16.2273 | 2.347 |

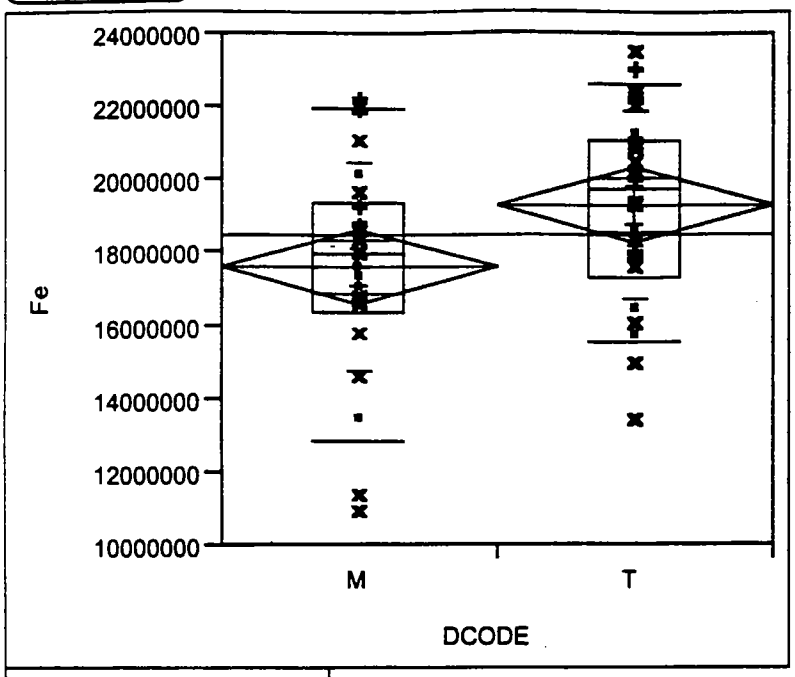
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 178.5 | 2.34745 | 0.0189 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.6474 | 1 | 0.0175 |

Fe By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 10900000 | 12870000 | 16400000 | 18000000 | 19400000 | 22000000 | 22300000 |
| T | 13400000 | 15560000 | 17325000 | 19750000 | 21075000 | 22610000 | 23500000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 17665385 | 2895782 | 567910 |
| T | 26 | 19305769 | 2646822 | 519084 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 584 | 22.4615 | -1.913 |
| T | 26 | 794 | 30.5385 | 1.913 |

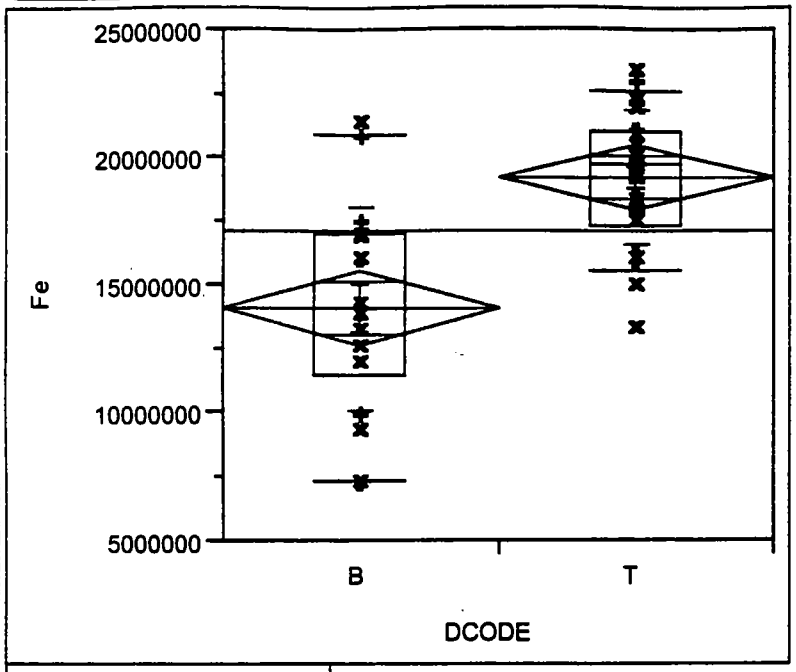
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 794 | 1.91341 | 0.0557 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.6963 | 1 | 0.0545 |

Fe By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 7180000 | 7351000 | 11497500 | 14100000 | 17025000 | 20960000 | 21500000 |
| T | 13400000 | 15560000 | 17325000 | 19750000 | 21075000 | 22610000 | 23500000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 14123611 | 4041713 | 952641 |
| T | 26 | 19305769 | 2646822 | 519084 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 237.5 | 13.1944 | -3.988 |
| T | 26 | 752.5 | 28.9423 | 3.988 |

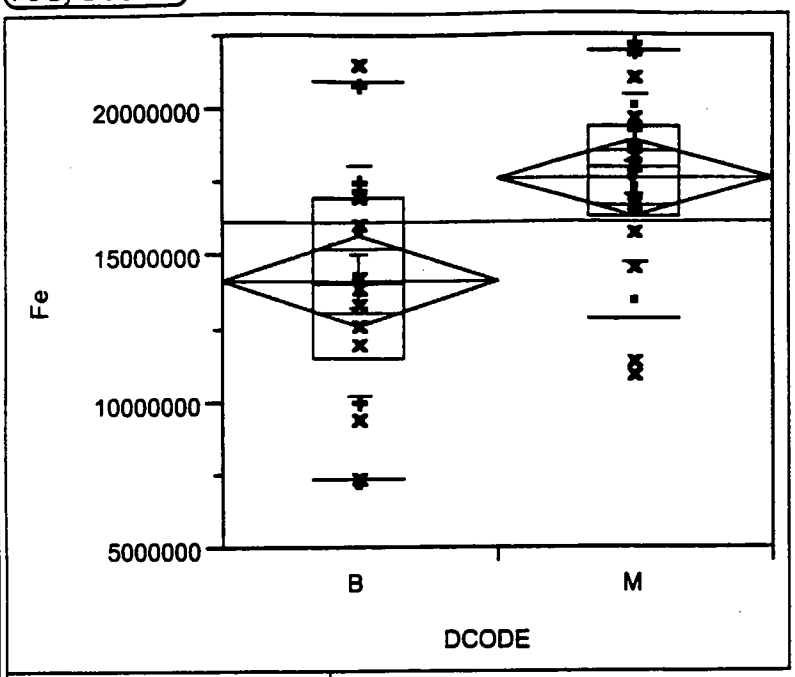
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 237.5 | -3.98778 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 15.9977 | 1 | <.0001 |

Fe By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 7180000 | 7351000 | 11497500 | 14100000 | 17025000 | 20960000 | 21500000 |
| M | 10900000 | 12870000 | 16400000 | 18000000 | 19400000 | 22000000 | 22300000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 14123611 | 4041713 | 952641 |
| M | 26 | 17665385 | 2895782 | 567910 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 275.5 | 15.3056 | -3.080 |
| M | 26 | 714.5 | 27.4808 | 3.080 |

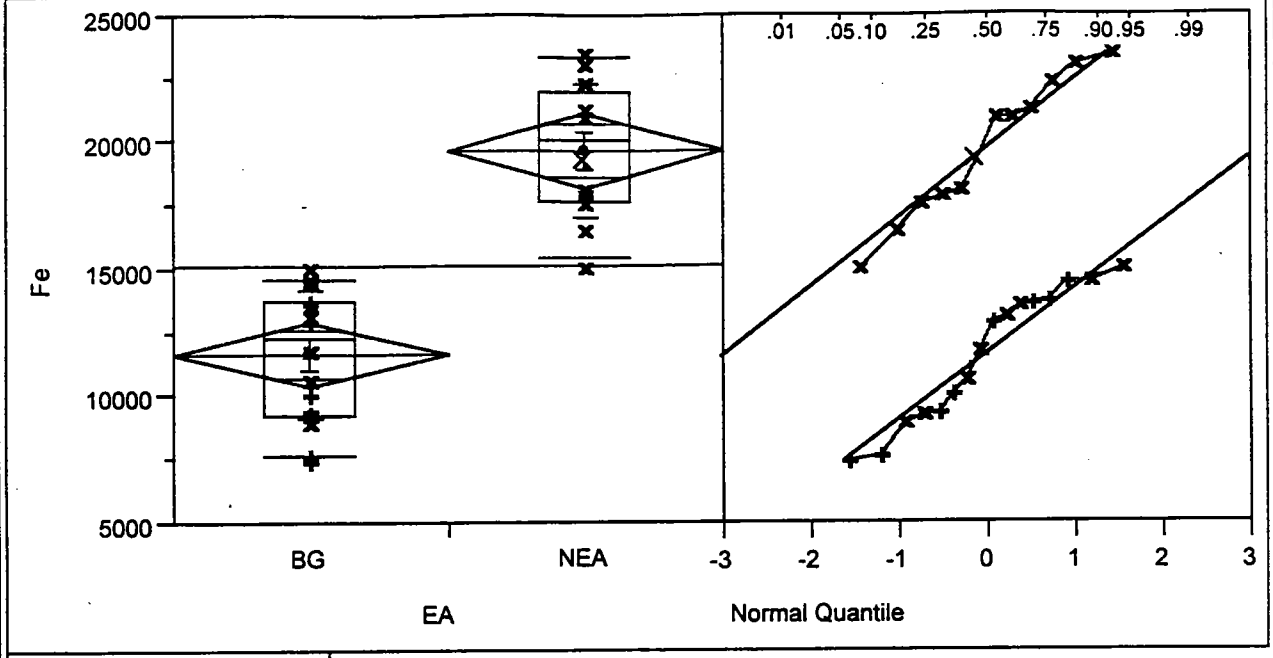
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 275.5 | -3.08027 | 0.0021 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 9.5618 | 1 | 0.0020 |

Fe By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 7520 | 7632 | 9310 | 12350 | 13775 | 14650 | 15000 |
| NEA | 15000 | 15450 | 17675 | 20150 | 22050 | 23380 | 23500 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 11656.3 | 2562.54 | 640.64 |
| NEA | 12 | 19716.7 | 2720.24 | 785.27 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 136.5 | 8.5313 | -4.412 |
| NEA | 12 | 269.5 | 22.4583 | 4.412 |

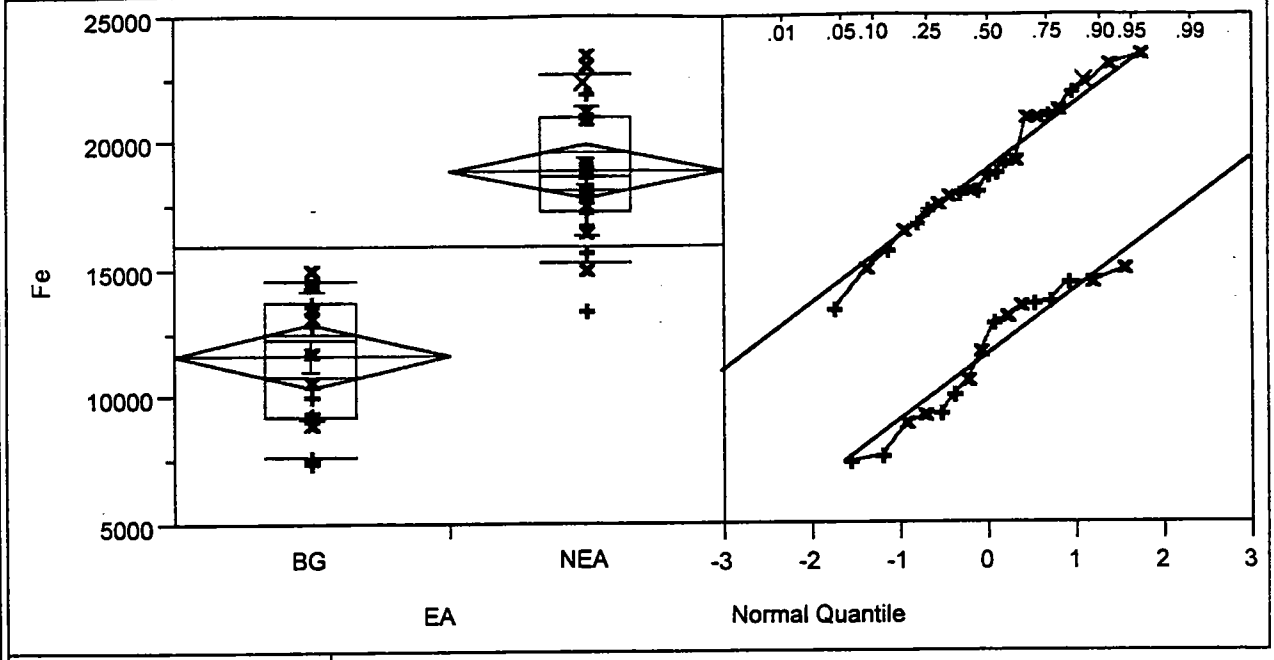
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 269.5 | 4.41208 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 19.6719 | 1 | <.0001 |

Fe By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 7520 | 7632 | 9310 | 12350 | 13775 | 14650 | 15000 |
| NEA | 13500 | 15320 | 17400 | 18700 | 21100 | 22780 | 23500 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 11656.3 | 2562.54 | 640.64 |
| NEA | 23 | 18960.9 | 2618.59 | 546.01 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 142.5 | 8.9063 | -5.055 |
| NEA | 23 | 637.5 | 27.7174 | 5.055 |

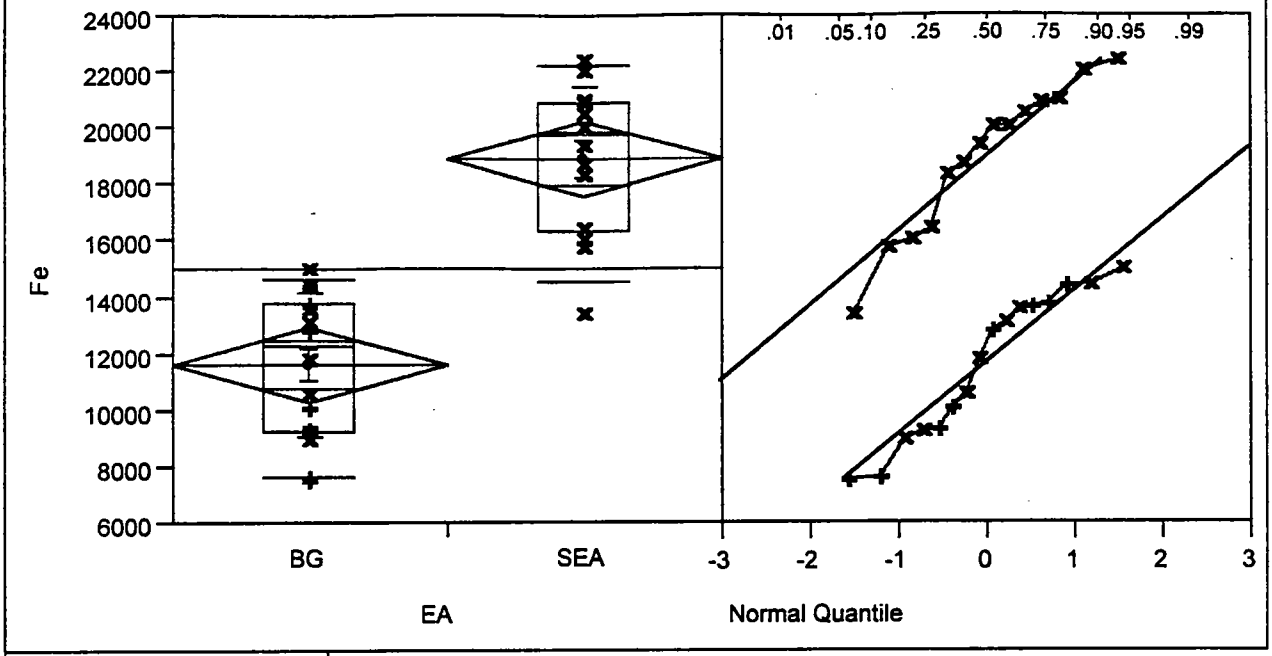
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 142.5 | -5.05499 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 25.6974 | 1 | <.0001 |

Fe By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 7520 | 7632 | 9310 | 12350 | 13775 | 14650 | 15000 |
| SEA | 13400 | 14600 | 16400 | 19750 | 20925 | 22225 | 22400 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 11656.3 | 2562.54 | 640.64 |
| SEA | 14 | 18953.6 | 2630.92 | 703.14 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 142 | 8.8750 | -4.387 |
| SEA | 14 | 323 | 23.0714 | 4.387 |

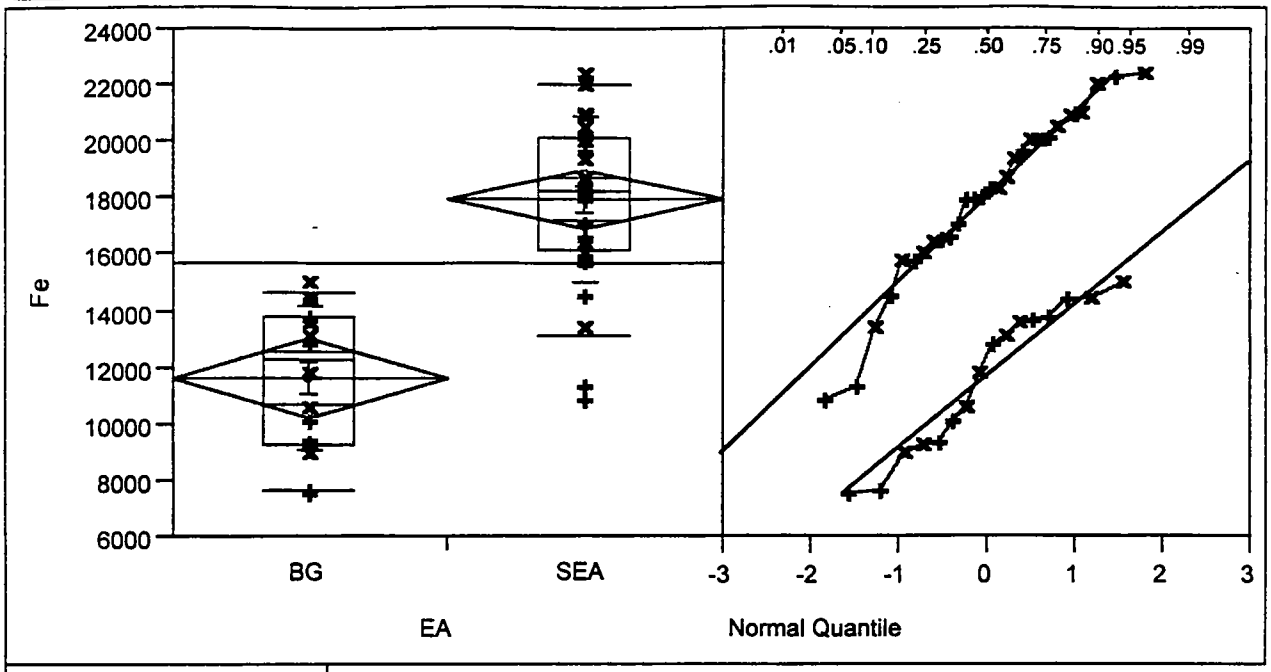
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 323 | 4.38667 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 19.4257 | 1 | <.0001 |

Fe By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 7520 | 7632 | 9310 | 12350 | 13775 | 14650 | 15000 |
| SEA | 10900 | 13200 | 16200 | 18250 | 20175 | 22075 | 22400 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 11656.3 | 2562.54 | 640.64 |
| SEA | 28 | 17969.6 | 3005.59 | 568.00 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 161 | 10.0625 | -4.844 |
| SEA | 28 | 829 | 29.6071 | 4.844 |

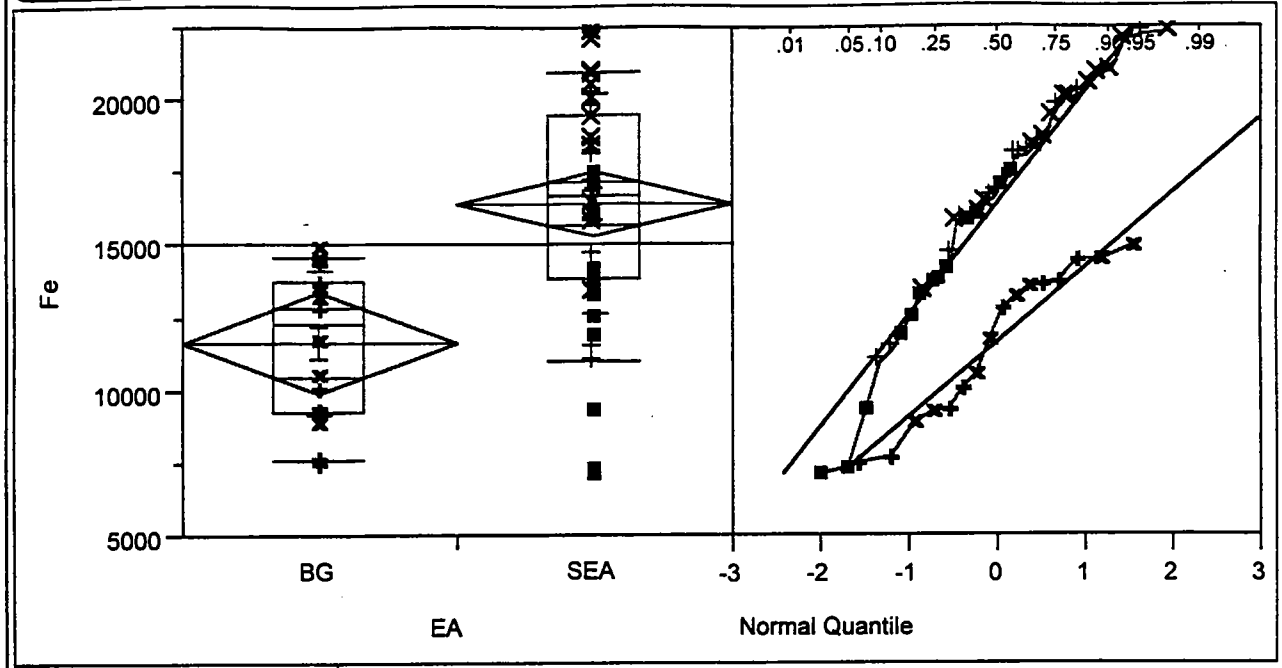
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 161 | -4.84376 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 23.5803 | 1 | <.0001 |

Fe By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 7520 | 7632 | 9310 | 12350 | 13775 | 14650 | 15000 |
| SEA | 7180 | 11000 | 13850 | 16700 | 19550 | 20980 | 22400 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 11656.3 | 2562.54 | 640.64 |
| SEA | 41 | 16431.3 | 3846.14 | 600.67 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 235.5 | 14.7188 | -4.050 |
| SEA | 41 | 1417.5 | 34.5732 | 4.050 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 235.5 | -4.04963 | <.0001 |

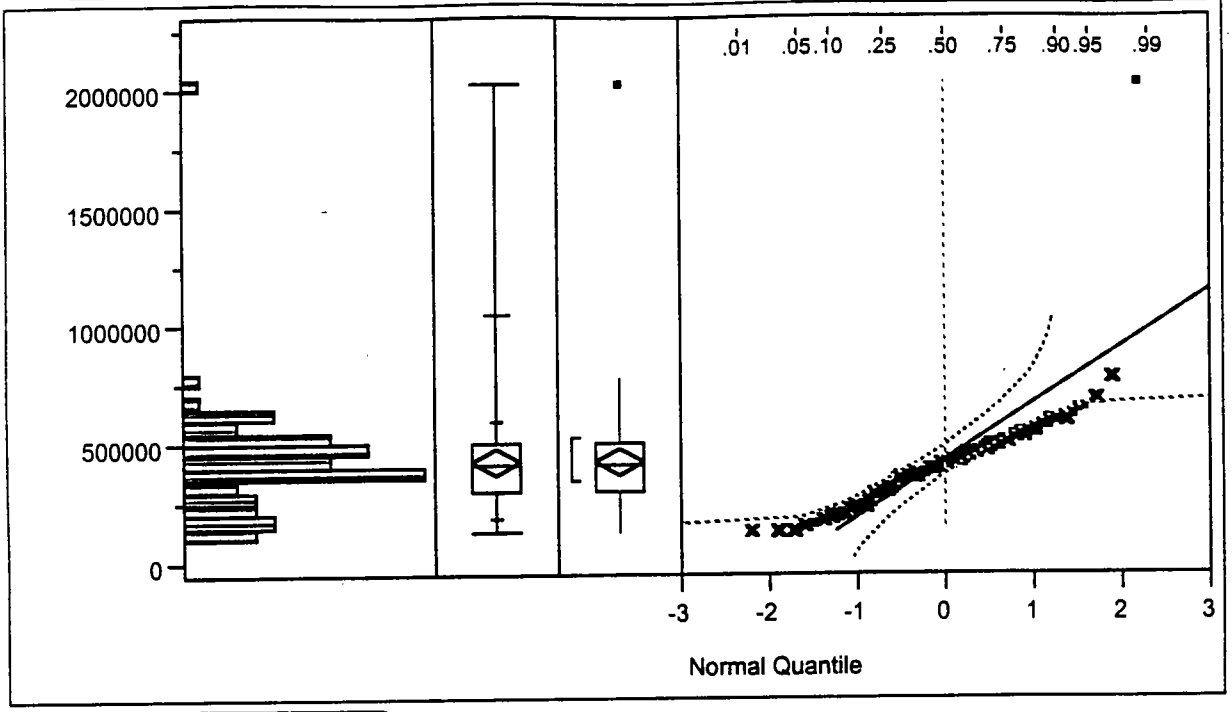
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 16.4715 | 1 | <.0001 |

# TAB 5

# Manganese

Mn




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 2030000 |
| | 99.5% | 2030000 |
| | 97.5% | 1056600 |
| | 90.0% | 601800 |
| quartile | 75.0% | 505000 |
| median | 50.0% | 415500 |
| quartile | 25.0% | 304250 |
| | 10.0% | 185300 |
| | 2.5% | 135100 |
| | 0.5% | 132000 |
| minimum | 0.0% | 132000 |

**Moments**

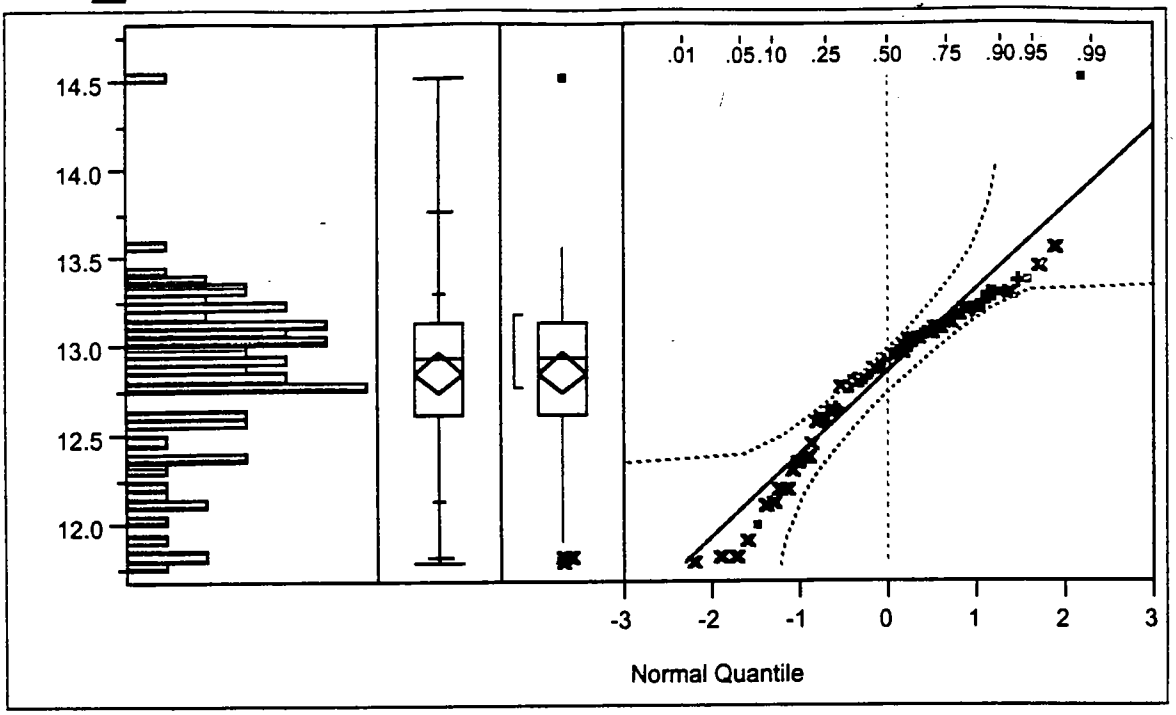
| | |
|---|---|
| Mean | 427092.9 |
| Std Dev | 242704.8 |
| Std Error Mean | 29008.8 |
| Upper 95% Mean | 484963.9 |
| Lower 95% Mean | 369221.8 |
| N | 70.0 |
| Sum Weights | 70.0 |
| Sum | 29896500 |
| Variance | 5.8906e10 |
| Skewness | 4.2 |
| Kurtosis | 27.3 |
| CV | 56.8 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.691515 | 0.0000 |

lnMn




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 14.524 |
| | 99.5% | 14.524 |
| | 97.5% | 13.776 |
| | 90.0% | 13.308 |
| quartile | 75.0% | 13.132 |
| median | 50.0% | 12.937 |
| quartile | 25.0% | 12.625 |
| | 10.0% | 12.130 |
| | 2.5% | 11.814 |
| | 0.5% | 11.791 |
| minimum | 0.0% | 11.791 |

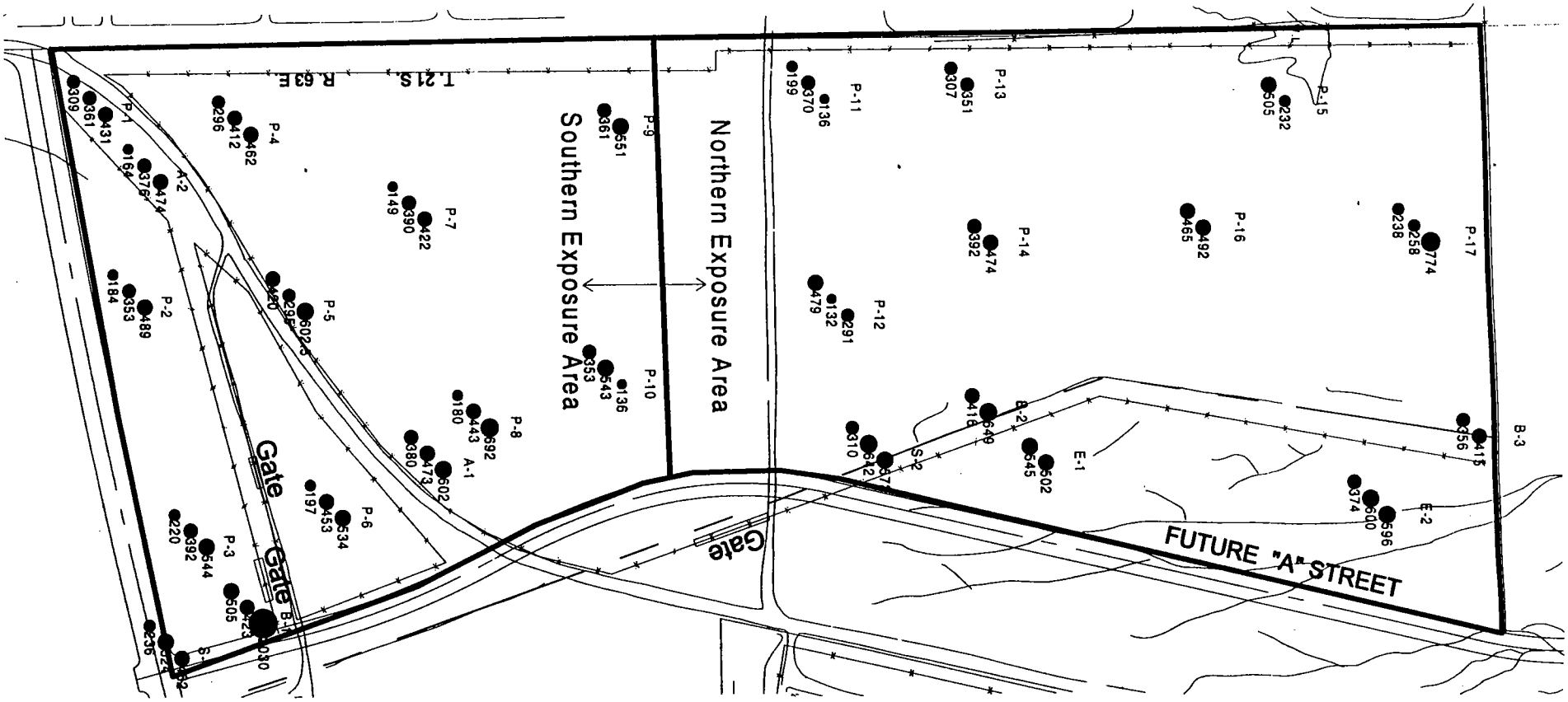
**Moments**

| | |
|---|---|
| Mean | 12.85469 |
| Std Dev | 0.46675 |
| Std Error Mean | 0.05579 |
| Upper 95% Mean | 12.96599 |
| Lower 95% Mean | 12.74340 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 899.82860 |
| Variance | 0.21786 |
| Skewness | -0.08503 |
| Kurtosis | 1.78262 |
| CV | 3.63099 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.940870 | 0.0042 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

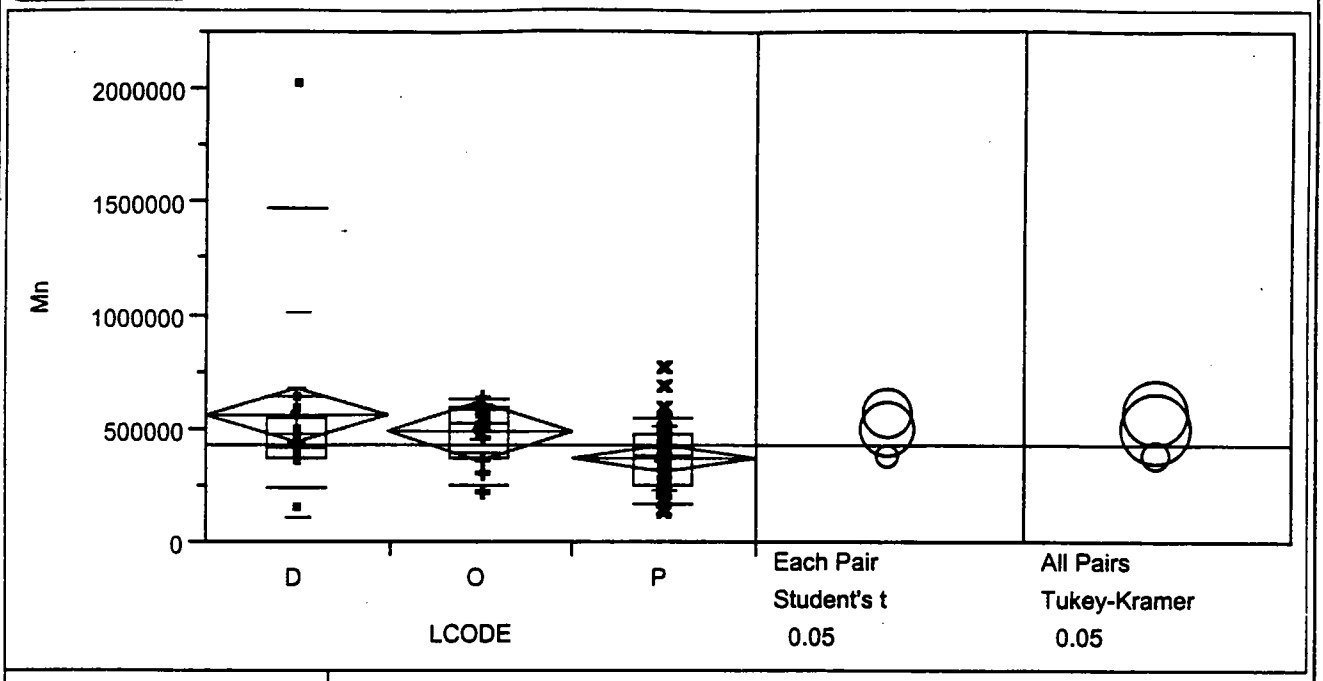
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Manganese mg/kg**

Mn By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 164000 | 240800 | 378000 | 423000 | 553500 | 1477600 | 2030000 |
| O | 236000 | 250800 | 374000 | 524000 | 596000 | 633600 | 642000 |
| P | 132000 | 170700 | 253000 | 380000 | 475250 | 546100 | 774000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.095526 |
| RSquare Adj | 0.068527 |
| Root Mean Square Error | 234241.3 |
| Mean of Response | 427092.9 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 3.88265e11 | 1.941e11 | 3.5381 |
| Error | 67 | 3.67622e12 | 5.487e10 | Prob>F |
| C Total | 69 | 4.06449e12 | 5.891e10 | 0.0346 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 558692 | 64967 |
| O | 11 | 487636 | 70626 |
| P | 46 | 375424 | 34537 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 558692 | 457691 | 126941 |
| O | 11 | 487636 | 129903 | 39167 |
| P | 46 | 375424 | 148601 | 21910 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | D | O | P |
|---|---|---|---|
| D | 0 | 71056 | 183268 |
| O | -71056 | 0 | 112212 |
| P | -183268 | -112212 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | D | O | P |
|---|---|---|---|
| D | -183388 | -120486 | 36409 |
| O | -120486 | -199363 | -44711 |
| P | 36409 | -44711 | -97491 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | D | O | P |
|---|---|---|---|
| D | -220219 | -158955 | 6914 |
| O | -158955 | -239403 | -76228 |
| P | 6914 | -76228 | -117071 |

Positive values show pairs of means that are significantly different.

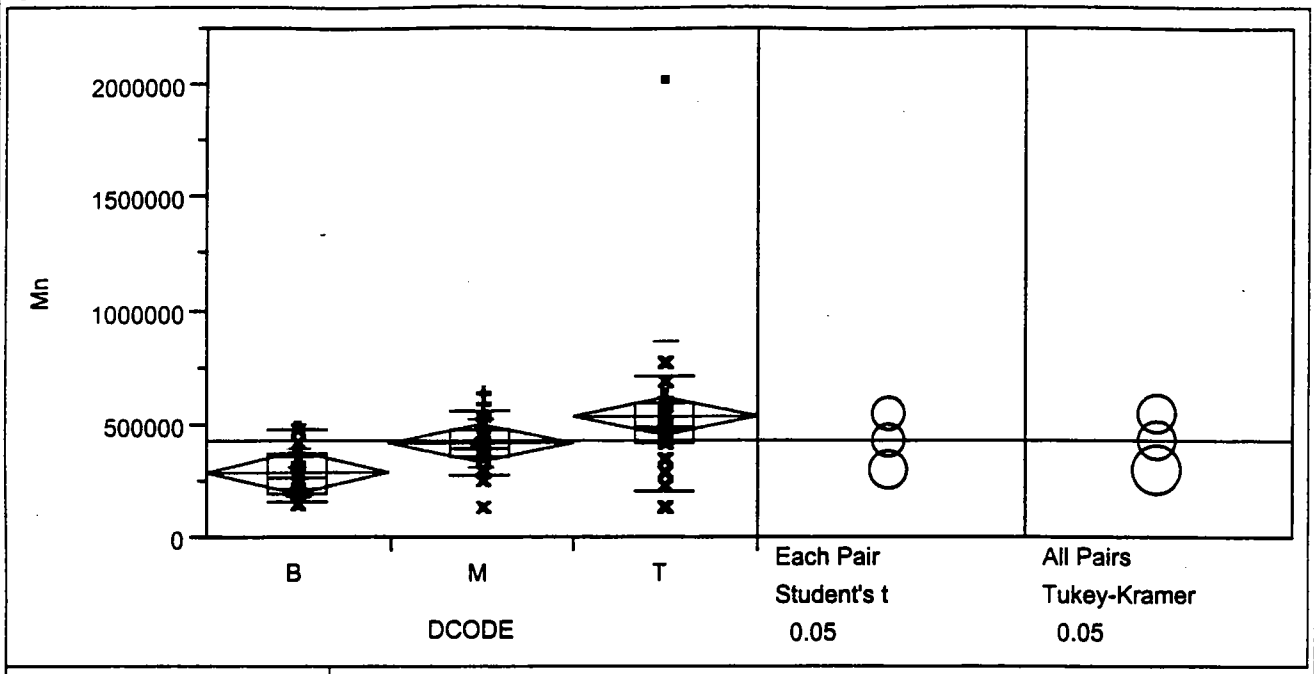
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 546 | 42.0000 | 1.269 |
| O | 11 | 521.5 | 47.4091 | 2.106 |
| P | 46 | 1417.5 | 30.8152 | -2.660 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 7.5315 | 2 | 0.0232 |

Mn By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 149000 | 162500 | 193750 | 267000 | 375500 | 481600 | 505000 |
| M | 132000 | 283900 | 359750 | 402000 | 481000 | 561500 | 642000 |
| T | 136000 | 203200 | 420250 | 490500 | 597500 | 716600 | 2030000 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.160848 |
| RSquare Adj | 0.135799 |
| Root Mean Square Error | 225624.3 |
| Mean of Response | 427092.9 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 6.53766e11 | 3.269e11 | 6.4213 |
| Error | 67 | 3.41072e12 | 5.091e10 | Prob>F |
| C Total | 69 | 4.06449e12 | 5.891e10 | 0.0028 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 288500 | 53180 |
| M | 26 | 414885 | 44249 |
| T | 26 | 535250 | 44249 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 288500 | 109885 | 25900 |
| M | 26 | 414885 | 108880 | 21353 |
| T | 26 | 535250 | 341120 | 66899 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0 | 120365 | 246750 |
| M | -120365 | 0 | 126385 |
| B | -246750 | -126385 | 0 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -124904 | -4539 | 108663 |
| M | -4539 | -124904 | -11702 |
| B | 108663 | -11702 | -150116 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -149990 | -29625 | 80930 |
| M | -29625 | -149990 | -39436 |
| B | 80930 | -39436 | -180266 |

Positive values show pairs of means that are significantly different.

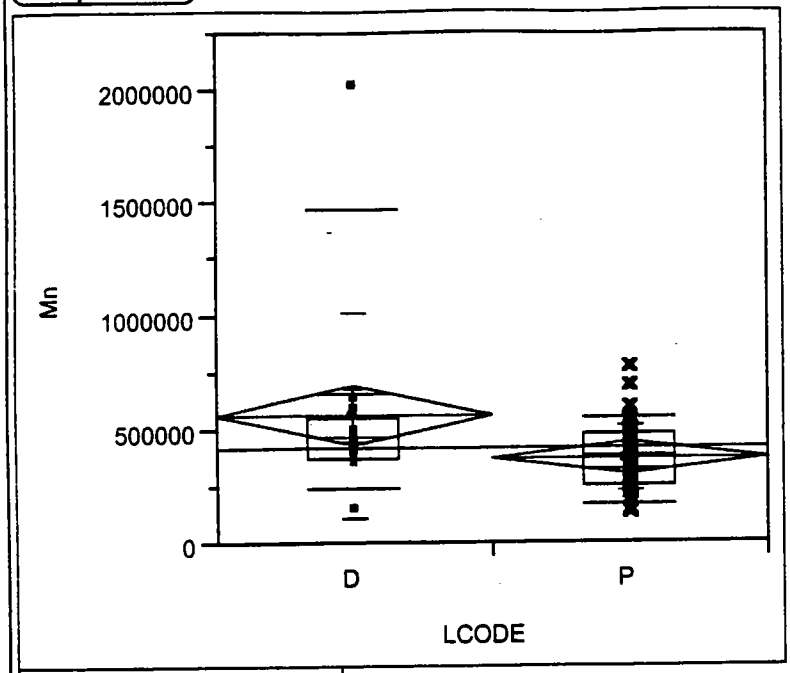
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 350 | 19.4444 | -3.877 |
| M | 26 | 935 | 35.9615 | 0.140 |
| T | 26 | 1200 | 46.1538 | 3.361 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 18.3444 | 2 | 0.0001 |

Mn By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 164000 | 240800 | 378000 | 423000 | 553500 | 1477600 | 2030000 |
| P | 132000 | 170700 | 253000 | 380000 | 475250 | 546100 | 774000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 558692 | 457691 | 126941 |
| P | 46 | 375424 | 148601 | 21910 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 484 | 37.2308 | 1.710 |
| P | 46 | 1286 | 27.9565 | -1.710 |

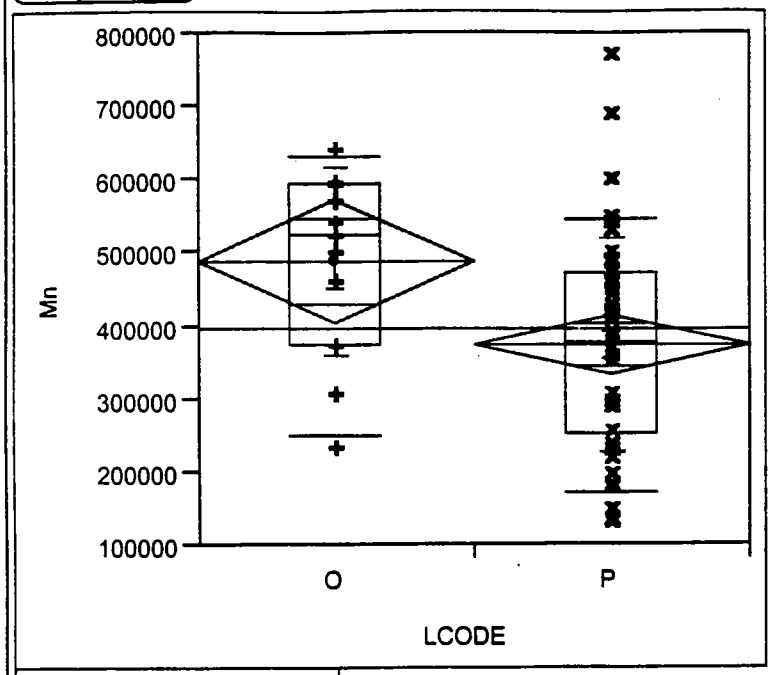
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 484 | 1.71007 | 0.0873 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.9557 | 1 | 0.0856 |

Mn By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 236000 | 250800 | 37[illegible]0 | 524000 | 596000 | 633600 | 642000 |
| P | 132000 | 170700 | 253000 | 380000 | 475250 | 546100 | 774000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 487636 | 129903 | 39167 |
| P | 46 | 375424 | 148601 | 21910 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 440.5 | 40.0455 | 2.447 |
| P | 46 | 1212.5 | 26.3587 | -2.447 |

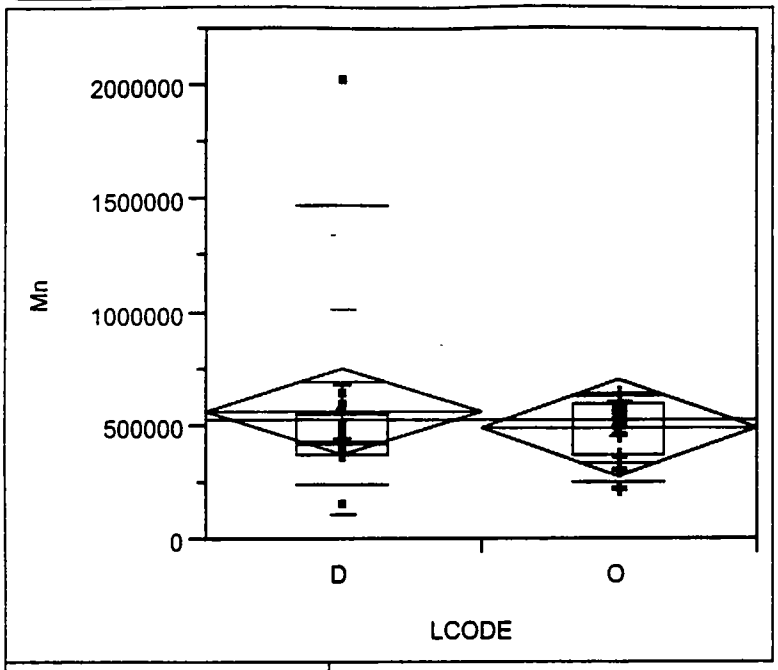
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 440.5 | 2.44693 | 0.0144 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.0371 | 1 | 0.0140 |

Mn By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 164000 | 240800 | 378000 | 423000 | 553500 | 1477600 | 2030000 |
| O | 236000 | 250800 | 374000 | 524000 | 596000 | 633600 | 642000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 558692 | 457691 | 126941 |
| O | 11 | 487636 | 129903 | 39167 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 153 | 11.7692 | -0.521 |
| O | 11 | 147 | 13.3636 | 0.521 |

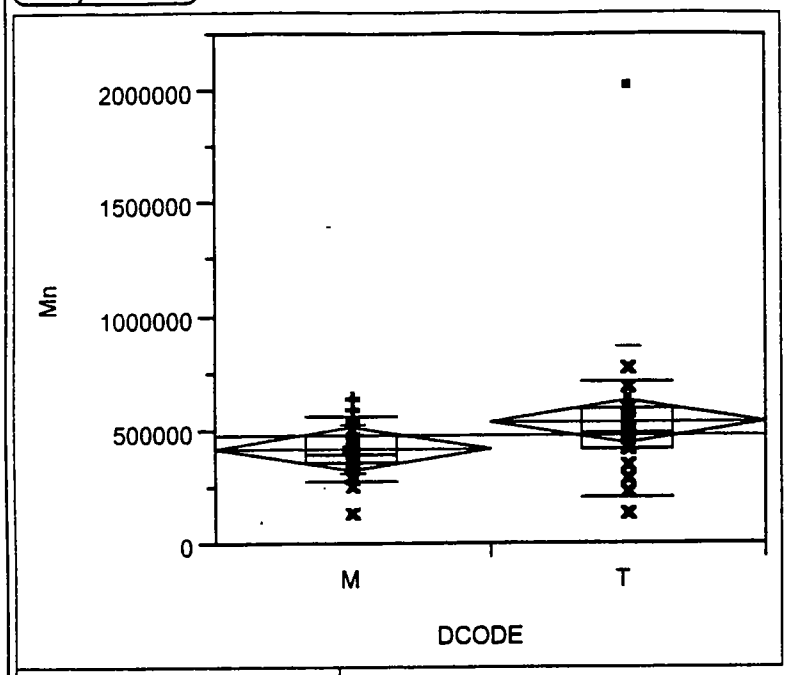
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 147 | 0.52143 | 0.6021 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.3029 | 1 | 0.5820 |

Mn By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 132000 | 283900 | 359750 | 402000 | 481000 | 561500 | 642000 |
| T | 136000 | 203200 | 420250 | 490500 | 597500 | 716600 | 2030000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 414885 | 108880 | 21353 |
| T | 26 | 535250 | 341120 | 66899 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 566 | 21.7692 | -2.242 |
| T | 26 | 812 | 31.2308 | 2.242 |

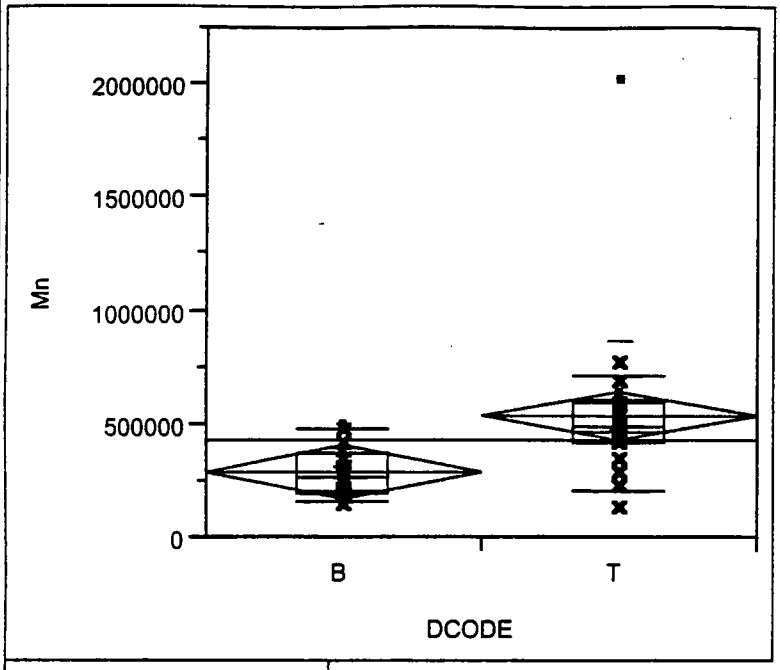
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 812 | 2.24214 | 0.0250 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.0683 | 1 | 0.0244 |

Mn By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 149000 | 162500 | 193750 | 267000 | 375500 | 481600 | 505000 |
| T | 136000 | 203200 | 420250 | 490500 | 597500 | 716600 | 2030000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 288500 | 109885 | 25900 |
| T | 26 | 535250 | 341120 | 66899 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 251 | 13.9444 | -3.665 |
| T | 26 | 739 | 28.4231 | 3.665 |

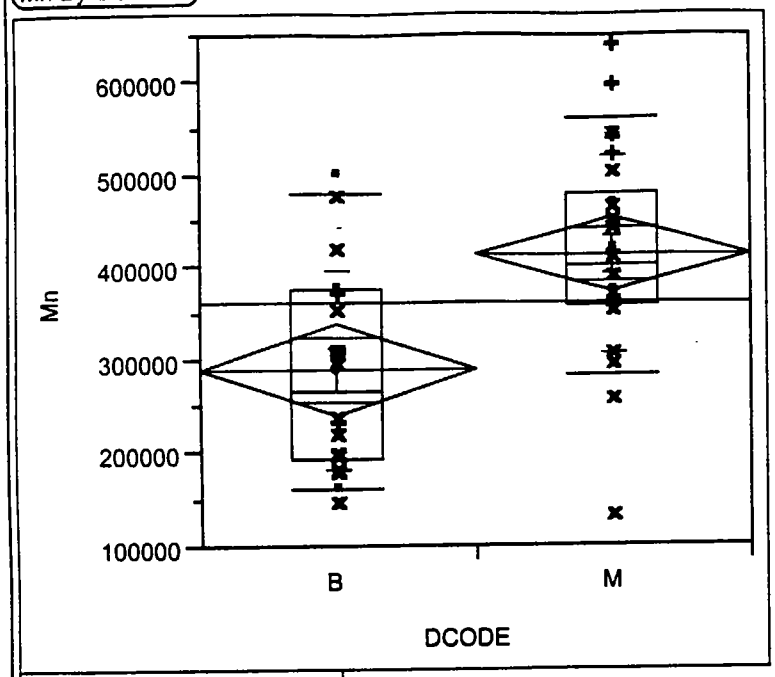
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 251 | -3.66451 | 0.0002 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.5162 | 1 | 0.0002 |

Mn By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 149000 | 162500 | 193750 | 267000 | 375500 | 481600 | 505000 |
| M | 132000 | 283900 | 359750 | 402000 | 481000 | 561500 | 642000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 288500 | 109885 | 25900 |
| M | 26 | 414885 | 108880 | 21353 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 270 | 15.0000 | -3.211 |
| M | 26 | 720 | 27.6923 | 3.211 |

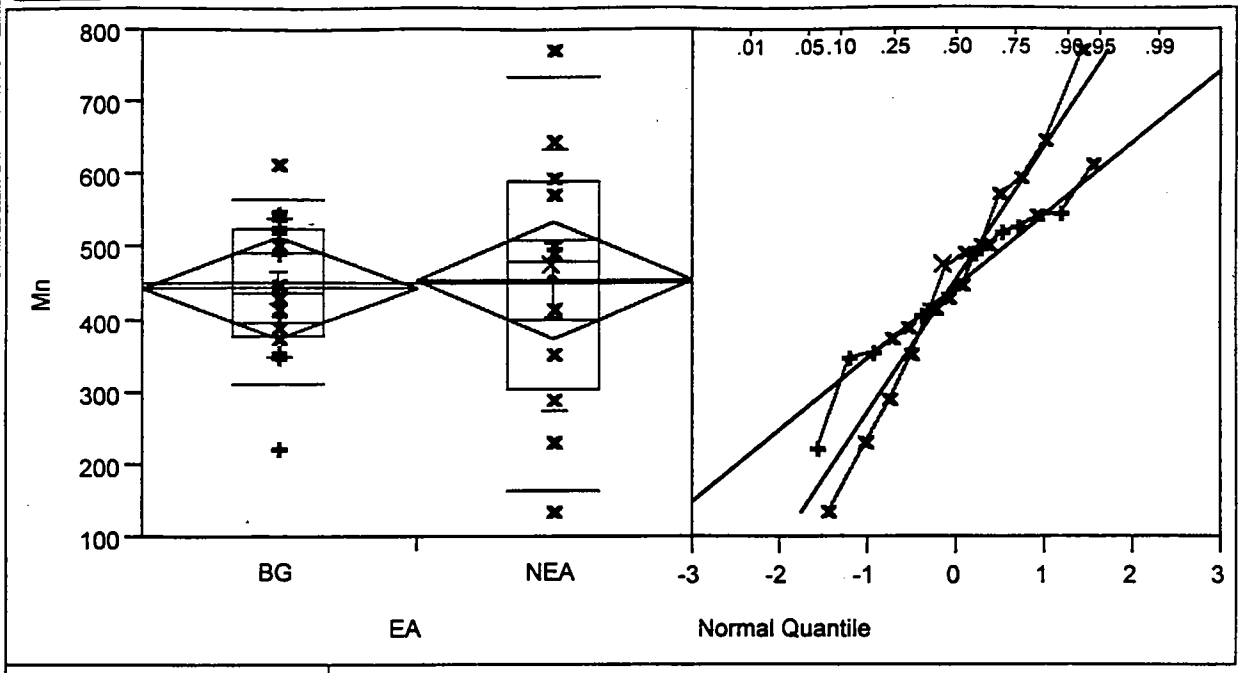
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 270 | -3.21103 | 0.0013 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 10.3875 | 1 | 0.0013 |

Mn By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 223 | 310.5 | 376.75 | 439 | 526.25 | 566.7 | 615 |
| NEA | 136 | 164.8 | 306 | 483 | 590.25 | 736.5 | 774 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 446.250 | 98.342 | 24.585 |
| NEA | 12 | 457.083 | 182.879 | 52.793 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 227.5 | 14.2188 | -0.186 |
| NEA | 12 | 178.5 | 14.8750 | 0.186 |

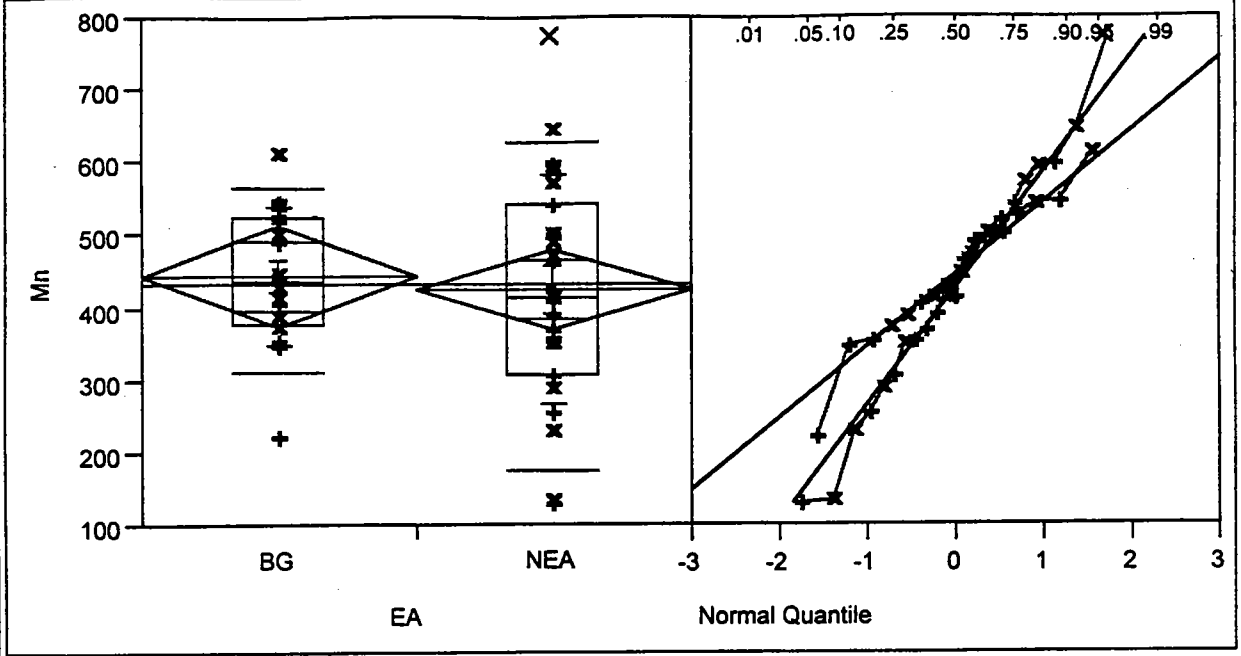
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 178.5 | 0.18572 | 0.8527 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0437 | 1 | 0.8345 |

Mn By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 223 | 310.5 | 376.75 | 439 | 526.25 | 566.7 | 615 |
| NEA | 132 | 174.4 | 307 | 416 | 545 | 629.4 | 774 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 446.250 | 98.342 | 24.585 |
| NEA | 23 | 427.435 | 160.928 | 33.556 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 335.5 | 20.9688 | 0.428 |
| NEA | 23 | 444.5 | 19.3261 | -0.428 |

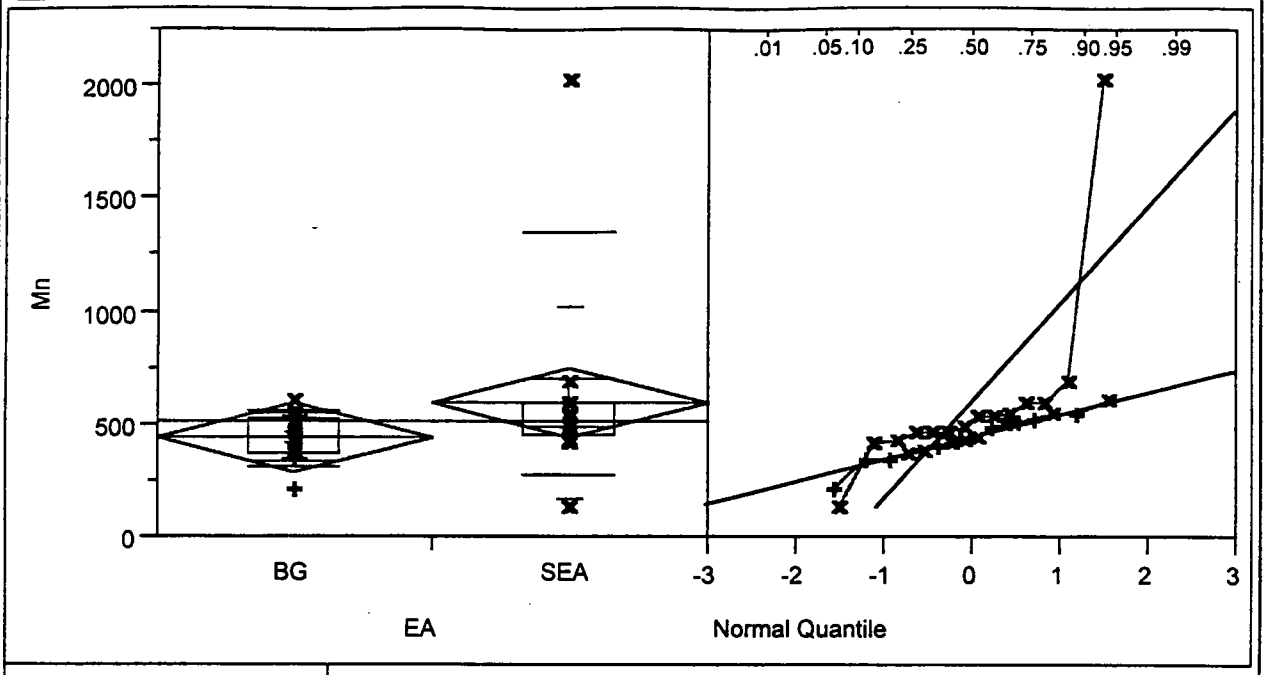
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 335.5 | 0.42835 | 0.6684 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1959 | 1 | 0.6580 |

Mn By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 223 | 310.5 | 376.75 | 439 | 526.25 | 566.7 | 615 |
| SEA | 136 | 279 | 454.25 | 511.5 | 602.125 | 1361 | 2030 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 446.250 | 98.342 | 24.59 |
| SEA | 14 | 602.250 | 430.118 | 114.95 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 206.5 | 12.9063 | -1.705 |
| SEA | 14 | 258.5 | 18.4643 | 1.705 |

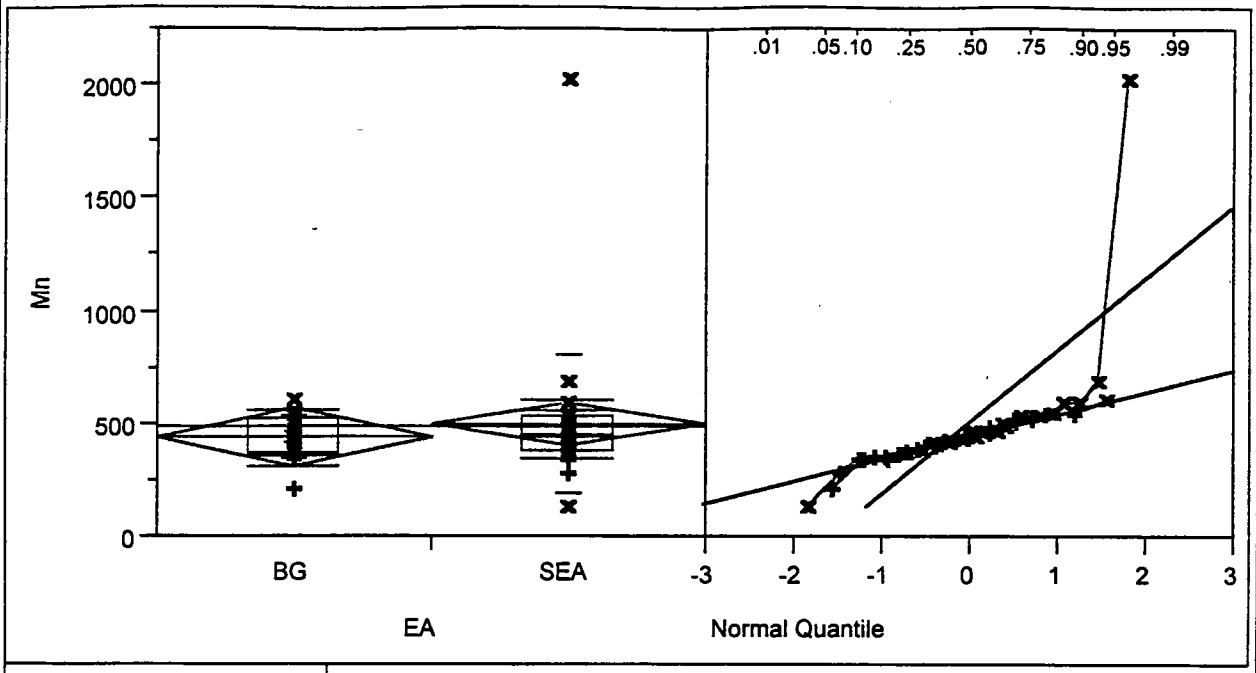
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 258.5 | 1.70477 | 0.0882 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.9776 | 1 | 0.0844 |

Mn By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 223 | 310.5 | 376.75 | 439 | 526.25 | 566.7 | 615 |
| SEA | 136 | 347.2 | 390.5 | 457.5 | 540.75 | 611.45 | 2030 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 446.250 | 98.342 | 24.585 |
| SEA | 28 | 508.232 | 317.000 | 59.907 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 343.5 | 21.4688 | -0.390 |
| SEA | 28 | 646.5 | 23.0893 | 0.390 |

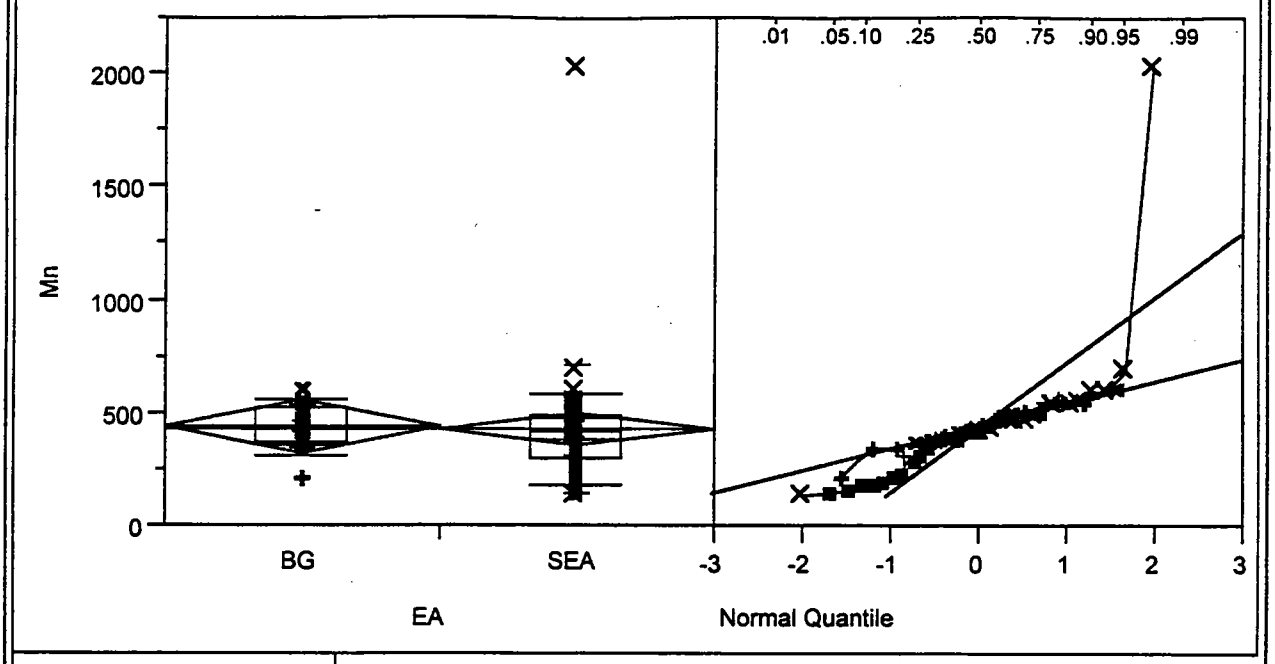
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 343.5 | -0.39040 | 0.6962 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1621 | 1 | 0.6872 |

Mn By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 223 | 310.5 | 376.75 | 439 | 526.25 | 566.7 | 615 |
| SEA | 136 | 180.8 | 302.5 | 420 | 497 | 591.8 | 2030 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 446.250 | 98.342 | 24.585 |
| SEA | 41 | 434.720 | 288.927 | 45.123 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 524.5 | 32.7813 | 1.066 |
| SEA | 41 | 1128.5 | 27.5244 | -1.066 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 524.5 | 1.06562 | 0.2866 |

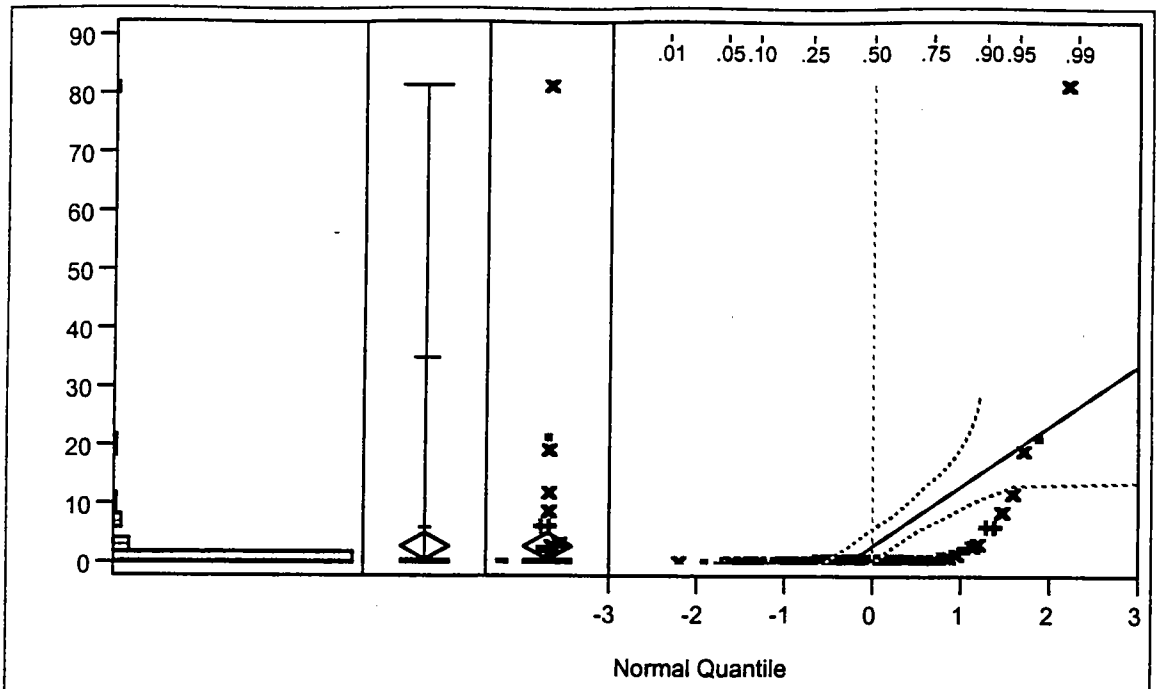
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.1546 | 1 | 0.2826 |

