## **Five-Year Periodic Review**

Bee-Jay Scales Site Sunnyside, WA 98944



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February 20, 2025

# Sign-off Sheet

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# 1.0 Introduction

Stantec Consulting Services Inc. (Stantec) is submitting this Five-Year Periodic Review to the Washington Department of Ecology (Ecology) for the Bee-Jay Scales Site (the Site), on behalf of Chevron Environmental Management Company (CEMC) and Remediation Management Services Company (RMSC) on behalf of Chevron Chemical Company and American Oil Company (Amoco), respectively. This Five-Year Periodic Review has been prepared as required by Consent Decree No. 132017660 between Ecology, Chevron Chemical Company, and Amoco (Ecology, 2013a) and under the provisions of the Washington State Model Toxics Control Act (MTCA) Washington Administrative Code (WAC) 173-340 (WAC, 2007). The objective of the periodic review is to determine whether human health and the environment are being protected based on the factors established in WAC 173-340-420(4). Those factors are:

- The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the Site;
- New scientific information for individual hazardous substances or mixtures present at the Site;
- New applicable state and federal laws for hazardous substances present at the Site;
- Current and projected Site use;
- Availability and practicability of higher preference technologies; and
- The availability of improved analytical techniques to evaluate compliance with cleanup levels (CULs).

This Five-Year Periodic Review covers the period of 2020 through 2024. The previous Five-Year Periodic Review was submitted December 16, 2019 (Stantec, 2019c).



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# 2.0 Summary of Site Conditions

## 2.1 SITE DESCRIPTION AND HISTORY

The Site is located in the City of Sunnyside (City), within Yakima County, Washington, and includes the two parcels where contaminants were historically released and the parcels where those contaminants have come to be located. The Site location is shown on **Figure 1**.

The two parcels where contaminants were historically released include the southern portions of Parcel No. 22102522014, located at 110 North 1st Street and owned by Bee-Jay Scales, Inc. (BJS), and Parcel No. 22102522015, located at 301 Warehouse Avenue and owned by Western General Land, LLC (WGL) (shown on **Figure 2**; note that only the last six digits of the parcel numbers are shown). The BJS parcel is approximately 3.0 acres in size. Three businesses currently operate at the parcel: Sandy Farms, a local trucking company; Sanleco, Inc., an interstate trucking company with a tractor-trailer repair garage; and Bee-Jay Scales, a commercial scale operation. The WGL parcel is approximately 0.9 acres in size and is currently used to park semi-trucks and trailers as well as store other equipment used by the food processing facility to the east.

The BJS and WGL parcels and the surrounding area have been the location of agricultural warehouses, lumber yards, coal storage, and railroad transportation activities since approximately 1906. Portions of these two parcels were owned by the Northern Pacific Railroad Company from 1906 until 1989 when the Glacier Park Company purchased them. An agricultural distribution facility operated at the BJS parcel from the 1960s through at least 1986. This facility consisted of buildings and aboveground storage tanks (ASTs), and was operated by at least two separate companies: Laneger Agricultural Services and Valley Agricultural, Inc. The ASTs have since been removed from the parcel. Documentation also indicates that Amoco, now part of BP, leased portions of the parcels from Northern Pacific Railroad Company between 1965 and 1972. A lagoon was constructed by Valley Agricultural, Inc. in the early 1980s to collect water from the washdown of farm chemical applicator vehicles.

The western portion of Lot 10 was purchased by Chevron Chemical Company in 1981 and sold to BJS in 1987. BJS purchased additional portions of Lots 10 and 11 in 1995 and 1996. Lots 10 and 11 are referenced in the Summary of Ownership included as Appendix B of the *Remedial Investigation/Feasibility Study Work Plan* (CH2M Hill, 2003). The exact locations and boundaries of Lots 10 and 11 are unknown based on available information.

Hickenbottom & Sons, Inc. leased the WGL parcel from the Northern Pacific Railroad Company beginning in 1961 and purchased portions of Lots 10 and 11 in 1992. The WGL parcel was previously used as pastureland; since 1961, it has been used for food packing, storage, and a transportation business. The parcel was purchased by WGL in 2010.

The BJS and WGL parcels were historically divided into six main study areas throughout the environmental investigation and assessment process. Those six study areas are shown on **Figure 2**.



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On the BJS property, material is spilling out of the east wall of the Former Fertilizer Building and accumulating on the ground surface outside of the building. This was documented in letters submitted to Ecology on November 7, 2014, and November 1, 2019. Similar photos to document the condition were taken in August 2022 and can be provided to Ecology upon request. Material in and around the Former Fertilizer Building was sampled November 19, 2014 and chemicals associated with fertilizer that may impact the Site remedy were detected, including ammonia, nitrate, sulfate, pentachlorophenol, 2,4-DB, p,p-DDE, p,p-DDT, and other pesticide/polychlorinated biphenyl (PCB) constituents. The BJS property owner is responsible for addressing this continual release.

Historical releases from activities on the BJS and WGL parcels have impacted the groundwater at those parcels and have extended down-gradient to affect several additional parcels. The following parcels were affected by the contaminant groundwater plumes as defined by the *Groundwater Remedy Engineering Design Report* (GW EDR) dated November 15, 2016 (Stantec, 2016), and are considered part of the Site:

- Parcel 22102522016 is located adjacent to the WGL parcel to the east and is owned by Northwest American Land LLC. The parcel is approximately 1.8 acres in size and contains a fruit processing facility.
- Parcel 22102522904 is located south of the BJS and WGL parcels and is owned by Burlington Northern Santa Fe Railway Company (BNSF). This parcel is approximately 1.5 acres in size and adjacent to the railroad right-of-way (ROW).
- Parcel 221025225559 is located south of the railroad ROW and is owned by Milne Fruit Products Inc. (MFP) & MFP Holdings Inc. (previously owned by Valley Processing Inc.). The parcel is approximately 3.8 acres in size and contains a fruit processing facility.
- Parcels 22102523416, 22102523418, 22102523419, 22102523420, 22102523421, 22102523437, 22102523438, 22102523439, 22102523440, and 22102523441 comprise the northeast portion of the triangular area bordered by Blaine Avenue to the north, S. 3<sup>rd</sup> Street to the east, a railroad spur to the south and S. 1<sup>st</sup> Street to the west. The parcels combined have an area of approximately 1.5 acres and are owned by MFP (previously owned by Mary Ann Bliesner). These parcels are used as transportation parking associated with the local fruit processing facilities.
- Parcel 22102523901 coincides with the location of a large structure located south of Blaine
  Avenue. The parcel is owned by MFP & MFP Holdings Inc. and occupies an area of 0.21 acres.
  The building appears to contain a fruit processing facility.
- Parcel 22102523417 is a square parcel 0.13 acres in size located at the southwest corner of Blaine Avenue and S. 3rd Street. The parcel is owned by Sunnyside Zero Storage LLC (previously owned by George and Evelyn Johnson) and is used as transportation parking.

The Site layout, including parcel numbers, monitoring well locations and other important features, is shown on **Figure 2**.



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#### 2.2 CLEANUP LEVELS AND POINTS OF COMPLIANCE

## 2.2.1 Soil Cleanup Levels

CULs have been established for two constituents for soil at the Site as identified in the Corrective Action Plan (CAP) dated March 8, 2013 (Ecology, 2013b). A nitrate CUL of 220 milligrams per kilogram (mg/kg) has been established by MTCA modified Method B for the protection of groundwater using Site-specific leaching tests pursuant to WAC 173-340-747(3)(d). Site-specific testing has established that Site soils with nitrate concentrations below the CUL should not leach to groundwater above the groundwater nitrate CUL. The ammonia CUL of 385 mg/kg has been established based on MTCA Method B for protection against acute vapor health effects for a construction worker.

# 2.2.2 Soil Point of Compliance

The point of compliance (POC) for soil is the soil overlying groundwater within the BJS and WGL parcels (Ecology, 2013b).

# 2.2.3 Groundwater Cleanup Levels

Site-specific CULs for groundwater constituents have been developed from a combination of primary maximum contaminant levels (MCLs), standard MTCA Method A CULs, and standard and modified MTCA Method B CULs. When primary MCLs have been developed for Site groundwater constituents, they are set as the CUL. If no MCL has been established, modified MTCA Method B CULs are generally used. In cases where modified MTCA Method B CULs have not been developed, standard MTCA Method A or Method B CULs are used.

