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SEAD 50/54

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Mr. Stephen Absolom
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Building 123
PO Box 0009
5786 State Route 96
Romulus, New York 14541-0009

SUBJECT: Seneca Army Depot Activity –Statistical Analysis of SEAD-50/54 TCRA Data and Proposed Plan

Dear Mr. Absolom:

In September 2003, the US Environmental Protection Agency, Region II (EPA) performed a statistical analysis of confirmational sampling results obtained during a removal action conducted at SEAD-50/54 (the Tank Farm Site, henceforth the Site) at Seneca Army Depot Activity (SEDA or the Depot) in Romulus, NY to the results of a set of Depot-wide background soil samples. As is defined in the document issued by the EPA NERL (henceforth NERL), the stated objective of the NERL's analysis was:

> "The main objective of the present request is to determine if contaminant concentrations at the SEAD 50/54 Site after the removal action are comparable (consistent with) to background concentrations."

In the conclusions of its analysis, the NERL stated:

> "Using the two statistical tests based upon the 95% UTLs (Table 1) and the two sample non-parametric Mann-Whitney test (Table 3), it can be concluded that contaminant concentrations for arsenic, mercury, and zinc at the SEAD50/54 Site (after final excavation) are not consistent with the background level contaminant concentrations."

After review of the NERL's analysis and conclusions, Parsons contends that the NERL's analysis is flawed because it relies on an inflexible statistical process that will never yield satisfactory results even it all contamination above recommended cleanup levels is removed, and because it lacks a common sense assessment of what the stated goal of the removal action was and what has been achieved. Additional details are summarized below and supported by additional information in the ensuing document.

Executive Summary:

The Army's stated goal for the time-critical removal action at SEAD-50/54 was originally presented in the "Action Memorandum and Decision Document, Time-Critical Removal Actions, Four Metals Sites (SEADs 24, 50/54, & 67), *Final*" (Parsons, August 2002) and was:

> "The objectives of a removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site. Therefore, to reduce the threat that appears to exist near the Tank Farm, the Army is proposing to conduct an action that focuses on the removal of soil that has been impacted by asbestos, arsenic, mercury, and polynuclear aromatic hydrocarbons at elevated concentrations. Specifically, the Army is proposing to address shallow soil contamination (i.e., soil in top 6 inches) that has been identified at five locations within the Tank Farm, as well as within two lengths of the drainage ditches that surround the Tank Farm."

Parsons believes that the work completed at SEAD-50/54 achieves these results. Specifically, with respect to the identified asbestos issue, the Army has developed data as part of the removal action that indicates that the suspected localized detection of the Asbestos identified at SEAD-50/54 during earlier work is no longer present based on additional sampling and analysis completed as part of the overall time-critical removal action. These data have been reported in the Completion Report that was submitted by Weston Solutions, Inc. in December 2003

Furthermore, the Army contents that the potential threat resulting from potential exposure to Arsenic and Mercury at the Site has been greatly reduced. Initial concentration measured for Arsenic in the shallow soils at the Site ranged upwards to 151 mg/Kg whereas the highest concentrations detected in the soil after the removal action was performed was 41.9 mg/Kg. Similarly, 20 percent of the samples collected and analyzed during the Expanded Site Investigation (ESI) exceeded the Depot-specific soil cleanup objective and the maximum concentration determined for Arsenic (i.e., 21.5 mg/Kg) in background samples before the work was performed whereas after the removal of soil, fewer than 10 percent of all samples characterized for Arsenic (425 total) contained concentrations that exceeded the Depot-specific cleanup objective and only 2 of 425 sample results exhibited concentrations above the maximum concentration found for Arsenic in the background data set. Finally, after the removal action, the Site-wide average concentration determined from the analysis of all 425 samples is 6.2 mg/Kg which compares very favorably with the Depot-wide background average concentration of 5.2 mg/Kg, and is greatly reduced from the prior average Site concentration determined during the ESI which was 20.9 mg/Kg.

Similar reductions are observed for Mercury where only two out of 419 total samples had concentrations that exceeded the State's recommended soil clean up level of 0.1 mg/Kg or the Depot-wide maximum mercury concentration of 0.13 mg/Kg. The overall site average concentration determined for mercury after the removal action is 0.047 mg/Kg, which again compares favorably to the Depot-wide background average of 0.038 mg/Kg.

With reference to the PAH compounds identified, the sampling results provided in the Completion Report indicate that there is a large reduction (at least a factor of 10 fold) for each of the maximum concentrations of carcinogenic PAHs previously detected at the site, and that the total concentration measured for total carcinogenic PAHs is considerably lower than the 10 mg/Kg (i.e., ppm) total threshold recommended for soil at SEAD-26.

Finally, Parsons wishes to highlight certain additional points about the statistical evaluation that was performed by NERL personnel. NERL indicates that it has conducted the analysis in accordance with

procedures described in two guidance documents, identified as EPA (1989) which is entitled "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Interim Final Guidance" (EPA/530-SW-89-026) and the Addendum to Interim Final Guidance (EPA, 1992). Within the analysis report, EPA NERL stated:

> "It is observed that arsenic dataset consists of an outlier, 21.5 ppm. The 95% UTL and the 95% UPL for arsenic have been computed with and without the outlier."

And additionally:

> "For example, for arsenic, the 95% UTL=8.0 ppm (instead of the maximum value= 21.5 ppm which may represent an outlier) can be used as the background threshold value. An exceedance of 8.0 ppm by a site arsenic concentration from an area of concern may be considered as an indication of contamination possibly requiring further remediation action. It is noted that there are several site observations from the final excavation (from the final 6" lift) which exceed the 95% UTLs as listed in Table 1 suggesting that possible contamination due to site activities may still exist at the SEAD50/54 Site."

Thus, NERL is saying that they have removed one piece of data from the background data set to further substantiate their claim that the Depot-wide background and the Site-specific confirmational analyses are different. In the EPA's 1992 reference, guidance specifically warns against the removal of statistical outliers until a specific reason for the outlier can be determined. To Parsons knowledge, this has not been done, so the indicated data value, in accordance with EPA guidance, should be treated as a true, but extreme value and a member of the Depot-wide data set.

In addition, what NERL has not indicated within its statistical analysis, is that even if all of the noted arsenic exceedances of recommended soil cleanup levels were removed from the Site-specific data set and replaced with values equivalent to the either the Site-wide average value or a value that is just below the recommended soil cleanup level, the comparison of the data sets would still indicate that the Site-wide data set is not consistent with the Depot-wide background data set. Thus, in either situation, Site-wide data that is fully compliant with the stated soil cleanup level objective defined for the Site would still be statistically different from the background data set. Specifics of this analysis are summarized in the material that follows this Executive Summary. Given this information, Parsons questions whether any Site-wide data set from SEAD-50/54 could ever be judged statistically comparable to the Depot-wide data set.

The remainder of this document presents and summarizes statistical analysis performed by Parsons for arsenic, mercury, and zinc concentrations in the final confirmatory soil data produced during the Time-Critical Removal Action (TCRA) at SEAD-50/54 Tank Farm Site using the same approach selected by NERL. Additionally, Parsons performed and summarized additional analyses completed for the Site data. Based on its analysis, Parsons considers the work at the site complete, and recommends that no Further Action are needed at this site.

Detailed Data Analysis:

The SEAD-50/54 TCRA data were further compared with background using alternative approaches recommended by EPA (2002). In addition, the data were compared with TAGM and risk-based screening values to support Army's position of no further action at the Site. The objectives of the document are to:

1. verify the statistical analysis results presented by the EPA Tech Support Center, NERL, Las Vegas;
2. further evaluate the Site condition using alternative approaches; and,
3. provide recommendations of further activities at SEAD-50/54 based on the evaluation of the Site data.

The Mann-Whitney Tests and the Student's T Tests conducted for SEAD-50/54 soil data by Parsons confirmed the statistical analysis results presented by NERL. Although the tests performed for the whole SEAD-50/54 Site and background indicate that the means of the two data sets are significantly different for arsenic, mercury, and zinc, the following factors were further evaluated and are presented in this memorandum:

- Although statistically different, the SEAD-50/54 data and the Seneca site background data are practically comparable based on alternative background comparison evaluations and the SEAD-50/54 data are generally consistent with published background levels.
- Exceedances of recommended soil cleanup levels (i.e., TAGMs) are rare for arsenic and mercury. For zinc, even if soil with TAGM exceedances were removed, a statistical difference would still exist between the means of the SEAD-50/54 data and background.
- Mercury and zinc concentrations remaining at SEAD-50/54 are not expected to pose significant risks to human health or the environment based on a preliminary risk screening.
- Potential risks posed by background arsenic levels found at SEDA are similar to potential risks posed by arsenic concentrations found at SEAD-50/54.

Based on the above factors, it is Parsons position that the conditions at SEAD-50/54 are generally comparable with background and no elevated risks are expected to human health or the environment. Therefore, Parsons recommends that no further action is needed for SEAD-50/54.

This remainder of this document is organized as follows: first, Site background and the summary results of the Mann-Whitney Tests and Student's T Test comparisons to the Depot-wide data set are presented; second, the comparison of the Site data to the Depot background set using alternative approaches is discussed; third, TAGM exceedances are evaluated; fourthly, the Site concentrations are compared with preliminary risk-based screening values; and lastly, a conclusion of Parsons position is presented.

1. Background and Summary of Mann-Whitney Test and Student's T Test Results

1.1 Background

Based on the results of sampling conducted at SEAD-50/54 in 1993 and 1994, a removal action was conducted in seven areas of SEAD-50/54 in late 2002 and early 2003. According to the BCT Meeting

Minutes (Parsons, 2003), soil removal actions were completed in 30 foot (ft) x 30 ft x 6-inch (in, depth) steps. After each soil removal step, confirmatory samples were collected from each 30 by 30 foot area of the base, and from the sidewalls of each excavation area. Samples from the base areas were collected as composites comprised of five sub-samples obtained within each of the 30 by 30 foot sub-areas. Each sidewall sample was collected and analyzed as a discrete grab sample obtained from a point halfway down the exposed face of the excavation wall.

A statistical analysis was conducted by NERL for arsenic, mercury, and zinc to compare background versus the post-removal SEAD-50/54 Site data. The results of NERL's analysis indicate that the arsenic, mercury, and zinc concentrations found at SEAD-50/54 are generally not consistent with the respective Seneca background levels. However, the Army determined that NERL's initial assessment of the Site and background data was completed using an incorrect Site data set that had inadvertently been provided to the agencies.

Since then, the updated SEAD-50/54 data have been released. Parsons conducted a review of the updated soil data, and has recomputed the statistical analysis of the arsenic, mercury, and zinc data in accordance with the procedures used by NERL and other evaluations as presented in this letter. Both non-parametric (Mann-Whitney Test) and parametric (Student's T Test) statistical test methods were used to compare background with the SEAD-50/54 Site data. One-tailed (one-sided) tests were conducted for both tests and a significance level of 0.05 was assumed. It should be noted that the statistical methods used are the same as those used by NERL as presented in its report, except as otherwise specified.

In conducting this analysis, Parsons has pooled all floor samples reported for excavation Area 1A and 1B together to represent Area 1 Floor samples. In addition, the concentrations of mercury nondetects in both the Site data set and the background data set were assumed half detection limits. The Mann-Whitney Test and Student's T Test results are presented as follows, respectively.

1.2 Mann-Whitney Test Results

The Mann-Whitney tests were conducted for the data using XLSTAT (version 6.1.9 by Addinsoft). **Table 1** summarizes the statistical results for the data comparison. The output of the statistical results is attached in Attachment A to this letter report.

The results presented in **Table 1** are consistent with those presented by NERL for samples grouped by areas and sample locations (i.e., floor and perimeter). In brief, metal concentrations, when grouped by areas, are generally not consistent with background with the exception of arsenic and zinc for Area 2 and mercury for Area 3. When all floor and perimeter samples from all areas are pooled together, the Site arsenic, mercury, and zinc concentrations would be significantly different from the Depot-wide background.

1.3 Student's T Test

The Student's T Tests were conducted for the data using XLSTAT. **Table 1** summarizes the statistical results of the data comparison. The output of the statistical results is attached in Attachment A to this letter report.

The results presented in **Table 1** are generally consistent with those presented by NERL for samples grouped by areas and sample locations (i.e., floor and perimeter) with several exceptions. This discrepancy is due to the difference in conducting the test. In the tests conducted by NERL, the variances between the background data set and the Site data set were assumed to be the same. Parsons first conducted test on the variances of the two tested groups (i.e., the Site data set versus the background data set) using the Fisher's F test, Bartlett's test, and Levene's test. The Fisher's F test and Bartlett's test results were used to determine if the variances between the two tested groups were different. If the difference was not significant, the same method conducted by NERL was used for the hypothesis test. Otherwise, results from Cochran-Cox's method and Satterthwaite's method (the latter is presented in the USEPA 2000 document) are presented. It should be noted that for some cases the Levene's test gave different conclusion from the Fisher's F test or Bartlett's test on whether the variances between the two tested groups were the same and the final test results would be different were the Levene's test results used.

As presented in **Table 1**, when grouped by areas, the arsenic concentrations were consistent with background with the exception of results listed for Area 4 and Area 6. This conclusion is consistent with the observation based on the descriptive statistics. The mercury concentrations were not consistent with background with the exception of results listed for Areas 2 and 3. The zinc concentrations were not consistent with background with the exception of results listed for Areas 2 and 6. When all floor and perimeter samples from all areas are pooled together, the arsenic, mercury, and zinc concentrations would be significantly different from background.

The results from the Student's T Tests based on the normal distribution assumption are generally consistent with the Mann-Whitney test results with the exception of several cases for arsenic and one case for mercury. It should be noted that NERL recommended Mann-Whitney methods be used to compare site and background data. USEPA (2002) recommends the use of the Student's T Test if a larger number of data points are available (n>25) and indicates that the parametric test will work well when the sample size is large. As a result, results from both methods are presented and should be taken into consideration.

1.4 Summary and Drawback of the Tests

To summarize, when all data are pooled together, both the Mann-Whitney and the Student's T Test results indicate significant difference between the means of the Site data and background data. It should be noted that the Student's T Test results indicate the arsenic concentrations are not statistically different from background for all the areas at the Site with the exception of Area 4 and Area 6. This conclusion is consistent with the review of the descriptive statistics for arsenic.

It should be noted that the use of the Mann-Whitney and Student's T Tests has certain drawbacks. The major assumption behind the conclusion that the post-removal SEAD-50/54 data are significantly different from background is that the SEAD-50/54 site-specific background data are the same as the current background data for the whole Seneca Site. The statistical assumption is whether SEAD-50/54 has been remediated to background (i.e., whether the post-removal data set is the same as the SEAD-50/54 site-specific background data set). As SEAD-50/54 site-specific background data are not available, the whole Seneca background data were used. It should be noted that the background data for the whole

Seneca Site were compiled using data from SEAD-25, the Ash Landfill, the OB Grounds, and SEAD-12. Although the background data can be used as a preliminary screening tool to evaluate contamination of sites at Seneca, site-specific background may vary from this data set. Therefore, cautions should be exercised to extrapolate the statistical results.

It should also be noted that nondetects of mercury in both the Site data set and the background data set were assumed to be half detection limits. The detection limits in the background data set are different from the detection limits in the Site data set. Even within each data set, the detection limits varied among samples as the samples were analyzed at different time and by different laboratories and different instruments. As a result, representing nondetects with half detection limits may not accurately represent the two data sets and therefore the statistical results.

One drawback of the tested data sets is that the data sets are unbalanced. The sample size of the SEAD-50/54 data set is much larger than the sample size of the background data set, whereas the size of SEAD-50/54 is much smaller than the size of the whole Seneca Depot site. The characterization of the background does not necessary match up with the characterization of the SEAD-50/54 data and the degree of sensitivity of the tests.

Based on the above factors, the statistical test results may not accurately represent the Site condition. The following sections of this document present evaluations of the SEAD-50/54 data using alternative approaches in addition to the statistical tests presented in this section.

2. Alternative Background Comparison Evaluation

As discussed in the previous section, the statistical tests have their drawbacks for Site condition evaluations. This section presents alternative background comparison evaluations including: (1) evaluation of the magnitude of the difference between the Site data and background; (2) descriptive summary statistics; (3) tests of outliers; (4) the comparison of the Site data and various published background data. Based on these evaluations, it is concluded that the Site data are generally comparable with the Seneca background data and the background data presented in the literatures.

2.1 Magnitude of Difference between the Site Data and Background

The Mann-Whitney Tests and the Student's T Tests concluded that the means of the Site data were statistically different from that of the background data set. As discussed in Section 1, the hypothesis tests were based on the assumption that the Depot-wide background data used would represent the SEAD-50/54 site-specific background. This assumption is not necessary true and therefore the conclusion based on the test results is not necessary accurate. Even if the assumption were appropriate, these tests did not address the magnitude of the difference between the two data sets. To evaluate the difference of the means between the Site data and Depot background, Parsons conducted the Student's T Test to further evaluate the "magnitude of difference" that could be detected by the test. As an example, a one-tailed Student's T Test was conducted to evaluate the difference between the whole Site arsenic data and Depot background. The test hypotheses are as follows:

Null hypothesis: DELTA = 0.35 mg/Kg (which is less than 7% of background mean)
Alternative hypothesis: DELTA > 0.35 mg/Kg

where DELTA is the difference between the two means; mean of the Site data set minus mean of background data set.

The null hypothesis is not rejected according to the test. That is, although the whole Site data are statistically different from background, the Site average is not significantly different from the background average by 7% (0.35 mg/Kg).

A similar test was conducted for the zinc concentrations in Area 4 and the average zinc concentration in Area 4 is not significantly different from the background average by 5% (i.e., 3.5 mg/kg).

2.2 Descriptive Statistics

According to USEPA (2002), several methods are available for comparing background to site data. These can be divided into several major categories: data ranking and plotting, descriptive summaries, simple comparison, parametric tests, and nonparametric tests. For a better understanding of the data, in addition to the Student's T Tests and Mann-Whitney Tests discussed above, descriptive statistical analysis and an alternative parametric test (UTL Tests) were performed to analyze the Site data. This section presents the descriptive summaries and Section 2.3 presents the results of the UTL Tests.

Summary descriptive statistics were provided by running the data through XLSTAT. **Tables 2**, **3**, and **4** present summary prescriptive statistics for arsenic, mercury, and zinc, respectively.

Arsenic

The maximum detected arsenic concentrations within each of the 7 areas were all below the maximum arsenic concentration in the background data set with the exception of the two perimeter samples found in Area 6.

With the exception of Area 4 and Area 6, the average arsenic concentrations in each of the 7 areas were close to the background average (i.e., the differences between the Site area average and background were within 12%). Similarly, with the exception of Area 4 and Area 6, the average plus one or two standard deviation values for all areas are below the corresponding background values. The Site average, including all 7 areas, was 1 mg/kg above the average background.

Mercury

Although summary descriptive statistics are presented for mercury, it should be noted that nondetects exist in both background and the Site data sets. Therefore, the results are dependent on the reported detection limits for nondetects and the statistics (e.g., average and the 95th percentile) may not represent the real Site condition.

The average mercury concentration was above the background average concentration (0.047 mg/kg vs. 0.038 mg/kg); however, the 95th percentile concentration of the SEAD-50/54 data was below the 95th percentile concentration of the background data (0.072 mg/kg vs. 0.096 mg/kg).