# TAB 6

## Total Dioxins and Furans (TEQ)

TEQ




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 81.700 |
| | 99.5% | 81.700 |
| | 97.5% | 35.072 |
| | 90.0% | 6.348 |
| quartile | 75.0% | 0.900 |
| median | 50.0% | 0.555 |
| quartile | 25.0% | 0.433 |
| | 10.0% | 0.363 |
| | 2.5% | 0.337 |
| | 0.5% | 0.336 |
| minimum | 0.0% | 0.336 |

**Moments**

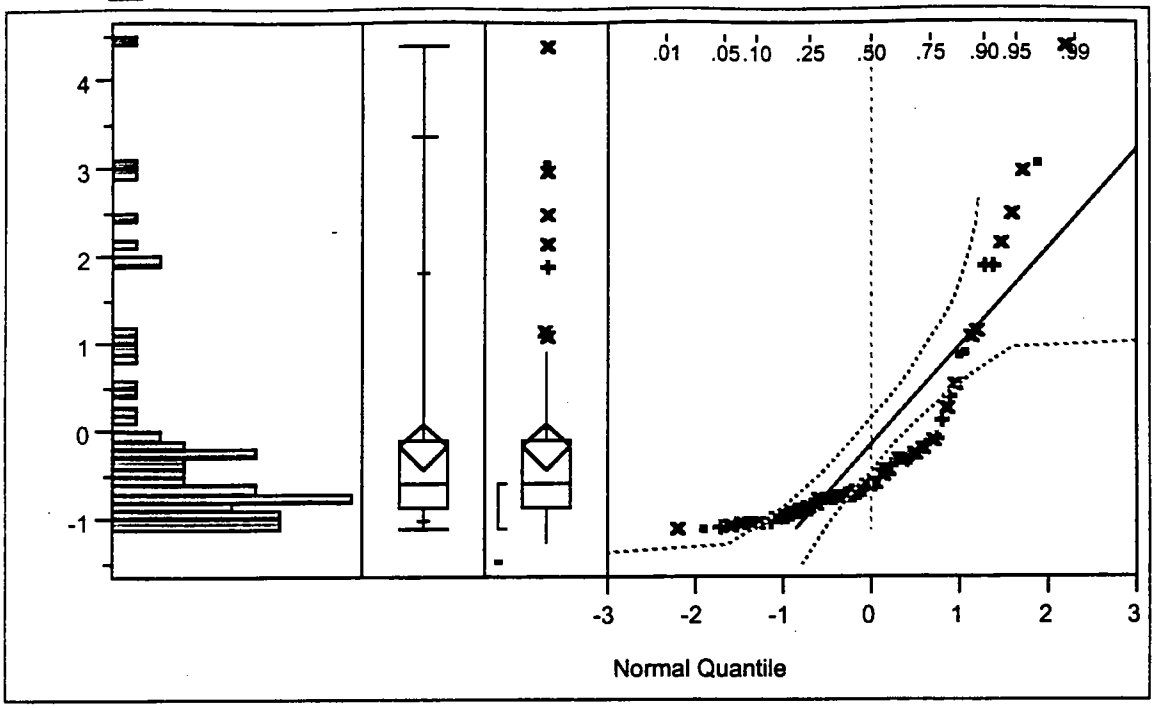
| | |
|---|---|
| Mean | 2.90842 |
| Std Dev | 10.27682 |
| Std Error Mean | 1.22832 |
| Upper 95% Mean | 5.35885 |
| Lower 95% Mean | 0.45800 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 203.58964 |
| Variance | 105.61311 |
| Skewness | 6.87779 |
| Kurtosis | 51.78110 |
| CV | 353.34688 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.274132 | 0.0000 |

lnTEQ




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 4.4031 |
| | 99.5% | 4.4031 |
| | 97.5% | 3.3697 |
| | 90.0% | 1.8281 |
| quartile | 75.0% | -0.1057 |
| median | 50.0% | -0.5891 |
| quartile | 25.0% | -0.8379 |
| | 10.0% | -1.0135 |
| | 2.5% | -1.0874 |
| | 0.5% | -1.0902 |
| minimum | 0.0% | -1.0902 |

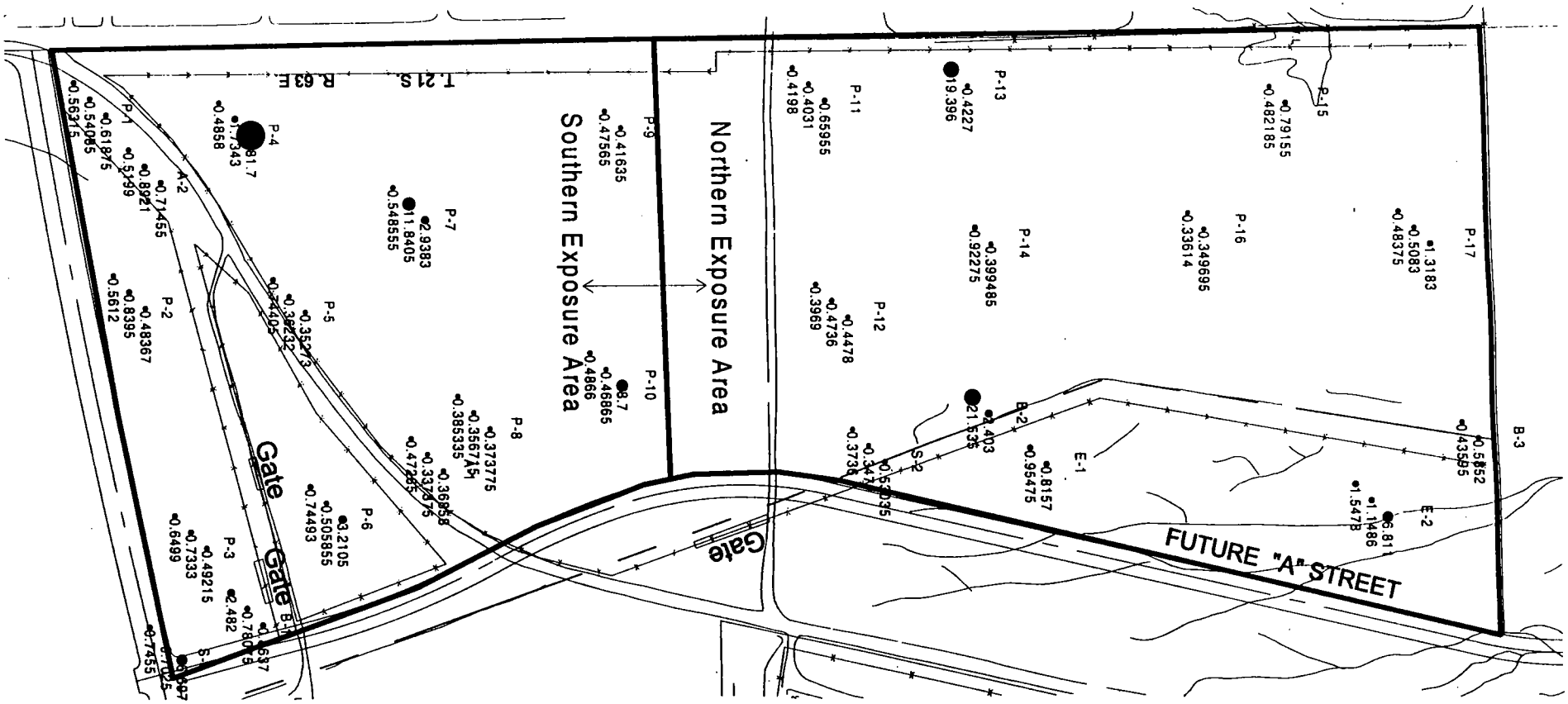
**Moments**

| | |
|---|---|
| Mean | -0.16137 |
| Std Dev | 1.11990 |
| Std Error Mean | 0.13385 |
| Upper 95% Mean | 0.10566 |
| Lower 95% Mean | -0.42840 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | -11.29609 |
| Variance | 1.25417 |
| Skewness | 2.14904 |
| Kurtosis | 4.61343 |
| CV | -693.9816 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.727824 | 0.0000 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

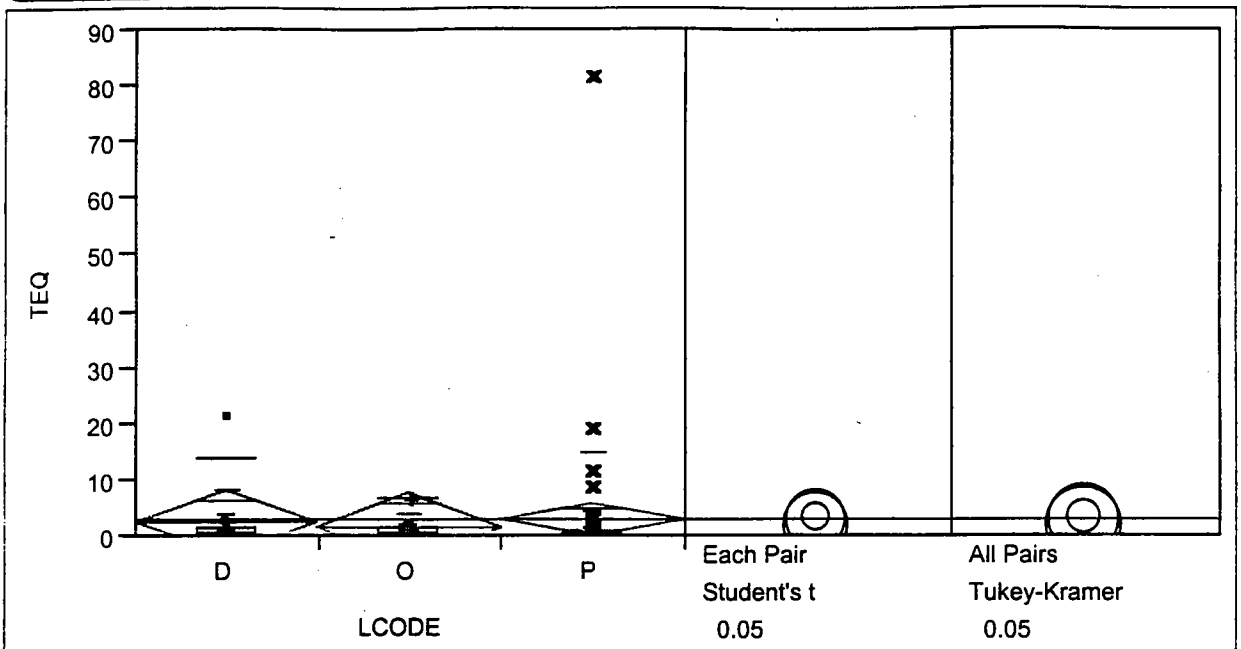
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Dioxins (TEQ) pg/g**

TEQ By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 0.337375 | 0.349857 | 0.4543 | 0.71455 | 1.64755 | 13.9138 | 21.535 |
| O | 0.3471 | 0.3524 | 0.53035 | 0.8157 | 1.5478 | 6.7882 | 6.811 |
| P | 0.33614 | 0.360639 | 0.418938 | 0.499003 | 0.756585 | 4.85735 | 81.7 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.002744 |
| RSquare Adj | -0.02702 |
| Root Mean Square Error | 10.41476 |
| Mean of Response | 2.908423 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 19.9955 | 9.998 | 0.0922 |
| Error | 67 | 7267.3087 | 108.467 | Prob>F |
| C Total | 69 | 7287.3043 | 105.613 | 0.9121 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 2.49160 | 2.8885 |
| O | 11 | 1.87945 | 3.1402 |
| P | 46 | 3.27228 | 1.5356 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 2.49160 | 5.7657 | 1.5991 |
| O | 11 | 1.87945 | 2.4345 | 0.7340 |
| P | 46 | 3.27228 | 12.3010 | 1.8137 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | P | D | O |
|---|---|---|---|
| P | 0.00000 | 0.78069 | 1.39284 |
| D | -0.78069 | 0.00000 | 0.61215 |
| O | -1.39284 | -0.61215 | 0.00000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | P | D | O |
|---|---|---|---|
| P | -4.33460 | -5.74893 | -5.58426 |
| D | -5.74893 | -8.15372 | -7.90413 |
| O | -5.58426 | -7.90413 | -8.86403 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | P | D | O |
|---|---|---|---|
| P | -5.2052 | -7.0603 | -6.9855 |
| D | -7.0603 | -9.7913 | -9.6145 |
| O | -6.9855 | -9.6145 | -10.6443 |

Positive values show pairs of means that are significantly different.

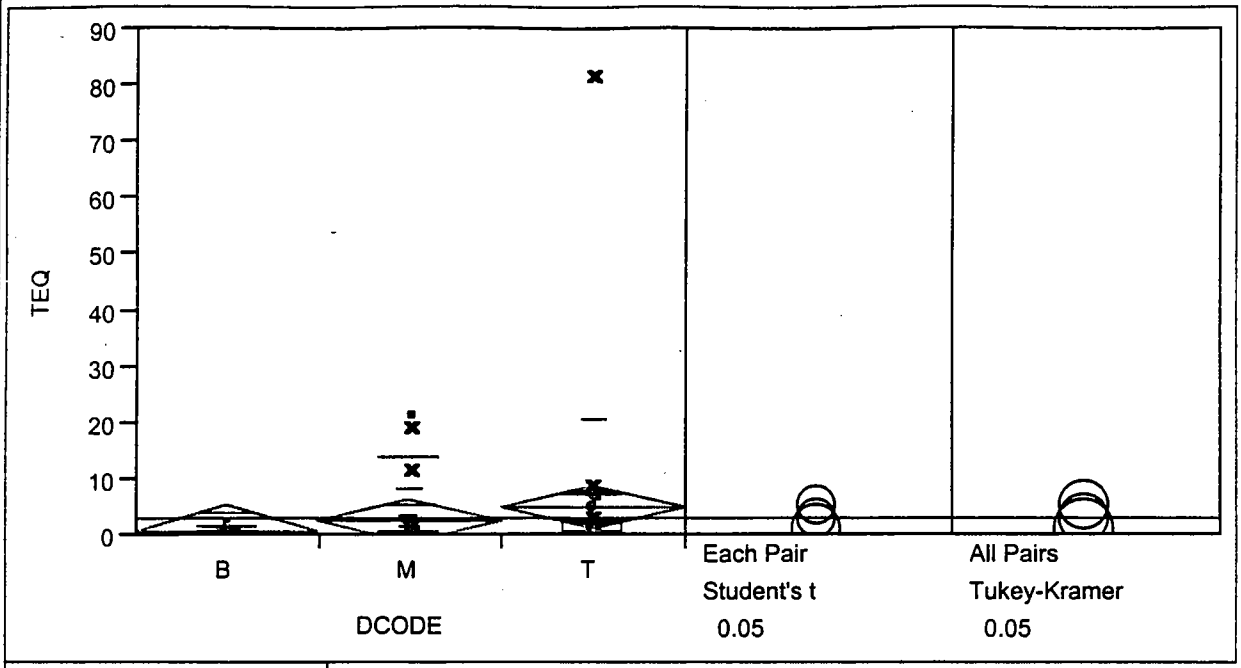
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 505 | 38.8462 | 0.649 |
| O | 11 | 482 | 43.8182 | 1.469 |
| P | 46 | 1498 | 32.5652 | -1.664 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.1458 | 2 | 0.2074 |

TEQ By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 0.3736 | 0.384161 | 0.459438 | 0.534228 | 0.74427 | 1.64122 | 2.482 |
| M | 0.33614 | 0.344183 | 0.427737 | 0.524575 | 0.93075 | 14.10715 | 21.535 |
| T | 0.349695 | 0.363825 | 0.421113 | 0.63915 | 2.536825 | 7.3777 | 81.7 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.024469 |
| RSquare Adj | -0.00465 |
| Root Mean Square Error | 10.3007 |
| Mean of Response | 2.908423 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 178.3100 | 89.155 | 0.8403 |
| Error | 67 | 7108.9942 | 106.104 | Prob>F |
| C Total | 69 | 7287.3043 | 105.613 | 0.4361 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 0.70063 | 2.4279 |
| M | 26 | 2.59669 | 2.0201 |
| T | 26 | 4.74863 | 2.0201 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 0.70063 | 0.5180 | 0.1221 |
| M | 26 | 2.59669 | 5.7158 | 1.1210 |
| T | 26 | 4.74863 | 15.8590 | 3.1102 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.00000 | 2.15194 | 4.04800 |
| M | -2.15194 | 0.00000 | 1.89605 |
| B | -4.04800 | -1.89605 | 0.00000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -5.70240 | -3.55046 | -2.25625 |
| M | -3.55046 | -5.70240 | -4.40819 |
| B | -2.25625 | -4.40819 | -6.85344 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

$q^*$

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -6.84768 | -4.69573 | -3.52239 |
| M | -4.69573 | -6.84768 | -5.67434 |
| B | -3.52239 | -5.67434 | -8.22988 |

Positive values show pairs of means that are significantly different.

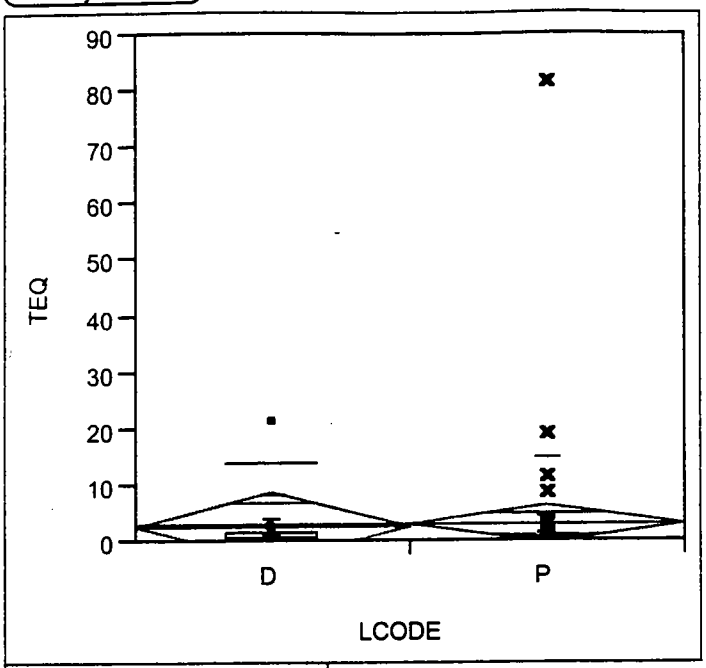
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 587 | 32.6111 | -0.692 |
| M | 26 | 901 | 34.6538 | -0.261 |
| T | 26 | 997 | 38.3462 | 0.893 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.9162 | 2 | 0.6325 |

TEQ By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 0.337375 | 0.349857 | 0.4543 | 0.71455 | 1.64755 | 13.9138 | 21.535 |
| P | 0.33614 | 0.360639 | 0.418938 | 0.499003 | 0.756585 | 4.85735 | 81.7 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 2.49160 | 5.7657 | 1.5991 |
| P | 46 | 3.27228 | 12.3010 | 1.8137 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 445 | 34.2308 | 0.997 |
| P | 46 | 1325 | 28.8043 | -0.997 |

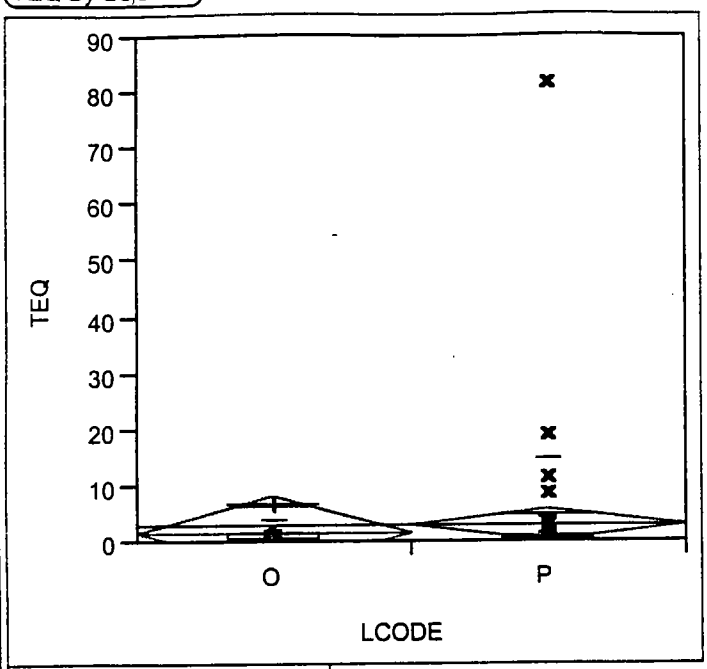
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 445 | 0.99669 | 0.3189 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.0117 | 1 | 0.3145 |

TEQ By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 0.3471 | 0.3524 | 0.53035 | 0.8157 | 1.5478 | 6.7882 | 6.811 |
| P | 0.33614 | 0.360639 | 0.418938 | 0.499003 | 0.756585 | 4.85735 | 81.7 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 1.87945 | 2.4345 | 0.7340 |
| P | 46 | 3.27228 | 12.3010 | 1.8137 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 399 | 36.2727 | 1.608 |
| P | 46 | 1254 | 27.2609 | -1.608 |

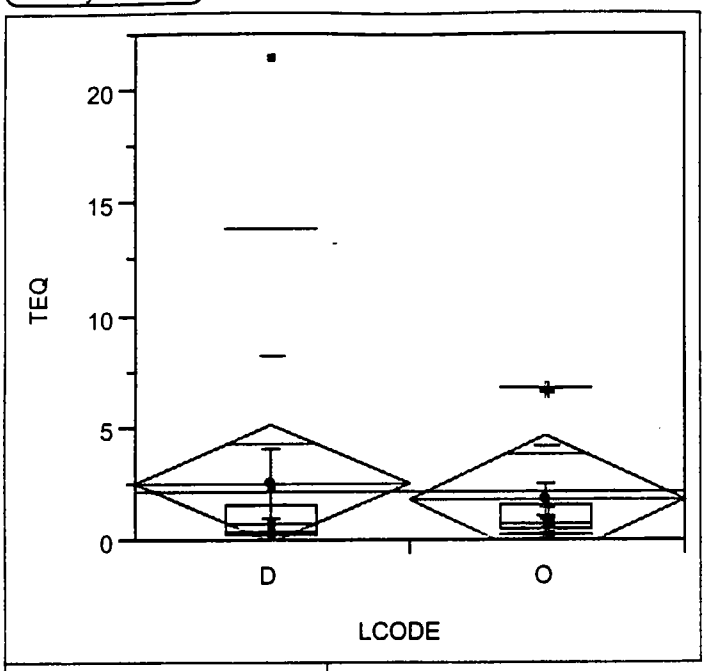
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 399 | 1.60756 | 0.1079 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.6169 | 1 | 0.1057 |

TEQ By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 0.337375 | 0.349857 | 0.4543 | 0.71455 | 1.64755 | 13.9138 | 21.535 |
| O | 0.3471 | 0.3524 | 0.53035 | 0.8157 | 1.5478 | 6.7882 | 6.811 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 2.49160 | 5.76573 | 1.5991 |
| O | 11 | 1.87945 | 2.43447 | 0.7340 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 151 | 11.6154 | -0.637 |
| O | 11 | 149 | 13.5455 | 0.637 |

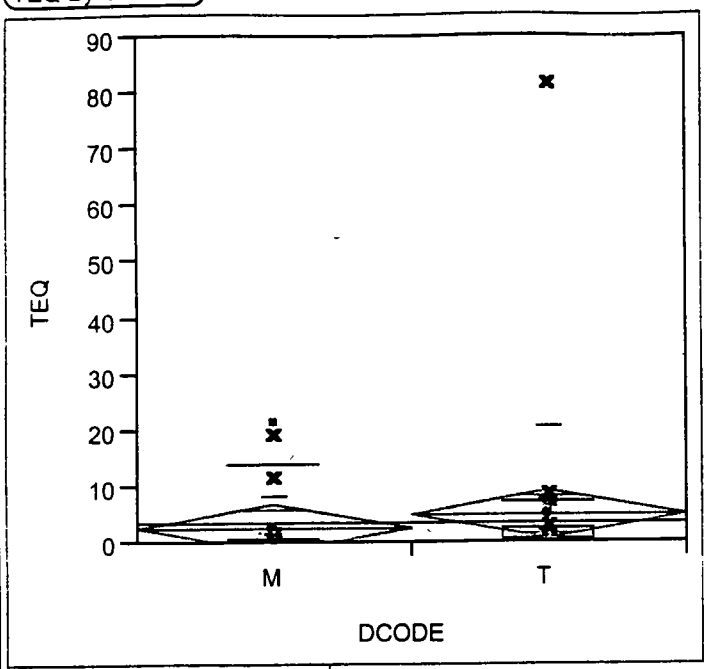
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 149 | 0.63730 | 0.5239 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.4439 | 1 | 0.5052 |

TEQ By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 0.33614 | 0.344183 | 0.427737 | 0.524575 | 0.93075 | 14.10715 | 21.535 |
| T | 0.349695 | 0.363825 | 0.421113 | 0.63915 | 2.536825 | 7.3777 | 81.7 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 2.59669 | 5.7158 | 1.1210 |
| T | 26 | 4.74863 | 15.8590 | 3.1102 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 657 | 25.2692 | -0.576 |
| T | 26 | 721 | 27.7308 | 0.576 |

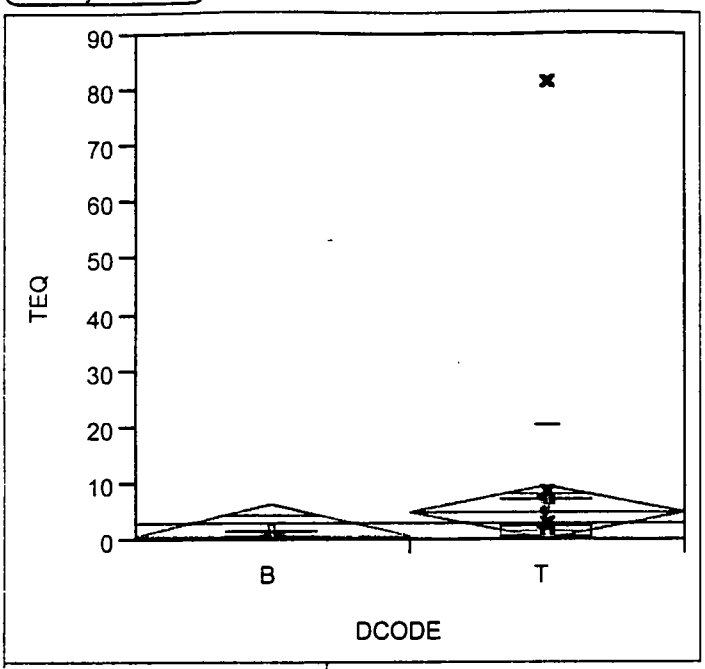
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 721 | 0.57649 | 0.5643 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.3430 | 1 | 0.5581 |

TEQ By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 0.3736 | 0.384161 | 0.459438 | 0.534228 | 0.74427 | 1.64122 | 2.482 |
| T | 0.349695 | 0.363825 | 0.421113 | 0.63915 | 2.536825 | 7.3777 | 81.7 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 0.70063 | 0.5180 | 0.1221 |
| T | 26 | 4.74863 | 15.8590 | 3.1102 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 363 | 20.1667 | -0.991 |
| T | 26 | 627 | 24.1154 | 0.991 |

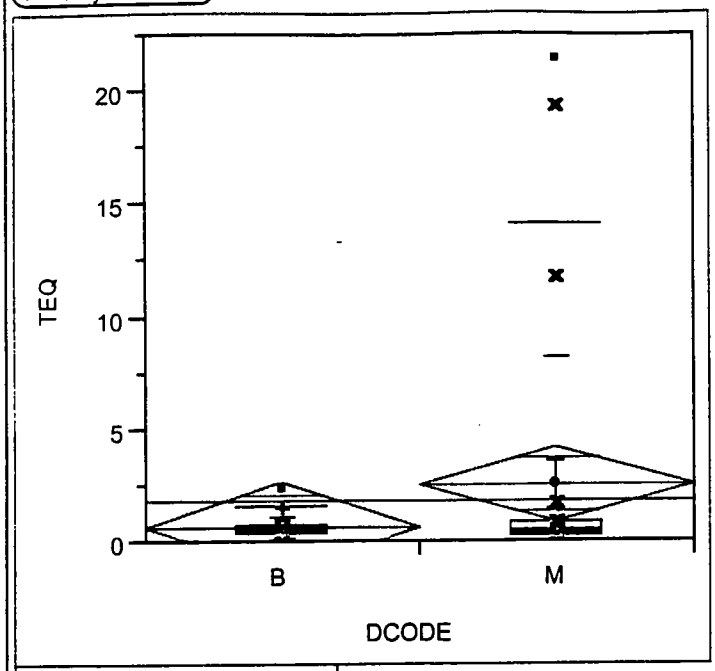
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 363 | -0.99063 | 0.3219 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.0051 | 1 | 0.3161 |

TEQ By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 0.3736 | 0.384161 | 0.459438 | 0.534228 | 0.74427 | 1.64122 | 2.482 |
| M | 0.33614 | 0.344183 | 0.427737 | 0.524575 | 0.93075 | 14.10715 | 21.535 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 0.70063 | 0.51803 | 0.1221 |
| M | 26 | 2.59669 | 5.71575 | 1.1210 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 395 | 21.9444 | -0.227 |
| M | 26 | 595 | 22.8846 | 0.227 |

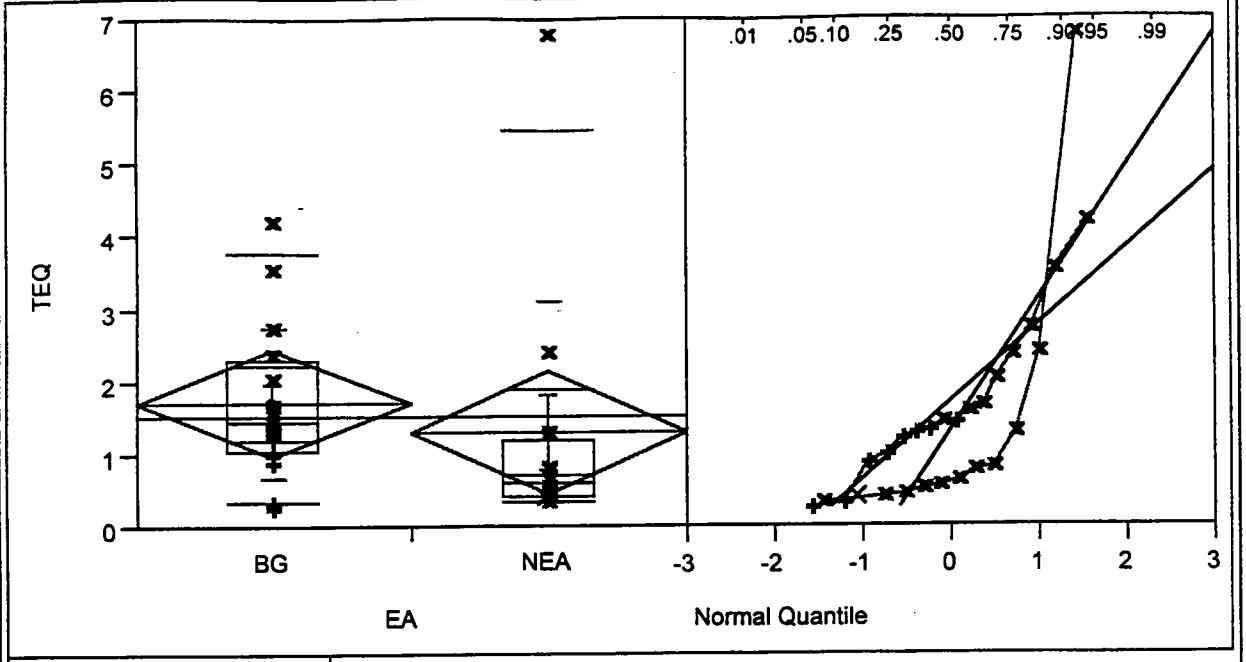
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 395 | -0.22677 | 0.8206 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0570 | 1 | 0.8113 |

TEQ By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.2915 | 0.334165 | 1.059758 | 1.45595 | 2.292625 | 3.7679 | 4.225 |
| NEA | 0.349695 | 0.364632 | 0.428975 | 0.622375 | 1.19265 | 5.4886 | 6.811 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.72244 | 1.06710 | 0.26677 |
| NEA | 12 | 1.29453 | 1.82916 | 0.52803 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 276 | 17.2500 | 2.019 |
| NEA | 12 | 130 | 10.8333 | -2.019 |

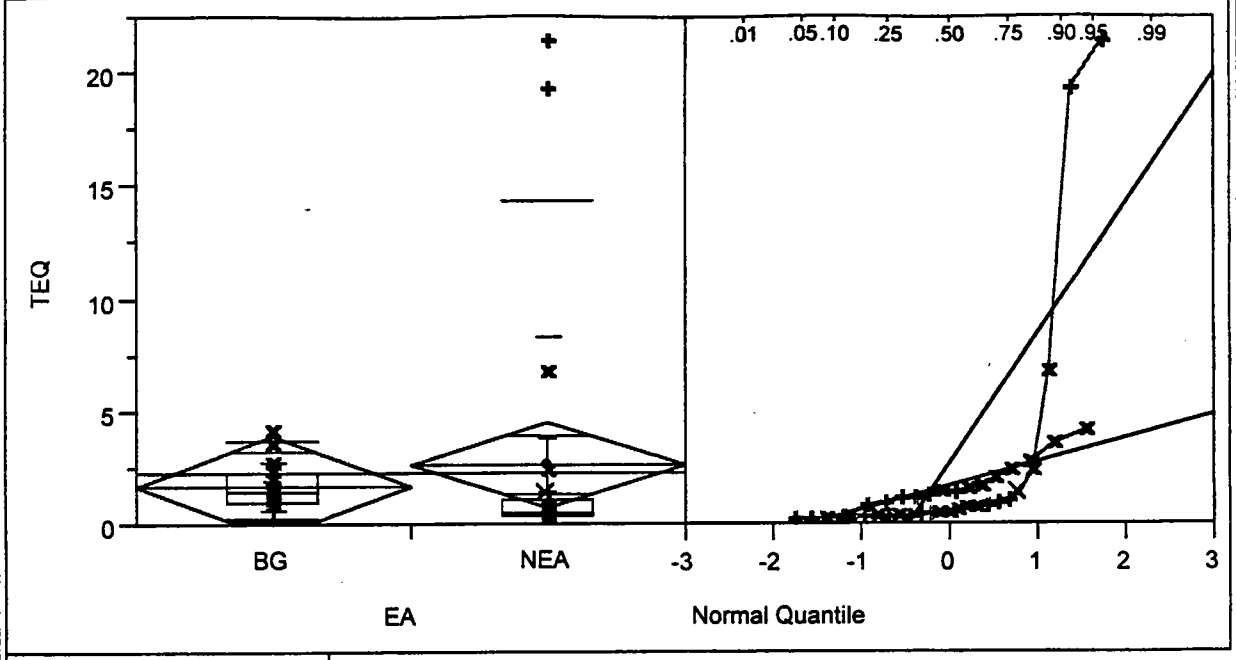
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 130 | -2.01944 | 0.0434 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.1724 | 1 | 0.0411 |

TEQ By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.2915 | 0.334165 | 1.059758 | 1.45595 | 2.292625 | 3.7679 | 4.225 |
| NEA | 0.33614 | 0.369611 | 0.43595 | 0.5852 | 1.1486 | 14.362 | 21.535 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.72244 | 1.06710 | 0.2668 |
| NEA | 23 | 2.70133 | 5.77338 | 1.2038 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 399 | 24.9375 | 2.241 |
| NEA | 23 | 381 | 16.5652 | -2.241 |

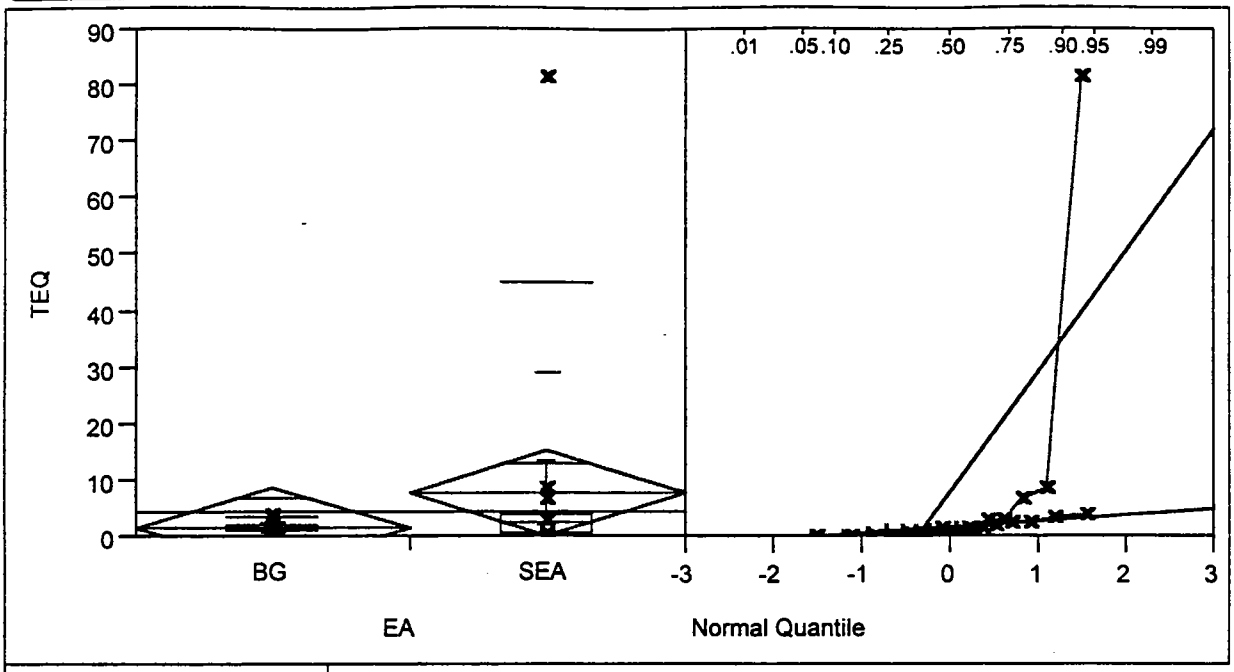
2-Sample Test; Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 399 | 2.24133 | 0.0250 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.0878 | 1 | 0.0241 |

TEQ By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.2915 | 0.334165 | 1.059758 | 1.45595 | 2.292625 | 3.7679 | 4.225 |
| SEA | 0.35273 | 0.360655 | 0.405706 | 0.66665 | 4.082125 | 45.2 | 81.7 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.72244 | 1.0671 | 0.2668 |
| SEA | 14 | 7.70929 | 21.4566 | 5.7345 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 266 | 16.6250 | 0.727 |
| SEA | 14 | 199 | 14.2143 | -0.727 |

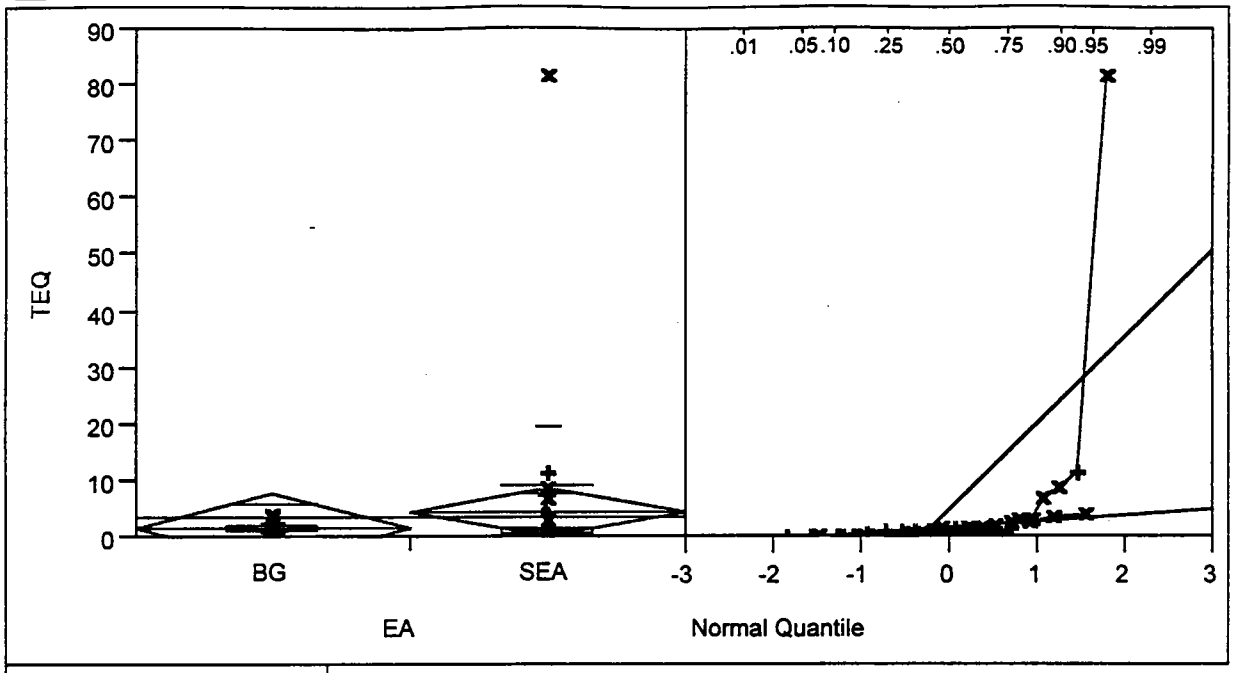
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 199 | -0.72748 | 0.4669 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.5599 | 1 | 0.4543 |

TEQ By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.2915 | 0.334165 | 1.059758 | 1.45595 | 2.292625 | 3.7679 | 4.225 |
| SEA | 0.337375 | 0.356316 | 0.429425 | 0.660625 | 1.52375 | 9.01405 | 81.7 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.72244 | 1.0671 | 0.2668 |
| SEA | 28 | 4.58930 | 15.3660 | 2.9039 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 440 | 27.5000 | 1.940 |
| SEA | 28 | 550 | 19.6429 | -1.940 |

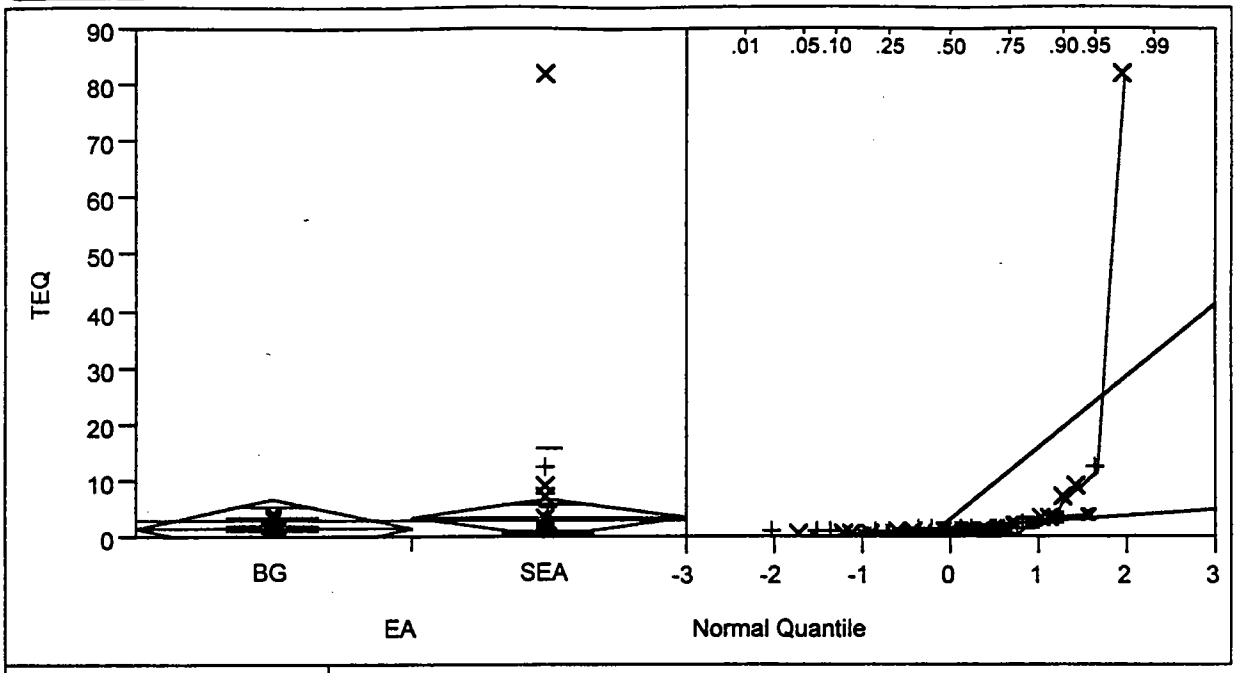
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 440 | 1.93960 | 0.0524 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.8095 | 1 | 0.0510 |

TEQ By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.2915 | 0.334165 | 1.059758 | 1.45595 | 2.292625 | 3.7679 | 4.225 |
| SEA | 0.337375 | 0.363572 | 0.47415 | 0.56315 | 0.8516 | 5.9997 | 81.7 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.72244 | 1.0671 | 0.2668 |
| SEA | 41 | 3.36317 | 12.7586 | 1.9926 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 611 | 38.1875 | 2.602 |
| SEA | 41 | 1042 | 25.4146 | -2.602 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 611 | 2.60173 | 0.0093 |

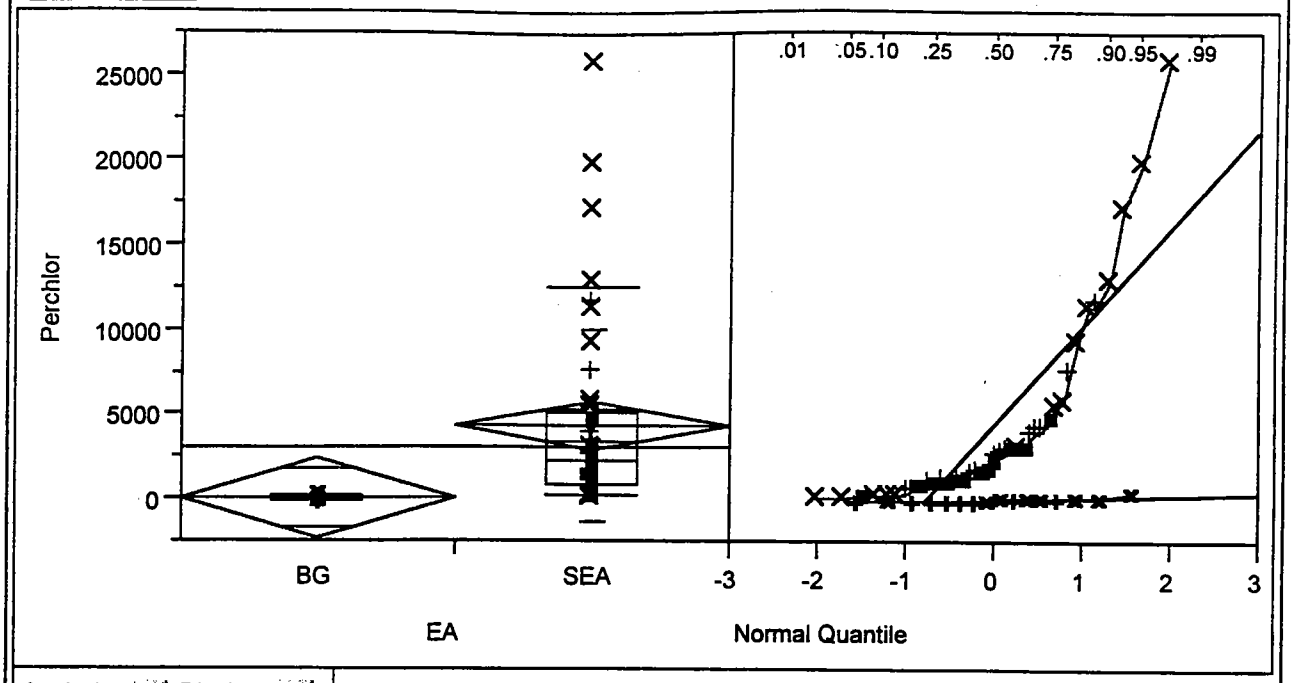
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.8153 | 1 | 0.0090 |

# TAB 7

# Perchlorate

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| SEA | 34.5 | 276.8 | 970 | 2360 | 5220 | 12572 | 25800 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.25 | 25.31 |
| SEA | 41 | 4402.46 | 5781.64 | 902.94 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 150 | 9.3750 | -5.568 |
| SEA | 41 | 1503 | 36.6585 | 5.568 |

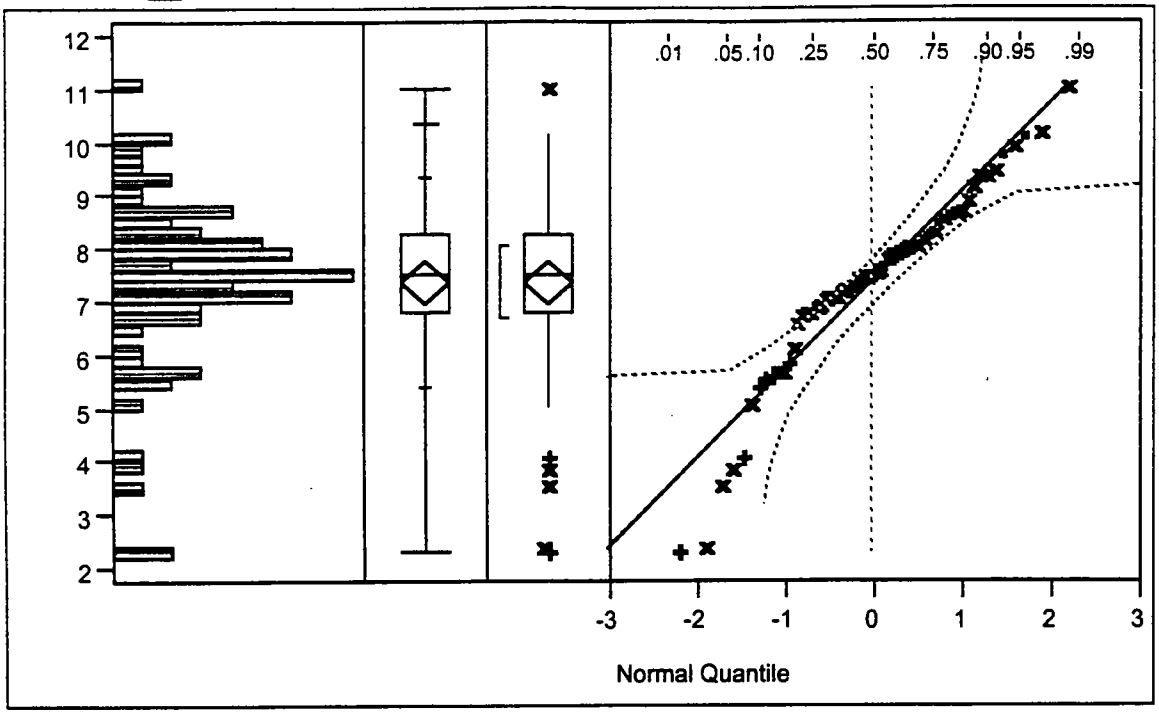
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 150 | -5.56789 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 31.1003 | 1 | <.0001 |

lnPerchlor




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 11.000 |
| | 99.5% | 11.000 |
| | 97.5% | 10.348 |
| | 90.0% | 9.348 |
| quartile | 75.0% | 8.304 |
| median | 50.0% | 7.528 |
| quartile | 25.0% | 6.848 |
| | 10.0% | 5.421 |
| | 2.5% | 2.353 |
| | 0.5% | 2.342 |
| minimum | 0.0% | 2.342 |

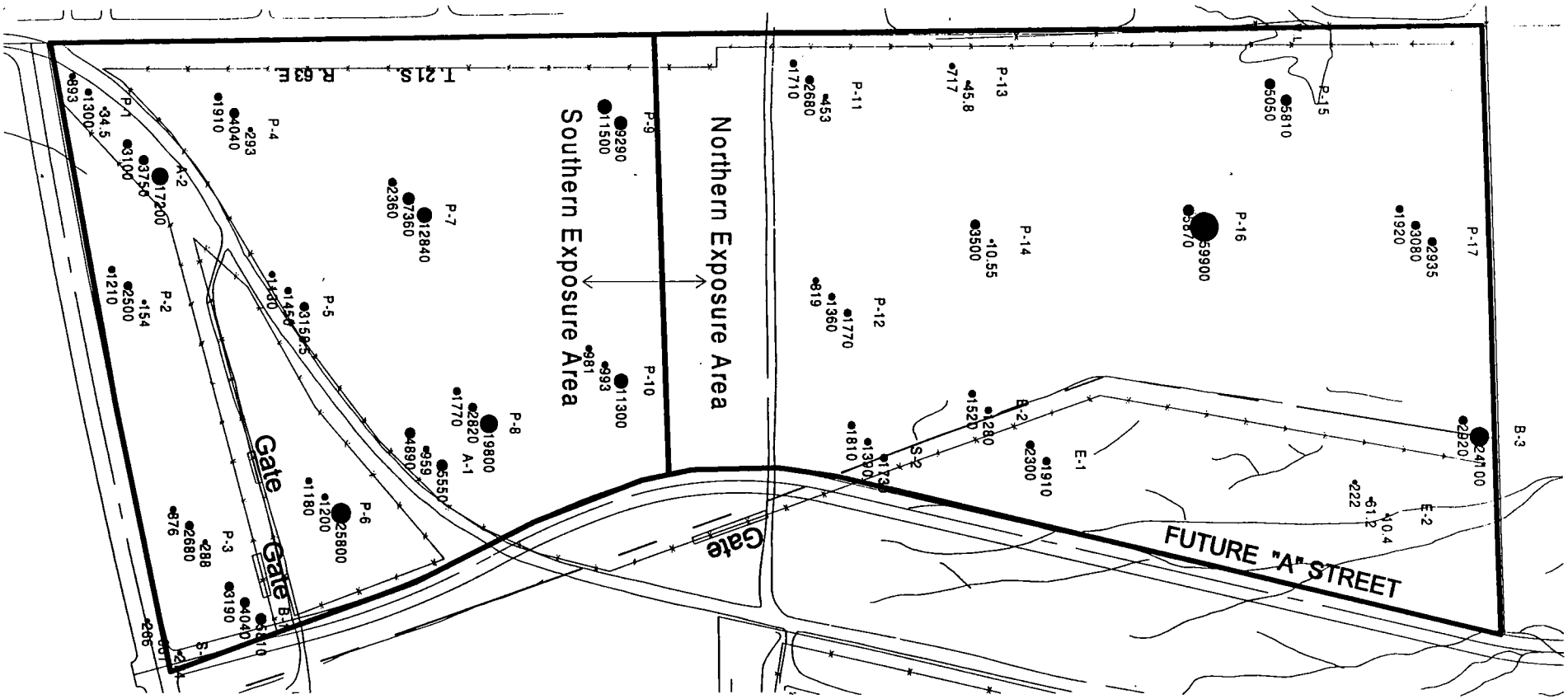
**Moments**

| | |
|---|---|
| Mean | 7.39041 |
| Std Dev | 1.66294 |
| Std Error Mean | 0.19876 |
| Upper 95% Mean | 7.78693 |
| Lower 95% Mean | 6.99390 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 517.32889 |
| Variance | 2.76536 |
| Skewness | -0.90409 |
| Kurtosis | 1.64633 |
| CV | 22.50128 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.936554 | 0.0021 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

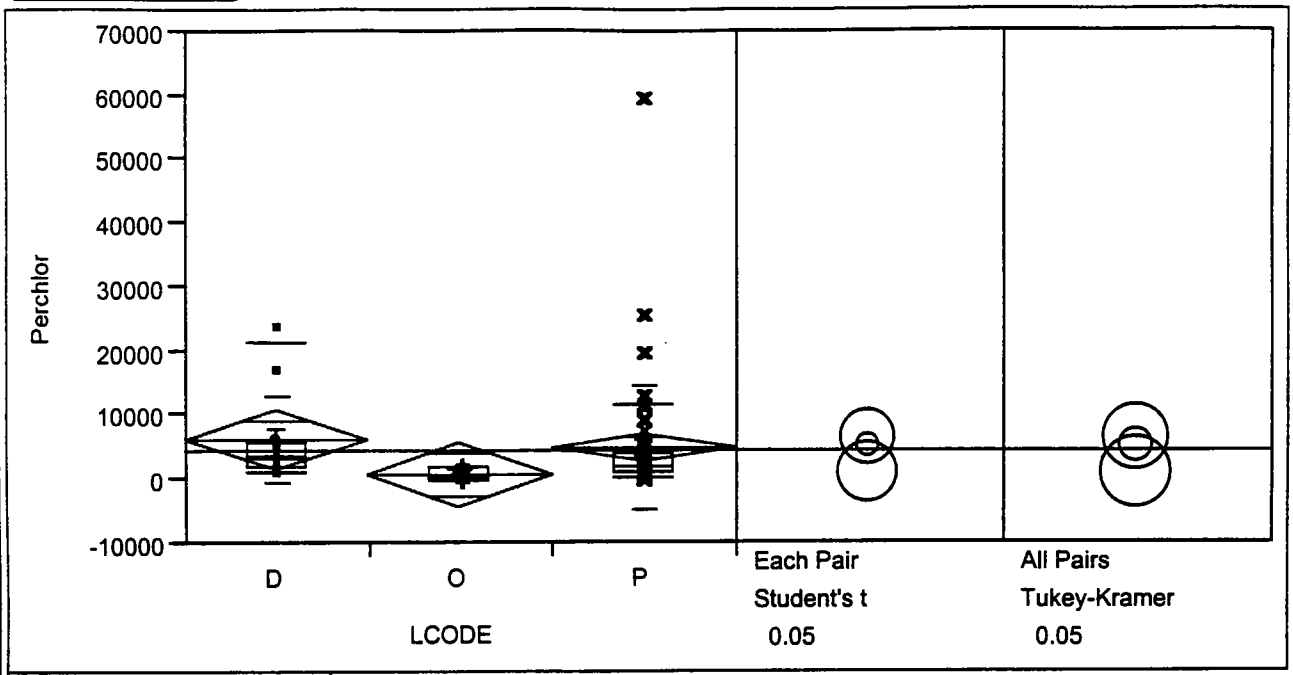
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

**Note:** Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Perchlorate µg/kg**

Perchlor By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 959 | 1087.4 | 2220 | 3750 | 5680 | 21340 | 24100 |
| O | 10.4 | 20.56 | 222 | 361 | 1810 | 2222 | 2300 |
| P | 10.55 | 247.8 | 959 | 1840 | 4292.5 | 11902 | 59900 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.035712 |
| RSquare Adj | 0.006928 |
| Root Mean Square Error | 8513.02 |
| Mean of Response | 4534.071 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 179826928 | 89913464 | 1.2407 |
| Error | 67 | 4855590587 | 72471501 | Prob>F |
| C Total | 69 | 5035417514 | 72977065 | 0.2957 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 6023.77 | 2361.1 |
| O | 11 | 939.51 | 2566.8 |
| P | 46 | 4972.64 | 1255.2 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 6023.77 | 6812.80 | 1889.5 |
| O | 11 | 939.51 | 880.85 | 265.6 |
| P | 46 | 4972.64 | 9764.86 | 1439.7 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | D | P | O |
|---|---|---|---|
| D | 0.00 | 1051.13 | 5084.26 |
| P | -1051.13 | 0.00 | 4033.13 |
| O | -5084.26 | -4033.13 | 0.00 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -6664.84 | -4286.17 | -1876.94 |
| P | -4286.17 | -3543.09 | -1669.94 |
| O | -1876.94 | -1669.94 | -7245.45 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -8003.41 | -5358.12 | -3275.03 |
| P | -5358.12 | -4254.69 | -2815.35 |
| O | -3275.03 | -2815.35 | -8700.63 |

Positive values show pairs of means that are significantly different.

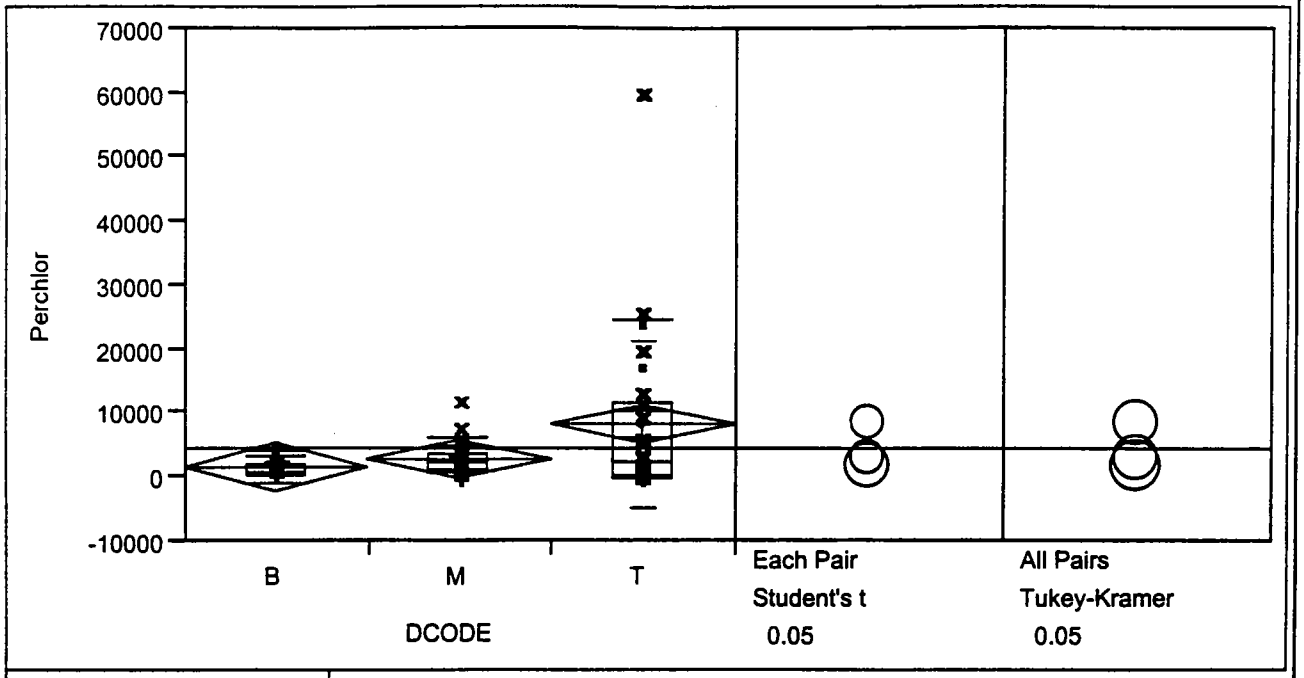
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 626 | 48.1538 | 2.477 |
| O | 11 | 212.5 | 19.3182 | -2.865 |
| P | 46 | 1646.5 | 35.7935 | 0.161 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 11.9911 | 2 | 0.0025 |

Perchlor By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 222 | 261.6 | 888.75 | 1460 | 2030 | 3360 | 4890 |
| M | 61.2 | 610.2 | 1275 | 2590 | 3822.5 | 6317 | 11500 |
| T | 10.4 | 27.315 | 284.5 | 2422.5 | 11685 | 24610 | 59900 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.1102 |
| RSquare Adj | 0.083639 |
| Root Mean Square Error | 8177.614 |
| Mean of Response | 4534.071 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 554902202 | 2.7745e8 | 4.1489 |
| Error | 67 | 4480515312 | 66873363 | Prob>F |
| C Total | 69 | 5035417514 | 72977065 | 0.0200 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1679.83 | 1927.5 |
| M | 26 | 2900.05 | 1603.8 |
| T | 26 | 8144.11 | 1603.8 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1679.83 | 1152.8 | 271.7 |
| M | 26 | 2900.05 | 2469.1 | 484.2 |
| T | 26 | 8144.11 | 13123.3 | 2573.7 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.00 | 5244.06 | 6464.27 |
| M | -5244.06 | 0.00 | 1220.21 |
| B | -6464.27 | -1220.21 | 0.00 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -4527.08 | 716.98 | 1459.40 |
| M | 716.98 | -4527.08 | -3784.66 |
| B | 1459.40 | -3784.66 | -5440.87 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -5436.30 | -192.24 | 454.22 |
| M | -192.24 | -5436.30 | -4789.84 |
| B | 454.22 | -4789.84 | -6533.61 |

Positive values show pairs of means that are significantly different.