Though nitrate in groundwater above the MCL of 10 milligrams per liter (mg/L) is the main driver, CULs have been established for 24 constituents for groundwater at the Site. The constituents, CULs, and basis for the CUL are shown in **Table 1**. Per WAC 173-340-703, when defining cleanup requirements at a site that is contaminated with a large number of hazardous substances, some of those substances may be eliminated from consideration where those substances contribute a small percentage of the overall threat to human health and the environment. The remaining hazardous substances shall serve as indicator hazardous substances (IHSs) for purposes of defining cleanup requirements.

Twelve groundwater IHSs have been identified from the 24 groundwater constituents with CULs based on the remedial investigation and feasibility study process completed for the Site. The 12 Site groundwater IHSs were identified in the CAP dated March 8, 2013 (Ecology, 2013b) and are shown in **bold** in **Table 1**. Only the IHSs will be used to monitor compliance with the Site cleanup requirements.

## 2.2.4 Groundwater Point of Compliance

The POC for Site groundwater constituents is defined in the CAP as monitoring wells MW-4R, MW-5R, MW-6, MW-12R, and all monitoring wells, including those to be constructed as part of the remedial action, that are located down-gradient of those wells (generally to the south and southeast). The POC includes groundwater from the POC to the outer boundary of the Site plume. This plume is considered to apply to



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groundwater that has migrated from the BJS and WGL parcels, and any other sources would need to be considered separately. The following monitoring wells were determined to meet the CAP POC definition in the *Groundwater Remedy Compliance Monitoring Plan* (GW CMP; Stantec, 2019a): MW-4R, MW-5R, MW-6, MW-9, MW-12R, MW-13, MW-16, MW-19. In addition, wells MW-21, MW-23, and MW-24 were installed between October 2019 and March 2022 and are considered groundwater POCs.

#### 2.3 CLEANUP ACTIONS

The CAP, dated March 8, 2013 and prepared for the Site by Ecology (Ecology, 2013b), contains both soil and groundwater cleanup objectives. The selected cleanup action includes a combination of the removal of contaminated soil overlying groundwater, in-situ bioremediation of the Site groundwater plume via injection wells and/or vertical barrier wall treatment system(s), natural attenuation of the groundwater and soil contamination to meet the CULs at the defined POCs, and institutional controls (ICs) to protect against the use of groundwater by the public.



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## 3.0 PERIODIC REVIEW

#### 3.1 ASSESSMENT OF CLEANUP ACTIONS

# 3.1.1 Previously Completed Cleanup Actions

As documented in the previous Five-Year Periodic Review (Stantec, 2019c), contaminated soils exceeding the nitrate and ammonia CULs and located above groundwater were excavated from the BJS and WGL parcels in 2014. The extent of contaminated soil was determined based on soil assessment activities completed in 2003 and 2004. Additional soil assessment activities were completed in 2013 and 2014 to delineate the limits of soil contamination prior to the initiation of excavation activities. Each excavation was then designed to extend to a confirmation soil sample location not exceeding the soil CULs or to a property boundary or building location. Completed excavation extents were then confirmed by survey.

A total of eight excavations were completed in 2014 to depths ranging from 4.75 feet below ground surface (bgs) to 11 feet bgs, with approximately 6,605 cubic yards of contaminated soil transported under manifest for off-site disposal to the Waste Management Columbia Ridge Landfill in Arlington, Oregon. Full details regarding the shallow soil excavation activities can be found in the *Shallow Soil Excavation As-Built Completion Report*, dated April 23, 2015 (Stantec, 2015).

# 3.1.2 Ongoing Cleanup Actions

#### 3.1.2.1 In-Situ Bioremediation of Groundwater

Planning for the implementation of in-situ bioremediation of the Site groundwater has been underway since 2015. The final version of the GW EDR was submitted to Ecology on November 15, 2016 (Stantec, 2016). Ecology approved the revised GW EDR on February 22, 2017. The final versions of the *Groundwater Remedy Construction Plans and Specifications* (GW CPS) and GW CMP were submitted to Ecology on May 1, 2019 (Stantec, 2019b and 2019a, respectively). Ecology approved the revised GW CPS and GW CMP on August 21, 2019.

A two-phased approach to the installation and implementation of the enhanced in-situ bioremediation (EISB) system was established in the GW CPS (Stantec, 2019b), with data obtained during Phase I used to refine the Phase II implementation. Between October and December 2019, ten Phase I EISB injection wells, three observation wells, and one monitoring well (MW-21) were installed and developed, and soil sampling and testing were implemented to provide additional analytical, geotechnical, and hydrogeological data.

In the Phase I EISB, a total of approximately 79,100 gallons of injection solution (consisting of water mixed with approximately 18,100 pounds of sodium acetate and approximately 3,500 grams of sodium triphosphate) were injected to the ten Phase I injection wells over the course of three stages between June and August 2020. Four quarterly post-injection groundwater monitoring events were conducted in September 2020, November 2020, February 2021, and May 2021 to monitor the response to the Phase I



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groundwater remedy implementation and gather additional data specific to EISB injection operating parameters during implementation across a greater portion of the Site groundwater plume.

The *Groundwater Remedy Phase I As-Built and Documentation Report* (GW Remedy Phase I Report) was first submitted to Ecology for review on July 30, 2021. Ecology comments on the GW Remedy Phase I Report were received on December 27, 2021. The revised GW Remedy Phase I Report and a response to comments were submitted to Ecology on February 18, 2022 (Stantec, 2022), and summarized Phase I injection well installation, Phase I data collection, the implementation of the Phase I EISB injection, and the subsequent quarterly EISB performance monitoring events. The GW Remedy Phase I Report also recommended design changes to be implemented for Phase II.

These design specifications were incorporated into the Phase II EISB, which was completed with the objective to augment Phase I treatment through the installation of additional EISB injection wells within the Site groundwater plume to create continuous groundwater treatment zones consistent with the overall groundwater cleanup objectives of the 2013 CAP. In February and March 2022, forty Phase II EISB injection wells and three groundwater monitoring wells (MW-22, MW-23, and MW-24) were installed and developed.

The Phase II EISB injection was conducted in three stages:

- During the first stage, from July 27 to August 18, 2022, a total of approximately 60,026 gallons of injection solution with 12,000 pounds of sodium acetate and 54 pounds of sodium triphosphate was injected to ten wells (IW-2-2, IW-2-5 through IW-2-7, IW-3-2, and IW-3-16 through IW-3-20);
- During the second stage, from September 15 to 29, 2022, a total of approximately 54,541 gallons of injection solution with 10,800 pounds of sodium acetate and 48.6 pounds of sodium triphosphate was injected through System A to nine wells (IW-4-1 through IW-4-3 and IW-4-5 through IW-4-10) and a total of approximately 48,011 gallons of injection solution with 9,600 pounds of sodium acetate and 43.2 pounds of sodium triphosphate was injected through System B to eight wells (IW-4-4 and IW-4-11 through IW-4-17); and
- During the third stage, from October 13 to 27, 2022, a total of approximately 60,157 gallons of injection solution with 11,950 pounds of sodium acetate and 54 pounds of sodium triphosphate was injected through System A to ten wells (IW-2-3, IW-2-4, IW-3-1, and IW-3-9 through IW-3-15) and a total of approximately 59,780 gallons of injection solution with 12,000 pounds of sodium acetate and 54 pounds of sodium triphosphate was injected through System B to ten wells (IW-1-1 through IW-1-4 and IW-3-3 through IW-3-8).

Following Phase II injection, quarterly EISB groundwater remedy performance monitoring events were conducted in December 2022, March 2023, May 2023, August 2023, and December 2023 to monitor the response to the Phase II groundwater remedy implementation.

The *Groundwater Remedy Phase II As-Built and Documentation Report* (GW Remedy Phase II Report) was submitted to Ecology for review on November 22, 2024 (Stantec, 2024), and summarized Phase II



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injection well installation, the implementation of the Phase II EISB injection, the subsequent quarterly EISB performance monitoring events, and a modeling update.

Following the Phase II injection, EISB conditions were indicated in at least one quarterly event at five of the six expected monitoring wells in the immediate treatment zones. The lack of EISB conditions following the Phase II injection event at MW-4R may indicate that the injection failed to achieve the target injection radius of 10 feet at this location.

Significant decreases in nitrate were observed in MW-5R, MW-21, MW-22, and MW-23 during Phase II EISB performance monitoring, with nitrate concentration reductions between approximately 69% to over 99% at these locations. Nitrate concentrations remained relatively stable at MW-4R and MW-12R after the Phase II injection and may be a result of the monitoring well location relative to the injection wells. Overall, the nitrate plume area decreased by approximately 32%.

Dinoseb concentrations generally show a similar response as nitrate at each of the immediate treatment zone locations. Phase II EISB performance monitoring showed decreases in dinoseb concentrations ranging from approximately 26% to over 99%. Overall, the dinoseb plume area decreased by approximately 28%.