Zinc

Several elevated hits of zinc were observed at Area 1 and Area 5 perimeters. Maximum concentrations measured in Area 1 and 5 were 1960 mg/Kg and 887 mg/Kg, respectively, and the respective 95th percentile values for these areas are 182 mg/Kg and 393 mg/Kg, respectively. These contribute to the reported localized elevated average concentrations for Area 1 (i.e., 106 mg/Kg) and Area 5 (i.e., 123 mg/Kg). The maximum and average concentrations for the other areas were close to those values observed in the background data set. The maximum detected zinc concentrations in areas other than Area 1 and Area 5 ranged from 97.8 mg/kg to 155 mg/kg as versus 126 mg/kg for background data set. The 95th percentile value for the Depot background data set is approximately 110 mg/Kg.

The average zinc concentrations in areas other than Area 1 and Area 5 ranged from approximately 78 mg/Kg to 90 mg/Kg as versus roughly 72 mg/Kg for the background data set. It should be noted that standard deviations for all areas other than Area 1 and Area 5 were close to the standard deviation for background data. The elevated standard deviation in Area 1 and Area 5 contributed to the elevated standard deviation for the whole data set.

In summary, although the T Test indicates significant difference between the whole Site data and background for arsenic, the difference is expected to be minor (i.e., the Site average is not significantly different from the background average by 7%). Similarly, with the exception of Area 1 and Area 5, the differences between the average zinc concentrations and the average background concentration are minor. Mercury nondetects may affect the comparison of the two data sets; however, based on the 95th percentile of the two data sets (considered more appropriate under the circumstances), the Site data were consistent with background.

2.3 Tests of Outliers

The NERL document indicated an alternative method to conduct background versus Site data comparison. This alternative method is to compare the Site data with the 95% upper tolerance limits (UTL) calculated based upon the background data sets. A 95% UTL represents the value below which 95% of the population are expected to fall (USEPA, 2002). The 95% UTLs calculated for arsenic, mercury, and zinc based upon the background data sets are presented in the NERL document and are summarized in **Table 5**. In addition, the number of 95% UTL exceedances at SEAD-50/54 (including all floor and perimeter samples for all seven areas) and the percentage of 95% UTL exceedance among the SEAD-50/54 samples are also presented.

Table 5 indicates that the mercury concentrations are above the 95% UTL in only 1% of the Site samples. Similarly, the arsenic concentrations are above the 95% UTL in only 4% of the Site samples. The zinc concentrations are above the 95% UTL in 10% of the Site samples. Based on the definition of the 95% UTL, 5% data from a data set that is consistent with background data set are expected to be above the 95%UTL. As a result, there is no evidence of inconsistency between Seneca background and arsenic/mercury data at SEAD-50/54 based on this alternative method presented by NERL. That is, for arsenic and mercury, although there are some "outliers" based on the comparison with the 95% UTLs, the same level or even higher percentage of "outliers" is expected for a data set that is consistent with background. The concentrations of the detected outliers (i.e., data points with 95% UTL exceedances) were further reviewed for arsenic and mercury. Among the outliers for arsenic, only two outliers (both

are perimeter samples in Area 6) had concentrations above the maximum background concentration (41.9 mg/Kg, 28.2 mg/Kg vs. 21.5 mg/Kg). Two perimeter samples from Area 1 had mercury concentrations above the maximum background concentration (0.56 mg/Kg, 0.18 mg/Kg vs. 0.13 mg/Kg).

The zinc concentrations in approximately 10% of the Site samples were above the 95% UTL, indicating the outliers were more than expected for a data set that is consistent with background.

In summary, based on the percentage of the 95% UPL exceedance, there is no evidence of inconsistency with background for the Site arsenic and mercury data. The concentrations in the two arsenic outliers (Area 6 Perimeter) and two mercury outliers (Area 1 Perimeter) were above the respective maximum background concentrations. Several zinc hits were detected at Area 1 and Area 5 perimeters.

2.4 Comparison with Other Published Background Values

It should be noted that no site-specific SEAD-50/54 background data were available for the background comparison purposes. However, it is very possible the SEAD-50/54 background varies from the Seneca site background. As a result, this difference (the difference between SEAD-50/54 background and current background used for Seneca) may contribute to the difference detected by the Mann-Whitney and Student's T Tests. As an alternative approach, the Site data were compared with other published background values to evaluate the Site conditions. **Table 6** presents the comparison of the SEAD-50/54 data with published background levels by USEPA, USGS, and other east cost states.

The SEAD-50/54 arsenic results were consistent with the background data published by USEPA (2002), USGS (1984), New Hampshire (1998, 2003), Massachusetts (2002), and Middle Port, New York. It should be noted that the background arsenic concentrations for New York State were listed as 3~12 mg/Kg in the TAGM. However, other studies indicated that background levels could be higher. As an example, the background arsenic concentrations identified for the Middle Port, NY ranged from 4.4 mg/Kg to 56.1 mg/Kg and the concentrations detected at SEAD-50/54 were within this range.

The SEAD-50/54 mercury results were consistent with the background data published by USGS (1984), New Hampshire (1998, 2003), and Massachusetts (2002). The SEAD-50/54 zinc results were generally elevated compared with the published data.

In summary, the SEAD-50/54 arsenic and mercury concentrations were generally consistent with the published background values while the SEAD-50/54 zinc concentrations were elevated compared with the published background data.

3. Recommended Soil Cleanup Level (i.e., TAGM) Exceedance Evaluation

As Technical and Administrative Guidance Memorandum (TAGM) values issued by the New York State Department of Environmental Conservation (NYSDEC) provide a basis and procedure to determine soil cleanup levels at individual Federal Superfund in NY, the SEAD-50/54 Site arsenic, mercury, and zinc data were compared with the corresponding TAGM values to evaluate the Site condition. For arsenic, mercury, and zinc, the TAGM values were established for the Seneca site based on the Seneca background data set. The TAGM values for arsenic, mercury, and zinc are 8.25 mg/kg, 0.1 mg/kg, and 110 mg/kg respectively.

TAGM exceedance information is presented in **Tables 2**, **3**, and **4** for arsenic, mercury, and zinc, respectively. For arsenic, there were less than 10% TAGM exceedances among the samples (41 exceedances out of 425 samples). Among these 41 exceedances, only the two perimeter samples in Area 6 had concentrations above the maximum background concentration. The comparison of the mercury concentrations with TAGM indicated that the mercury concentrations at SEAD-50/54 were generally below TAGM. Of the total 419 samples, only the two samples located at Area 1 perimeter had concentrations above the TAGM value. For zinc, TAGM exceedances were observed in 150 out of 418 samples.

In addition to the above evaluations, the Mann-Whitney Tests were conducted for the Site arsenic and zinc data grouped by areas and sample locations (i.e., floor and perimeter) assuming all TAGM exceedances were replaced by either a value just below TAGM (i.e., 8.2 mg/Kg for arsenic and 109 mg/Kg for zinc) or an average value for the tested Site data set. The results (not shown in Table 1) are the same as those presented in Table 1 except that Area 5 Floor data would not be significantly higher than background were TAGM exceedances replaced by the Area 5 average. Therefore, even when soil associated with TAGM exceedances were removed, the Site data would not be consistent with background based on the Mann-Whitney Tests.

In summary, for arsenic and mercury, TAGM exceedances were rare and were slight for most exceedances. TAGM exceedances for zinc were comparatively significant. However, even when soil associated with TAGM exceedances were removed, the Site data would not be consistent with background based on the Mann-Whitney Tests.

4. Potential Risk Screening

A preliminary risk screening was conducted for arsenic, mercury, and zinc to evaluate potential risks to human health and the environment at SEAD-50/54. **Table 7** presents the comparison of the SEAD-50/54 data with selected risk-based values and remediation criteria. EPA Region III Risk-Based Concentrations (RBCs) and USEPA Soil Screening Levels (SSLs) for Superfund Sites were identified to evaluate potential human health risk. As the remediation criteria published by Canadian Council of Ministers of the Environment (CCME), Ontario Ministry of Environment and Energy (MOE), and Dutch Ministry of Housing, Spatial and the Environment were developed to protect human health and the environment, these values were also included to evaluate potential impacts to human health and the environment.

The levels observed at SEAD-50/54 were generally consistent with the remediation criteria presented in Table 7. However, the SEAD-50/54 arsenic concentrations were elevated compared with the EPA RBCs and SSL, indicating potential risk to human health. As discussed in the previous sections, the concentrations were generally comparable with background and background levels would result in potential human health and environmental risks. As a demonstration, a preliminary evaluation of the difference of the potential human health risk caused by Seneca background and SEAD-50/54 was conducted using the averages of the two data sets. For cancer risk, arsenic and PAHs are the risk drivers. Mercury (elemental) and zinc are classified by the EPA IRIS database as "D" - not classifiable as to human carcinogenicity. As no PAH background data are available, this analysis only focuses on arsenic. Based on the comparison of the average SEAD-50/54 arsenic concentration and the EPA Region III RBCs, the potential cancer risk would be approximately 1.4×10^{-5} assuming the default exposure

assumptions adopted by EPA Region III (e.g., the residents are exposed to arsenic via ingestion 350 days a year for 30 years, the soil ingestion rate is 100 mg/d for adults and 200 mg/d for children ages 1-6 yr). As a comparison, the average background concentration would result in a cancer risk of $1.2x10^{-5}$. The difference between the risks to industrial workers posed by Site arsenic and background arsenic is also minor (i.e., $3.3x10^{-6}$ vs. $2.7x10^{-6}$ for SEAD-50/54 and background, respectively). As none of these three metals are risk drivers for noncancer risk, the noncancer risk posed by the arsenic, mercury, and zinc concentrations at SEAD-50/54 is not significantly different from the risk posed by background.

The SEAD-50/54 mercury concentrations were below the EPA RBCs, SSL, and listed remediation criteria.

The SEAD-50/54 zinc concentrations were below the EPA RBCs and SSL, indicating no potential significant risk to human health. The average zinc concentration and the 95% percentile were below the listed remediation criteria while the maximum exceeded the remediation criteria.

It should be noted that the future use of the Site is designed to be Industrial with a County Jail and the exposure, and therefore potential risks will be limited.

5. Summary and Conclusion

In summary, the evaluation presented in this memorandum indicates that:

1. The difference detected by the Mann-Whitney and Student's T Tests may not represent the real difference between the post-removal SEAD-50/54 data and the site-specific background. The difference between the SEAD-50/54 site-specific background and the Seneca whole site background data may contribute to the difference identified by the tests.

2. The Mann-Whitney and Student's T Test results for mercury may not give accurate presentation of the mercury condition at the Site due to nondetects in both the data sets. Half the detection limits were used for the nondetects. The detection limits in the background data set are different from the detection limits in the Site data set. Even within each data set, the detection limits may vary among samples as the samples were analyzed at different time and by different laboratories and different instruments.

3. Although significant difference was identified between the Site data and background data, the difference is expected to be minor. The alternative comparisons conducted indicate that the Site data are generally comparable with the background data.

4. The SEAD-50/54 arsenic and mercury data are generally consistent with the published background values while the SEAD-50/54 zinc data are elevated compared with the published background data.

5. TAGM exceedances are rare and even with TAGM exceedances removed, the Site data would still be significantly different from background based on the Mann-Whitney and Student's T Tests.

6. Mercury and zinc concentrations detected at SEAD-50/54 are not expected to pose significant risks to human health or the environment based on a preliminary risk screening.

7. Potential risks posed by background and SEAD-50/54 conditions are similar and not significantly different from each other.

8. The future use of the Site is designed to be Industrial with a County Jail and the exposure, and therefore potential risks will be limited.

Conclusion:

Based on the above factors, it is the Army's position that the conditions at SEAD-50/54 are generally comparable with background and therefore no action is warranted for SEAD-50/54.

Should you have any questions, please do not hesitate to call me at (617) 457-7905 to discuss them.

Sincerely,

TODD HEINO by

Todd Heino, P.E.
Program Manager

Enclosure

cc: S. Absolom, SEDA
C. Boes, AEC
K. Healy, USACE, Huntsville
File, Parsons
R. Battaglia, USACE
M. Greene, USACE, Huntsville
K. Hoddinott, USACHPPM

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Table 1
Site Versus Background Comparison Results Based Upon Mann-Whitney Test and Student's T Test
SEAD-50/54
Seneca Army Depot Activity

Group	Significantly Different From Background? [1]		
	Arsenic	Mercury	Zinc
Area 1 - Floor Samples	YES/NO	YES/YES	NO/NO
Area 1 - Perimeter Samples	NO/NO	NO/NO	YES/YES
Area 2 - Floor Samples	NO/NO	YES/YES	NO/NO
Area 2 - Perimeter Samples	NO/NO	NO/NO	YES/YES
Area 3 - Floor Samples	YES/YES	NO/NO	YES/YES
Area 3 - Perimeter Samples	NO/NO	NO/NO	YES/YES
Area 4 - Floor Samples	YES/YES	YES/YES	YES/YES
Area 4 - Perimeter Samples	YES/YES	YES/NO	YES/YES
Area 5 - Floor Samples	YES/YES	YES/YES	YES/YES
Area 5 - Perimeter Samples	NO/NO	NO/NO	YES/YES
Area 6 - Floor Samples	YES/NO	YES/YES	NO/NO
Area 6 - Perimeter Samples	YES/YES	YES/YES	YES/YES
Area 7 - Floor Samples	YES/NO	YES/YES	YES/YES
Area 7 - Perimeter Samples	NO/NO	NO/NO	NO/NO
Area 1	YES/NO	YES/YES	YES/YES
Area 2	NO/NO	YES/NO	NO/NO
Area 3	YES/NO	NO/NO	YES/YES
Area 4	YES/YES	YES/YES	YES/YES
Area 5	YES/NO	YES/YES	YES/YES
Area 6	YES/YES	YES/YES	YES/NO
Area 7	YES/NO	YES/YES	YES/YES
Whole Site - Floor	YES/YES	YES/YES	YES/YES
Whole Site - Perimeter	YES/YES	NO/NO	YES/YES
Whole Site - Floor&Perimeter	YES/YES	YES/YES	YES/YES

Notes:
1. Based on the 1-sided (or one-tailed) Mann-Whitney Test results and 1-sided t test results.
   The t test was conducted depending on whether the variances of site data and background data were different, which was tested by the Fisher's method.
2. Mann-Whitney test result/t-test result
   YES: Site data significantly different from background
   NO: Site data not significantly different from background

Table 2
TCRA Confirmatory Sample Results Summary Statistics - Arsenic
SEAD-50/54
Seneca Army Depot Activity

Area	Location	Sample Number	Detects	Maximum	Minimum	Average	Standard Deviation	Average+One Standard Deviation	Average+Two Standard Deviation	95th percentile	TAGM Exceedence [1]	Statistically Different From Background? [2]
Area 1	Floor [3]	126	126	16.3	2.8	5.9	2.1	8.0	10.2	10.7	10	YES/NO
	Perimeter	63	63	9.4	2.4	5.3	1.5	6.8	8.3	8.4	3	NO/NO
Area 2	Floor	16	16	6.8	4.3	5.1	0.7	5.8	6.5	6.4	0	NO/NO
	Perimeter	16	16	6.6	3.3	4.7	0.9	5.6	6.5	6.5	0	NO/NO
Area 3	Floor	16	16	8.7	4.4	6.3	1.1	7.4	8.4	7.7	1	YES/YES
	Perimeter	16	16	7.4	2.4	5.2	1.4	6.6	7.9	7.3	0	NO/NO
Area 4	Floor	60	60	13.9	4.3	7.2	1.9	9.1	10.9	10.7	10	YES/YES
	Perimeter	34	34	20.9	2.1	7.4	3.7	11.1	14.8	15.0	5	YES/YES
Area 5	Floor	26	26	8.7	4.4	6.1	1.0	7.1	8.1	7.5	1	YES/YES
	Perimeter	20	20	8.4	3.1	5.4	1.4	6.8	8.3	7.9	1	NO/NO
Area 6	Floor	6	6	9.5	3.5	6.9	2.1	9.0	11.1	9.3	2	YES/NO
	Perimeter	14	14	41.9	3.8	12.5	10.4	22.9	33.4	33.0	8	YES/YES
Area 7	Floor	10	10	6.7	5.1	5.9	0.6	6.5	7.1	6.7	0	YES/NO
	Perimeter	2	2	6.1	5.0	5.6	0.8	6.3	7.1	6.0	0	NO/NO
Area 1		189	189	16.3	2.4	5.7	2.0	7.7	9.6	9.2	13	YES/NO
Area 2		32	32	6.8	3.3	4.9	0.8	5.7	6.5	6.5	0	NO/NO
Area 3		32	32	8.7	2.4	5.7	1.3	7.1	8.4	7.4	1	YES/NO
Area 4		94	94	20.9	2.1	7.3	2.7	9.9	12.6	11.3	15	YES/YES
Area 5		46	46	8.7	3.1	5.8	1.2	7.0	8.3	7.8	2	YES/NO
Area 6		20	20	41.9	3.5	10.8	9.1	19.9	29.0	28.9	10	YES/YES
Area 7		12	12	6.7	5.0	5.8	0.6	6.4	7.0	6.6	0	YES/NO
Whole Site Floor		260	260	16.3	2.8	6.2	1.9	8.1	10.0	10.2	24	YES/YES
Whole Site Perimeter		165	165	41.9	2.1	6.3	4.1	10.4	14.6	10.8	17	YES/YES
Whole Site		425	425	41.9	2.1	6.2	3.0	9.2	12.2	10.4	41	YES/YES
Background		51	51	21.5	2.3	5.2	2.8	8.0	10.7	8.3		

Notes:
1. Based on the following TAGM values: As 8.25 mg/kg; Hg 0.1 mg/kg; and Zn 110 mg/kg.
2. Statistical results based on the Mann-Whitney Test / the Student's T Test with the following assumptions: a=0.05.
3. Include all floor samples from Area 1.
Unit: mg/kg dry

Table 3
Confirmatory Sample Results Summary Statistics - Mercury
SEAD-50/54
Seneca Army Depot Activity

Area	Locatioon	Sample Number	Detects	Maximum	Minimum	Average	Standard Deviation	Average+Standard Deviation	Average+Two Standard Deviation	TAGM Exceedence [1]	95th Percentile	Statistically Different From Background ? [2]
Area 1	Floor [3]	125	91	0.090	0.020	0.047	0.016	0.063	0.080	0	0.074	YES/YES
	Perimeter	62	34	0.560	0.016	0.050	0.071	0.121	0.192	2	0.077	NO/NO
Area 2	Floor	16	16	0.060	0.040	0.049	0.005	0.054	0.059	0	0.057	YES/YES
	Perimeter	16	11	0.060	0.020	0.041	0.015	0.056	0.072	0	0.055	NO/NO
Area 3	Floor	16	6	0.089	0.018	0.033	0.019	0.051	0.070	0	0.059	NO/NO
	Perimeter	16	4	0.047	0.016	0.026	0.010	0.036	0.047	0	0.043	NO/NO
Area 4	Floor	59	52	0.084	0.016	0.047	0.013	0.060	0.073	0	0.066	YES/YES
	Perimeter	34	34	0.075	0.017	0.043	0.018	0.061	0.079	0	0.065	YES/NO
Area 5	Floor	26	25	0.100	0.020	0.062	0.019	0.081	0.100	0	0.091	YES/YES
	Perimeter	20	9	0.082	0.016	0.029	0.018	0.047	0.065	0	0.061	NO/NO
Area 6	Floor	5	5	0.084	0.057	0.071	0.012	0.083	0.096	0	0.083	YES/YES
	Perimeter	12	12	0.093	0.049	0.071	0.012	0.083	0.096	0	0.091	YES/YES
Area 7	Floor	10	10	0.077	0.045	0.061	0.009	0.071	0.080	0	0.074	YES/YES
	Perimeter	2	1	0.053	0.020	0.036	0.024	0.060	0.084	0	0.051	NO/NO
Area 1		187	125	0.560	0.016	0.048	0.043	0.091	0.134	2	0.076	YES/YES
Area 2		32	27	0.058	0.019	0.045	0.012	0.057	0.069	0	0.056	YES/NO
Area 3		32	10	0.089	0.016	0.029	0.015	0.044	0.059	0	0.048	NO/NO
Area 4		93	86	0.084	0.016	0.046	0.015	0.061	0.076	0	0.066	YES/YES
Area 5		46	34	0.100	0.016	0.048	0.025	0.073	0.098	0	0.089	YES/YES
Area 6		17	17	0.093	0.049	0.071	0.012	0.083	0.095	0	0.090	YES/YES
Area 7		12	11	0.077	0.020	0.057	0.015	0.072	0.087	0	0.074	YES/YES
Whole Site Floor		257	205	0.100	0.016	0.049	0.017	0.066	0.083	0	0.077	YES/YES
Whole Site Perimeter		162	105	0.560	0.016	0.044	0.047	0.091	0.138	2	0.076	NO/NO
Whole Site		419	310	0.560	0.016	0.047	0.032	0.079	0.111	2	0.072	YES/YES
Background		50	39	0.130	0.005	0.038	0.028	0.066	0.094		0.096	

Notes:
1. Based on the following TAGM values: As 8.25 mg/kg; Hg 0.1 mg/kg; and Zn 110 mg/kg.
2. Statistical results based on the Mann-Whitney Test / the Student's T Test with the following assumptions: a=0.05.
3. Include all floor samples from Area 1.
Results for nondetects were assumed to be half of the detection limits. Unit: mg/kg dry.