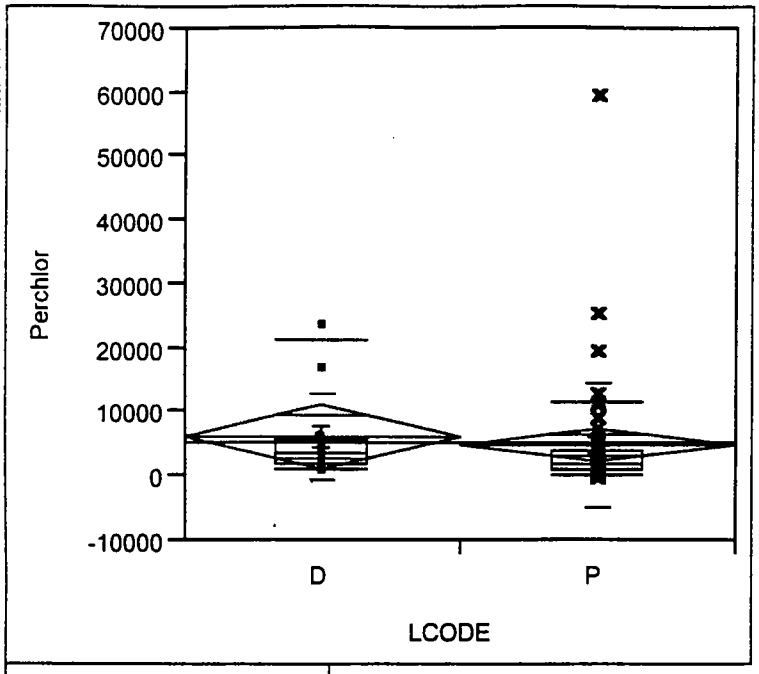
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 516 | 28.6667 | -1.646 |
| M | 26 | 984 | 37.8462 | 0.735 |
| T | 26 | 985 | 37.8846 | 0.748 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.7321 | 2 | 0.2551 |

Perchlor By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 959 | 1087.4 | 2220 | 3750 | 5680 | 21340 | 24100 |
| P | 10.55 | 247.8 | 959 | 1840 | 4292.5 | 11902 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 6023.77 | 6812.80 | 1889.5 |
| P | 46 | 4972.64 | 9764.86 | 1439.7 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 497 | 38.2308 | 1.948 |
| P | 46 | 1273 | 27.6739 | -1.948 |

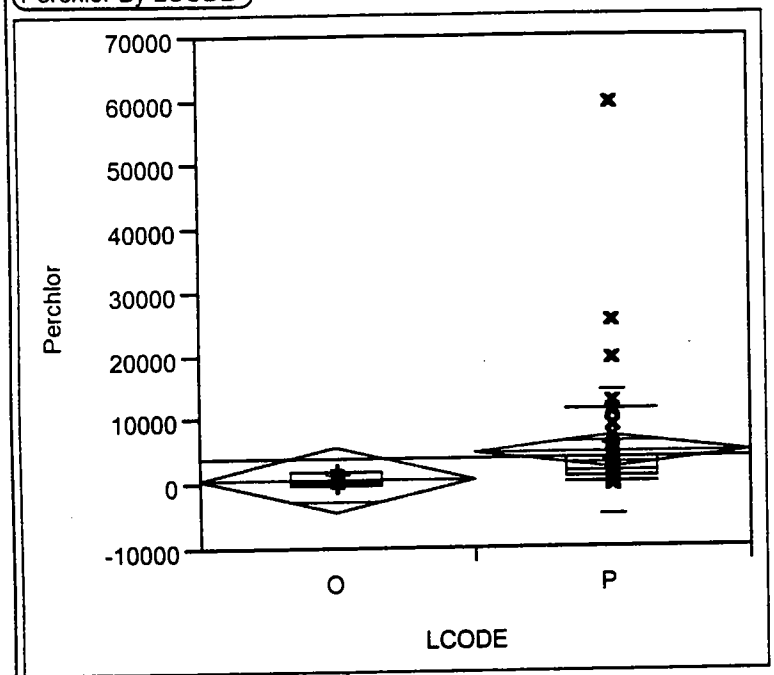
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 497 | 1.94778 | 0.0514 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.8295 | 1 | 0.0504 |

Perchlor By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 10.4 | 20.56 | 222 | 361 | 1810 | 2222 | 2300 |
| P | 10.55 | 247.8 | 959 | 1840 | 4292.5 | 11902 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 939.51 | 880.85 | 265.6 |
| P | 46 | 4972.64 | 9764.86 | 1439.7 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 198.5 | 18.0455 | -2.427 |
| P | 46 | 1454.5 | 31.6196 | 2.427 |

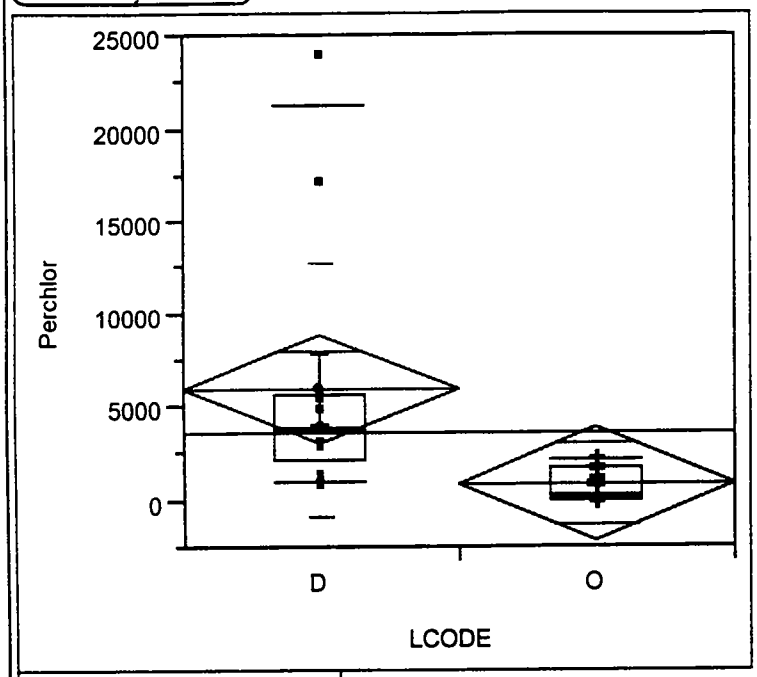
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 198.5 | -2.42663 | 0.0152 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.9377 | 1 | 0.0148 |

Perchlor By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 959 | 1087.4 | 2220 | 3750 | 5680 | 21340 | 24100 |
| O | 10.4 | 20.56 | 222 | 361 | 1810 | 2222 | 2300 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 6023.77 | 6812.80 | 1889.5 |
| O | 11 | 939.51 | 880.85 | 265.6 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 220 | 16.9231 | 3.302 |
| O | 11 | 80 | 7.2727 | -3.302 |

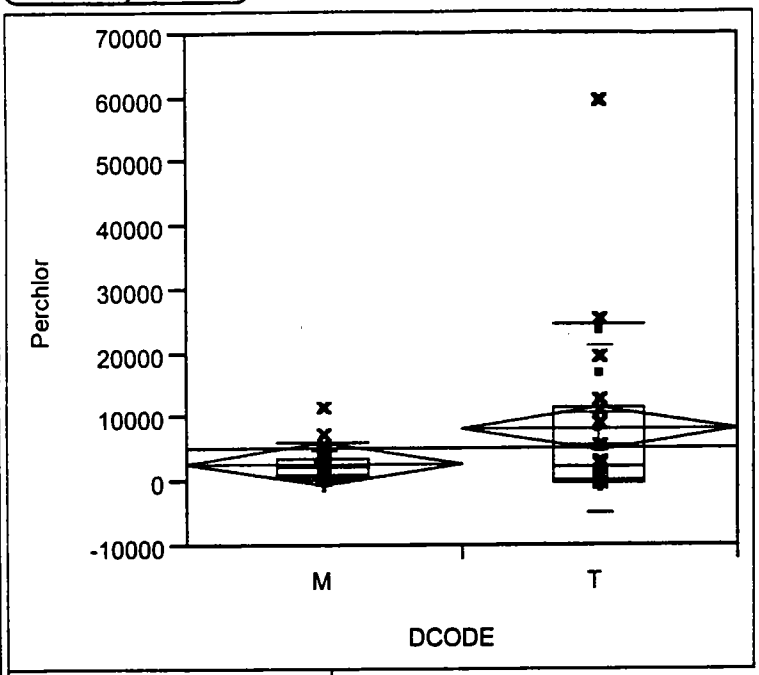
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 80 | -3.30238 | 0.0010 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 11.0979 | 1 | 0.0009 |

Perchlor By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 61.2 | 610.2 | 1275 | 2590 | 3822.5 | 6317 | 11500 |
| T | 10.4 | 27.315 | 284.5 | 2422.5 | 11685 | 24610 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 2900.05 | 2469.1 | 484.2 |
| T | 26 | 8144.11 | 13123.3 | 2573.7 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 672 | 25.8462 | -0.302 |
| T | 26 | 706 | 27.1538 | 0.302 |

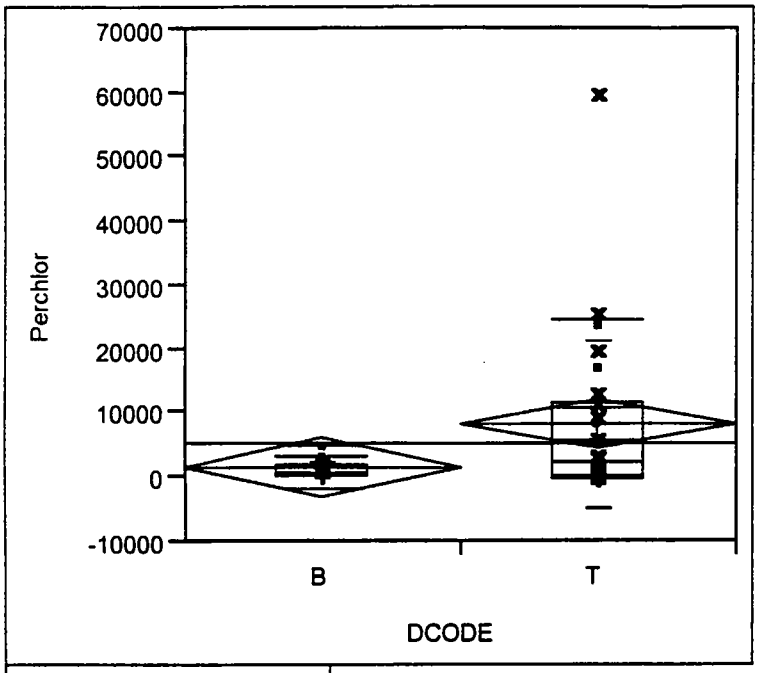
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 706 | 0.30199 | 0.7627 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0968 | 1 | 0.7557 |

Perchlor By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 222 | 261.6 | 888.75 | 1460 | 2030 | 3360 | 4890 |
| T | 10.4 | 27.315 | 284.5 | 2422.5 | 11685 | 24610 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1679.83 | 1152.8 | 271.7 |
| T | 26 | 8144.11 | 13123.3 | 2573.7 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 360 | 20.0000 | -1.062 |
| T | 26 | 630 | 24.2308 | 1.062 |

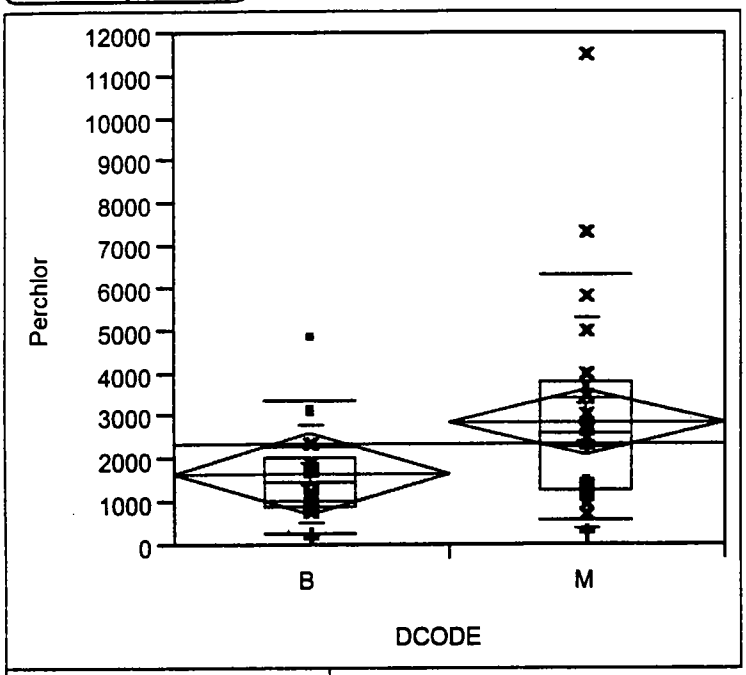
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 360 | -1.06235 | 0.2881 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.1541 | 1 | 0.2827 |

Perchlor By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 222 | 261.6 | 888.75 | 1460 | 2030 | 3360 | 4890 |
| M | 61.2 | 610.2 | 1275 | 2590 | 3822.5 | 6317 | 11500 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1679.83 | 1152.84 | 271.73 |
| M | 26 | 2900.05 | 2469.14 | 484.24 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 327 | 18.1667 | -1.850 |
| M | 26 | 663 | 25.5000 | 1.850 |

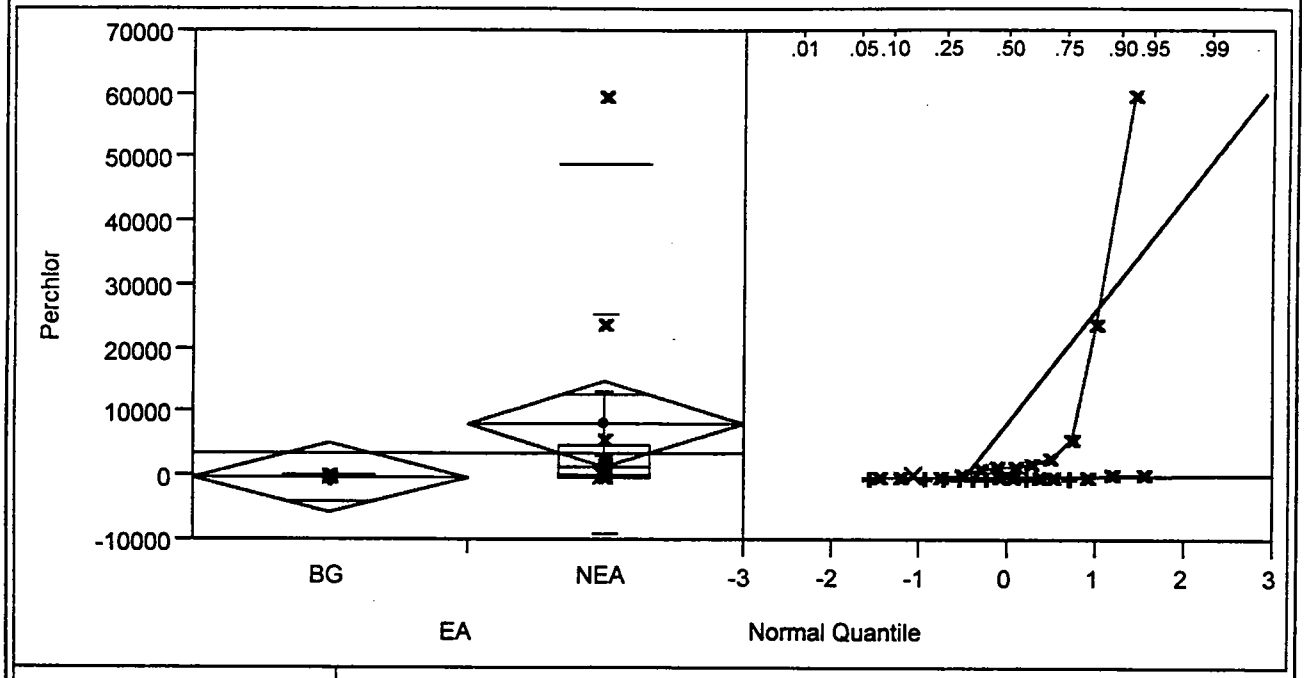
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 327 | -1.85009 | 0.0643 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.4672 | 1 | 0.0626 |

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| NEA | 10.4 | 10.445 | 147.6 | 1750 | 5091.25 | 49160 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.3 | 25.3 |
| NEA | 12 | 8329.56 | 17555.7 | 5067.9 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 158 | 9.8750 | -3.414 |
| NEA | 12 | 248 | 20.6667 | 3.414 |

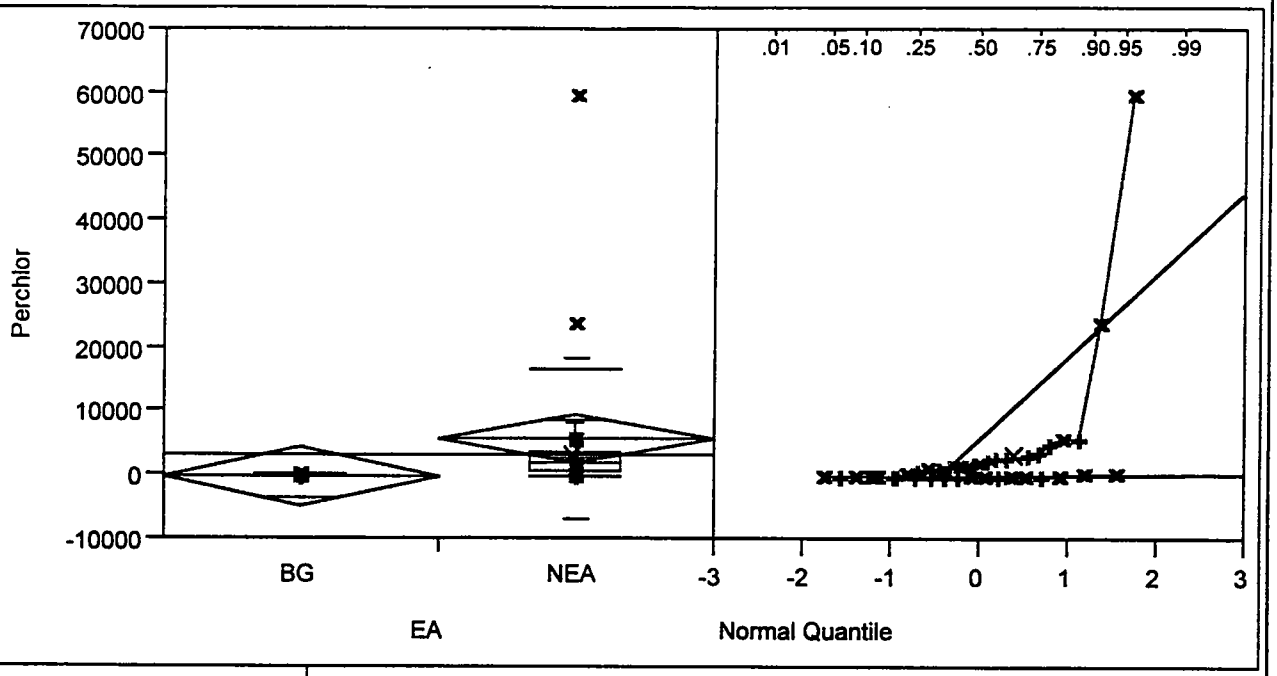
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 248 | 3.41355 | 0.0006 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 11.8114 | 1 | 0.0006 |

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| NEA | 10.4 | 24.65 | 717 | 1910 | 3500 | 16808 | 59900 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.3 | 25.3 |
| NEA | 23 | 5609.26 | 12803.6 | 2669.7 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 161 | 10.0625 | -4.526 |
| NEA | 23 | 619 | 26.9130 | 4.526 |

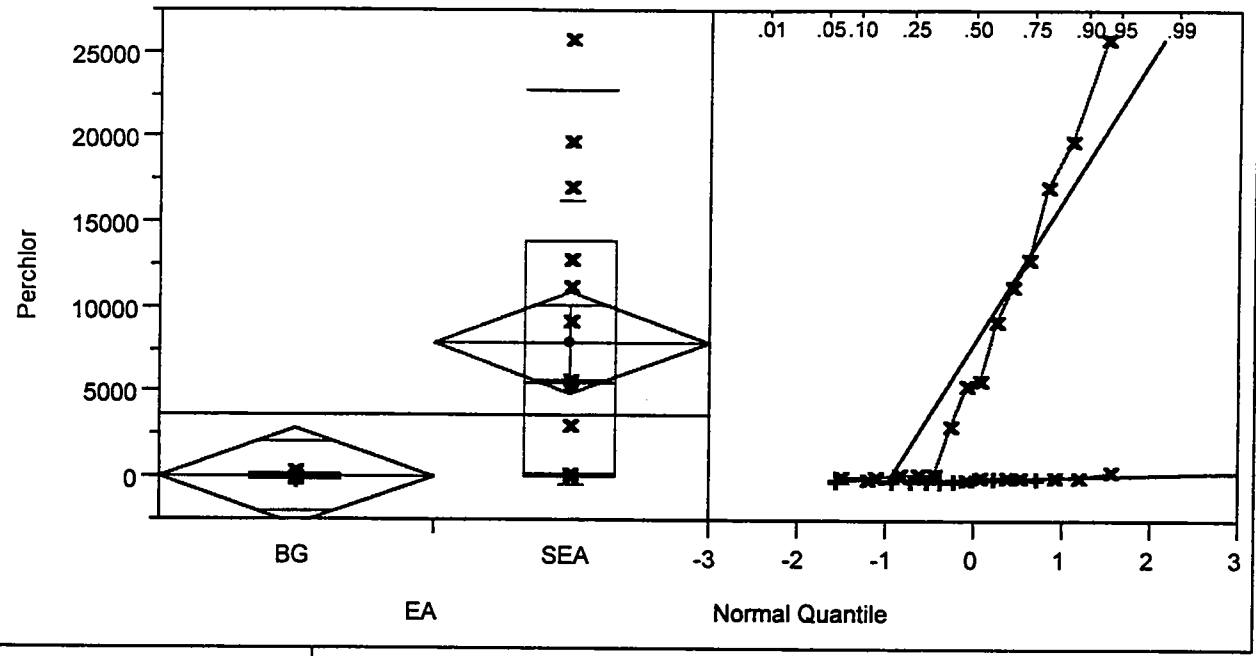
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 161 | -4.52618 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 20.6158 | 1 | <.0001 |

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| SEA | 34.5 | 94.25 | 284.5 | 5680 | 13930 | 22800 | 25800 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.25 | 25.3 |
| SEA | 14 | 7985.14 | 8387.30 | 2241.6 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 148 | 9.2500 | -4.138 |
| SEA | 14 | 317 | 22.6429 | 4.138 |

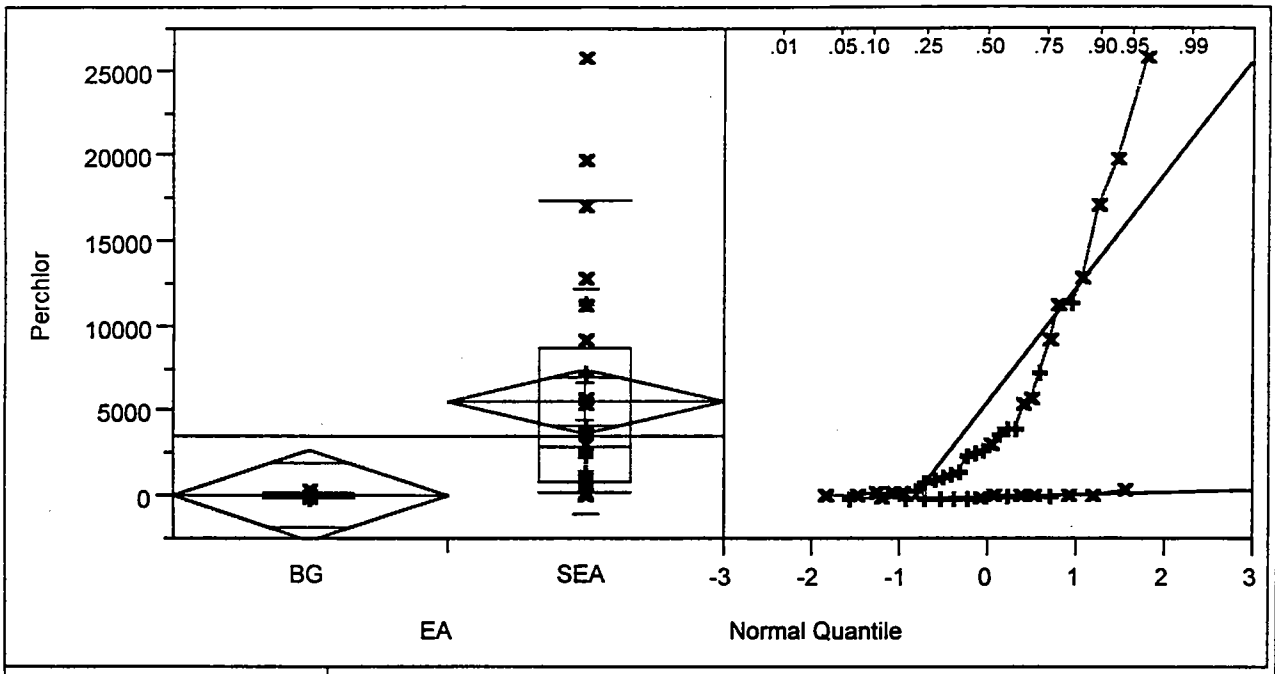
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 317 | 4.13765 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 17.2926 | 1 | <.0001 |

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| SEA | 34.5 | 262 | 967.5 | 2989.25 | 8807.5 | 17460 | 25800 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.25 | 25.3 |
| SEA | 28 | 5598.04 | 6643.01 | 1255.4 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 149 | 9.3125 | -5.136 |
| SEA | 28 | 841 | 30.0357 | 5.136 |

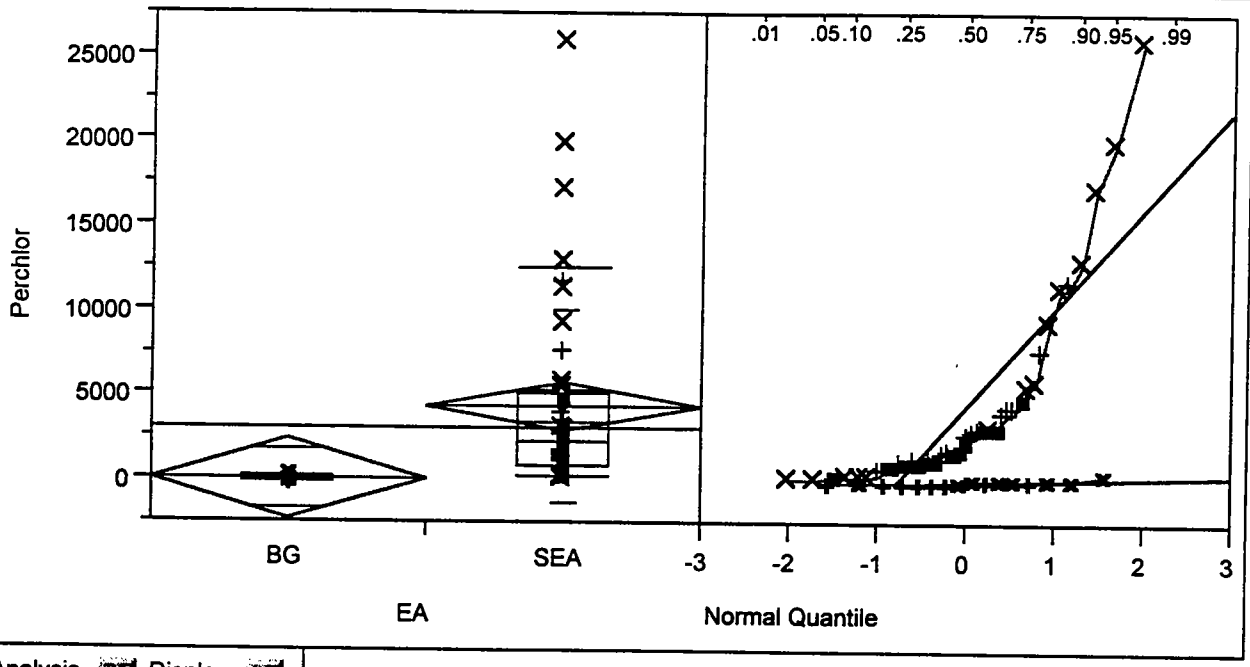
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 149 | -5.13640 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 26.5081 | 1 | <.0001 |

Perchlor By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 9.35 | 9.35 | 9.45 | 28.8 | 54.475 | 248.85 | 402.5 |
| SEA | 34.5 | 276.8 | 970 | 2360 | 5220 | 12572 | 25800 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 60.04 | 101.25 | 25.31 |
| SEA | 41 | 4402.46 | 5781.64 | 902.94 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 150 | 9.3750 | -5.568 |
| SEA | 41 | 1503 | 36.6585 | 5.568 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 150 | -5.56789 | <.0001 |

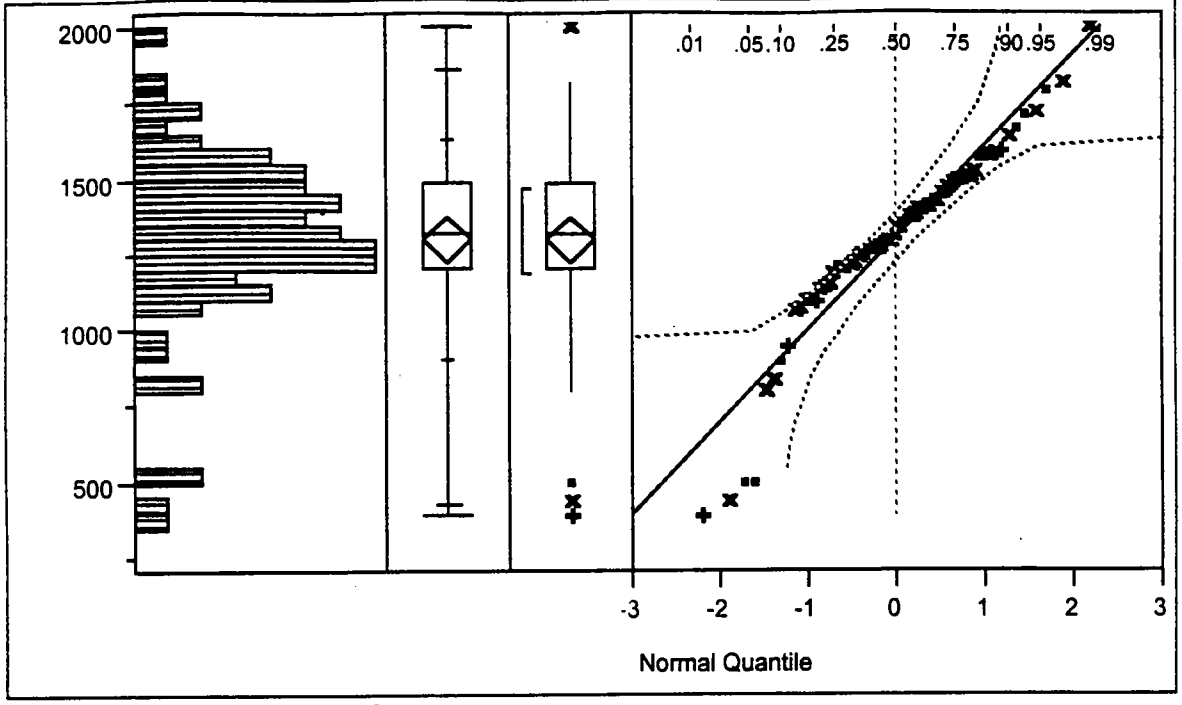
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 31.1003 | 1 | <.0001 |

# TAB 8

# Actinium 228

Ac228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 2000.0 |
| | 99.5% | 2000.0 |
| | 97.5% | 1860.5 |
| | 90.0% | 1636.0 |
| quartile | 75.0% | 1492.5 |
| median | 50.0% | 1325.0 |
| quartile | 25.0% | 1205.0 |
| | 10.0% | 905.0 |
| | 2.5% | 431.8 |
| | 0.5% | 395.0 |
| minimum | 0.0% | 395.0 |

**Moments**

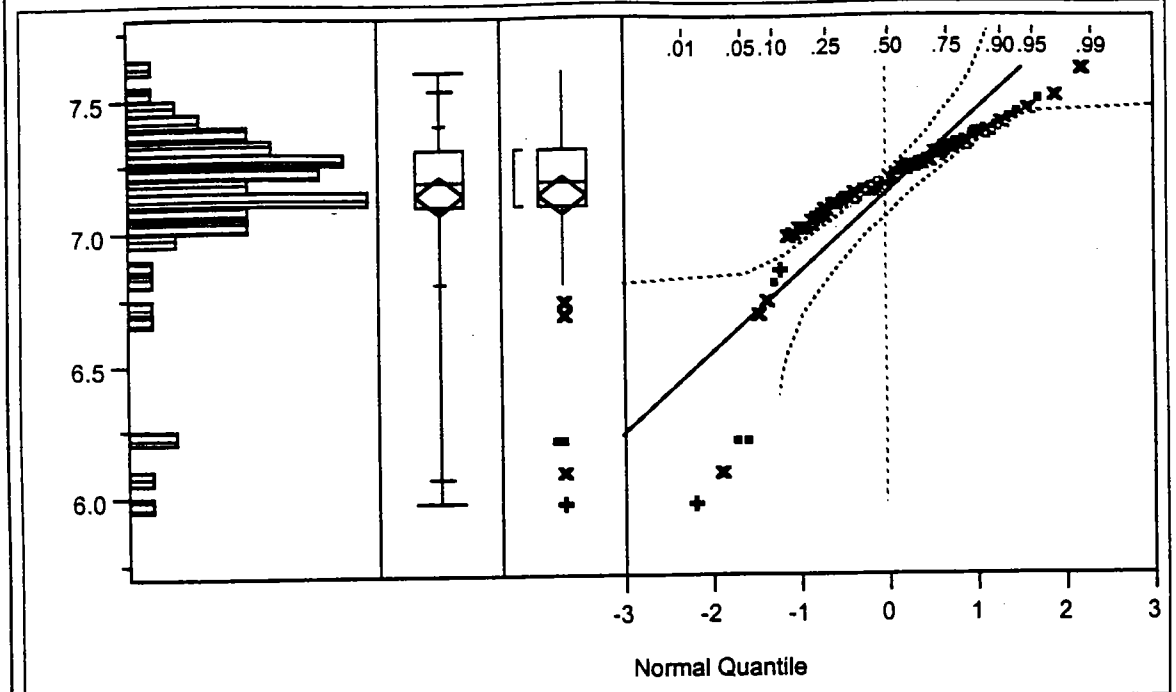
| | |
|---|---|
| Mean | 1303.321 |
| Std Dev | 304.730 |
| Std Error Mean | 36.422 |
| Upper 95% Mean | 1375.982 |
| Lower 95% Mean | 1230.661 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 91232.500 |
| Variance | 92860.638 |
| Skewness | -0.959 |
| Kurtosis | 1.860 |
| CV | 23.381 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.928160 | 0.0006 |

lnAc228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 7.6009 |
| | 99.5% | 7.6009 |
| | 97.5% | 7.5278 |
| | 90.0% | 7.4000 |
| quartile | 75.0% | 7.3082 |
| median | 50.0% | 7.1891 |
| quartile | 25.0% | 7.0942 |
| | 10.0% | 6.8078 |
| | 2.5% | 6.0669 |
| | 0.5% | 5.9789 |
| minimum | 0.0% | 5.9789 |

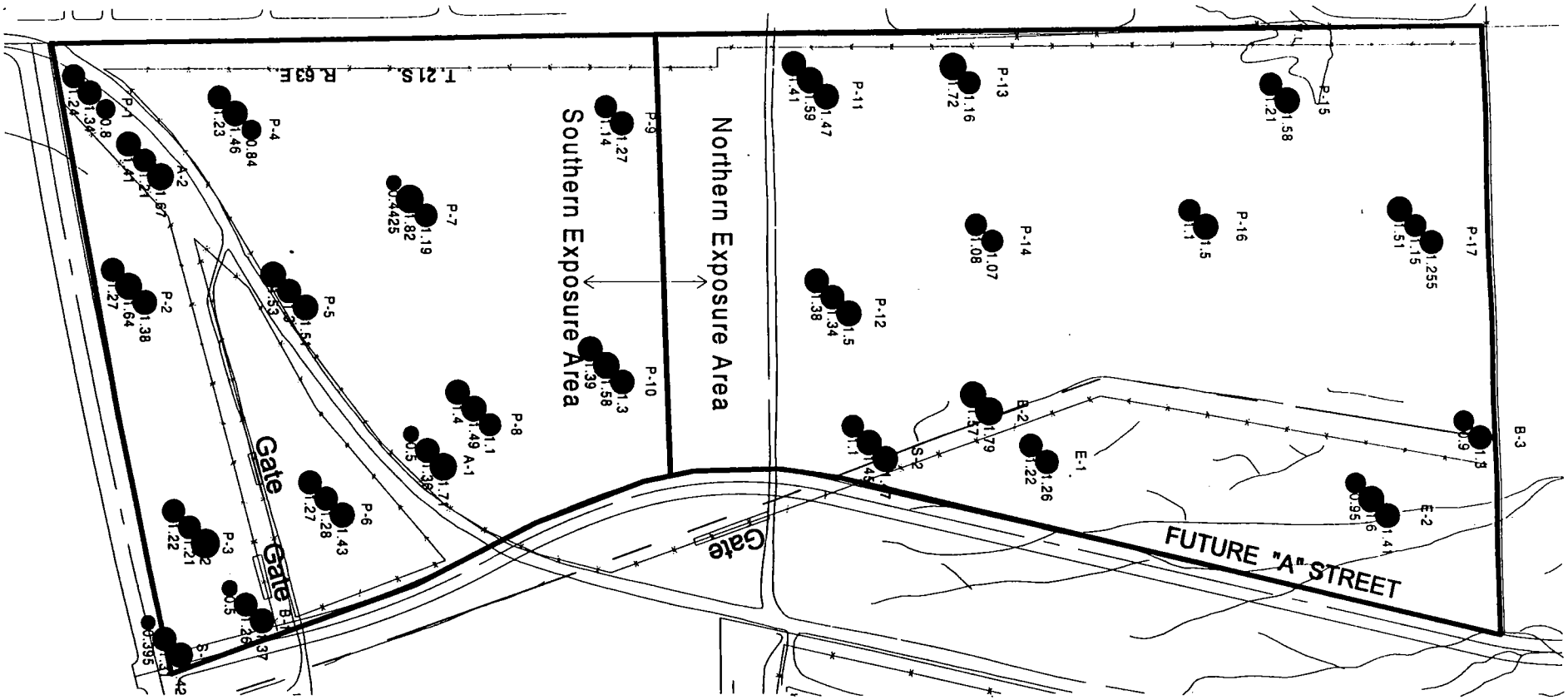
**Moments**

| | |
|---|---|
| Mean | 7.13544 |
| Std Dev | 0.30310 |
| Std Error Mean | 0.03623 |
| Upper 95% Mean | 7.20771 |
| Lower 95% Mean | 7.06317 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 499.48063 |
| Variance | 0.09187 |
| Skewness | -2.16877 |
| Kurtosis | 5.54932 |
| CV | 4.24780 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.782370 | <.0001 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

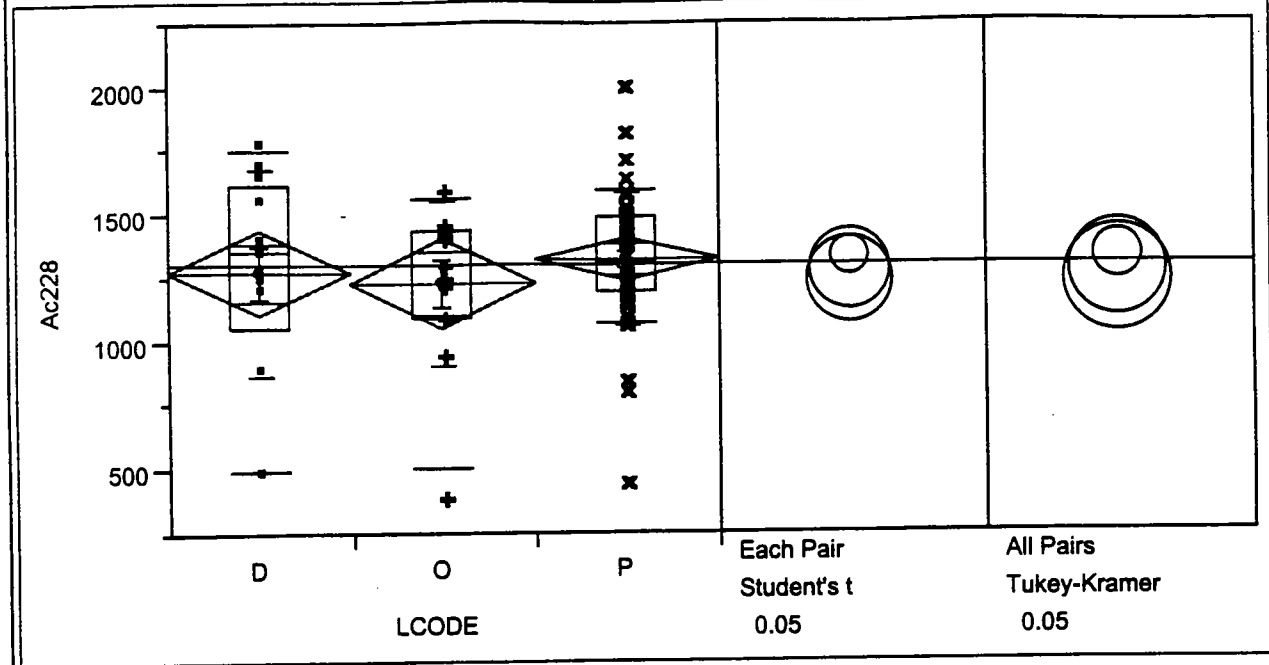
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Actinium 228 pCi/g**

Ac228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 500 | 500 | 1055 | 1360 | 1620 | 1758 | 1790 |
| O | 395 | 506 | 1100 | 1310 | 1450 | 1574 | 1600 |
| P | 442.5 | 1077 | 1205 | 1320 | 1500 | 1605 | 2000 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.014315 |
| RSquare Adj | -0.01511 |
| Root Mean Square Error | 307.0238 |
| Mean of Response | 1303.321 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 91723.8 | 45861.9 | 0.4865 |
| Error | 67 | 6315660.2 | 94263.6 | Prob>F |
| C Total | 69 | 6407384.0 | 92860.6 | 0.6169 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 1273.08 | 85.153 |
| O | 11 | 1235.00 | 92.571 |
| P | 46 | 1328.21 | 45.268 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1273.08 | 416.221 | 115.44 |
| O | 11 | 1235.00 | 333.324 | 100.50 |
| P | 46 | 1328.21 | 263.554 | 38.86 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | P | D | O |
|---|---|---|---|
| P | 0.0000 | 55.1296 | 93.2065 |
| D | -55.1296 | 0.0000 | 38.0769 |
| O | -93.2065 | -38.0769 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | P | D | O |
|---|---|---|---|
| P | -127.782 | -137.361 | -112.476 |
| D | -137.361 | -240.369 | -212.980 |
| O | -112.476 | -212.980 | -261.309 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | P | D | O |
|---|---|---|---|
| P | -153.446 | -176.021 | -153.785 |
| D | -176.021 | -288.645 | -263.403 |
| O | -153.785 | -263.403 | -313.790 |

Positive values show pairs of means that are significantly different.

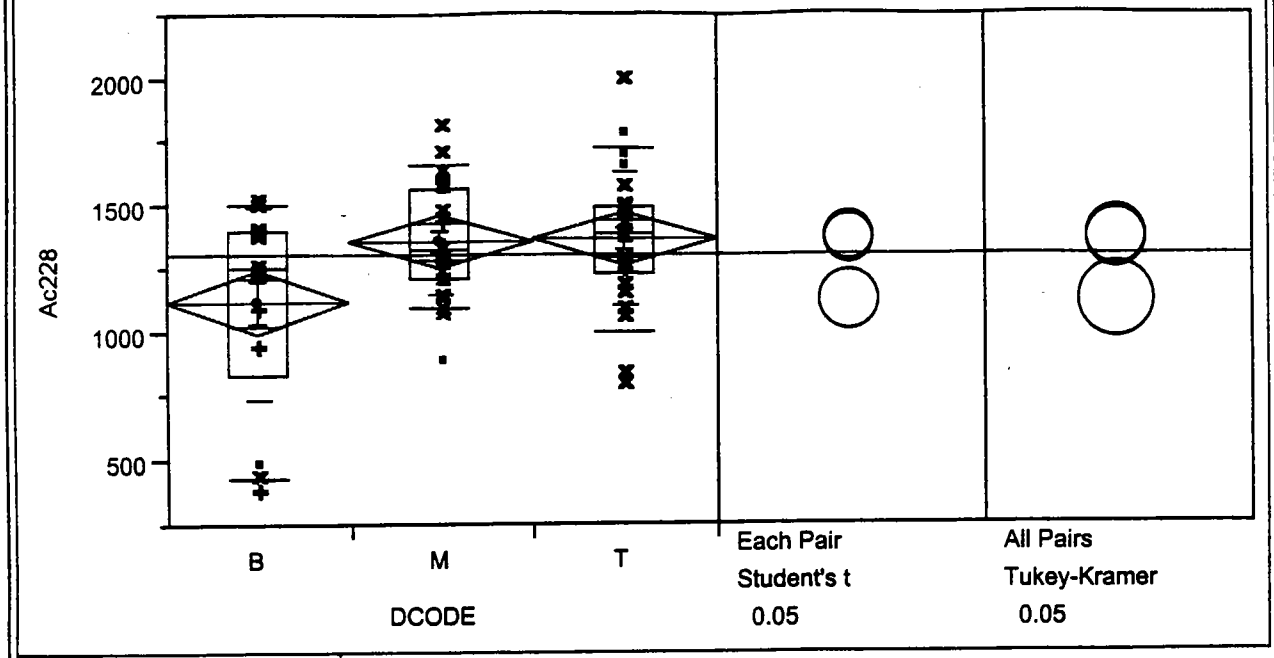
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 472.5 | 36.3462 | 0.159 |
| O | 11 | 359.5 | 32.6818 | -0.492 |
| P | 46 | 1653 | 35.9348 | 0.241 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.2545 | 2 | 0.8805 |

Ac228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 395 | 437.75 | 837.5 | 1255 | 1402.5 | 1512 | 1530 |
| M | 900 | 1094 | 1210 | 1325 | 1572.5 | 1664 | 1820 |
| T | 800 | 1001 | 1238.75 | 1395 | 1502.5 | 1734 | 2000 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.128597 |
| RSquare Adj | 0.102585 |
| Root Mean Square Error | 288.6772 |
| Mean of Response | 1303.321 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 823972.0 | 411986 | 4.9438 |
| Error | 67 | 5583412.0 | 83335 | Prob>F |
| C Total | 69 | 6407384.0 | 92861 | 0.0099 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1119.31 | 68.042 |
| M | 26 | 1358.85 | 56.614 |
| T | 26 | 1375.19 | 56.614 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1119.31 | 388.929 | 91.672 |
| M | 26 | 1358.85 | 220.732 | 43.289 |
| T | 26 | 1375.19 | 267.867 | 52.533 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.000 | 16.346 | 255.887 |
| M | -16.346 | 0.000 | 239.541 |
| B | -255.887 | -239.541 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -159.810 | -143.464 | 79.210 |
| M | -143.464 | -159.810 | 62.864 |
| B | 79.210 | 62.864 | -192.068 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -191.906 | -175.560 | 43.726 |
| M | -175.560 | -191.906 | 27.380 |
| B | 43.726 | 27.380 | -230.643 |

Positive values show pairs of means that are significantly different.

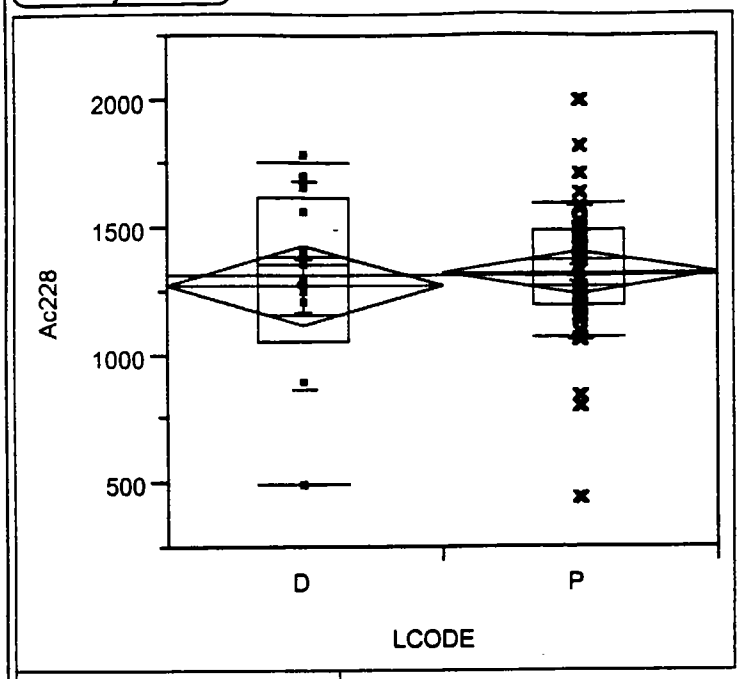
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 486.5 | 27.0278 | -2.043 |
| M | 26 | 969.5 | 37.2885 | 0.559 |
| T | 26 | 1029 | 39.5769 | 1.283 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.3660 | 2 | 0.1127 |

Ac228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 500 | 500 | 1055 | 1360 | 1620 | 1758 | 1790 |
| P | 442.5 | 1077 | 1205 | 1320 | 1500 | 1605 | 2000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1273.08 | 416.221 | 115.44 |
| P | 46 | 1328.21 | 263.554 | 38.86 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 395.5 | 30.4231 | 0.091 |
| P | 46 | 1374.5 | 29.8804 | -0.091 |

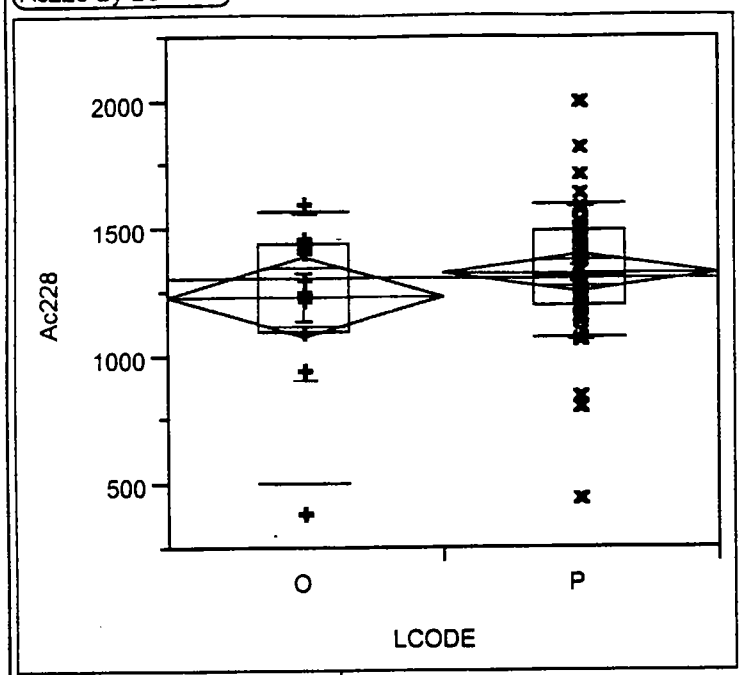
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 395.5 | 0.09147 | 0.9271 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0101 | 1 | 0.9199 |

Ac228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 395 | 506 | 1100 | 1310 | 1450 | 1574 | 1600 |
| P | 442.5 | 1077 | 1205 | 1320 | 1500 | 1605 | 2000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 1235.00 | 333.324 | 100.50 |
| P | 46 | 1328.21 | 263.554 | 38.86 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 293.5 | 26.6818 | -0.506 |
| P | 46 | 1359.5 | 29.5543 | 0.506 |

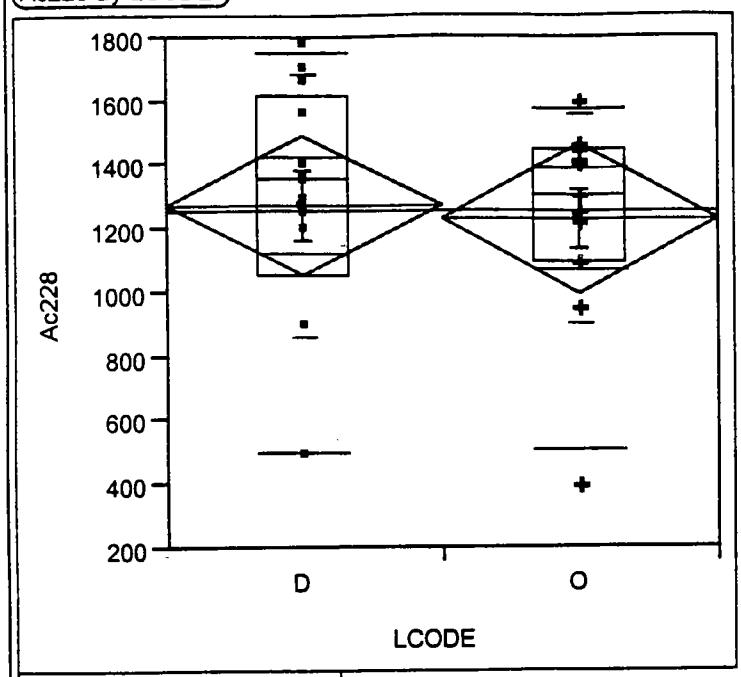
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 293.5 | -0.50567 | 0.6131 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.2660 | 1 | 0.6060 |

Ac228 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 500 | 500 | 1055 | 1360 | 1620 | 1758 | 1790 |
| O | 395 | 506 | 1100 | 1310 | 1450 | 1574 | 1600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1273.08 | 416.221 | 115.44 |
| O | 11 | 1235.00 | 333.324 | 100.50 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 168 | 12.9231 | 0.290 |
| O | 11 | 132 | 12.0000 | -0.290 |

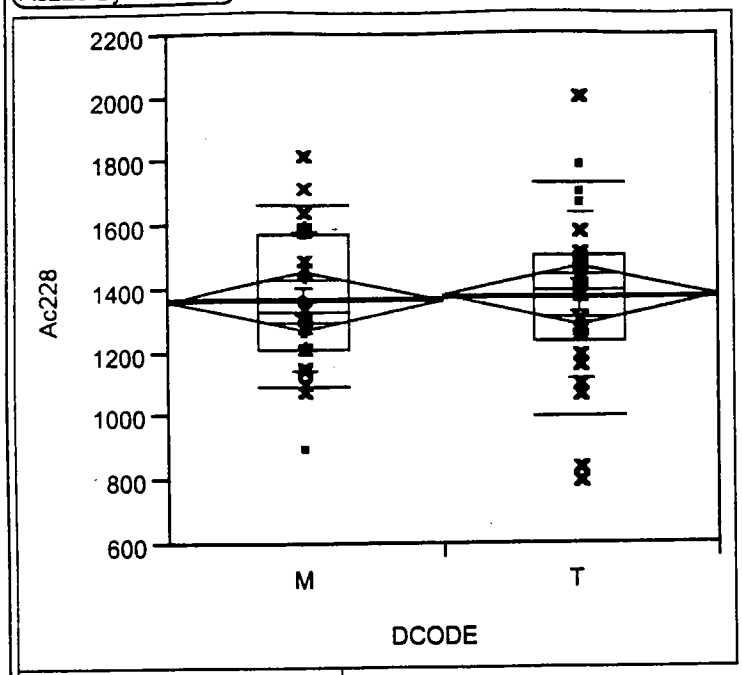
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 132 | -0.28987 | 0.7719 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1017 | 1 | 0.7498 |

Ac228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 900 | 1094 | 1210 | 1325 | 1572.5 | 1664 | 1820 |
| T | 800 | 1001 | 1238.75 | 1395 | 1502.5 | 1734 | 2000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 1358.85 | 220.732 | 43.289 |
| T | 26 | 1375.19 | 267.867 | 52.533 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 669.5 | 25.7500 | -0.348 |
| T | 26 | 708.5 | 27.2500 | 0.348 |

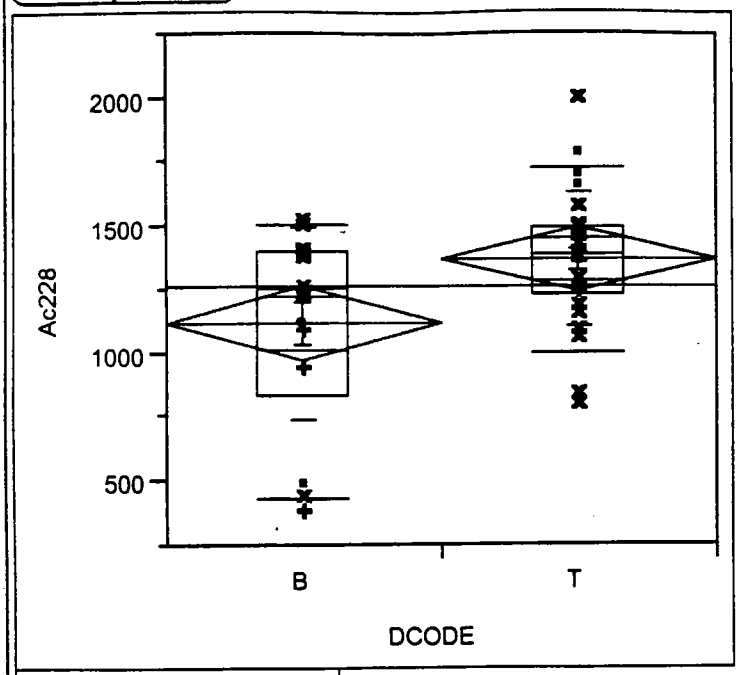
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 708.5 | 0.34783 | 0.7280 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1274 | 1 | 0.7211 |

Ac228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 395 | 437.75 | 837.5 | 1255 | 1402.5 | 1512 | 1530 |
| T | 800 | 1001 | 1238.75 | 1395 | 1502.5 | 1734 | 2000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1119.31 | 388.929 | 91.672 |
| T | 26 | 1375.19 | 267.867 | 52.533 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 318.5 | 17.6944 | -2.054 |
| T | 26 | 671.5 | 25.8269 | 2.054 |

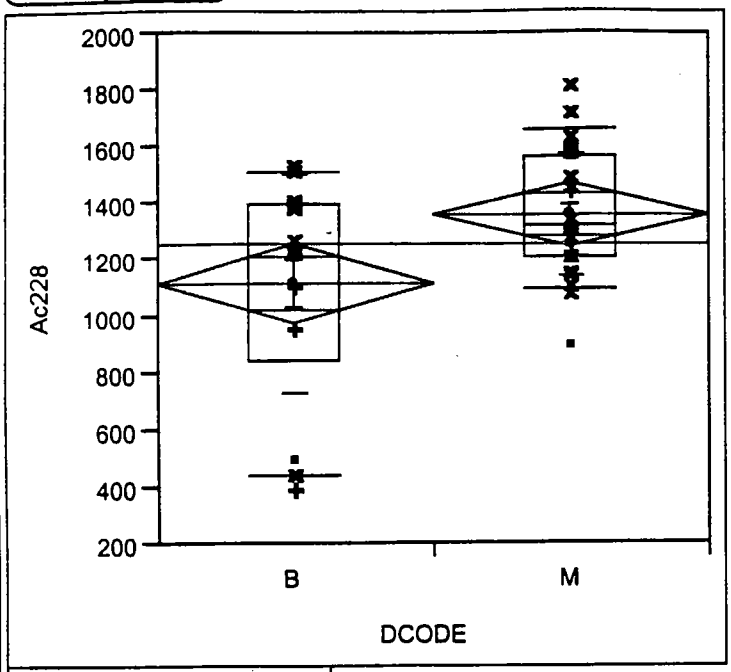
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 318.5 | -2.05395 | 0.0400 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.2679 | 1 | 0.0388 |

Ac228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 395 | 437.75 | 837.5 | 1255 | 1402.5 | 1512 | 1530 |
| M | 900 | 1094 | 1210 | 1325 | 1572.5 | 1664 | 1820 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1119.31 | 388.929 | 91.672 |
| M | 26 | 1358.85 | 220.732 | 43.289 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 339 | 18.8333 | -1.564 |
| M | 26 | 651 | 25.0385 | 1.564 |

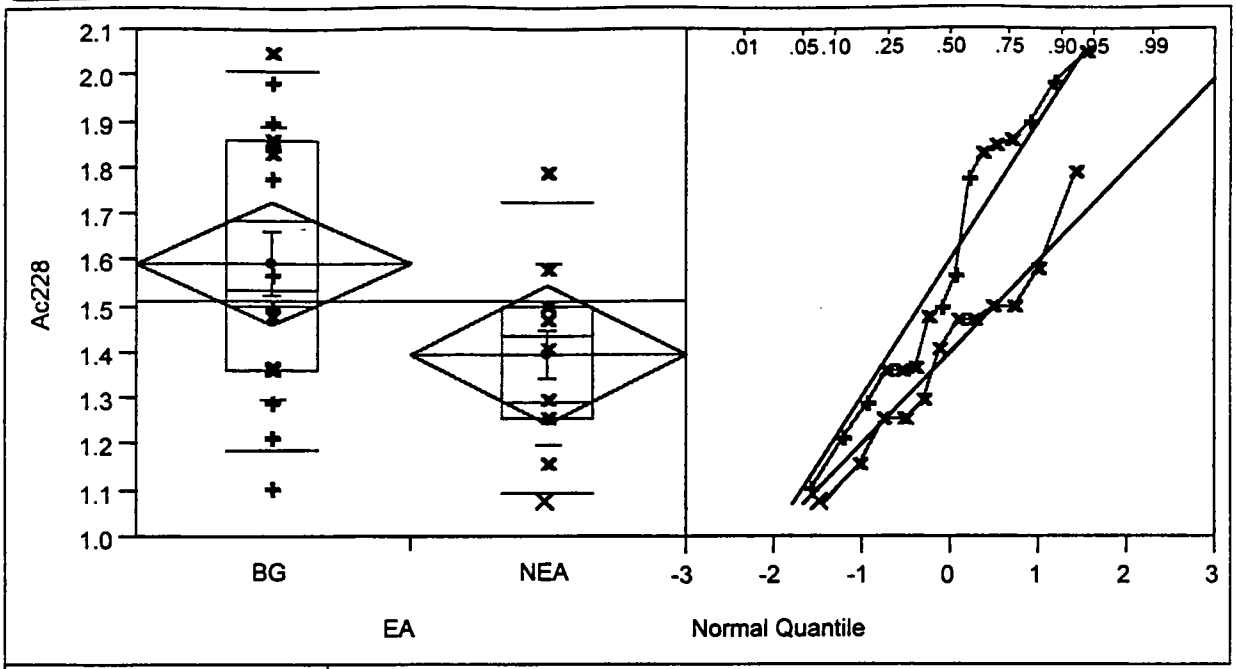
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 339 | -1.56407 | 0.1178 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.4838 | 1 | 0.1150 |

Ac228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.11 | 1.187 | 1.36 | 1.535 | 1.8575 | 2.008 | 2.05 |
| NEA | 1.07 | 1.097 | 1.25625 | 1.44 | 1.5 | 1.727 | 1.79 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.59500 | 0.298172 | 0.07454 |
| NEA | 12 | 1.39708 | 0.198041 | 0.05717 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 268 | 16.7500 | 1.649 |
| NEA | 12 | 138 | 11.5000 | -1.649 |

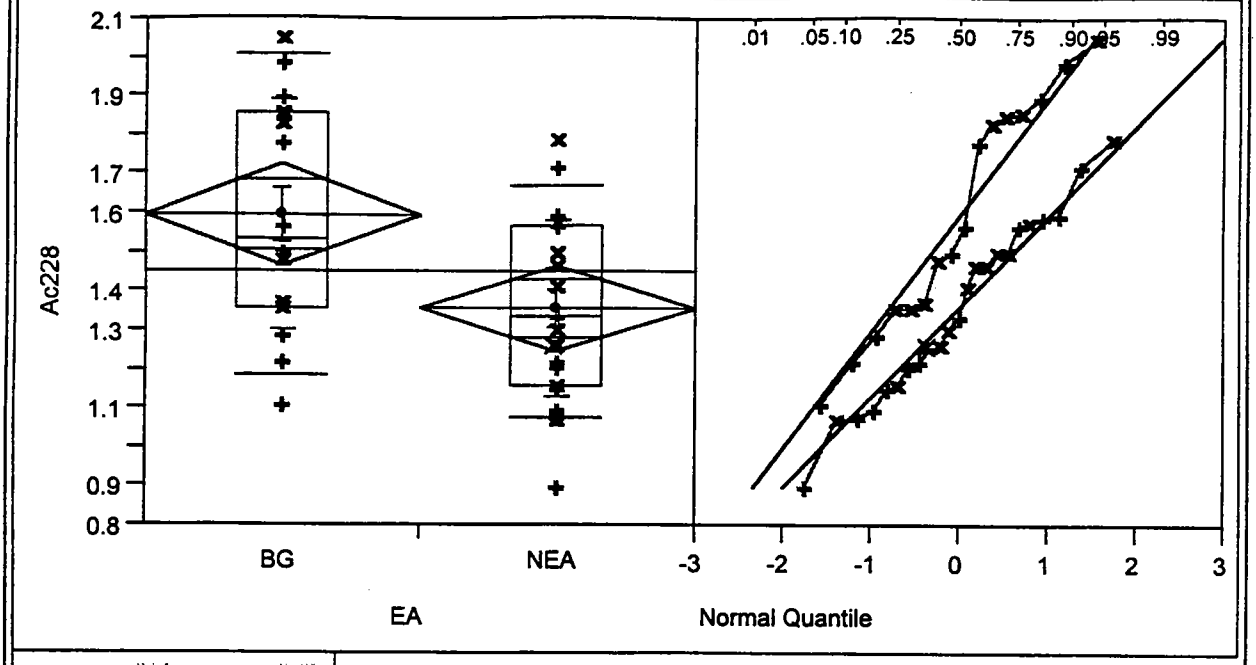
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 138 | -1.64940 | 0.0991 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.7977 | 1 | 0.0944 |

Ac228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.11 | 1.187 | 1.36 | 1.535 | 1.8575 | 2.008 | 2.05 |
| NEA | 0.9 | 1.074 | 1.16 | 1.34 | 1.57 | 1.672 | 1.79 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.59500 | 0.298172 | 0.07454 |
| NEA | 23 | 1.35848 | 0.231229 | 0.04821 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 402 | 25.1250 | 2.328 |
| NEA | 23 | 378 | 16.4348 | -2.328 |

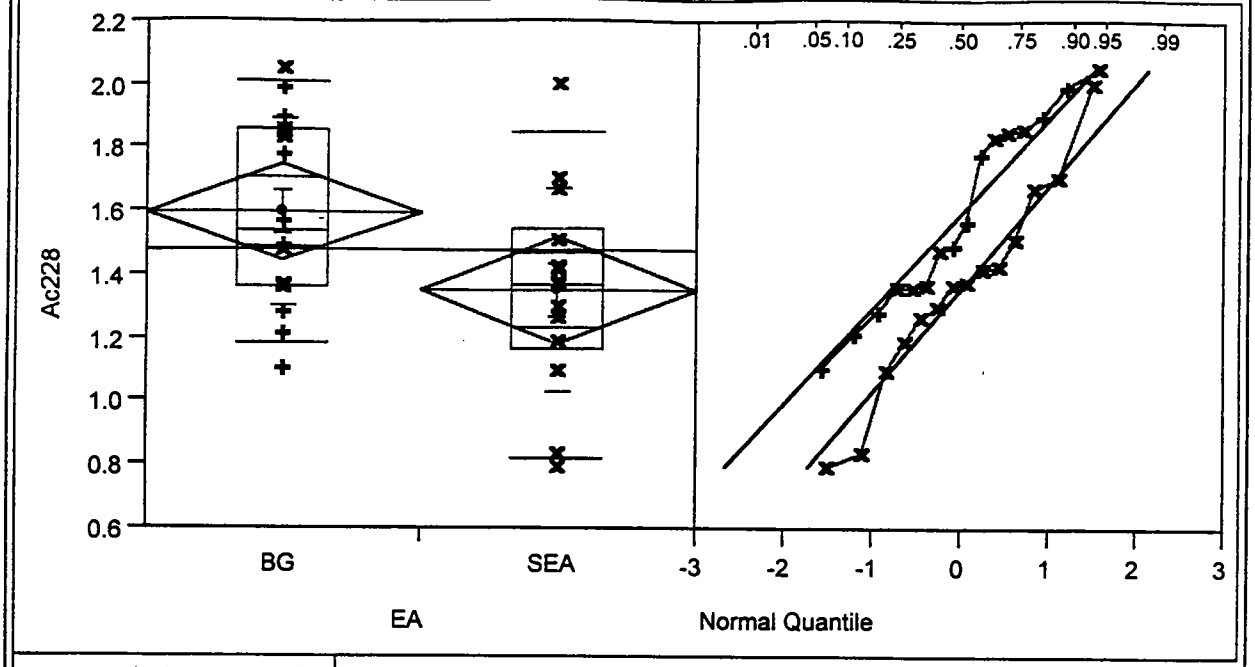
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 402 | 2.32793 | 0.0199 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.4860 | 1 | 0.0192 |

Ac228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.11 | 1.187 | 1.36 | 1.535 | 1.8575 | 2.008 | 2.05 |
| SEA | 0.8 | 0.82 | 1.1675 | 1.375 | 1.55 | 1.855 | 2 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.59500 | 0.298172 | 0.07454 |
| SEA | 14 | 1.35643 | 0.322457 | 0.08618 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 289.5 | 18.0938 | 1.705 |
| SEA | 14 | 175.5 | 12.5357 | -1.705 |

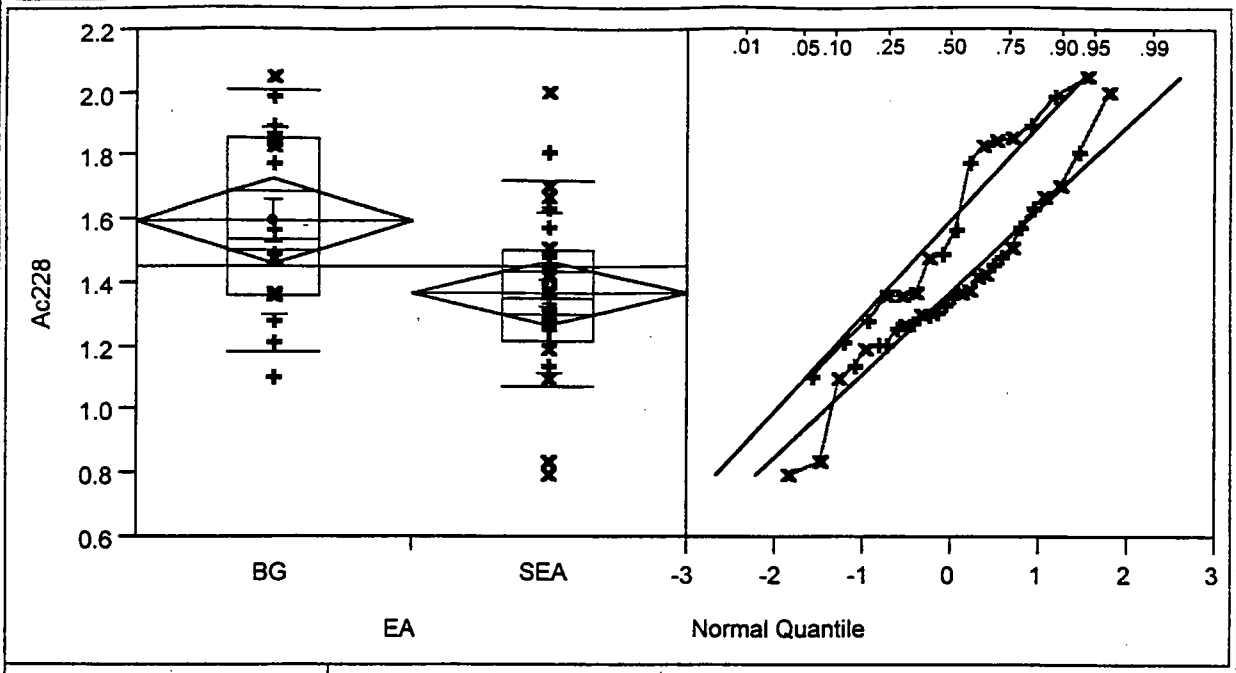
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 175.5 | -1.70477 | 0.0882 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.9776 | 1 | 0.0844 |

Ac228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.11 | 1.187 | 1.36 | 1.535 | 1.8575 | 2.008 | 2.05 |
| SEA | 0.8 | 1.074 | 1.2225 | 1.35 | 1.505 | 1.721 | 2 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.59500 | 0.298172 | 0.07454 |
| SEA | 28 | 1.37107 | 0.260346 | 0.04920 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 452.5 | 28.2813 | 2.245 |
| SEA | 28 | 537.5 | 19.1964 | -2.245 |

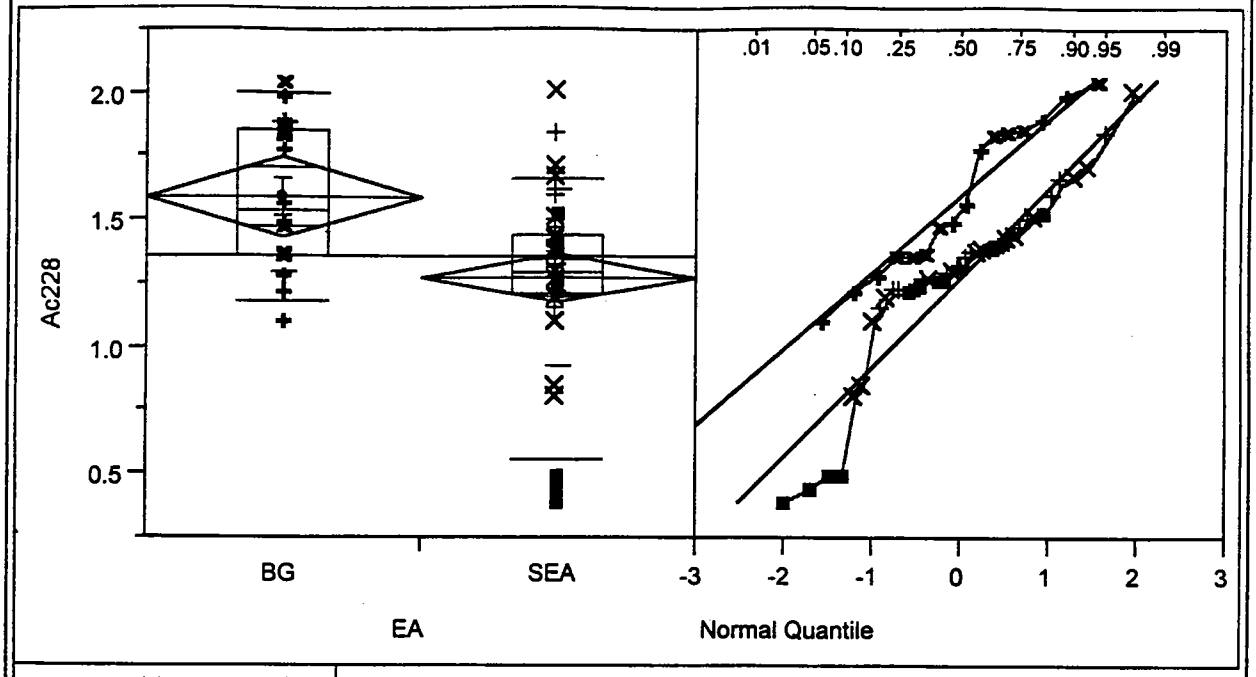
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 452.5 | 2.24512 | 0.0248 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.0955 | 1 | 0.0240 |

Ac228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.11 | 1.187 | 1.36 | 1.535 | 1.8575 | 2.008 | 2.05 |
| SEA | 0.395 | 0.56 | 1.21 | 1.3 | 1.445 | 1.664 | 2 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.59500 | 0.298172 | 0.07454 |
| SEA | 41 | 1.27287 | 0.349122 | 0.05452 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 625 | 39.0625 | 2.851 |
| SEA | 41 | 1028 | 25.0732 | -2.851 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 625 | 2.85096 | 0.0044 |

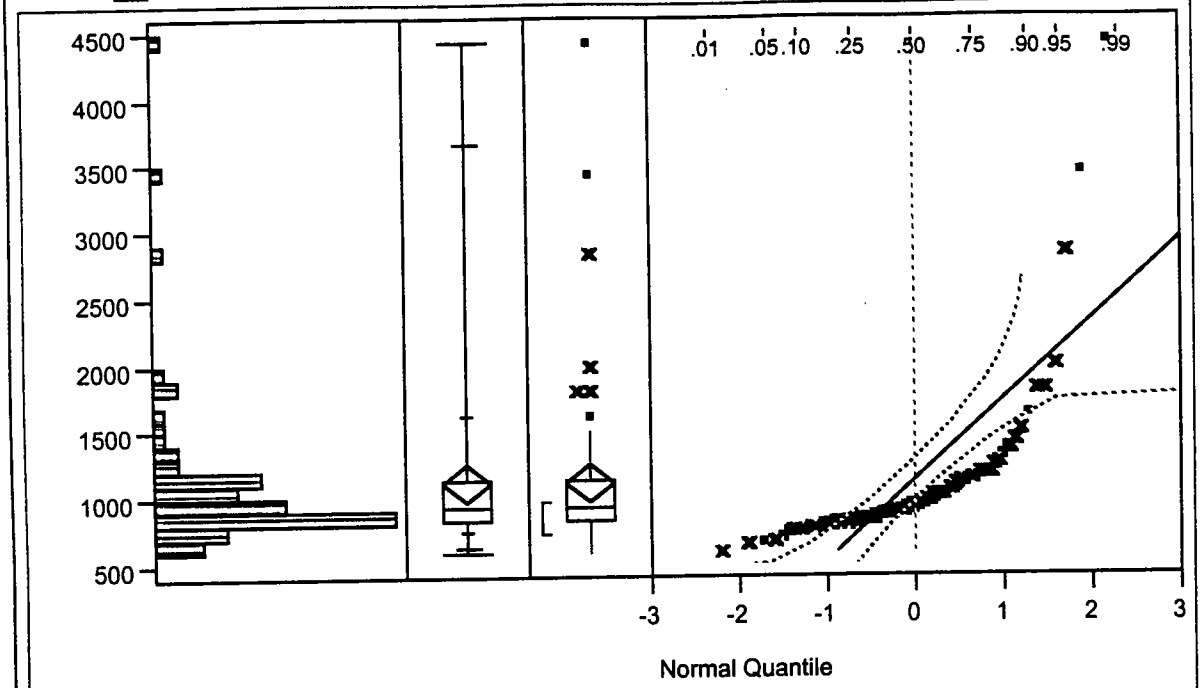
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 8.1787 | 1 | 0.0042 |

**TAB 9**

**Bismuth 214**

Bi214




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 4430.0 |
| | 99.5% | 4430.0 |
| | 97.5% | 3662.7 |
| | 90.0% | 1617.0 |
| quartile | 75.0% | 1137.5 |
| median | 50.0% | 937.5 |
| quartile | 25.0% | 827.5 |
| | 10.0% | 761.0 |
| | 2.5% | 638.8 |
| | 0.5% | 600.0 |
| minimum | 0.0% | 600.0 |

**Moments**

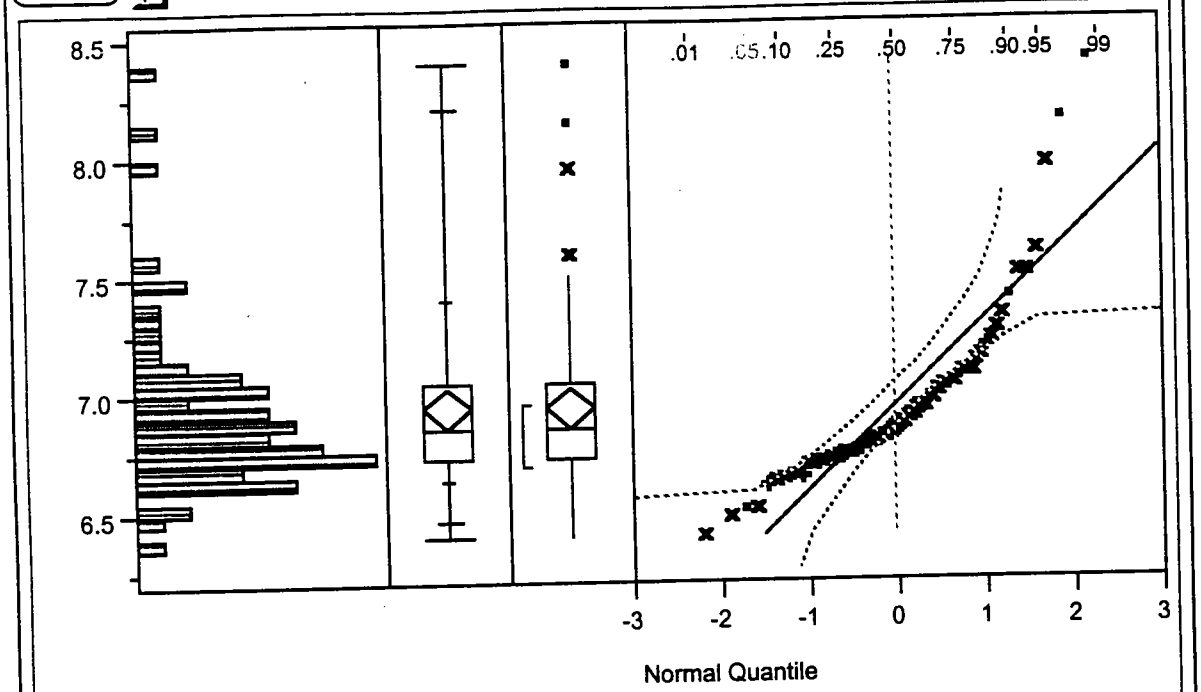
| | |
|---|---|
| Mean | 1113.214 |
| Std Dev | 604.786 |
| Std Error Mean | 72.286 |
| Upper 95% Mean | 1257.421 |
| Lower 95% Mean | 969.008 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 77925.000 |
| Variance | 365765.97 |
| Skewness | 3.685 |
| Kurtosis | 15.862 |
| CV | 54.328 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.596294 | 0.0000 |

lnBi214




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 8.3962 |
| | 99.5% | 8.3962 |
| | 97.5% | 8.2001 |
| | 90.0% | 7.3880 |
| quartile | 75.0% | 7.0365 |
| median | 50.0% | 6.8432 |
| quartile | 25.0% | 6.7184 |
| | 10.0% | 6.6346 |
| | 2.5% | 6.4590 |
| | 0.5% | 6.3969 |
| minimum | 0.0% | 6.3969 |

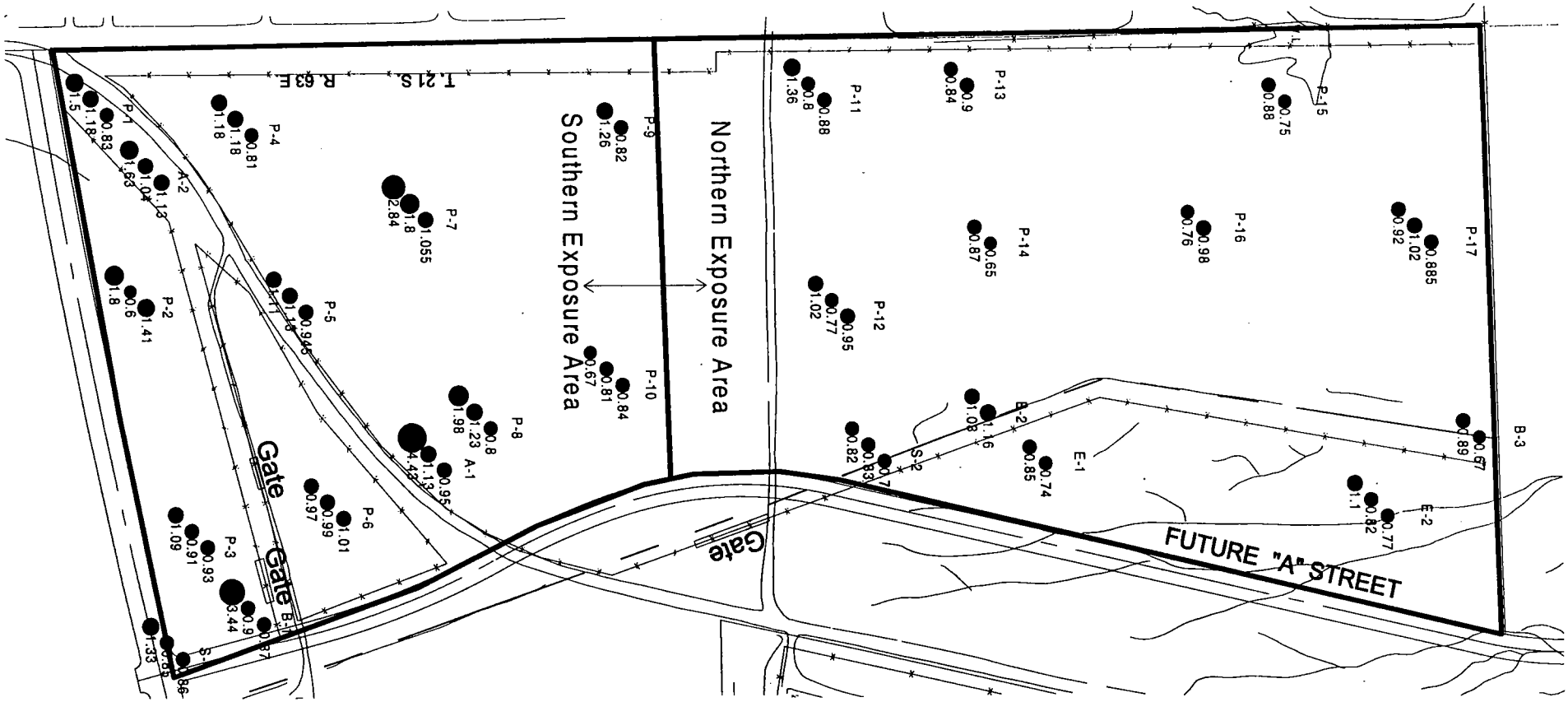
**Moments**

| | |
|---|---|
| Mean | 6.93433 |
| Std Dev | 0.35716 |
| Std Error Mean | 0.04269 |
| Upper 95% Mean | 7.01949 |
| Lower 95% Mean | 6.84917 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 485.40304 |
| Variance | 0.12756 |
| Skewness | 1.99102 |
| Kurtosis | 5.15246 |
| CV | 5.15059 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.830123 | <.0001 |




**Approximate Scale**

1 Inch = 265 Feet

N

## LEGEND

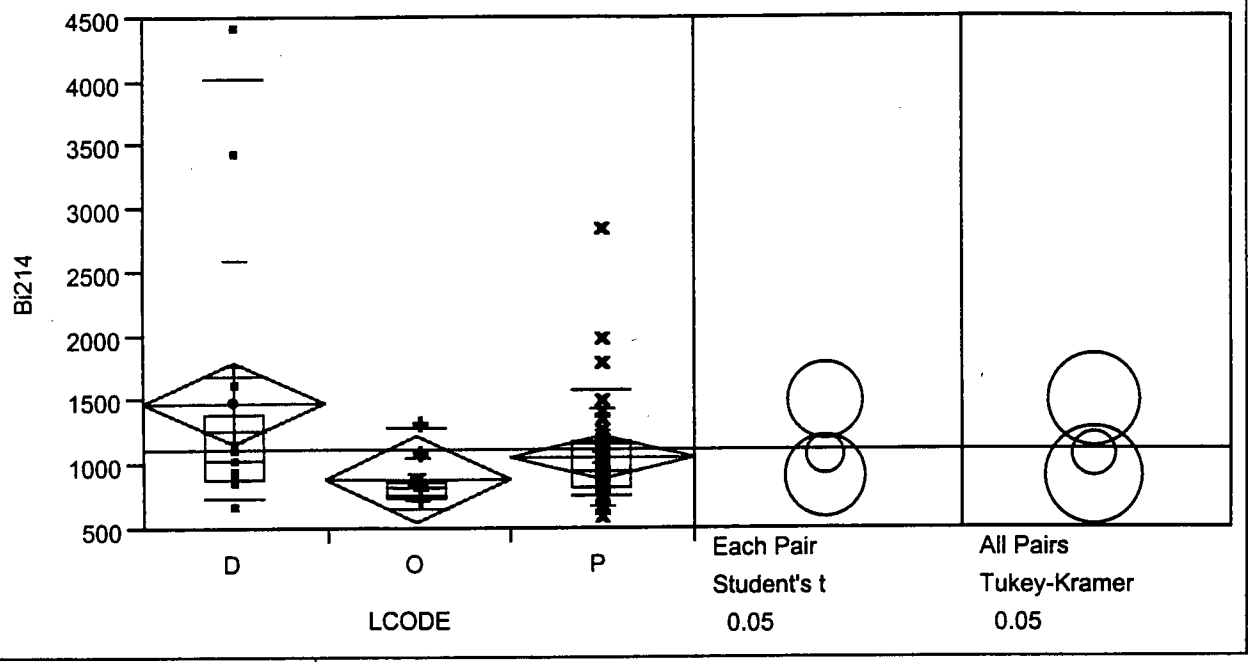
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

# ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Bismuth 214 pCi/g**

Bi214 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 670 | 750 | 895 | 1040 | 1395 | 4034 | 4430 |
| O | 740 | 746 | 770 | 830 | 860 | 1284 | 1330 |
| P | 600 | 757 | 827.5 | 947.5 | 1180 | 1590 | 2840 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.09731 |
| RSquare Adj | 0.070364 |
| Root Mean Square Error | 583.1202 |
| Mean of Response | 1113.214 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 2455896 | 1227948 | 3.6113 |
| Error | 67 | 22781956 | 340029 | Prob>F |
| C Total | 69 | 25237852 | 365766 | 0.0324 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 1482.31 | 161.73 |
| O | 11 | 885.45 | 175.82 |
| P | 46 | 1063.37 | 85.98 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1482.31 | 1129.29 | 313.21 |
| O | 11 | 885.45 | 175.01 | 52.77 |
| P | 46 | 1063.37 | 399.22 | 58.86 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | D | P | O |
|---|---|---|---|
| D | 0.000 | 418.938 | 596.853 |
| P | -418.938 | 0.000 | 177.915 |
| O | -596.853 | -177.915 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -456.525 | 53.346 | 120.028 |
| P | 53.346 | -242.693 | -212.731 |
| O | 120.028 | -212.731 | -496.295 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | D | P | O |
|---|---|---|---|
| D | -548.213 | -20.079 | 24.263 |
| P | -20.079 | -291.435 | -291.188 |
| O | 24.263 | -291.188 | -595.971 |

Positive values show pairs of means that are significantly different.