The EISB groundwater remedy was not designed to directly remediate the 1,2-DCP plume at the Site. Increases in 1,2-DCP concentrations were indicated near the source area and decreases in the downgradient portion of the plume. It is noted that the wells indicating increasing 1,2-DCP concentrations are located within the combined nitrate/ammonia plume while those with decreasing concentrations are located outside of the ammonia plume but still in the nitrate plume. Overall, the 1,2-DCP plume area decreased by approximately 12.3%.

Expected short-term increases in metals concentrations were observed in the immediate treatment zones, correlated to EISB conditions and inversely related to nitrate and dinoseb concentrations. As a result, significant increases in metal concentrations were observed during the Phase II EISB performance monitoring at MW-5R, MW-21, MW-22, and MW-23. However, arsenic concentrations have decreased at many monitoring well locations despite EISB conditions associated with the groundwater remedy. The Phase II EISB performance monitoring data support that metal concentrations generally decrease to or below pre-treatment concentrations with the transition out of EISB conditions.

Ammonia is commingled with nitrate at the up-gradient portion of the groundwater plume with ammonia concentrations exceeding 100 mg/L at MW-3, MW-4R, MW-9, and MW-12R. Site data support that ammonia may be acting as an ongoing source of nitrate. At MW-4R and MW-12R, Phase II EISB performance monitoring nitrate reductions averaged approximately 29%, while when ammonia concentrations were less than 100 mg/L (at MW-5R, MW-21, MW-22, and MW-23), nitrate reductions averaged approximately 90%.

The relationship between nitrate, nitrite, biochemical oxygen demand (BOD), and phosphorus in the Phase II EISB performance monitoring indicates that phosphorus may be limiting the denitrification of nitrate in some portions of the treatment zones. Instances where both nitrate and BOD were elevated but phosphorus concentrations were low may indicate that phosphorus is a limiting nutrient to denitrification



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and frequently corresponded to spikes in nitrite concentrations which can indicate the incomplete denitrification of nitrate.

Neither EISB conditions nor significant decreases in nitrate concentrations have been observed in locations downgradient of the IW Lines at monitoring wells MW-3, MW-9, MW-16, and MW-24. However, significant reductions in dinoseb concentrations have been indicated at downgradient monitoring wells MW-3, MW-9, and MW-16 with an average decrease of 72%. Treatment responses of dinoseb may be indicated downgradient from the IW Lines before nitrate responses because, unlike nitrate with ammonia, there are no known reactions that would reconstitute it.

The Site-wide groundwater model was updated and recalibrated with data through the Phase II EISB performance monitoring.

- The nitrate reactive transport model was updated to incorporate details of the Phase II injection and nitrate concentrations were added as transient concentration targets to the model. Compared to the 2021 model results, the revised simulation shows more rapid expansion of the extent of the acetate treatment zone resulting in reduced nitrate plume sizes. These changes are attributed to the updated simulation of the remedy to include the Phase I injections as well as the Phase II injections. The changes are also attributed to the time between the start of the Phase I injections and the end of the Phase II injections which allow for more dispersion and advective transport to have occurred by the end of the injection period.
- For 1,2-DCP, updated values for 1,2-DCP were interpolated to a grid which was used as the initial concentrations in an updated forward simulation of 1,2-DCP. Compared to the 2021 modeling results, for the simulation using a 3.5-year half-life, the plume is still simulated to be depleted within 30 years although the plume extends further south at 5 and 15 years. Similarly, for the simulation using a 14.1-year half-life, the plume is predicted to extend further to the southeast compared to the 2021 modeling results.
- For dinoseb, review of groundwater sampling results indicates that the acetate is treating the
  dinoseb plume. Additional time for the acetate treatment zone to expand and for ongoing
  sampling to occur will facilitate further evaluation of the dinoseb transport model.

Although it is early in the modeled post-injection period, at select wells there appeared to be earlier rebound in nitrate concentrations in the Phase II EISB performance monitoring versus simulated nitrate concentrations; this may be attributable to ammonia nitrification which could not be factored into the model.

Based on the Phase II EISB groundwater remedy performance monitoring data and conclusions made in the GW Remedy Phase II Report (Stantec, 2024), it is recommended that the project remain in post-EISB groundwater remedy performance monitoring through at least 2026.



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#### 3.1.2.2 Natural Attenuation of Groundwater

Groundwater monitoring has been conducted either quarterly or semi-annually since the issuance of the Consent Decree, and since 2020 has generally been semi-annual other than the periods of quarterly EISB performance monitoring that followed the Phase I and Phase II groundwater remedy injection events. The Site is currently following the semi-annual post-EISB groundwater remedy performance monitoring program. Groundwater monitoring data through September 2024 have been analyzed to provide an update to the IHS plume distributions and trends at the Site as part of this periodic review.

## **Groundwater Concentration and Trend Analysis**

The IHS groundwater concentrations from the period of 2022 through 2024 (from up to nine sampling events) were analyzed and, when sufficient data were available, the 3-year 95 percent (%) upper confidence limit (UCL95) concentration was calculated using ProUCL version 5.2 (United States Environmental Protection Agency [EPA], 2022) to help define the areas exceeding the CULs for the selected time period per the GW CMP (Stantec, 2019a). These UCL95 concentrations are presented in **Table 2**. The ProUCL software outputs are provided for each applicable monitoring well in **Appendix A**. Since the purpose of this trend analysis is to evaluate natural attenuation, results for select analytes (nitrate, nitrite, arsenic, iron, manganese, dinoseb, etc.) that are affected by the EISB groundwater remedy were excluded from the sample set for the sampling events when EISB conditions were assessed to be present in the well. In some cases, the calculated UCL95 concentration exceeds the maximum concentration for the analyte due to small sample set size; this is noted in **Table 2**. In cases where there were insufficient data to calculate the 3-year UCL95 concentration due to data distribution or the small data set sample size, the maximum concentration is shown in **Table 2**.

In addition, for applicable IHSs and monitoring well locations, a trend analysis was performed using the Ecology Package A, Natural Attenuation Analysis Tool Package (Ecology, 2005). The trend analysis was only performed for IHSs that were detected and had exceeded their CUL at least once in the last five years and was completed using the maximum amount (16) of monitoring events, if available. The trend analysis outputs are provided for each applicable monitoring well in **Appendix B**.

**Table 2** summarizes the status (UCL95 concentration and trend) of analyzed IHSs at each of the monitoring wells for the period of 2022 through 2024. The status of the groundwater concentrations for each IHS is further summarized below.

#### **Nitrate and Nitrite**

The nitrate 3-year UCL95 concentration (or maximum concentration if a UCL95 could not be calculated) exceeds the CUL of 10 mg/L at 13 of the 23 monitoring well locations (MW-1, MW-3, MW-4R, MW-8, MW-9, MW-12R, MW-13, MW-15, MW-16, MW-21, MW-22, MW-23, and MW-24). The nitrate 3-year UCL95 concentrations and estimated plume extents are shown on **Figure 3**. Note that UCL95 concentrations were calculated at each monitoring well for nitrate, even when the nitrate concentrations didn't exceed the CUL; these nitrate UCL95 concentrations are shown in **Table 2** and on **Figure 3**. The calculated concentration trends for each monitoring well with a UCL95 concentration above the CUL indicate stable trends at seven wells (MW-3, MW-9, MW-12R, MW-15, MW-16, MW-23, and MW-24),



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decreasing trends at five wells (MW-4R, MW-8, MW-13, MW-21, and MW-22), and an increasing trend at one well (MW-1). Additional monitoring well locations (MW-5R, MW-6, and MW-11) were defined as within the nitrate plume in the previous Five-Year Periodic Review (Stantec, 2019c); these locations currently have 3-year nitrate UCL95 concentrations below the CUL. MW-5R is under EISB conditions and MW-6 and MW-11 indicate decreasing trends.

Collectively, it is difficult to draw a single conclusion from the collective trend analysis throughout the nitrate plume, though overall stable to decreasing nitrate trends are observed. Generally, the wells in the western and northern portions of the nitrate plume (MW-4R, MW-8, MW-13, MW-21, and MW-22) show a decreasing trend, while wells within the central and eastern portions (MW-3, MW-9, MW-12R, MW-15, MW-16, MW-23, and MW-24) show a stable trend. This supports that the nitrate plume is generally stable with some decreasing concentrations and that significant nitrate plume migration is not occurring. Crossgradient well MW-1 in the northern portion of the Site and outside of the primary nitrate plume area indicates an increasing nitrate concentration trend; however, the UCL95 concentration exceedance of the CUL is due to a nitrate concentration slightly above the CUL observed during first half 2023. The source of that concentration increase is not clear.