Table 4
Confirmatory Sample Results Summary Statistics - Zinc
SEAD-50/54
Seneca Army Depot Activity

Area	Location	Sample Number	Detects	Maximum	Minimum	Average	Standard Deviation	Average+ One Standard Deviation	Average+ Two Standard Deviation	TAGM Exceedence [1]	95th Percentile	Statistically Different From Background ? [2]
Area 1	Floor [3]	124	124	769	40.6	79	65	144	209	6	107	NO/NO
	Perimeter	61	61	1960	45.7	162	297	459	755	21	259	YES/YES
Area 2	Floor	16	16	121	58.4	73	19	92	110	1	111	NO/NO
	Perimeter	16	16	131	45.6	82	20	102	122	1	112	YES/YES
Area 3	Floor	16	16	121	58	89	15	105	120	1	111	YES/YES
	Perimeter	16	18	144	39.9	90	26	116	142	4	135	YES/YES
Area 4	Floor	60	60	115	35.6	78	13	90	103	1	95	YES/YES
	Perimeter	34	34	155	28.3	86	24	110	134	3	134	YES/YES
Area 5	Floor	26	26	106	57.9	82	14	96	109	0	104	YES/YES
	Perimeter	20	20	887	47.2	176	218	395	613	5	592	YES/YES
Area 6	Floor	5	5	81.5	54.8	70	10	81	91	0	81	NO/NO
	Perimeter	12	12	100	67.1	81	9	91	100	0	95	YES/YES
Area 7	Floor	10	10	97.8	68	84	8	91	99	0	94	YES/YES
	Perimeter	2	2	95.9	75.3	86	15	100	115	0	95	NO/NO
Area 1		185	185	1960	40.6	106	182	288	470	27	182	YES/YES
Area 2		32	32	131	45.6	78	19	97	117	2	114	NO/NO
Area 3		32	32	144	39.9	90	21	111	132	5	126	YES/YES
Area 4		94	94	155	28.3	81	18	99	117	4	105	YES/YES
Area 5		46	46	887	47.2	123	150	273	423	5	393	YES/YES
Area 6		17	17	100	54.8	78	11	89	99	0	93	YES/NO
Area 7		12	12	97.8	68	84	8	92	101	0	97	YES/YES
Whole Site Floor		257	257	769	35.6	79	46	126	172	9	106	YES/YES
Whole Site Perimeter		161	161	1960	28.3	126	201	327	528	34	259	YES/YES
Whole Site		418	418	1960	28.3	97	132	229	361	43	150	YES/YES
Background		50	50	126	34.7	72	21	93	113		110	

Notes:
1. Based on the following TAGM values: As 8.25 mg/kg; Hg 0.1 mg/kg; and Zn 110 mg/kg.
2. Statistical results based on the Mann-Whitney Test / the Student's T Test with the following assumptions: a=0.05.
3. Include all floor samples from Area 1.

Table 5
Outlier Test Results
SEAD-50/54
Seneca Army Depot Activity

Area	Location	Arsenic			Mercury			Zinc		
		Sample Number (1)	Exceedences of 95% UTL (2)	Exceedence Ratio [2] (3)	Sample Number (1)	Exceedences of 95% UTL (2)	Exceedence Ratio [2] (3)	Sample Number (1)	Exceedences of 95% UTL (2)	Exceedence Ratio [2] (3)
Area 1	Floor [3]	126	6	5%	125	0	0%	124	5	4%
	Perimeter	63	0	0%	62	2	3%	61	21	34%
Area 2	Floor	16	0	0%	16	0	0%	16	1	6%
	Perimeter	16	0	0%	16	0	0%	16	1	6%
Area 3	Floor	16	0	0%	16	0	0%	16	1	6%
	Perimeter	16	0	0%	16	0	0%	16	3	19%
Area 4	Floor	60	2	3%	59	0	0%	60	1	2%
	Perimeter	34	3	9%	34	0	0%	34	3	9%
Area 5	Floor	26	0	0%	26	1	4%	26	0	0%
	Perimeter	20	0	0%	20	0	0%	20	5	25%
Area 6	Floor	6	0	0%	5	0	0%	5	0	0%
	Perimeter	14	5	36%	12	0	0%	12	0	0%
Area 7	Floor	10	0	0%	10	0	0%	10	0	0%
	Perimeter	2	0	0%	2	0	0%	2	0	0%
Area 1		189	6	3%	187	2	1%	185	26	14%
Area 2		32	0	0%	32	0	0%	32	2	6%
Area 3		32	0	0%	32	0	0%	32	4	13%
Area 4		94	5	5%	93	0	0%	94	4	4%
Area 5		46	0	0%	46	1	2%	46	5	11%
Area 6		20	5	25%	17	0	0%	17	0	0%
Area 7		12	0	0%	12	0	0%	12	0	0%
Whole Site Floor		260	8	3%	257	1	0%	257	8	3%
Whole Site Perimeter		165	8	5%	162	2	1%	161	33	20%
Whole Site		425	16	4%	419	3	1%	418	41	10%

Notes:

1. 95% UPL from the NERL Tech Support Center report: 10.922 mg/kg, 0.0959 mg/kg, and 114.835 mg/kg for arsenic, mercury, and zinc, respectively.
2. Ratio of 95% UTL exceedences = 95% UTL exceedences / Total Sample Number. (3) = (2)/(1)
3. Include all floor samples in Area 1 at SEAD-50/54.

Table 6
Comparison with Published Background Values
SEAD-50/54
Seneca Army Depot Activity

	SEAD-50/54 [1]			Seneca Whole Site [1]			USEPA, 2000 [2]		MA [3]		NH [4]	USGS [5]	NJ [6]	DE [7]	NY		
	average	max	95th percentile	average	max	95th percentile (TAGM)	average	max	95th percentile	max	95th percentile	Average	Cleanup Criteria		Southside High School Project [8]	Middle Port [9]	TAGM [10]
Arsenic	6.2	41.9	10.4	5.2	21.5	8.3	10.7	63.9	24.5	99	11	7.2	20	1-10	2-20	4.4-56.1	3-12
Mercury	0.047	0.56	0.072	0.038	0.13	0.096	NA	NA	0.43	1.4	0.31	0.09		0.1-0.3	0.01-0.1		0.001-0.2
Zinc	97	1960	150	72	126	110	77	506	131.2	190	98	60		60-90	20-200		9-50

References:
1. From Tables 2 through 4.
2. USEPA. 2000. Ecological Soil Screening Level Guidance.
3. MADEP. 2002. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil. From DEP 1995 database.
4. NHDES. 1998 (with 2003 updates). Contaminated Sites Risk Characterization and Management Policy.

USGS Professional Paper 1270. Cited from http://www.mde.state.md.us/assets/document/hazcleanup_Aug2001.pdf.
6. New Jersey DEP. 1999. Soil Cleanup Criteria. http://www.state.nj.us/dep/srp/regs/scc/scc_0599.pdf
7. Delaware DNREC. 1999. Remediation Standards Guidance Under The Delaware Hazardous Substance Cleanup Act.
8. Typical New York State Background used for Southside High School Project, http://www.stargazettenews.com/southside/appendixb.html
9. From http://www.teapothollow.com/fmc_sampling_program.html
10. NYSDEC. 1994. Technical and Administrative Guidance memorandum #4046.

Table 7
Comparison with Risk Screening Values and Published Remediation Criteria
SEAD-50/54, Seneca Army Depot Activity

	SEAD-50/54 [1] (mg/kg)			EPA Region III RBC [2] (mg/kg)		Soil Screening Level for Ingestion - Dermal [3] (mg/kg)	CCME [4] (mg/kg)		MOE [5] (mg/kg)		Dutch Intervention Value [6] (mg/kg)
	Maximum	Mean	95% percer	Residential	Industrial		Residential	Industrial	Residential	Industrial	
Arsenic	41.9	6.2	10.4	0.43	1.9	0.4	12	12	20-25	40-50	55
Mercury	0.56	0.047	0.1	23 (NC) [5]	310 (NC) [5]	23	6.6	50	10	10	10
Zinc	1,960	97	150	23,000 (NC)	310,000 (NC)	23,000	220	360	600-800	600-800	720

Notes:
1. From Tables 2 through 4.
2. EPA Region III risk-based concentrations from http://www.epa.gov/reg3hwmd/risk/index.htm
   Unless otherwise specified (NC - Noncancer), the risk-based concentrations are based on cancer risk.
   The risk-based concentrations are associated with a target HQ of 1 or a cancer risk of 1E-6, whichever is lower.
3. From Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. USEPA, March 2001.
   Risk-based concentrations based on soil ingestion and dermal exposure except that for zinc and vanadium, only ingestion exposure pathway included.
   The risk-based concentrations are associated with a target HQ of 1 or a cancer risk of 1E-6, whichever is lower.
4. Canadian Council of Ministers of the Environment. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
5. MOE. 1999. Guideline for use at Contaminated Sites in Ontario. Soil remediation criteria vary depending on different land use and soil type.
6. Dutch Ministry of Housing, Spatial Planning and the Environment. 2000. Circular on Target Values and Intervention Values for Soil Remediation.

Attachment A

Supporting Statistical Analysis Results

MANN-WHITNEY TEST AND STUDENT'S T TEST OUTPUT RESULTS

COMPARISON OF BACKGROUND WITH SEAD-50/54 DATA GROUPED BY AREA AND SAMPLE LOCATION (I.E., FLOOR AND PERIMETER)

1. Area 1 Floor vs. Background
2. Area 1 Perimeter vs. Background
3. Area 2 Floor vs. Background
4. Area 2 Perimeter vs. Background
5. Area 3 Floor vs. Background
6. Area 3 Perimeter vs. Background
7. Area 4 Floor vs. Background
8. Area 4 Perimeter vs. Background
9. Area 5 Floor vs. Background
10. Area 5 Perimeter vs. Background
11. Area 6 Floor vs. Background
12. Area 6 Perimeter vs. Background
13. Area 7 Floor vs. Background
14. Area 7 Perimeter vs. Background

Results of Background versus Area 1 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:04:31 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $C$7:$C$175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $H$4:$H$57 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	4121.000
U (expected value)	3213.000
U (variance)	95258.045
Z (observed value)	2.942
Z (critical value)	1.645
One-tailed p-value	0.002
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:21:47 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $E$7:$E$175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $I$4:$I$57 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	4204.500
U (expected value)	3125.000
U (variance)	91607.759
Z (observed value)	3.567
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:18:54 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $F$7:$F$175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $J$4:$J$57 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	3301.000
U (expected value)	3100.000
U (variance)	90414.401
Z (observed value)	0.668
Z (critical value)	1.645
One-tailed p-value	0.252
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 1 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/15/03 at 11:58:40 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $C$7:$C$175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:$B$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	126	5.907	4.518	2.126	0.189	2.800	4.600	5.550	6.700	16.300
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.692
F (critical value) (df1 = 50, df2 = 125)	1.559
Two-tailed p-value	0.020
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	5.239
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.022
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.023
F (critical value) (df1 = 1, df2 = 175)	5.111
One-tailed p-value	0.880
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.797
t (critical value) (df = 1	1.654
One-tailed p-value	0.037
Alpha	0.050

Results of Background versus Area 1 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.610
t (critical value) (df = 75)	1.665
One-tailed p-value	0.056
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.610
t (critical value) (df = 54)	1.672
One-tailed p-value	0.056
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.610	Satterthwaite	75.064	1.665	0.056
	1.610	Cochran-Cox	54.500	1.672	0.056
Equal	1.797		175	1.654	0.037

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:49:21 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $E$7:e175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	125	0.047	0.000	0.016	0.001	0.018	0.029	0.048	0.058	0.088
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Levene's test:

F (observed value)	15.592
F (critical value) (df1 = 1, df2 = 173)	5.112
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 1 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.681
t (critical value) (df = 173)	1.654
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.161
t (critical value) (df = 62)	1.669
One-tailed p-value	0.017
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.161
t (critical value) (df = 50)	1.674
One-tailed p-value	0.018
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.161	Satterthwaite	62.804	1.669	0.017
	2.161	Cochran-Cox	50.400	1.674	0.018
Equal	2.681		173	1.654	0.004

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:27:21 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1F_remove / range = $F$7:f175 / 169 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	124	78.693	4269.32	65.340	5.868	40.600	61.250	72.100	82.450	769.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 1 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.744
t (critical value) (df = 172)	1.654
One-tailed p-value	0.229
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.070
t (critical value) (df = 166)	1.654
One-tailed p-value	0.143
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.070
t (critical value) (df = 87)	1.661
One-tailed p-value	0.144
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.070	Satterthwaite	166.452	1.654	0.143
	1.070	Cochran-Cox	87.400	1.661	0.144
Equal	0.744		172	1.654	0.229

Results of Background versus Area 1 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:56:13 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $D$8:$D$117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1803.000
U (expected value)	1606.500
U (variance)	30755.583
Z (observed value)	1.120
Z (critical value)	1.645
One-tailed p-value	0.131
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:57:15 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $F$8:f117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1754.500
U (expected value)	1550.000
U (variance)	29113.743
Z (observed value)	1.199
Z (critical value)	1.645
One-tailed p-value	0.115
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:57:59 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $G$8:g117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2267.500
U (expected value)	1525.000
U (variance)	28465.667
Z (observed value)	4.401
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 1 Perimeter Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:29:43 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $D$8:$D$117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	63	5.267	2.304	1.518	0.191	2.400	4.300	5.000	5.700	9.400
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.132
t (critical value) (df = 112)	1.659
One-tailed p-value	0.448
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.125
t (critical value) (df = 73)	1.666
One-tailed p-value	0.450
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.125
t (critical value) (df = 50)	1.675
One-tailed p-value	0.451
Alpha	0.050

Decision:
At the level of significance alpha=0 050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.125	Satterthwaite	73.829	1.666	0.450
	0.125	Cochran-Cox	50	1.675	0.451
Equal	0.132		112	1.659	0.448

Results of Background versus Area 1 Perimeter Data Comparison

Hg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:31:05 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $F$8:f117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	62	0.050	0.005	0.071	0.009	0.016	0.020	0.042	0.058	0.560
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.141
t (critical value) (df = 110)	1.659
One-tailed p-value	0.128
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.234
t (critical value) (df = 83)	1.663
One-tailed p-value	0.110
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.234
t (critical value) (df = 56)	1.671
One-tailed p-value	0.111
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.234	Satterthwaite	83.090	1.663	0.110
	1.234	Cochran-Cox	56.300	1.671	0.111
Equal	1.141		110	1.659	0.128

Results of Background versus Area 1 Perimeter Data Comparison

Zn

XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:32:07 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1P_removed / range = $G$8:g117 / 110 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	61	162.123	88000.12	296.648	37.982	45.700	73.150	88.800	148.000	1960.00
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.150
t (critical value) (df = 109)	1.659
One-tailed p-value	0.017
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.374
t (critical value) (df = 60)	1.670
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.374
t (critical value) (df = 56)	1.671
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.374	Satterthwaite	60.727	1.670	0.010
	2.374	Cochran-Cox	56.500	1.671	0.010
Equal	2.150		109	1.659	0.017

Results of Background versus Area 2 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:40:16 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $D$8:$D$23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $H$8:$H$61 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	469.500
U (expected value)	408.000
U (variance)	4617.08
Z (observed value)	0.905
Z (critical value)	1.645
One-tailed p-value	0.183
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:42:03 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $E$8:e23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $I$8:i61 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	569.500
U (expected value)	400.000
U (variance)	4438.32
Z (observed value)	2.544
Z (critical value)	1.645
One-tailed p-value	0.005
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:43:14 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $F$8:f23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $J$8:j61 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	415.500
U (expected value)	400.000
U (variance)	4466.39
Z (observed value)	0.232
Z (critical value)	1.645
One-tailed p-value	0.408
Alpha	0.050

Results of Background versus Area 2 Floor Data Comparison

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Student's T test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:33:43 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $D$8:$D$23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	5.088	0.497	0.705	0.176	4.300	4.650	4.900	5.400	6.800
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.179
t (critical value) (df = 65)	1.669
One-tailed p-value	0.571
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.294
t (critical value) (df = 6:	1.669
One-tailed p-value	0.615
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.294
t (critical value) (df = 3	1.689
One-tailed p-value	0.615
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 2 Floor Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.294	Satterthwaite	63.747	1.669	0.615
	-0.294	Cochran-Cox	31.700	1.689	0.615
Equal	-0.179		65	1.669	0.571

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/15/03 at 1:36:00 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $E$8:$E$23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	0.049	0.000	0.005	0.001	0.039	0.046	0.049	0.052	0.058
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	31.974
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed \	34.666
Chi-square (critical vali	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	15.679
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 2 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.530
t (critical value) (df = 64)	1.669
One-tailed p-value	0.065
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.607
t (critical value) (df = 57)	1.672
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.607
t (critical value) (df = 38)	1.683
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.607	Satterthwaite	57.260	1.672	0.006
	2.607	Cochran-Cox	38.300	1.683	0.006
Equal	1.530		64	1.669	0.065