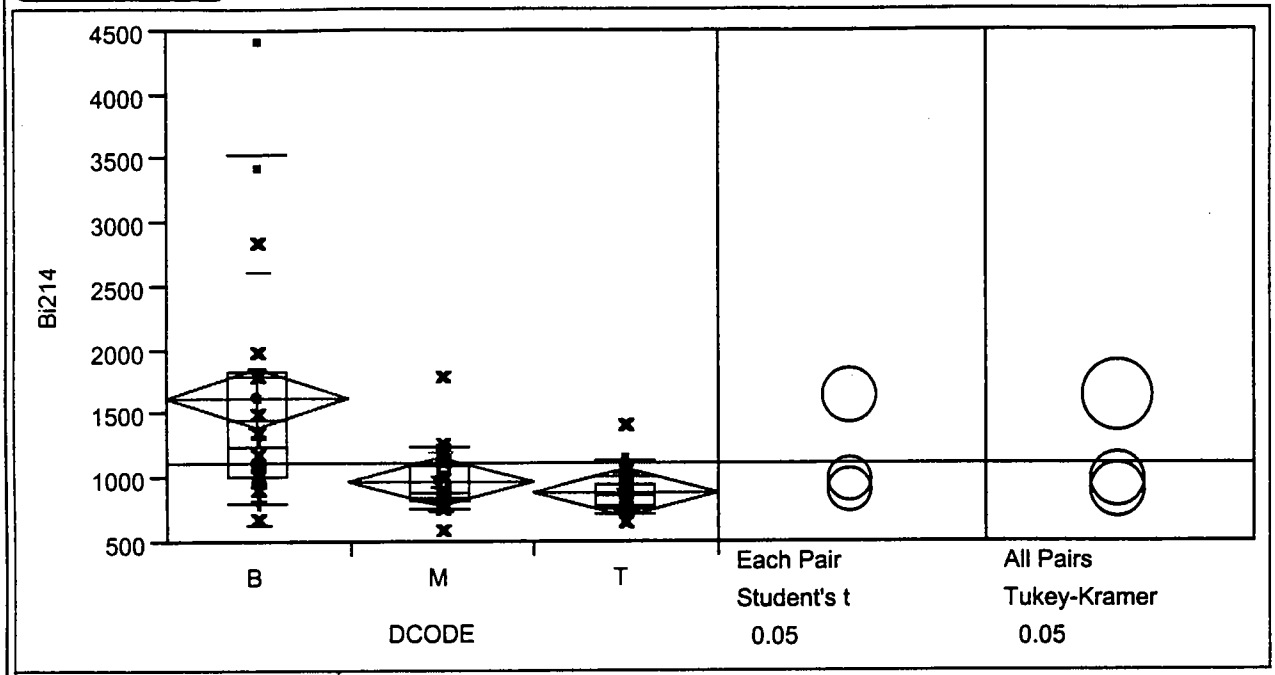
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 580 | 44.6154 | 1.783 |
| O | 11 | 251.5 | 22.8636 | -2.236 |
| P | 46 | 1653.5 | 35.9457 | 0.248 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.8744 | 2 | 0.0322 |

Bi214 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 670 | 805 | 1007.5 | 1255 | 1845 | 3539 | 4430 |
| M | 600 | 767 | 827.5 | 895 | 1130 | 1239 | 1800 |
| T | 650 | 719 | 792.5 | 875 | 957.5 | 1139 | 1410 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.251271 |
| RSquare Adj | 0.228921 |
| Root Mean Square Error | 531.0692 |
| Mean of Response | 1113.214 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 6341539 | 3170770 | 11.2425 |
| Error | 67 | 18896312 | 282035 | Prob>F |
| C Total | 69 | 25237852 | 365766 | <.0001 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1621.67 | 125.17 |
| M | 26 | 975.77 | 104.15 |
| T | 26 | 898.65 | 104.15 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1621.67 | 995.432 | 234.63 |
| M | 26 | 975.77 | 235.528 | 46.19 |
| T | 26 | 898.65 | 163.025 | 31.97 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | B | M | T |
|---|---|---|---|
| B | 0.000 | 645.897 | 723.013 |
| M | -645.897 | 0.000 | 77.115 |
| T | -723.013 | -77.115 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -353.340 | 320.872 | 397.987 |
| M | 320.872 | -293.997 | -216.881 |
| T | 397.987 | -216.881 | -293.997 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

$q^*$

2.39689

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -424.305 | 255.594 | 332.709 |
| M | 255.594 | -353.043 | -275.928 |
| T | 332.709 | -275.928 | -353.043 |

Positive values show pairs of means that are significantly different.

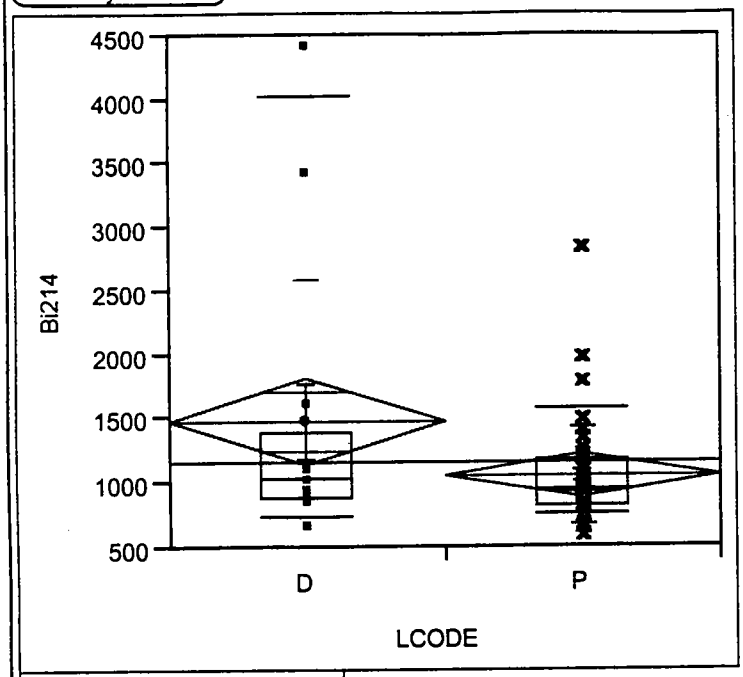
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 926.5 | 51.4722 | 3.858 |
| M | 26 | 863.5 | 33.2115 | -0.717 |
| T | 26 | 695 | 26.7308 | -2.766 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 16.2516 | 2 | 0.0003 |

Bi214 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 670 | 750 | 895 | 1040 | 1395 | 4034 | 4430 |
| P | 600 | 757 | 827.5 | 947.5 | 1180 | 1590 | 2840 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1482.31 | 1129.29 | 313.21 |
| P | 46 | 1063.37 | 399.22 | 58.86 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 463 | 35.6154 | 1.326 |
| P | 46 | 1307 | 28.4130 | -1.326 |

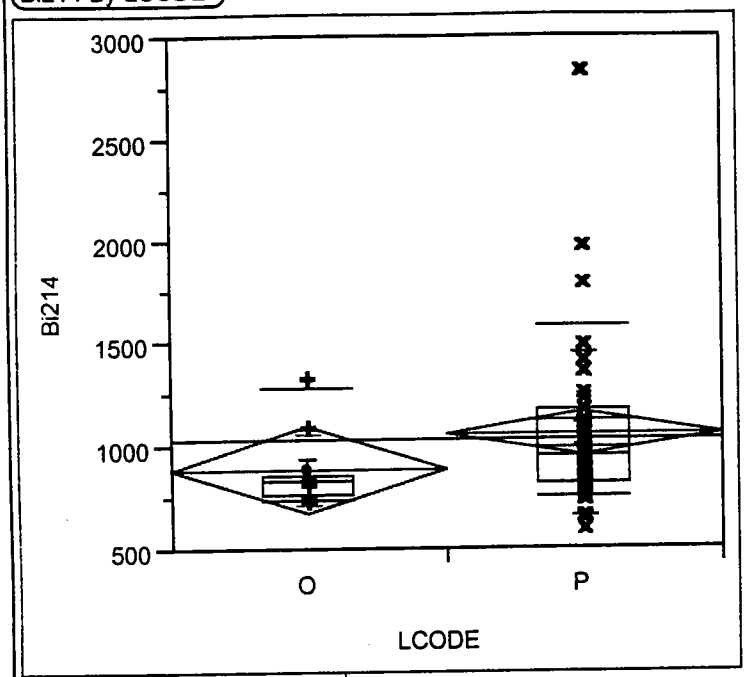
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 463 | 1.32622 | 0.1848 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.7832 | 1 | 0.1818 |

Bi214 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 740 | 746 | 770 | 830 | 860 | 1284 | 1330 |
| P | 600 | 757 | 827.5 | 947.5 | 1180 | 1590 | 2840 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 885.45 | 175.006 | 52.766 |
| P | 46 | 1063.37 | 399.223 | 58.862 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 225.5 | 20.5000 | -1.881 |
| P | 46 | 1427.5 | 31.0326 | 1.881 |

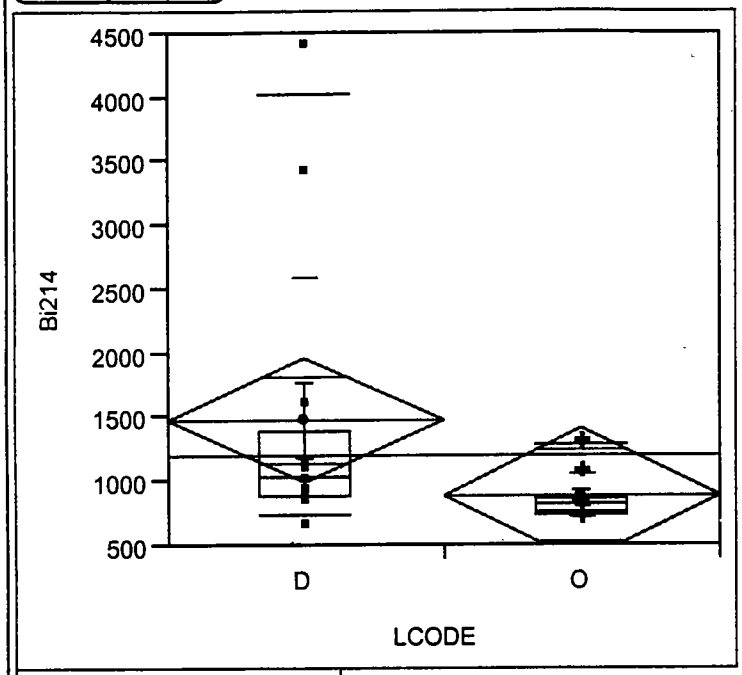
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 225.5 | -1.88116 | 0.0600 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.5769 | 1 | 0.0586 |

Bi214 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 670 | 750 | 895 | 1040 | 1395 | 4034 | 4430 |
| O | 740 | 746 | 770 | 830 | 860 | 1284 | 1330 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1482.31 | 1129.29 | 313.21 |
| O | 11 | 885.45 | 175.01 | 52.77 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 208 | 16.0000 | 2.609 |
| O | 11 | 92 | 8.3636 | -2.609 |

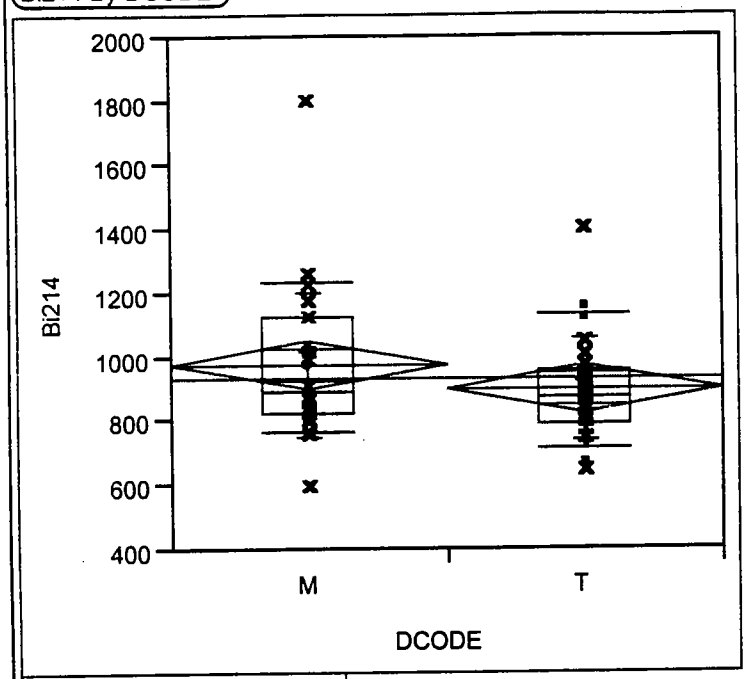
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 92 | -2.60941 | 0.0091 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.9612 | 1 | 0.0083 |

Bi214 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 600 | 767 | 827.5 | 895 | 1130 | 1239 | 1800 |
| T | 650 | 719 | 792.5 | 875 | 957.5 | 1139 | 1410 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 975.769 | 235.528 | 46.191 |
| T | 26 | 898.654 | 163.025 | 31.972 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 757 | 29.1154 | 1.236 |
| T | 26 | 621 | 23.8846 | -1.236 |

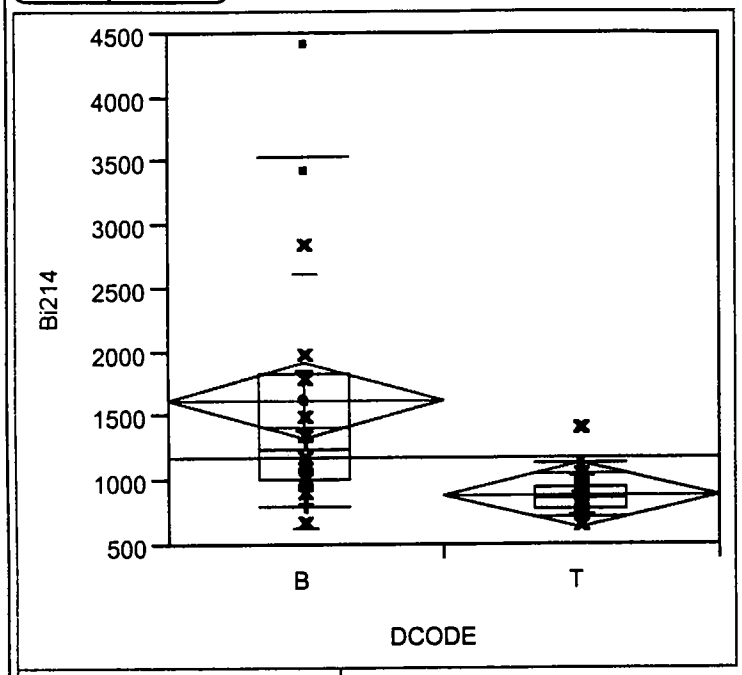
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 621 | -1.23583 | 0.2165 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.5500 | 1 | 0.2131 |

Bi214 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 670 | 805 | 1007.5 | 1255 | 1845 | 3539 | 4430 |
| T | 650 | 719 | 792.5 | 875 | 957.5 | 1139 | 1410 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1621.67 | 995.432 | 234.63 |
| T | 26 | 898.65 | 163.025 | 31.97 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 565 | 31.3889 | 3.808 |
| T | 26 | 425 | 16.3462 | -3.808 |

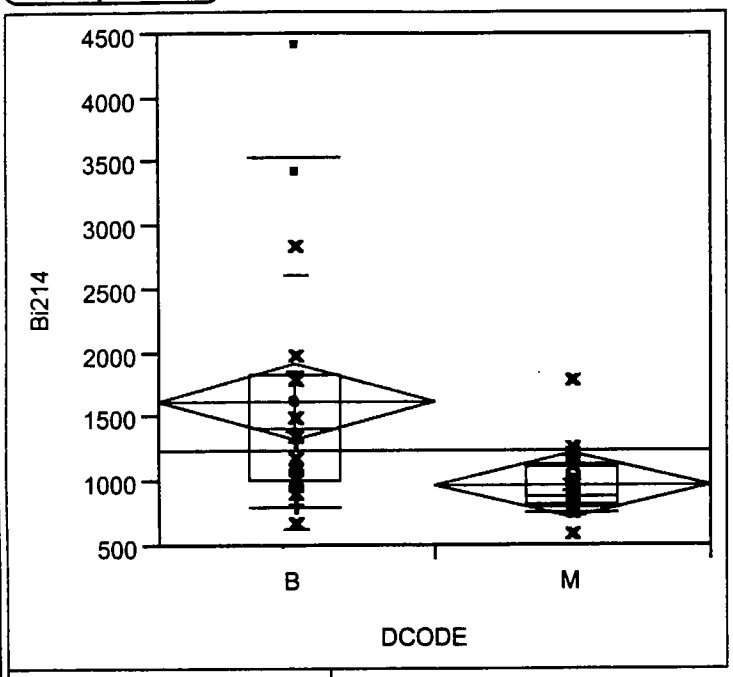
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 565 | 3.80788 | 0.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 14.5910 | 1 | 0.0001 |

Bi214 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 670 | 805 | 1007.5 | 1255 | 1845 | 3539 | 4430 |
| M | 600 | 767 | 827.5 | 895 | 1130 | 1239 | 1800 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1621.67 | 995.432 | 234.63 |
| M | 26 | 975.77 | 235.528 | 46.19 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 532.5 | 29.5833 | 3.033 |
| M | 26 | 457.5 | 17.5962 | -3.033 |

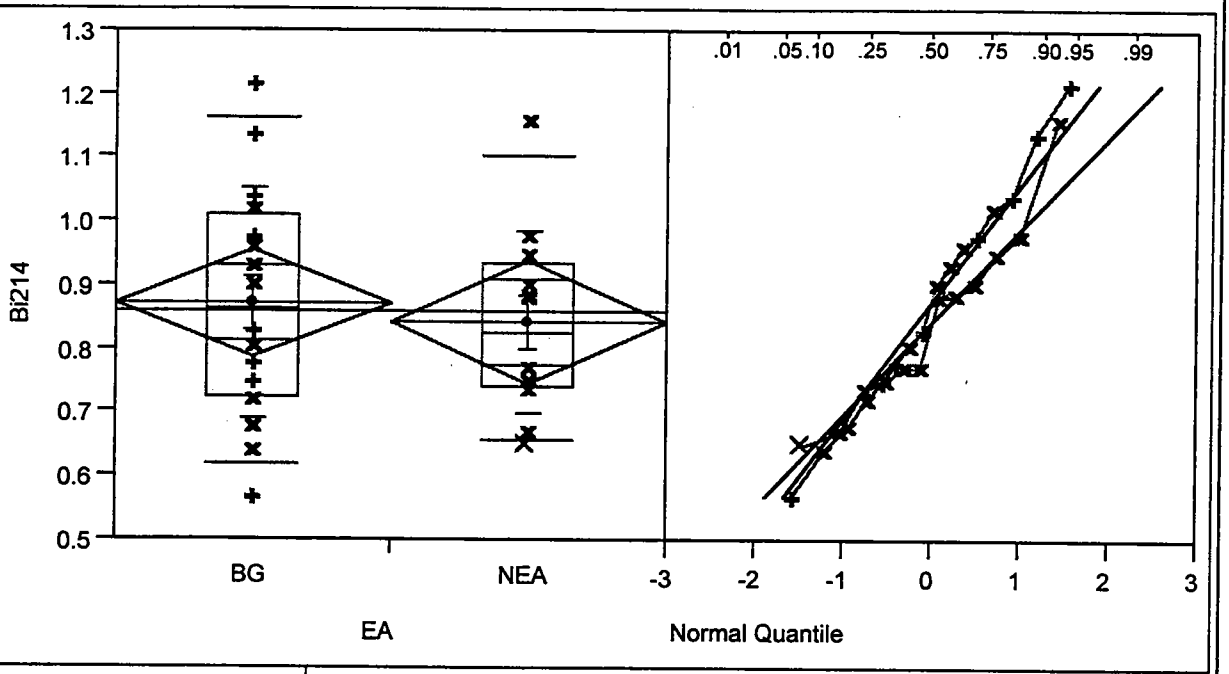
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 532.5 | 3.03251 | 0.0024 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 9.2687 | 1 | 0.0023 |

Bi214 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.57 | 0.619 | 0.7275 | 0.865 | 1.01 | 1.164 | 1.22 |
| NEA | 0.65 | 0.656 | 0.7425 | 0.825 | 0.9375 | 1.106 | 1.16 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.872812 | 0.182793 | 0.04570 |
| NEA | 12 | 0.842083 | 0.145906 | 0.04212 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 244.5 | 15.2813 | 0.557 |
| NEA | 12 | 161.5 | 13.4583 | -0.557 |

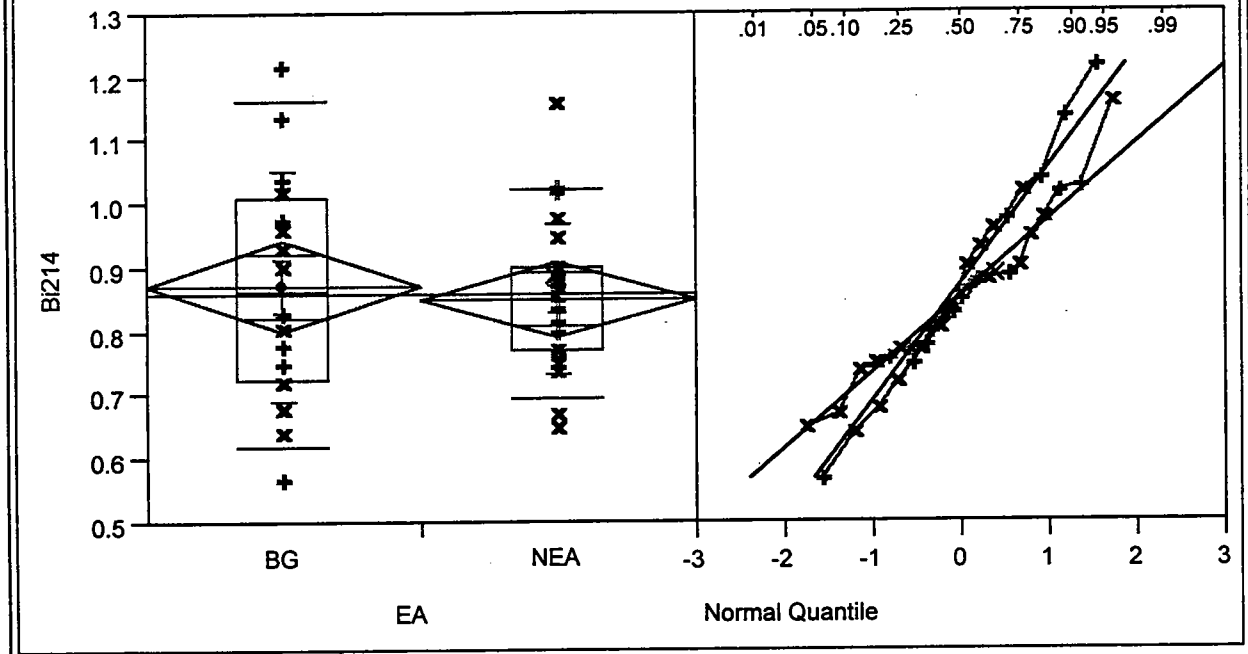
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 161.5 | -0.55739 | 0.5773 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.3371 | 1 | 0.5615 |

Bi214 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.57 | 0.619 | 0.7275 | 0.865 | 1.01 | 1.164 | 1.22 |
| NEA | 0.65 | 0.698 | 0.77 | 0.85 | 0.9 | 1.026 | 1.16 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.872812 | 0.182793 | 0.04570 |
| NEA | 23 | 0.853696 | 0.120002 | 0.02502 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 332 | 20.7500 | 0.328 |
| NEA | 23 | 448 | 19.4783 | -0.328 |

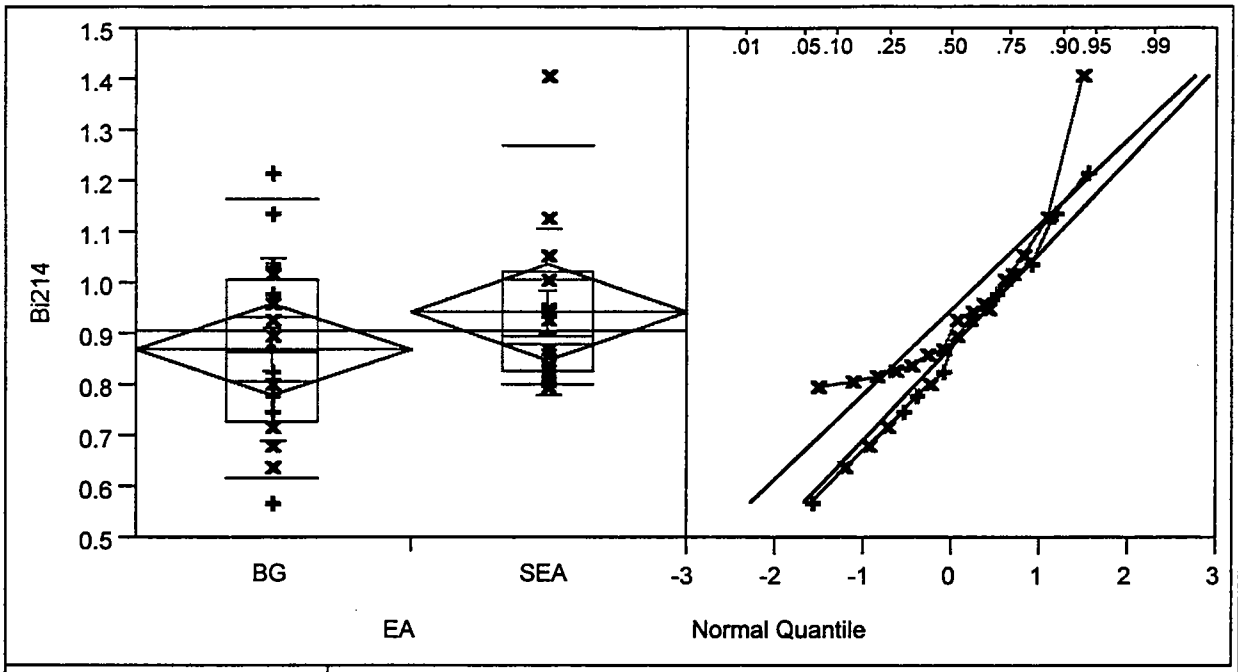
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 332 | 0.32850 | 0.7425 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1175 | 1 | 0.7318 |

Bi214 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.57 | 0.619 | 0.7275 | 0.865 | 1.01 | 1.164 | 1.22 |
| SEA | 0.8 | 0.805 | 0.8275 | 0.9 | 1.02125 | 1.27 | 1.41 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.872812 | 0.182793 | 0.04570 |
| SEA | 14 | 0.947143 | 0.166164 | 0.04441 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 223 | 13.9375 | -1.019 |
| SEA | 14 | 242 | 17.2857 | 1.019 |

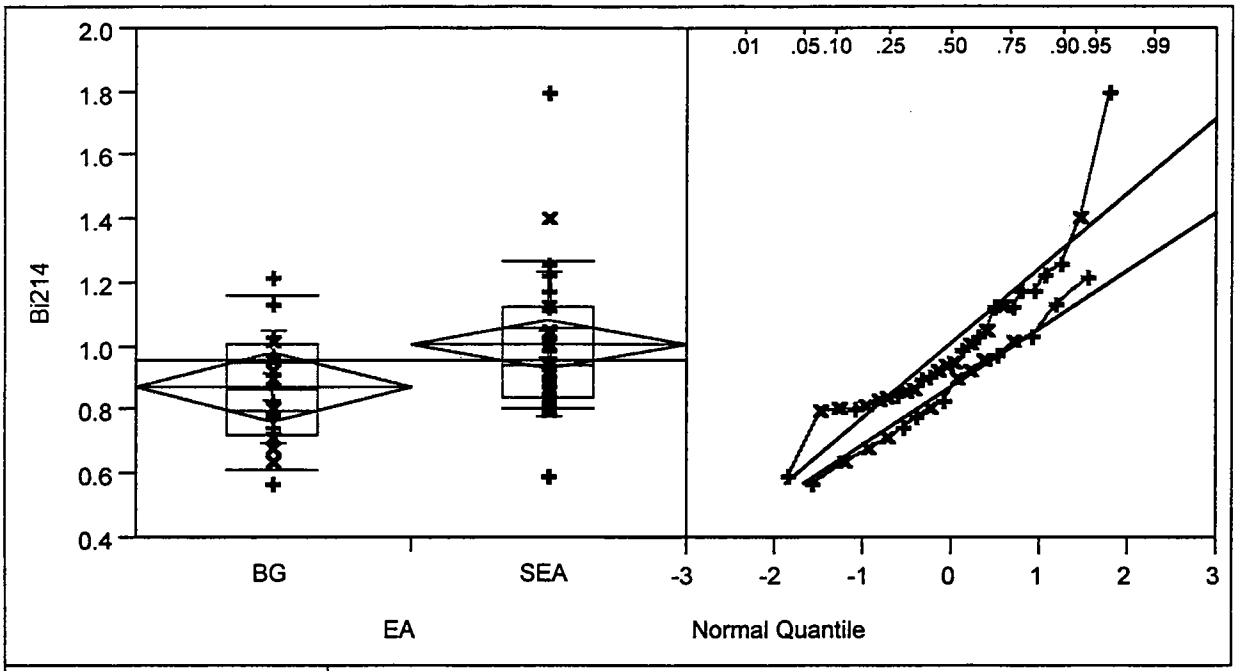
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 242 | 1.01871 | 0.3083 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.0805 | 1 | 0.2986 |

Bi214 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.57 | 0.619 | 0.7275 | 0.865 | 1.01 | 1.164 | 1.22 |
| SEA | 0.6 | 0.809 | 0.8425 | 0.9475 | 1.13 | 1.275 | 1.8 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.87281 | 0.182793 | 0.04570 |
| SEA | 28 | 1.00964 | 0.235147 | 0.04444 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 282 | 17.6250 | -1.891 |
| SEA | 28 | 708 | 25.2857 | 1.891 |

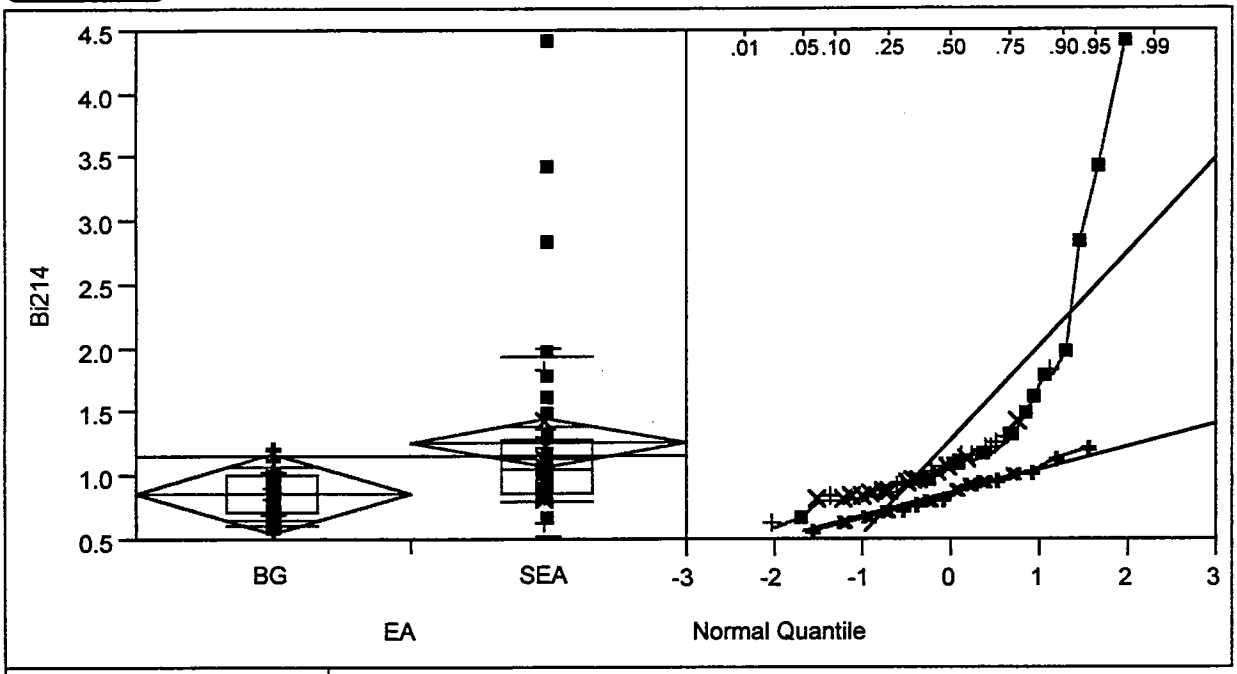
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 282 | -1.89147 | 0.0586 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.6240 | 1 | 0.0570 |

Bi214 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.57 | 0.619 | 0.7275 | 0.865 | 1.01 | 1.164 | 1.22 |
| SEA | 0.6 | 0.81 | 0.865 | 1.055 | 1.295 | 1.944 | 4.43 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.87281 | 0.182793 | 0.04570 |
| SEA | 41 | 1.27415 | 0.742241 | 0.11592 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 306 | 19.1250 | -2.798 |
| SEA | 41 | 1347 | 32.8537 | 2.798 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 306 | -2.79772 | 0.0051 |

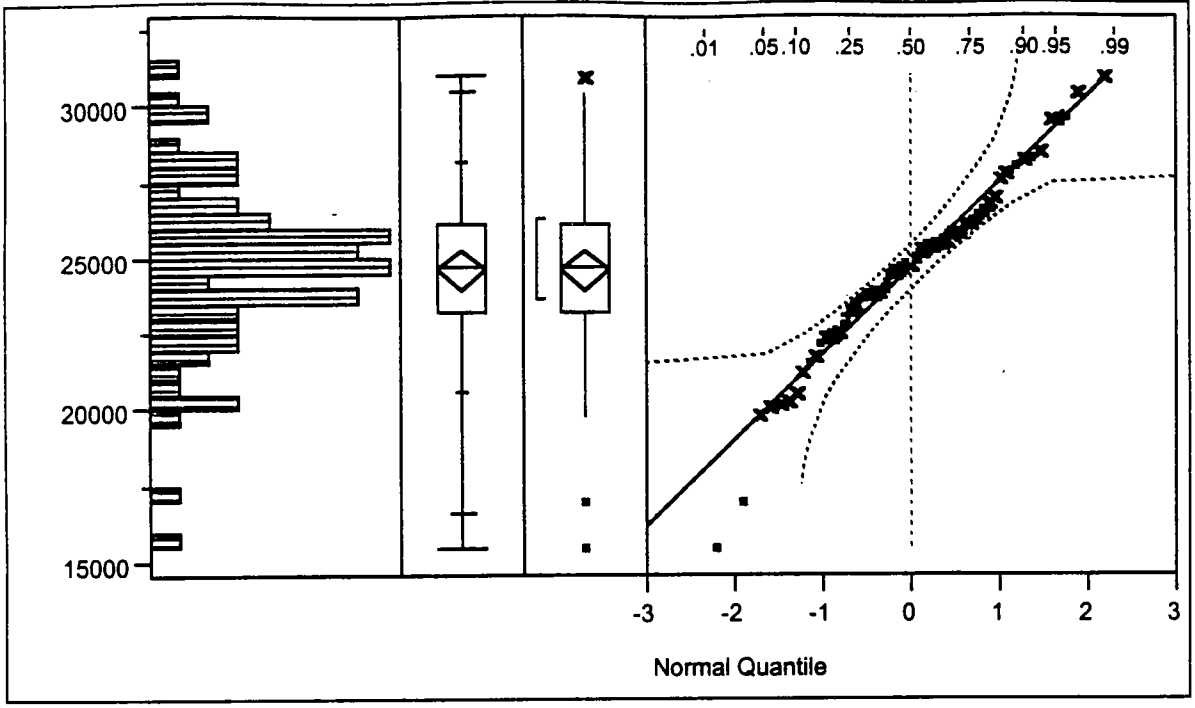
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 7.8770 | 1 | 0.0050 |

**TAB 10**

**Potassium 40**

K40




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 31000 |
| | 99.5% | 31000 |
| | 97.5% | 30535 |
| | 90.0% | 28180 |
| quartile | 75.0% | 26200 |
| median | 50.0% | 24800 |
| quartile | 25.0% | 23275 |
| | 10.0% | 20570 |
| | 2.5% | 16663 |
| | 0.5% | 15500 |
| minimum | 0.0% | 15500 |

**Moments**

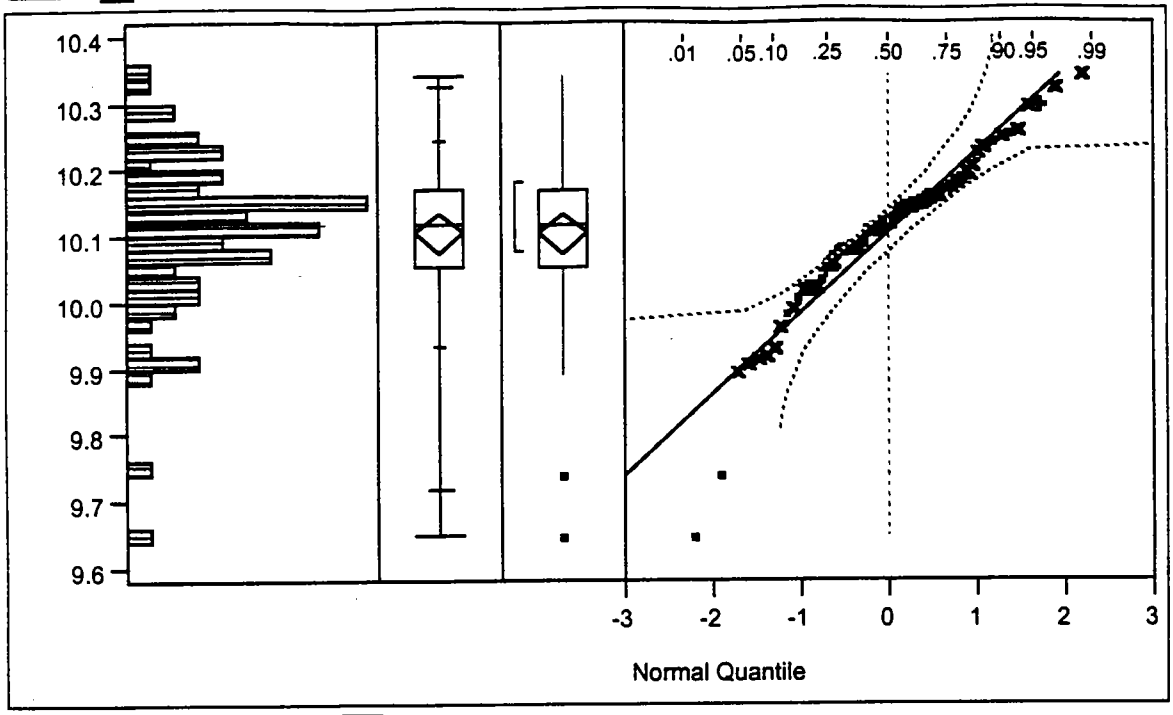
| | |
|---|---|
| Mean | 24650.00 |
| Std Dev | 2831.04 |
| Std Error Mean | 338.37 |
| Upper 95% Mean | 25325.04 |
| Lower 95% Mean | 23974.96 |
| N | 70.00 |
| Sum Weights | 70.00 |
| Sum | 1725500 |
| Variance | 8014782.6 |
| Skewness | -0.53 |
| Kurtosis | 1.27 |
| CV | 11.48 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.972446 | 0.3234 |

lnK40




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 10.342 |
| | 99.5% | 10.342 |
| | 97.5% | 10.327 |
| | 90.0% | 10.246 |
| quartile | 75.0% | 10.174 |
| median | 50.0% | 10.119 |
| quartile | 25.0% | 10.055 |
| | 10.0% | 9.932 |
| | 2.5% | 9.720 |
| | 0.5% | 9.649 |
| minimum | 0.0% | 9.649 |

**Moments**

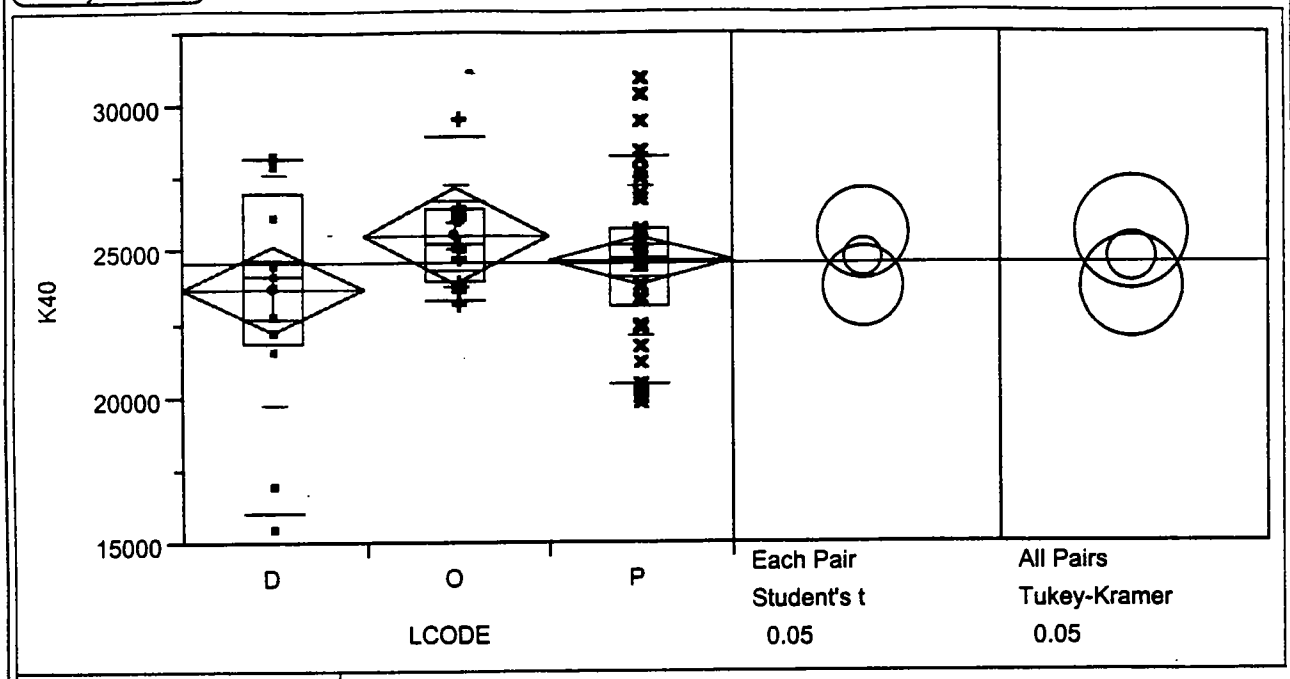
| | |
|---|---|
| Mean | 10.10556 |
| Std Dev | 0.12139 |
| Std Error Mean | 0.01451 |
| Upper 95% Mean | 10.13451 |
| Lower 95% Mean | 10.07662 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 707.38941 |
| Variance | 0.01473 |
| Skewness | -1.09857 |
| Kurtosis | 2.71735 |
| CV | 1.20118 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.939162 | 0.0032 |

K40 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 15500 | 16100 | 21900 | 24200 | 27050 | 28180 | 28300 |
| O | 23200 | 23300 | 24000 | 25300 | 26500 | 29000 | 29600 |
| P | 19800 | 20440 | 23112.5 | 24800 | 25800 | 28290 | 31000 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.038301 |
| RSquare Adj | 0.009594 |
| Root Mean Square Error | 2817.426 |
| Mean of Response | 24650 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 21181362 | 10590681 | 1.3342 |
| Error | 67 | 531838638 | 7937890 | Prob>F |
| C Total | 69 | 553020000 | 8014783 | 0.2703 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 23707.7 | 781.41 |
| O | 11 | 25581.8 | 849.49 |
| P | 46 | 24693.5 | 415.41 |

Std Error uses a pooled estimate of error variance


**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Potassium 40 pCi/g**

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 23707.7 | 3982.14 | 1104.4 |
| O | 11 | 25581.8 | 1780.91 | 537.0 |
| F | 46 | 24693.5 | 2623.96 | 386.9 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | P | D |
|---|---|---|---|
| O | 0.00 | 888.34 | 1874.13 |
| P | -888.34 | 0.00 | 985.79 |
| D | -1874.13 | -985.79 | 0.00 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -2397.92 | -999.12 | -429.72 |
| P | -999.12 | -1172.60 | -780.62 |
| D | -429.72 | -780.62 | -2205.76 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -2879.52 | -1378.20 | -892.42 |
| P | -1378.20 | -1408.11 | -1135.39 |
| D | -892.42 | -1135.39 | -2648.77 |

Positive values show pairs of means that are significantly different.

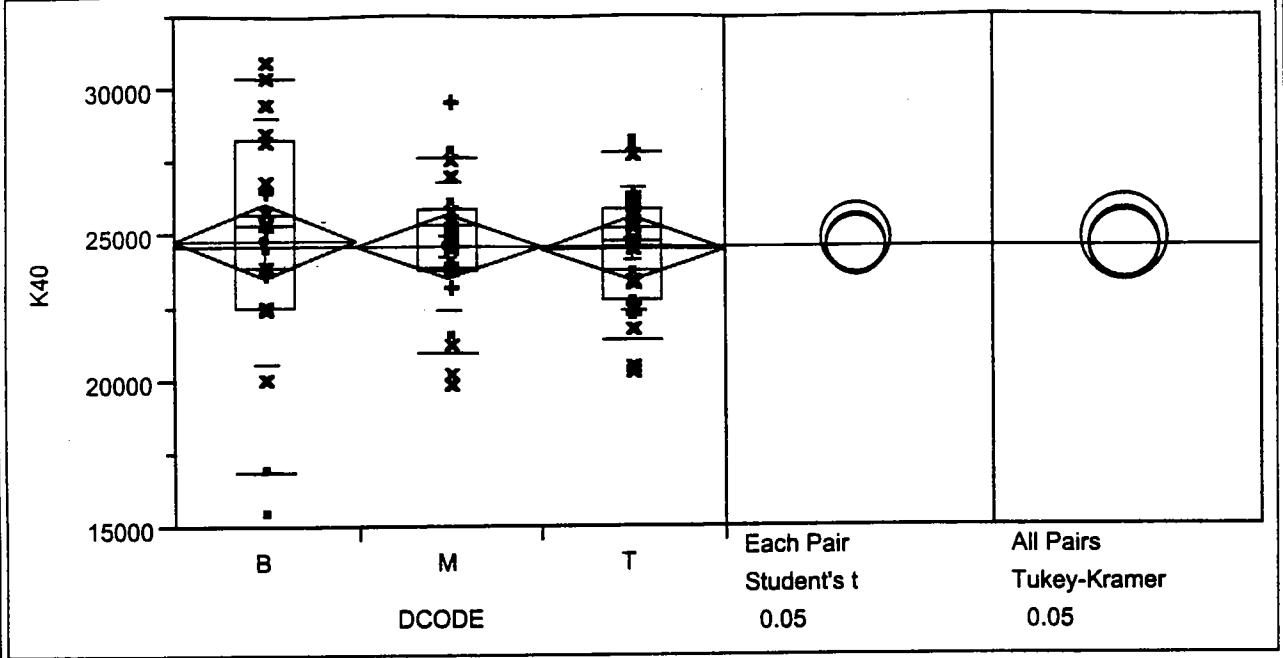
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 415.5 | 31.9615 | -0.687 |
| O | 11 | 466 | 42:3636 | 1.211 |
| P | 46 | 1603.5 | 34.8587 | -0.359 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.6910 | 2 | 0.4293 |

K40 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 15500 | 16850 | 22475 | 25350 | 28275 | 30460 | 31000 |
| M | 19800 | 20900 | 23800 | 24650 | 25900 | 27690 | 29600 |
| T | 20300 | 21410 | 22737.5 | 24800 | 25900 | 27860 | 28300 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.001601 |
| RSquare Adj | -0.0282 |
| Root Mean Square Error | 2870.682 |
| Mean of Response | 24650 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 885491 | 442746 | 0.0537 |
| Error | 67 | 552134509 | 8240814 | Prob>F |
| C Total | 69 | 553020000 | 8014783 | 0.9477 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 24836.1 | 676.63 |
| M | 26 | 24615.4 | 562.99 |
| T | 26 | 24555.8 | 562.99 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 24836.1 | 4263.52 | 1004.9 |
| M | 26 | 24615.4 | 2259.15 | 443.1 |
| T | 26 | 24555.8 | 2149.62 | 421.6 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | B | M | T |
|---|---|---|---|
| B | 0.000 | 220.726 | 280.342 |
| M | -220.726 | 0.000 | 59.615 |
| T | -280.342 | -59.615 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -1909.97 | -1536.19 | -1476.58 |
| M | -1536.19 | -1589.19 | -1529.58 |
| T | -1476.58 | -1529.58 | -1589.19 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -2293.57 | -1889.05 | -1829.44 |
| M | -1889.05 | -1908.37 | -1848.75 |
| T | -1829.44 | -1848.75 | -1908.37 |

Positive values show pairs of means that are significantly different.

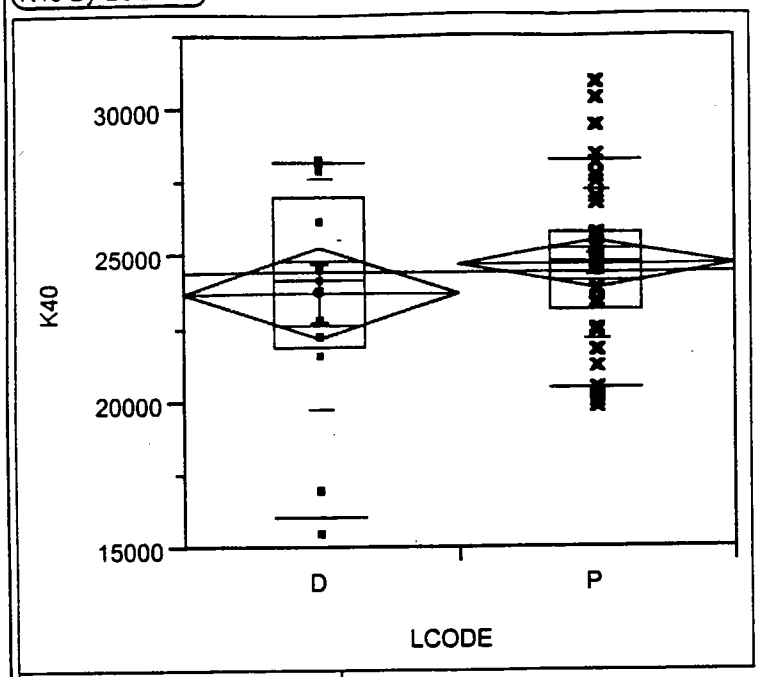
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 692.5 | 38.4722 | 0.712 |
| M | 26 | 895 | 34.4231 | -0.334 |
| T | 26 | 897.5 | 34.5192 | -0.304 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.5175 | 2 | 0.7720 |

K40 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 15500 | 16100 | 21900 | 24200 | 27050 | 28180 | 28300 |
| P | 19800 | 20440 | 23112.5 | 24800 | 25800 | 28290 | 31000 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 23707.7 | 3982.14 | 1104.4 |
| P | 46 | 24693.5 | 2623.96 | 386.9 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 364.5 | 28.0385 | -0.457 |
| P | 46 | 1405.5 | 30.5543 | 0.457 |

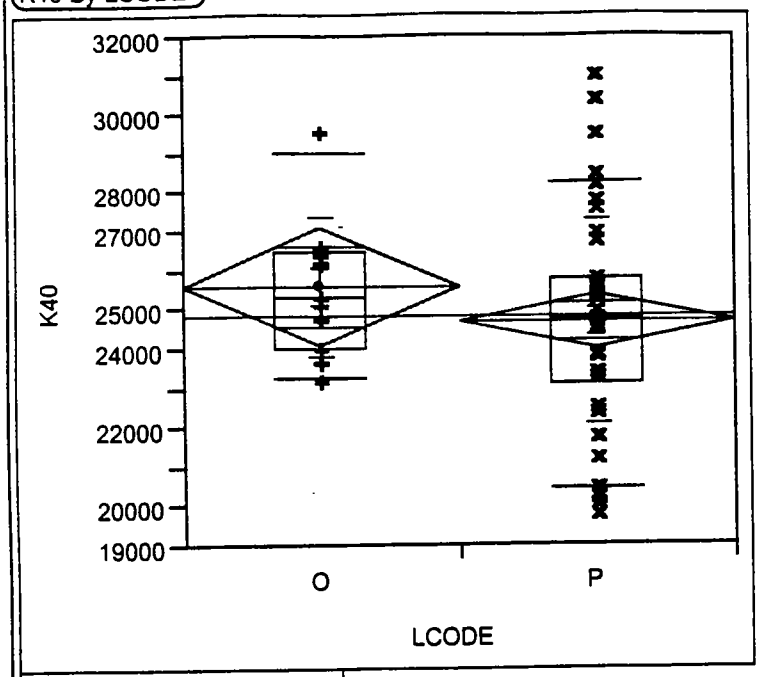
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 364.5 | -0.45739 | 0.6474 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.2177 | 1 | 0.6408 |

K40 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 23200 | 23300 | 24000 | 25300 | 26500 | 29000 | 29600 |
| P | 19800 | 20440 | 23112.5 | 24800 | 25800 | 28290 | 31000 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 25581.8 | 1780.91 | 536.96 |
| P | 46 | 24693.5 | 2623.96 | 386.88 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 374 | 34.0000 | 1.102 |
| P | 46 | 1279 | 27.8043 | -1.102 |

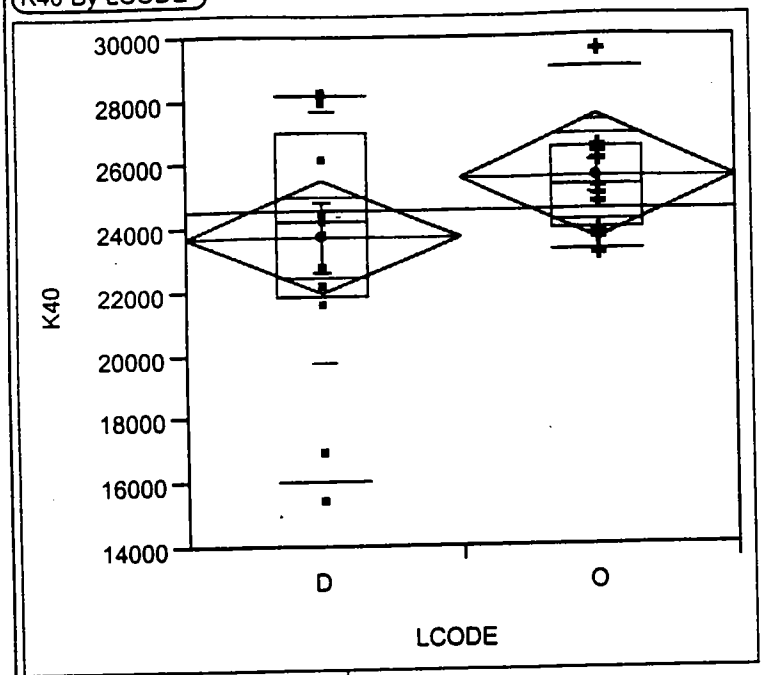
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 374 | 1.10247 | 0.2703 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.2378 | 1 | 0.2659 |

K40 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 15500 | 16100 | 21900 | 24200 | 27050 | 28180 | 28300 |
| O | 23200 | 23300 | 24000 | 25300 | 26500 | 29000 | 29600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 23707.7 | 3982.14 | 1104.4 |
| O | 11 | 25581.8 | 1780.91 | 537.0 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 142 | 10.9231 | -1.160 |
| O | 11 | 158 | 14.3636 | 1.160 |

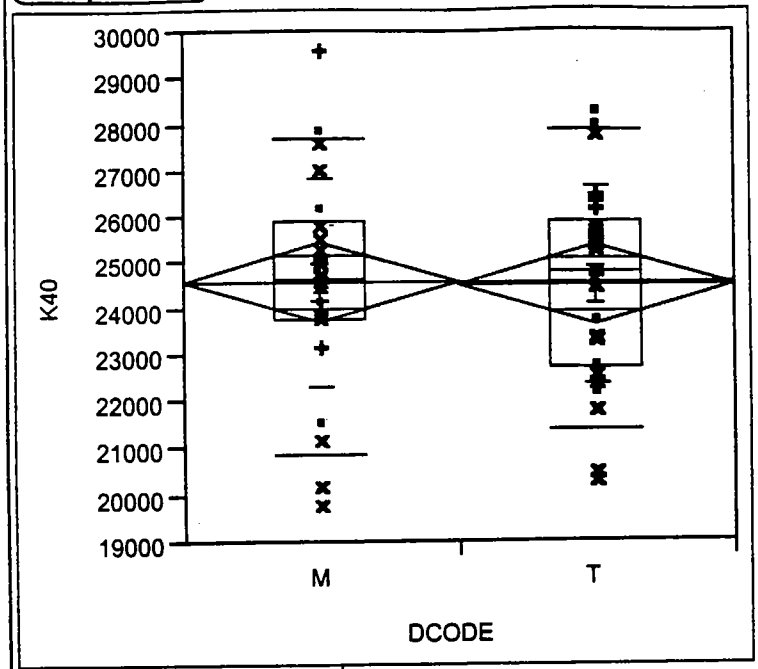
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 158 | 1.15974 | 0.2462 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.4131 | 1 | 0.2345 |

K40 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 19800 | 20900 | 23800 | 24650 | 25900 | 27690 | 29600 |
| T | 20300 | 21410 | 22737.5 | 24800 | 25900 | 27860 | 28300 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 24615.4 | 2259.15 | 443.06 |
| T | 26 | 24555.8 | 2149.62 | 421.58 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 685 | 26.3462 | -0.064 |
| T | 26 | 693 | 26.6538 | 0.064 |

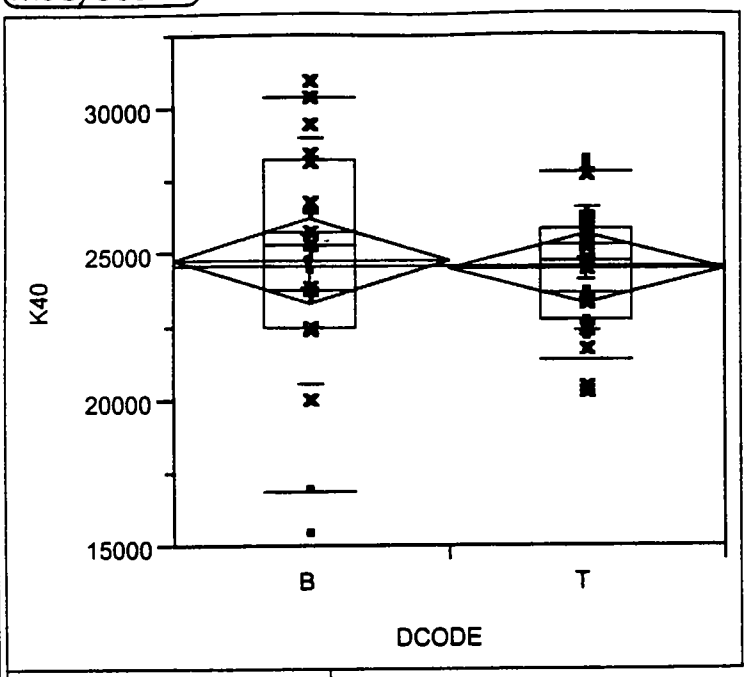
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 693 | 0.06409 | 0.9489 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0054 | 1 | 0.9416 |

K40 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 15500 | 16850 | 22475 | 25350 | 28275 | 30460 | 31000 |
| T | 20300 | 21410 | 22737.5 | 24800 | 25900 | 27860 | 28300 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 24836.1 | 4263.52 | 1004.9 |
| T | 26 | 24555.8 | 2149.62 | 421.6 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 434.5 | 24.1389 | 0.692 |
| T | 26 | 555.5 | 21.3654 | -0.692 |

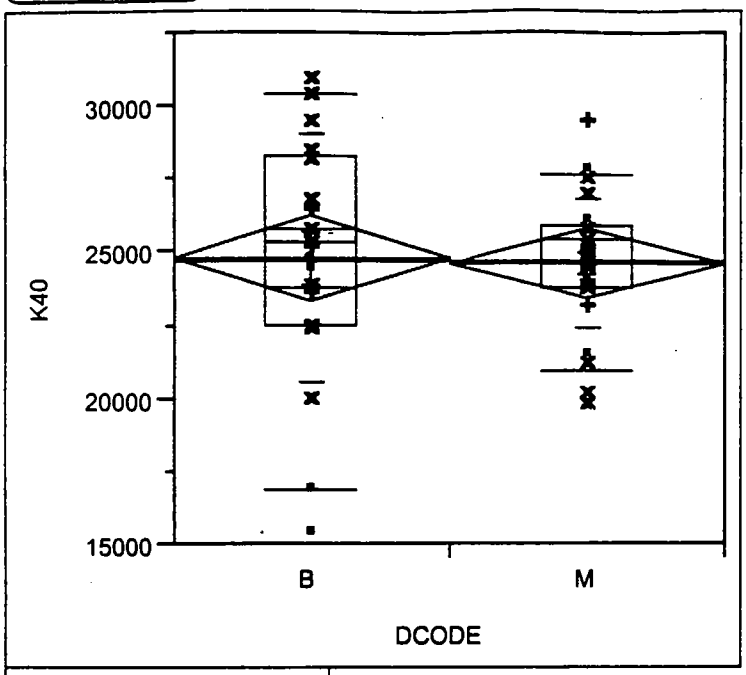
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 434.5 | 0.69246 | 0.4886 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.4962 | 1 | 0.4812 |

K40 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 15500 | 16850 | 22475 | 25350 | 28275 | 30460 | 31000 |
| M | 19800 | 20900 | 23800 | 24650 | 25900 | 27690 | 29600 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 24836.1 | 4263.52 | 1004.9 |
| M | 26 | 24615.4 | 2259.15 | 443.1 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 429 | 23.8333 | 0.561 |
| M | 26 | 561 | 21.5769 | -0.561 |

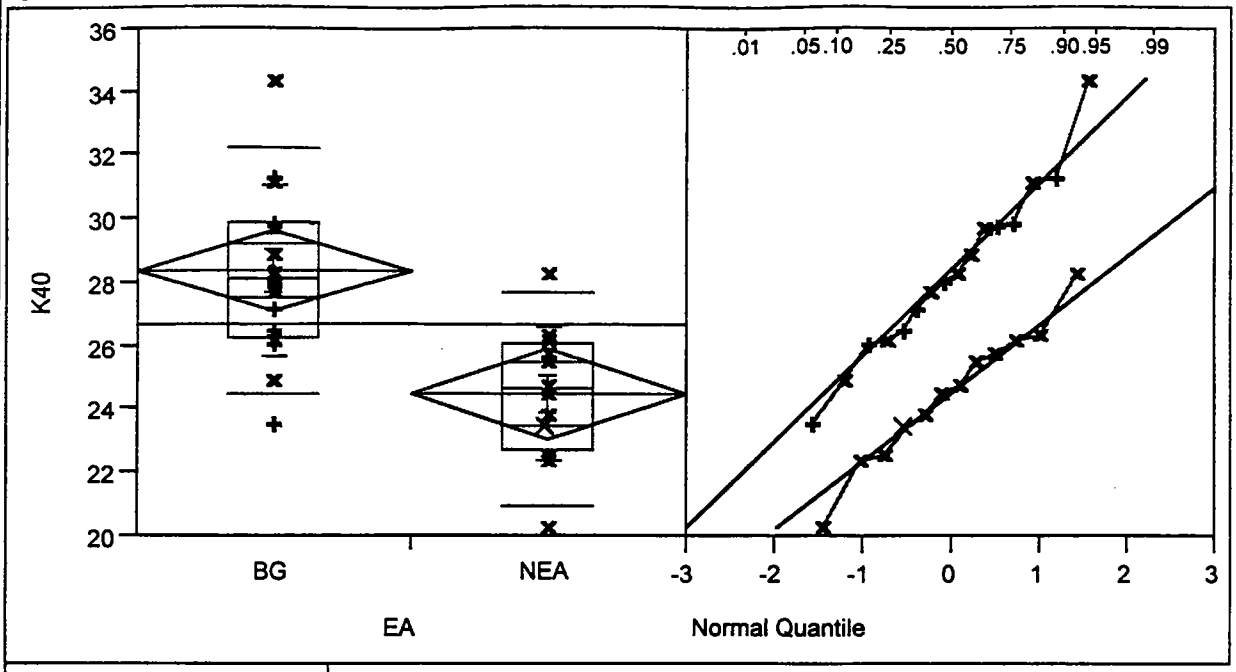
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 429 | 0.56115 | 0.5747 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.3284 | 1 | 0.5666 |

K40 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 23.6 | 24.51 | 26.275 | 28.15 | 29.875 | 32.23 | 34.4 |
| NEA | 20.3 | 20.93 | 22.7625 | 24.65 | 26.1 | 27.73 | 28.3 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 28.3562 | 2.70184 | 0.67546 |
| NEA | 12 | 24.4958 | 2.15896 | 0.62324 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 305 | 19.0625 | 3.367 |
| NEA | 12 | 101 | 8.4167 | -3.367 |