The nitrite UCL95 concentration exceeds the CUL of 1 mg/L at three (MW-16, MW-21, and MW-22) of the 23 monitoring well locations; these three wells are within the current nitrate plume. The nitrite concentration trend is decreasing at MW-16 and undetermined at MW-21 and MW-22. As discussed in the GW Remedy Phase II Report, the presence of nitrite may be a result of the incomplete denitrification of nitrate or the incomplete nitrification of ammonia depending on the oxidation-reduction conditions present.

#### **Dinoseb**

The dinoseb 3-year UCL95 concentration (or maximum concentration if a UCL95 could not be calculated) exceeds the CUL of 0.007 mg/L at six (MW-3, MW-4R, MW-9, MW-12R, MW-16, and MW-23) of the 13 monitoring well locations where dinoseb was analyzed. The dinoseb 3-year UCL95 concentrations and estimated plume extents are shown on **Figure 4**. Monitoring wells defined as within the dinoseb plume in the previous Five-Year Periodic Review (Stantec, 2019c) remain within the plume extents. The calculated dinoseb concentration trends for each monitoring well with a UCL95 concentration above the CUL indicate an increasing trend at one well (MW-16), a stable trend at one well (MW-23), and decreasing trends at four wells (MW-3, MW-4R, MW-9, and MW-12R). The decreasing trends are primarily observed in the source area wells. The Site data indicate the dinoseb plume is generally shrinking.

#### 2,4-D

2,4-D has not been detected above the CUL of 0.07 mg/L during the 2022 through 2024 monitoring events in any sample collected from the 13 monitoring wells where it was analyzed.

## 1,2-Dichloropropane

The 1,2-dichloropropane (1,2-DCP) 3-year UCL95 concentration (or maximum concentration if a UCL95 could not be calculated) exceeds the CUL of 0.005 mg/L at seven (MW-4R, MW-9, MW-12R, MW-16, MW-19, MW-23, and MW-24) of the 13 monitoring well locations where 1,2-DCP was analyzed. The



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1,2-DCP 3-year UCL95 concentrations and estimated plume extents are shown on **Figure 5**. Five of the seven locations (MW-4R, MW-12R, MW-19, MW-23, and MW-24) show stable concentration trends while MW-9 indicates an increasing concentration trend and MW-16 indicates a decreasing concentration trend. Overall, the 1,2-DCP plume is considered stable.

#### Benzene and Chlorobenzene

The 3-year UCL95 concentrations for both benzene and chlorobenzene exceed the CULs of 0.005 mg/L and 0.1 mg/L, respectively, at one (MW-12R) of the 13 monitoring well locations where they were analyzed. Both the benzene and chlorobenzene concentrations at MW-12R indicate stable trends.

## 2-Methylnaphthalene

2-Methylnaphthalene has not been detected above the CUL of 0.032 mg/L during the 2022 through 2024 monitoring events in any sample collected from the 13 monitoring wells where it was analyzed.

#### **TPH-Gx**

TPH-Gx has not been analyzed at the Site since 2008.

## Arsenic, Iron, and Manganese

Total arsenic, iron, and manganese were analyzed in samples collected during the last nine monitoring events in only nine selected wells of the 23 Site monitoring wells as part of the EISB and post-EISB performance monitoring. These metals were analyzed in samples collected semi-annually in all 23 Site monitoring wells between 2022 and 2024 as part of the post-EISB groundwater monitoring. Therefore, the number of analytical results per well for total arsenic, iron, and manganese varies from four to nine.

The total arsenic 3-year UCL95 concentration (or maximum concentrations if a UCL95 could not be calculated) exceeds the CUL of 0.01 mg/L at 18 monitoring well locations (MW-1, MW-4R, MW-6, MW-7, MW-8, MW-10, MW-11, MW-12R, MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, and MW-23). The arsenic 3-year UCL95 concentrations and estimated plume extents are shown on **Figure 6**. The Site-wide arsenic concentrations from September 2024 were input to ProUCL to calculate a Site-wide UCL95 of 0.0347 mg/L (output included in **Appendix A**), which was below the Site-wide arsenic remediation level (RL) of 0.04 mg/L for the Site as defined in the GW EDR (Stantec, 2016).

Arsenic concentrations do not follow a similar distribution to the other Site IHSs. Total arsenic UCL95 concentrations exceeding the CUL were present: 1) in up-gradient, source area, and down-gradient wells in the west, central, and east/southeast portions of the Site (MW-4R, MW-6, MW-8, MW-10, MW-11, MW-12R, MW-14, MW-15, MW-17, and MW-23); 2) in two wells in the northern portion of the Site (MW-1 and MW-7); and 3) in five wells at the southeast extent of the Site (MW-13, MW-16, MW-18, MW-19, and MW-20). Total arsenic concentrations in down-gradient and cross-gradient wells MW-3, MW-9, MW-21, MW-22, and MW-24 were below the CUL, defining the separation of the Site arsenic plume boundaries. Arsenic concentration trends are largely stable (at eight wells: MW-4R, MW-6, MW-7, MW-8, MW-13, MW-15, MW-20, and MW-21) or decreasing (at seven wells: MW-10, MW-11, MW-12R, MW-14, MW-16, MW-18, and MW-19), with increasing trends indicated at three wells (MW-1, MW-17, and MW-23).



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Total iron has not been detected above the CUL of 11 mg/L during the 2022 through 2024 monitoring events in any sample collected from the 15 monitoring wells where it was analyzed.

The total manganese 3-year UCL95 concentration exceeds the CUL of 0.75 mg/L at eight monitoring well locations (MW-3, MW-11, MW-12R, MW-16, MW-19, MW-21, MW-22, and MW-23). Total manganese concentration trends are stable (MW-3, MW-12R, MW-16, MW-19, MW-21, and MW-22) or undetermined (MW-11 and MW-23).

#### 3.1.2.3 Institutional Controls

The Consent Decree and CAP require a good faith effort to implement ICs in the form of restrictive covenants with the owners of the affected Site parcels. The purpose of a restrictive covenant is to prohibit activities that may interfere with a cleanup action or other measures necessary to assure the integrity of the cleanup action and to protect human health and the environment.

As detailed in the GW CPS, Stantec is working with CEMC and RMSC to draft restrictive covenants for review using the Ecology Environmental Covenant for MTCA Sites template and to identify parties that would need to sign the restrictive covenant for each applicable Site parcel.

# 3.2 NEW SCIENTIFIC INFORMATION FOR INDIVIDUAL HAZARDOUS SUBSTANCES OR MIXTURES PRESENT AT THE SITE

Chemical-specific changes to the Ecology Cleanup Levels and Risk Calculation (CLARC) tool were reviewed for the 12 Site IHSs (Ecology, 2024) and are summarized in this section.

The manganese Modified MTCA Method B CUL was adjusted from 2.24 mg/L in the Ecology 2015 CLARC table to 0.75 mg/L in the 2019 CLARC table. The manganese CUL has been updated in **Table 1**.

In July 2022, Ecology added chemical-specific values from the Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profiles for benzene.

In July 2024, Ecology filled in effects information for 52 chemicals that had both oral and inhalation noncancer toxicity criteria, including arsenic, chlorobenzene, and 1,2-DCP. For these chemicals, the IRIS toxicity source already had noncancer effects information, and Ecology added the information for the non-IRIS source.

Though not one of the IHSs, a CUL is included in **Table 1** for 2,4-DB. It should be noted that in July 2022 Ecology removed 2,4-DB from CLARC based on updates from EPA's Office of Pesticide Programs. There is no longer toxicity data for this pesticide.

# 3.3 NEW APPLICABLE STATE AND FEDERAL LAWS FOR HAZARDOUS SUBSTANCES PRESENT AT THE SITE

The groundwater cleanup at the Site is governed by MTCA and all other applicable, relevant and appropriate requirements (ARAR) as detailed in the GW EDR. No changes to MTCA or other ARARs



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identified in the GW EDR were identified which would substantively affect the implementation of the remediation of the Site.

#### 3.4 CURRENT AND PROJECTED SITE USE

The Site is located in an industrial and food manufacturing area and the parcels comprising the Site contain food processing facilities or open staging areas for food transportation vehicles and containers. In addition, the Site includes a railroad ROW and several city street ROWs. The use of Site parcels has remained relatively unchanged and there are no known changes planned for the parcels comprising the Site; however, all Site parcels are third-party owned.

#### 3.5 AVAILABILITY AND PRACTICABILITY OF HIGHER PREFERENCE TECHNOLOGIES

The remedy that has been or is currently being implemented at the Site includes removal of contaminated soil overlying groundwater, in-situ bioremediation of the Site groundwater plume via injection wells, natural attenuation of the groundwater and soil contamination, and ICs to protect against the use of groundwater by the public.