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:37:14 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $F$8:f23 / 16 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 2 Floor Data Comparison

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	73.481	342.504	18.507	4.627	58.400	59.250	65.950	80.650	121.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Levene's test:

F (observed value)	0.740
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.393
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.311
t (critical value) (df = 64)	1.669
One-tailed p-value	0.379
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.331
t (critical value) (df = 28)	1.701
One-tailed p-value	0.372
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.331
t (critical value) (df = 17)	1.731
One-tailed p-value	0.372
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 2 Floor Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.331	Satterthwaite	28.307	1.701	0.372
	0.331	Cochran-Cox	17.800	1.731	0.372
Equal	0.311		64	1.669	0.379

Results of Background versus Area 2 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:46:40 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $D$8:$D$24 / 17 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = Area2F_removed / range = $H$8:$H$61 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	396.000
U (expected value)	408.000
U (variance)	4617.265
Z (observed value)	-0.177
Z (critical value)	1.645
One-tailed p-value	0.570
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:48:03 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $F$8:f24 / 17 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:$C$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	484.500
U (expected value)	400.000
U (variance)	4433.566
Z (observed value)	1.269
Z (critical value)	1.645
One-tailed p-value	0.102
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:49:30 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $G$8:g24 / 17 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	539.000
U (expected value)	400.000
U (variance)	4466.200
Z (observed value)	2.080
Z (critical value)	1.645
One-tailed p-value	0.019
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 2 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 11:58:48 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $D$8:$D$25 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	4.731	0.785	0.886	0.221	3.300	4.300	4.650	4.900	6.600
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Levene's test:

F (observed value)	2.276
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.136
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.683
t (critical value) (df = 65)	1.669
One-tailed p-value	0.751
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-1.079
t (critical value) (df = 64)	1.669
One-tailed p-value	0.858
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Results of Background versus Area 2 Perimeter Data Comparison

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-1.079
t (critical value) (df = 30)	1.695
One-tailed p-value	0.856
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-1.079	Satterthwaite	64.908	1.669	0.858
	-1.079	Cochran-Cox	30.700	1.695	0.856
Equal	-0.683		65	1.669	0.751

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:01:06 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $F$8:$F$25 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:$C$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	0.041	0.000	0.015	0.004	0.019	0.022	0.049	0.054	0.056
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Levene's test:

F (observed value)	3.255
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.076
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.470
t (critical value) (df = 64)	1.669
One-tailed p-value	0.320
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 2 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.630
t (critical value) (df = 48)	1.677
One-tailed p-value	0.266
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.630
t (critical value) (df = 22)	1.713
One-tailed p-value	0.268
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.630	Satterthwaite	48.114	1.677	0.266
	0.630	Cochran-Cox	22.700	1.713	0.268
Equal	0.470		64	1.669	0.320

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:02:04 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2P_removed / range = $G$8:g25 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	82.431	400.020	20.000	5.000	45.600	72.050	76.350	97.250	131.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Levene's test:

F (observed value)	0.181
F (critical value) (df1	5.269
One-tailed p-value	0.672
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

Results of Background versus Area 2 Perimeter Data Comparison

t (observed value)	1.811
t (critical value) (df = 64)	1.669
One-tailed p-value	0.037
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.854
t (critical value) (df = 26)	1.705
One-tailed p-value	0.038
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.854
t (critical value) (df = 18)	1.733
One-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.854	Satterthwaite	26.337	1.705	0.038
	1.854	Cochran-Cox	18.000	1.733	0.040
Equal	1.811		64	1.669	0.037

Results of Background versus Area 3 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:53:10 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $D$8:$D$30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	637.000
U (expected value)	408.000
U (variance)	4620.03
Z (observed value)	3.369
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:54:28 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $F$8:f30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Hg Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	384.000
U (expected value)	400.000
U (variance)	4432.35
Z (observed value)	-0.240
Z (critical value)	1.645
One-tailed p-value	0.595
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:55:26 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $G$8:g30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	609.500
U (expected value)	400.000
U (variance)	4466.39
Z (observed value)	3.135
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 3 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:05:19 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $D$8:$D$30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	6.256	1.203	1.097	0.274	4.400	5.550	6.300	6.900	8.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	6.356
F (critical value) (df1 = 50, df2 = 15)	2.549
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	13.368
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.245
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.269
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Results of Background versus Area 3 Floor Data Comparison

Assume the equality of the two theoretical variances

t (observed value)	1.468
t (critical value) (df = 65)	1.669
One-tailed p-value	0.074
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.200
t (critical value) (df = 61)	1.670
One-tailed p-value	0.016
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.200
t (critical value) (df = 27)	1.702
One-tailed p-value	0.018
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.200	Satterthwaite	61.320	1.670	0.016
	2.200	Cochran-Cox	27.000	1.702	0.018
Equal	1.468		65	1.669	0.074

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:40:43 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $F$8:f30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	0.033	0.000	0.019	0.005	0.018	0.021	0.022	0.044	0.089
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Results of Background versus Area 3 Floor Data Comparison

Fisher's F test:

F (observed value)	2.247
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.088
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	3.150
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.076
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	2.302
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.134
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.692
t (critical value) (df = 64)	1.669
One-tailed p-value	0.754
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.848
t (critical value) (df = 38)	1.686
One-tailed p-value	0.799
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 3 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.848
t (critical value) (df = 20)	1.721
One-tailed p-value	0.797
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.848	Satterthwaite	38.268	1.686	0.799
	-0.848	Cochran-Cox	20.600	1.721	0.797
Equal	-0.692		64	1.669	0.754

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:44:05 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3F_removed / range = $G$8:g30 / 23 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	89.356	234.799	15.323	3.831	58.000	81.000	90.150	97.750	121.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.861
F (critical value) (df1 = 49, df2	2.552
Two-tailed p-value	0.188
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.927
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.165
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 3 Floor Data Comparison

Levene's test:

F (observed value)	2.595
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.112
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.120
t (critical value) (df = 64)	1.669
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.656
t (critical value) (df = 34)	1.690
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.656
t (critical value) (df = 18)	1.724
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.656	Satterthwaite	34.450	1.690	0.000
	3.656	Cochran-Cox	18.100	1.724	0.001
Equal	3.120		64	1.669	0.001

Results of Background versus Area 3 Perimeter Data Comparison

Mann-Whitney Test

As

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 9:58:26 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $D$9:$D$36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	468.000
U (expected value)	408.000
U (variance)	4618.741
Z (observed value)	0.883
Z (critical value)	1.645
One-tailed p-value	0.189
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:00:51 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $F$9:f36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	310.500
U (expected value)	400.000
U (variance)	4432.075
Z (observed value)	-1.344
Z (critical value)	1.645
One-tailed p-value	0.911
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:02:08 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $G$9:g36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	576.500
U (expected value)	400.000
U (variance)	4466.387
Z (observed value)	2.641
Z (critical value)	1.645
One-tailed p-value	0.004
Alpha	0.050

Results of Background versus Area 3 Perimeter Data Comparison

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:45:55 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $D$9:$D$36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	5.206	1.829	1.352	0.338	2.400	4.250	5.150	6.300	7.400
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	4.180
F (critical value) (df1 = 50, df2 = 15)	2.549
Two-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	8.701
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.625
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.432
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Results of Background versus Area 3 Perimeter Data Comparison

Assume the equality of the two theoretical variances

t (observed value)	-0.009
t (critical value) (df = 65)	1.669
One-tailed p-value	0.504
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.013
t (critical value) (df = 52)	1.674
One-tailed p-value	0.505
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.013
t (critical value) (df = 15)	1.709
One-tailed p-value	0.505
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.013	Satterthwaite	52.866	1.674	0.505
	-0.013	Cochran-Cox	15	1.709	0.505
Equal	-0.009		65	1.669	0.504

Hg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:48:18 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $F$9:f36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	0.026	0.000	0.010	0.003	0.016	0.019	0.021	0.036	0.047
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Results of Background versus Area 3 Perimeter Data Comparison

Fisher's F test:

F (observed value)	7.387
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	15.142
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	7.994
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-1.627
t (critical value) (df = 64)	1.669
One-tailed p-value	0.946
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-2.474
t (critical value) (df = 62)	1.670
One-tailed p-value	0.992
Alpha	0.050

Results of Background versus Area 3 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-2.474
t (critical value) (df = 27)	1.699
One-tailed p-value	0.990
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-2.474	Satterthwaite	62.620	1.670	0.992
	-2.474	Cochran-Cox	27.800	1.699	0.990
Equal	-1.627		64	1.669	0.946

Zn

XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:50:21 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3P_removed / range = $G$9:g36 / 28 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	90.350	670.667	25.897	6.474	39.900	76.200	82.900	104.800	144.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.534
F (critical value) (df1 = 15, df2 = 49)	2.115
Two-tailed p-value	0.259
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.104
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.293
Alpha	0.050

Results of Background versus Area 3 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.401
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.529
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.934
t (critical value) (df = 64)	1.669
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.625
t (critical value) (df = 21)	1.718
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.625
t (critical value) (df = 16)	1.740
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 3 Perimeter Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.625	Satterthwaite	21.621	1.718	0.008
	2.625	Cochran-Cox	16.600	1.740	0.009
Equal	2.934		64	1.669	0.002

Results of Background versus Area 4 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:06:46 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $E$9:$E$103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2587.000
U (expected value)	1530.000
U (variance)	28544.462
Z (observed value)	6.256
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:07:43 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $G$9:g103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2000.500
U (expected value)	1475.000
U (variance)	26969.120
Z (observed value)	3.200
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:08:38 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $H$9:h103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1881.000
U (expected value)	1500.000
U (variance)	27748.999
Z (observed value)	2.287
Z (critical value)	1.645
One-tailed p-value	0.011
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 4 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:51:46 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $E$9:$E$103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	7.235	3.430	1.852	0.239	4.300	6.050	6.750	7.950	13.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	2.229
F (critical value) (df1 = 50, df2 = 59)	1.703
Two-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observec	8.575
Chi-square (critical va	3.841
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.176
F (critical value) (df1	5.166
One-tailed p-value	0.676
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.585
t (critical value) (df = 109)	1.659
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.444
t (critical value) (df = 84)	1.663
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.444
t (critical value) (df = 50)	1.675
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.444	Satterthwaite	84.939	1.663	< 0.0001
	4.444	Cochran-Cox	50	1.675	< 0.0001
Equal	4.585		109	1.659	< 0.0001

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:52:49 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $G$9:g103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	59	0.047	0.000	0.013	0.002	0.016	0.045	0.049	0.054	0.084
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	4.594
F (critical value) (df1 = 49, df2 = 58)	1.712
Two-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observec	29.124
Chi-square (critical va	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	23.093
F (critical value) (df1 = 1, df2 = 107)	5.168
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.271
t (critical value) (df = 107)	1.659
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.153
t (critical value) (df =	1.668
One-tailed p-value	0.017
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.153
t (critical value) (df =	1.676
One-tailed p-value	0.018
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 4 Floor Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.153	Satterthwaite	66.824	1.668	0.017
	2.153	Cochran-Cox	49	1.676	0.018
Equal	2.271		107	1.659	0.013

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:54:04 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4F_removed / range = $H$9:h103 / 95 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	77.673	158.422	12.587	1.625	35.600	69.650	77.800	83.950	115.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.759
F (critical value) (df1 = 49, df2 = 59)	1.707
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	13.508
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	14.766
F (critical value) (df1 = 1, df2 = 108)	5.167
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 4 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.859
t (critical value) (df = 108)	1.659
One-tailed p-value	0.033
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.781
t (critical value) (df = 77)	1.665
One-tailed p-value	0.039
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.781
t (critical value) (df = 49)	1.675
One-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.781	Satterthwaite	77.221	1.665	0.039
	1.781	Cochran-Cox	49.300	1.675	0.040
Equal	1.859		108	1.659	0.033

Results of Background versus Area 4 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:11:56 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $D$8:$D$57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1353.500
U (expected value)	867.000
U (variance)	12418.257
Z (observed value)	4.366
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:12:54 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $F$8:f57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1056.000
U (expected value)	850.000
U (variance)	11995.948
Z (observed value)	1.881
Z (critical value)	1.645
One-tailed p-value	0.030
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:13:54 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $G$8:g57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1187.500
U (expected value)	850.000
U (variance)	12040.691
Z (observed value)	3.076
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 4 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:55:30 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $D$8:$D$57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	7.356	13.713	3.703	0.635	2.100	5.500	6.500	7.500	20.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.794
F (critical value) (df1 = 33, df2 = 50)	1.841
Two-tailed p-value	0.061
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	3.440
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.064
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	1.532
F (critical value) (df1 = 1, df2 = 83)	5.211
One-tailed p-value	0.219
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 4 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.052
t (critical value) (df = 83)	1.663
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.881
t (critical value) (df = 56)	1.672
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.881
t (critical value) (df = 34)	1.688
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.881	Satterthwaite	56.899	1.672	0.003
	2.881	Cochran-Cox	34.000	1.688	0.003
Equal	3.052		83	1.663	0.002

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:56:55 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $F$8:f57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 4 Perimeter Data Comparison

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	0.043	0.000	0.018	0.003	0.017	0.021	0.050	0.057	0.075
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.544
F (critical value) (df1 = 49, df2 = 33)	1.922
Two-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	7.748
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	3.466
F (critical value) (df1 = 1, df2 = 82)	5.213
One-tailed p-value	0.066
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.006
t (critical value) (df = 82)	1.664
One-tailed p-value	0.159
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 4 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.094
t (critical value) (df = 81)	1.664
One-tailed p-value	0.139
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.094
t (critical value) (df = 40)	1.682
One-tailed p-value	0.140
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.094	Satterthwaite	81.558	1.664	0.139
	1.094	Cochran-Cox	40.200	1.682	0.140
Equal	1.006		82	1.664	0.159

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 12:58:58 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4P_removed / range = $G$8:g57 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	86.071	580.540	24.094	4.132	28.300	72.000	86.400	95.300	155.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.328
F (critical value) (df1 = 33, df2 = 49)	1.847
Two-tailed p-value	0.361
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 4 Perimeter Data Comparison

Bartlett's test:

Chi-square (observed value)	0.797
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.372
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.017
F (critical value) (df1 = 1, df2 = 82)	5.213
One-tailed p-value	0.898
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.914
t (critical value) (df = 82)	1.664
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.835
t (critical value) (df = 64)	1.669
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 4 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.835
t (critical value) (df = 34)	1.687
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.835	Satterthwaite	64.120	1.669	0.003
	2.835	Cochran-Cox	34.800	1.687	0.004
Equal	2.914		82	1.664	0.002

Results of Background versus Area 5 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:16:19 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $E$9:$E$39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1004.000
U (expected value)	663.000
U (variance)	8611.069
Z (observed value)	3.675
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:17:52 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $G$9:g39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1032.000
U (expected value)	650.000
U (variance)	8305.746
Z (observed value)	4.192
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:18:36 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $H$9:h39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	877.500
U (expected value)	650.000
U (variance)	8341.096
Z (observed value)	2.491
Z (critical value)	1.645
One-tailed p-value	0.006
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 5 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:00:26 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $E$9:$E$39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	26	6.069	1.048	1.024	0.201	4.400	5.300	6.200	6.600	8.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	7.296
F (critical value) (df1 = 50, df2 = 25)	2.079
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	23.872
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.041
F (critical value) (df1 = 1, df2 = 75)	5.232
One-tailed p-value	0.157
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 5 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.523
t (critical value) (df = 75)	1.665
One-tailed p-value	0.066
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.964
t (critical value) (df = 70)	1.667
One-tailed p-value	0.027
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.964
t (critical value) (df = 39)	1.683
One-tailed p-value	0.028
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.964	Satterthwaite	70.332	1.667	0.027
	1.964	Cochran-Cox	39.900	1.683	0.028
Equal	1.523		75	1.665	0.066

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:01:58 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $G$9:g39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 5 Floor Data Comparison

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	26	0.062	0.000	0.019	0.004	0.020	0.048	0.059	0.076	0.100
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.267
F (critical value) (df1 = 49, df2 = 25)	2.082
Two-tailed p-value	0.029
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	4.898
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.027
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.811
F (critical value) (df1 = 1, df2 = 74)	5.235
One-tailed p-value	0.098
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.003
t (critical value) (df = 74)	1.666
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 5 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.534
t (critical value) (df = 69)	1.667
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.534
t (critical value) (df = 25)	1.691
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.534	Satterthwaite	69.443	1.667	< 0.0001
	4.534	Cochran-Cox	25	1.691	< 0.0001
Equal	4.003		74	1.666	< 0.0001

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:02:51 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5F_removed / range = $H$9:h39 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	26	81.858	189.579	13.769	2.700	57.900	71.700	83.500	92.900	106.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.305
F (critical value) (df1 = 49, df2 = 25)	2.082
Two-tailed p-value	0.026
Alpha	0.050

Results of Background versus Area 5 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	5.090
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.024
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	4.832
F (critical value) (df1 = 1, df2 = 74)	5.235
One-tailed p-value	0.031
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.242
t (critical value) (df = 74)	1.666
One-tailed p-value	0.014
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.546
t (critical value) (df = 69)	1.667
One-tailed p-value	0.007
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 5 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.546
t (critical value) (df = 32)	1.691
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.546	Satterthwaite	69.736	1.667	0.007
	2.546	Cochran-Cox	32.700	1.691	0.008
Equal	2.242		74	1.666	0.014

Results of Background versus Area 5 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:21:01 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $E$9:$E$46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	620.500
U (expected value)	510.000
U (variance)	6113.022
Z (observed value)	1.413
Z (critical value)	1.645
One-tailed p-value	0.079
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:22:25 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $G$9:g46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	409.500
U (expected value)	500.000
U (variance)	5871.739
Z (observed value)	-1.181
Z (critical value)	1.645
One-tailed p-value	0.881
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:23:16 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $H$9:h46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	703.000
U (expected value)	500.000
U (variance)	5916.046
Z (observed value)	2.639
Z (critical value)	1.645
One-tailed p-value	0.004
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 5 Perimeter Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:03:51 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $E$9:$E$46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	5.410	2.027	1.424	0.318	3.100	4.450	5.350	6.050	8.400
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	3.771
F (critical value) (df1 = 50, df2 = 19)	2.295
Two-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	9.437
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.736
F (critical value) (df1 = 1, df2 = 69)	5.250
One-tailed p-value	0.394
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.303
t (critical value) (df = 69)	1.667
One-tailed p-value	0.381
Alpha	0.050

Results of Background versus Area 5 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.394
t (critical value) (df = 63)	1.669
One-tailed p-value	0.348
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.394
t (critical value) (df = 28)	1.697
One-tailed p-value	0.348
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.394	Satterthwaite	63.759	1.669	0.348
	0.394	Cochran-Cox	28.000	1.697	0.348
Equal	0.303		69	1.667	0.381

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:04:49 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $G$9:g46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	0.029	0.000	0.018	0.004	0.016	0.018	0.020	0.037	0.082
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.456
F (critical value) (df1 = 49, df2 = 19)	2.298
Two-tailed p-value	0.035
Alpha	0.050

Results of Background versus Area 5 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	4.667
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.031
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	3.249
F (critical value) (df1 = 1, df2 = 68)	5.254
One-tailed p-value	0.076
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-1.271
t (critical value) (df = 68)	1.668
One-tailed p-value	0.896
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-1.530
t (critical value) (df = 54)	1.673
One-tailed p-value	0.934
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