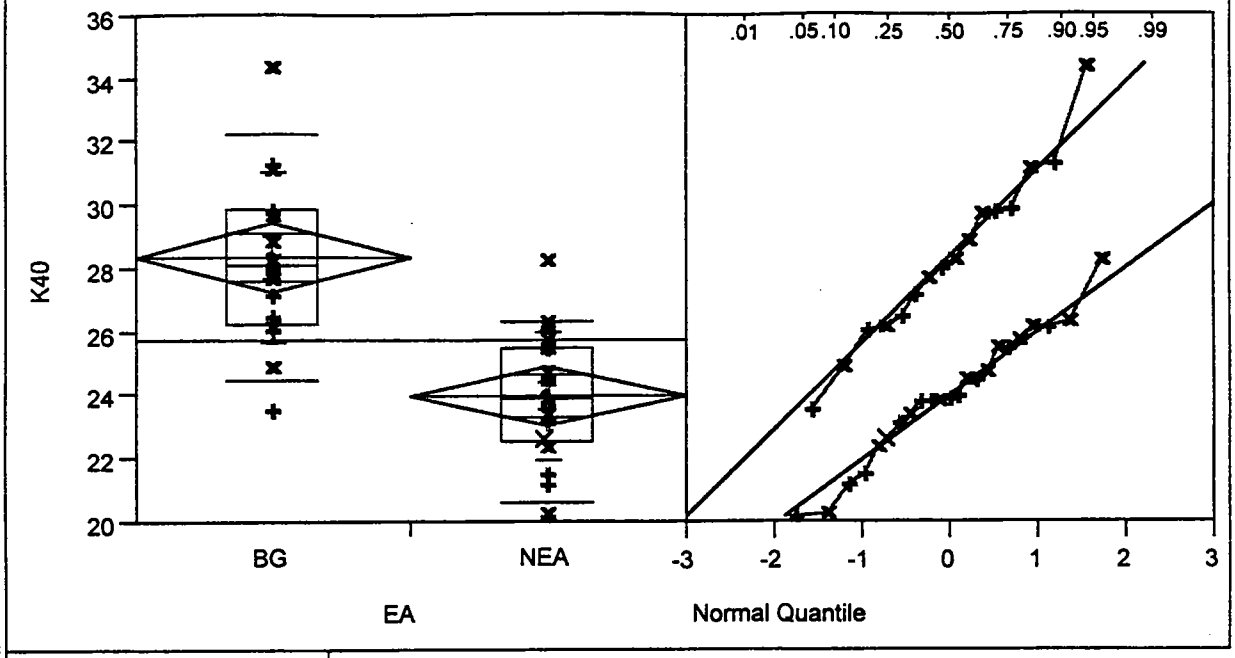
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 101 | -3.36665 | 0.0008 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 11.4912 | 1 | 0.0007 |

K40 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 23.6 | 24.51 | 26.275 | 28.15 | 29.875 | 32.23 | 34.4 |
| NEA | 20.2 | 20.66 | 22.55 | 23.9 | 25.5 | 26.32 | 28.3 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 28.3562 | 2.70184 | 0.67546 |
| NEA | 23 | 23.9935 | 2.02632 | 0.42252 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 470.5 | 29.4063 | 4.285 |
| NEA | 23 | 309.5 | 13.4565 | -4.285 |

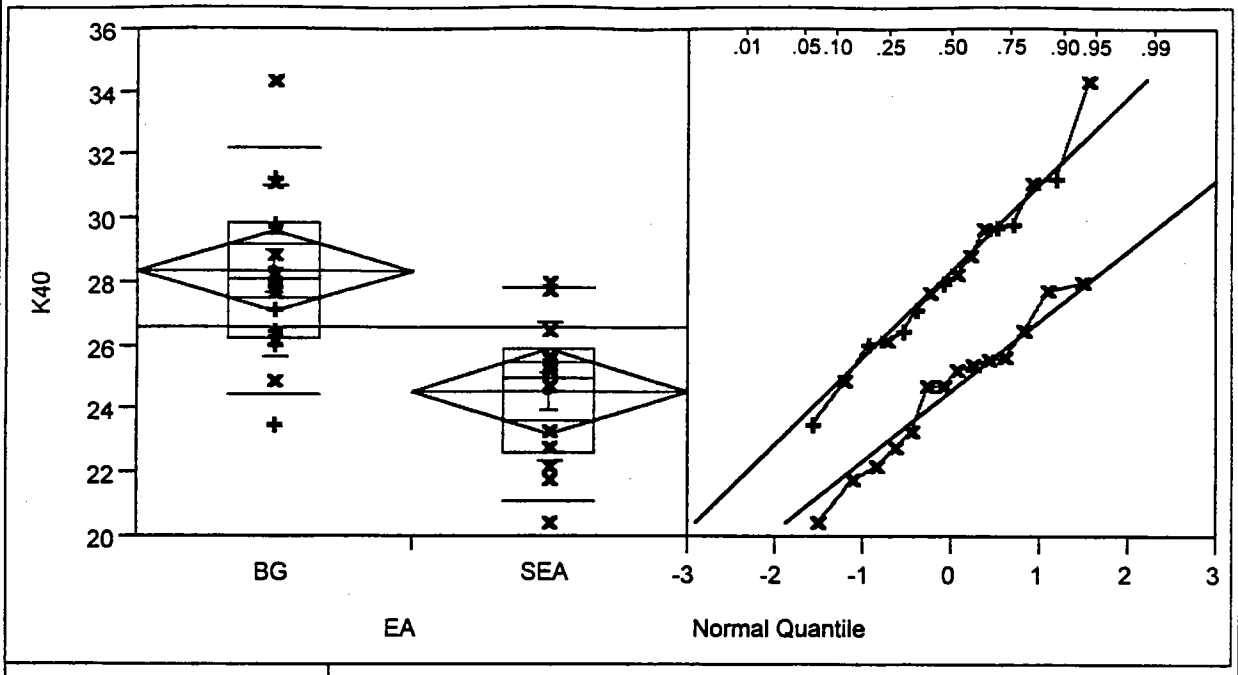
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 470.5 | 4.28519 | <.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 18.4855 | 1 | <.0001 |

K40 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 23.6 | 24.51 | 26.275 | 28.15 | 29.875 | 32.23 | 34.4 |
| SEA | 20.5 | 21.15 | 22.65 | 25.05 | 25.9 | 27.9 | 28 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 28.3562 | 2.70184 | 0.67546 |
| SEA | 14 | 24.6071 | 2.22173 | 0.59378 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 331 | 20.6875 | 3.431 |
| SEA | 14 | 134 | 9.5714 | -3.431 |

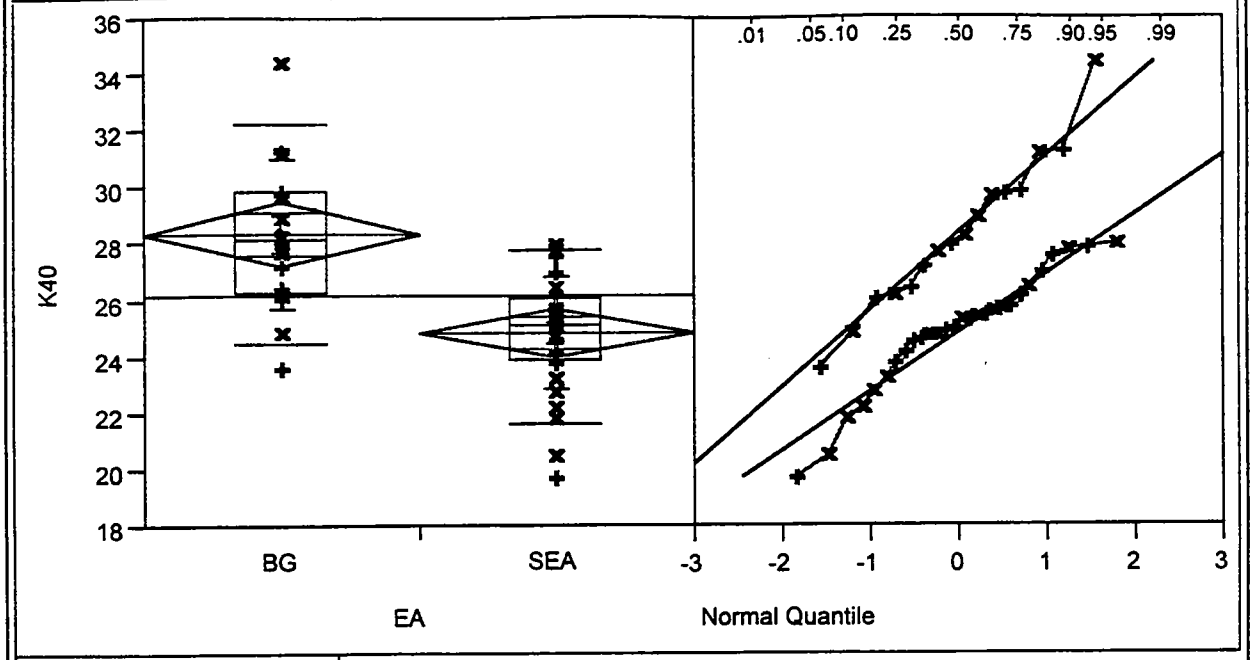
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 134 | -3.43072 | 0.0006 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 11.9129 | 1 | 0.0006 |

K40 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 23.6 | 24.51 | 26.275 | 28.15 | 29.875 | 32.23 | 34.4 |
| SEA | 19.8 | 21.67 | 23.9 | 25.2 | 26.1 | 27.81 | 28 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 28.3562 | 2.70184 | 0.67546 |
| SEA | 28 | 24.8929 | 2.08148 | 0.39336 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 519.5 | 32.4688 | 3.880 |
| SEA | 28 | 470.5 | 16.8036 | -3.880 |

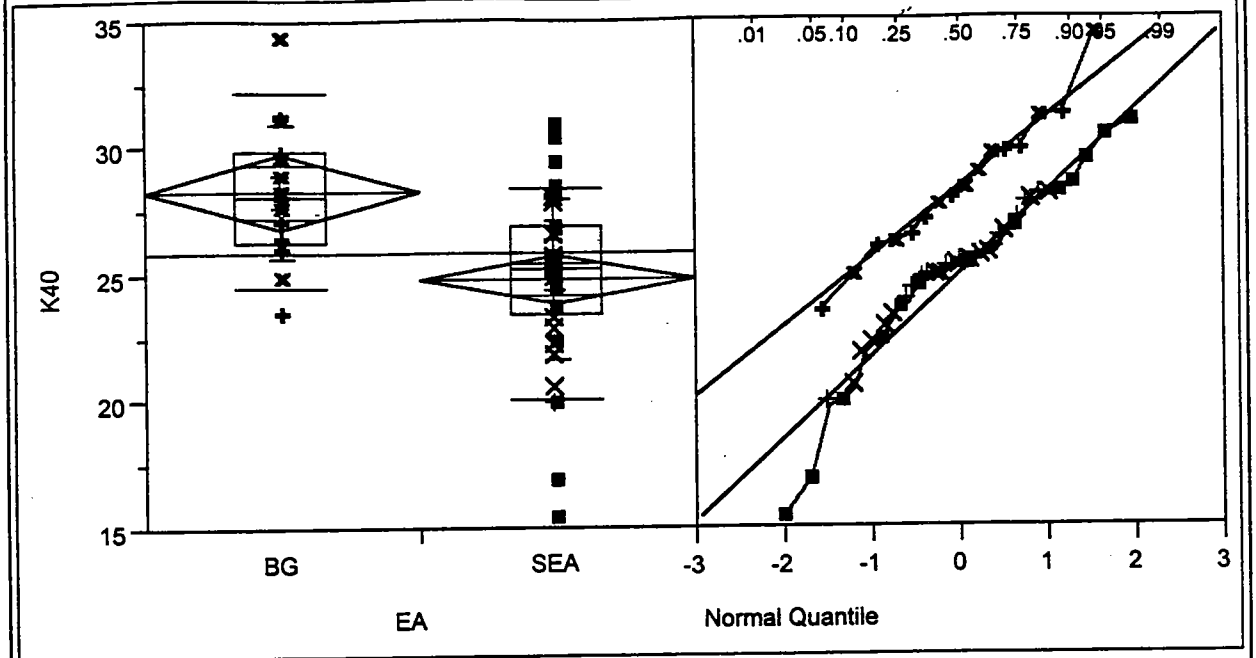
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 519.5 | 3.87989 | 0.0001 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 15.1483 | 1 | <.0001 |

K40 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 23.6 | 24.51 | 26.275 | 28.15 | 29.875 | 32.23 | 34.4 |
| SEA | 15.5 | 20.14 | 23.5 | 25.3 | 26.9 | 28.44 | 31 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 28.3562 | 2.70184 | 0.67546 |
| SEA | 41 | 24.8768 | 3.22269 | 0.50330 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 665.5 | 41.5938 | 3.570 |
| SEA | 41 | 987.5 | 24.0854 | -3.570 |

2-Sample Test, Normal Approximation

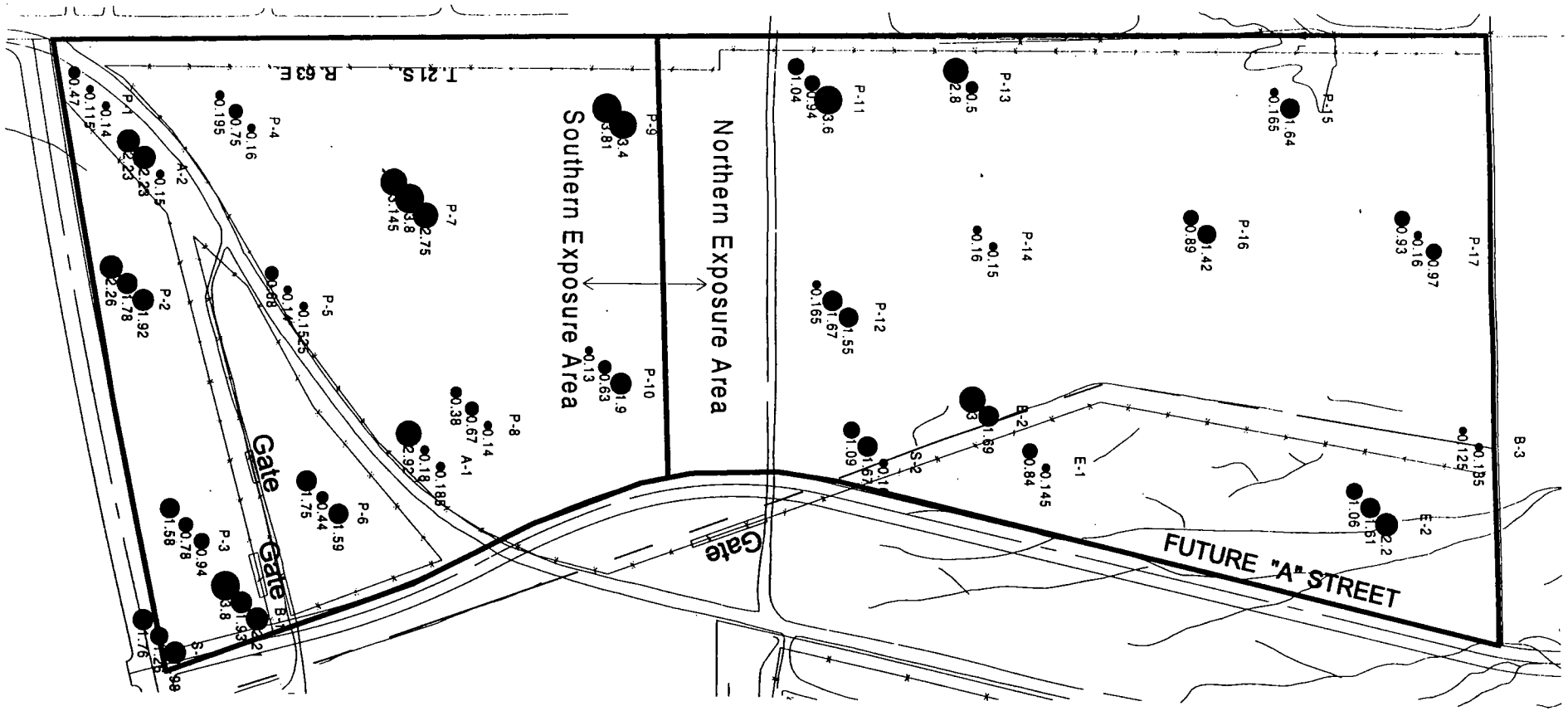
| S | Z | Prob>\|Z\| |
|---|---|---|
| 665.5 | 3.56996 | 0.0004 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 12.8081 | 1 | 0.0003 |

**TAB 11**

**Radium 226**




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

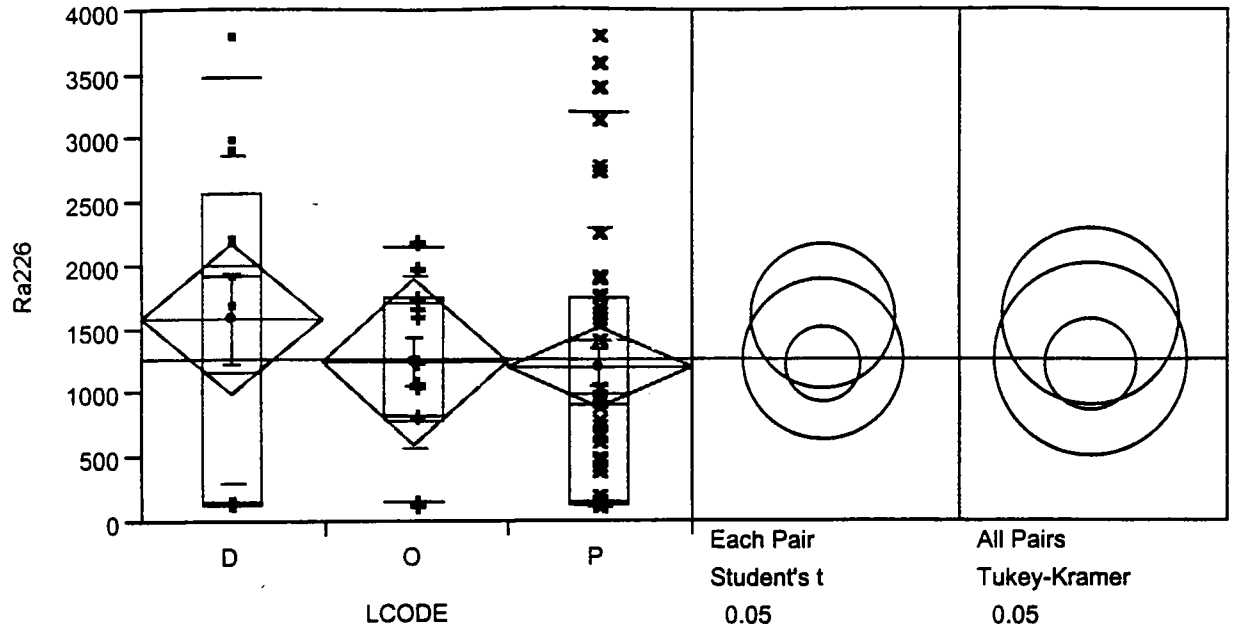
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

# ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Radium 226 pCi/g**

Ra226 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 125 | 129 | 165 | 1930 | 2575 | 3480 | 3800 |
| O | 145 | 148 | 840 | 1260 | 1760 | 2156 | 2200 |
| P | 115 | 140 | 165 | 910 | 1757.5 | 3221.5 | 3810 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.019685 |
| RSquare Adj | -0.00958 |
| Root Mean Square Error | 1090.525 |
| Mean of Response | 1284.393 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 1599996 | 799998 | 0.6727 |
| Error | 67 | 79679334 | 1189244 | Prob>F |
| C Total | 69 | 81279330 | 1177961 | 0.5137 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 1598.85 | 302.46 |
| O | 11 | 1252.27 | 328.81 |
| P | 46 | 1203.21 | 160.79 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1598.85 | 1299.62 | 360.45 |
| O | 11 | 1252.27 | 681.21 | 205.39 |
| P | 46 | 1203.21 | 1103.23 | 162.66 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | D | O | P |
|---|---|---|---|
| D | 0.000 | 346.573 | 395.640 |
| O | -346.573 | 0.000 | 49.066 |
| P | -395.640 | -49.066 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | D | O | P |
|---|---|---|---|
| D | -853.772 | -545.162 | -288.073 |
| O | -545.162 | -928.148 | -681.502 |
| P | -288.073 | -681.502 | -453.873 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | D | O | P |
|---|---|---|---|
| D | -1025.24 | -724.26 | -425.39 |
| O | -724.26 | -1114.56 | -828.23 |
| P | -425.39 | -828.23 | -545.03 |

Positive values show pairs of means that are significantly different.

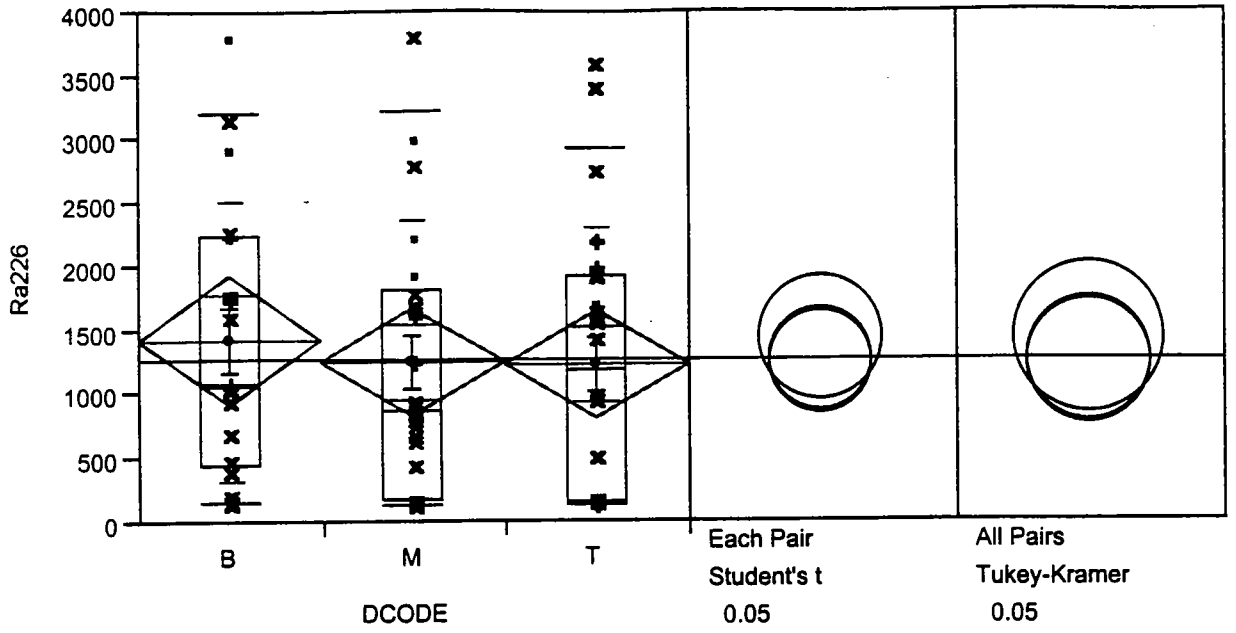
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 524 | 40.3077 | 0.937 |
| O | 11 | 417 | 37.9091 | 0.420 |
| P | 46 | 1544 | 33.5652 | -1.095 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.2959 | 2 | 0.5231 |

Ra226 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 130 | 161.5 | 447.5 | 1075 | 2237.5 | 3210.5 | 3800 |
| M | 115 | 135.5 | 176.25 | 865 | 1817.5 | 3240 | 3810 |
| T | 135 | 140 | 151.875 | 1195 | 1935 | 2945 | 3600 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.005734 |
| RSquare Adj | -0.02395 |
| Root Mean Square Error | 1098.257 |
| Mean of Response | 1284.393 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 466089 | 233044 | 0.1932 |
| Error | 67 | 80813241 | 1206168 | Prob>F |
| C Total | 69 | 81279330 | 1177961 | 0.8248 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1421.39 | 258.86 |
| M | 26 | 1251.73 | 215.39 |
| T | 26 | 1222.21 | 215.39 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1421.39 | 1095.34 | 258.18 |
| M | 26 | 1251.73 | 1121.30 | 219.91 |
| T | 26 | 1222.21 | 1076.73 | 211.16 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | B | M | T |
|---|---|---|---|
| B | 0.000 | 169.658 | 199.177 |
| M | -169.658 | 0.000 | 29.519 |
| T | -199.177 | -29.519 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -730.711 | -502.498 | -472.979 |
| M | -502.498 | -607.988 | -578.469 |
| T | -472.979 | -578.469 | -607.988 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | B | M | T |
|---|---|---|---|
| B | -877.467 | -637.494 | -607.975 |
| M | -637.494 | -730.097 | -700.577 |
| T | -607.975 | -700.577 | -730.097 |

Positive values show pairs of means that are significantly different.

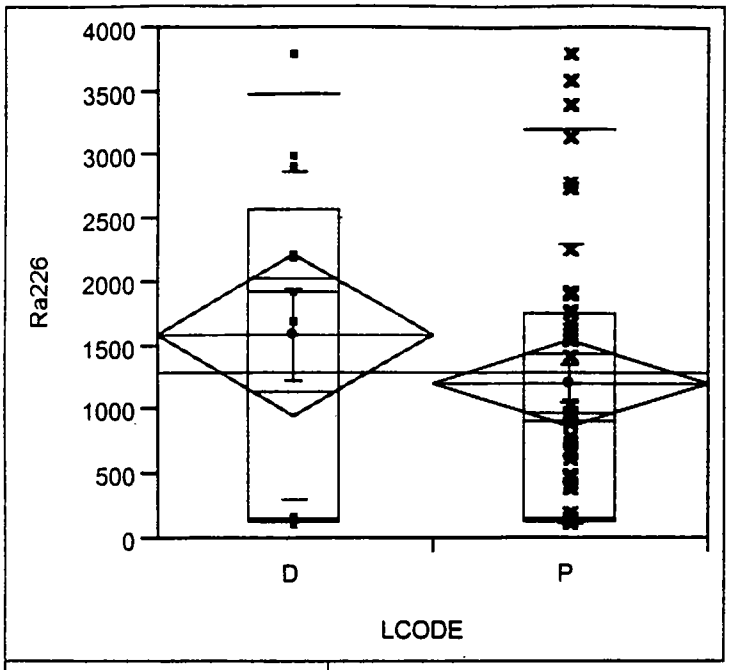
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 709.5 | 39.4167 | 0.941 |
| M | 26 | 899 | 34.5769 | -0.286 |
| T | 26 | 876.5 | 33.7115 | -0.559 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.9213 | 2 | 0.6309 |

Ra226 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 125 | 129 | 165 | 1930 | 2575 | 3480 | 3800 |
| P | 115 | 140 | 165 | 910 | 1757.5 | 3221.5 | 3810 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13. | 1598.85 | 1299.62 | 360.45 |
| P | 46 | 1203.21 | 1103.23 | 162.66 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 436 | 33.5385 | 0.832 |
| P | 46 | 1334 | 29.0000 | -0.832 |

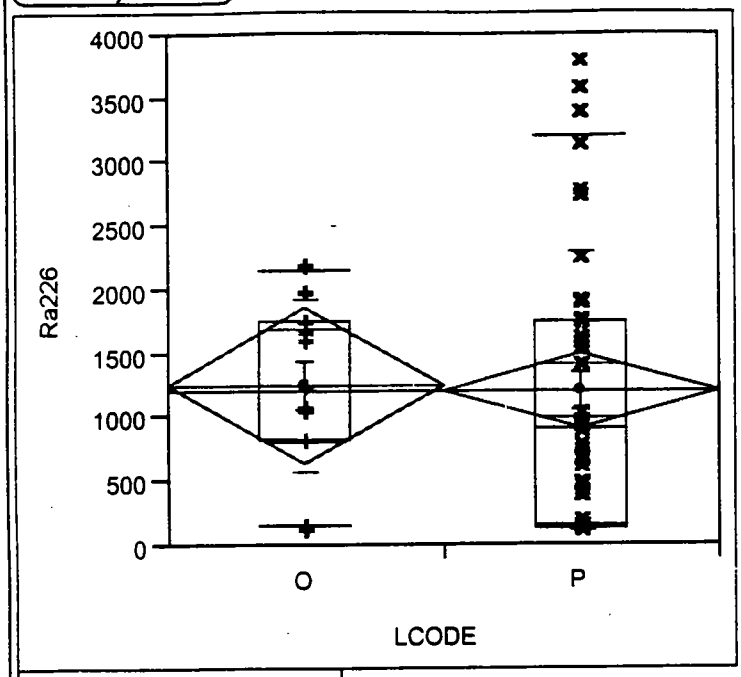
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 436 | 0.83226 | 0.4053 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.7080 | 1 | 0.4001 |

Ra226 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 145 | 148 | 840 | 1260 | 1760 | 2156 | 2200 |
| P | 115 | 140 | 165 | 910 | 1757.5 | 3221.5 | 3810 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 1252.27 | 681.21 | 205.39 |
| P | 46 | 1203.21 | 1103.23 | 162.66 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 362 | 32.9091 | 0.860 |
| P | 46 | 1291 | 28.0652 | -0.860 |

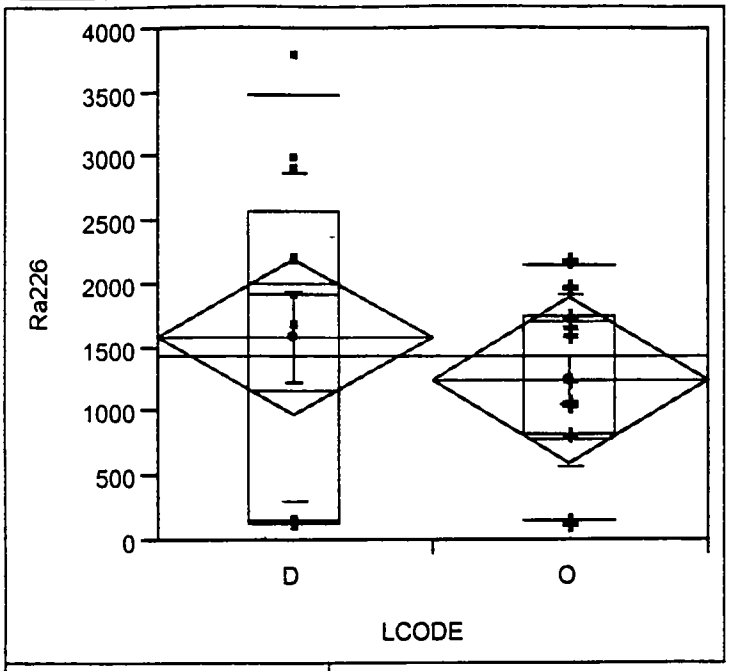
2-Sample Test Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 362 | 0.85963 | 0.3900 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.7564 | 1 | 0.3844 |

Ra226 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 125 | 129 | 165 | 1930 | 2575 | 3480 | 3800 |
| O | 145 | 148 | 840 | 1260 | 1760 | 2156 | 2200 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1598.85 | 1299.62 | 360.45 |
| O | 11 | 1252.27 | 681.21 | 205.39 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 179 | 13.7692 | 0.927 |
| O | 11 | 121 | 11.0000 | -0.927 |

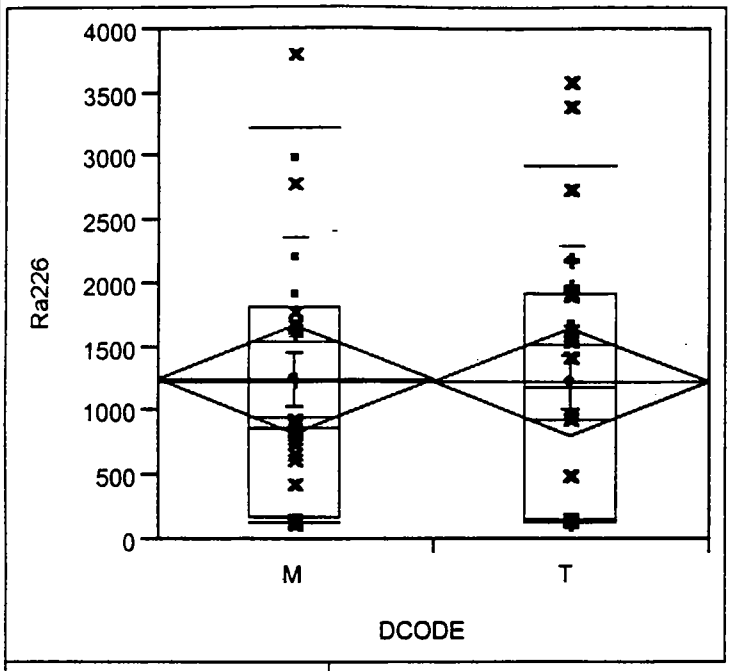
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 121 | -0.92719 | 0.3538 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.9142 | 1 | 0.3390 |

Ra226 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 115 | 135.5 | 176.25 | 865 | 1817.5 | 3240 | 3810 |
| T | 135 | 140 | 151.875 | 1195 | 1935 | 2945 | 3600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 1251.73 | 1121.30 | 219.91 |
| T | 26 | 1222.21 | 1076.73 | 211.16 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 698.5 | 26.8654 | 0.165 |
| T | 26 | 679.5 | 26.1346 | -0.165 |

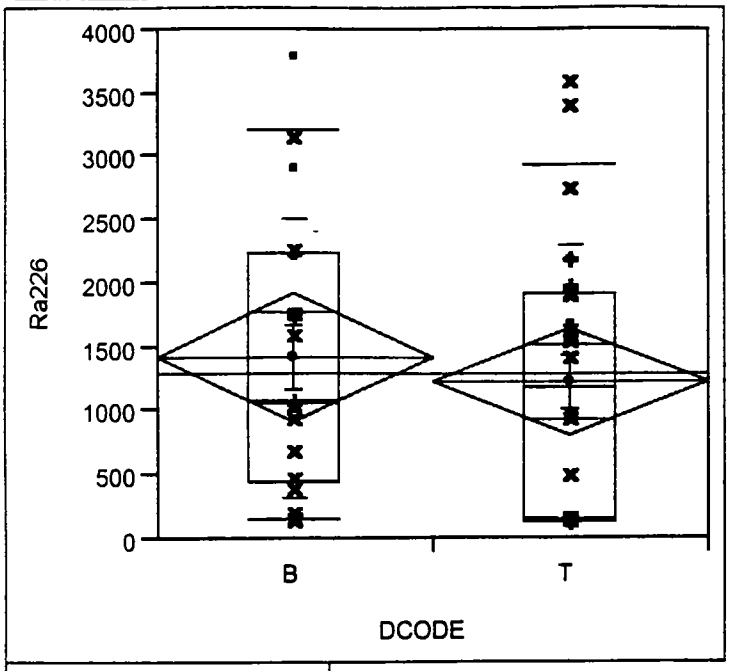
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 679.5 | -0.16477 | 0.8691 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0302 | 1 | 0.8619 |

Ra226 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 130 | 161.5 | 447.5 | 1075 | 2237.5 | 3210.5 | 3800 |
| T | 135 | 140 | 151.875 | 1195 | 1935 | 2945 | 3600 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1421.39 | 1095.34 | 258.18 |
| T | 26 | 1222.21 | 1076.73 | 211.16 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 442 | 24.5556 | 0.871 |
| T | 26 | 548 | 21.0769 | -0.871 |

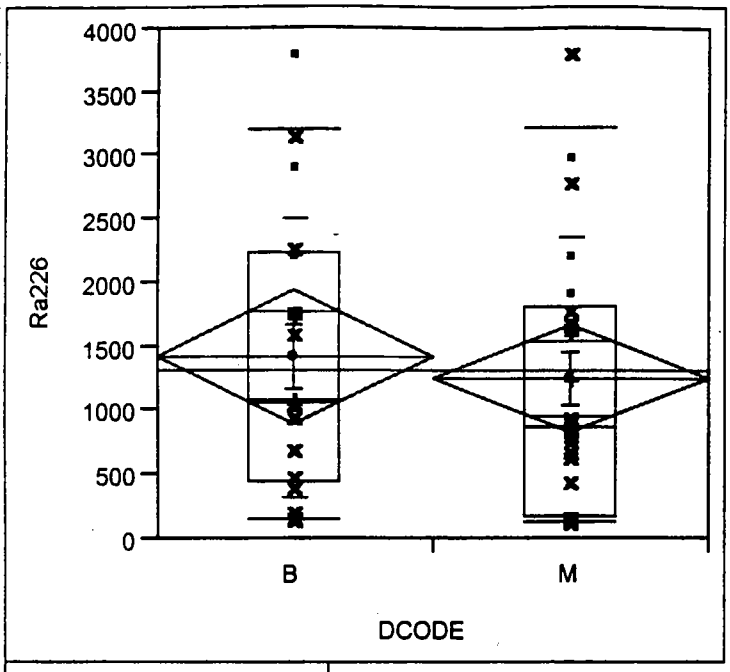
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 442 | 0.87137 | 0.3836 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.7802 | 1 | 0.3771 |

Ra226 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 130 | 161.5 | 447.5 | 1075 | 2237.5 | 3210.5 | 3800 |
| M | 115 | 135.5 | 176.25 | 865 | 1817.5 | 3240 | 3810 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1421.39 | 1095.34 | 258.18 |
| M | 26 | 1251.73 | 1121.30 | 219.91 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 438.5 | 24.3611 | 0.788 |
| M | 26 | 551.5 | 21.2115 | -0.788 |

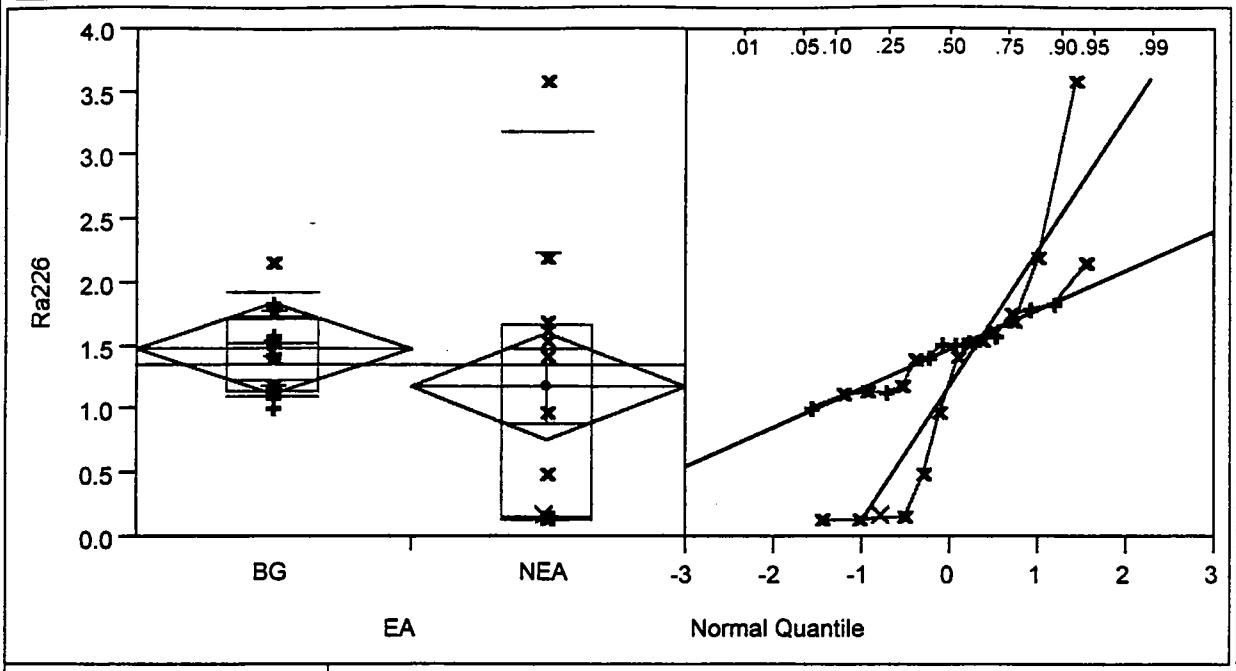
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 438.5 | 0.78787 | 0.4308 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.6397 | 1 | 0.4238 |

Ra226 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.03 | 1.1 | 1.1575 | 1.52 | 1.71125 | 1.933 | 2.15 |
| NEA | 0.135 | 0.138 | 0.1525 | 1.195 | 1.6775 | 3.18 | 3.6 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.48031 | 0.30893 | 0.07723 |
| NEA | 12 | 1.18000 | 1.05890 | 0.30568 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 255 | 15.9375 | 1.045 |
| NEA | 12 | 151 | 12.5833 | -1.045 |

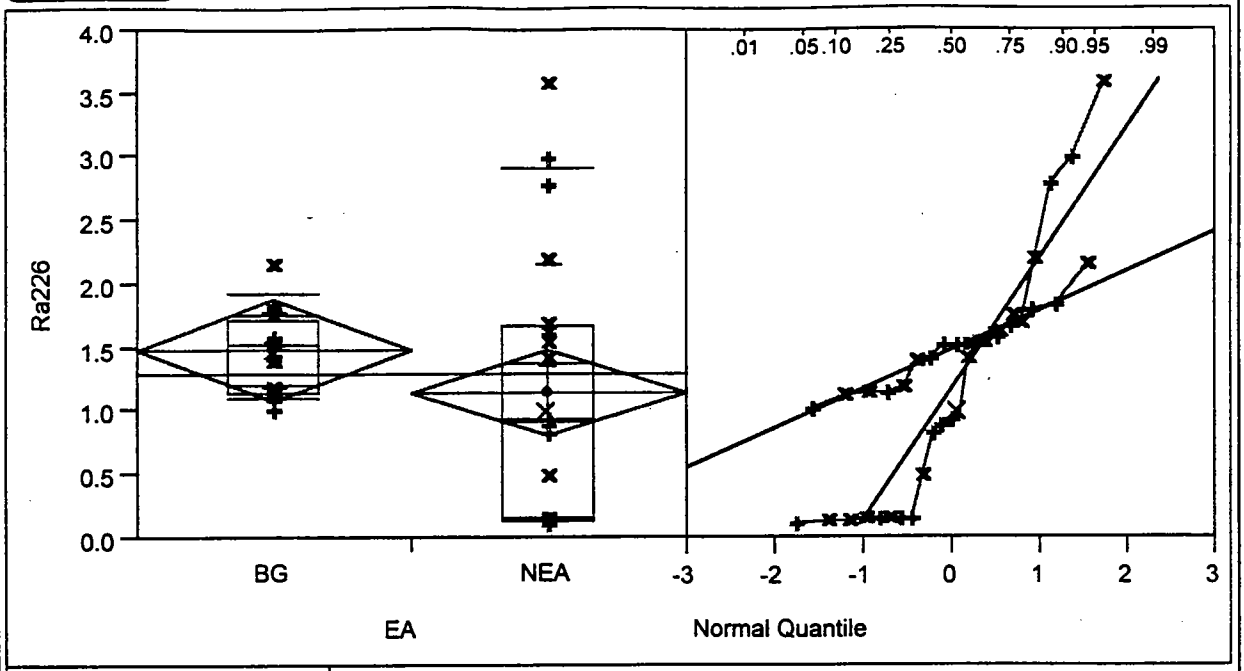
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 151 | -1.04511 | 0.2960 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.1413 | 1 | 0.2854 |

Ra226 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.03 | 1.1 | 1.1575 | 1.52 | 1.71125 | 1.933 | 2.15 |
| NEA | 0.125 | 0.139 | 0.16 | 0.94 | 1.67 | 2.92 | 3.6 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.48031 | 0.30893 | 0.07723 |
| NEA | 23 | 1.15304 | 1.02604 | 0.21394 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 375 | 23.4375 | 1.557 |
| NEA | 23 | 405 | 17.6087 | -1.557 |

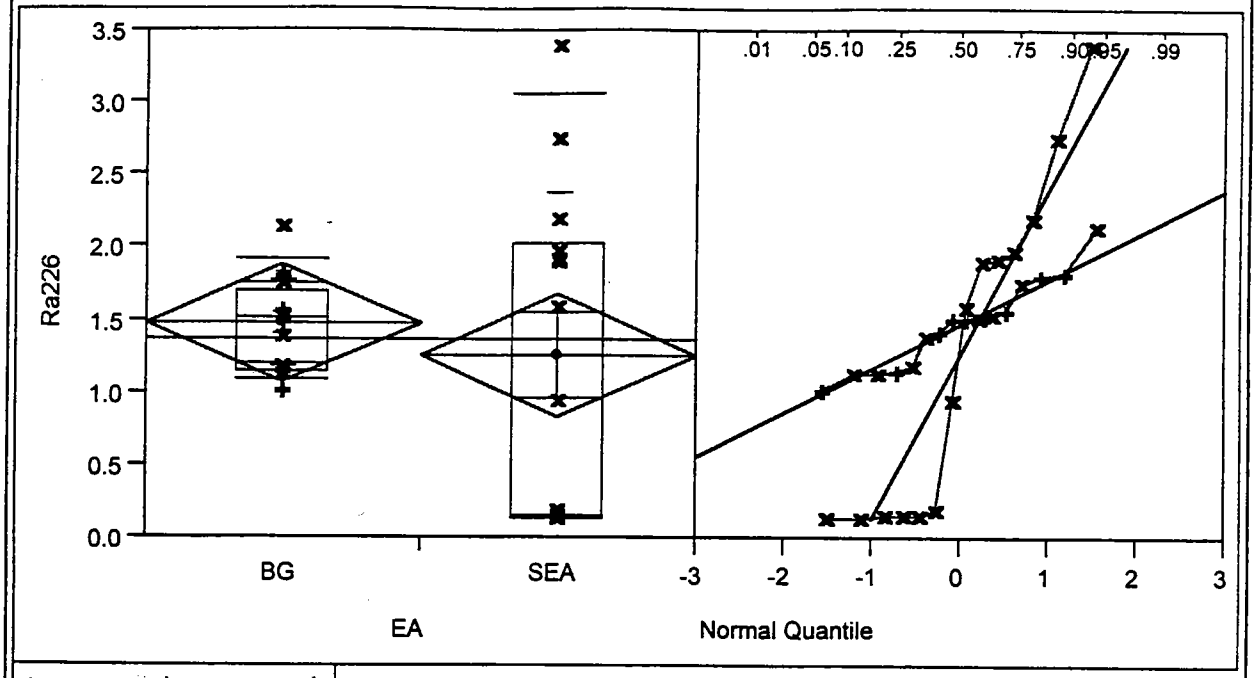
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 375 | 1.55672 | 0.1195 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.4680 | 1 | 0.1162 |

Ra226 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.03 | 1.1 | 1.1575 | 1.52 | 1.71125 | 1.933 | 2.15 |
| SEA | 0.14 | 0.14 | 0.151875 | 1.265 | 2.0375 | 3.075 | 3.4 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.48031 | 0.30893 | 0.07723 |
| SEA | 14 | 1.25839 | 1.13036 | 0.30210 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 255 | 15.9375 | 0.270 |
| SEA | 14 | 210 | 15.0000 | -0.270 |

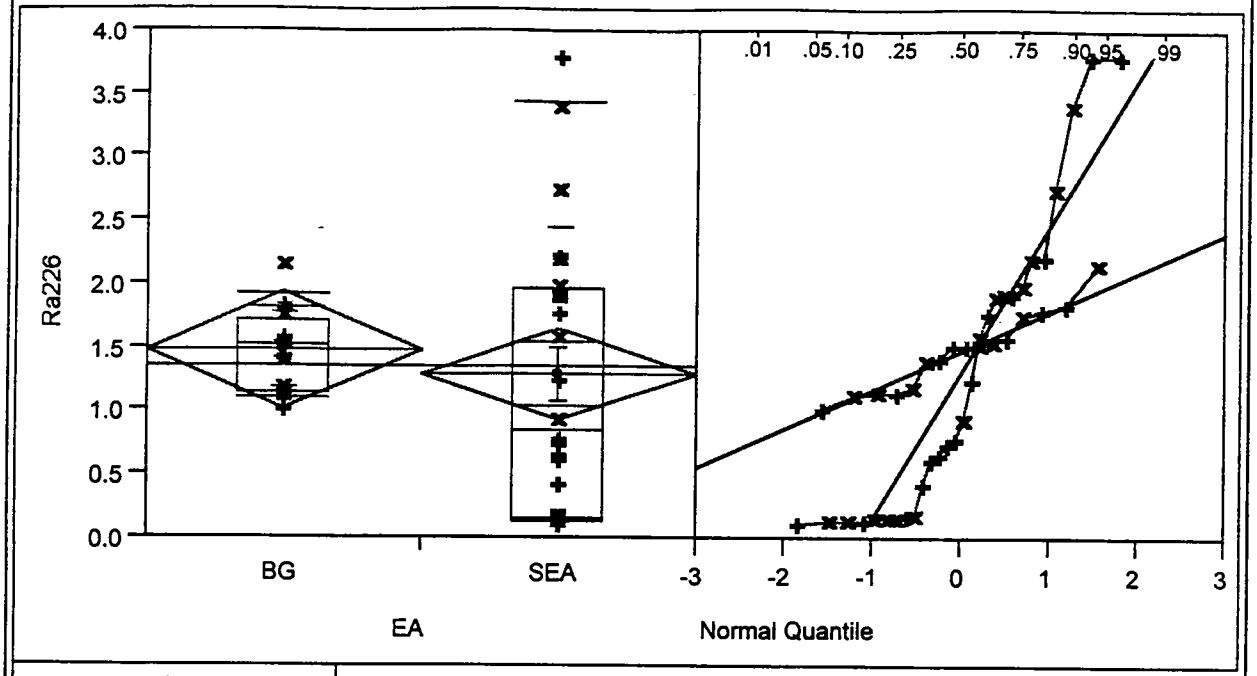
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 210 | -0.27036 | 0.7869 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0848 | 1 | 0.7709 |

Ra226 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.03 | 1.1 | 1.1575 | 1.52 | 1.71125 | 1.933 | 2.15 |
| SEA | 0.115 | 0.14 | 0.165 | 0.86 | 1.9675 | 3.44 | 3.81 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.48031 | 0.30893 | 0.07723 |
| SEA | 28 | 1.29045 | 1.16807 | 0.22074 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 398 | 24.8750 | 0.915 |
| SEA | 28 | 592 | 21.1429 | -0.915 |

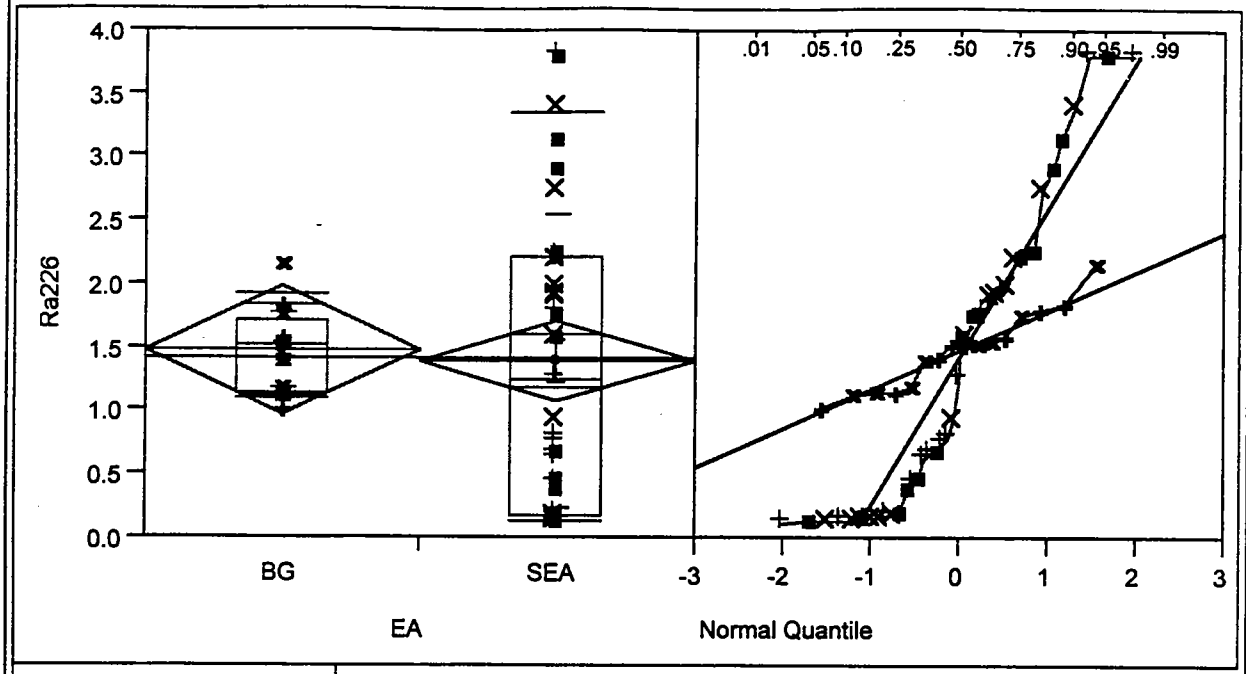
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 398 | 0.91516 | 0.3601 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.8600 | 1 | 0.3537 |

Ra226 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.03 | 1.1 | 1.1575 | 1.52 | 1.71125 | 1.933 | 2.15 |
| SEA | 0.115 | 0.14 | 0.19 | 1.26 | 2.22 | 3.349 | 3.81 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.48031 | 0.30893 | 0.07723 |
| SEA | 41 | 1.40079 | 1.17783 | 0.18395 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 489.5 | 30.5938 | 0.444 |
| SEA | 41 | 1163.5 | 28.3780 | -0.444 |

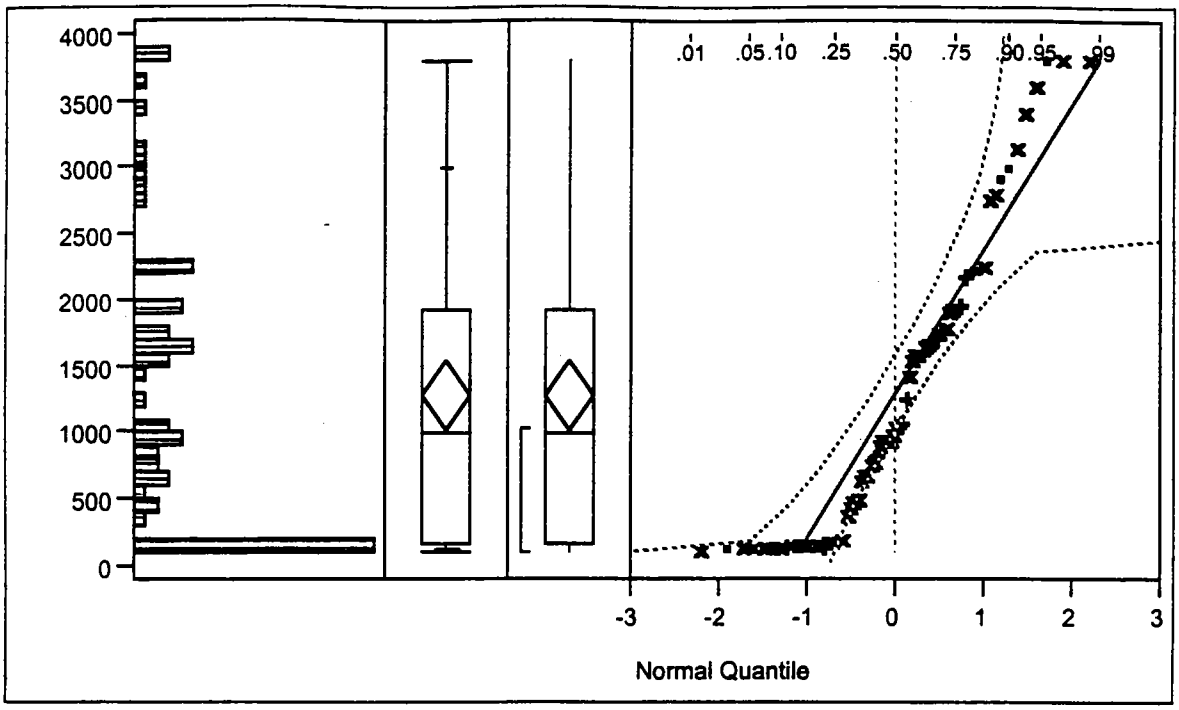
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 489.5 | 0.44406 | 0.6570 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.2052 | 1 | 0.6506 |

Ra226




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 3810.0 |
| | 99.5% | 3810.0 |
| | 97.5% | 3802.3 |
| | 90.0% | 2992.0 |
| quartile | 75.0% | 1922.5 |
| median | 50.0% | 1005.0 |
| quartile | 25.0% | 176.3 |
| | 10.0% | 140.5 |
| | 2.5% | 122.8 |
| | 0.5% | 115.0 |
| minimum | 0.0% | 115.0 |

**Moments**

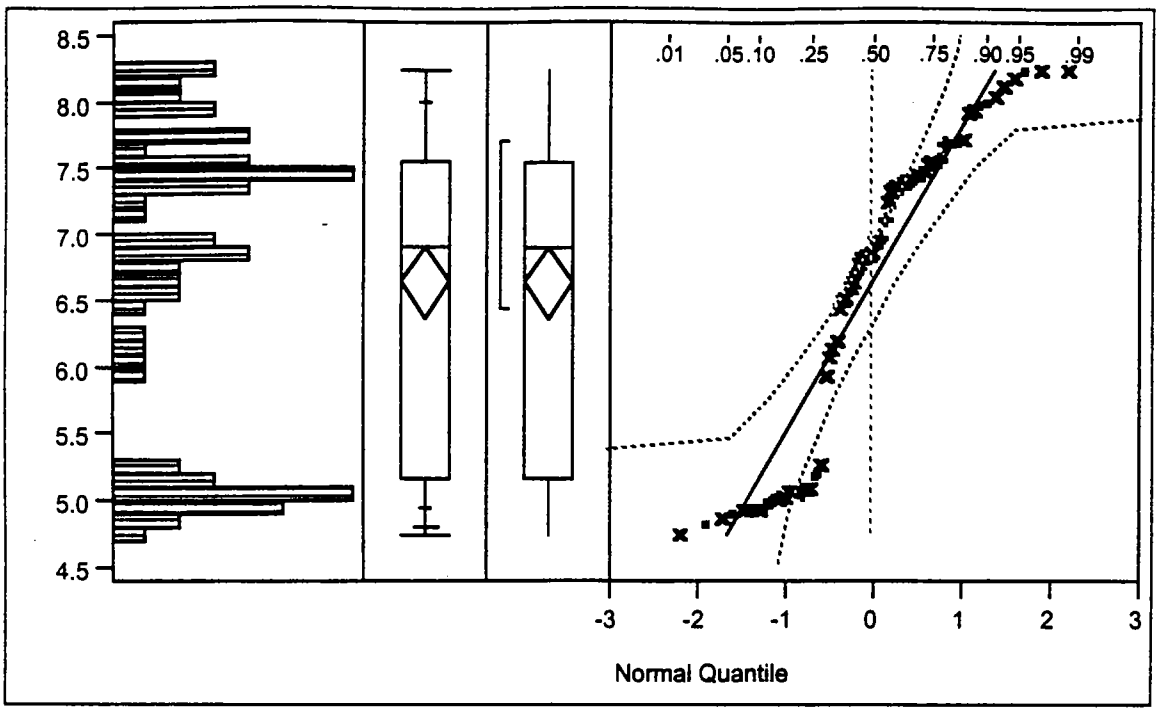
| | |
|---|---|
| Mean | 1284.393 |
| Std Dev | 1085.339 |
| Std Error Mean | 129.723 |
| Upper 95% Mean | 1543.183 |
| Lower 95% Mean | 1025.602 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 89907.500 |
| Variance | 1177961.3 |
| Skewness | 0.765 |
| Kurtosis | -0.312 |
| CV | 84.502 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.875048 | <.0001 |

lnRa226




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 8.2454 |
| | 99.5% | 8.2454 |
| | 97.5% | 8.2433 |
| | 90.0% | 8.0037 |
| quartile | 75.0% | 7.5614 |
| median | 50.0% | 6.9121 |
| quartile | 25.0% | 5.1712 |
| | 10.0% | 4.9452 |
| | 2.5% | 4.8096 |
| | 0.5% | 4.7449 |
| minimum | 0.0% | 4.7449 |

**Moments**

| | |
|---|---|
| Mean | 6.64424 |
| Std Dev | 1.15703 |
| Std Error Mean | 0.13829 |
| Upper 95% Mean | 6.92013 |
| Lower 95% Mean | 6.36836 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 465.09698 |
| Variance | 1.33872 |
| Skewness | -0.40597 |
| Kurtosis | -1.32911 |
| CV | 17.41401 |

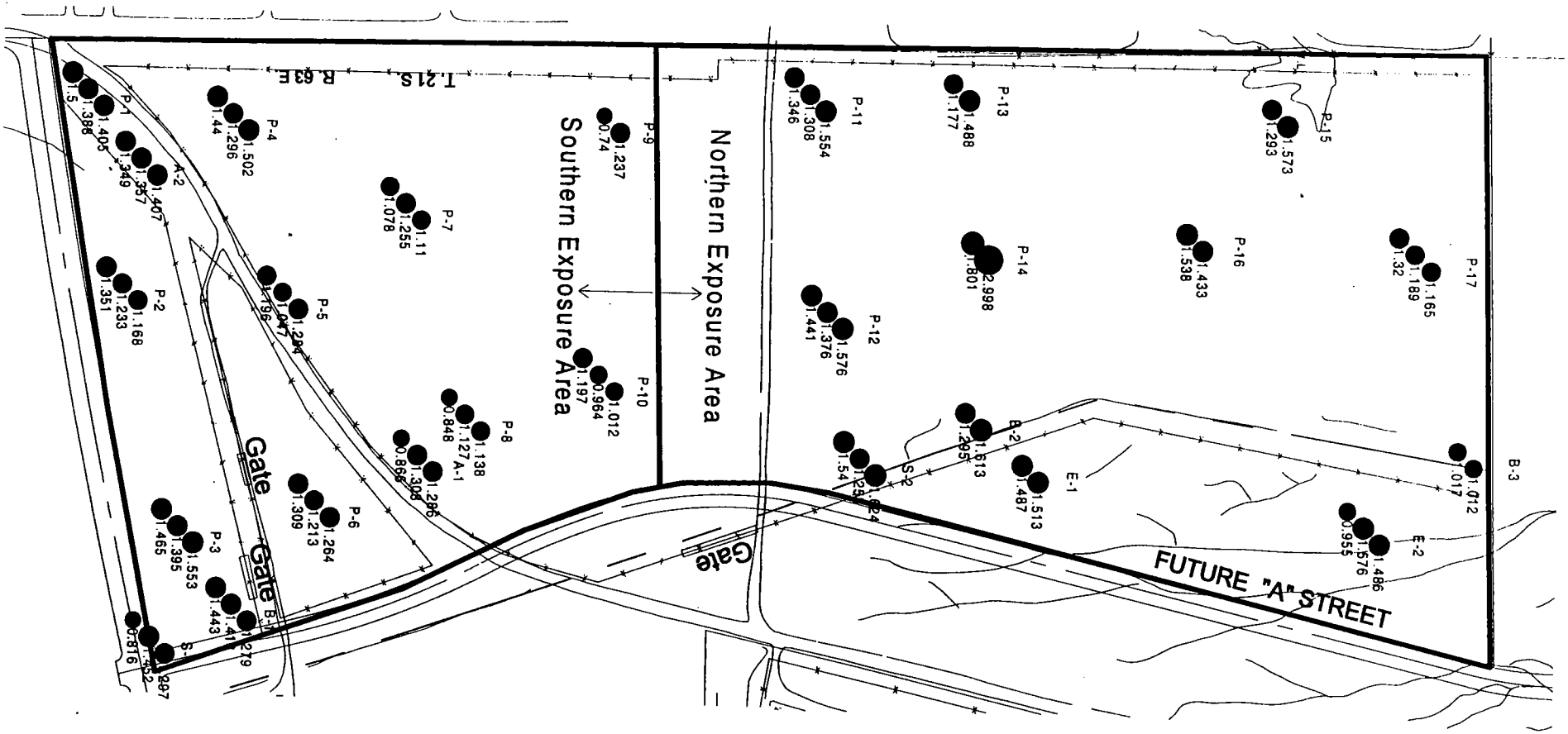
**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.861398 | <.0001 |

**TAB 12**

**Radium 228**




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

**Note:** Surface interval indicator appears at the actual sample location

# ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Radium 228 pCi/g**

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1280.77 | 203.459 | 56.429 |
| O | 11 | 1364.00 | 262.066 | 79.016 |
| P | 46 | 1332.41 | 322.650 | 47.572 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | P | D |
|---|---|---|---|
| O | 0.0000 | 31.5870 | 83.2308 |
| P | -31.5870 | 0.0000 | 51.6438 |
| D | -83.2308 | -51.6438 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -251.881 | -166.675 | -158.769 |
| P | -166.675 | -123.172 | -133.902 |
| D | -158.769 | -133.902 | -231.697 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -302.469 | -206.494 | -207.372 |
| P | -206.494 | -147.910 | -171.168 |
| D | -207.372 | -171.168 | -278.231 |

Positive values show pairs of means that are significantly different.

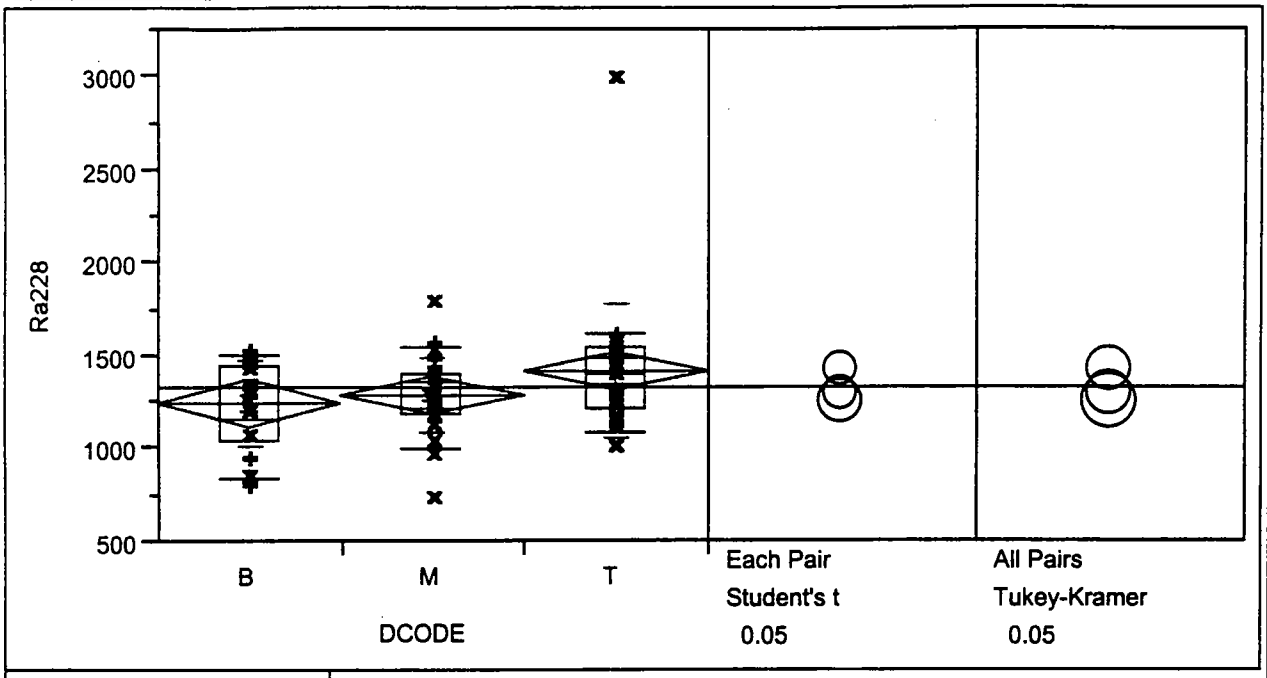
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 433 | 33.3077 | -0.423 |
| O | 11 | 479.5 | 43.5909 | 1.428 |
| P | 46 | 1572.5 | 34.1848 | -0.742 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.0817 | 2 | 0.3531 |

Ra228 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 816 | 844.8 | 1047.25 | 1333 | 1441.5 | 1504 | 1540 |
| M | 740 | 1001.1 | 1186 | 1295.5 | 1400.75 | 1549.4 | 1801 |
| T | 1012 | 1080.6 | 1219.75 | 1406 | 1553.25 | 1616.3 | 2998 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.065377 |
| RSquare Adj | 0.037478 |
| Root Mean Square Error | 287.1835 |
| Mean of Response | 1327.786 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 386530.0 | 193265 | 2.3433 |
| Error | 67 | 5525783.8 | 82474 | Prob>F |
| C Total | 69 | 5912313.8 | 85686 | 0.1038 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1247.78 | 67.690 |
| M | 26 | 1288.77 | 56.321 |
| T | 26 | 1422.19 | 56.321 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1247.78 | 237.625 | 56.009 |
| M | 26 | 1288.77 | 211.884 | 41.554 |
| T | 26 | 1422.19 | 371.133 | 72.785 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.000 | 133.423 | 174.415 |
| M | -133.423 | 0.000 | 40.991 |
| B | -174.415 | -40.991 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -158.983 | -25.560 | -1.348 |
| M | -25.560 | -158.983 | -134.771 |
| B | -1.348 | -134.771 | -191.074 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -190.913 | -57.490 | -36.648 |
| M | -57.490 | -190.913 | -170.071 |
| B | -36.648 | -170.071 | -229.449 |

Positive values show pairs of means that are significantly different.