The groundwater remedy for the Site, utilizing EISB via injection wells, was selected because of access limitations resulting from the current land use of the Site parcels. The groundwater remedy was implemented in a two-phase approach to confirm the design parameters of the selected remedy in Phase I prior to the full-scale implementation in Phase II. Based on the Phase II EISB groundwater remedy performance monitoring data and conclusions in the GW Remedy Phase II Report (Stantec, 2024), it is recommended the project remain in post-EISB groundwater remedy performance monitoring through at least 2026. The semi-annual groundwater monitoring data collected during the post-EISB performance monitoring period will improve understanding of the following:

- Residual treatment capacity of the Phase II injection;
- Ammonia-nitrate interaction at the Site;
- · Acetate consumption within the Site aquifer; and
- Phosphorus consumption and migration within the Site aquifer.

The post-EISB groundwater remedy performance monitoring data collected through 2026 will be used to develop a plan for any additional active groundwater remedy actions or recommendations for continued post-EISB monitoring. Any additional active groundwater remedy actions would most likely utilize the existing injection wells unless land use changes allow additional access.



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# 3.6 AVAILABILITY OF IMPROVED ANALYTICAL TECHNIQUES TO EVALUATE COMPLIANCE WITH CLEANUP LEVELS

In March 2024, the analytical method used for ammonia testing was changed from SM4500NH3-D to EPA Method 350.1. From an analytical standpoint, SM4500NH3-D is an older methodology and not very efficient. EPA Method 350.1 provides a lower detection limit.



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## 4.0 Conclusions

The following conclusions have been made as a result of this periodic review:

- The groundwater remedy has been implemented per the plans and specifications as approved by Ecology on August 21, 2019.
  - In the Phase I EISB, a total of approximately 79,100 gallons of injection solution (consisting of water mixed with approximately 18,100 pounds of sodium acetate and approximately 3,500 grams of sodium triphosphate) were injected to the ten Phase I injection wells over the course of three stages between June and August 2020.
  - Four quarterly post-injection groundwater monitoring events were conducted in September 2020, November 2020, February 2021, and May 2021 to monitor the response to the Phase I groundwater remedy implementation.
  - The Phase II EISB injection was conducted in three stages between July and October 2022. A total of approximately 282,515 gallons of injection solution with 56,350 pounds of sodium acetate and 253.8 pounds of sodium triphosphate was injected to the 47 injection wells.
  - Five quarterly post-injection groundwater remedy performance monitoring events were conducted in December 2022, March 2023, May 2023, August 2023, and December 2023 to monitor the response to the Phase II groundwater remedy implementation.
  - Conclusions regarding the Phase II EISB groundwater remedy performance are provided in the GW Remedy Phase II Report (Stantec, 2024). Based on the conclusions, it is recommended that the project remain in post-EISB groundwater remedy performance monitoring through at least 2026.
- The groundwater monitoring program has continued to monitor the distribution and natural attenuation of IHSs in the groundwater.
  - Nitrate concentrations remain above the CUL in the 13 monitoring wells in the source and downgradient areas with decreasing or stable trends observed in all source area and downgradient plume monitoring wells; however, cross-gradient well MW-1 indicates an increasing trend. Wells MW-5R, MW-6, and MW-11, previously defined as within the nitrate plume in the previous Five-Year Periodic Review (Stantec, 2019c), currently have 3-year nitrate UCL95 concentrations below the CUL and are either under EISB conditions or indicate decreasing trends. Generally, the wells in the western and northern portions of the nitrate plume show a decreasing trend, while wells within the central and eastern portions show a stable trend. This supports that significant nitrate plume migration is not occurring.



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- Nitrite concentrations exceed the CUL at three wells (MW-16, MW-21, and MW-22). The nitrite concentration trend is decreasing at MW-16 and undetermined at MW-21 and MW-22.
- Dinoseb concentrations remain above the CUL in the source and downgradient areas with decreasing trends in wells MW-3, MW-4R, MW-9, and MW-12R, an increasing trend in MW-16, and a stable trend at MW-23. The decreasing trends are primarily observed in the source area wells. The Site data indicate the dinoseb plume is generally shrinking.
- 1,2-DCP concentrations remain above the CUL in the source and downgradient areas, with stable trends in five wells (MW-4R, MW-12R, MW-19, MW-23, and MW-24). MW-9 indicates an increasing concentration trend and MW-16 indicates a decreasing concentration trend. Overall, the 1,2-DCP plume is considered stable.
- Benzene and chlorobenzene are only above the CUL in source area well MW-12R, and both indicate stable trends.
- Arsenic concentrations remain above the CUL in the source, downgradient, and upgradient areas with stable or decreasing trends in 15 of the 18 monitoring wells exceeding the CUL. The Site-wide arsenic UCL95 concentration for September 2024 was 0.0347 mg/L, which is below the arsenic Site-wide RL of 0.04 mg/L.
- Manganese concentrations exceed the CUL at eight wells (MW-3, MW-11, MW-12R, MW-16, MW-19, MW-21, MW-22, and MW-23). Manganese concentration trends are stable or undetermined.
- All Site parcels are within the City limits and are on municipal water supply from the City. No new structures have been constructed on Site parcels since the implementation of the Site Consent Decree and CAP. ICs in the form of restrictive covenants are being pursued for Site parcels to further protect human health and the environment.
- A release of a material continues to occur at the Former Fertilizer Building of the BJS property.
   This was previously documented in letters submitted to Ecology in November 2014 and November 2019. Similar photos to document the condition were taken in August 2022 and can be provided to Ecology upon request. The BJS property owner is responsible for addressing this release.

Based on the general conclusions contained within the periodic review for this period, human health and the environment are being protected based on the factors established in WAC 173-340-420(4).



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# 5.0 References

CH2M Hill, 2003. Remedial Investigation/Feasibility Study Work Plan. February.

Stantec, 2015. Shallow Soil Excavation As-Built Completion Report, April 23.

Stantec, 2016. Groundwater Remedy Engineering Design Report, November 15.

Stantec, 2019a. Groundwater Remedy Compliance Monitoring Plan, May 1.

Stantec, 2019b. Groundwater Remedy Construction Plans and Specifications, May 1.

Stantec, 2019c. Five-Year Periodic Review, December 16.

Stantec, 2022. Groundwater Remedy Phase I As-Built and Documentation Report, February 18.

Stantec, 2024. Groundwater Remedy Phase II As-Built and Documentation Report, November 22.

EPA, 2022. Statistical Software ProUCL 5.2 for Environmental Applications for Data Sets with and without Nondetect Observations, June 14.

WAC, 2007. MTCA Cleanup Regulation, WAC 173-340-400, October 12.

Ecology, 2005. Package A, Natural Attenuation Analysis Tool Package.

Ecology, 2013a. *Consent Decree No. 132017660*, State of Washington, Yakima County Superior Court, May 28.

Ecology, 2013b. Cleanup Action Plan, Bee-Jay Scales, Sunnyside, Washington, March 8.

Ecology, 2024. Cleanup Levels and Risk Calculation (CLARC) Table, July.





# Table 1 Groundwater Cleanup Levels

Bee-Jay Scales Site Sunnyside, Washington

Analyte	Groundwater Cleanup Level (mg/L)	Source
1,2,3-Trichloropropane	0.00001	Modified MTCA Method B
1,2,4-Trimethylbenzene	0.4	Modified MTCA Method B
1,2-Dichloropropane	0.005	Primary MCL
1,3,5-Trimethylbenzene	0.4	Modified MTCA Method B
2-Methylnaphthalene	0.032	Modified MTCA Method B
2,4,5-T	0.16	Modified MTCA Method B
2,4,5-TP	0.05	Primary MCL
2,4-D	0.07	Primary MCL
2,4-DB	0.128	Modified MTCA Method B
Arsenic	0.01	Primary MCL
Benzene	0.005	Primary MCL
Chlorobenzene	0.1	Primary MCL
Dicamba	0.48	Modified MTCA Method B
Dinoseb	0.007	Primary MCL
Ethylbenzene	0.7	Primary MCL
Iron	11	Modified MTCA Method B
Manganese <sup>1</sup>	0.75	Standard MTCA Method B
Naphthalene	0.16	Modified MTCA Method B
Nitrate Nitrogen	10	Primary MCL
Nitrite Nitrogen	1	Primary MCL
Pentachlorophenol	0.001	Primary MCL
Toluene	1	Primary MCL
TPH-Gx	0.8	Standard MTCA Method A
Xylenes	10	Primary MCL

## Notes:

2,4,5-T = 2,4,5-Trichlorophenoxyacetic acid

2,4,5-TP = 2(2,4,5-Trichlorophenoxy)propionic acid

2,4-D = 2,4-Dichlorophenoxyacetic acid

2,4-DB = 4-(2,4-Dichlorophenoxy)butyric acid

TPH-Gx = Total petroleum hydrocarbons in the gasoline range

mg/L = milligrams per liter

MCL = Maximum Contaminant Level

MTCA = Model Toxics Control Act

**Bold analytes** are indicator hazardous substances (IHSs).

<sup>&</sup>lt;sup>1</sup> The manganese cleanup level was adjusted from 2.2 mg/L to 0.75 mg/L in 2019.