Results of Background versus Area 5 Perimeter Data Comparison

t (observed value)	-1.530
t (critical value) (df = 26)	1.703
One-tailed p-value	0.931
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-1.530	Satterthwaite	54.334	1.673	0.934
	-1.530	Cochran-Cox	26.700	1.703	0.931
Equal	-1.271		68	1.668	0.896

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:05:42 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5P_removed / range = $H$9:h46 / 38 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	176.405	47617.6	218.215	48.794	47.200	68.750	87.100	114.500	887.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	108.948
F (critical value) (df1 = 19, df2 = 49)	2.018
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	141.978
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 5 Perimeter Data Comparison

Levene's test:

F (observed value)	40.295
F (critical value) (df1 = 1, df2 = 68)	5.254
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.392
t (critical value) (df = 68)	1.668
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.143
t (critical value) (df = 19)	1.728
One-tailed p-value	0.023
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.143
t (critical value) (df = 19)	1.729
One-tailed p-value	0.023
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.143	Satterthwaite	19.140	1.728	0.023
	2.143	Cochran-Cox	19	1.729	0.023
Equal	3.392		68	1.668	0.001

Results of Background versus Area 6 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:27:31 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $E$9:$E$26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	240.500
U (expected value)	153.000
U (variance)	1477.658
Z (observed value)	2.276
Z (critical value)	1.645
One-tailed p-value	0.011
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:28:47 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $F$9:f26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	217.000
U (expected value)	125.000
U (variance)	1154.209
Z (observed value)	2.708
Z (critical value)	1.645
One-tailed p-value	0.003
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:29:25 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $G$9:g26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	130.000
U (expected value)	125.000
U (variance)	1166.582
Z (observed value)	0.146
Z (critical value)	1.645
One-tailed p-value	0.442
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 6 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:08:40 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $E$9:$E$26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	6	6.883	4.426	2.104	0.859	3.500	6.100	6.850	8.500	9.500
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.727
F (critical value) (df1 = 50, df2 = 5)	6.144
Two-tailed p-value	0.568
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.549
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.459
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.007
F (critical value) (df1 = 1, df2 = 55)	5.310
One-tailed p-value	0.932
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.428
t (critical value) (df = 55)	1.673
One-tailed p-value	0.080
Alpha	0.050

Results of Background versus Area 6 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.773
t (critical value) (df = 7)	1.886
One-tailed p-value	0.059
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.773
t (critical value) (df = 0)	1.958
One-tailed p-value	0.064
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.773	Satterthwaite	7.209	1.886	0.059
	1.773	Cochran-Cox	0	1.958	0.064
Equal	1.428		55	1.673	0.080

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:13:19 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $F$9:f26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	5	0.071	0.000	0.012	0.006	0.057	0.058	0.074	0.083	0.084
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	5.129
F (critical value) (df1 = 49, df2 = 4)	8.383
Two-tailed p-value	0.120
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 6 Floor Data Comparison

Bartlett's test:

Chi-square (observed value)	2.969
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.085
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	1.922
F (critical value) (df1 = 1, df2 = 53)	5.322
One-tailed p-value	0.171
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.598
t (critical value) (df = 53)	1.674
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.863
t (critical value) (df = 8)	1.834
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.863
t (critical value) (df = 5)	1.978
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 6 Floor Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.863	Satterthwaite	8.963	1.834	0.000
Equal	4.863	Cochran-Cox	5.100	1.978	0.002
	2.598		53	1.674	0.006

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:12:30 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6F_removed / range = $G$9:g26 / 18 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	5	70.360	109.753	10.476	4.685	54.800	60.100	73.600	79.000	81.500
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	3.982
F (critical value) (df1 = 49, df2 = 4)	8.383
Two-tailed p-value	0.185
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	2.255
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.133
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	2.408
F (critical value) (df1 = 1, df2 = 53)	5.322
One-tailed p-value	0.127
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 6 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.137
t (critical value) (df = 53)	1.674
One-tailed p-value	0.554
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.235
t (critical value) (df = 7)	1.868
One-tailed p-value	0.590
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.235
t (critical value) (df = 5)	2.002
One-tailed p-value	0.589
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.235	Satterthwaite	7.720	1.868	0.590
	-0.235	Cochran-Cox	5.300	2.002	0.589
Equal	-0.137		53	1.674	0.554

Results of Background versus Area 6 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:31:37 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $E$8:$E$38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	615.500
U (expected value)	357.000
U (variance)	3924.254
Z (observed value)	4.127
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:32:34 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $F$8:f38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	523.000
U (expected value)	300.000
U (variance)	3126.520
Z (observed value)	3.988
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:33:22 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $G$8:g38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	420.500
U (expected value)	300.000
U (variance)	3149.762
Z (observed value)	2.147
Z (critical value)	1.645
One-tailed p-value	0.016
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 6 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:14:16 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $E$8:$E$38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	14	12.507	108.930	10.437	2.789	3.800	6.500	9.650	12.200	41.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	14.249
F (critical value) (df1 = 13, df2 = 50)	2.176
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	47.189
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	20.451
F (critical value) (df1 = 1, df2 = 63)	5.273
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.525
t (critical value) (df = 63)	1.669
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 6 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.590
t (critical value) (df = 13)	1.766
One-tailed p-value	0.011
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.590
t (critical value) (df = 13)	1.769
One-tailed p-value	0.011
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.590	Satterthwaite	13.504	1.766	0.011
	2.590	Cochran-Cox	13	1.769	0.011
Equal	4.525		63	1.669	< 0.0001

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:15:34 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $F$8:f38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	12	0.071	0.000	0.012	0.004	0.049	0.065	0.070	0.077	0.093
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	5.219
F (critical value) (df1 = 49, df2 = 11)	3.030
Two-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 6 Perimeter Data Comparison

Bartlett's test:

Chi-square (observed value)	8.290
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	5.505
F (critical value) (df1 = 1, df2 = 60)	5.286
One-tailed p-value	0.022
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.981
t (critical value) (df = 60)	1.671
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	6.228
t (critical value) (df = 41)	1.683
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	6.228
t (critical value) (df = 11)	1.730
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 6 Perimeter Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	6.228	Satterthwaite	41.279	1.683	< 0.0001
	6.228	Cochran-Cox	11	1.730	< 0.0001
Equal	3.981		60	1.671	< 0.0001

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:16:34 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6P_removed / range = $G$8:g38 / 31 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	12	81.325	84.248	9.179	2.650	67.100	76.100	80.000	86.200	100.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	5.188
F (critical value) (df1 = 49, df2 = 11)	3.030
Two-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	8.240
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	7.165
F (critical value) (df1 = 1, df2 = 60)	5.286
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 6 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.557
t (critical value) (df = 60)	1.671
One-tailed p-value	0.062
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.433
t (critical value) (df = 41)	1.683
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.433
t (critical value) (df = 18)	1.730
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.433	Satterthwaite	41.131	1.683	0.010
	2.433	Cochran-Cox	18.300	1.730	0.013
Equal	1.557		60	1.671	0.062

Results of Background versus Area 7 Floor Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:34:58 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $E$9:$E$18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	386.000
U (expected value)	255.000
U (variance)	2632.422
Z (observed value)	2.553
Z (critical value)	1.645
One-tailed p-value	0.005
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:35:54 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $F$9:f18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	419.500
U (expected value)	250.000
U (variance)	2520.621
Z (observed value)	3.376
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:36:49 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $G$9:g18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	357.000
U (expected value)	250.000
U (variance)	2541.455
Z (observed value)	2.122
Z (critical value)	1.645
One-tailed p-value	0.017
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 7 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:19:45 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $E$9:$E$18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	10	5.890	0.352	0.593	0.188	5.100	5.300	5.850	6.500	6.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	21.710
F (critical value) (df1 = 50, df2 = 9)	3.472
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	17.747
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.877
F (critical value) (df1 = 1, df2 = 59)	5.290
One-tailed p-value	0.176
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0 766
t (critical value) (df = 59)	1 671
One-tailed p-value	0.223
Alpha	0 050

Results of Background versus Area 7 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.574
t (critical value) (df = 58)	1.671
One-tailed p-value	0.060
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.574
t (critical value) (df = 25)	1.706
One-tailed p-value	0.064
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.574	Satterthwaite	58.359	1.671	0.060
	1.574	Cochran-Cox	25.600	1.706	0.064
Equal	0.766		59	1.671	0.223

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:21:01 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $F$9:f18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	10	0.061	0.000	0.009	0.003	0.045	0.055	0.062	0.068	0.077
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	9.101
F (critical value) (df1 = 49, df2 = 9)	3.475
Two-tailed p-value	0.001
Alpha	0.050

Results of Background versus Area 7 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	10.841
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	6.637
F (critical value) (df1 = 1, df2 = 58)	5.295
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.590
t (critical value) (df = 58)	1.672
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.732
t (critical value) (df = 44)	1.680
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.732
t (critical value) (df = 12)	1.732
One-tailed p-value	0.000
Alpha	0.050

Results of Background versus Area 7 Floor Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.732	Satterthwaite	44.502	1.680	< 0.0001
	4.732	Cochran-Cox	12.900	1.732	0.000
Equal	2.590		58	1.672	0.006

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:22:02 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7F_removed / range = $G$9:g18 / 10 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	10	83.700	58.998	7.681	2.429	68.000	79.900	84.250	88.100	97.800
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	7.408
F (critical value) (df1 = 4	3.475
Two-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	9.309
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	8.617
F (critical value) (df1 = 1, df2 = 58)	5.295
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 7 Floor Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.786
t (critical value) (df = 58)	1.672
One-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.146
t (critical value) (df = 39)	1.684
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.146
t (critical value) (df = 15)	1.740
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.146	Satterthwaite	39.500	1.684	0.002
	3.146	Cochran-Cox	15.900	1.740	0.003
Equal	1.786		58	1.672	0.040

Results of Background versus Area 7 Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:38:19 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $E$8:$E$9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	69.500
U (expected value)	51.000
U (variance)	458.426
Z (observed value)	0.864
Z (critical value)	1.645
One-tailed p-value	0.194
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:39:00 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $G$8:g9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	51.000
U (expected value)	50.000
U (variance)	436.086
Z (observed value)	0.048
Z (critical value)	1.645
One-tailed p-value	0.481
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:39:46 AM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $H$8:h9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	76.000
U (expected value)	50.000
U (variance)	441.629
Z (observed value)	1.237
Z (critical value)	1.645
One-tailed p-value	0.108
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which

the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:22:56 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $E$8:$E$9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	2	5.550	0.605	0.778	0.550	5.000	5.000	5.550	6.100	6.100
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	12.636
F (critical value) (df1 = 50, df2 = 1)	1008.117
Two-tailed p-value	0.441
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.205
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.272
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.331
F (critical value) (df1 = 1, df2 = 51)	5.334
One-tailed p-value	0.567
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

Results of Background versus Area 7 Perimeter Data Comparison

t (observed value)	0.171
t (critical value) (df = 51)	1.675
One-tailed p-value	0.433
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.501
t (critical value) (df = 2)	2.728
One-tailed p-value	0.331
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.501
t (critical value) (df = 0)	4.777
One-tailed p-value	0.341
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.501	Satterthwaite	2.226	2.728	0.331
	0.501	Cochran-Cox	0	4.777	0.341
Equal	0.171		51	1.675	0.433

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:23:49 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $G$8:g9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	2	0.036	0.001	0.024	0.017	0.020	0.020	0.036	0.053	0.053
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	1.412
F (critical value) (df1 = 49, df2 = 1)	1007.911
Two-tailed p-value	1.192
Alpha	0.050

Results of Background versus Area 7 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.039
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.843
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.144
F (critical value) (df1 = 1, df2 = 50)	5.340
One-tailed p-value	0.706
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.074
t (critical value) (df = 50)	1.676
One-tailed p-value	0.529
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.087
t (critical value) (df = 1)	5.749
One-tailed p-value	0.528
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.087
t (critical value) (df = 0)	6.066
One-tailed p-value	0.528
Alpha	0.050

Results of Background versus Area 7 Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.087	Satterthwaite	1.116	5.749	0.528
	-0.087	Cochran-Cox	0	6.066	0.528
Equal	-0.074		50	1.676	0.529

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:24:46 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7P_removed / range = $H$8:h9 / 2 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	2	85.600	212.180	14.566	10.300	75.300	75.300	85.600	95.900	95.900
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.060
F (critical value) (df1 = 49, df	1007.911
Two-tailed p-value	1.021
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.154
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.695
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.558
F (critical value) (df1 = 1, df2 = 50)	5.340
One-tailed p-value	0.459
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 7 Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.929
t (critical value) (df = 50)	1.676
One-tailed p-value	0.179
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.300
t (critical value) (df = 1)	5.252
One-tailed p-value	0.196
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.300
t (critical value) (df = 0)	5.961
One-tailed p-value	0.204
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.300	Satterthwaite	1.171	5.252	0.196
	1.300	Cochran-Cox	0	5.961	0.204
Equal	0.929		50	1.676	0.179

MANN-WHITNEY TEST AND STUDENT'S T TEST OUTPUT RESULTS

COMPARISON OF BACKGROUND WITH SEAD-50/54 DATA GROUPED BY AREA

1. **Area 1 vs. Background**
2. **Area 2 vs. Background**
3. **Area 3 vs. Background**
4. **Area 4 vs. Background**
5. **Area 5 vs. Background**
6. **Area 6 vs. Background**
7. **Area 7 vs. Background**

Results of Background versus Area 1 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:41:00 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $D$7:$D$286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	189	5.693	3.855	1.963	0.143	2.400	4.400	5.400	6.400	16.300
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.983
F (critical value) (df1 = 50, df2 = 188)	1.516
Two-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	10.376
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.277
F (critical value) (df1 = 1, df2 = 238)	5.088
One-tailed p-value	0.599
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.412
t (critical value) (df = 238)	1.651
One-tailed p-value	0.080
Alpha	0.050

Decision:

Results of Background versus Area 1 Data Comparison

At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.165
t (critical value) (df = 64)	1.669
One-tailed p-value	0.124
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.165
t (critical value) (df = 52)	1.673
One-tailed p-value	0.125
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.165	Satterthwaite	64.218	1.669	0.124
	1.165	Cochran-Cox	52.600	1.673	0.125
Equal	1.412		238	1.651	0.080

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:45:34 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $F$7:f286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	187	0.048	0.002	0.043	0.003	0.016	0.026	0.047	0.058	0.560
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.324
F (critical value) (df1 = 186, df2 = 49)	1.614
Two-tailed p-value	0.001
Alpha	0.050

Results of Background versus Area 1 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	11.520
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.315
F (critical value) (df1 = 1, df2 = 235)	5.089
One-tailed p-value	0.575
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.586
t (critical value) (df = 235)	1.651
One-tailed p-value	0.057
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.006
t (critical value) (df = 116)	1.658
One-tailed p-value	0.024
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.006
t (critical value) (df = 64)	1.668
One-tailed p-value	0.024
Alpha	0.050

Results of Background versus Area 1 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.006	Satterthwaite	116.920	1.658	0.024
	2.006	Cochran-Cox	64.700	1.668	0.024
Equal	1.586		235	1.651	0.057

XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:47:40 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $G$7:g286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	185	106.202	33096.34	181.924	13.375	40.600	63.050	74.900	91.400	1960.00
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	75.724
F (critical value) (df1 = 184, df2 = 49)	1.615
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	156.708
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.800
F (critical value) (df1 = 1, df2 = 233)	5.089
One-tailed p-value	0.096
Alpha	0.050

Results of Background versus Area 1 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.338
t (critical value) (df = 233)	1.651
One-tailed p-value	0.091
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.521
t (critical value) (df = 200)	1.652
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.521
t (critical value) (df = 134)	1.654
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.521	Satterthwaite	200.622	1.652	0.006
	2.521	Cochran-Cox	134.200	1.654	0.006
Equal	1.338		233	1.651	0.091

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:32:39 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $D$7:$D$286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:$B$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

Results of Background versus Area 1 Data Comparison

U	5924
U (expected value)	4820
U (variance)	193445
Z (observed value)	2.511
Z (critical value)	1.645
One-tailed p-value	0.006
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:34:22 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $F$7:f286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	5959
U (expected value)	4675
U (variance)	185344
Z (observed value)	2.982
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:35:07 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area1 / range = $G$7:g286 / 280 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	5569
U (expected value)	4625
U (variance)	181913
Z (observed value)	2.212
Z (critical value)	1.645
One-tailed p-value	0.013
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 2 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:51:13 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $D$8:$D$41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	4.909	0.653	0.808	0.143	3.300	4.500	4.800	5.050	6.800
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	11.704
F (critical value) (df1 = 50, df2 = 31)	1.950
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	40.820
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	4.974
F (critical value) (df1 = 1, df2 = 81)	5.216
One-tailed p-value	0.028
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-0.603
t (critical value) (df = 81)	1.664
One-tailed p-value	0.726
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 2 Data Comparison

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-0.735
t (critical value) (df = 62)	1.670
One-tailed p-value	0.767
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-0.735
t (critical value) (df = 44)	1.678
One-tailed p-value	0.767
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-0.735	Satterthwaite	62.670	1.670	0.767
	-0.735	Cochran-Cox	44.100	1.678	0.767
Equal	-0.603		81	1.664	0.726

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:55:14 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $F$8:f41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:$C$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	0.045	0.000	0.012	0.002	0.019	0.044	0.049	0.052	0.058
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	5.725
F (critical value) (df1 = 49, df2 = 31)	1.954
Two-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 2 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	22.953
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	15.223
F (critical value) (df1 = 1, df2 = 80)	5.218
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.365
t (critical value) (df = 80)	1.664
One-tailed p-value	0.088
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.597
t (critical value) (df = 71)	1.667
One-tailed p-value	0.057
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.597
t (critical value) (df = 42)	1.681
One-tailed p-value	0.059
Alpha	0.050

Results of Background versus Area 2 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.597	Satterthwaite	71.032	1.667	0.057
	1.597	Cochran-Cox	42.400	1.681	0.059
Equal	1.365		80	1.664	0.088

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:56:07 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $G$8:g41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	77.956	379.957	19.492	3.446	45.600	64.250	73.900	86.400	131.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.150
F (critical value) (df1 = 49, df2 = 31)	1.954
Two-tailed p-value	0.688
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.182
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.670
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.499
F (critical value) (df1 = 1, df2 = 80)	5.218
One-tailed p-value	0.482
Alpha	0.050

Results of Background versus Area 2 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.364
t (critical value) (df = 80)	1.664
One-tailed p-value	0.088
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.386
t (critical value) (df = 69)	1.667
One-tailed p-value	0.085
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.386
t (critical value) (df = 35)	1.687
One-tailed p-value	0.087
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.386	Satterthwaite	69.586	1.667	0.085
	1.386	Cochran-Cox	35.800	1.687	0.087
Equal	1.364		80	1.664	0.088

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:36:08 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $D$8:$D$41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Note: The calculation of the Mann-Whitney's U takes ties into account