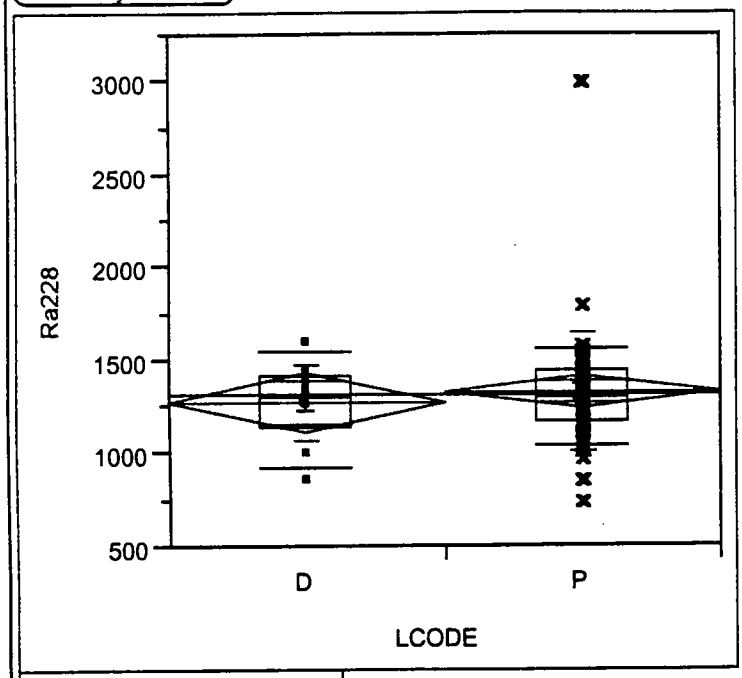
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 575 | 31.9444 | -0.853 |
| M | 26 | 846.5 | 32.5577 | -0.924 |
| T | 26 | 1063.5 | 40.9038 | 1.702 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.9262 | 2 | 0.2315 |

Ra228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 866 | 924.4 | 1148 | 1308 | 1412.5 | 1545 | 1613 |
| P | 740 | 1036.5 | 1174.75 | 1302 | 1447 | 1559.7 | 2998 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1280.77 | 203.459 | 56.429 |
| P | 46 | 1332.41 | 322.650 | 47.572 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 385 | 29.6154 | -0.082 |
| P | 46 | 1385 | 30.1087 | 0.082 |

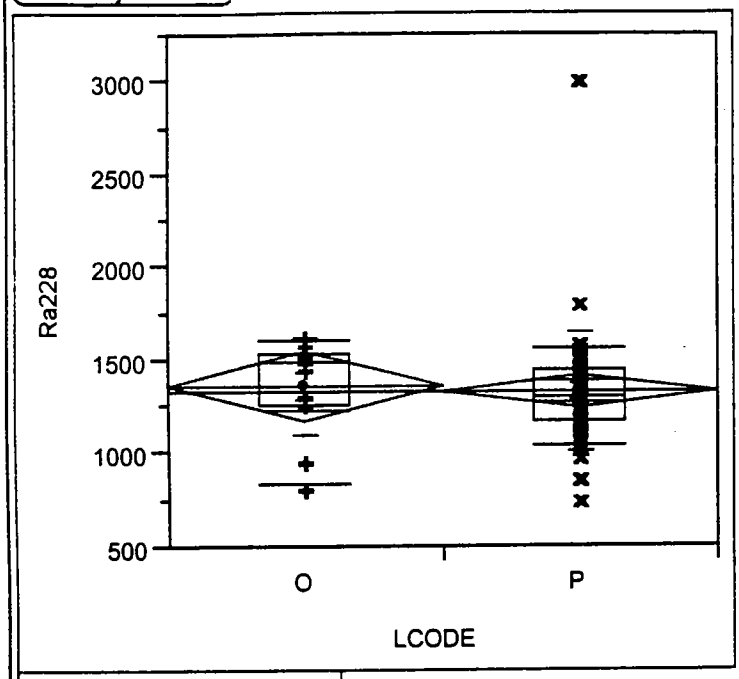
2-Sample Test; Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 385 | -0.08230 | 0.9344 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0084 | 1 | 0.9271 |

Ra228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 816 | 843.8 | 1258 | 1486 | 1540 | 1614.4 | 1624 |
| P | 740 | 1036.5 | 1174.75 | 1302 | 1447 | 1559.7 | 2998 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 1364.00 | 262.066 | 79.016 |
| P | 46 | 1332.41 | 322.650 | 47.572 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 384.5 | 34.9545 | 1.314 |
| P | 46 | 1268.5 | 27.5761 | -1.314 |

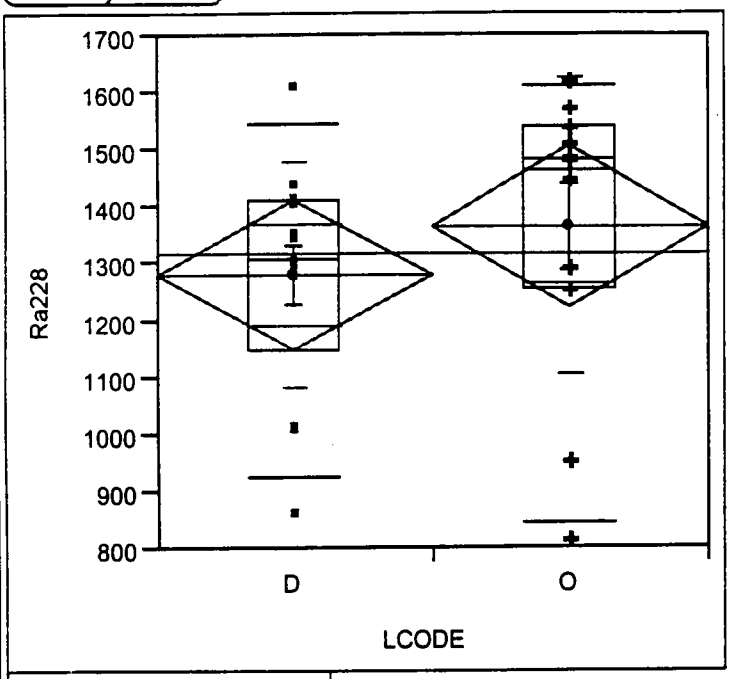
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 384.5 | 1.31438 | 0.1887 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.7543 | 1 | 0.1853 |

Ra228 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 866 | 924.4 | 1148 | 1308 | 1412.5 | 1545 | 1613 |
| O | 816 | 843.8 | 1258 | 1486 | 1540 | 1614.4 | 1624 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1280.77 | 203.459 | 56.429 |
| O | 11 | 1364.00 | 262.066 | 79.016 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 139 | 10.6923 | -1.333 |
| O | 11 | 161 | 14.6364 | 1.333 |

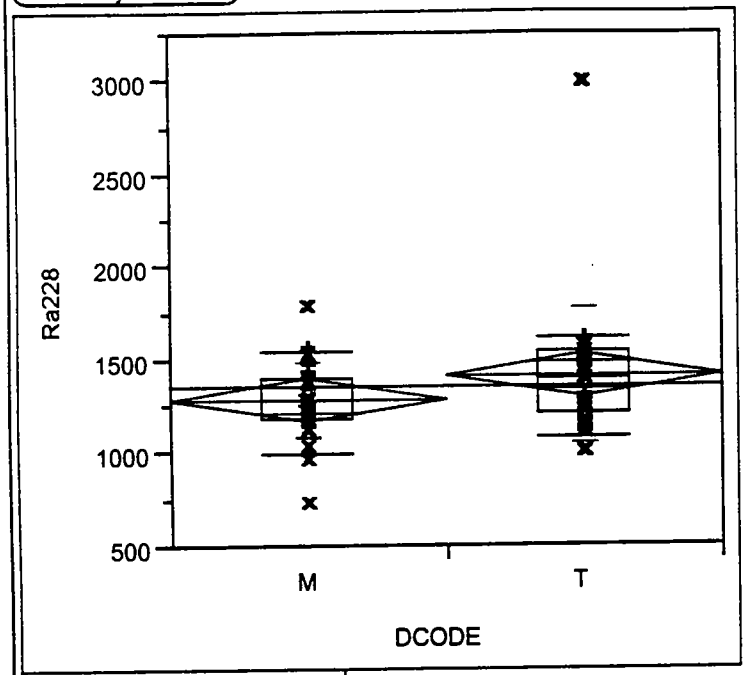
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 161 | 1.33254 | 0.1827 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.8537 | 1 | 0.1734 |

Ra228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 740 | 1001.1 | 1186 | 1295.5 | 1400.75 | 1549.4 | 1801 |
| T | 1012 | 1080.6 | 1219.75 | 1406 | 1553.25 | 1616.3 | 2998 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 1288.77 | 211.884 | 41.554 |
| T | 26 | 1422.19 | 371.133 | 72.785 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 612.5 | 23.5577 | -1.391 |
| T | 26 | 765.5 | 29.4423 | 1.391 |

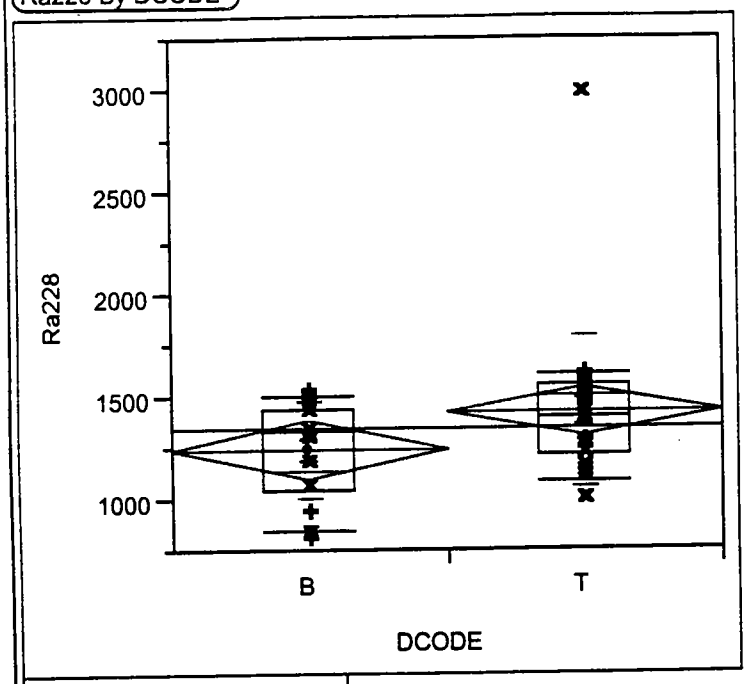
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 765.5 | 1.39098 | 0.1642 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.9604 | 1 | 0:1615 |

Ra228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 816 | 844.8 | 1047.25 | 1333 | 1441.5 | 1504 | 1540 |
| T | 1012 | 1080.6 | 1219.75 | 1406 | 1553.25 | 1616.3 | 2998 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1247.78 | 237.625 | 56.009 |
| T | 26 | 1422.19 | 371.133 | 72.785 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 341 | 18.9444 | -1.516 |
| T | 26 | 649 | 24.9615 | 1.516 |

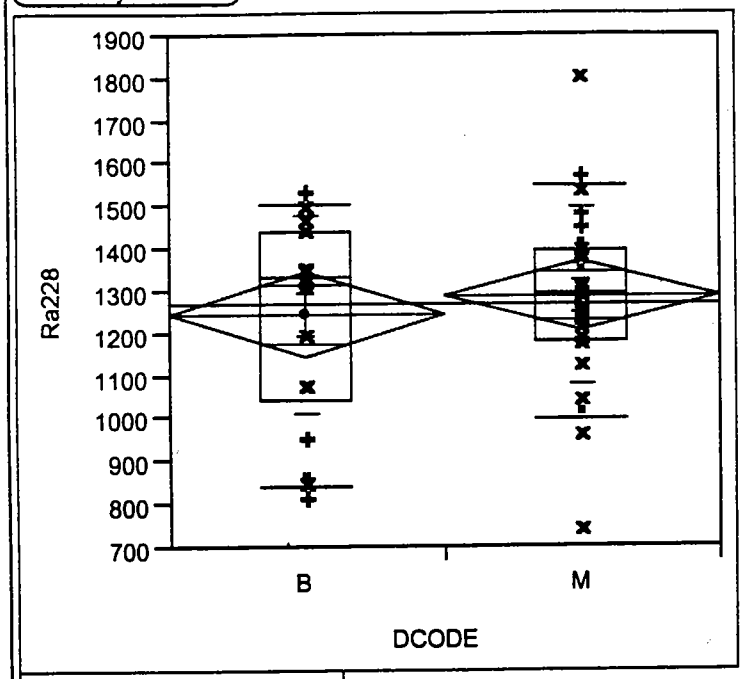
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 341 | -1.51583 | 0.1296 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.3341 | 1 | 0.1266 |

Ra228 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 816 | 844.8 | 1047.25 | 1333 | 1441.5 | 1504 | 1540 |
| M | 740 | 1001.1 | 1186 | 1295.5 | 1400.75 | 1549.4 | 1801 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1247.78 | 237.625 | 56.009 |
| M | 26 | 1288.77 | 211.884 | 41.554 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 405 | 22.5000 | 0.012 |
| M | 26 | 585 | 22.5000 | 0.012 |

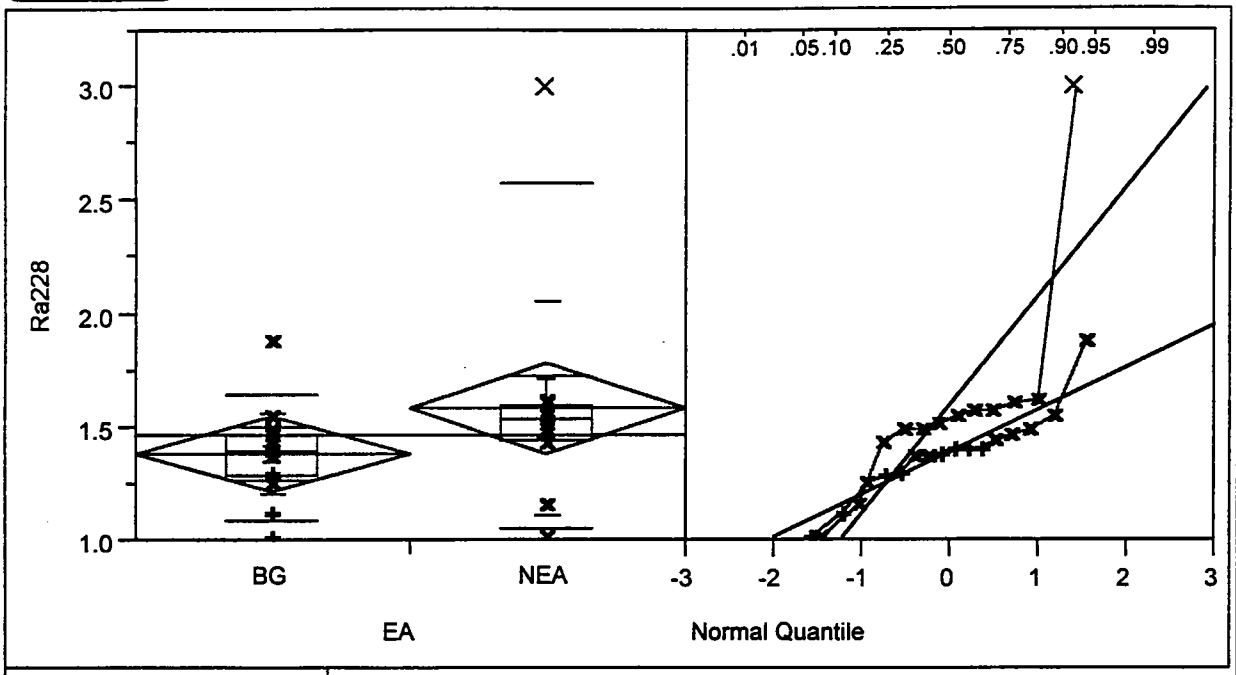
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 405 | 0.01194 | 0.9905 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.0000 | 1 | 1.0000 |

Ra228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.02 | 1.09 | 1.2925 | 1.4 | 1.46375 | 1.649 | 1.88 |
| NEA | 1.012173 | 1.058117 | 1.446426 | 1.533486 | 1.603655 | 2.585563 | 2.997711 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.38594 | 0.188743 | 0.04719 |
| NEA | 12 | 1.58626 | 0.481557 | 0.13901 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 184 | 11.5000 | -2.207 |
| NEA | 12 | 222 | 18.5000 | 2.207 |

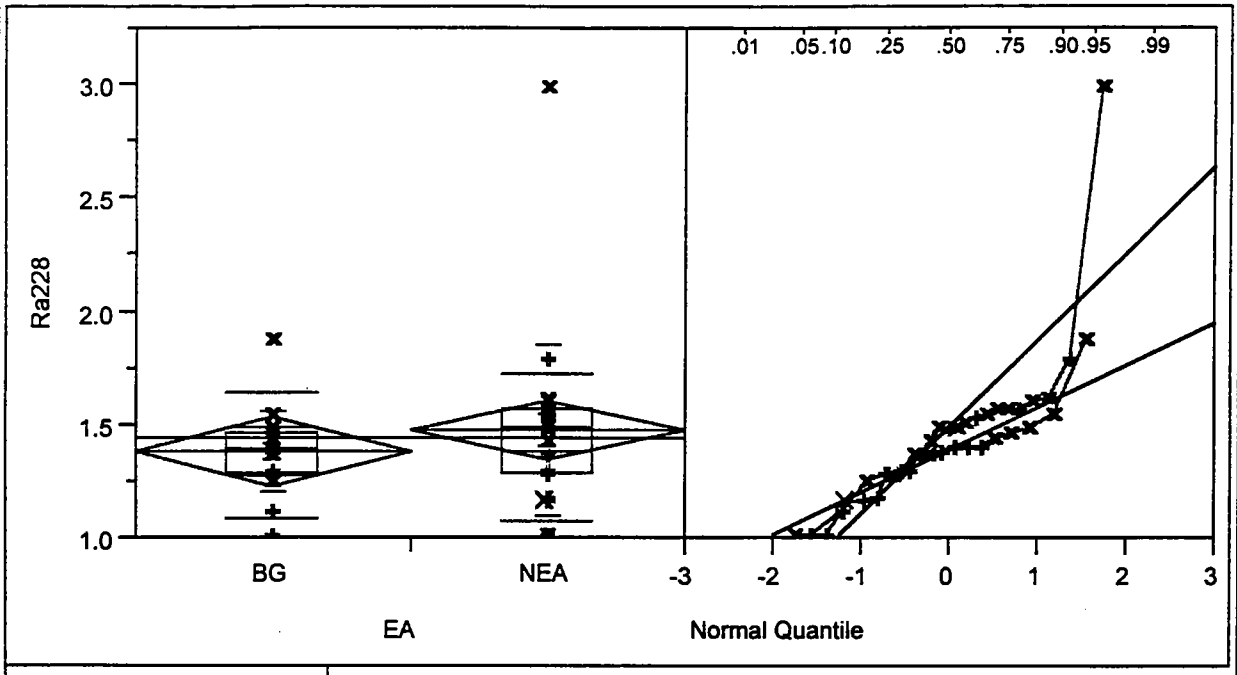
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 222 | 2.20664 | 0.0273 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.9723 | 1 | 0.0258 |

Ra228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.02 | 1.09 | 1.2925 | 1.4 | 1.46375 | 1.649 | 1.88 |
| NEA | 1.012173 | 1.076298 | 1.29313 | 1.48707 | 1.575889 | 1.730438 | 2.997711 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.38594 | 0.188743 | 0.04719 |
| NEA | 23 | 1.48233 | 0.387438 | 0.08079 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 279 | 17.4375 | -1.157 |
| NEA | 23 | 501 | 21.7826 | 1.157 |

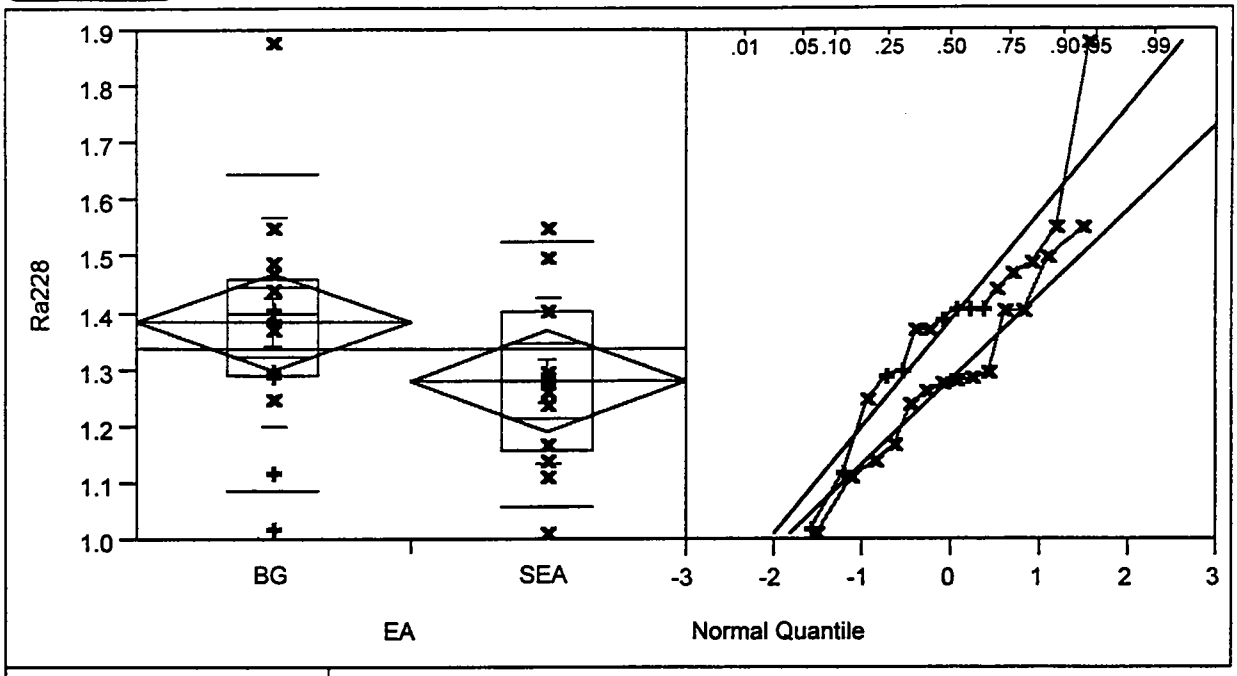
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 279 | -1.15665 | 0.2474 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.3711 | 1 | 0.2416 |

Ra228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.02 | 1.09 | 1.2925 | 1.4 | 1.46375 | 1.649 | 1.88 |
| SEA | 1.011848 | 1.060839 | 1.160816 | 1.281306 | 1.405082 | 1.527616 | 1.553408 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.38594 | 0.188743 | 0.04719 |
| SEA | 14 | 1.28154 | 0.149689 | 0.04001 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 292 | 18.2500 | 1.809 |
| SEA | 14 | 173 | 12.3571 | -1.809 |

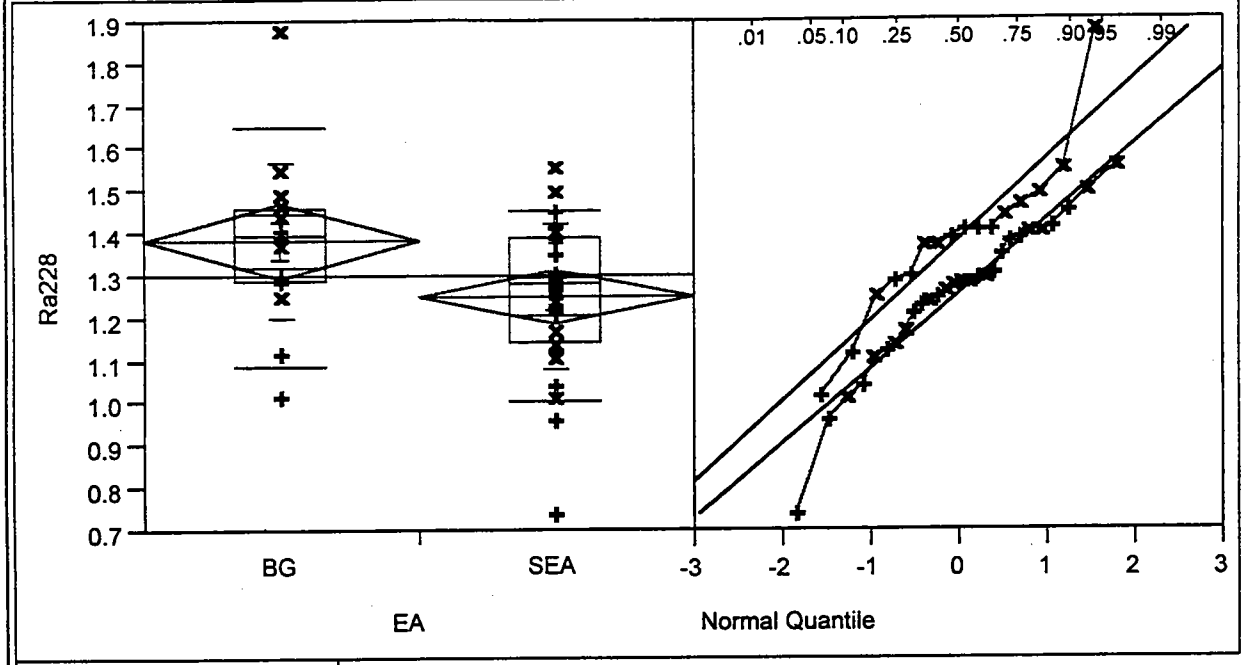
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 173 | -1.80933 | 0.0704 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.3493 | 1 | 0.0672 |

Ra228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.02 | 1.09 | 1.2925 | 1.4 | 1.46375 | 1.649 | 1.88 |
| SEA | 0.739666 | 1.007112 | 1.145798 | 1.281306 | 1.393282 | 1.45688 | 1.553408 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.38594 | 0.188743 | 0.04719 |
| SEA | 28 | 1.25479 | 0.175364 | 0.03314 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 454 | 28.3750 | 2.282 |
| SEA | 28 | 536 | 19.1429 | -2.282 |

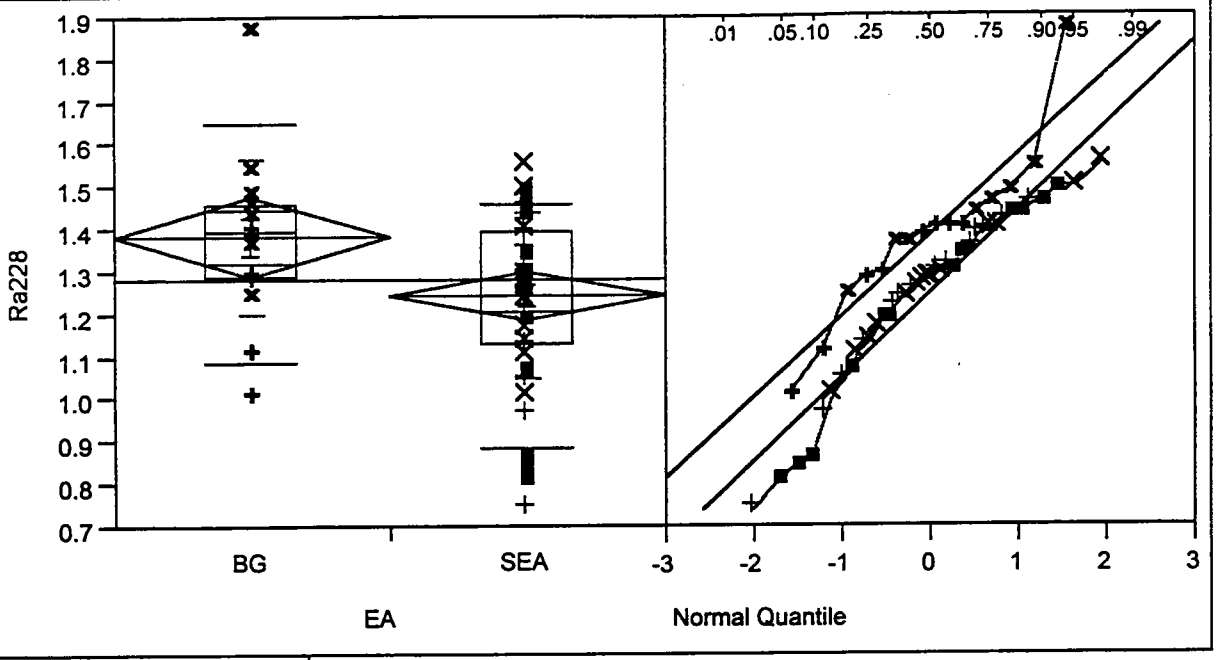
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 454 | 2.28157 | 0.0225 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.2614 | 1 | 0.0218 |

Ra228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.02 | 1.09 | 1.2925 | 1.4 | 1.46375 | 1.649 | 1.88 |
| SEA | 0.739666 | 0.886037 | 1.132799 | 1.283921 | 1.399738 | 1.462096 | 1.553408 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.38594 | 0.188743 | 0.04719 |
| SEA | 41 | 1.24370 | 0.197962 | 0.03092 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 594 | 37.1250 | 2.300 |
| SEA | 41 | 1059 | 25.8293 | -2.300 |

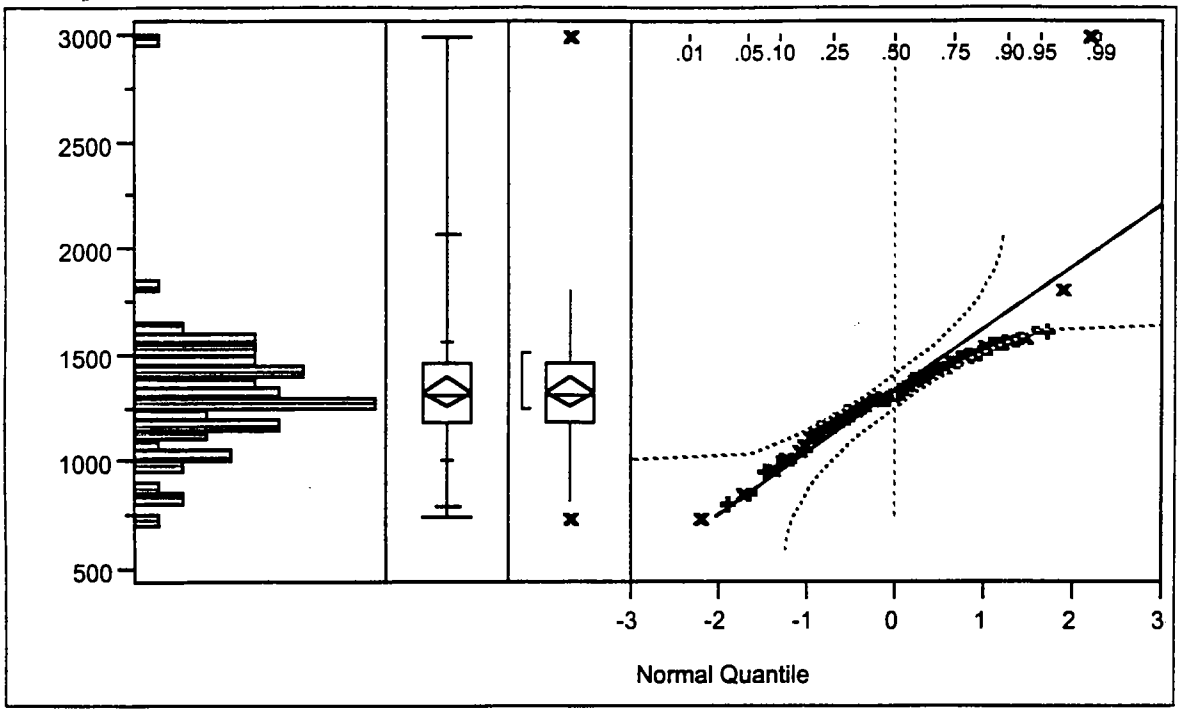
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 594 | 2.30001 | 0.0214 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.3310 | 1 | 0.0209 |

Ra228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 2998.0 |
| | 99.5% | 2998.0 |
| | 97.5% | 2070.3 |
| | 90.0% | 1571.1 |
| quartile | 75.0% | 1470.3 |
| median | 50.0% | 1308.5 |
| quartile | 25.0% | 1186.0 |
| | 10.0% | 1012.0 |
| | 2.5% | 798.9 |
| | 0.5% | 740.0 |
| minimum | 0.0% | 740.0 |

**Moments**

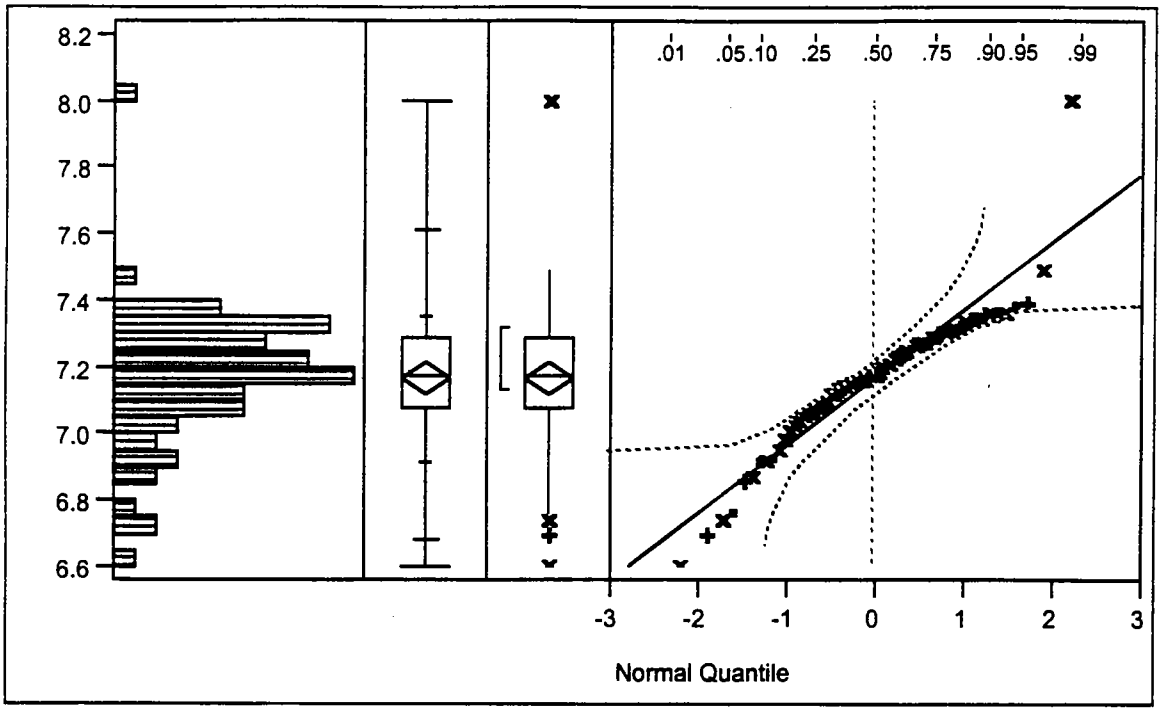
| | |
|---|---|
| Mean | 1327.786 |
| Std Dev | 292.721 |
| Std Error Mean | 34.987 |
| Upper 95% Mean | 1397.583 |
| Lower 95% Mean | 1257.989 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 92945.000 |
| Variance | 85685.707 |
| Skewness | 2.449 |
| Kurtosis | 14.617 |
| CV | 22.046 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.828988 | <.0001 |

lnRa228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 8.0057 |
| | 99.5% | 8.0057 |
| | 97.5% | 7.6108 |
| | 90.0% | 7.3595 |
| quartile | 75.0% | 7.2932 |
| median | 50.0% | 7.1766 |
| quartile | 25.0% | 7.0783 |
| | 10.0% | 6.9197 |
| | 2.5% | 6.6824 |
| | 0.5% | 6.6067 |
| minimum | 0.0% | 6.6067 |

**Moments**

| | |
|---|---|
| Mean | 7.17048 |
| Std Dev | 0.20225 |
| Std Error Mean | 0.02417 |
| Upper 95% Mean | 7.21871 |
| Lower 95% Mean | 7.12226 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 501.93383 |
| Variance | 0.04091 |
| Skewness | 0.26252 |
| Kurtosis | 4.31257 |
| CV | 2.82063 |

**Test for Normality**

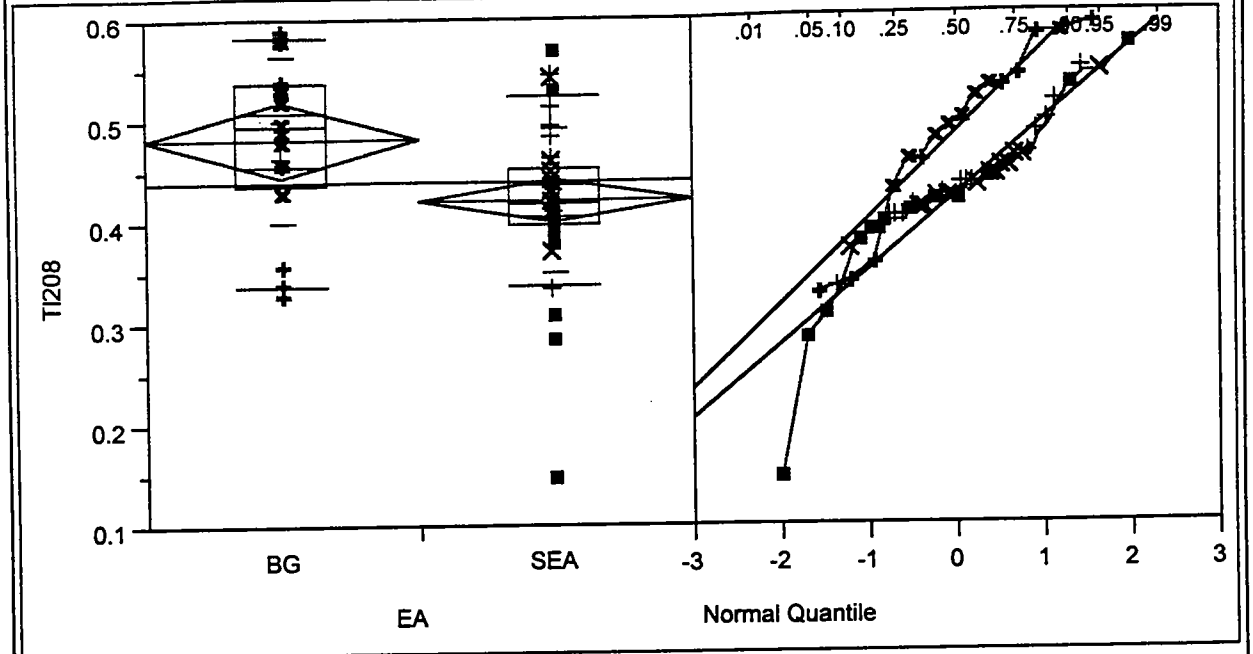
Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.934581 | 0.0016 |

# TAB 13

# Thallium 208

Tl208 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.33 | 0.337 | 0.4375 | 0.495 | 0.5375 | 0.583 | 0.59 |
| SEA | 0.15 | 0.338 | 0.4 | 0.42 | 0.455 | 0.526 | 0.57 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.482500 | 0.082664 | 0.02067 |
| SEA | 41 | 0.423049 | 0.071945 | 0.01124 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 616.5 | 38.5313 | 2.704 |
| SEA | 41 | 1036.5 | 25.2805 | -2.704 |

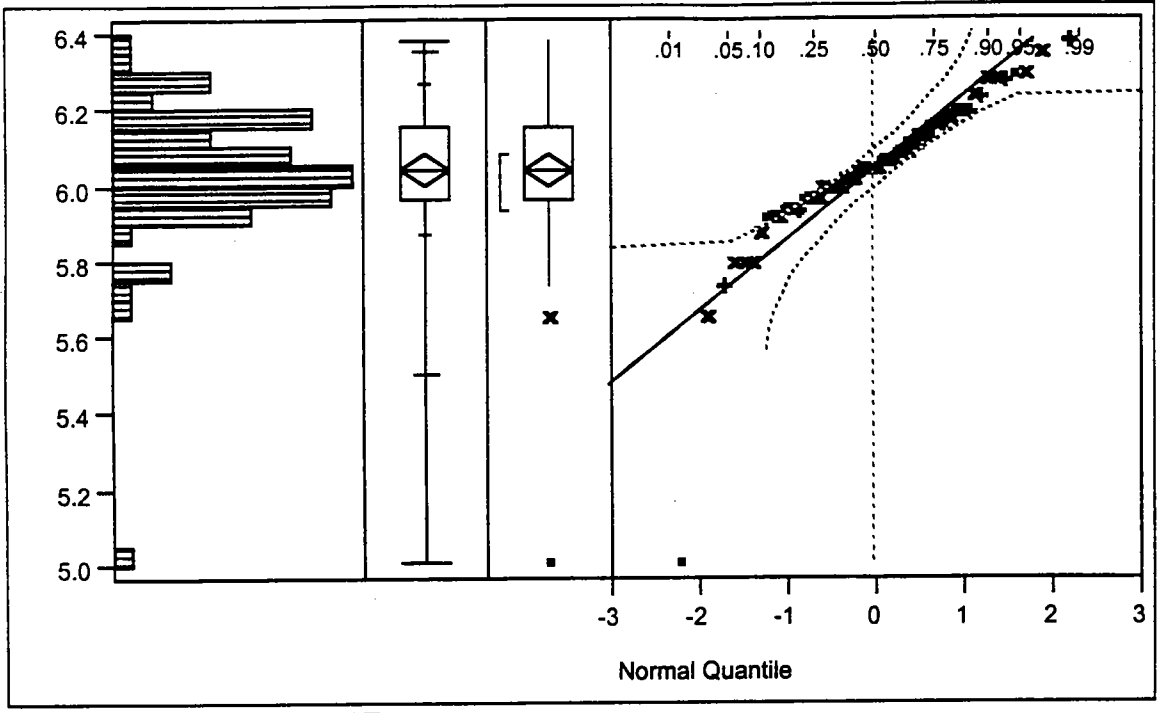
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 616.5 | 2.70436 | 0.0068 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 7.3618 | 1 | 0.0067 |

lnTl208




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 6.3801 |
| | 99.5% | 6.3801 |
| | 97.5% | 6.3534 |
| | 90.0% | 6.2690 |
| quartile | 75.0% | 6.1527 |
| median | 50.0% | 6.0403 |
| quartile | 25.0% | 5.9661 |
| | 10.0% | 5.8763 |
| | 2.5% | 5.5081 |
| | 0.5% | 5.0106 |
| minimum | 0.0% | 5.0106 |

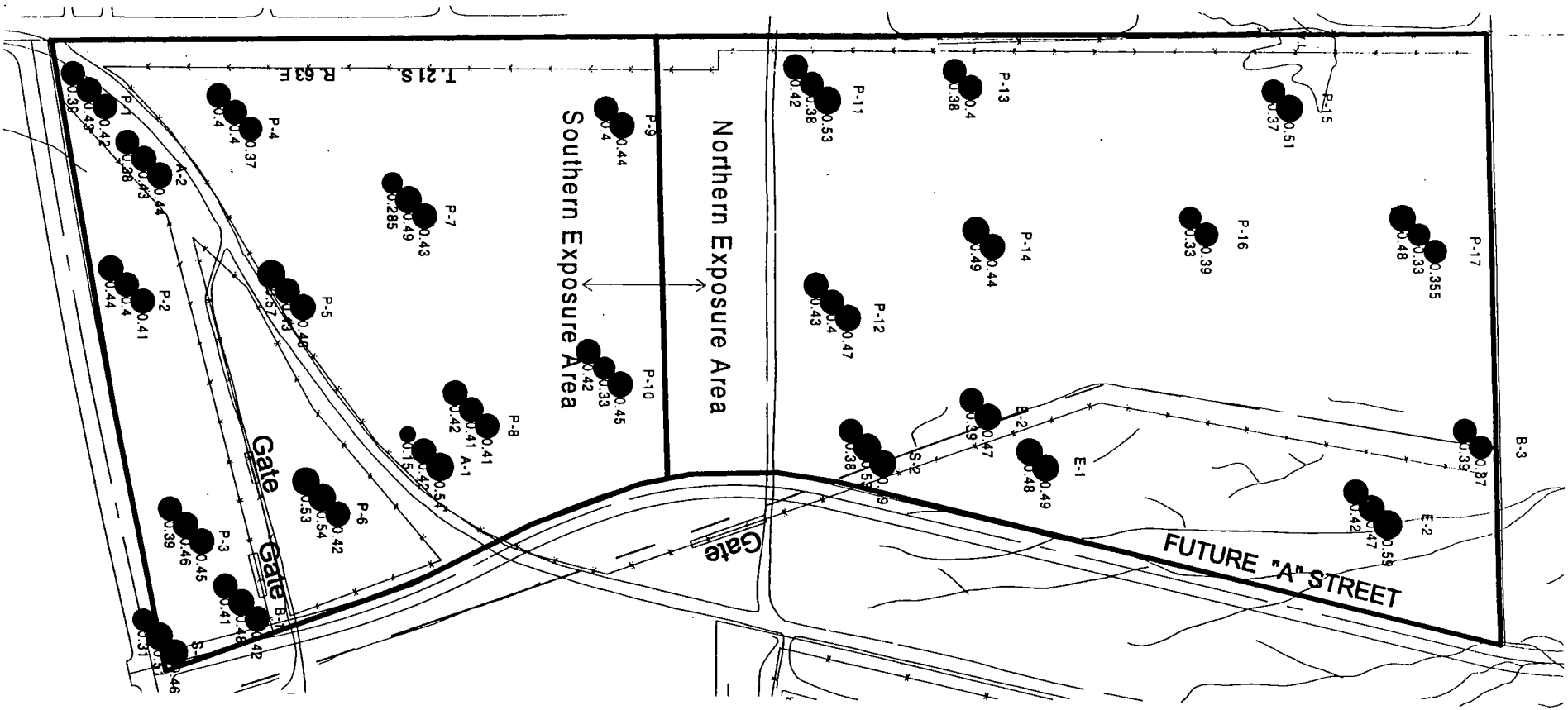
**Moments**

| | |
|---|---|
| Mean | 6.04240 |
| Std Dev | 0.18815 |
| Std Error Mean | 0.02249 |
| Upper 95% Mean | 6.08726 |
| Lower 95% Mean | 5.99754 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 422.96820 |
| Variance | 0.03540 |
| Skewness | -2.40124 |
| Kurtosis | 12.28258 |
| CV | 3.11377 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.846544 | <.0001 |




**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

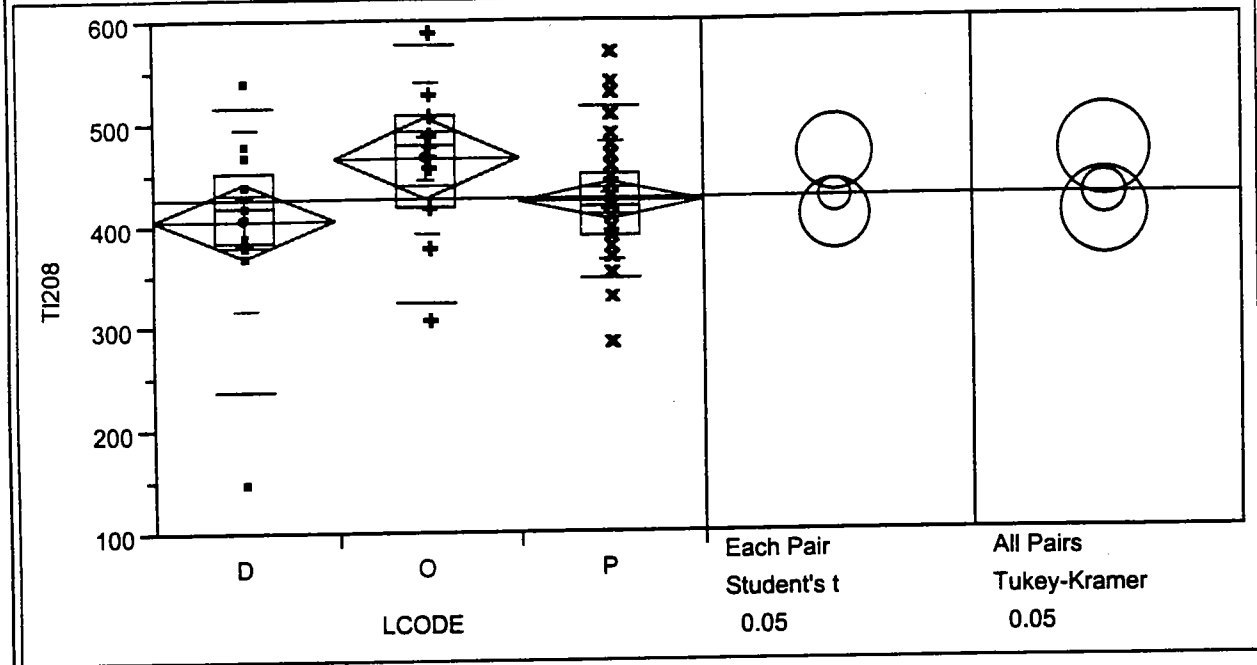
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

**Note:** Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Thallium 208 pCi/g**

TI208 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 150 | 238 | 385 | 420 | 455 | 516 | 540 |
| O | 310 | 324 | 420 | 480 | 510 | 578 | 590 |
| P | 285 | 347.5 | 390 | 420 | 452.5 | 516 | 570 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.069156 |
| RSquare Adj | 0.04137 |
| Root Mean Square Error | 67.54513 |
| Mean of Response | 427.4286 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 22710.02 | 11355.0 | 2.4889 |
| Error | 67 | 305677.12 | 4562.3 | Prob>F |
| C Total | 69 | 328387.14 | 4759.2 | 0.0907 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 406.923 | 18.734 |
| O | 11 | 466.364 | 20.366 |
| P | 46 | 423.913 | 9.959 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 406.923 | 90.2205 | 25.023 |
| O | 11 | 466.364 | 75.2692 | 22.695 |
| P | 46 | 423.913 | 57.9934 | 8.551 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | P | D |
|---|---|---|---|
| O | 0.0000 | 42.4506 | 59.4406 |
| P | -42.4506 | 0.0000 | 16.9900 |
| D | -59.4406 | -16.9900 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -57.4878 | -2.7995 | 4.2081 |
| P | -2.7995 | -28.1121 | -25.3580 |
| D | 4.2081 | -25.3580 | -52.8811 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

$q^*$

2.39689

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -69.0337 | -11.8875 | -6.8848 |
| P | -11.8875 | -33.7581 | -33.8632 |
| D | -6.8848 | -33.8632 | -63.5017 |

Positive values show pairs of means that are significantly different.

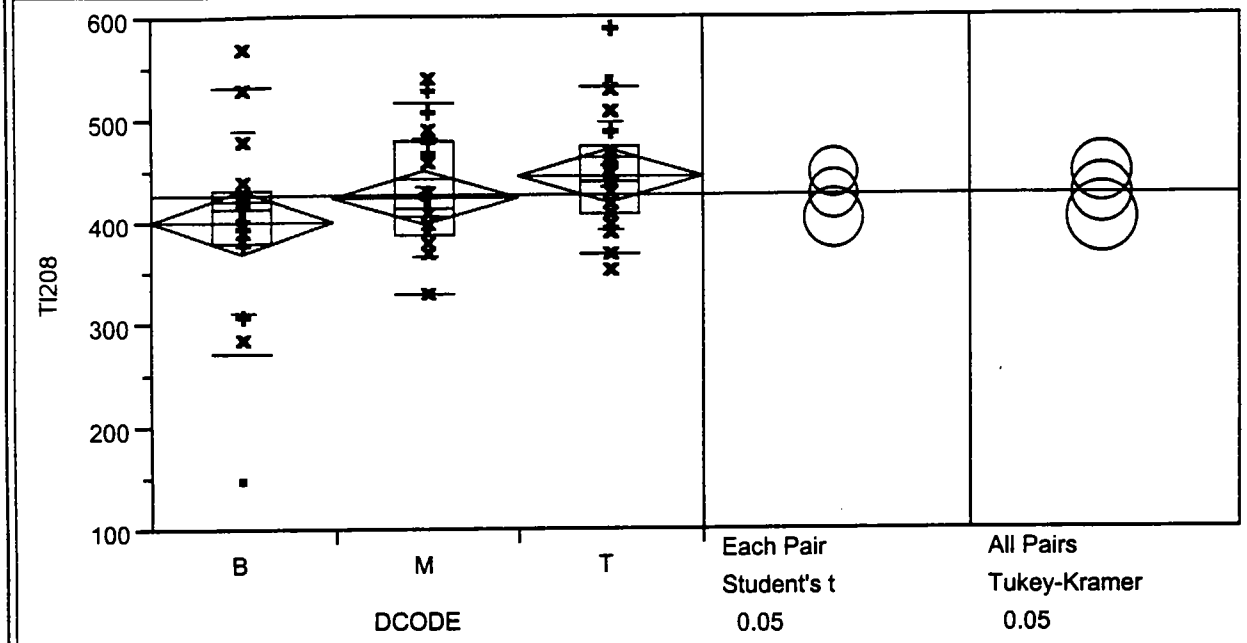
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 412 | 31.6923 | -0.741 |
| O | 11 | 524.5 | 47.6818 | 2.159 |
| P | 46 | 1548.5 | 33.6630 | -1.041 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.7901 | 2 | 0.0912 |

TI208 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 150 | 271.5 | 380 | 415 | 432.5 | 534 | 570 |
| M | 330 | 330 | 387.5 | 415 | 480 | 516 | 540 |
| T | 355 | 370 | 410 | 440 | 475 | 533 | 590 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.068071 |
| RSquare Adj | 0.040252 |
| Root Mean Square Error | 67.5845 |
| Mean of Response | 427.4286 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 22353.60 | 11176.8 | 2.4469 |
| Error | 67 | 306033.55 | 4567.7 | Prob>F |
| C Total | 69 | 328387.14 | 4759.2 | 0.0943 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 401.389 | 15.930 |
| M | 26 | 425.769 | 13.254 |
| T | 26 | 447.115 | 13.254 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 401.389 | 91.1335 | 21.480 |
| M | 26 | 425.769 | 59.5431 | 11.677 |
| T | 26 | 447.115 | 55.2118 | 10.828 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | T | M | B |
|---|---|---|---|
| T | 0.0000 | 21.3462 | 45.7265 |
| M | -21.3462 | 0.0000 | 24.3803 |
| B | -45.7265 | -24.3803 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -37.4144 | -16.0682 | 4.3633 |
| M | -16.0682 | -37.4144 | -16.9828 |
| B | 4.3633 | -16.9828 | -44.9665 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

$q^*$

2.39689

| Abs(Dif)-LSD | T | M | B |
|---|---|---|---|
| T | -44.9287 | -23.5825 | -3.9440 |
| M | -23.5825 | -44.9287 | -25.2902 |
| B | -3.9440 | -25.2902 | -53.9975 |

Positive values show pairs of means that are significantly different.

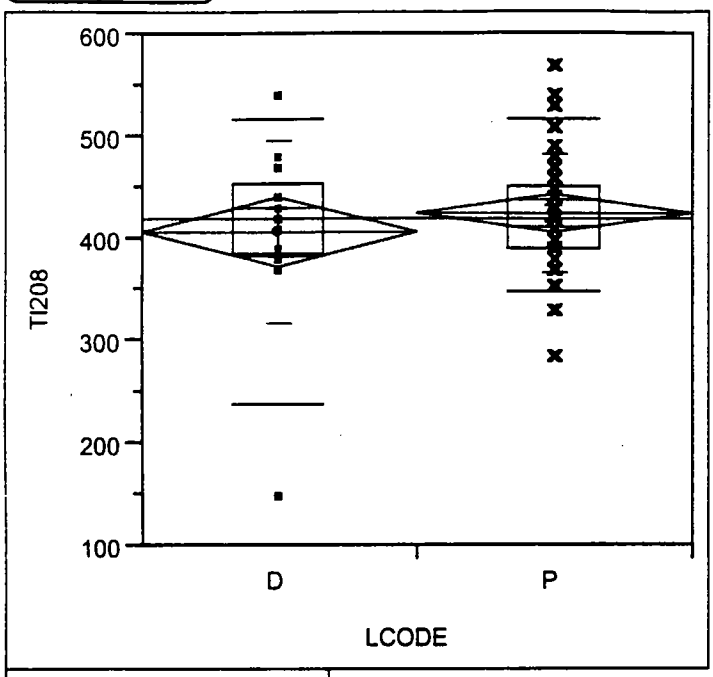
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 523.5 | 29.0833 | -1.548 |
| M | 26 | 883 | 33.9615 | -0.481 |
| T | 26 | 1078.5 | 41.4808 | 1.888 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.2001 | 2 | 0.1224 |

TI208 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 150 | 238 | 385 | 420 | 455 | 516 | 540 |
| P | 285 | 347.5 | 390 | 420 | 452.5 | 516 | 570 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 406.923 | 90.2205 | 25.023 |
| P | 46 | 423.913 | 57.9934 | 8.551 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 372.5 | 28.6538 | -0.312 |
| P | 46 | 1397.5 | 30.3804 | 0.312 |

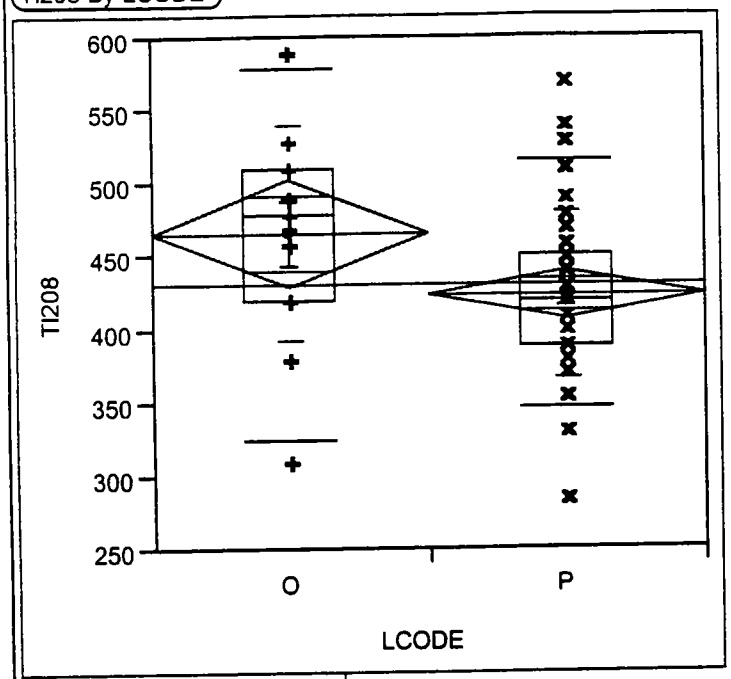
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 372.5 | -0.31167 | 0.7553 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.1029 | 1 | 0.7483 |

TI208 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 310 | 324 | 420 | 480 | 510 | 578 | 590 |
| P | 285 | 347.5 | 390 | 420 | 452.5 | 516 | 570 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 466.364 | 75.2692 | 22.695 |
| P | 46 | 423.913 | 57.9934 | 8.551 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 421 | 38.2727 | 2.057 |
| P | 46 | 1232 | 26.7826 | -2.057 |

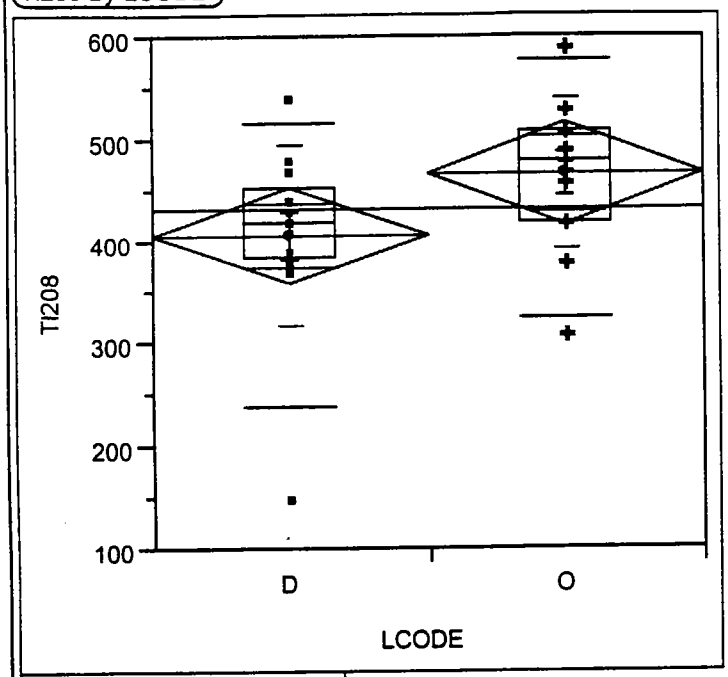
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 421 | 2.05653 | 0.0397 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.2711 | 1 | 0.0388 |

TI208 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 150 | 238 | 385 | 420 | 455 | 516 | 540 |
| O | 310 | 324 | 420 | 480 | 510 | 578 | 590 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13. | 406.923 | 90.2205 | 25.023 |
| O | 11 | 466.364 | 75.2692 | 22.695 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 130.5 | 10.0385 | -1.829 |
| O | 11 | 169.5 | 15.4091 | 1.829 |

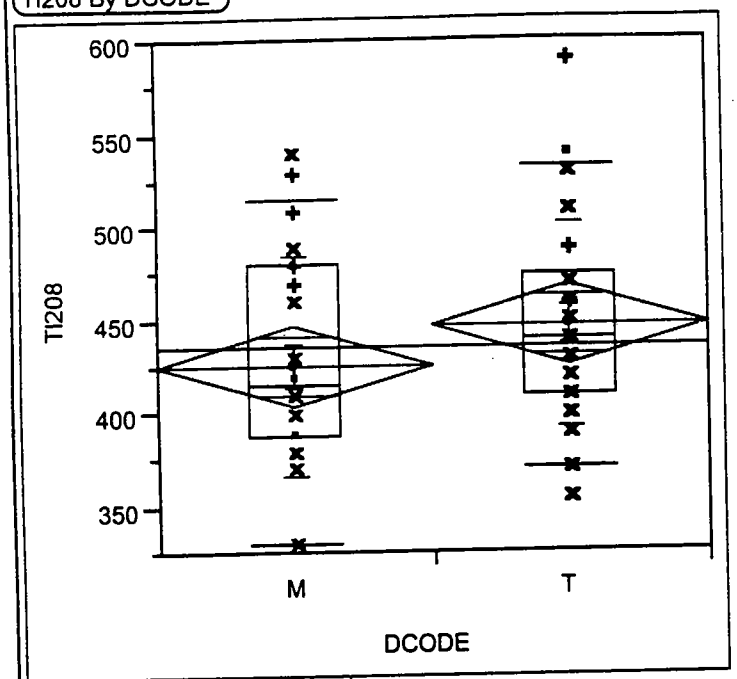
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 169.5 | 1.82858 | 0.0675 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.4507 | 1 | 0.0632 |

TI208 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 330 | 330 | 387.5 | 415 | 480 | 516 | 540 |
| T | 355 | 370 | 410 | 440 | 475 | 533 | 590 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 425.769 | 59.5431 | 11.677 |
| T | 26 | 447.115 | 55.2118 | 10.828 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 618.5 | 23.7885 | -1.283 |
| T | 26 | 759.5 | 29.2115 | 1.283 |

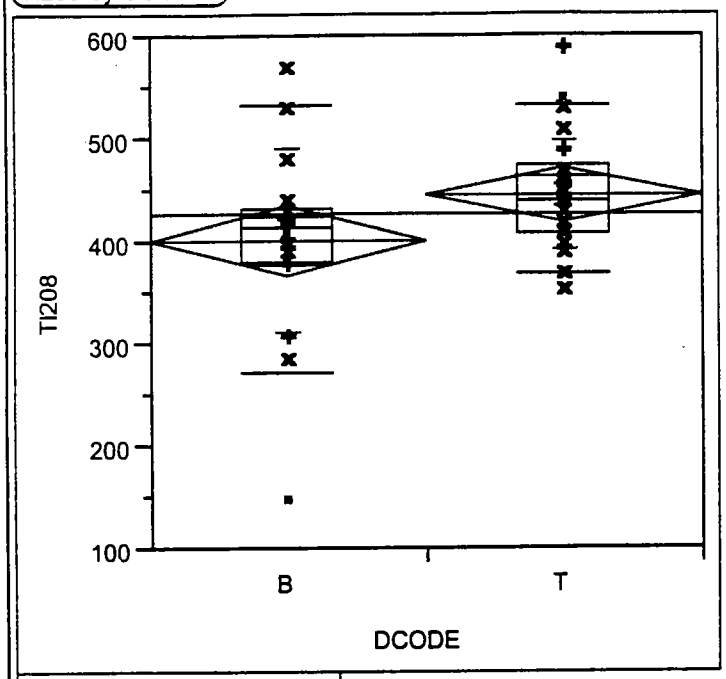
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 759.5 | 1.28339 | 0.1994 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.6707 | 1 | 0.1962 |

Tl208 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 150 | 271.5 | 380 | 415 | 432.5 | 534 | 570 |
| T | 355 | 370 | 410 | 440 | 475 | 533 | 590 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 401.389 | 91.1335 | 21.480 |
| T | 26 | 447.115 | 55.2118 | 10.828 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 320 | 17.7778 | -2.023 |
| T | 26 | 670 | 25.7692 | 2.023 |

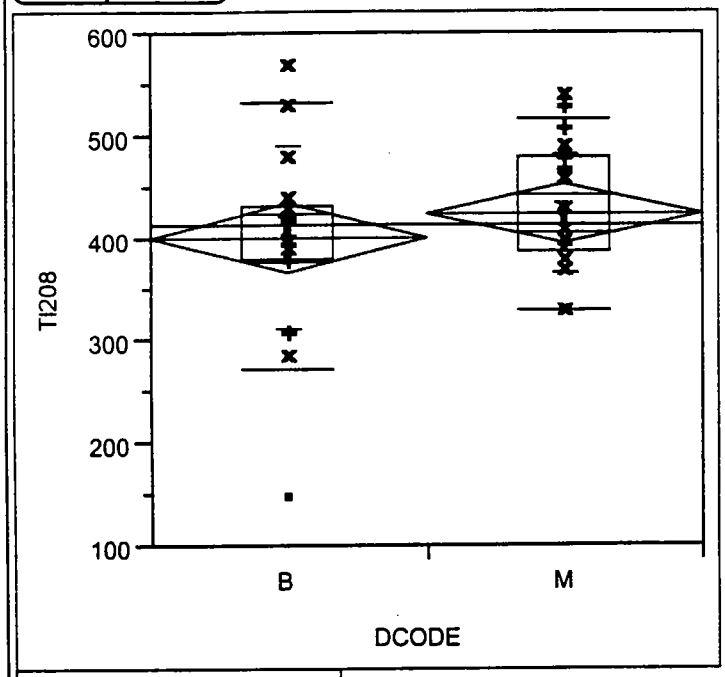
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 320 | -2.02298 | 0.0431 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.1410 | 1 | 0.0419 |

TI208 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 150 | 271.5 | 380 | 415 | 432.5 | 534 | 570 |
| M | 330 | 330 | 387.5 | 415 | 480 | 516 | 540 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 401.389 | 91.1335 | 21.480 |
| M | 26 | 425.769 | 59.5431 | 11.677 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 374.5 | 20.8056 | -0.718 |
| M | 26 | 615.5 | 23.6731 | 0.718 |

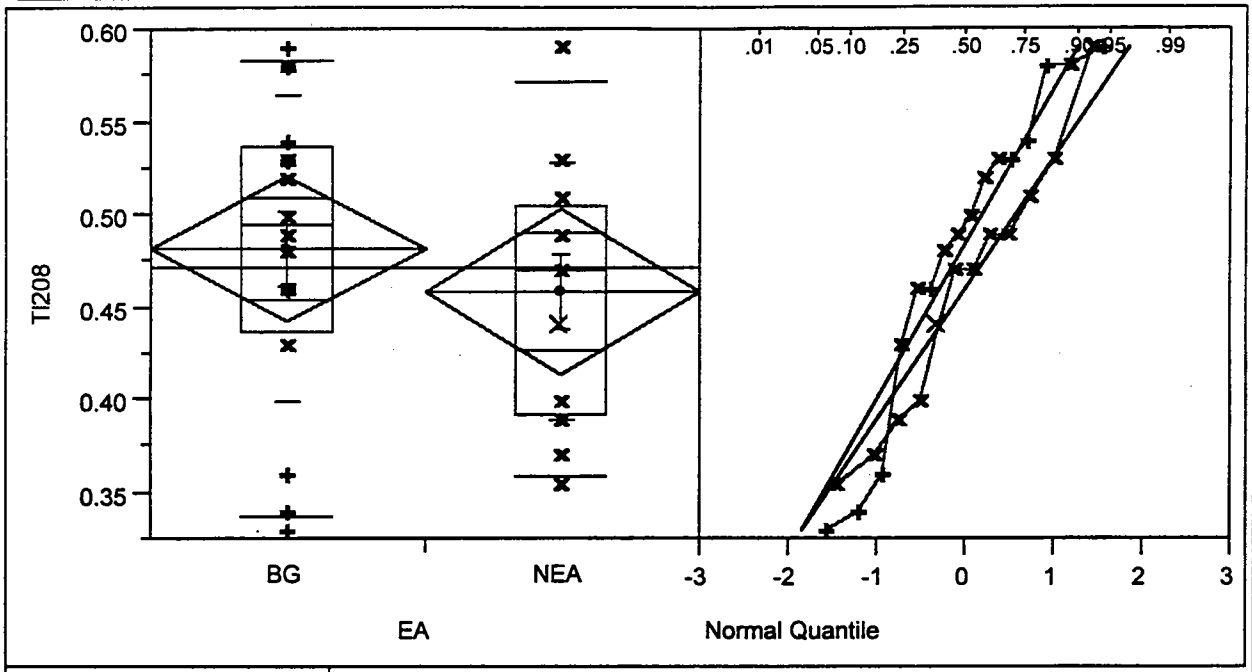
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 374.5 | -0.71817 | 0.4727 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.5331 | 1 | 0.4653 |

TI208 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.33 | 0.337 | 0.4375 | 0.495 | 0.5375 | 0.583 | 0.59 |
| NEA | 0.355 | 0.3595 | 0.3925 | 0.47 | 0.505 | 0.572 | 0.59 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.482500 | 0.082664 | 0.02067 |
| NEA | 12 | 0.458750 | 0.070263 | 0.02028 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 250.5 | 15.6563 | 0.837 |
| NEA | 12 | 155.5 | 12.9583 | -0.837 |

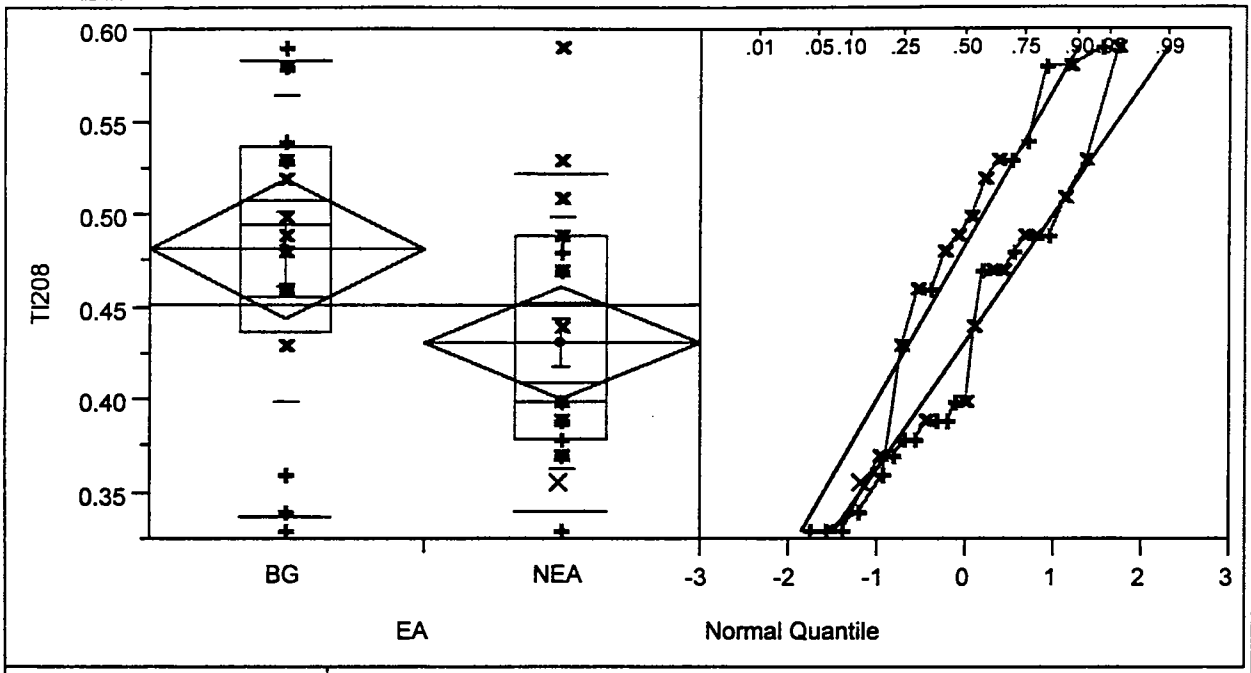
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 155.5 | -0.83700 | 0.4026 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 0.7400 | 1 | 0.3896 |

Tl208 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.33 | 0.337 | 0.4375 | 0.495 | 0.5375 | 0.583 | 0.59 |
| NEA | 0.33 | 0.34 | 0.38 | 0.4 | 0.49 | 0.522 | 0.59 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.482500 | 0.082664 | 0.02067 |
| NEA | 23 | 0.431087 | 0.068952 | 0.01438 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 387.5 | 24.2188 | 1.916 |
| NEA | 23 | 392.5 | 17.0652 | -1.916 |

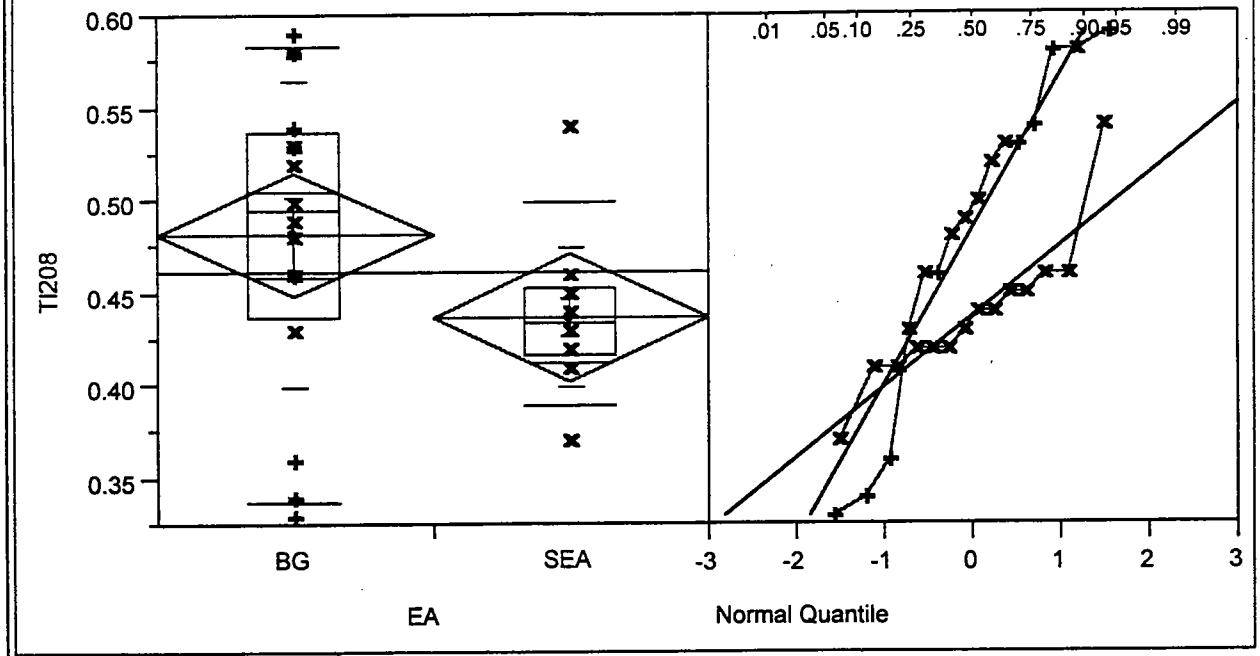
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 387.5 | 1.91619 | 0.0553 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.7268 | 1 | 0.0535 |

Tl208 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.33 | 0.337 | 0.4375 | 0.495 | 0.5375 | 0.583 | 0.59 |
| SEA | 0.37 | 0.39 | 0.4175 | 0.435 | 0.4525 | 0.5 | 0.54 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.482500 | 0.082664 | 0.02067 |
| SEA | 14 | 0.437143 | 0.038115 | 0.01019 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 300 | 18.7500 | 2.146 |
| SEA | 14 | 165 | 11.7857 | -2.146 |

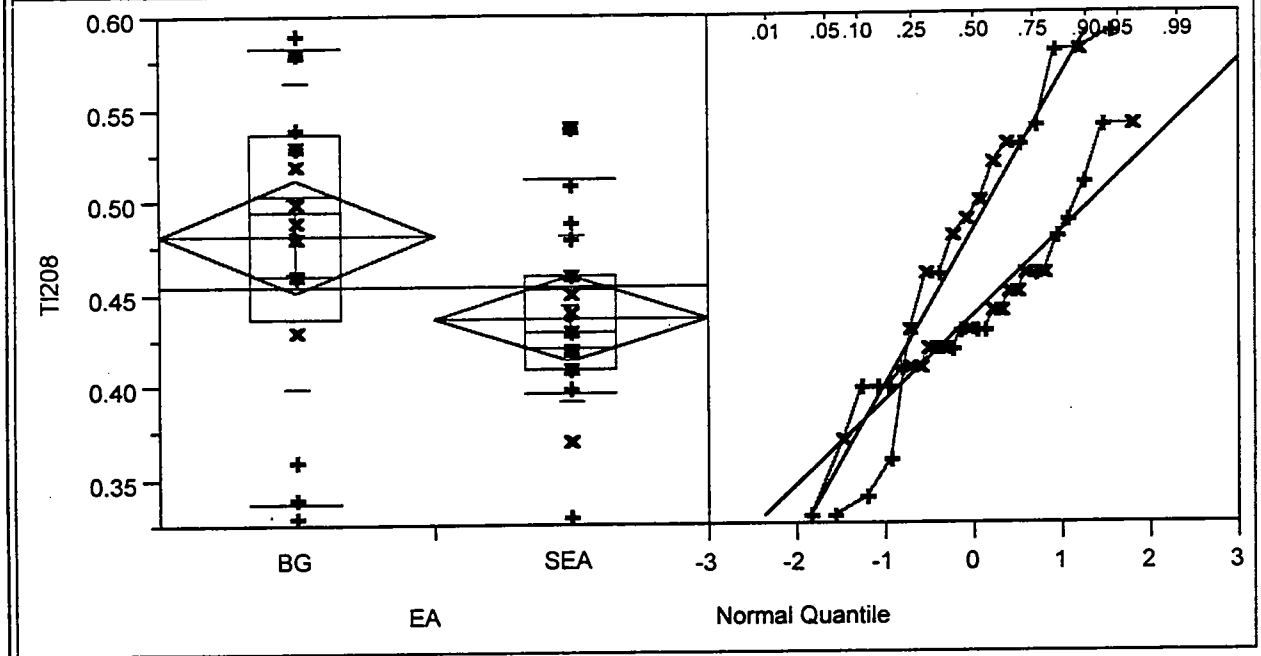
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 165 | -2.14590 | 0.0319 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.6947 | 1 | 0.0303 |