Bee-Jay Scales Site Sunnyside, Washington

Monitoring Well ID	Well Designation	Total # Sampling Events / # Sampling Events Under MNA Conditions	IHS	CUL (mg/L)	# Times Detected Conc. ≥ CUL / # Events IHS Was Analyzed	3-Year UCL95 <sup>1</sup> (mg/L)	3-Year UCL95 / CUL Status <sup>1</sup>	Trend <sup>1,2</sup>
	Um as Crass		Nitrate	10	1/6	10.2	Above	Increasing
MW-1	Up- or Cross- Gradient	6/6	Nitrite	1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
	Gradierii		Arsenic	0.01	4 / 4	0.012 <sup>c</sup>	Above	Increasing
			Nitrate	10	8/8	368.2	Above	Stable
			Nitrite	1	0/8	0.48	Below	Decreasing
			Arsenic	0.01	0/8	0.0086	Below	Decreasing
			Iron	11	0/8	0.39	Below	NA <sup>e</sup>
			Manganese	0.75	8/8	2.32	Above	Stable
MW-3	In Plume	8/8	2,4-D	0.07	0/8	0.00038	Below	NA <sup>e</sup>
			Dinoseb	0.007	5/8	0.023	Above	Decreasing
			Benzene	0.005	0/8	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/8	0.012	Below	NA <sup>e</sup>
			1,2-DCP	0.005	0/8	0.0014	Below	NA <sup>e</sup>
			2-Methylnaphthalene	0.032	0/8	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	9/9	212.9	Above	Decreasing
			Nitrite	1	0/9	0.087	Below	NA <sup>e</sup>
			Arsenic	0.01	8/9	0.013	Above	Stable
			Iron	11	0/9	0.13	Below	NA <sup>e</sup>
			Manganese	0.75	0/9	0.48	Below	NA <sup>e</sup>
MW-4R	POC	9/9	2,4-D	0.07	0/9	0.00028	Below	NA <sup>e</sup>
			Dinoseb	0.007	9/9	0.033	Above	Decreasing
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	0.00054	Below	NA <sup>e</sup>
			1,2-DCP	0.005	8/9	0.0066	Above	Stable
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	0/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sub>a'p</sub>
			Nitrite	1	1/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
			Arsenic	0.01	8/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
			Iron	11	0/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
			Manganese	0.75	2/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
MW-5R	POC	9/0	2,4-D	0.07	0/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
			Dinoseb	0.007	0/9	NA <sup>a,b</sup>	NA <sup>a,b</sup>	NA <sup>a,b</sup>
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	0 / 4	6.9 <sup>c</sup>	Below	Decreasing
			Nitrite	1	0 / 4	NC (0.048 J) <sup>d</sup>	Below	NA <sup>e</sup>
MW-6	POC	4 / 4	Arsenic	0.01	4 / 4	NC (0.026) <sup>d</sup>	Above	Stable
		., .	Iron	11	0/3	NC (0.10 J) <sup>d</sup>	Below	NA <sup>e</sup>
			Manganese	0.75	0/3	0.39°	Below	NA <sup>e</sup>
			Nitrate	10	0/6	5.8	Below	Stable
MW-7	Up- or Cross-	6/6	Nitrite	1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
	Gradient	†   ","	Arsenic	0.01	4 / 4	0.014	Above	Stable
	i i		Nitrate	10	6/6	48.5	Above	Decreasing
			Nitrite	1	0/6	NC (0.082) <sup>d</sup>	Below	NA <sup>e</sup>
MW-8	In Plume	6/6	Arsenic	0.01	4 / 4	0.012	Above	Stable
	iiiiiioiiie	, -	Iron	11	0 / 4	NC (0.090) <sup>d</sup>	Below	NA <sup>e</sup>
			Manganese	0.75	0 / 4	0.68°	Below	NA <sup>e</sup>

Bee-Jay Scales Site Sunnyside, Washington

Monitoring Well ID	Well Designation	Total # Sampling Events / # Sampling Events Under MNA Conditions	IHS	CUL (mg/L)	# Times Detected Conc. ≥ CUL / # Events IHS Was Analyzed	3-Year UCL95 <sup>1</sup> (mg/L)	3-Year UCL95 / CUL Status <sup>1</sup>	Trend <sup>1,2</sup>
			Nitrate	10	6/6	328.9	Above	Stable
			Nitrite	1	0/6	NC (0.081) <sup>d</sup>	Below	NA <sup>e</sup>
			Arsenic	0.01	0/6	0.0082	Below	NA <sup>e</sup>
			Iron	11	0 / 4	NC (0.19) <sup>d</sup>	Below	NA <sup>e</sup>
			Manganese	0.75	0 / 4	0.073	Below	NA <sup>e</sup>
MW-9	In Plume	6/6	2,4-D	0.07	0 / 4	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	3/6	0.1	Above	Decreasing
			Benzene	0.005	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/6	0.0009	Below	NA <sup>e</sup>
			1,2-DCP	0.005	6/6	0.067	Above	Increasing
			2-Methylnaphthalene	0.032	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	0/6	5.7	Below	Stable
MW-10	Up-Gradient	6/6	Nitrite	1	0/6	0.088	Below	NA <sup>e</sup>
			Arsenic	0.01	6/6	0.020	Above	Decreasing
			Nitrate	10	0/6	5.7	Below	Decreasing
			Nitrite	1	0/6	0.056	Below	NA <sup>e</sup>
MW-11	Up-Gradient	6/6	Arsenic	0.01	6/6	0.035	Above	Decreasing
	op Gradiem	0,0	Iron	11	0 / 4	NC (0.028 J) <sup>d</sup>	Below	NA <sup>e</sup>
			Manganese	0.75	2 / 4	2.8	Above	Undetermined
			Nitrate	10	9/9	377.8°	Above	Stable
			Nitrite	10	0/9	NC (0.13) <sup>a,d</sup>	Below	NA <sup>e</sup>
			Arsenic	0.01	8/9	0.034°	Above	Decreasing
			Iron	11	0/9	0.034 0.11 <sup>a</sup>	Below	NA <sup>e</sup>
				0.75	9/9	1.4	Above	Stable
MW-12R	POC	9/8	Manganese 2,4-D	0.73	0/9	0.002	Below	NA <sup>e</sup>
1V1VV-12IX	100	7 / 0	Dinoseb	0.007	8/9		Above	
			Benzene	0.007	9/9	1.18° 0.017	Above	Decreasing Stable
				0.003	9/9	0.017	1	Stable
			Chlorobenzene 1,2-DCP	0.005	9/9	1.3	Above Above	Stable
				0.003	0/9		1	NA <sup>e</sup>
			2-Methylnaphthalene Nitrate	10	9/9	NC (0.025) <sup>d</sup> 23.1	Below Above	
				10			1	Decreasing
			Nitrite	0.01	0/9	0.054	Below	NA <sup>e</sup>
			Arsenic				Above	Stable
			Iron	11	0/9	0.079	Below	NA <sup>e</sup>
MM 12	DOC.	0.70	Manganese	0.75	1/9	0.66	Below	Stable
MW-13	POC	9/9	2,4-D	0.07	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	0/9	0.0024	Below	NA <sup>e</sup>
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
1414/ 14	Davis !	, , ,	Nitrate	10	0/6	1.8	Below	Decreasing
MW-14	Boundary	6/6	Nitrite	1	0/6	0.11	Below	NA <sup>e</sup>
			Arsenic	0.01	0 / 4	0.011 <sup>c</sup>	Above	Decreasing
			Nitrate	10	1/6	NC (12) <sup>d</sup>	Above	Stable
			Nitrite	1	0/6	NAb	NA <sup>b</sup>	NA <sup>b</sup>
			Arsenic	0.01	6/6	NC (0.015) <sup>d</sup>	Above	Stable
	_		2,4-D	0.07	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
MW-15	Boundary	6/6	Dinoseb	0.007	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Benzene	0.005	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			2-Methylnaphthalene	0.032	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>