Results of Background versus Area 2 Data Comparison

U	865.500
U (expected value)	816.000
U (variance)	11402.06
Z (observed value)	0.464
Z (critical value)	1.645
One-tailed p-value	0.321
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:36:52 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $F$8:f41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1054.000
U (expected value)	800.000
U (variance)	11021.14
Z (observed value)	2.419
Z (critical value)	1.645
One-tailed p-value	0.008
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:37:44 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area2 / range = $G$8:g41 / 34 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	954.500
U (expected value)	800.000
U (variance)	11065.94
Z (observed value)	1.469
Z (critical value)	1.645
One-tailed p-value	0.071
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Results of Background versus Area 3 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:58:22 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $D$8:$D$59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	5.731	1.751	1.323	0.234	2.400	4.850	5.800	6.700	8.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	4.365
F (critical value) (df1 = 50, df2 = 31)	1.950
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	17.136
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.069
F (critical value) (df1 = 1, df2 = 81)	5.216
One-tailed p-value	0.304
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.990
t (critical value) (df = 81)	1.664
One-tailed p-value	0.162
Alpha	0.050

Results of Background versus Area 3 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.146
t (critical value) (df = 76)	1.665
One-tailed p-value	0.128
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.146
t (critical value) (df = 41)	1.681
One-tailed p-value	0.129
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.146	Satterthwaite	76.688	1.665	0.128
	1.146	Cochran-Cox	41.700	1.681	0.129
Equal	0.990		81	1.664	0.162

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:59:33 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $F$8:f59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	0.029	0.000	0.015	0.003	0.016	0.019	0.022	0.041	0.089
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	3.393
F (critical value) (df1 = 49, df2 = 31)	1.954
Two-tailed p-value	0.001
Alpha	0.050

Results of Background versus Area 3 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	12.170
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	8.180
F (critical value) (df1 = 1, df2 = 80)	5.218
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	-1.562
t (critical value) (df = 80)	1.664
One-tailed p-value	0.939
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	-1.763
t (critical value) (df = 78)	1.665
One-tailed p-value	0.959
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	-1.763
t (critical value) (df = 40)	1.683
One-tailed p-value	0.957
Alpha	0.050

Results of Background versus Area 3 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	-1.763	Satterthwaite	78.282	1.665	0.959
	-1.763	Cochran-Cox	40.200	1.683	0.957
Equal	-1.562		80	1.664	0.939

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:00:28 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $G$8:g59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	32	89.853	438.383	20.938	3.701	39.900	79.500	87.950	97.750	144.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.003
F (critical value) (df1 = 31, df2 = 49)	1.863
Two-tailed p-value	0.973
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.000
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.993
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.283
F (critical value) (df1 = 1, df2 = 80)	5.218
One-tailed p-value	0.596
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 3 Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.841
t (critical value) (df = 80)	1.664
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.840
t (critical value) (df = 66)	1.668
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.840
t (critical value) (df = 31)	1.688
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.840	Satterthwaite	66.145	1.668	0.000
	3.840	Cochran-Cox	31	1.688	0.000
Equal	3.841		80	1.664	0.000

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 2:38:47 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $D$8:$D$59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1105.000
U (expected value)	816.000
U (variance)	11414.528
Z (observed value)	2.705
Z (critical value)	1.645
One-tailed p-value	0.003
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 3 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:06:57 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $F$8:f59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	694.500
U (expected value)	800.000
U (variance)	11009.937
Z (observed value)	-1.005
Z (critical value)	1.645
One-tailed p-value	0.843
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:07:56 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area3 / range = $G$8:g59 / 52 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1186.000
U (expected value)	800.000
U (variance)	11066.064
Z (observed value)	3.669
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 4 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:02:29 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $E$9:$E$154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	94	7.279	7.045	2.654	0.274	2.100	5.800	6.700	7.900	20.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.085
F (critical value) (df1 = 50, df2 = 93)	1.604
Two-tailed p-value	0.723
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.108
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.742
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.171
F (critical value) (df1 = 1, df2 = 143)	5.131
One-tailed p-value	0.680
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.410
t (critical value) (df = 143)	1.656
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.357
t (critical value) (df = 99)	1.660
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.357
t (critical value) (df = 50)	1.671
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.357	Satterthwaite	99.173	1.660	< 0.0001
	4.357	Cochran-Cox	50	1.671	< 0.0001
Equal	4.410		143	1.656	< 0.0001

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:11:51 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $G$9:g154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	93	0.046	0.000	0.015	0.002	0.016	0.042	0.049	0.054	0.084
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	3.538
F (critical value) (df1 = 49, df2 = 92)	1.610
Two-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	27.027
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	20.050
F (critical value) (df1 = 1, df2 = 141)	5.133
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.199
t (critical value) (df = 141)	1.656
One-tailed p-value	0.015
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.853
t (critical value) (df = 64)	1.669
One-tailed p-value	0.034
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.853
t (critical value) (df = 50)	1.675
One-tailed p-value	0.035
Alpha	0.050

Results of Background versus Area 4 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.853	Satterthwaite	64.233	1.669	0.034
	1.853	Cochran-Cox	50.300	1.675	0.035
Equal	2.199		141	1.656	0.015

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:12:48 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $H$9:h154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	94	80.711	322.957	17.971	1.854	28.300	70.800	78.650	88.200	155.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.353
F (critical value) (df1 = 49, df2 = 93)	1.608
Two-tailed p-value	0.211
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.498
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.221
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	4.159
F (critical value) (df1 = 1, df2 = 142)	5.132
One-tailed p-value	0.043
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 4 Data Comparison

Student's t test for independent samples / right-tailed test:
Assume the equality of the two theoretical variances

t (observed value)	2.715
t (critical value) (df = 142)	1.656
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.592
t (critical value) (df = 87)	1.662
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:
Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.592
t (critical value) (df = 52)	1.672
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.592	Satterthwaite	87.931	1.662	0.006
	2.592	Cochran-Cox	52.500	1.672	0.006
Equal	2.715		142	1.656	0.004

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:09:13 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $E$9:$E$154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	3940.500
U (expected value)	2397.000
U (variance)	58300.826
Z (observed value)	6.392
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus Area 4 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:10:06 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $G$9:g154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	3056.500
U (expected value)	2325.000
U (variance)	55703.936
Z (observed value)	3.099
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:10:46 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area4 / range = $H$9:h154 / 146 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	3068.500
U (expected value)	2350.000
U (variance)	56789.841
Z (observed value)	3.015
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 5 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:14:49 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $E$9:$E$78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	46	5.783	1.547	1.244	0.183	3.100	4.900	5.500	6.600	8.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	4.941
F (critical value) (df1 = 50, df2 = 45)	1.788
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	26.529
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.077
F (critical value) (df1 = 1, df2 = 95)	5.187
One-tailed p-value	0.153
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.285
t (critical value) (df = 95)	1.661
One-tailed p-value	0.101
Alpha	0.050

Results of Background versus Area 5 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.330
t (critical value) (df = 70)	1.667
One-tailed p-value	0.094
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.330
t (critical value) (df = 47)	1.677
One-tailed p-value	0.095
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.330	Satterthwaite	70.986	1.667	0.094
	1.330	Cochran-Cox	47.400	1.677	0.095
Equal	1.285		95	1.661	0.101

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:16:11 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $G$9:g78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	46	0.048	0.001	0.025	0.004	0.016	0.020	0.048	0.065	0.100
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	1.305
F (critical value) (df1 = 49, df2 = 45)	1.791
Two-tailed p-value	0.368
Alpha	0.050

Results of Background versus Area 5 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.817
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.366
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.148
F (critical value) (df1 = 1, df2 = 94)	5.189
One-tailed p-value	0.701
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.865
t (critical value) (df = 94)	1.661
One-tailed p-value	0.033
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.876
t (critical value) (df = 93)	1.661
One-tailed p-value	0.032
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the altemative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.876
t (critical value) (df = 45)	1.678
One-tailed p-value	0.033
Alpha	0.050

Results of Background versus Area 5 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.876	Satterthwaite	93.778	1.661	0.032
	1.876	Cochran-Cox	45.600	1.678	0.033
Equal	1.865		94	1.661	0.033

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:17:27 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $H$9:h78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	46	122.965	22456.143	149.854	22.095	47.200	71.100	83.950	99.300	887.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	51.379
F (critical value) (df1 = 45, df2 = 49)	1.778
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	124.423
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	10.358
F (critical value) (df1 = 1, df2 = 94)	5.189
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 5 Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.397
t (critical value) (df = 94)	1.661
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.301
t (critical value) (df = 46)	1.678
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.301
t (critical value) (df = 45)	1.679
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.301	Satterthwaite	46.612	1.678	0.013
	2.301	Cochran-Cox	45	1.679	0.013
Equal	2.397		94	1.661	0.009

Results of Background versus Area 5 Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:28:51 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $E$9:$E$78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	1624.500
U (expected value)	1173.000
U (variance)	19139.475
Z (observed value)	3.264
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

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Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:32:11 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $G$9:g78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	1441.500
U (expected value)	1150.000
U (variance)	18533.284
Z (observed value)	2.141
Z (critical value)	1.645
One-tailed p-value	0.016
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:31:04 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area5 / range = $H$9:h78 / 70 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	1580.500
U (expected value)	1150.000
U (variance)	18590.406
Z (observed value)	3.157
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 6 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:20:14 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $E$9:$E$58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	10.820	82.687	9.093	2.033	3.500	6.200	7.950	11.050	41.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	10.817
F (critical value) (df1 = 19, df2 = 50)	2.012
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	44.235
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	13.389
F (critical value) (df1 = 1, df2 = 69)	5.250
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.995
t (critical value) (df = 69)	1.667
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 6 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.709
t (critical value) (df = 20)	1.723
One-tailed p-value	0.007
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.709
t (critical value) (df = 19)	1.727
One-tailed p-value	0.007
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.709	Satterthwaite	20.392	1.723	0.007
	2.709	Cochran-Cox	19	1.727	0.007
Equal	3.995		69	1.667	< 0.0001

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:21:25 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $F$9:f58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	17	0.071	0.000	0.012	0.003	0.049	0.062	0.071	0.079	0.093
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	5.541
F (critical value) (df1 = 49, df2 = 16)	2.475
Two-tailed p-value	0.001
Alpha	0.050

Results of Background versus Area 6 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	12.470
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	7.330
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.709
t (critical value) (df = 65)	1.669
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	6.751
t (critical value) (df = 61)	1.670
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	6.751
t (critical value) (df = 16)	1.701
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 6 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	6.751	Satterthwaite	61.640	1.670	< 0.0001
	6.751	Cochran-Cox	16	1.701	< 0.0001
Equal	4.709		65	1.669	< 0.0001

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:22:24 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $G$9:g58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	17	78.100	111.880	10.577	2.565	54.800	71.850	77.200	85.550	100.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	3.907
F (critical value) (df1 = 49, df2 = 16)	2.475
Two-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	8.463
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	8.363
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 6 Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.213
t (critical value) (df = 65)	1.669
One-tailed p-value	0.115
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.644
t (critical value) (df = 55)	1.673
One-tailed p-value	0.053
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.644
t (critical value) (df = 25)	1.706
One-tailed p-value	0.056
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.644	Satterthwaite	55.030	1.673	0.053
	1.644	Cochran-Cox	25.300	1.706	0.056
Equal	1.213		65	1.669	0.115

Results of Background versus Area 6 Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:34:55 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $E$9:$E$58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	856.000
U (expected value)	510.000
U (variance)	6116.511
Z (observed value)	4.424
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:35:54 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $F$9:f58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	740.000
U (expected value)	425.000
U (variance)	4788.122
Z (observed value)	4.552
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 3:36:32 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area6 / range = $G$9:g58 / 50 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:
Note: The calculation of the Mann-Whitney's U takes ties into account

U	550.500
U (expected value)	425.000
U (variance)	4816.378
Z (observed value)	1.808
Z (critical value)	1.645
One-tailed p-value	0.035
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Results of Background versus Area 7 Data Comparison

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:24:23 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7 / range = $E$9:$E$21 / 13 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	12	5.833	0.361	0.601	0.173	5.000	5.250	5.850	6.350	6.700
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	21.199
F (critical value) (df1 = 50, df2 = 11)	3.027
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	21.419
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.209
F (critical value) (df1 = 1, df2 = 61)	5.281
One-tailed p-value	0.142
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.769
t (critical value) (df = 61)	1.670
One-tailed p-value	0.223
Alpha	0.050

Results of Background versus Area 7 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.463
t (critical value) (df = 60)	1.670
One-tailed p-value	0.074
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.463
t (critical value) (df = 30)	1.696
One-tailed p-value	0.077
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.463	Satterthwaite	60.927	1.670	0.074
	1.463	Cochran-Cox	30.300	1.696	0.077
Equal	0.769		61	1.670	0.223

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:25:24 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7 / range = $G$9:g21 / 13 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	12	0.057	0.000	0.015	0.004	0.020	0.053	0.060	0.065	0.077
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	3.659
F (critical value) (df1 = 49, df2 = 11)	3.030
Two-tailed p-value	0.024
Alpha	0.050

Results of Background versus Area 7 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	5.516
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.019
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	4.555
F (critical value) (df1 = 1, df2 = 60)	5.286
One-tailed p-value	0.037
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.290
t (critical value) (df = 60)	1.671
One-tailed p-value	0.013
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.314
t (critical value) (df = 33)	1.692
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.314
t (critical value) (df = 15)	1.740
One-tailed p-value	0.002
Alpha	0.050

Results of Background versus Area 7 Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.314	Satterthwaite	33.076	1.692	0.001
	3.314	Cochran-Cox	15.800	1.740	0.002
Equal	2.290		60	1.671	0.013

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 2:26:37 PM
Sample 1: workbook = Statistics_new data.xls / sheet = Area7 / range = $H$9:h21 / 13 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	12	84.017	68.107	8.253	2.382	68.000	79.900	84.250	88.550	97.800
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	6.417
F (critical value) (df1 = 49, df2 = 11)	3.030
Two-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	10.044
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	8.882
F (critical value) (df1 = 1, df2 = 60)	5.286
One-tailed p-value	0.004
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 7 Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.999
t (critical value) (df = 60)	1.671
One-tailed p-value	0.025
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.253
t (critical value) (df = 46)	1.678
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.253
t (critical value) (df = 18)	1.724
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.253	Satterthwaite	46.314	1.678	0.001
	3.253	Cochran-Cox	18.700	1.724	0.002
Equal	1.999		60	1.671	0.025

MANN-WHITNEY TEST AND STUDENT'S T TEST OUTPUT RESULTS

COMPARISON OF BACKGROUND WITH SEAD-50/54 WHOLE SITE DATA

1. **SEAD-50/54 All Floor vs. Background**
2. **SEAD-50/54 All Perimeter vs. Background**
3. **SEAD-50/54 Whole Site vs. Background**

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:48:40 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $D$7:$D$374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	9445.000
U (expected value)	6630.000
U (variance)	344590.210
Z (observed value)	4.795
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:49:43 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $F$7:f374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	8827.000
U (expected value)	6425.000
U (variance)	329592.679
Z (observed value)	4.184
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 10:50:33 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $G$7:g374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	7571.500
U (expected value)	6425.000
U (variance)	329809.622
Z (observed value)	1.996
Z (critical value)	1.645
One-tailed p-value	0.023
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:29:45 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $D$7:$D$374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	260	6.222	3.641	1.908	0.118	2.800	5.000	5.900	7.000	16.300
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	2.099
F (critical value) (df1 = 50, df2 = 259)	1.492
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	13.417
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.338
F (critical value) (df1 = 1, df2 = 309)	5.073
One-tailed p-value	0.561
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.184
t (critical value) (df = 309)	1.650
One-tailed p-value	0.001
Alpha	0.050

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.494
t (critical value) (df = 59)	1.671
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.494
t (critical value) (df = 50)	1.674
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.494	Satterthwaite	59.680	1.671	0.008
	2.494	Cochran-Cox	50.300	1.674	0.008
Equal	3.184		309	1.650	0.001

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:31:14 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $F$7:f374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	257	0.049	0.000	0.017	0.001	0.016	0.042	0.049	0.058	0.100
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.784
F (critical value) (df1 = 49, df2 = 256)	1.497
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Bartlett's test:

Chi-square (observed value)	26.506
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	21.492
F (critical value) (df1 = 1, df2 = 305)	5.074
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.717
t (critical value) (df = 305)	1.650
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.670
t (critical value) (df = 56)	1.673
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.670
t (critical value) (df = 49)	1.675
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.670	Satterthwaite	56.036	1.673	0.005
	2.670	Cochran-Cox	49	1.675	0.005
Equal	3.717		305	1.650	0.000

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:32:02 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Floor / range = $G$7:g374 / 368 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	257	79.147	2156.107	46.434	2.896	35.600	65.050	75.600	84.700	769.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	4.933
F (critical value) (df1 = 256, df2 = 49)	1.598
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	36.144
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.030
F (critical value) (df1 = 1, df2 = 305)	5.074
One-tailed p-value	0.862
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Results of Background versus SEAD-50/54 All Floor Sample Data Comparison

Assume the equality of the two theoretical variances

t (observed value)	1.117
t (critical value) (df = 305)	1.650
One-tailed p-value	0.133
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.808
t (critical value) (df = 159)	1.654
One-tailed p-value	0.036
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.808
t (critical value) (df = 76)	1.664
One-tailed p-value	0.037
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.808	Satterthwaite	159.984	1.654	0.036
	1.808	Cochran-Cox	76.600	1.664	0.037
Equal	1.117		305	1.650	0.133

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:02:40 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $D$8:$D$293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	5326.000
U (expected value)	4207.500
U (variance)	152075.213
Z (observed value)	2.868
Z (critical value)	1.645
One-tailed p-value	0.002
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:03:29 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $F$8:f293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	4589.000
U (expected value)	4050.000
U (variance)	143625.067
Z (observed value)	1.422
Z (critical value)	1.645
One-tailed p-value	0.077
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:04:09 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $G$8:g293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	5770.000
U (expected value)	4025.000
U (variance)	142211.761
Z (observed value)	4.627
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:26:18 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $D$8:$D$293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	165	6.275	17.133	4.139	0.322	2.100	4.500	5.400	6.900	41.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	2.241
F (critical value) (df1 = 164, df2 = 50)	1.615
Two-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	10.621
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.199
F (critical value) (df1 = 1, df2 = 214)	5.095
One-tailed p-value	0.275
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.716
t (critical value) (df = 214)	1.652
One-tailed p-value	0.044
Alpha	0.050

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.108
t (critical value) (df = 124)	1.657
One-tailed p-value	0.019
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.108
t (critical value) (df = 66)	1.667
One-tailed p-value	0.019
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.108	Satterthwaite	124.981	1.657	0.019
	2.108	Cochran-Cox	66.000	1.667	0.019
Equal	1.716		214	1.652	0.044

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:27:30 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $F$8:f293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	162	0.044	0.002	0.047	0.004	0.016	0.020	0.042	0.056	0.560
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Fisher's F test:

F (observed value)	2.769
F (critical value) (df1 = 161, df2 = 49)	1.623
Two-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	15.887
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.001
F (critical value) (df1 = 1, df2 = 210)	5.097
One-tailed p-value	0.970
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.911
t (critical value) (df = 210)	1.652
One-tailed p-value	0.182
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.175
t (critical value) (df = 137)	1.656
One-tailed p-value	0.121
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.175
t (critical value) (df = 68)	1.666
One-tailed p-value	0.122
Alpha	0.050

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.175	Satterthwaite	137.880	1.656	0.121
	1.175	Cochran-Cox	68.200	1.666	0.122
Equal	0.911		210	1.652	0.182