TI208 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 0.33 | 0.337 | 0.4375 | 0.495 | 0.5375 | 0.583 | 0.59 |
| SEA | 0.33 | 0.397 | 0.41 | 0.43 | 0.46 | 0.513 | 0.54 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 0.482500 | 0.082664 | 0.02067 |
| SEA | 28 | 0.437500 | 0.045836 | 0.00866 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 457.5 | 28.5938 | 2.372 |
| SEA | 28 | 532.5 | 19.0179 | -2.372 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 457.5 | 2.37233 | 0.0177 |

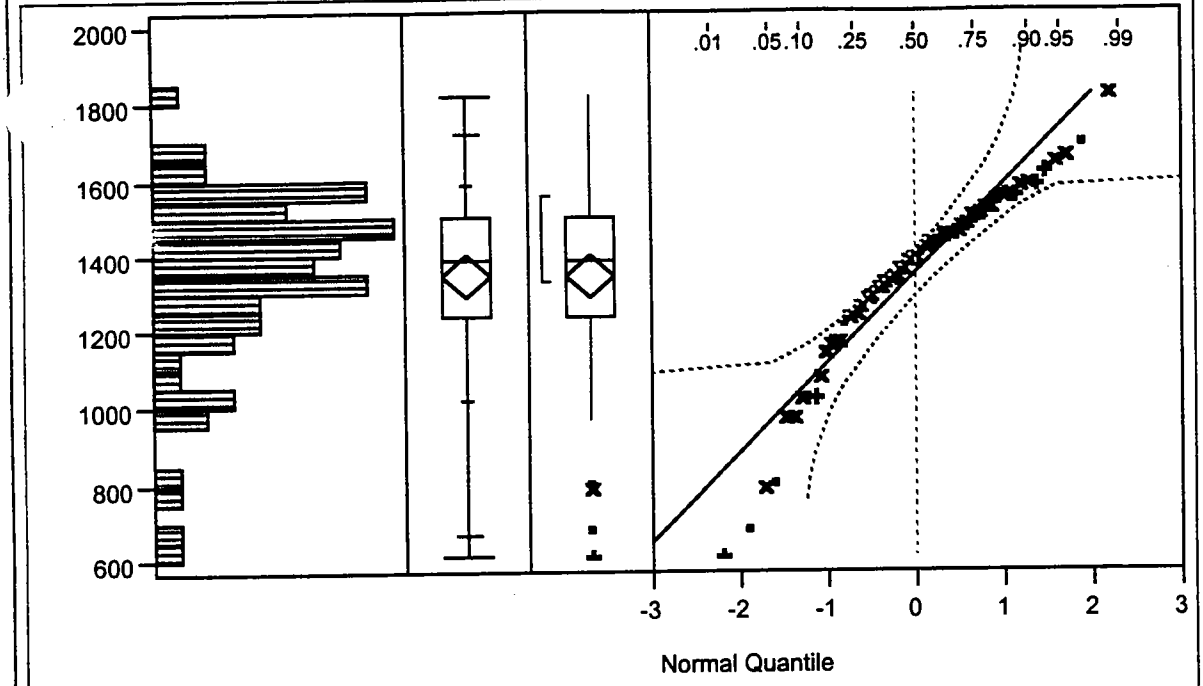
1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.6861 | 1 | 0.0171 |

# TAB 14

# Thorium 228

Th228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 1820.0 |
| | 99.5% | 1820.0 |
| | 97.5% | 1719.2 |
| | 90.0% | 1589.0 |
| quartile | 75.0% | 1500.0 |
| median | 50.0% | 1390.0 |
| quartile | 25.0% | 1240.0 |
| | 10.0% | 1021.0 |
| | 2.5% | 664.3 |
| | 0.5% | 610.0 |
| minimum | 0.0% | 610.0 |

**Moments**

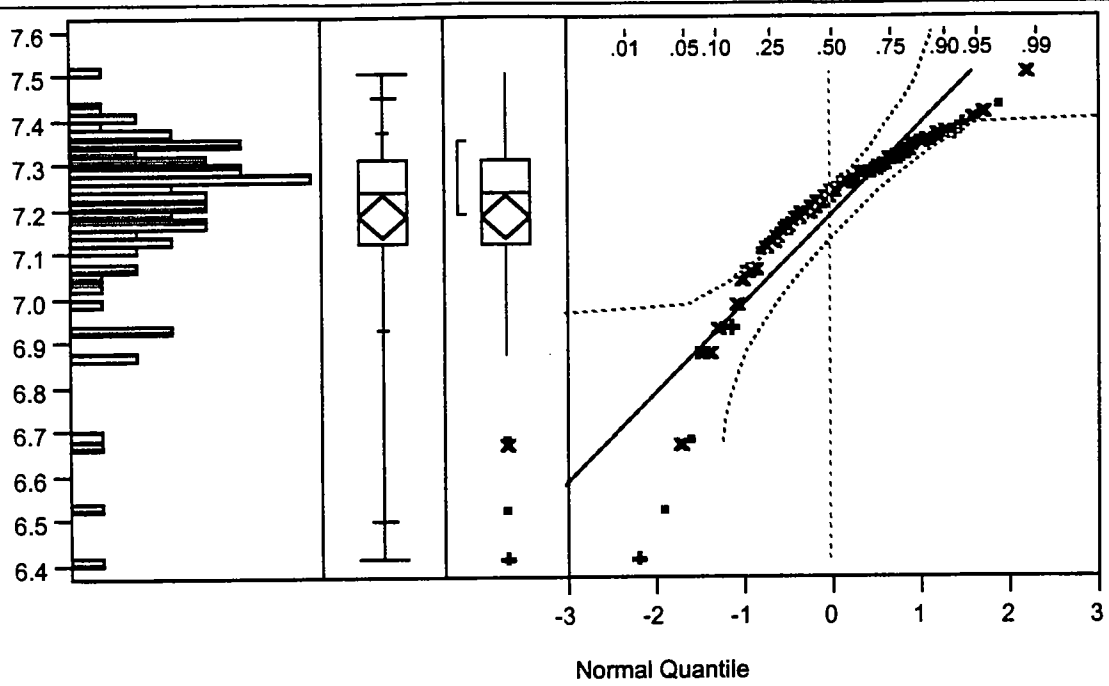
| | |
|---|---|
| Mean | 1345.143 |
| Std Dev | 233.942 |
| Std Error Mean | 27.961 |
| Upper 95% Mean | 1400.925 |
| Lower 95% Mean | 1289.361 |
| N | 70.000 |
| Sum Weights | 70.000 |
| Sum | 94160.000 |
| Variance | 54728.965 |
| Skewness | -1.075 |
| Kurtosis | 1.437 |
| CV | 17.392 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.927903 | 0.0005 |

lnTh228




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 7.5066 |
| | 99.5% | 7.5066 |
| | 97.5% | 7.4492 |
| | 90.0% | 7.3709 |
| quartile | 75.0% | 7.3132 |
| median | 50.0% | 7.2371 |
| quartile | 25.0% | 7.1229 |
| | 10.0% | 6.9285 |
| | 2.5% | 6.4977 |
| | 0.5% | 6.4135 |
| minimum | 0.0% | 6.4135 |

**Moments**

| | |
|---|---|
| Mean | 7.18609 |
| Std Dev | 0.20300 |
| Std Error Mean | 0.02426 |
| Upper 95% Mean | 7.23450 |
| Lower 95% Mean | 7.13769 |
| N | 70.00000 |
| Sum Weights | 70.00000 |
| Sum | 503.02638 |
| Variance | 0.04121 |
| Skewness | -1.77882 |
| Kurtosis | 3.82685 |
| CV | 2.82492 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.846791 | <.0001 |


**Approximate Scale**

**1 Inch = 265 Feet**

N

## LEGEND

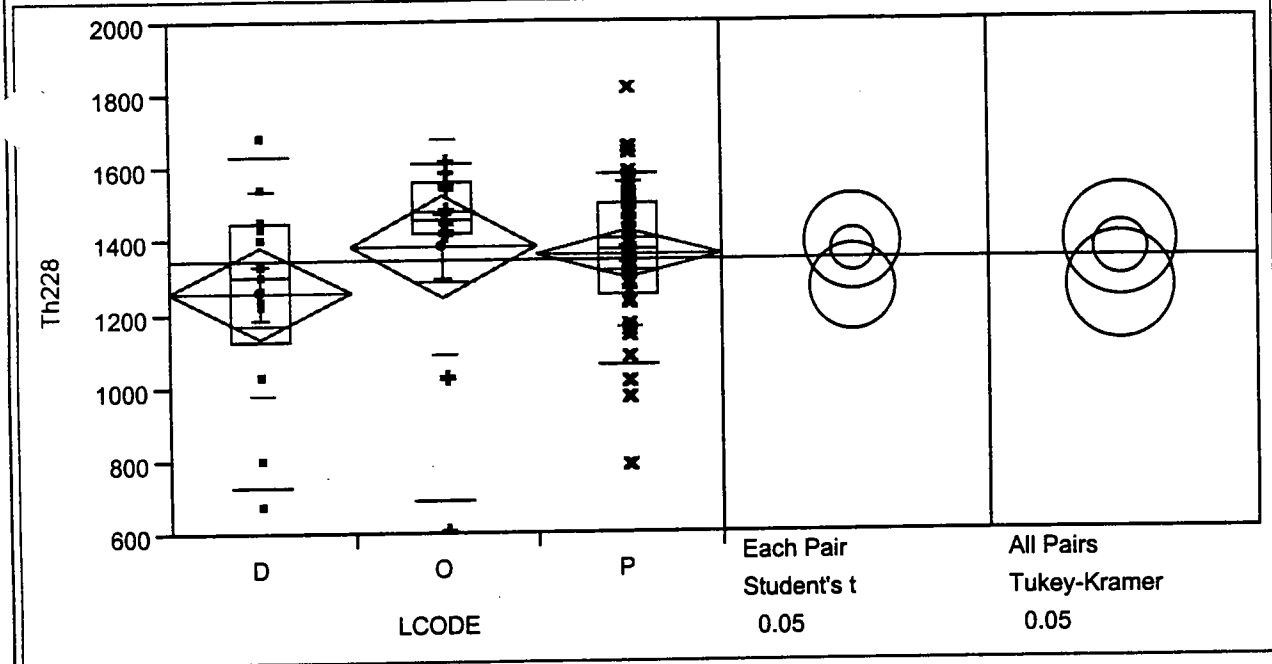
- Surface ( 0-1 foot ) Sampling Interval
- Intermediate Sampling Interval
- Deepest Sampling Interval

Note: Surface interval indicator appears at the actual sample location

ENVIRON

**Data from May 2001**
**Soil Sampling Event**
**Concentrations of Thorium 228 pCi/g**

Th228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 680 | 728 | 1125 | 1300 | 1450 | 1634 | 1690 |
| O | 610 | 694 | 1420 | 1460 | 1560 | 1614 | 1620 |
| P | 790 | 1062 | 1255 | 1380 | 1500 | 1583 | 1820 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.029757 |
| RSquare Adj | 0.000795 |
| Root Mean Square Error | 233.8492 |
| Mean of Response | 1345.143 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 112373.0 | 56186.5 | 1.0274 |
| Error | 67 | 3663925.5 | 54685.5 | Prob>F |
| C Total | 69 | 3776298.6 | 54729.0 | 0.3635 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| D | 13 | 1263.08 | 64.858 |
| O | 11 | 1382.73 | 70.508 |
| P | 46 | 1359.35 | 34.479 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1263.08 | 284.792 | 78.987 |
| | 11 | 1382.73 | 300.968 | 90.745 |
| | 46 | 1359.35 | 199.155 | 29.364 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | O | P | D |
|---|---|---|---|
| O | 0.000 | 23.379 | 119.650 |
| P | -23.379 | 0.000 | 96.271 |
| D | -119.650 | -96.271 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -199.030 | -133.282 | -71.571 |
| P | -133.282 | -97.327 | -50.343 |
| D | -71.571 | -50.343 | -183.081 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | O | P | D |
|---|---|---|---|
| O | -239.003 | -164.745 | -109.976 |
| | -164.745 | -116.875 | -79.789 |
| | -109.976 | -79.789 | -219.850 |

Positive values show pairs of means that are significantly different.

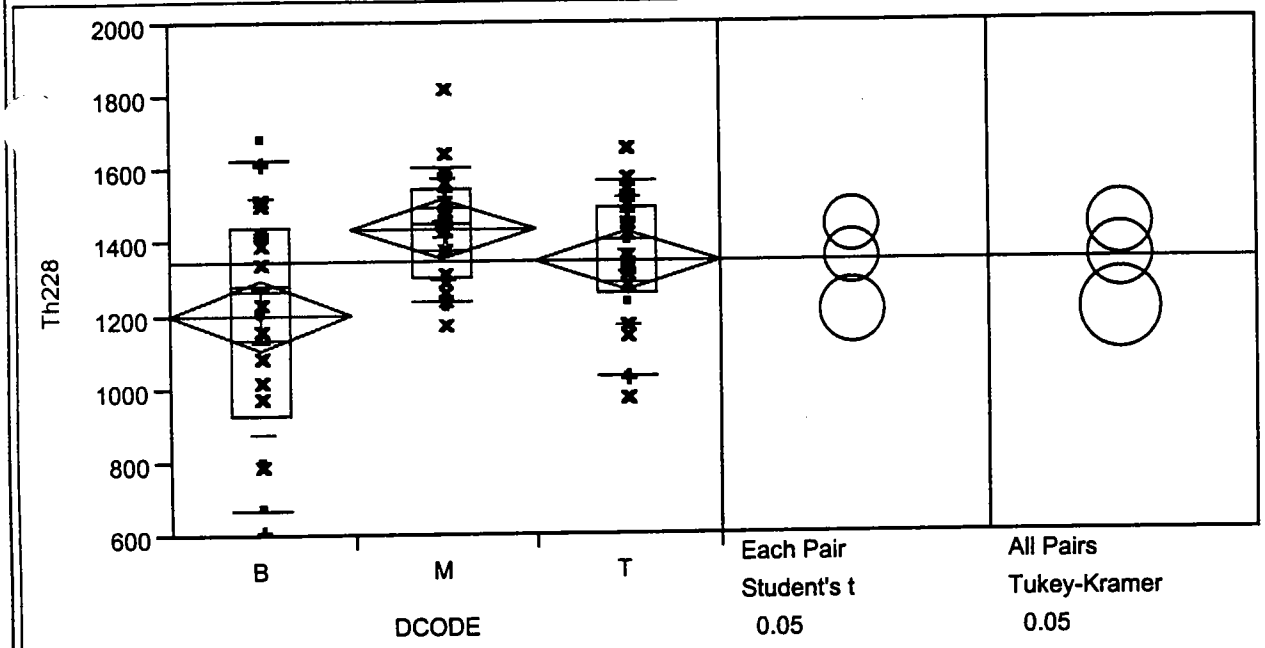
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 373.5 | 28.7308 | -1.322 |
| O | 11 | 485 | 44.0909 | 1.517 |
| P | 46 | 1626.5 | 35.3587 | -0.074 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.4025 | 2 | 0.1825 |

Th228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 610 | 673 | 927.5 | 1285 | 1447.5 | 1627 | 1690 |
| M | 1170 | 1234 | 1307.5 | 1450 | 1550 | 1605 | 1820 |
| T | 970 | 1030 | 1262.5 | 1350 | 1492.5 | 1566 | 1660 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.157696 |
| RSquare Adj | 0.132552 |
| Root Mean Square Error | 217.8865 |
| Mean of Response | 1345.143 |
| Observations (or Sum Wgts) | 70 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 2 | 595506.7 | 297753 | 6.2719 |
| Error | 67 | 3180791.9 | 47475 | Prob>F |
| C Total | 69 | 3776298.6 | 54729 | 0.0032 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| B | 18 | 1202.78 | 51.356 |
| M | 26 | 1439.23 | 42.731 |
| T | 26 | 1349.62 | 42.731 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1202.78 | 330.344 | 77.863 |
| | 26 | 1439.23 | 146.531 | 28.737 |
| | 26 | 1349.62 | 177.634 | 34.837 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | M | T | B |
|---|---|---|---|
| M | 0.000 | 89.615 | 236.453 |
| T | -89.615 | 0.000 | 146.838 |
| B | -236.453 | -146.838 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

1.99601

| Abs(Dif)-LSD | M | T | B |
|---|---|---|---|
| M | -120.621 | -31.005 | 103.102 |
| T | -31.005 | -120.621 | 13.486 |
| B | 103.102 | 13.486 | -144.968 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.39689

| Abs(Dif)-LSD | M | T | B |
|---|---|---|---|
| M | -144.846 | -55.231 | 76.320 |
| T | -55.231 | -144.846 | -13.296 |
| B | 76.320 | -13.296 | -174.083 |

Positive values show pairs of means that are significantly different.

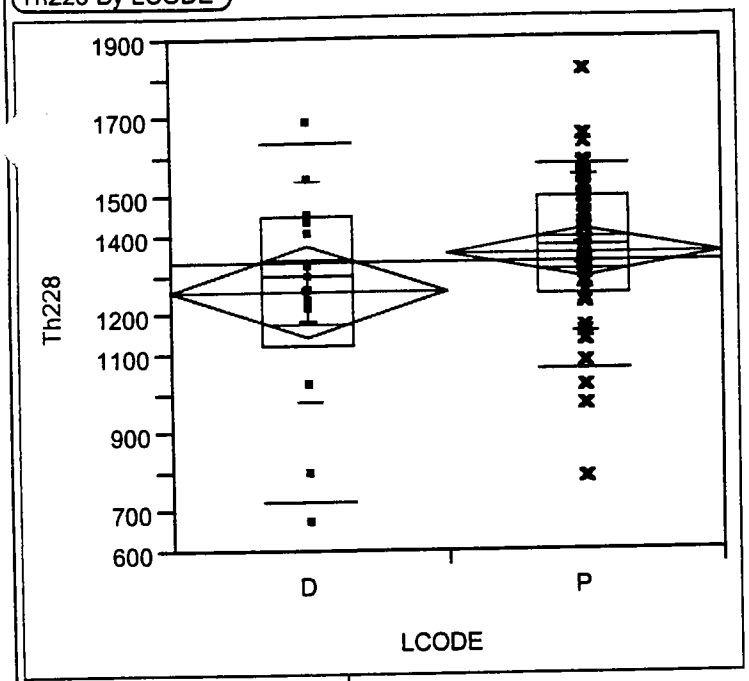
## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 487.5 | 27.0833 | -2.030 |
| M | 26 | 1111.5 | 42.7500 | 2.286 |
| T | 26 | 886 | 34.0769 | -0.444 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.5090 | 2 | 0.0386 |

Th228 By LCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 680 | 728 | 1125 | 1300 | 1450 | 1634 | 1690 |
| P | 790 | 1062 | 1255 | 1380 | 1500 | 1583 | 1820 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1263.08 | 284.792 | 78.987 |
| P | 46 | 1359.35 | 199.155 | 29.364 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 330 | 25.3846 | -1.088 |
| P | 46 | 1440 | 31.3043 | 1.088 |

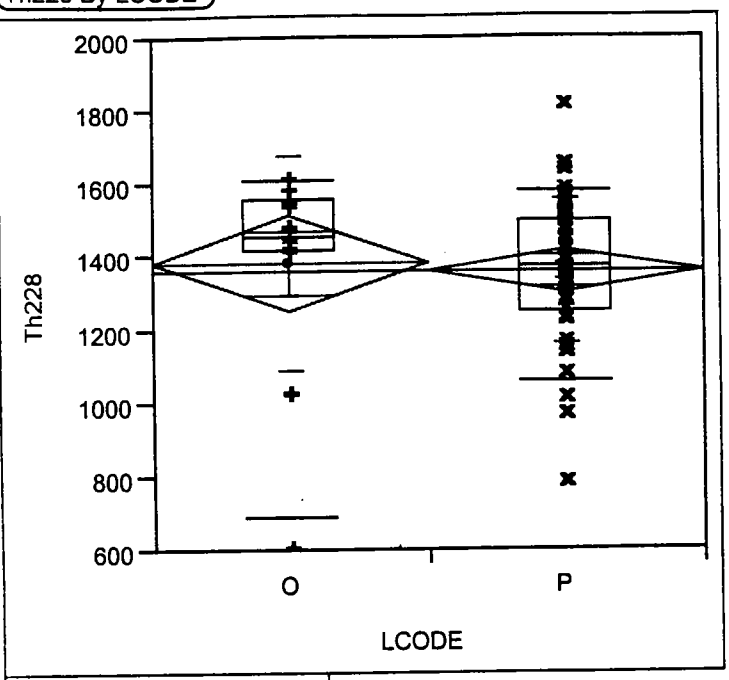
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 330 | -1.08835 | 0.2764 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.2045 | 1 | 0.2724 |

Th228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| O | 610 | 694 | 1420 | 1460 | 1560 | 1614 | 1620 |
| P | 790 | 1062 | 1255 | 1380 | 1500 | 1583 | 1820 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| O | 11 | 1382.73 | 300.968 | 90.745 |
| P | 46 | 1359.35 | 199.155 | 29.364 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| O | 11 | 385.5 | 35.0455 | 1.335 |
| P | 46 | 1267.5 | 27.5543 | -1.335 |

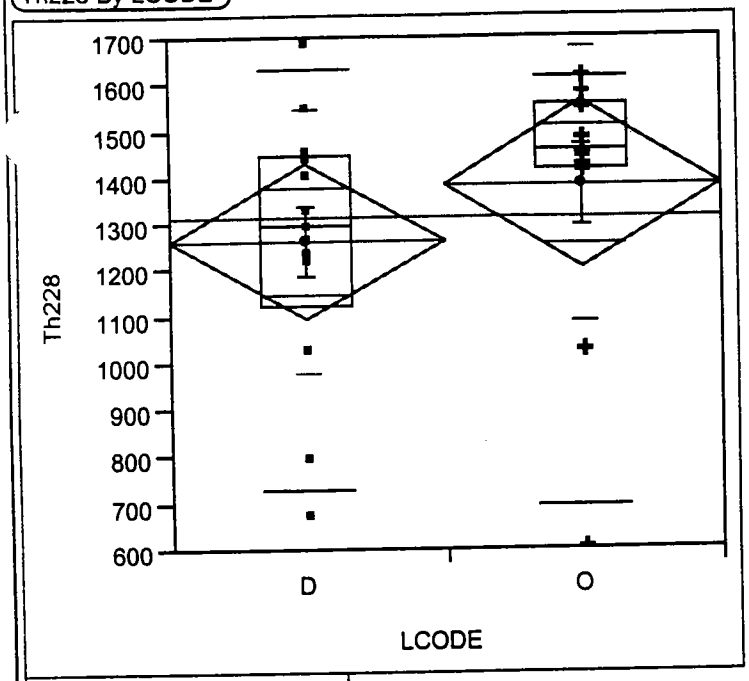
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 385.5 | 1.33504 | 0.1819 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.8094 | 1 | 0.1786 |

Th228 By LCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| D | 680 | 728 | 1125 | 1300 | 1450 | 1634 | 1690 |
| O | 610 | 694 | 1420 | 1460 | 1560 | 1614 | 1620 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| D | 13 | 1263.08 | 284.792 | 78.987 |
| O | 11 | 1382.73 | 300.968 | 90.745 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| D | 13 | 134.5 | 10.3462 | -1.594 |
| O | 11 | 165.5 | 15.0455 | 1.594 |

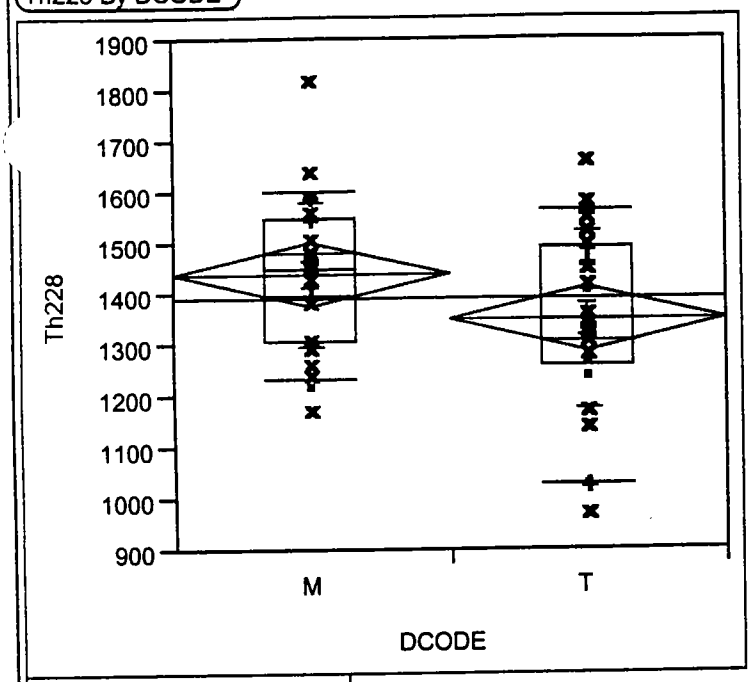
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 165.5 | 1.59430 | 0.1109 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.6350 | 1 | 0.1045 |

Th228 By DCODE




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| M | 1170 | 1234 | 1307.5 | 1450 | 1550 | 1605 | 1820 |
| T | 970 | 1030 | 1262.5 | 1350 | 1492.5 | 1566 | 1660 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| M | 26 | 1439.23 | 146.531 | 28.737 |
| T | 26 | 1349.62 | 177.634 | 34.837 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| M | 26 | 777.5 | 29.9038 | 1.611 |
| T | 26 | 600.5 | 23.0962 | -1.611 |

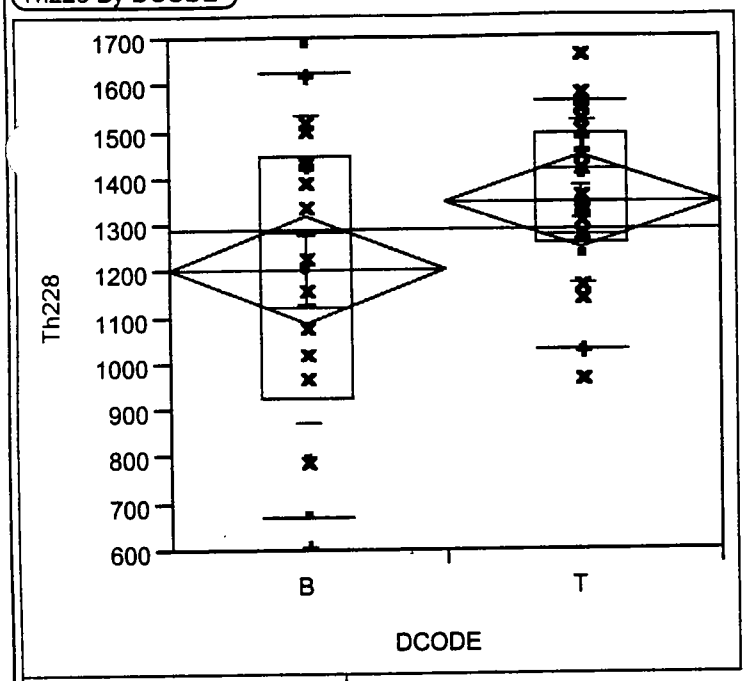
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 600.5 | -1.61126 | 0.1071 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.6257 | 1 | 0.1051 |

Th228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 610 | 673 | 927.5 | 1285 | 1447.5 | 1627 | 1690 |
| T | 970 | 1030 | 1262.5 | 1350 | 1492.5 | 1566 | 1660 |

Means and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1202.78 | 330.344 | 77.863 |
| T | 26 | 1349.62 | 177.634 | 34.837 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 353.5 | 19.6389 | -1.218 |
| T | 26 | 636.5 | 24.4808 | 1.218 |

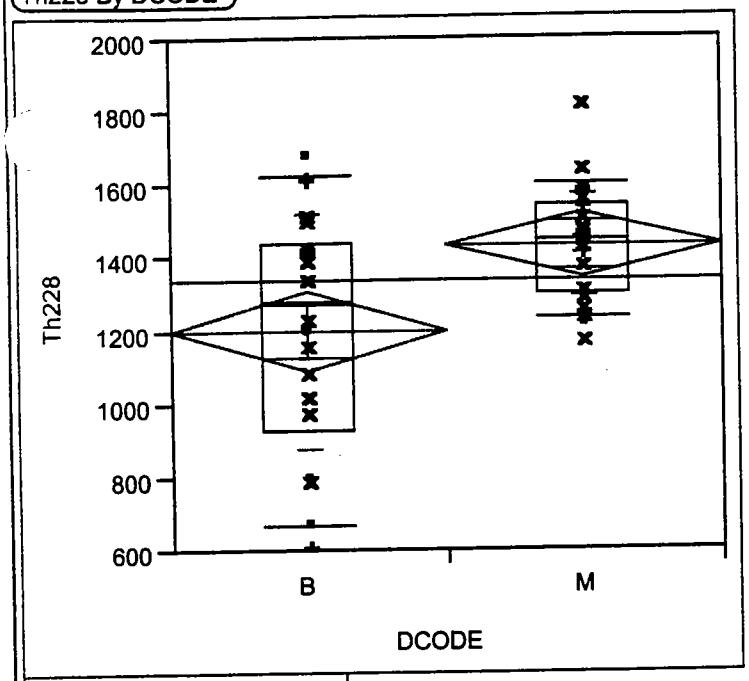
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 353.5 | -1.21774 | 0.2233 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 1.5121 | 1 | 0.2188 |

Th228 By DCODE




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| B | 610 | 673 | 927.5 | 1285 | 1447.5 | 1627 | 1690 |
| M | 1170 | 1234 | 1307.5 | 1450 | 1550 | 1605 | 1820 |

leans and Std Deviations ▶

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| B | 18 | 1202.78 | 330.344 | 77.863 |
| M | 26 | 1439.23 | 146.531 | 28.737 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| B | 18 | 305 | 16.9444 | -2.376 |
| M | 26 | 685 | 26.3462 | 2.376 |

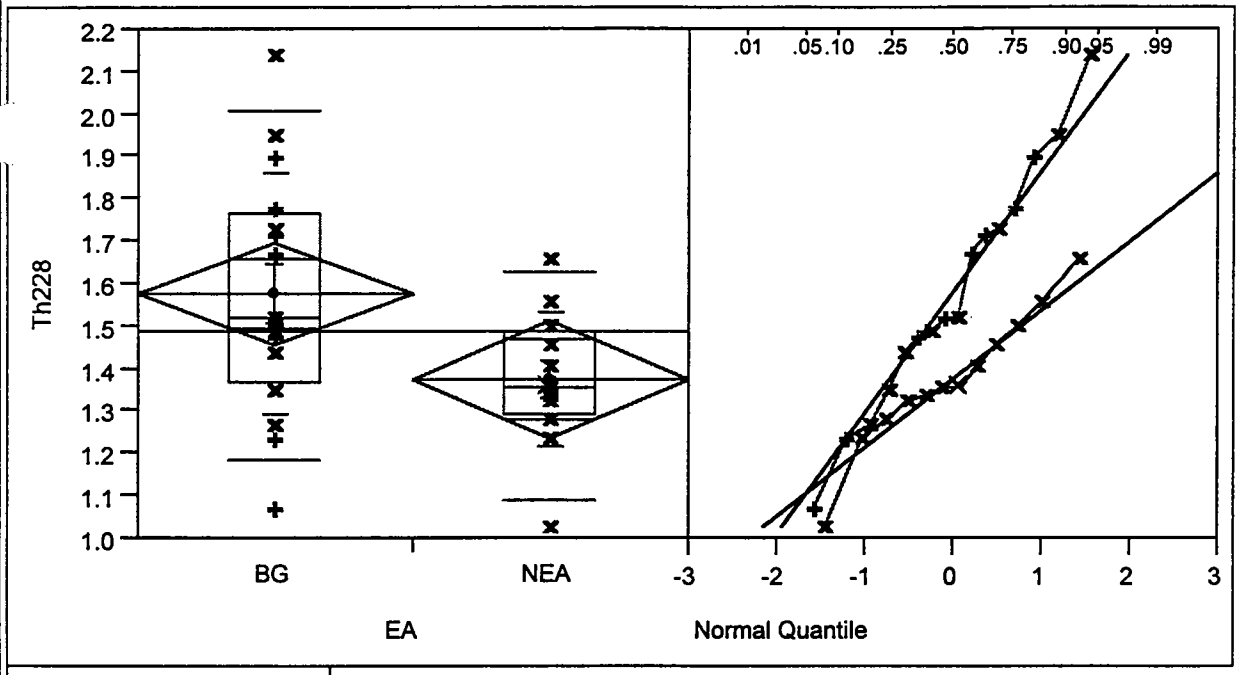
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 305 | -2.37595 | 0.0175 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.7020 | 1 | 0.0169 |

Th228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.07 | 1.189 | 1.3725 | 1.52 | 1.7675 | 2.007 | 2.14 |
| NEA | 1.03 | 1.093 | 1.29125 | 1.36 | 1.49 | 1.63 | 1.66 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.57938 | 0.284335 | 0.07108 |
| NEA | 12 | 1.37708 | 0.162347 | 0.04687 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 275.5 | 17.2188 | 1.997 |
| NEA | 12 | 130.5 | 10.8750 | -1.997 |

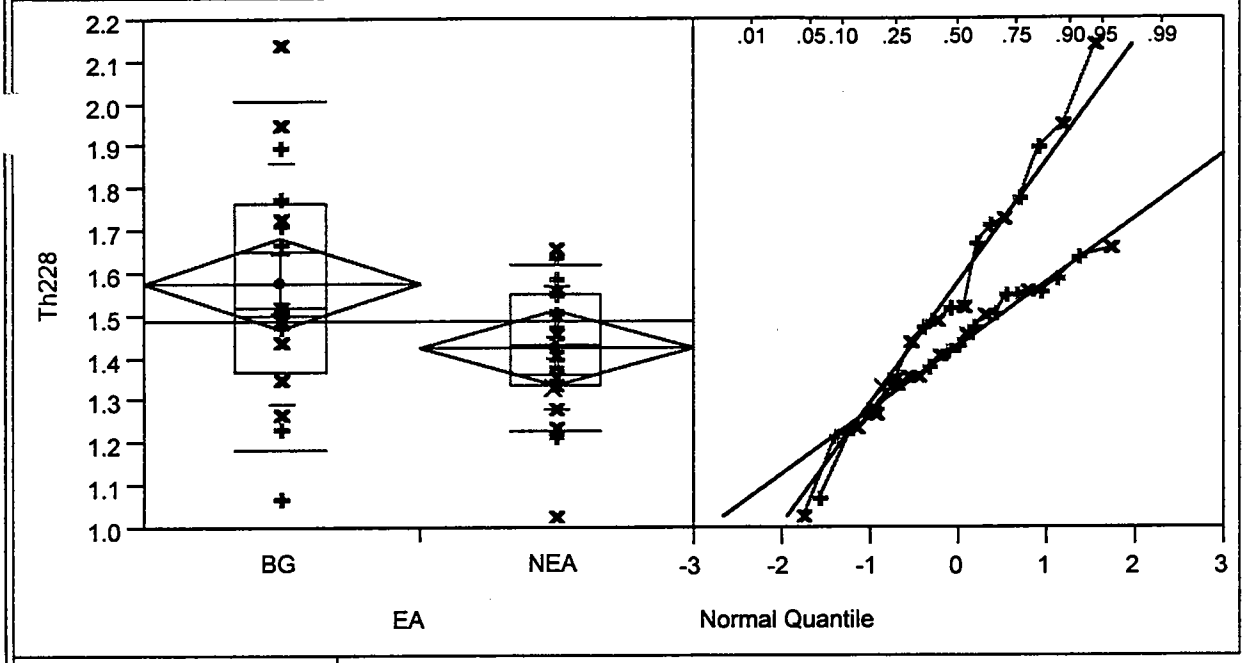
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 130.5 | -1.99704 | 0.0458 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 4.0815 | 1 | 0.0434 |

Th228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.07 | 1.189 | 1.3725 | 1.52 | 1.7675 | 2.007 | 2.14 |
| NEA | 1.03 | 1.228 | 1.34 | 1.43 | 1.55 | 1.62 | 1.66 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.57938 | 0.284335 | 0.07108 |
| NEA | 23 | 1.42848 | 0.149920 | 0.03126 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 381 | 23.8125 | 1.728 |
| NEA | 23 | 399 | 17.3478 | -1.728 |

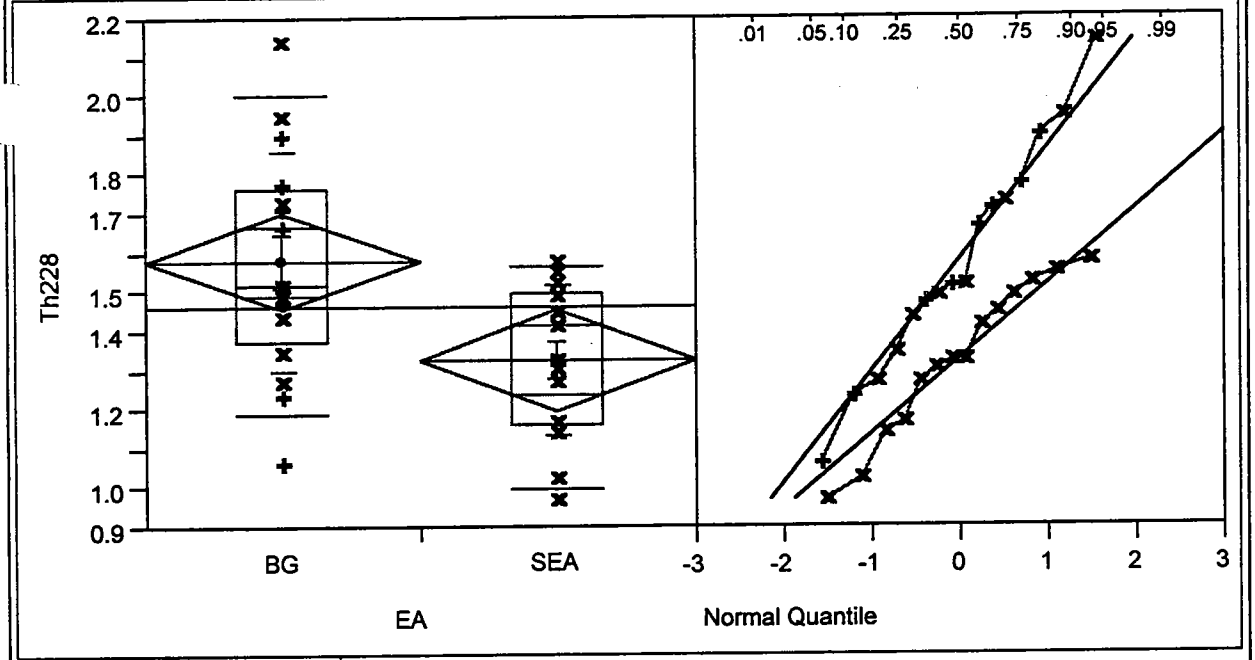
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 381 | 1.72792 | 0.0840 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.0353 | 1 | 0.0815 |

Th228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.07 | 1.189 | 1.3725 | 1.52 | 1.7675 | 2.007 | 2.14 |
| SEA | 0.97 | 1 | 1.1625 | 1.33 | 1.49875 | 1.565 | 1.58 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.57938 | 0.284335 | 0.07108 |
| SEA | 14 | 1.32607 | 0.192575 | 0.05147 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 304 | 19.0000 | 2.308 |
| SEA | 14 | 161 | 11.5000 | -2.308 |

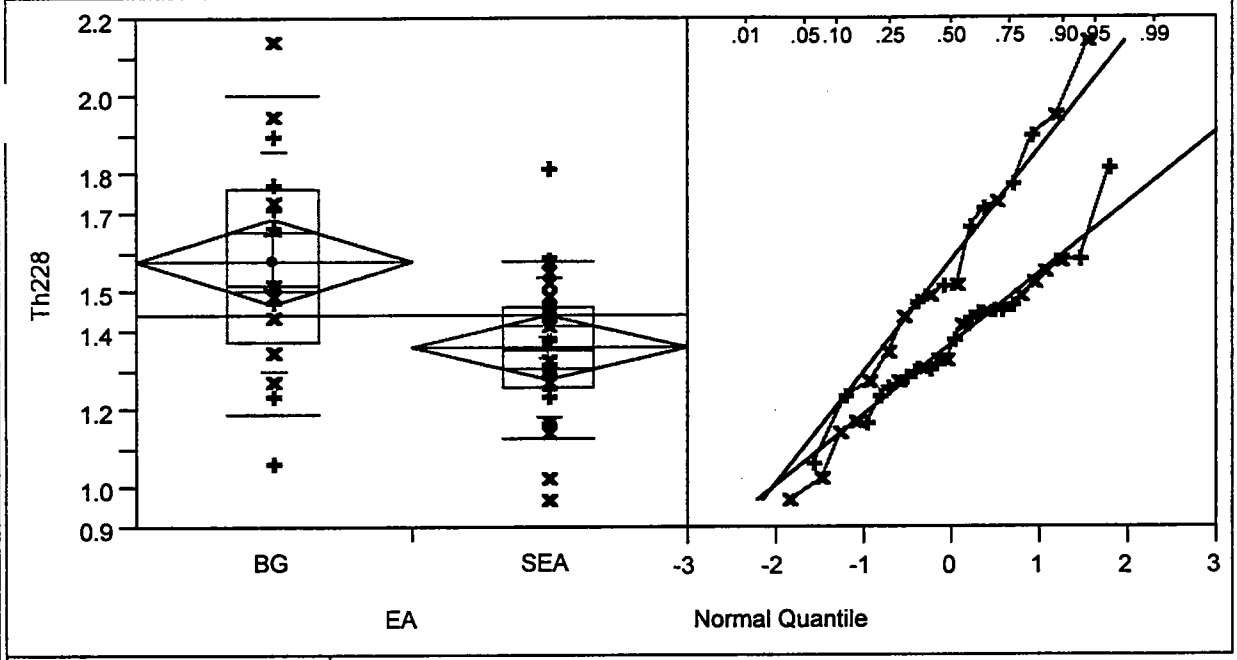
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 161 | -2.30819 | 0.0210 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.4242 | 1 | 0.0199 |

Th228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.07 | 1.189 | 1.3725 | 1.52 | 1.7675 | 2.007 | 2.14 |
| SEA | 0.97 | 1.129 | 1.2625 | 1.355 | 1.4675 | 1.581 | 1.82 |

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.57938 | 0.284335 | 0.07108 |
| SEA | 28 | 1.36446 | 0.180603 | 0.03413 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 464 | 29.0000 | 2.526 |
| SEA | 28 | 526 | 18.7857 | -2.526 |

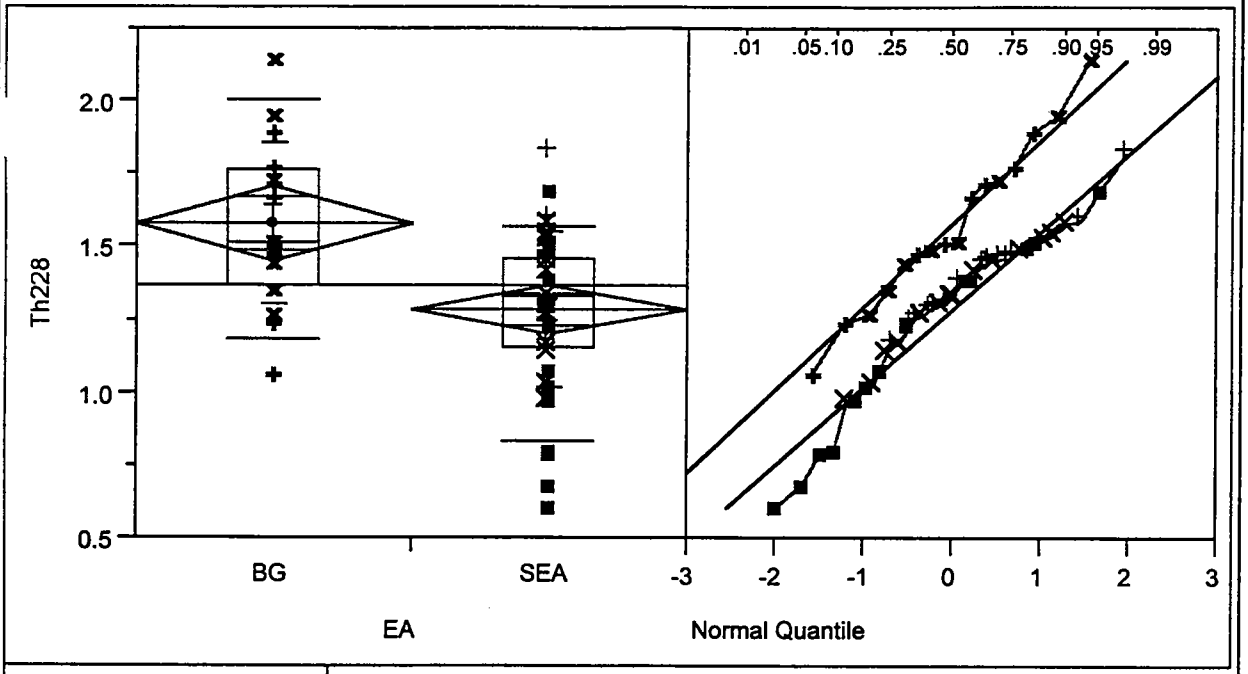
2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 464 | 2.52603 | 0.0115 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 6.4426 | 1 | 0.0111 |

Th228 By EA




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| BG | 1.07 | 1.189 | 1.3725 | 1.52 | 1.7675 | 2.007 | 2.14 |
| SEA | 0.61 | 0.834 | 1.155 | 1.33 | 1.465 | 1.574 | 1.82 |

eans and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| BG | 16 | 1.57938 | 0.284335 | 0.07108 |
| SEA | 41 | 1.28963 | 0.267419 | 0.04176 |

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| BG | 16 | 637 | 39.8125 | 3.064 |
| SEA | 41 | 1016 | 24.7805 | -3.064 |

2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 637 | 3.06422 | 0.0022 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 9.4439 | 1 | 0.0021 |

**TAB 15**

Correlations

| Variable | Al | As | Ba | Fe | Mn | TEQ | Perchlor | Ac228 | Bi214 | K40 | Ra226 | Ra228 | Tl208 | Th228 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Al | 1.0000 | -0.1136 | 0.0190 | 0.6420 | 0.2440 | 0.0782 | 0.1345 | 0.0672 | -0.0568 | -0.2325 | -0.1745 | 0.2215 | -0.0932 | 0.0914 |
| As | -0.1136 | 1.0000 | 0.2331 | -0.1244 | 0.2967 | -0.0859 | -0.0173 | -0.3130 | 0.4328 | -0.2669 | 0.1338 | -0.2355 | -0.3852 | -0.2090 |
| Ba | 0.0190 | 0.2331 | 1.0000 | -0.0029 | 0.6678 | 0.0014 | -0.0062 | 0.1562 | -0.2858 | 0.1691 | 0.0241 | 0.0014 | 0.0306 | -0.0048 |
| Fe | 0.6420 | -0.1244 | -0.0029 | 1.0000 | 0.2276 | 0.1217 | 0.1330 | 0.0799 | -0.1930 | -0.2264 | -0.1715 | 0.1769 | 0.0353 | 0.0621 |
| Mn | 0.2440 | 0.2967 | 0.6678 | 0.2276 | 1.0000 | -0.0003 | 0.0956 | 0.1591 | -0.1538 | -0.0168 | -0.0392 | 0.0751 | 0.1179 | 0.1275 |
| TEQ | 0.0782 | -0.0859 | 0.0014 | 0.1217 | -0.0003 | 1.0000 | -0.0529 | -0.0848 | -0.0517 | -0.1585 | 0.0325 | 0.0413 | -0.0761 | 0.0582 |
| Perchlor | 0.1345 | -0.0173 | -0.0062 | 0.1330 | 0.0956 | -0.0529 | 1.0000 | -0.0116 | -0.0000 | -0.2958 | 0.0294 | -0.1259 | -0.1587 | -0.1082 |
| Ac228 | 0.0672 | -0.3130 | 0.1562 | 0.0799 | 0.1591 | -0.0848 | -0.0116 | 1.0000 | -0.4243 | 0.4439 | -0.0152 | 0.1869 | 0.5810 | 0.3994 |
| Bi214 | -0.0568 | 0.4328 | -0.2858 | -0.1930 | -0.1538 | -0.0517 | -0.0000 | -0.4243 | 1.0000 | -0.4219 | 0.3941 | -0.2551 | -0.3905 | -0.3406 |
| K40 | -0.2325 | -0.2669 | 0.1691 | -0.2264 | -0.0168 | -0.1585 | -0.2958 | 0.4439 | -0.4219 | 1.0000 | -0.1330 | 0.0853 | 0.5107 | 0.1279 |
| Ra226 | -0.1745 | 0.1338 | 0.0241 | -0.1715 | -0.0392 | 0.0325 | 0.0294 | -0.0152 | 0.3941 | -0.1330 | 1.0000 | -0.1578 | -0.0016 | -0.0407 |
| Ra228 | 0.2215 | -0.2355 | 0.0014 | 0.1769 | 0.0751 | 0.0413 | -0.1259 | 0.1869 | -0.2551 | 0.0853 | -0.1578 | 1.0000 | 0.3732 | 0.2845 |
| Tl208 | -0.0932 | -0.3852 | 0.0306 | 0.0353 | 0.1179 | -0.0761 | -0.1587 | 0.5810 | -0.3905 | 0.5107 | -0.0016 | 0.3732 | 1.0000 | 0.4407 |
| Th228 | 0.0914 | -0.2090 | -0.0048 | 0.0621 | 0.1275 | 0.0582 | -0.1082 | 0.3994 | -0.3406 | 0.1279 | -0.0407 | 0.2845 | 0.4407 | 1.0000 |

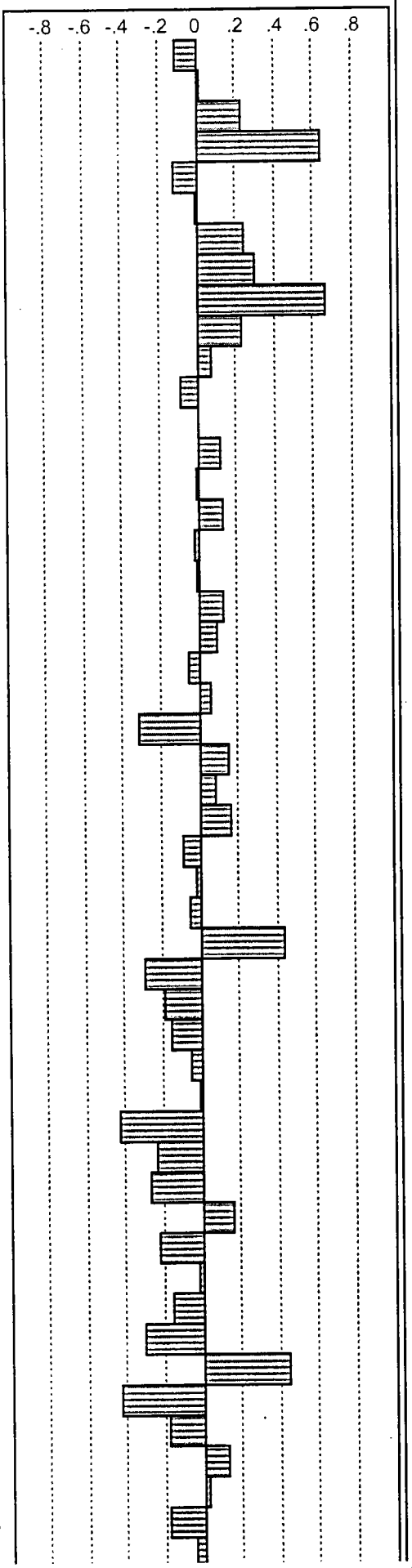
Pairwise Correlations

Nonparametric Measures of Association

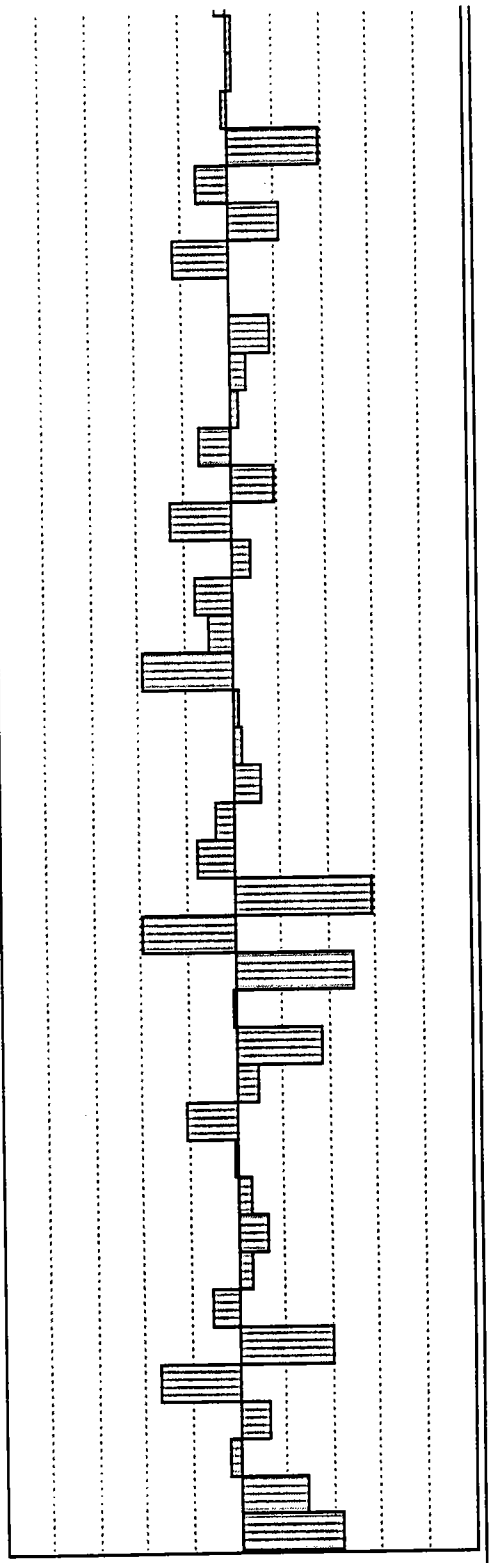
Correlations

Pairwise Correlations

| Variable | by Variable | Correlation | Count | Signif Prob |
|---|---|---|---|---|
| As | Al | -0.1136 | 86 | 0.2978 |
| Ba | Al | 0.0190 | 86 | 0.8619 |
| Ba | As | 0.2331 | 86 | 0.0308 |
| Fe | Al | 0.6420 | 86 | 0.0000 |
| Fe | As | -0.1244 | 86 | 0.2537 |
| Fe | Ba | -0.0029 | 86 | 0.9788 |
| Mn | Al | 0.2440 | 86 | 0.0236 |
| Mn | As | 0.2967 | 86 | 0.0055 |
| Mn | Ba | 0.6678 | 86 | 0.0000 |
| Mn | Fe | 0.2276 | 86 | 0.0351 |
| TEQ | Al | 0.0782 | 86 | 0.4740 |
| TEQ | As | -0.0859 | 86 | 0.4315 |
| TEQ | Ba | 0.0014 | 86 | 0.9894 |
| TEQ | Fe | 0.1217 | 86 | 0.2643 |
| TEQ | Mn | -0.0003 | 86 | 0.9982 |
| Perchlor | Al | 0.1345 | 86 | 0.2169 |
| Perchlor | As | -0.0173 | 86 | 0.8745 |
| Perchlor | Ba | -0.0062 | 86 | 0.9546 |
| Perchlor | Fe | 0.1330 | 86 | 0.2223 |
| Perchlor | Mn | 0.0956 | 86 | 0.3815 |
| Perchlor | TEQ | -0.0529 | 86 | 0.6285 |
| Ac228 | Al | 0.0672 | 86 | 0.5385 |
| Ac228 | As | -0.3130 | 86 | 0.0033 |
| Ac228 | Ba | 0.1562 | 86 | 0.1510 |
| Ac228 | Fe | 0.0799 | 86 | 0.4645 |
| Ac228 | Mn | 0.1591 | 86 | 0.1434 |
| Ac228 | TEQ | -0.0848 | 86 | 0.4375 |
| Ac228 | Perchlor | -0.0116 | 86 | 0.9158 |
| Bi214 | Al | -0.0568 | 86 | 0.6034 |
| Bi214 | As | 0.4328 | 86 | 0.0000 |
| Bi214 | Ba | -0.2858 | 86 | 0.0076 |
| Bi214 | Fe | -0.1930 | 86 | 0.0750 |
| Bi214 | Mn | -0.1538 | 86 | 0.1574 |
| Bi214 | TEQ | -0.0517 | 86 | 0.6361 |
| Bi214 | Perchlor | -0.0000 | 86 | 0.9997 |
| Bi214 | Ac228 | -0.4243 | 86 | 0.0000 |
| K40 | Al | -0.2325 | 86 | 0.0312 |
| K40 | As | -0.2669 | 86 | 0.0130 |
| K40 | Ba | 0.1691 | 86 | 0.1196 |
| K40 | Fe | -0.2264 | 86 | 0.0360 |
| K40 | Mn | -0.0168 | 86 | 0.8776 |
| K40 | TEQ | -0.1585 | 86 | 0.1449 |
| K40 | Perchlor | -0.2958 | 86 | 0.0057 |
| K40 | Ac228 | 0.4439 | 86 | 0.0000 |
| K40 | Bi214 | -0.4219 | 86 | 0.0001 |
| Ra226 | Al | -0.1745 | 86 | 0.1080 |
| Ra226 | As | 0.1338 | 86 | 0.2192 |
| Ra226 | Ba | 0.0241 | 86 | 0.8255 |
| Ra226 | Fe | -0.1715 | 86 | 0.1145 |



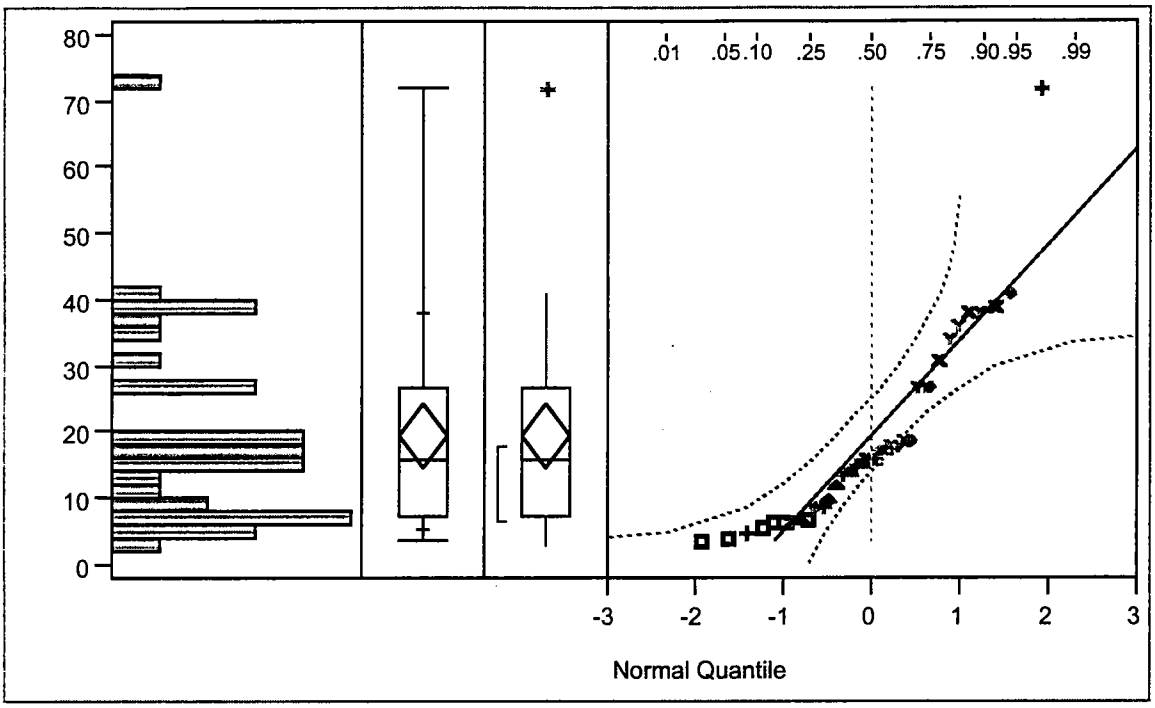
| Variable | by Variable | Correlation | Count | Signif Prob |
|---|---|---|---|---|
| Ra226 | Mn | -0.0392 | 86 | 0.7201 |
| Ra226 | TEQ | 0.0325 | 86 | 0.7665 |
| Ra226 | Perchlor | 0.0294 | 86 | 0.7883 |
| Ra226 | Ac228 | -0.0152 | 86 | 0.8892 |
| Ra226 | Bi214 | 0.3941 | 86 | 0.0002 |
| Ra226 | K40 | -0.1330 | 86 | 0.2223 |
| Ra228 | Al | 0.2215 | 86 | 0.0404 |
| Ra228 | As | -0.2355 | 86 | 0.0291 |
| Ra228 | Ba | 0.0014 | 86 | 0.9895 |
| Ra228 | Fe | 0.1769 | 86 | 0.1032 |
| Ra228 | Mn | 0.0751 | 86 | 0.4922 |
| Ra228 | TEQ | 0.0413 | 86 | 0.7056 |
| Ra228 | Perchlor | -0.1259 | 86 | 0.2480 |
| Ra228 | Ac228 | 0.1869 | 86 | 0.0849 |
| Ra228 | Bi214 | -0.2551 | 86 | 0.0178 |
| Ra228 | K40 | 0.0853 | 86 | 0.4347 |
| Ra228 | Ra226 | -0.1578 | 86 | 0.1467 |
| Tl208 | Al | -0.0932 | 86 | 0.3935 |
| Tl208 | As | -0.3852 | 86 | 0.0003 |
| Tl208 | Ba | 0.0306 | 86 | 0.7794 |
| Tl208 | Fe | 0.0353 | 86 | 0.7468 |
| Tl208 | Mn | 0.1179 | 86 | 0.2798 |
| Tl208 | TEQ | -0.0761 | 86 | 0.4864 |
| Tl208 | Perchlor | -0.1587 | 86 | 0.1446 |
| Tl208 | Ac228 | 0.5810 | 86 | 0.0000 |
| Tl208 | Bi214 | -0.3905 | 86 | 0.0002 |
| Tl208 | K40 | 0.5107 | 86 | 0.0000 |
| Tl208 | Ra226 | -0.0016 | 86 | 0.9882 |
| Tl208 | Ra228 | 0.3732 | 86 | 0.0004 |
| Th228 | Al | 0.0914 | 86 | 0.4024 |
| Th228 | As | -0.2090 | 86 | 0.0535 |
| Th228 | Ba | -0.0048 | 86 | 0.9651 |
| Th228 | Fe | 0.0621 | 86 | 0.5698 |
| Th228 | Mn | 0.1275 | 86 | 0.2419 |
| Th228 | TEQ | 0.0582 | 86 | 0.5948 |
| Th228 | Perchlor | -0.1082 | 86 | 0.3213 |
| Th228 | Ac228 | 0.3994 | 86 | 0.0001 |
| Th228 | Bi214 | -0.3406 | 86 | 0.0013 |
| Th228 | K40 | 0.1279 | 86 | 0.2406 |
| Th228 | Ra226 | -0.0407 | 86 | 0.7097 |
| Th228 | Ra228 | 0.2845 | 86 | 0.0079 |
| Th228 | Tl208 | 0.4407 | 86 | 0.0000 |



Nonparametric Measures of Association

**TAB 16**

As




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 72.000 |
| | 99.5% | 72.000 |
| | 97.5% | 72.000 |
| | 90.0% | 38.300 |
| quartile | 75.0% | 27.000 |
| median | 50.0% | 16.000 |
| quartile | 25.0% | 7.525 |
| | 10.0% | 5.490 |
| | 2.5% | 3.900 |
| | 0.5% | 3.900 |
| minimum | 0.0% | 3.900 |

**Moments**

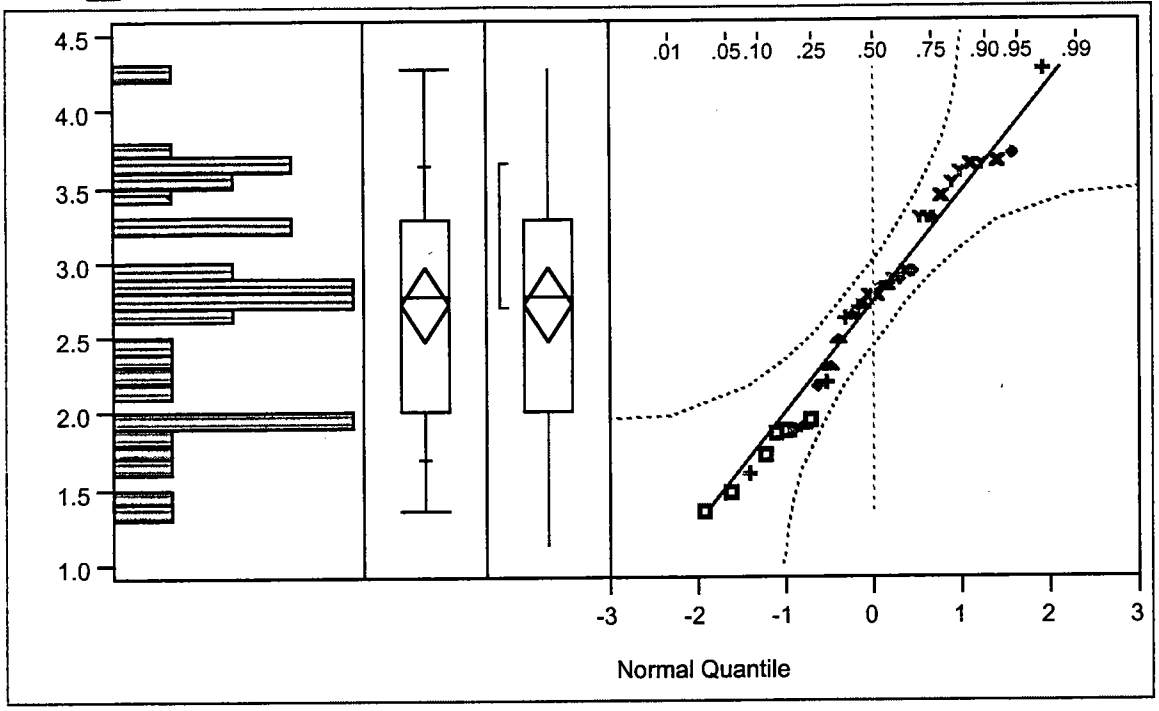
| | |
|---|---|
| Mean | 19.46389 |
| Std Dev | 14.40500 |
| Std Error Mean | 2.40083 |
| Upper 95% Mean | 24.33781 |
| Lower 95% Mean | 14.58997 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 700.70000 |
| Variance | 207.50409 |
| Skewness | 1.60216 |
| Kurtosis | 3.59405 |
| CV | 74.00886 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.852073 | 0.0001 |

lnAs




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 4.2767 |
| | 99.5% | 4.2767 |
| | 97.5% | 4.2767 |
| | 90.0% | 3.6454 |
| quartile | 75.0% | 3.2958 |
| median | 50.0% | 2.7726 |
| quartile | 25.0% | 2.0138 |
| | 10.0% | 1.7012 |
| | 2.5% | 1.3610 |
| | 0.5% | 1.3610 |
| minimum | 0.0% | 1.3610 |

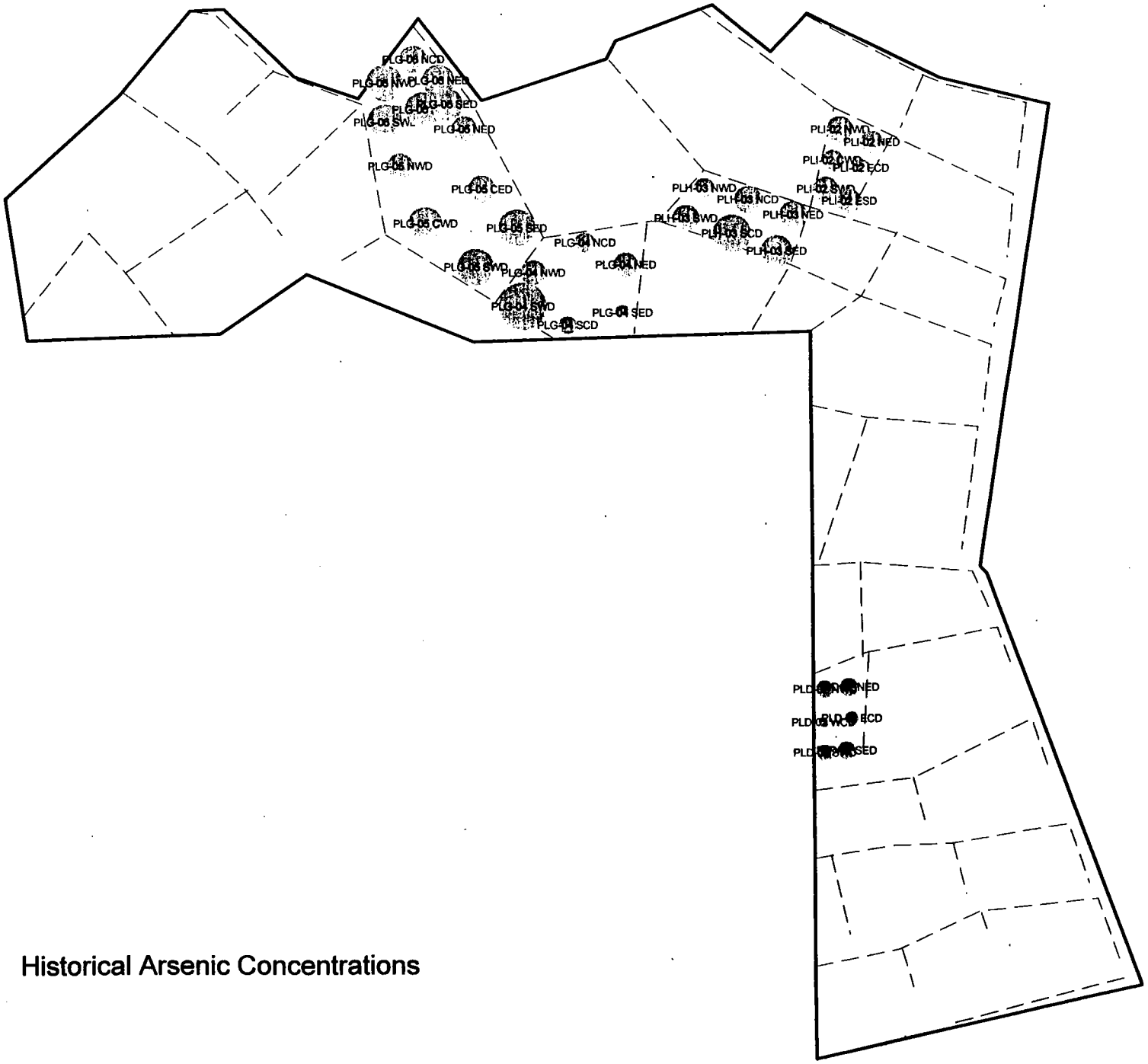
**Moments**

| | |
|---|---|
| Mean | 2.71811 |
| Std Dev | 0.73154 |
| Std Error Mean | 0.12192 |
| Upper 95% Mean | 2.96562 |
| Lower 95% Mean | 2.47059 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 97.85183 |
| Variance | 0.53514 |
| Skewness | -0.02918 |
| Kurtosis | -0.76604 |
| CV | 26.91344 |

**Test for Normality**

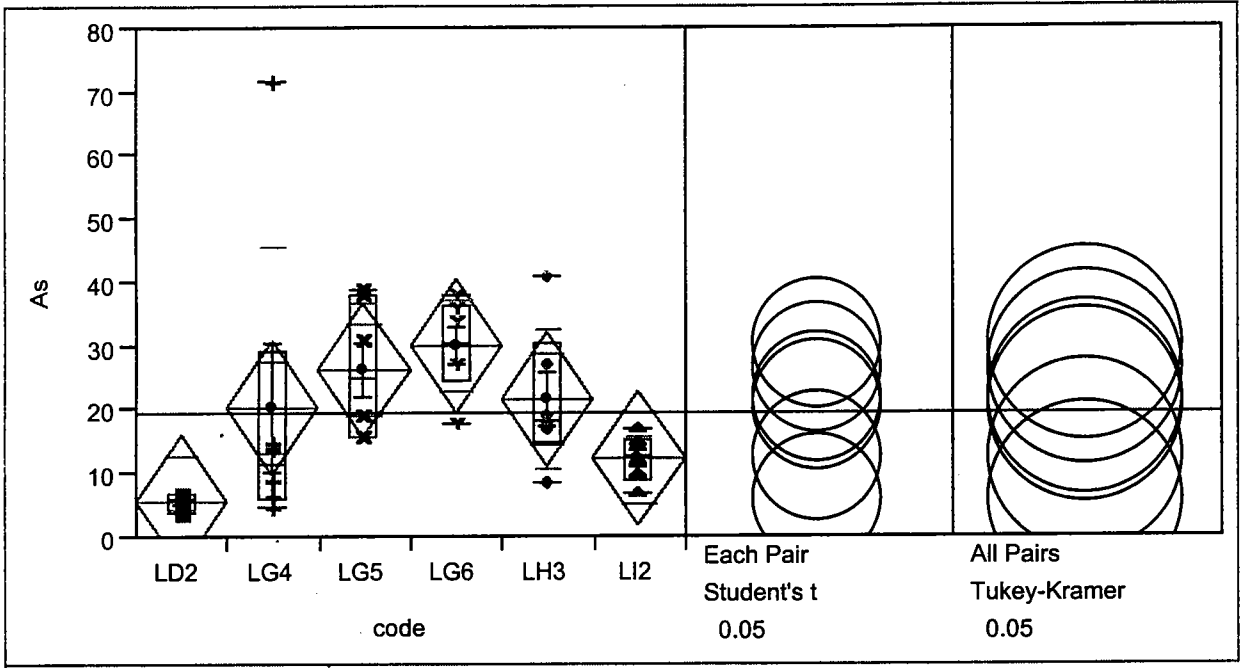
Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.965112 | 0.3852 |




Historical Arsenic Concentrations

As By code




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| LD2 | 3.9 | 3.9 | 4.275 | 6.1 | 6.8 | 7.1 | 7.1 |
| LG4 | 5 | 5 | 6.275 | 11.55 | 29.25 | 72 | 72 |
| LG5 | 16 | 16 | 16 | 25 | 38.25 | 39 | 39 |
| LG6 | 18 | 18 | 24.75 | 30.5 | 36.5 | 38 | 38 |
| LH3 | 8.8 | 8.8 | 14.95 | 18.5 | 30.5 | 41 | 41 |
| LI2 | 6.8 | 6.8 | 9.2 | 13 | 15.5 | 17 | 17 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.334275 |
| RSquare Adj | 0.223321 |
| Root Mean Square Error | 12.69504 |
| Mean of Response | 19.46389 |
| Observations (or Sum Wgts) | 36 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 5 | 2427.7214 | 485.544 | 3.0127 |
| Error | 30 | 4834.9217 | 161.164 | Prob>F |
| C Total | 35 | 7262.6431 | 207.504 | 0.0255 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| LD2 | 6 | 5.7167 | 5.1827 |
| LG4 | 6 | 20.3000 | 5.1827 |
| LG5 | 6 | 26.5000 | 5.1827 |
| LG6 | 6 | 30.0000 | 5.1827 |
| LH3 | 6 | 21.8000 | 5.1827 |
| LI2 | 6 | 12.4667 | 5.1827 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| LD2 | 6 | 5.7167 | 1.3060 | 0.533 |
| LG4 | 6 | 20.3000 | 25.6326 | 10.464 |
| LG5 | 6 | 26.5000 | 10.8213 | 4.418 |
| LG6 | 6 | 30.0000 | 7.4565 | 3.044 |
| LH3 | 6 | 21.8000 | 11.0454 | 4.509 |
| LI2 | 6 | 12.4667 | 3.6806 | 1.503 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | LG6 | LG5 | LH3 | LG4 | LI2 | LD2 |
|---|---|---|---|---|---|---|
| LG6 | 0.0000 | 3.5000 | 8.2000 | 9.7000 | 17.5333 | 24.2833 |
| LG5 | -3.5000 | 0.0000 | 4.7000 | 6.2000 | 14.0333 | 20.7833 |
| LH3 | -8.2000 | -4.7000 | 0.0000 | 1.5000 | 9.3333 | 16.0833 |
| LG4 | -9.7000 | -6.2000 | -1.5000 | 0.0000 | 7.8333 | 14.5833 |
| LI2 | -17.5333 | -14.0333 | -9.3333 | -7.8333 | 0.0000 | 6.7500 |
| LD2 | -24.2833 | -20.7833 | -16.0833 | -14.5833 | -6.7500 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

2.04226

| Abs(Dif)-LSD | LG6 | LG5 | LH3 | LG4 | LI2 | LD2 |
|---|---|---|---|---|---|---|
| LG6 | -14.9687 | -11.4687 | -6.7687 | -5.2687 | 2.5646 | 9.3146 |
| LG5 | -11.4687 | -14.9687 | -10.2687 | -8.7687 | -0.9354 | 5.8146 |
| LH3 | -6.7687 | -10.2687 | -14.9687 | -13.4687 | -5.6354 | 1.1146 |
| LG4 | -5.2687 | -8.7687 | -13.4687 | -14.9687 | -7.1354 | -0.3854 |
| LI2 | 2.5646 | -0.9354 | -5.6354 | -7.1354 | -14.9687 | -8.2187 |
| LD2 | 9.3146 | 5.8146 | 1.1146 | -0.3854 | -8.2187 | -14.9687 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

3.04160

| Abs(Dif)-LSD | LG6 | LG5 | LH3 | LG4 | LI2 | LD2 |
|---|---|---|---|---|---|---|
| LG6 | -22.2933 | -18.7933 | -14.0933 | -12.5933 | -4.7600 | 1.9900 |
| LG5 | -18.7933 | -22.2933 | -17.5933 | -16.0933 | -8.2600 | -1.5100 |
| LH3 | -14.0933 | -17.5933 | -22.2933 | -20.7933 | -12.9600 | -6.2100 |
| LG4 | -12.5933 | -16.0933 | -20.7933 | -22.2933 | -14.4600 | -7.7100 |
| LI2 | -4.7600 | -8.2600 | -12.9600 | -14.4600 | -22.2933 | -15.5433 |
| LD2 | 1.9900 | -1.5100 | -6.2100 | -7.7100 | -15.5433 | -22.2933 |

Positive values show pairs of means that are significantly different.