Bee-Jay Scales Site Sunnyside, Washington

Monitoring Well ID	Well Designation	Total # Sampling Events / # Sampling Events Under MNA Conditions	IHS	CUL (mg/L)	# Times Detected Conc. ≥ CUL / # Events IHS Was Analyzed	3-Year UCL95 <sup>1</sup> (mg/L)	3-Year UCL95 / CUL Status <sup>1</sup>	Trend <sup>1,2</sup>
			Nitrate	10	6/6	109.5	Above	Stable
			Nitrite	1	2/6	1.34	Above	Decreasing
			Arsenic	0.01	1 / 4	0.018	Above	Decreasing
			Iron	11	0 / 4	1.41	Below	NA <sup>e</sup>
			Manganese	0.75	3 / 4	1.74 <sup>c</sup>	Above	Stable
MW-16	POC	6/6	2,4-D	0.07	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	4/6	0.032	Above	Increasing
			Benzene	0.005	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	6/6	0.15	Above	Decreasing
			2-Methylnaphthalene	0.032	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	0/6	4.3	Below	Stable
MW-17	Boundary	6/6	Nitrite	1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Arsenic	0.01	2 / 4	0.012	Above	Increasing
			Nitrate	10	0/6	NC (8.8) <sup>d</sup>	Below	Stable
MW-18	Boundary	6/6	Nitrite	1	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Arsenic	0.01	6/6	0.018	Above	Decreasing
			Nitrate	10	1/6	9.3	Below	Stable
			Nitrite	1	0/6	0.19	Below	NA <sup>e</sup>
			Arsenic	0.01	5/6	0.027	Above	Decreasing
			Iron	11	0 / 4	NC (3.7) <sup>d</sup>	Below	NA <sup>e</sup>
	POC	6/6	Manganese	0.75	1 / 4	0.84	Above	Stable
MW-19			2,4-D	0.07	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	0/6	NC (0.00043 J) <sup>d</sup>	Below	NA <sup>e</sup>
			Benzene	0.005	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene 1,2-DCP	0.1	0 / 6 5 / 6	0.030	NA <sup>b</sup> Above	Stable
			2-Methylnaphthalene	0.003	0/6	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	0/6	NC (7.0) <sup>d</sup>	Below	Stable
MW-20	Boundary	6/6	Nitrite	10	0/6	NC (7.0)	NA <sup>b</sup>	NA <sup>b</sup>
7777 20	booridary	0,0	Arsenic	0.01	6/6	0.020	Above	Stable
			Nitrate	10	8/9	84.4°	Above	Decreasing
			Nitrite	1	5/9	2.6°	Above	Undetermined
			Arsenic	0.01	2/9	NC (0.032) <sup>a,d</sup>	Above	Stable
			Iron	11	0/9	0.33°	Below	NA <sup>e</sup>
			Manganese	0.75	9/9	2.42°	Above	Stable
MW-21	POC	9/8	2,4-D	0.07	0/9	NA <sup>a,b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	0/9	NA <sup>a,b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	0/9	0.00069	Below	NA <sup>e</sup>
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	4/9	48.0°	Above	Decreasing
			Nitrite	1	4/9	4.4°	Above	Undetermined
			Arsenic	0.01	3/9	0.0097°	Below	Undetermined
			Iron	11	0/9	0.87°	Below	NA <sup>e</sup>
			Manganese	0.75	7/9	4.26°	Above	Stable
MW-22	In Plume	9 / 7	2,4-D	0.07	0/9	NC (0.0047) <sup>a,d</sup>	Below	NA <sup>e</sup>
			Dinoseb	0.007	0/9	NC (0.00051 J) <sup>a,d</sup>	Below	NA <sup>e</sup>
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			2-Methylnaphthalene	0.032	0/9	NC (0.0024 J) <sup>d</sup>	Below	NA <sup>e</sup>

Bee-Jay Scales Site Sunnyside, Washington

Monitoring Well ID	Well Designation	Total # Sampling Events / # Sampling Events Under MNA Conditions	IHS	CUL (mg/L)	# Times Detected Conc. ≥ CUL / # Events IHS Was Analyzed	3-Year UCL95 <sup>1</sup> (mg/L)	3-Year UCL95 / CUL Status <sup>1</sup>	Trend <sup>1,2</sup>
•			Nitrate	10	7/9	179.3 <sup>a,c</sup>	Above	Stable
			Nitrite	1	2/9	0.92 <sup>a,c</sup>	Below	Undetermined
			Arsenic	0.01	6/9	0.012°	Above	Increasing
			Iron	11	0/9	0.26 <sup>a,c</sup>	Below	NA <sup>e</sup>
			Manganese	0.75	5/9	1.24 <sup>a,c</sup>	Above	Undetermined
MW-23	POC	9 / 4	2,4-D	0.07	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	4/9	0.017°	Above	Stable
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	9/9	0.17	Above	Stable
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Nitrate	10	8/9	39.6	Above	Stable
			Nitrite	1	0/9	0.037	Below	NA <sup>e</sup>
			Arsenic	0.01	0/9	0.0083	Below	NA <sup>e</sup>
			Iron	11	0/9	0.14	Below	NA <sup>e</sup>
			Manganese	0.75	0/9	0.013	Below	NA <sup>e</sup>
MW-24	POC	9/9	2,4-D	0.07	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Dinoseb	0.007	0/9	0.0043	Below	NA <sup>e</sup>
			Benzene	0.005	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			Chlorobenzene	0.1	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>
			1,2-DCP	0.005	9/9	NC (0.29) <sup>d</sup>	Above	Stable
			2-Methylnaphthalene	0.032	0/9	NA <sup>b</sup>	NA <sup>b</sup>	NA <sup>b</sup>

#### Notes:

MNA = monitored natural attenuation

IHS = indicator hazardous substance

CUL = Cleanup Level

mg/L = milligrams per liter

UCL95 = 95% Upper Confidence Limit

NA = Not applicable

NC = Not calculated

2,4-D = 2,4-Dichlorophenoxyacetic acid

1,2-DCP = 1,2-Dichloropropane

POC = Point of Compliance

<sup>&</sup>lt;sup>1</sup> Results for nitrate, nitrite, dinoseb, arsenic, iron, and manganese from sampling events under EISB conditions are excluded from UCL95 calculations and trend analysis. Significant figures for UCL95 calculations have been rounded in some cases.

<sup>&</sup>lt;sup>2</sup> Mann-Kendall trend analysis applied to the last 16 sampling events, as applicable; expanding plume is considered increasing trend and shrinking plume is considered decreasing trend.

<sup>&</sup>lt;sup>a</sup> Sample results were excluded from the data set when EISB conditions were present during one or more sampling events.

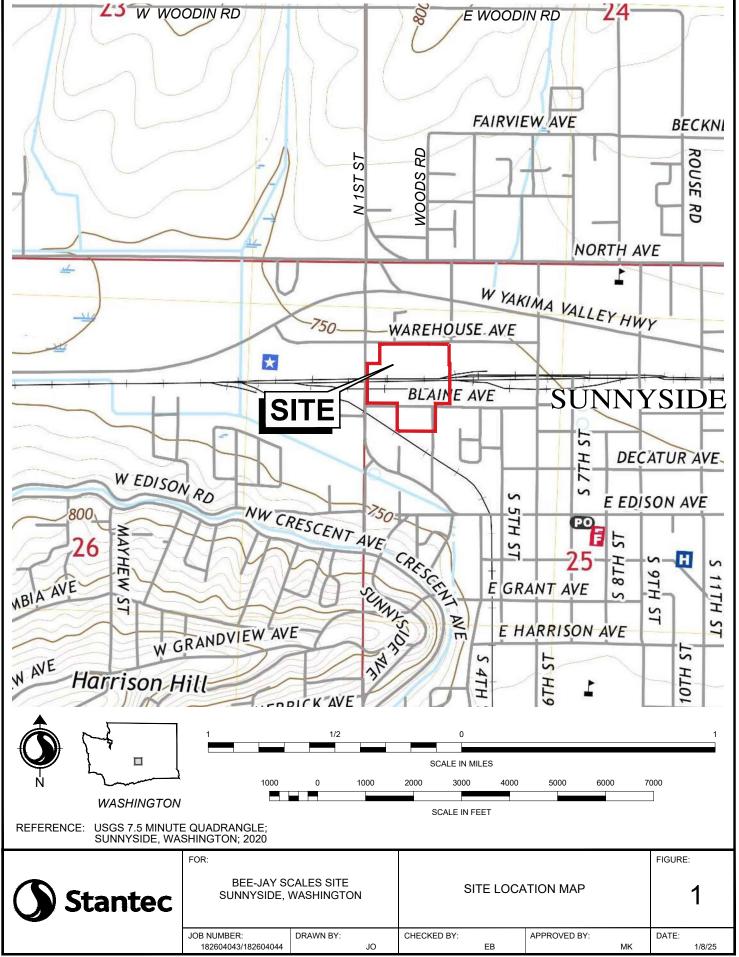
<sup>&</sup>lt;sup>b</sup> Of the data set, there are insufficient data available (non-detect, excluded under EISB conditions, etc.) to calculate a 3-year UCL95 or analyze trends.