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:28:32 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite_Perimeter / range = $G$8:g293 / 286 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	161	125.811	40522.706	201.303	15.865	28.300	72.750	85.400	102.000	1960.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	92.715
F (critical value) (df1 = 160, df2 = 49)	1.624
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	165.592
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	4.682
F (critical value) (df1 = 1, df2 = 209)	5.097
One-tailed p-value	0.032
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant

Results of Background versus SEAD-50/54 All Perimeter Data Comparison

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.896
t (critical value) (df = 209)	1.652
One-tailed p-value	0.030
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.355
t (critical value) (df = 170)	1.654
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.355
t (critical value) (df = 79)	1.655
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.355	Satterthwaite	170.635	1.654	0.000
	3.355	Cochran-Cox	79.200	1.655	0.001
Equal	1.896		209	1.652	0.030

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Mann-Whitney Test

As XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:06:37 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $D$7:$D$661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	14771.000
U (expected value)	10837.500
U (variance)	861188.253
Z (observed value)	4.239
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Hg XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:07:29 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $F$7:f661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	13416.000
U (expected value)	10475.000
U (variance)	820123.081
Z (observed value)	3.248
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/6/03 at 11:08:10 AM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $G$7:g661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	13341.500
U (expected value)	10450.000
U (variance)	816828.709
Z (observed value)	3.199
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:33:42 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $D$7:$D$661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	425	6.243	8.852	2.975	0.144	2.100	4.800	5.700	6.975	41.900
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	1.158
F (critical value) (df1 = 424, df2 = 50)	1.573
Two-tailed p-value	0.533
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.460
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.498
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.147
F (critical value) (df1 = 1, df2 = 474)	5.056
One-tailed p-value	0.701
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Assume the equality of the two theoretical variances

t (observed value)	2.353
t (critical value) (df = 474)	1.648
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.493
t (critical value) (df = 64)	1.669
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.493
t (critical value) (df = 52)	1.673
One-tailed p-value	0.008
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.493	Satterthwaite	64.713	1.669	0.008
	2.493	Cochran-Cox	52.400	1.673	0.008
Equal	2.353		474	1.648	0.010

Hg XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:34:50 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $F$7:f661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $C$2:c55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	419	0.047	0.001	0.032	0.002	0.016	0.026	0.048	0.057	0.560
Hg_bkg	50	0.038	0.001	0.028	0.004	0.005	0.020	0.030	0.050	0.130

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Fisher's F test:

F (observed value)	1.293
F (critical value) (df1 = 418, df2 = 49)	1.581
Two-tailed p-value	0.269
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.343
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.247
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	1.692
F (critical value) (df1 = 1, df2 = 467)	5.056
One-tailed p-value	0.194
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.946
t (critical value) (df = 467)	1.648
One-tailed p-value	0.026
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.153
t (critical value) (df = 65)	1.669
One-tailed p-value	0.018
Alpha	0.050

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.153
t (critical value) (df = 53)	1.673
One-tailed p-value	0.018
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.153	Satterthwaite	65.103	1.669	0.018
	2.153	Cochran-Cox	53.000	1.673	0.018
Equal	1.946		467	1.648	0.026

Zn XLSTAT 6.1.9 - Comparing 2 Samples - 10/6/03 at 1:35:42 PM
Sample 1: workbook = Statistics_new data.xls / sheet = WholeSite / range = $G$7:g661 / 655 rows and 1 column
Sample 2: workbook = Statistics_new data.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	418	97.121	17388.841	131.867	6.450	28.300	67.200	78.450	91.300	1960.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	39.785
F (critical value) (df1 = 417, df2 = 49)	1.581
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	129.204
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.436
F (critical value) (df1 = 1, df2 = 466)	5.057
One-tailed p-value	0.231
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.362
t (critical value) (df = 466)	1.648
One-tailed p-value	0.087
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.588
t (critical value) (df = 443)	1.648
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.588
t (critical value) (df = 65)	1.653
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus SEAD-50/54 Whole Site Data Comparison

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.588	Satterthwaite	443.871	1.648	0.000
	3.588	Cochran-Cox	65.000	1.653	0.000
Equal	1.362		466	1.648	0.087

MANN-WHITNEY TEST AND STUDENT'S T TEST OUTPUT RESULTS

COMPARISON OF BACKGROUND WITH SEAD-50/54 DATA WITH TAGM EXCEEDANCES REMOVED

1. Area 1 Floor With As TAGM Exceedances Removed vs. Background
2. Area 1 Perimeter With Zn TAGM Exceedances Removed vs. Background
3. Area 2 Perimeter With Zn TAGM Exceedances Removed vs. Background
4. Area 3 Floor With As TAGM Exceedances Removed vs. Background
5. Area 3 Floor With Zn TAGM Exceedances Removed vs. Background
6. Area 3 Perimeter With Zn TAGM Exceedances Removed vs. Background
7. Area 4 Floor With As TAGM Exceedances Removed vs. Background
8. Area 4 Floor With Zn TAGM Exceedances Removed vs. Background
9. Area 4 Perimeter With As TAGM Exceedances Removed vs. Background
10. Area 4 Perimeter With Zn TAGM Exceedances Removed vs. Background
11. Area 5 Floor With As TAGM Exceedances Removed vs. Background
12. Area 5 Perimeter With Zn TAGM Exceedances Removed vs. Background
13. Area 6 Floor With As TAGM Exceedances Removed vs. Background
14. Area 6 Perimeter With As TAGM Exceedances Removed vs. Background
15. Area 1 Floor With As TAGM Exceedances Removed vs. Background

Results of Background versus Area 1 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As **10 TAGM exceedence replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:16:54 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1F_remove / range = $C$7:$C$175 / 169 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	4097.000
U (expected value)	3213.000
U (variance)	95228.753
Z (observed value)	2.865
Z (critical value)	1.645
One-tailed p-value	0.002
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As **10 TAGM exceedence replaced by average - 5.4 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:20:31 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1F_remove / range = $D$7:d175 / 169 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	3957.000
U (expected value)	3213.000
U (variance)	95202.452
Z (observed value)	2.411
Z (critical value)	1.645
One-tailed p-value	0.008
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As **10 TAGM exceedence replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 2:21:40 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1F_remove / range = $C$7:$C$175 / 169 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:$B$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 1 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	126	5.638	1.974	1.405	0.125	2.800	4.600	5.550	6.700	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Levene's test:

F (observed value)	2.315
F (critical value) (df1 = 1, df2 = 175)	5.111
One-tailed p-value	0.130
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.352
t (critical value) (df = 175)	1.654
One-tailed p-value	0.089
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.046
t (critical value) (df = 60)	1.670
One-tailed p-value	0.150
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.046
t (critical value) (df = 50)	1.674
One-tailed p-value	0.150
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.046	Satterthwaite	60.734	1.670	0.150
	1.046	Cochran-Cox	50.700	1.674	0.150
Equal	1.352		175	1.654	0.089

Results of Background versus Area 1 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

As **10 TAGM exceedence replaced by average - 5.4 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 2:24:12 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1F_remove / range = $D$7:d175 / 169 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:$B$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	126	5.416	1.404	1.185	0.106	2.800	4.600	5.400	6.100	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	5.445
F (critical value) (df1 = 50, df2 = 125)	1.559
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	58.289
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	6.225
F (critical value) (df1 = 1, df2 = 175)	5.111
One-tailed p-value	0.014
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.686
t (critical value) (df = 175)	1.654
One-tailed p-value	0.247
Alpha	0.050

Results of Background versus Area 1 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.507
t (critical value) (df = 57)	1.672
One-tailed p-value	0.307
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.507
t (critical value) (df = 50)	1.675
One-tailed p-value	0.307
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.507	Satterthwaite	57.583	1.672	0.307
	0.507	Cochran-Cox	50	1.675	0.307
Equal	0.686		175	1.654	0.247

Results of Background versus Area 1 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn 21 exceedences replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/7/03 at 4:09:17 PM
Sample 1: workbook = statistics_approach.xls / sheet = Area1P_removed / range = $G$8:$G$117 / 110 rows and 1 column
Sample 2: workbook = statistics_approach.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2207.500
U (expected value)	1525.000
U (variance)	28273.575
Z (observed value)	4.059
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn 21 exceedences replaced by average - 78 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/7/03 at 4:10:17 PM
Sample 1: workbook = statistics_approach.xls / sheet = Area1P_removed / range = $H$8:h117 / 110 rows and 1 column
Sample 2: workbook = statistics_approach.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1913.500
U (expected value)	1525.000
U (variance)	28273.575
Z (observed value)	2.310
Z (critical value)	1.645
One-tailed p-value	0.010
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn 21 exceedences replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 2:34:05 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1P_removed / range = $G$8:g117 / 110 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 1 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	61	88.369	396.045	19.901	2.548	45.700	73.150	88.800	109.000	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.104
F (critical value) (df1 = 49, df2 = 60)	1.702
Two-tailed p-value	0.711
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.130
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.718
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.032
F (critical value) (df1 = 1, df2 = 109)	5.166
One-tailed p-value	0.859
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.301
t (critical value) (df = 109)	1.659
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 1 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	4.280
t (critical value) (df = 102)	1.660
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	4.280
t (critical value) (df = 49)	1.674
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	4.280	Satterthwaite	102.597	1.660	< 0.0001
	4.280	Cochran-Cox	49	1.674	< 0.0001
Equal	4.301		109	1.659	< 0.0001

Zn 21 exceedences replaced by average - 78 mg/kg
XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 2:32:09 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area1P_removed / range = $H$8:h117 / 110 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	61	77.697	168.906	12.996	1.664	45.700	73.150	78.000	83.100	106.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.588
F (critical value) (df1 = 49, df2 = 60)	1.702
Two-tailed p-value	0.001
Alpha	0.050

Results of Background versus Area 1 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	12.016
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	15.294
F (critical value) (df1 = 1, df2 = 109)	5.166
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.859
t (critical value) (df = 109)	1.659
One-tailed p-value	0.033
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.778
t (critical value) (df = 78)	1.664
One-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 1 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.778
t (critical value) (df = 49)	1.675
One-tailed p-value	0.041
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.778	Satterthwaite	78.525	1.664	0.040
	1.778	Cochran-Cox	49.600	1.675	0.041
Equal	1.859		109	1.659	0.033

Results of Background versus Area 2 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn 1 exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:40:52 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area2P_removed / range = $G$8:$G$24 / 17 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	536.000
U (expected value)	400.000
U (variance)	4466.200
Z (observed value)	2.035
Z (critical value)	1.645
One-tailed p-value	0.021
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn 1 exceedence replaced by average - 79 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:42:42 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area2P_removed / range = $H$8:h24 / 17 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	522.000
U (expected value)	400.000
U (variance)	4466.200
Z (observed value)	1.826
Z (critical value)	1.645
One-tailed p-value	0.034
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn 1 exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 2:44:32 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area2P_removed / range = $G$8:$G$24 / 17 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	81.056	287.801	16.965	4.241	45.600	72.050	76.350	97.250	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 2 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	1.519
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.379
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.906
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.341
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.924
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.340
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.631
t (critical value) (df = 64)	1.669
One-tailed p-value	0.054
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.817
t (critical value) (df = 30)	1.696
One-tailed p-value	0.039
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 2 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.817
t (critical value) (df = 19)	1.728
One-tailed p-value	0.042
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.817	Satterthwaite	30.888	1.696	0.039
	1.817	Cochran-Cox	19.000	1.728	0.042
Equal	1.631		64	1.669	0.054

Zn 1 exceedence replaced by average 79 mg/kg
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 2:45:57 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area2P_removed / range = $H$8:h24 / 17 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	79.181	232.276	15.241	3.810	45.600	72.050	76.350	90.550	106.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.882
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.180
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.990
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.158
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	2.714
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.104
Alpha	0.050

Results of Background versus Area 2 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.327
t (critical value) (df = 64)	1.669
One-tailed p-value	0.095
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.559
t (critical value) (df = 34)	1.690
One-tailed p-value	0.064
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.559
t (critical value) (df = 19)	1.724
One-tailed p-value	0.067
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.559	Satterthwaite	34.656	1.690	0.064
	1.559	Cochran-Cox	19.900	1.724	0.067
Equal	1.327		64	1.669	0.095

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As **1 TAGM exceedence replaced by 8.2 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:57:05 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $D$8:$D$30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	635.500
U (expected value)	408.000
U (variance)	4619.940
Z (observed value)	3.347
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As **1 TAGM exceedence replaced by average - 6.1 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 2:58:02 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $E$8:e30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	629.500
U (expected value)	408.000
U (variance)	4619.940
Z (observed value)	3.259
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As **1 TAGM exceedence replaced by 8.2 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 2:59:18 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $D$8:$D$30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	6.225	1.055	1.027	0.257	4.400	5.550	6.300	6.900	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Fisher's F test:

F (observed value)	7.244
F (critical value) (df1 = 50, df2 = 15)	2.549
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	14.931
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.373
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.246
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.428
t (critical value) (df = 65)	1.669
One-tailed p-value	0.079
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.179
t (critical value) (df = 63)	1.669
One-tailed p-value	0.017
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.179
t (critical value) (df = 28)	1.699
One-tailed p-value	0.019
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.179	Satterthwaite	63.014	1.669	0.017
	2.179	Cochran-Cox	28.100	1.699	0.019
Equal	1.428		65	1.669	0.079

As **1 TAGM exceedence replaced by average - 6.1 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:01:29 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $E$8:e30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	6.094	0.778	0.882	0.221	4.400	5.550	6.150	6.800	7.400
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	9.826
F (critical value) (df1 = 50, df2 = 15)	2.549
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	18.732
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	1.894
F (critical value) (df1 = 1, df2 = 65)	5.265
One-tailed p-value	0.173
Alpha	0.050

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.249
t (critical value) (df = 65)	1.669
One-tailed p-value	0.108
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.977
t (critical value) (df = 64)	1.669
One-tailed p-value	0.026
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.977
t (critical value) (df = 30)	1.695
One-tailed p-value	0.028
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.977	Satterthwaite	64.927	1.669	0.026
	1.977	Cochran-Cox	30.700	1.695	0.028
Equal	1.249		65	1.669	0.108

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn 1 exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:09:07 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $H$8:$H$30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	607.500
U (expected value)	400.000
U (variance)	4466.387
Z (observed value)	3.105
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn 1 exceedence replaced by average - 87 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:10:34 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $I$8:i30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	599.500
U (expected value)	400.000
U (variance)	4466.387
Z (observed value)	2.985
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn 1 exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:11:32 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $H$8:$H$30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	88.606	193.169	13.899	3.475	58.000	81.000	90.150	97.750	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	2.263
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.085
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	3.201
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.074
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	3.417
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.069
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.026
t (critical value) (df = 64)	1.669
One-tailed p-value	0.002
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.714
t (critical value) (df = 38)	1.685
One-tailed p-value	0.000
Alpha	0.050

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.714
t (critical value) (df = 18)	1.721
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.714	Satterthwaite	38.419	1.685	0.000
	3.714	Cochran-Cox	18.500	1.721	0.001
Equal	3.026		64	1.669	0.002

Zn 1 exceedence replaced by average - 87mg/kg
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:12:29 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3F_removed / range = $I$8:i30 / 23 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	87.231	163.597	12.791	3.198	58.000	81.000	88.350	94.950	108.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.672
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	4.484
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.034
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Results of Background versus Area 3 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Levene's test:

F (observed value)	4.905
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.030
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.806
t (critical value) (df = 64)	1.669
One-tailed p-value	0.003
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.575
t (critical value) (df = 42)	1.682
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.575
t (critical value) (df = 19)	1.718
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.575	Satterthwaite	42.175	1.682	0.000
	3.575	Cochran-Cox	19.500	1.718	0.001
Equal	2.806		64	1.669	0.003

Results of Background versus Area 3 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn - 3P **4 exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:17:01 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3P_removed / range = $G$9:$G$37 / 29 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	568.500
U (expected value)	400.000
U (variance)	4465.455
Z (observed value)	2.522
Z (critical value)	1.645
One-tailed p-value	0.006
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn - 3P **4 exceedences replaced by average - 78 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:18:07 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3P_removed / range = $H$9:h37 / 29 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	512.500
U (expected value)	400.000
U (variance)	4465.455
Z (observed value)	1.684
Z (critical value)	1.645
One-tailed p-value	0.046
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not s
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn - 3P **4 exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 2:57:32 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3P_removed / range = $G$9:$G$37 / 29 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	85.850	346.027	18.602	4.650	39.900	76.200	82.900	102.300	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 3 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	1.263
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.639
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.293
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.588
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.597
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.442
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.422
t (critical value) (df = 64)	1.669
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.574
t (critical value) (df = 28)	1.701
One-tailed p-value	0.008
Alpha	0.050

Results of Background versus Area 3 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.574
t (critical value) (df = 18)	1.731
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.574	Satterthwaite	28.168	1.701	0.008
	2.574	Cochran-Cox	18.200	1.731	0.009
Equal	2.422		64	1.669	0.009

Zn - 3P **4 exceedences replaced by average - 78 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 2:58:22 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area3P_removed / range = $H$9:h37 / 29 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:$D$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	16	78.100	155.480	12.469	3.117	39.900	76.000	78.200	82.900	95.600
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	2.811
F (critical value) (df1 = 49, df2 = 15)	2.552
Two-tailed p-value	0.032
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	4.910
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.027
Alpha	0.050

Results of Background versus Area 3 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	7.934
F (critical value) (df1 = 1, df2 = 64)	5.269
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.163
t (critical value) (df = 64)	1.669
One-tailed p-value	0.125
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.498
t (critical value) (df = 43)	1.681
One-tailed p-value	0.071
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.498
t (critical value) (df = 21)	1.717
One-tailed p-value	0.074
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 3 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.498	Satterthwaite	43.379	1.681	0.071
	1.498	Cochran-Cox	21.900	1.717	0.074
Equal	1.163		64	1.669	0.125

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As_4F **10 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:31:00 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $E$9:$E$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2564.500
U (expected value)	1530.000
U (variance)	28508.875
Z (observed value)	6.127
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As_4F **10 TAGM exceedences replaced by average - 6.6 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:32:11 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $F$9:f103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	2539.500
U (expected value)	1530.000
U (variance)	28488.826
Z (observed value)	5.981
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As_4F **10 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:33:39 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $E$9:$E$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	6.853	1.254	1.120	0.145	4.300	6.050	6.750	7.950	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Fisher's F test:

F (observed value)	6.094
F (critical value) (df1 = 50, df2 = 59)	1.703
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	40.603
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	3.183
F (critical value) (df1 = 1, df2 = 109)	5.166
One-tailed p-value	0.077
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	4.210
t (critical value) (df = 109)	1.659
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.970
t (critical value) (df = 63)	1.669
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.970
t (critical value) (df = 50)	1.675
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.970	Satterthwaite	63.868	1.669	< 0.0001
	3.970	Cochran-Cox	50	1.675	0.000
Equal	4.210		109	1.659	< 0.0001