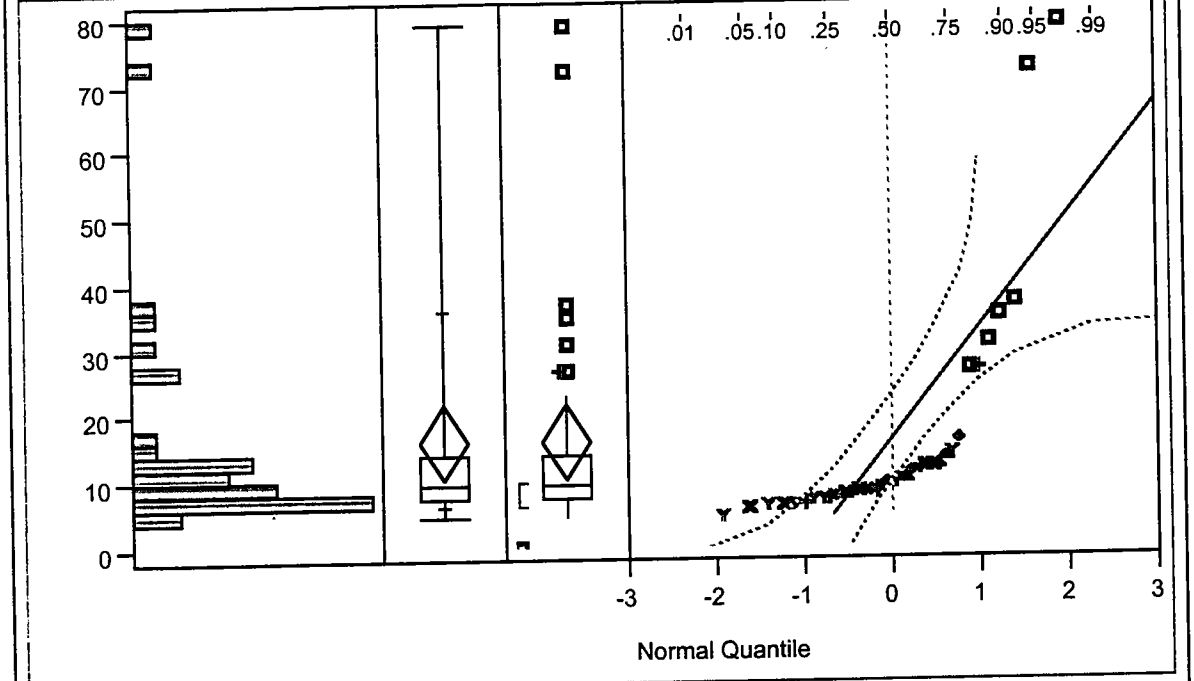
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| LD2 | 6 | 27.5 | 4.5833 | -3.526 |
| LG4 | 6 | 87.5 | 14.5833 | -0.977 |
| LG5 | 6 | 157 | 26.1667 | 1.933 |
| LG6 | 6 | 170 | 28.3333 | 2.485 |
| LH3 | 6 | 139.5 | 23.2500 | 1.189 |
| LI2 | 6 | 84.5 | 14.0833 | -1.104 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 22.0100 | 5 | 0.0005 |

Pb




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 79.000 |
| | 99.5% | 79.000 |
| | 97.5% | 79.000 |
| | 90.0% | 35.600 |
| quartile | 75.0% | 13.750 |
| median | 50.0% | 9.650 |
| quartile | 25.0% | 7.350 |
| | 10.0% | 6.170 |
| | 2.5% | 4.700 |
| | 0.5% | 4.700 |
| minimum | 0.0% | 4.700 |

**Moments**

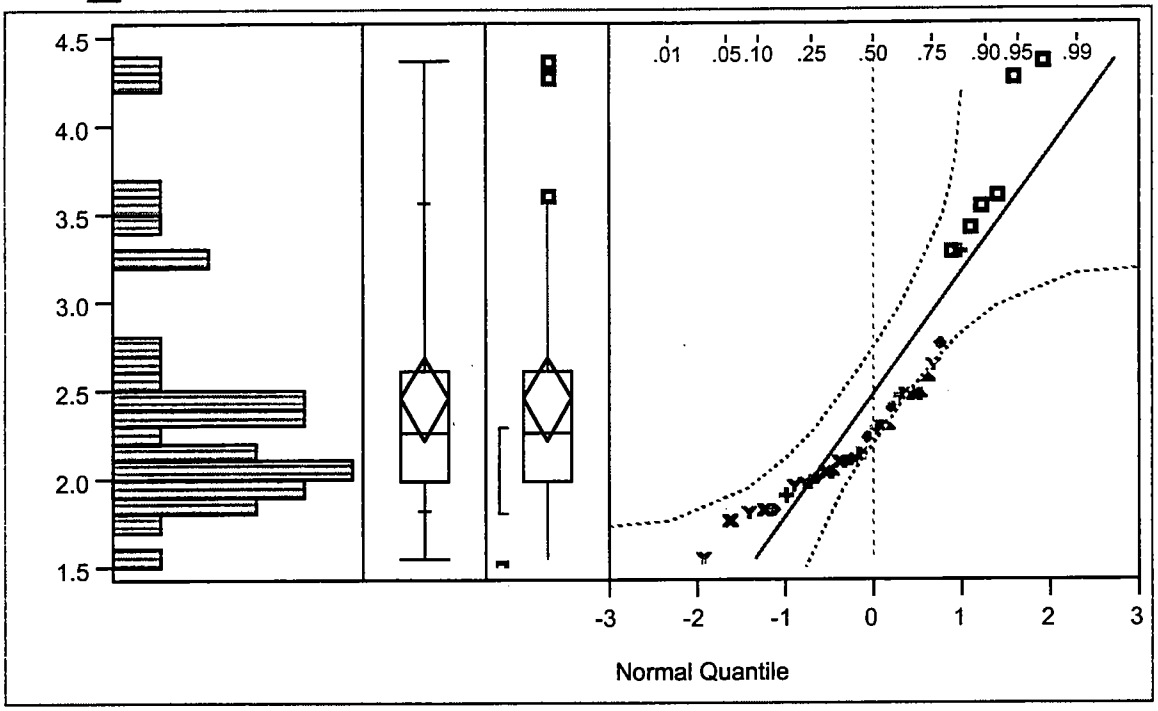
| | |
|---|---|
| Mean | 15.86111 |
| Std Dev | 16.88207 |
| Std Error Mean | 2.81368 |
| Upper 95% Mean | 21.57315 |
| Lower 95% Mean | 10.14908 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 571.00000 |
| Variance | 285.00416 |
| Skewness | 2.75626 |
| Kurtosis | 7.72998 |
| CV | 106.43684 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.599752 | <.0001 |

InPb




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 4.3694 |
| | 99.5% | 4.3694 |
| | 97.5% | 4.3694 |
| | 90.0% | 3.5720 |
| quartile | 75.0% | 2.6205 |
| median | 50.0% | 2.2663 |
| quartile | 25.0% | 1.9946 |
| | 10.0% | 1.8197 |
| | 2.5% | 1.5476 |
| | 0.5% | 1.5476 |
| minimum | 0.0% | 1.5476 |

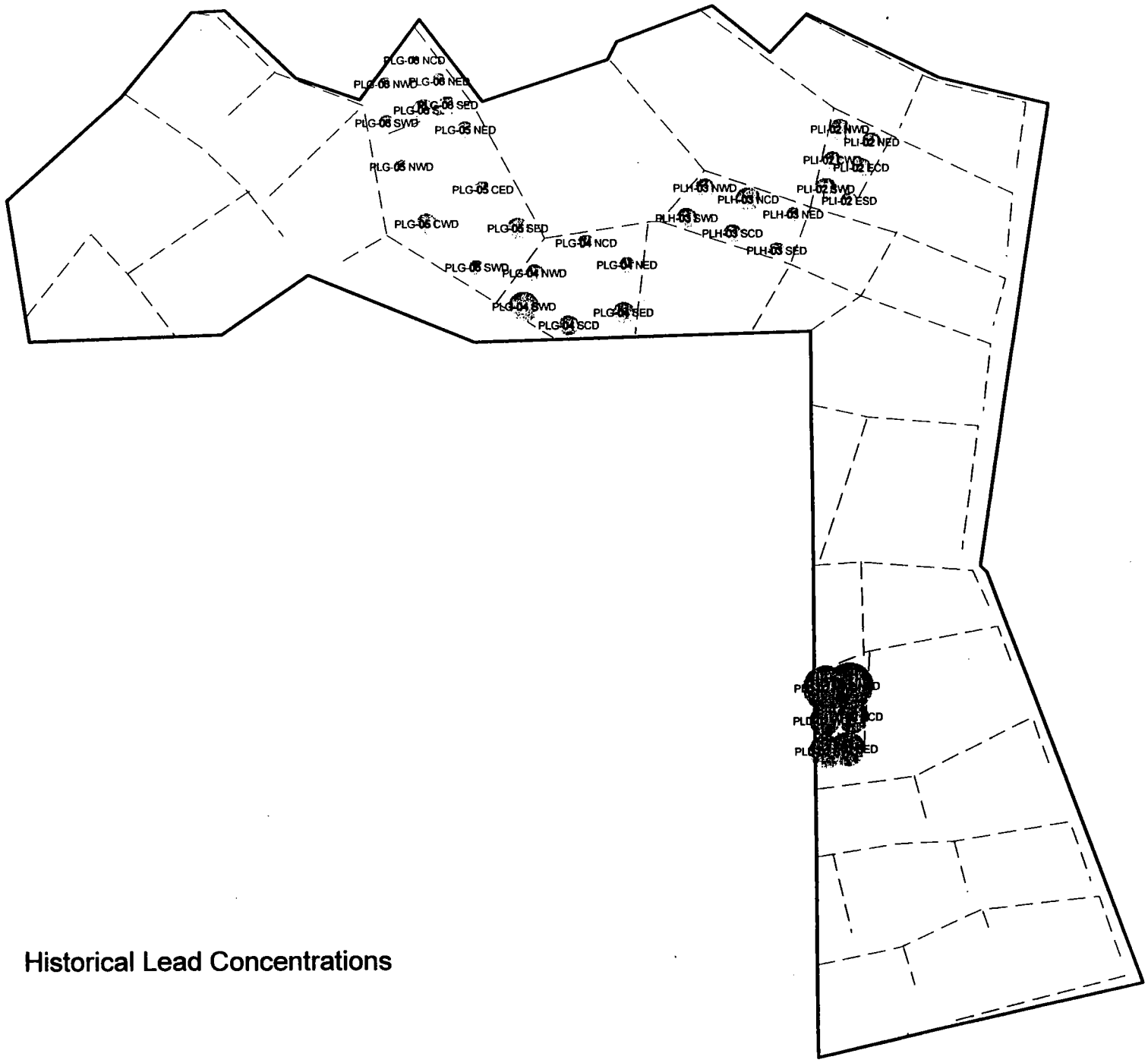
**Moments**

| | |
|---|---|
| Mean | 2.45993 |
| Std Dev | 0.69289 |
| Std Error Mean | 0.11548 |
| Upper 95% Mean | 2.69436 |
| Lower 95% Mean | 2.22549 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 88.55733 |
| Variance | 0.48009 |
| Skewness | 1.36956 |
| Kurtosis | 1.30823 |
| CV | 28.16691 |

**Test for Normality**

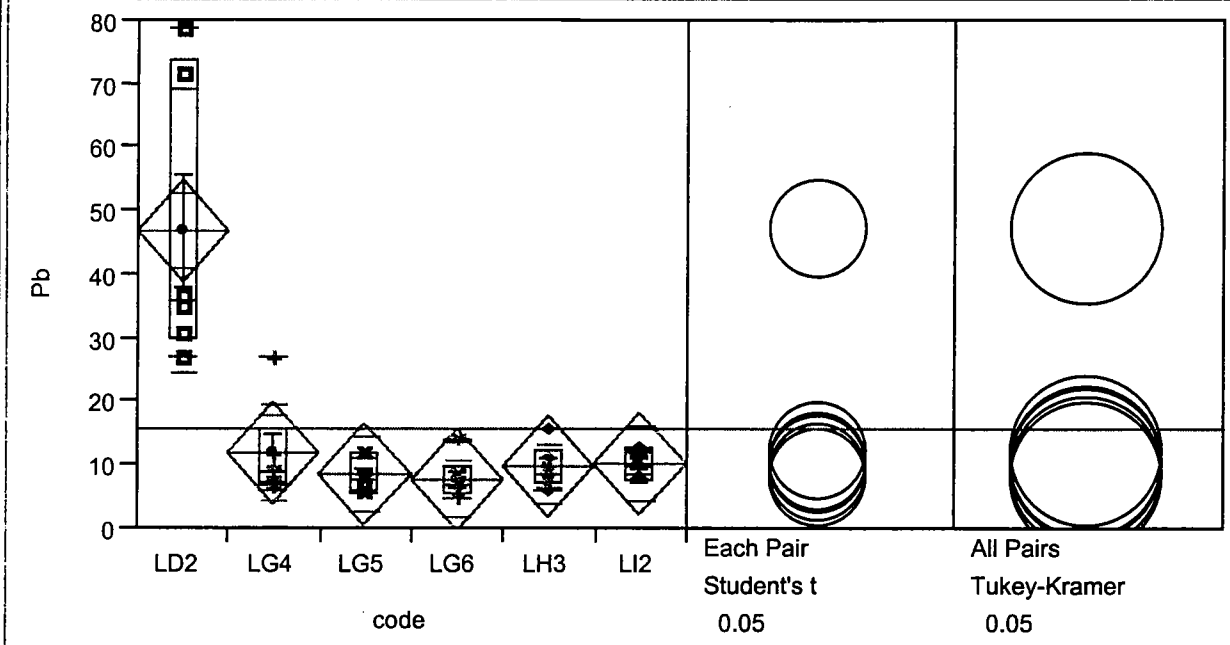
Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.847168 | <.0001 |




Historical Lead Concentrations

Pb By code




Analysis Display

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| LD2 | 27 | 27 | 30 | 36 | 73.75 | 79 | 79 |
| LG4 | 6.8 | 6.8 | 7.175 | 9.2 | 15.75 | 27 | 27 |
| LG5 | 5.8 | 5.8 | 6.1 | 7.9 | 12 | 12 | 12 |
| LG6 | 4.7 | 4.7 | 5.75 | 7.15 | 9.875 | 14 | 14 |
| LH3 | 6.2 | 6.2 | 7.175 | 8.8 | 12.25 | 16 | 16 |
| LI2 | 7.7 | 7.7 | 8 | 10 | 12.25 | 13 | 13 |

Oneway Anova

Summary of Fit

| | |
|---|---|
| RSquare | 0.698028 |
| RSquare Adj | 0.6477 |
| Root Mean Square Error | 10.02033 |
| Mean of Response | 15.86111 |
| Observations (or Sum Wgts) | 36 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 5 | 6962.9356 | 1392.59 | 13.8694 |
| Error | 30 | 3012.2100 | 100.41 | Prob>F |
| C Total | 35 | 9975.1456 | 285.00 | <.0001 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| LD2 | 6 | 46.8333 | 4.0908 |
| LG4 | 6 | 11.9167 | 4.0908 |
| LG5 | 6 | 8.6333 | 4.0908 |
| LG6 | 6 | 7.9333 | 4.0908 |
| LH3 | 6 | 9.7167 | 4.0908 |
| LI2 | 6 | 10.1333 | 4.0908 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| LD2 | 6 | 46.8333 | 22.5780 | 9.2174 |
| LG4 | 6 | 11.9167 | 7.6295 | 3.1147 |
| LG5 | 6 | 8.6333 | 2.7486 | 1.1221 |
| LG6 | 6 | 7.9333 | 3.2303 | 1.3188 |
| LH3 | 6 | 9.7167 | 3.4810 | 1.4211 |
| LI2 | 6 | 10.1333 | 2.0877 | 0.8523 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | LD2 | LG4 | LI2 | LH3 | LG5 | LG6 |
|---|---|---|---|---|---|---|
| LD2 | 0.0000 | 34.9167 | 36.7000 | 37.1167 | 38.2000 | 38.9000 |
| LG4 | -34.9167 | 0.0000 | 1.7833 | 2.2000 | 3.2833 | 3.9833 |
| LI2 | -36.7000 | -1.7833 | 0.0000 | 0.4167 | 1.5000 | 2.2000 |
| LH3 | -37.1167 | -2.2000 | -0.4167 | 0.0000 | 1.0833 | 1.7833 |
| LG5 | -38.2000 | -3.2833 | -1.5000 | -1.0833 | 0.0000 | 0.7000 |
| LG6 | -38.9000 | -3.9833 | -2.2000 | -1.7833 | -0.7000 | 0.0000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

2.04226

| Abs(Dif)-LSD | LD2 | LG4 | LI2 | LH3 | LG5 | LG6 |
|---|---|---|---|---|---|---|
| LD2 | -11.8150 | 23.1017 | 24.8850 | 25.3017 | 26.3850 | 27.0850 |
| LG4 | 23.1017 | -11.8150 | -10.0316 | -9.6150 | -8.5316 | -7.8316 |
| LI2 | 24.8850 | -10.0316 | -11.8150 | -11.3983 | -10.3150 | -9.6150 |
| LH3 | 25.3017 | -9.6150 | -11.3983 | -11.8150 | -10.7316 | -10.0316 |
| LG5 | 26.3850 | -8.5316 | -10.3150 | -10.7316 | -11.8150 | -11.1150 |
| LG6 | 27.0850 | -7.8316 | -9.6150 | -10.0316 | -11.1150 | -11.8150 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

3.04160

| Abs(Dif)-LSD | LD2 | LG4 | LI2 | LH3 | LG5 | LG6 |
|---|---|---|---|---|---|---|
| LD2 | -17.5964 | 17.3203 | 19.1036 | 19.5203 | 20.6036 | 21.3036 |
| LG4 | 17.3203 | -17.5964 | -15.8130 | -15.3964 | -14.3130 | -13.6130 |
| LI2 | 19.1036 | -15.8130 | -17.5964 | -17.1797 | -16.0964 | -15.3964 |
| LH3 | 19.5203 | -15.3964 | -17.1797 | -17.5964 | -16.5130 | -15.8130 |
| LG5 | 20.6036 | -14.3130 | -16.0964 | -16.5130 | -17.5964 | -16.8964 |
| LG6 | 21.3036 | -13.6130 | -15.3964 | -15.8130 | -16.8964 | -17.5964 |

Positive values show pairs of means that are significantly different.

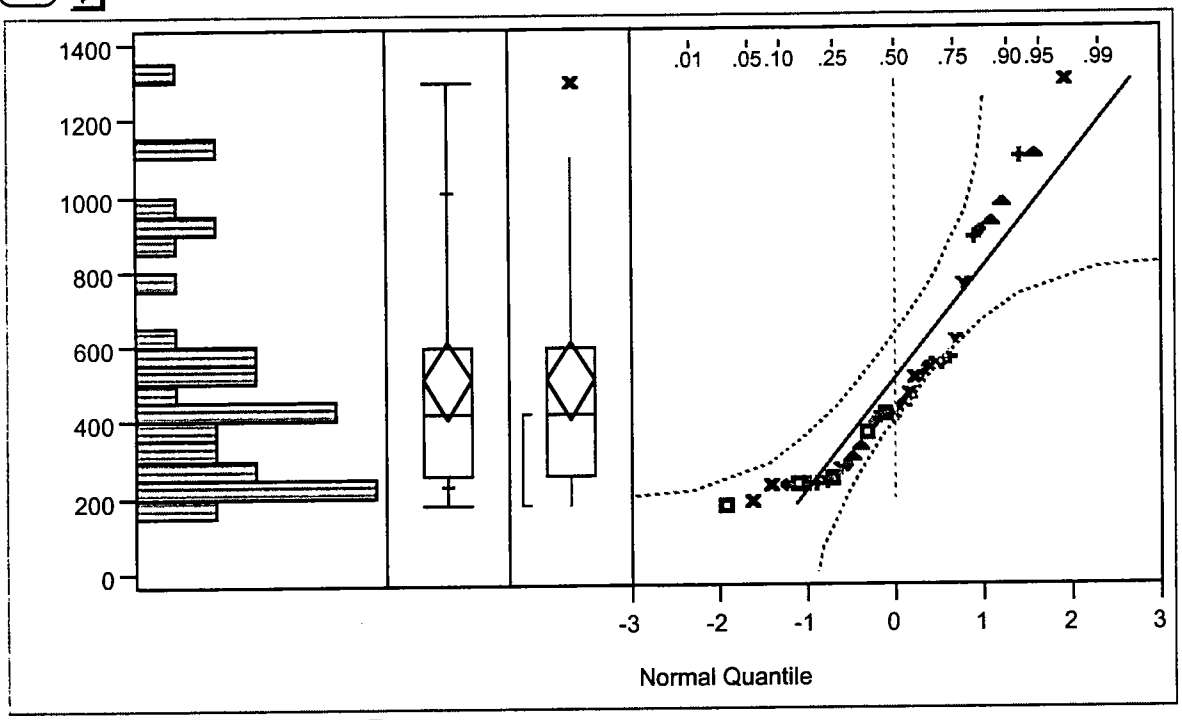
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| LD2 | 6 | 200.5 | 33.4167 | 3.782 |
| LG4 | 6 | 106 | 17.6667 | -0.191 |
| LG5 | 6 | 80.5 | 13.4167 | -1.275 |
| LG6 | 6 | 64 | 10.6667 | -1.976 |
| LH3 | 6 | 98.5 | 16.4167 | -0.510 |
| LI2 | 6 | 116.5 | 19.4167 | 0.212 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 17.0982 | 5 | 0.0043 |

Mn




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 1300.0 |
| | 99.5% | 1300.0 |
| | 97.5% | 1300.0 |
| | 90.0% | 1009.0 |
| quartile | 75.0% | 600.0 |
| median | 50.0% | 420.0 |
| quartile | 25.0% | 255.0 |
| | 10.0% | 230.0 |
| | 2.5% | 180.0 |
| | 0.5% | 180.0 |
| minimum | 0.0% | 180.0 |

**Moments**

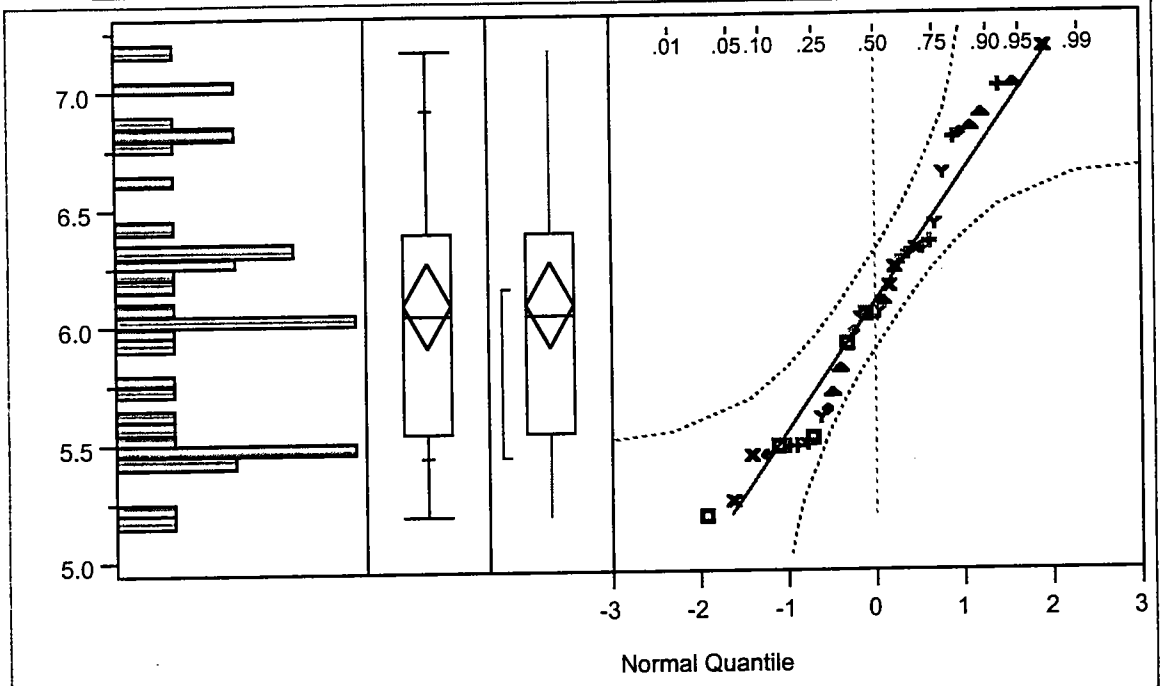
| | |
|---|---|
| Mean | 510.0000 |
| Std Dev | 295.9826 |
| Std Error Mean | 49.3304 |
| Upper 95% Mean | 610.1455 |
| Lower 95% Mean | 409.8545 |
| N | 36.0000 |
| Sum Weights | 36.0000 |
| Sum | 18360 |
| Variance | 87605.714 |
| Skewness | 1.1004 |
| Kurtosis | 0.3636 |
| CV | 58.0358 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.866353 | 0.0003 |

lnMn




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 7.1701 |
| | 99.5% | 7.1701 |
| | 97.5% | 7.1701 |
| | 90.0% | 6.9150 |
| quartile | 75.0% | 6.3965 |
| median | 50.0% | 6.0403 |
| quartile | 25.0% | 5.5407 |
| | 10.0% | 5.4381 |
| | 2.5% | 5.1930 |
| | 0.5% | 5.1930 |
| minimum | 0.0% | 5.1930 |

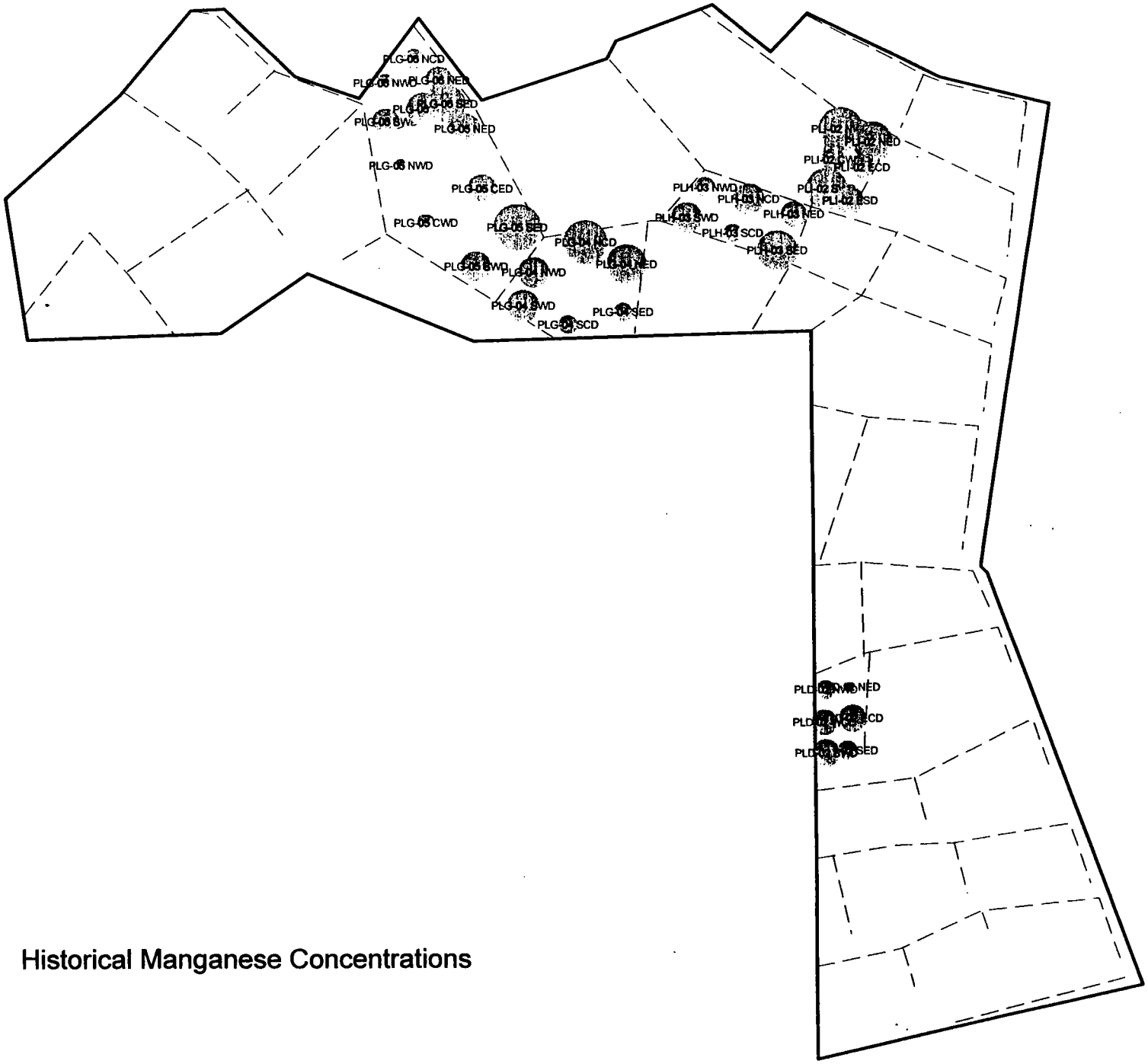
**Moments**

| | |
|---|---|
| Mean | 6.08430 |
| Std Dev | 0.54949 |
| Std Error Mean | 0.09158 |
| Upper 95% Mean | 6.27022 |
| Lower 95% Mean | 5.89839 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 219.03496 |
| Variance | 0.30194 |
| Skewness | 0.28006 |
| Kurtosis | -0.90523 |
| CV | 9.03126 |

**Test for Normality**

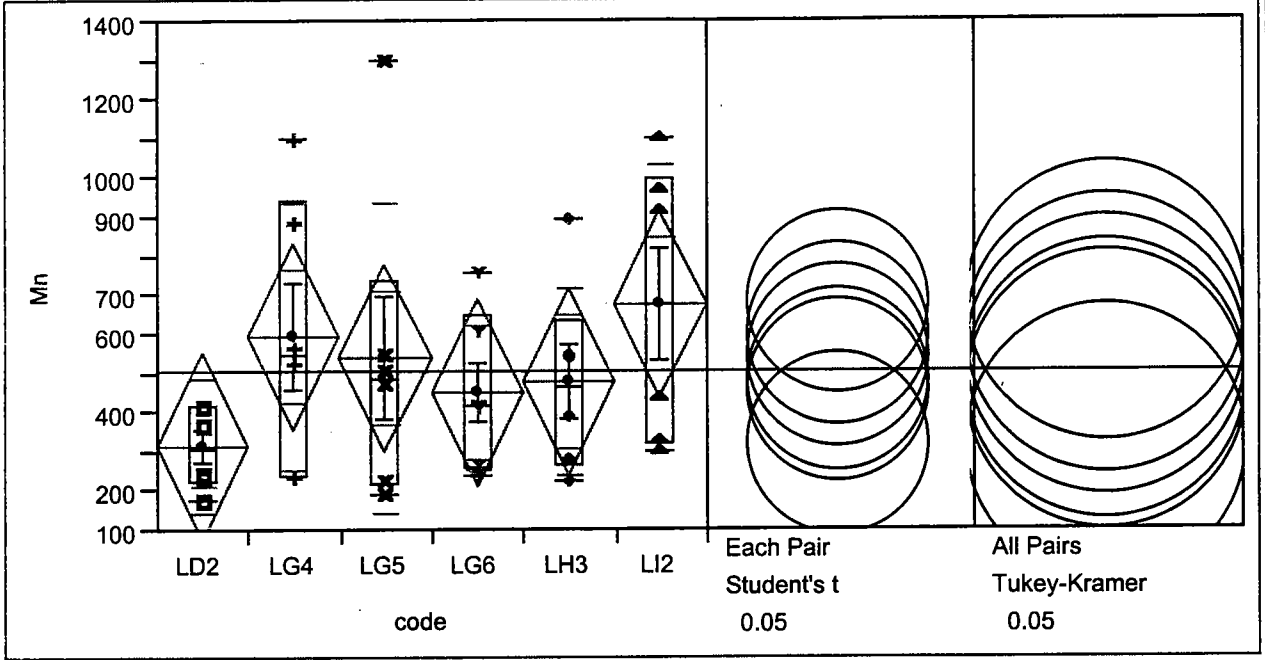
Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.946093 | 0.1040 |




Historical Manganese Concentrations

Mn By code




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| LD2 | 180 | 180 | 225 | 310 | 420 | 420 | 420 |
| LG4 | 240 | 240 | 240 | 550 | 942.5 | 1100 | 1100 |
| LG5 | 190 | 190 | 220 | 490 | 737.5 | 1300 | 1300 |
| LG6 | 240 | 240 | 262.5 | 415 | 647.5 | 760 | 760 |
| LH3 | 230 | 230 | 267.5 | 465 | 637.5 | 900 | 900 |
| LI2 | 300 | 300 | 322.5 | 680 | 1002.5 | 1100 | 1100 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.154371 |
| RSquare Adj | 0.013433 |
| Root Mean Square Error | 293.9879 |
| Mean of Response | 510 |
| Observations (or Sum Wgts) | 36 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 5 | 473333.3 | 94666.7 | 1.0953 |
| Error | 30 | 2592866.7 | 86428.9 | Prob>F |
| C Total | 35 | 3066200.0 | 87605.7 | 0.3834 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| LD2 | 6 | 313.333 | 120.02 |
| LG4 | 6 | 595.000 | 120.02 |
| LG5 | 6 | 541.667 | 120.02 |
| LG6 | 6 | 451.667 | 120.02 |
| LH3 | 6 | 481.667 | 120.02 |
| LI2 | 6 | 676.667 | 120.02 |

Std Error uses a pooled estimate of error variance

Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| LD2 | 6 | 313.333 | 103.086 | 42.08 |
| LG4 | 6 | 595.000 | 346.107 | 141.30 |
| LG5 | 6 | 541.667 | 400.520 | 163.51 |
| LG6 | 6 | 451.667 | 200.341 | 81.79 |
| LH3 | 6 | 481.667 | 243.098 | 99.24 |
| LI2 | 6 | 676.667 | 358.478 | 146.35 |

Means Comparisons

| Dif=Mean[i]-Mean[j] | LI2 | LG4 | LG5 | LH3 | LG6 | LD2 |
|---|---|---|---|---|---|---|
| LI2 | 0.000 | 81.667 | 135.000 | 195.000 | 225.000 | 363.333 |
| LG4 | -81.667 | 0.000 | 53.333 | 113.333 | 143.333 | 281.667 |
| LG5 | -135.000 | -53.333 | 0.000 | 60.000 | 90.000 | 228.333 |
| LH3 | -195.000 | -113.333 | -60.000 | 0.000 | 30.000 | 168.333 |
| LG6 | -225.000 | -143.333 | -90.000 | -30.000 | 0.000 | 138.333 |
| LD2 | -363.333 | -281.667 | -228.333 | -168.333 | -138.333 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

2.04226

| Abs(Dif)-LSD | LI2 | LG4 | LG5 | LH3 | LG6 | LD2 |
|---|---|---|---|---|---|---|
| LI2 | -346.641 | -264.974 | -211.641 | -151.641 | -121.641 | 16.693 |
| LG4 | -264.974 | -346.641 | -293.307 | -233.307 | -203.307 | -64.974 |
| LG5 | -211.641 | -293.307 | -346.641 | -286.641 | -256.641 | -118.307 |
| LH3 | -151.641 | -233.307 | -286.641 | -346.641 | -316.641 | -178.307 |
| LG6 | -121.641 | -203.307 | -256.641 | -316.641 | -346.641 | -208.307 |
| LD2 | 16.693 | -64.974 | -118.307 | -178.307 | -208.307 | -346.641 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

3.04160

| Abs(Dif)-LSD | LI2 | LG4 | LG5 | LH3 | LG6 | LD2 |
|---|---|---|---|---|---|---|
| LI2 | -516.263 | -434.596 | -381.263 | -321.263 | -291.263 | -152.929 |
| LG4 | -434.596 | -516.263 | -462.929 | -402.929 | -372.929 | -234.596 |
| LG5 | -381.263 | -462.929 | -516.263 | -456.263 | -426.263 | -287.929 |
| LH3 | -321.263 | -402.929 | -456.263 | -516.263 | -486.263 | -347.929 |
| LG6 | -291.263 | -372.929 | -426.263 | -486.263 | -516.263 | -377.929 |
| LD2 | -152.929 | -234.596 | -287.929 | -347.929 | -377.929 | -516.263 |

Positive values show pairs of means that are significantly different.

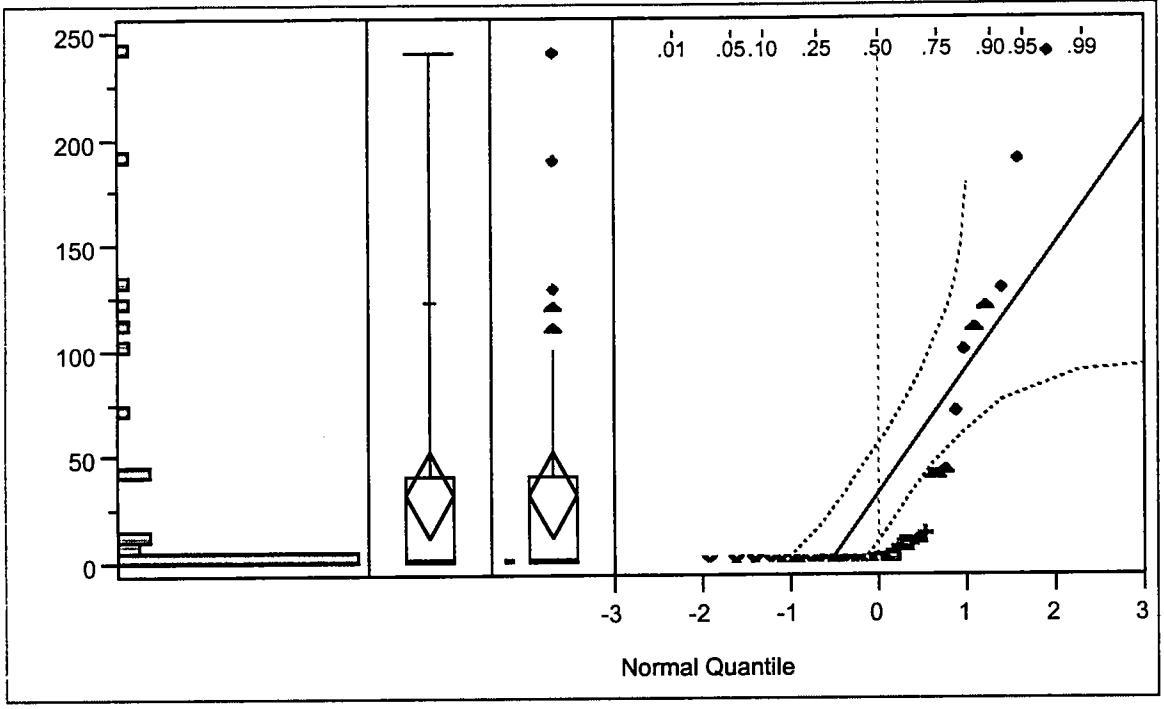
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| LD2 | 6 | 66.5 | 11.0833 | -1.870 |
| LG4 | 6 | 127.5 | 21.2500 | 0.680 |
| LG5 | 6 | 110 | 18.3333 | -0.021 |
| LG6 | 6 | 107.5 | 17.9167 | -0.127 |
| LH3 | 6 | 110 | 18.3333 | -0.021 |
| LI2 | 6 | 144.5 | 24.0833 | 1.402 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 5.0997 | 5 | 0.4038 |

Pclrate




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 240.00 |
| | 99.5% | 240.00 |
| | 97.5% | 240.00 |
| | 90.0% | 123.00 |
| quartile | 75.0% | 41.00 |
| median | 50.0% | 1.85 |
| quartile | 25.0% | 0.19 |
| | 10.0% | 0.04 |
| | 2.5% | 0.02 |
| | 0.5% | 0.02 |
| minimum | 0.0% | 0.02 |

**Moments**

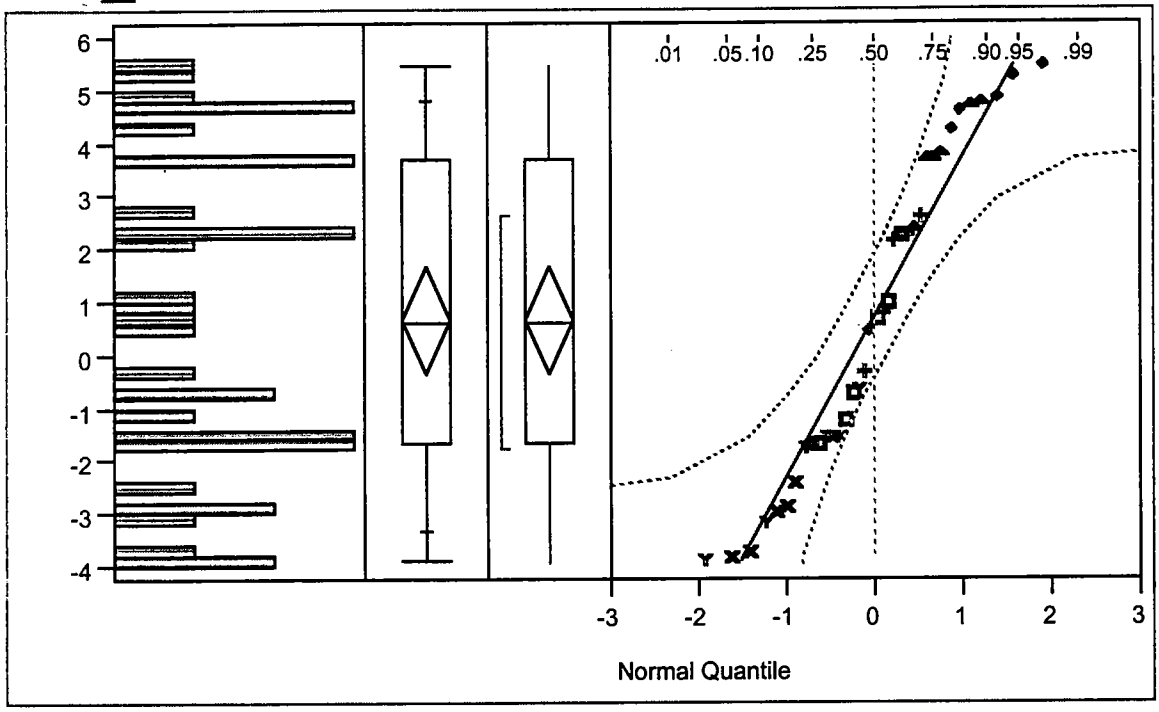
| | |
|---|---|
| Mean | 32.02461 |
| Std Dev | 58.82865 |
| Std Error Mean | 9.80478 |
| Upper 95% Mean | 51.92925 |
| Lower 95% Mean | 12.11998 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 1152.886 |
| Variance | 3460.8103 |
| Skewness | 2.18531 |
| Kurtosis | 4.45040 |
| CV | 183.69826 |

**Test for Normality**

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.622009 | <.0001 |

InPclr




**Quantiles**

| | | |
|---|---|---|
| maximum | 100.0% | 5.4806 |
| | 99.5% | 5.4806 |
| | 97.5% | 5.4806 |
| | 90.0% | 4.8115 |
| quartile | 75.0% | 3.7136 |
| median | 50.0% | 0.6060 |
| quartile | 25.0% | -1.6594 |
| | 10.0% | -3.3380 |
| | 2.5% | -3.8632 |
| | 0.5% | -3.8632 |
| minimum | 0.0% | -3.8632 |

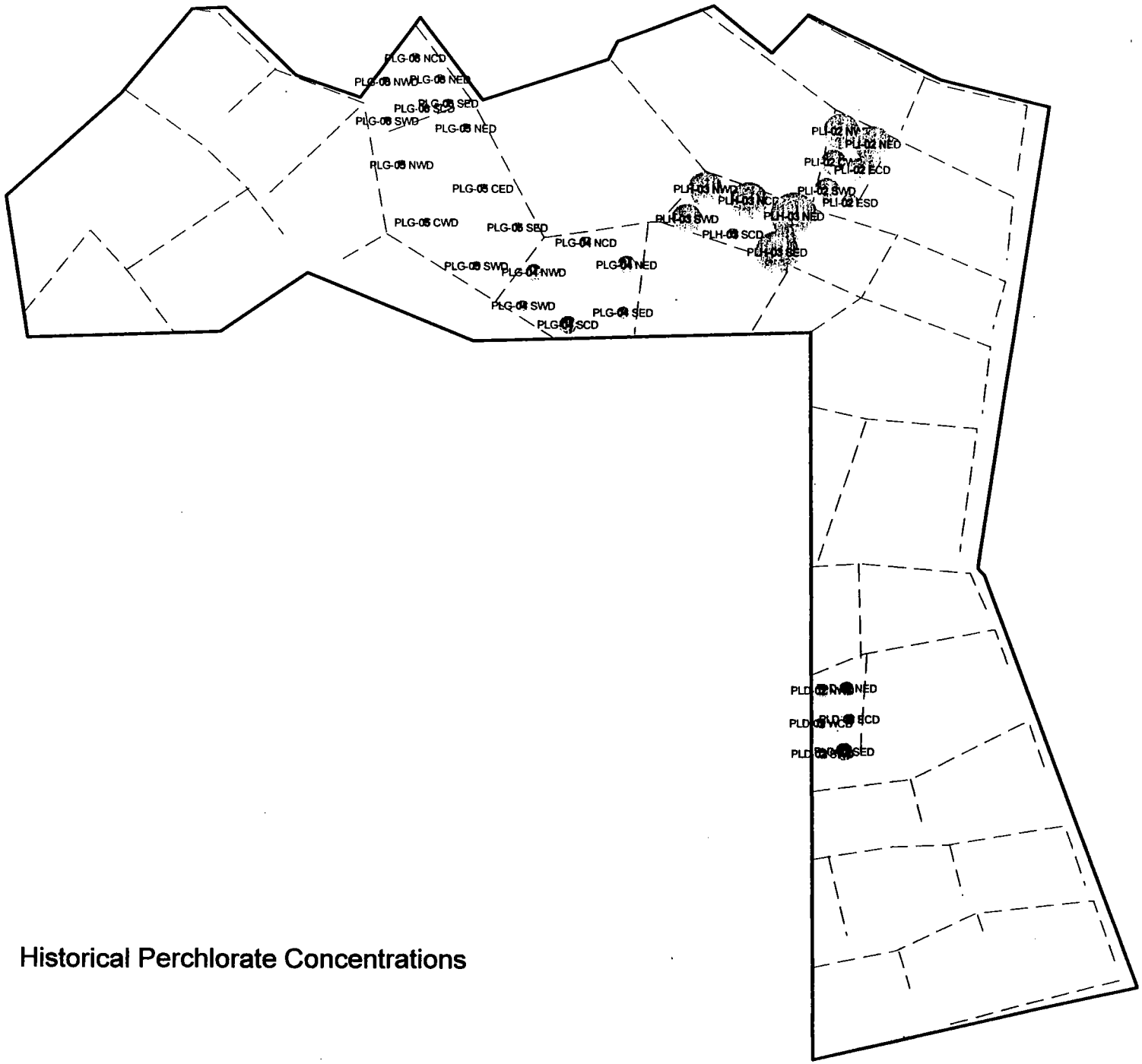
**Moments**

| | |
|---|---|
| Mean | 0.68468 |
| Std Dev | 3.00322 |
| Std Error Mean | 0.50054 |
| Upper 95% Mean | 1.70081 |
| Lower 95% Mean | -0.33146 |
| N | 36.00000 |
| Sum Weights | 36.00000 |
| Sum | 24.64833 |
| Variance | 9.01930 |
| Skewness | 0.09991 |
| Kurtosis | -1.36866 |
| CV | 438.63313 |

**Test for Normality**

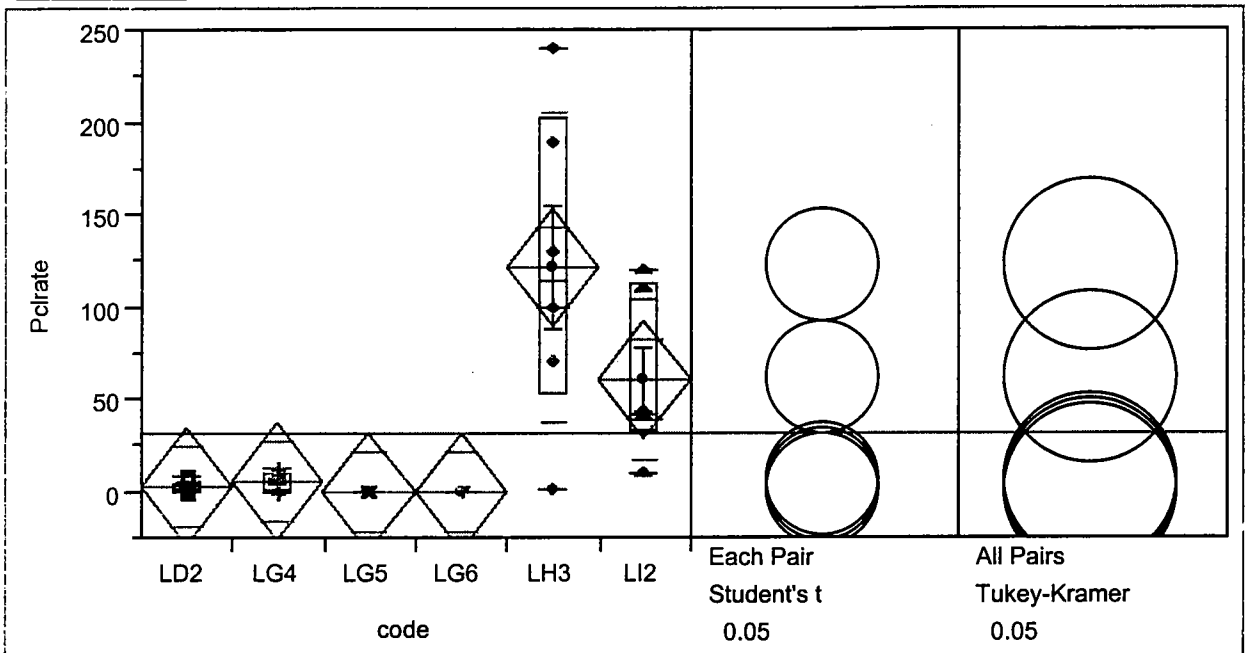
Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.919429 | 0.0140 |




Historical Perchlorate Concentrations

Pclrate By code




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| LD2 | 0.191 | 0.191 | 0.28025 | 1.295 | 4.525 | 9.7 | 9.7 |
| LG4 | 0.19 | 0.19 | 0.6175 | 5.55 | 11 | 14 | 14 |
| LG5 | 0.022 | 0.022 | 0.0235 | 0.0545 | 0.11925 | 0.21 | 0.21 |
| LG6 | 0.021 | 0.021 | 0.03675 | 0.189 | 0.2925 | 0.54 | 0.54 |
| LH3 | 1.6 | 1.6 | 53.65 | 115 | 202.5 | 240 | 240 |
| LI2 | 11 | 11 | 33.5 | 42.5 | 112.5 | 120 | 120 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.62112 |
| RSquare Adj | 0.557974 |
| Root Mean Square Error | 39.11226 |
| Mean of Response | 32.02461 |
| Observations (or Sum Wgts) | 36 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 5 | 75235.29 | 15047.1 | 9.8362 |
| Error | 30 | 45893.07 | 1529.8 | Prob>F |
| C Total | 35 | 121128.36 | 3460.8 | <.0001 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| LD2 | 6 | 2.599 | 15.968 |
| LG4 | 6 | 6.008 | 15.968 |
| LG5 | 6 | 0.076 | 15.968 |
| LG6 | 6 | 0.198 | 15.968 |
| LH3 | 6 | 122.100 | 15.968 |
| LI2 | 6 | 61.167 | 15.968 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| LD2 | 6 | 2.599 | 3.6387 | 1.485 |
| LG4 | 6 | 6.008 | 5.7051 | 2.329 |
| LG5 | 6 | 0.076 | 0.0703 | 0.029 |
| LG6 | 6 | 0.198 | 0.1864 | 0.076 |
| LH3 | 6 | 122.100 | 85.0801 | 34.734 |
| LI2 | 6 | 61.167 | 43.5220 | 17.768 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | LH3 | LI2 | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|---|---|
| LH3 | 0.000 | 60.933 | 116.092 | 119.502 | 121.902 | 122.024 |
| LI2 | -60.933 | 0.000 | 55.158 | 58.568 | 60.968 | 61.091 |
| LG4 | -116.092 | -55.158 | 0.000 | 3.410 | 5.810 | 5.933 |
| LD2 | -119.502 | -58.568 | -3.410 | 0.000 | 2.400 | 2.523 |
| LG6 | -121.902 | -60.968 | -5.810 | -2.400 | 0.000 | 0.123 |
| LG5 | -122.024 | -61.091 | -5.933 | -2.523 | -0.123 | 0.000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

2.04226

| Abs(Dif)-LSD | LH3 | LI2 | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|---|---|
| LH3 | -46.1172 | 14.8161 | 69.9745 | 73.3843 | 75.7843 | 75.9071 |
| LI2 | 14.8161 | -46.1172 | 9.0411 | 12.4510 | 14.8510 | 14.9738 |
| LG4 | 69.9745 | 9.0411 | -46.1172 | -42.7074 | -40.3074 | -40.1845 |
| LD2 | 73.3843 | 12.4510 | -42.7074 | -46.1172 | -43.7172 | -43.5944 |
| LG6 | 75.7843 | 14.8510 | -40.3074 | -43.7172 | -46.1172 | -45.9944 |
| LG5 | 75.9071 | 14.9738 | -40.1845 | -43.5944 | -45.9944 | -46.1172 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

3.04160

| Abs(Dif)-LSD | LH3 | LI2 | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|---|---|
| LH3 | -68.6838 | -7.7504 | 47.4079 | 50.8177 | 53.2177 | 53.3406 |
| LI2 | -7.7504 | -68.6838 | -13.5254 | -10.1156 | -7.7156 | -7.5928 |
| LG4 | 47.4079 | -13.5254 | -68.6838 | -65.2739 | -62.8739 | -62.7511 |
| LD2 | 50.8177 | -10.1156 | -65.2739 | -68.6838 | -66.2838 | -66.1609 |
| LG6 | 53.2177 | -7.7156 | -62.8739 | -66.2838 | -68.6838 | -68.5609 |
| LG5 | 53.3406 | -7.5928 | -62.7511 | -66.1609 | -68.5609 | -68.6838 |

Positive values show pairs of means that are significantly different.

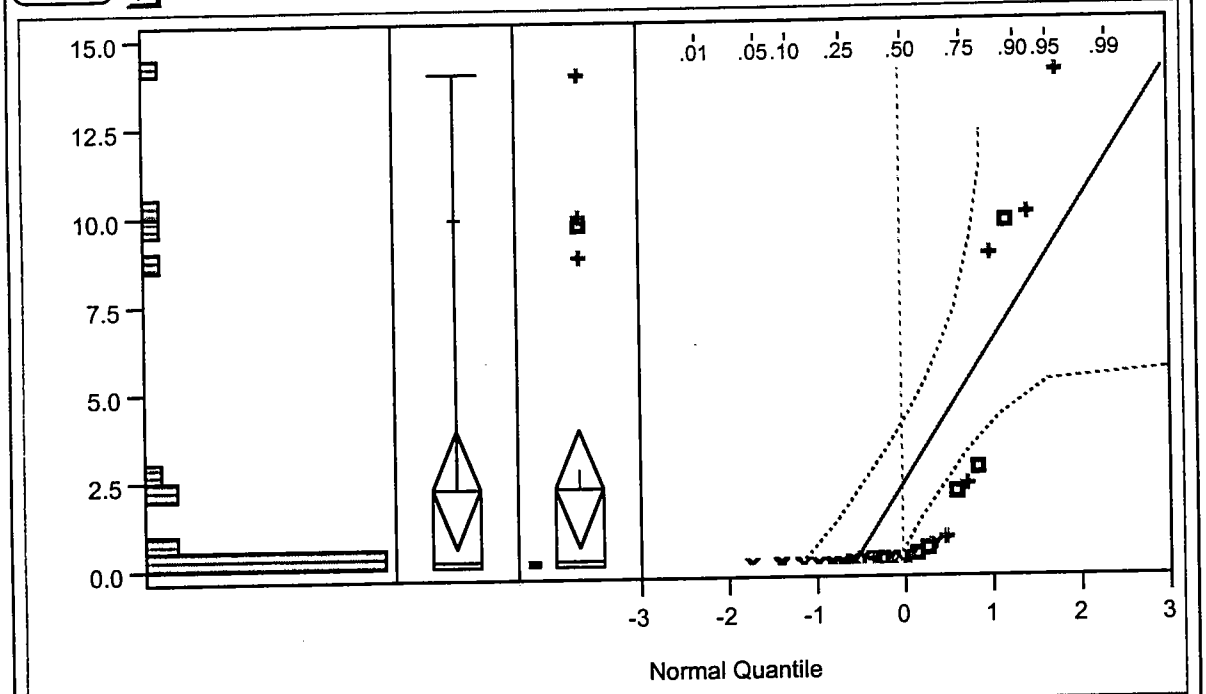
Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| LD2 | 6 | 102 | 17.0000 | -0.361 |
| LG4 | 6 | 118 | 19.6667 | 0.276 |
| LG5 | 6 | 35.5 | 5.9167 | -3.184 |
| LG6 | 6 | 52.5 | 8.7500 | -2.462 |
| LH3 | 6 | 184 | 30.6667 | 3.078 |
| LI2 | 6 | 174 | 29.0000 | 2.653 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 27.8608 | 5 | <.0001 |

Pclrate




Quantiles

| | | |
|---|---|---|
| maximum | 100.0% | 14.000 |
| | 99.5% | 14.000 |
| | 97.5% | 14.000 |
| | 90.0% | 9.850 |
| quartile | 75.0% | 2.250 |
| median | 50.0% | 0.210 |
| quartile | 25.0% | 0.065 |
| | 10.0% | 0.023 |
| | 2.5% | 0.021 |
| | 0.5% | 0.021 |
| minimum | 0.0% | 0.021 |

Moments

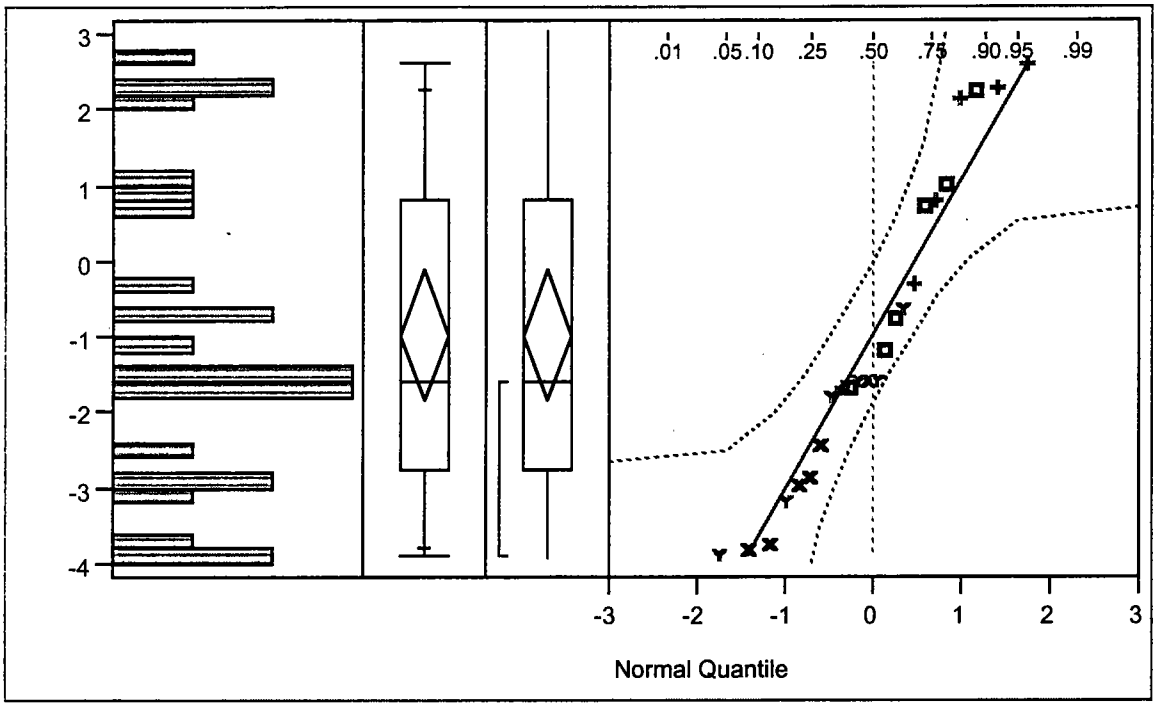
| | |
|---|---|
| Mean | 2.22025 |
| Std Dev | 4.00118 |
| Std Error Mean | 0.81674 |
| Upper 95% Mean | 3.90979 |
| Lower 95% Mean | 0.53071 |
| N | 24.00000 |
| Sum Weights | 24.00000 |
| Sum | 53.28600 |
| Variance | 16.00945 |
| Skewness | 1.97481 |
| Kurtosis | 2.78097 |
| CV | 180.21306 |

Test for Normality

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.604081 | <.0001 |

lnPclr




Quantiles

| | | |
|---|---|---|
| maximum | 100.0% | 2.6391 |
| | 99.5% | 2.6391 |
| | 97.5% | 2.6391 |
| | 90.0% | 2.2874 |
| quartile | 75.0% | 0.8102 |
| median | 50.0% | -1.5606 |
| quartile | 25.0% | -2.7533 |
| | 10.0% | -3.7732 |
| | 2.5% | -3.8632 |
| | 0.5% | -3.8632 |
| minimum | 0.0% | -3.8632 |

Moments

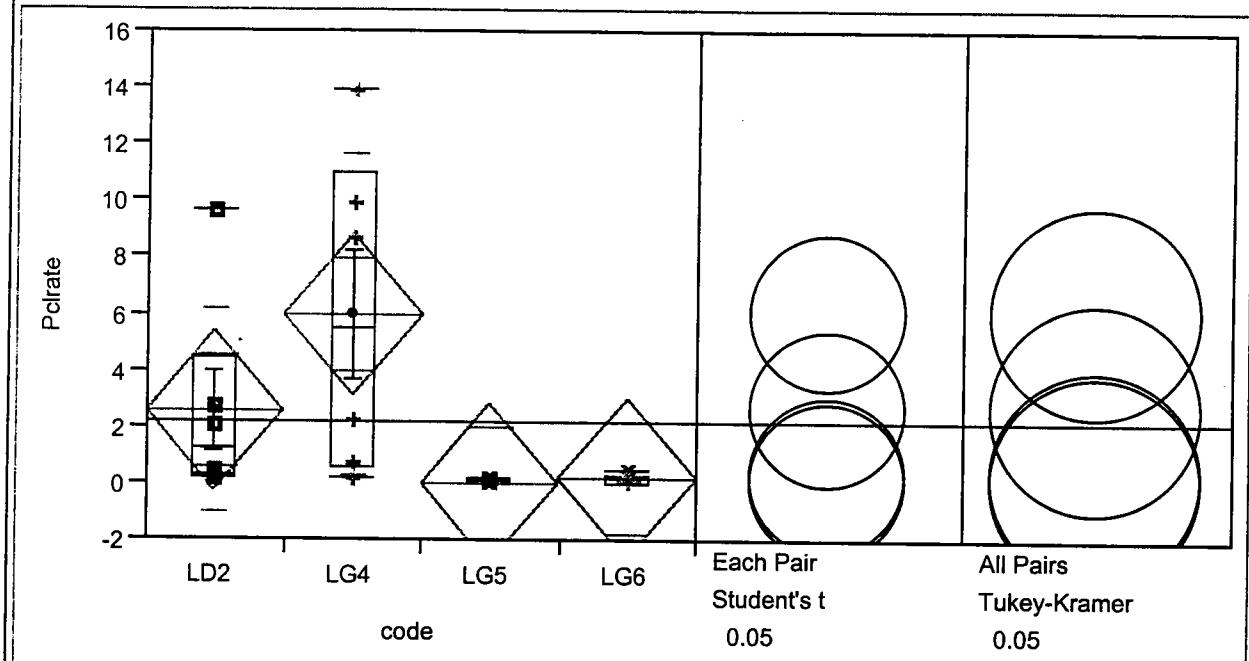
| | |
|---|---|
| Mean | -0.97425 |
| Std Dev | 2.04563 |
| Std Error Mean | 0.41756 |
| Upper 95% Mean | -0.11046 |
| Lower 95% Mean | -1.83803 |
| N | 24.00000 |
| Sum Weights | 24.00000 |
| Sum | -23.38192 |
| Variance | 4.18459 |
| Skewness | 0.38394 |
| Kurtosis | -0.91829 |
| CV | -209.9702 |

Test for Normality

Shapiro-Wilk W Test

| W | Prob<W |
|---|---|
| 0.930311 | 0.1012 |

Pclrate By code




Analysis ▶ Display ▶

Quantiles

| Level | minimum | 10.0% | 25.0% | median | 75.0% | 90.0% | maximum |
|---|---|---|---|---|---|---|---|
| LD2 | 0.191 | 0.191 | 0.28025 | 1.295 | 4.525 | 9.7 | 9.7 |
| LG4 | 0.19 | 0.19 | 0.6175 | 5.55 | 11 | 14 | 14 |
| LG5 | 0.022 | 0.022 | 0.0235 | 0.0545 | 0.11925 | 0.21 | 0.21 |
| LG6 | 0.021 | 0.021 | 0.03675 | 0.189 | 0.2925 | 0.54 | 0.54 |

Oneway Anova ▶

Summary of Fit

| | |
|---|---|
| RSquare | 0.377701 |
| RSquare Adj | 0.284357 |
| Root Mean Square Error | 3.384827 |
| Mean of Response | 2.22025 |
| Observations (or Sum Wgts) | 24 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 3 | 139.07615 | 46.3587 | 4.0463 |
| Error | 20 | 229.14109 | 11.4571 | Prob>F |
| C Total | 23 | 368.21724 | 16.0094 | 0.0212 |

Means for Oneway Anova

| Level | Number | Mean | Std Error |
|---|---|---|---|
| LD2 | 6 | 2.59850 | 1.3818 |
| LG4 | 6 | 6.00833 | 1.3818 |
| LG5 | 6 | 0.07567 | 1.3818 |
| LG6 | 6 | 0.19850 | 1.3818 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean |
|---|---|---|---|---|
| LD2 | 6 | 2.59850 | 3.63867 | 1.4855 |
| LG4 | 6 | 6.00833 | 5.70514 | 2.3291 |
| LG5 | 6 | 0.07567 | 0.07026 | 0.0287 |
| LG6 | 6 | 0.19850 | 0.18636 | 0.0761 |

## Means Comparisons

| Dif=Mean[i]-Mean[j] | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|
| LG4 | 0.00000 | 3.40983 | 5.80983 | 5.93267 |
| LD2 | -3.40983 | 0.00000 | 2.40000 | 2.52283 |
| LG6 | -5.80983 | -2.40000 | 0.00000 | 0.12283 |
| LG5 | -5.93267 | -2.52283 | -0.12283 | 0.00000 |

Alpha= 0.05

Comparisons for each pair using Student's t

t

2.08595

| Abs(Dif)-LSD | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|
| LG4 | -4.07642 | -0.66659 | 1.73341 | 1.85624 |
| LD2 | -0.66659 | -4.07642 | -1.67642 | -1.55359 |
| LG6 | 1.73341 | -1.67642 | -4.07642 | -3.95359 |
| LG5 | 1.85624 | -1.55359 | -3.95359 | -4.07642 |

Positive values show pairs of means that are significantly different.

Comparisons for all pairs using Tukey-Kramer HSD

q*

2.79894

| Abs(Dif)-LSD | LG4 | LD2 | LG6 | LG5 |
|---|---|---|---|---|
| LG4 | -5.46977 | -2.05994 | 0.34006 | 0.46290 |
| LD2 | -2.05994 | -5.46977 | -3.06977 | -2.94694 |
| LG6 | 0.34006 | -3.06977 | -5.46977 | -5.34694 |
| LG5 | 0.46290 | -2.94694 | -5.34694 | -5.46977 |

Positive values show pairs of means that are significantly different.

## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|
| LD2 | 6 | 99 | 16.5000 | 1.567 |
| LG4 | 6 | 113 | 18.8333 | 2.501 |
| LG5 | 6 | 35.5 | 5.9167 | -2.601 |
| LG6 | 6 | 52.5 | 8.7500 | -1.467 |

1-way Test, Chi-Square Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.6276 | 3 | 0.0035 |