As_4F **10 TAGM exceedences replaced by average - 6.6 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:34:32 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $F$9:f103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	6.587	0.886	0.941	0.121	4.300	6.050	6.600	7.400	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	8.632
F (critical value) (df1 = 50, df2 = 59)	1.703
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	55.678
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	6.676
F (critical value) (df1 = 1, df2 = 109)	5.166
One-tailed p-value	0.011
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	3.613
t (critical value) (df = 109)	1.659
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.386
t (critical value) (df = 59)	1.671
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.386
t (critical value) (df = 50)	1.675
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.386	Satterthwaite	59.840	1.671	0.001
	3.386	Cochran-Cox	50	1.675	0.001
Equal	3.613		109	1.659	0.000

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn-4F 1 TAGM exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:35:22 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $I$9:$I$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1880.500
U (expected value)	1500.000
U (variance)	27749.124
Z (observed value)	2.284
Z (critical value)	1.645
One-tailed p-value	0.011
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn-4F 1 TAGM exceedence replaced by average - 77 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:36:40 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $J$9:$J$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1866.500
U (expected value)	1500.000
U (variance)	27749.124
Z (observed value)	2.200
Z (critical value)	1.645
One-tailed p-value	0.014
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn-4F 1 TAGM exceedence replaced by 109 mg/kg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:37:39 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $I$9:$I$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	77.573	151.430	12.306	1.589	35.600	69.650	77.800	83.950	110.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	2.886
F (critical value) (df1 = 49, df2 = 59)	1.707
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	14.702
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	15.555
F (critical value) (df1 = 1, df2 = 108)	5.167
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.841
t (critical value) (df = 108)	1.659
One-tailed p-value	0.034
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.761
t (critical value) (df = 76)	1.665
One-tailed p-value	0.041
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.761
t (critical value) (df = 49)	1.675
One-tailed p-value	0.042
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.761	Satterthwaite	76.110	1.665	0.041
	1.761	Cochran-Cox	49.200	1.675	0.042
Equal	1.841		108	1.659	0.034

Zn-4F **1 TAGM exceedence replaced by average - 77mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 3:42:00 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4F_removed / range = $J$9:$J$103 / 95 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	60	77.040	134.407	11.593	1.497	35.600	69.650	77.350	83.850	110.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	3.252
F (critical value) (df1 = 49, df2 = 59)	1.707
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	18.072
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	18.449
F (critical value) (df1 = 1, df2 = 108)	5.167
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.703
t (critical value) (df = 108)	1.659
One-tailed p-value	0.046
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.622
t (critical value) (df = 73)	1.666
One-tailed p-value	0.055
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.622
t (critical value) (df = 49)	1.675
One-tailed p-value	0.055
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 4 Floor Data Comparison After TAGM Exceedences Being Removed - Zinc

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.622	Satterthwaite	73.332	1.666	0.055
	1.622	Cochran-Cox	49.200	1.675	0.055
Equal	1.703		108	1.659	0.046

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As-4P **5 exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 3:59:35 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $D$8:$D$57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1342.000
U (expected value)	867.000
U (variance)	12411.579
Z (observed value)	4.264
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As-4P **5 exceedences replaced by average - 6.1 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:01:21 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $E$8:e57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1312.000
U (expected value)	867.000
U (variance)	12411.579
Z (observed value)	3.994
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As-4P **5 exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:02:33 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $D$8:$D$57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	6.429	2.026	1.424	0.244	2.100	5.500	6.500	7.500	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Fisher's F test:

F (observed value)	3.772
F (critical value) (df1 = 50, df2 = 33)	1.918
Two-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	14.941
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.000
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.753
F (critical value) (df1 = 1, df2 = 83)	5.211
One-tailed p-value	0.388
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.362
t (critical value) (df = 83)	1.663
One-tailed p-value	0.010
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.658
t (critical value) (df = 78)	1.664
One-tailed p-value	0.005
Alpha	0.050

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.658
t (critical value) (df = 40)	1.681
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.658	Satterthwaite	78.792	1.664	0.005
	2.658	Cochran-Cox	40.900	1.681	0.005
Equal	2.362		83	1.663	0.010

As-4P **5 exceedences replaced by average - 6.1 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:03:30 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $E$8:e57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	6.121	1.470	1.212	0.208	2.100	5.500	6.100	7.100	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	5.202
F (critical value) (df1 = 50, df2 = 33)	1.918
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	21.986
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.237
F (critical value) (df1 = 1, df2 = 83)	5.211
One-tailed p-value	0.139
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.800
t (critical value) (df = 83)	1.663
One-tailed p-value	0.038
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.066
t (critical value) (df = 73)	1.666
One-tailed p-value	0.021
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.066
t (critical value) (df = 43)	1.680
One-tailed p-value	0.022
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.066	Satterthwaite	73.707	1.666	0.021
	2.066	Cochran-Cox	43.300	1.680	0.022
Equal	1.800		83	1.663	0.038

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn_4P **3 TAGM exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:05:05 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $H$8:$H$57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1179.500
U (expected value)	850.000
U (variance)	12040.204
Z (observed value)	3.003
Z (critical value)	1.645
One-tailed p-value	0.001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn_4P **3 TAGM exceedences replaced by average - 80 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:08:28 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $I$8:i57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1137.500
U (expected value)	850.000
U (variance)	12040.204
Z (observed value)	2.620
Z (critical value)	1.645
One-tailed p-value	0.004
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

Zn_4P **3 TAGM exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:09:51 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $H$8:$H$57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	82.982	296.890	17.230	2.955	28.300	72.000	86.400	95.300	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	1.472
F (critical value) (df1 = '	1.922
Two-tailed p-value	0.243
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.412
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.235
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	1.688
F (critical value) (df1 = 1, df2 = 82)	5.213
One-tailed p-value	0.197
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.610
t (critical value) (df = 82)	1.664
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.708
t (critical value) (df = 78)	1.664
One-tailed p-value	0.004
Alpha	0.050

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.708
t (critical value) (df = 37)	1.684
One-tailed p-value	0.005
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.708	Satterthwaite	78.894	1.664	0.004
	2.708	Cochran-Cox	37.200	1.684	0.005
Equal	2.610		82	1.664	0.005

Zn_4P **3 TAGM exceedences replaced by average - 80 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:10:42 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area4P_removed / range = $I$8:i57 / 50 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	34	80.424	229.415	15.146	2.598	28.300	72.000	80.050	90.200	102.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.905
F (critical value) (df1 = 4	1.922
Two-tailed p-value	0.053
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	3.821
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.051
Alpha	0.050

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	4.794
F (critical value) (df1 = 1, df2 = 82)	5.213
One-tailed p-value	0.031
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.096
t (critical value) (df = 82)	1.664
One-tailed p-value	0.020
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.226
t (critical value) (df = 81)	1.664
One-tailed p-value	0.014
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.226
t (critical value) (df = 39)	1.683
One-tailed p-value	0.016
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 4 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.226	Satterthwaite	81.626	1.664	0.014
	2.226	Cochran-Cox	39.100	1.683	0.016
Equal	2.096		82	1.664	0.020

Results of Background versus Area 5 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As_5F 1 TAGM exceedence replaced by 8.2 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:25:06 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5F_removed / range = $E$9:$E$39 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	1002.500
U (expected value)	663.000
U (variance)	8610.956
Z (observed value)	3.659
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As_5F 1 TAGM exceedence replaced by average - 6.0 mg/kg

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:26:39 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5F_removed / range = $F$9:f39 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	995.500
U (expected value)	663.000
U (variance)	8610.956
Z (observed value)	3.583
Z (critical value)	1.645
One-tailed p-value	0.000
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As_5F 1 TAGM exceedence replaced by 8.2 mg/kg

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:27:26 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5F_removed / range = $E$9:$E$39 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	26	6.050	0.952	0.976	0.191	4.400	5.300	6.200	6.600	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Results of Background versus Area 5 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Fisher's F test:

F (observed value)	8.028
F (critical value) (df1 = 50, df2 = 25)	2.079
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	25.794
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.165
F (critical value) (df1 = 1, df2 = 75)	5.232
One-tailed p-value	0.145
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.493
t (critical value) (df = 75)	1.665
One-tailed p-value	0.070
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.939
t (critical value) (df = 69)	1.667
One-tailed p-value	0.028
Alpha	0.050

Results of Background versus Area 5 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.939
t (critical value) (df = 40)	1.682
One-tailed p-value	0.030
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.939	Satterthwaite	69.160	1.667	0.028
	1.939	Cochran-Cox	40.500	1.682	0.030
Equal	1.493		75	1.665	0.070

As_5F 1 TAGM exceedence replaced by average - 6.0 mg/kg
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:28:22 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5F_removed / range = $F$9:f39 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	26	5.965	0.760	0.872	0.171	4.400	5.300	6.050	6.600	7.500
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	10.059
F (critical value) (df1 = 50, df2 = 25)	2.079
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	30.467
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 5 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.709
F (critical value) (df1 = 1, df2 = 75)	5.232
One-tailed p-value	0.104
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.350
t (critical value) (df = 75)	1.665
One-tailed p-value	0.090
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.778
t (critical value) (df = 66)	1.668
One-tailed p-value	0.040
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.778
t (critical value) (df = 41)	1.681
One-tailed p-value	0.041
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Results of Background versus Area 5 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.778	Satterthwaite	66.355	1.668	0.040
	1.778	Cochran-Cox	41.800	1.681	0.041
Equal	1.350		75	1.665	0.090

Results of Background versus Area 5 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Mann-Whitney Test

Zn-5P **5 TAGM exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:34:51 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5P_removed / range = $I$9:$I$46 / 38 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	689.000
U (expected value)	500.000
U (variance)	5913.975
Z (observed value)	2.458
Z (critical value)	1.645
One-tailed p-value	0.007
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Zn-5P **5 TAGM exceedences replaced by average - 78 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:37:36 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5P_removed / range = $J$9:j46 / 38 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	619.000
U (expected value)	500.000
U (variance)	5913.975
Z (observed value)	1.547
Z (critical value)	1.645
One-tailed p-value	0.061
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is not significant.

Student's T Test

Zn-5P **5 TAGM exceedences replaced by 109 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:38:53 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5P_removed / range = $I$9:$I$46 / 38 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	85.855	445.108	21.098	4.718	47.200	68.750	87.100	107.500	109.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Results of Background versus Area 5 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Fisher's F test:

F (observed value)	1.018
F (critical value) (df1 = 19, df2 = 49)	2.018
Two-tailed p-value	0.917
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	0.002
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.962
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.235
F (critical value) (df1 = 1, df2 = 68)	5.254
One-tailed p-value	0.630
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.559
t (critical value) (df = 68)	1.668
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	2.549
t (critical value) (df = 34)	1.690
One-tailed p-value	0.008
Alpha	0.050

Results of Background versus Area 5 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	2.549
t (critical value) (df = 22)	1.714
One-tailed p-value	0.009
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	2.549	Satterthwaite	34.776	1.690	0.008
	2.549	Cochran-Cox	22.300	1.714	0.009
Equal	2.559		68	1.668	0.006

Zn-5P **5 TAGM exceedences replaced by average - 78 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:39:38 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area5P_removed / range = $J$9:$J$46 / 38 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $D$2:d55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	20	78.105	257.150	16.036	3.586	47.200	68.750	78.000	87.100	106.000
Zn_bkg	50	71.664	437.067	20.906	2.957	34.700	57.900	65.000	85.100	126.000

Fisher's F test:

F (observed value)	1.700
F (critical value) (df1 = 49, df2 = 19)	2.298
Two-tailed p-value	0.207
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.736
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.188
Alpha	0.050

Results of Background versus Area 5 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	2.477
F (critical value) (df1 = 1, df2 = 68)	5.254
One-tailed p-value	0.120
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.238
t (critical value) (df = 68)	1.668
One-tailed p-value	0.110
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.386
t (critical value) (df = 45)	1.679
One-tailed p-value	0.086
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.386
t (critical value) (df = 24)	1.708
One-tailed p-value	0.089
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 5 Perimeter Data Comparison After TAGM Exceedences Being Removed - Zinc

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.386	Satterthwaite	45.468	1.679	0.086
	1.386	Cochran-Cox	24.700	1.708	0.089
Equal	1.238		68	1.668	0.110

Results of Background versus Area 6 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As-6F **2 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:53:59 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6F_removed / range = $E$9:$E$26 / 18 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	237.500
U (expected value)	153.000
U (variance)	1477.466
Z (observed value)	2.198
Z (critical value)	1.645
One-tailed p-value	0.014
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As-6F **2 TAGM exceedences replaced by average - 5.9 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/20/03 at 4:30:43 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6F_removed / range = $F$9:$F$26 / 18 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:$B$55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	221.500
U (expected value)	153.000
U (variance)	1477.466
Z (observed value)	1.782
Z (critical value)	1.645
One-tailed p-value	0.037
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As-6F **2 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 4:27:19 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6F_removed / range = $E$9:$E$26 / 18 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Results of Background versus Area 6 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	6	6.617	3.142	1.772	0.724	3.500	6.100	6.850	8.200	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	2.433
F (critical value) (df1 = 50, df2 = 5)	6.144
Two-tailed p-value	0.322
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Bartlett's test:

Chi-square (observed value)	1.330
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.249
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.037
F (critical value) (df1 = 1, df2 = 55)	5.310
One-tailed p-value	0.849
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	1.209
t (critical value) (df = 55)	1.673
One-tailed p-value	0.116
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 6 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.711
t (critical value) (df = 8)	1.854
One-tailed p-value	0.062
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.711
t (critical value) (df = 6)	1.940
One-tailed p-value	0.069
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.711	Satterthwaite	8.205	1.854	0.062
	1.711	Cochran-Cox	6.100	1.940	0.069
Equal	1.209		55	1.673	0.116

As-6F **2 TAGM exceedences replaced by average - 5.9 mg/kg**
XLSTAT 6.1.9 - Comparing 2 Samples - 10/20/03 at 4:28:35 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6F_removed / range = $F$9:f26 / 18 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	6	5.850	1.639	1.280	0.523	3.500	5.900	6.000	6.300	7.400
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	4.664
F (critical value) (df1 = 50, df2 = 5)	6.144
Two-tailed p-value	0.090
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Results of Background versus Area 6 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Bartlett's test:

Chi-square (observed value)	3.396
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.065
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Levene's test:

F (observed value)	0.558
F (critical value) (df1 = 1, df2 = 55)	5.310
One-tailed p-value	0.458
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.554
t (critical value) (df = 55)	1.673
One-tailed p-value	0.291
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	0.980
t (critical value) (df = 11)	1.787
One-tailed p-value	0.174
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	0.980
t (critical value) (df = 7)	1.895
One-tailed p-value	0.180
Alpha	0.050

Results of Background versus Area 6 Floor Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	0.980	Satterthwaite	11.642	1.787	0.174
	0.980	Cochran-Cox	7.200	1.895	0.180
Equal	0.554		55	1.673	0.291

Results of Background versus Area 6 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Mann-Whitney Test

As-6P **8 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:48:28 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6P_removed / range = $E$8:$E$38 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	594.500
U (expected value)	357.000
U (variance)	3913.956
Z (observed value)	3.796
Z (critical value)	1.645
One-tailed p-value	< 0.0001
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

As-6P **8 TAGM exceedences replaced by average - 6.0 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Independent Samples - 10/8/03 at 4:49:24 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6P_removed / range = $F$8:f38 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05

Mann-Whitney test / right-tailed test:

Note: The calculation of the Mann-Whitney's U takes ties into account

U	538.500
U (expected value)	357.000
U (variance)	3910.180
Z (observed value)	2.903
Z (critical value)	1.645
One-tailed p-value	0.002
Alpha	0.050

The Mann-Whitney's U is normalized and tested against the normal distribution

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis according to which the values of the sample 1 are not superior to those of the sample 2.
In other words, the hypothetical superiority of the values of the sample 1 is significant.

Student's T Test

As-6P **8 TAGM exceedences replaced by 8.2 mg/kg**

XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:50:19 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6P_removed / range = $E$8:$E$38 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	14	7.207	2.099	1.449	0.387	3.800	6.500	8.200	8.200	8.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Results of Background versus Area 6 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Fisher's F test:

F (observed value)	3.642
F (critical value) (df1 = 50, df2 = 13)	2.744
Two-tailed p-value	0.014
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	6.413
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	0.011
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	0.334
F (critical value) (df1 = 1, df2 = 63)	5.273
One-tailed p-value	0.565
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	2.593
t (critical value) (df = 63)	1.669
One-tailed p-value	0.006
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	3.642
t (critical value) (df = 41)	1.683
One-tailed p-value	0.000
Alpha	0.050

Results of Background versus Area 6 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	3.642
t (critical value) (df = 18)	1.723
One-tailed p-value	0.001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is significant.

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	3.642	Satterthwaite	41.262	1.683	0.000
	3.642	Cochran-Cox	18.100	1.723	0.001
Equal	2.593		63	1.669	0.006

As-6P 8 TAGM exceedences replaced by average - 6.0 mg/kg
XLSTAT 6.1.9 - Comparing 2 Samples - 10/8/03 at 4:50:58 PM
Sample 1: workbook = statistics_noTAGM exceedence.xls / sheet = Area6P_removed / range = $F$8:f38 / 31 rows and 1 column
Sample 2: workbook = statistics_noTAGM exceedence.xls / sheet = SenecaBKG / range = $B$2:b55 / 54 rows and 1 column
Note: All the available information is used, the missing data are simply ignored
Significance level: 0.05
Levene's test: Mean

Descriptive statistics:

Sample	Sample size	Mean	Variance	Standard deviation	Standard-error	Minimum	First Quartile	Median	Third quartile	Maximum
Sample 1	14	5.950	0.687	0.829	0.222	3.800	6.000	6.000	6.000	7.200
As_bkg	51	5.213	7.644	2.765	0.387	2.300	4.100	4.600	5.700	21.500

Fisher's F test:

F (observed value)	11.122
F (critical value) (df1 = 50, df2 = 13)	2.744
Two-tailed p-value	< 0.0001
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Bartlett's test:

Chi-square (observed value)	17.733
Chi-square (critical value) (df = 1)	3.841
One-tailed p-value	< 0.0001
Alpha	0.050

Results of Background versus Area 6 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Decision:
At the level of significance alpha=0.050 the decision is to reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is significant.

Levene's test:

F (observed value)	2.681
F (critical value) (df1 = 1, df2 = 63)	5.273
One-tailed p-value	0.107
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the variances.
In other words, the inequality (Variance1 <> Variance2) is not significant.

Student's t test for independent samples / right-tailed test:

Assume the equality of the two theoretical variances

t (observed value)	0.981
t (critical value) (df = 63)	1.669
One-tailed p-value	0.165
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Satterthwaite's method)

t (observed value)	1.653
t (critical value) (df = 62)	1.670
One-tailed p-value	0.052
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Student's t test for independent samples / right-tailed test:

Not assume the equality of the two theoretical variances (Cochran-Cox's method)

t (observed value)	1.653
t (critical value) (df = 28)	1.699
One-tailed p-value	0.055
Alpha	0.050

Decision:
At the level of significance alpha=0.050 the decision is to not reject the null hypothesis of equality of the means.
In other words, the alternative hypothesis according to which Mean1 > Mean2 is not significant.

Results of Background versus Area 6 Perimeter Data Comparison After TAGM Exceedences Being Removed - Arsenic

Synthesis table for Student's test:

Variances	Observed t	Method	df	Critical t	Pr > t
Unequal	1.653	Satterthwaite	62.379	1.670	0.052
	1.653	Cochran-Cox	28.400	1.699	0.055
Equal	0.981		63	1.669	0.165