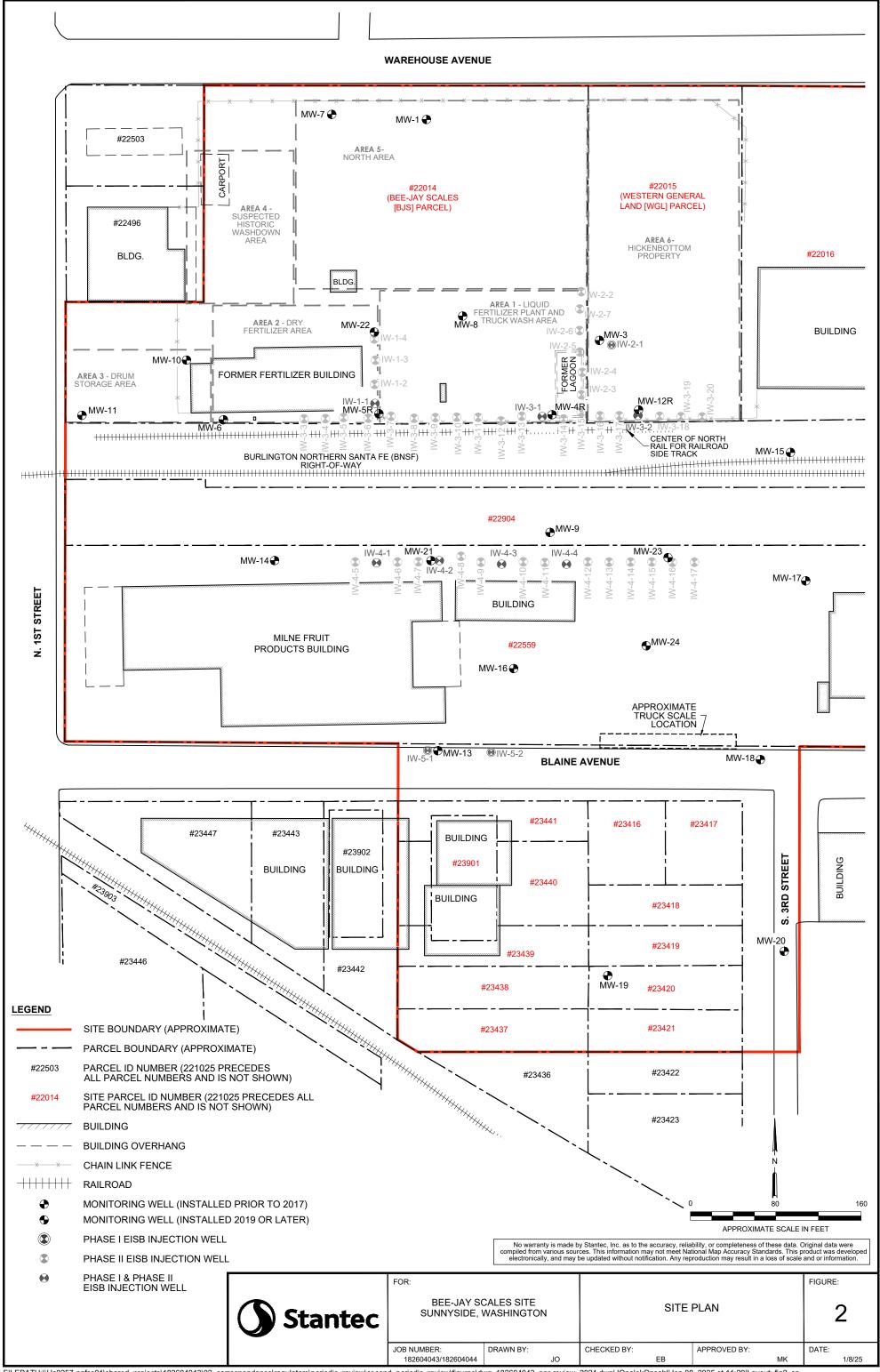
 $<sup>^{\</sup>mathrm{c}}$  Calculated 3-year UCL95 exceeds maximum concentration during the timeframe due to small data set sample size.

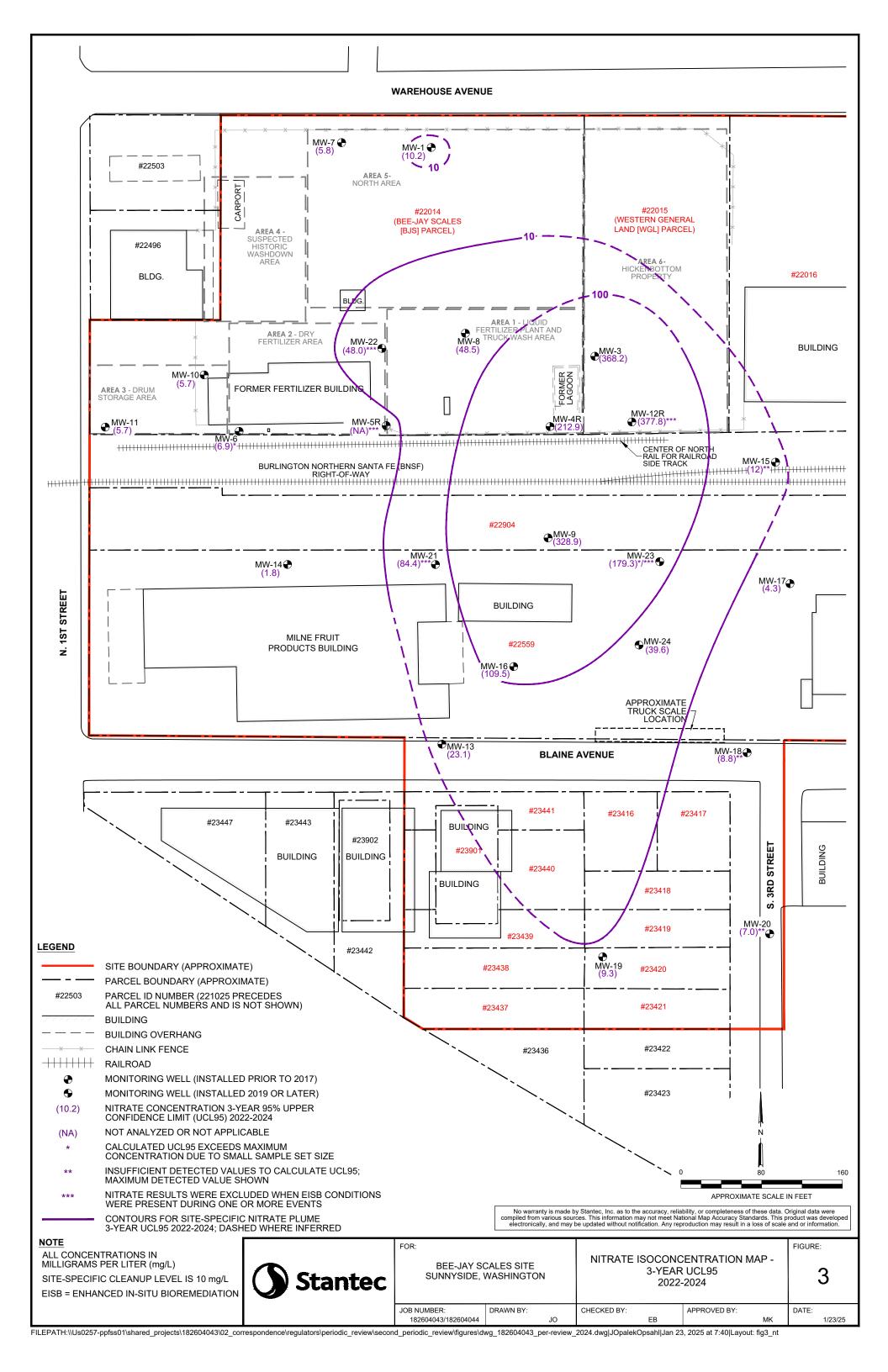
<sup>&</sup>lt;sup>d</sup> 3-year UCL95 value could not be calculated due to data distribution or small sample size of the dataset; therefore, the maximum concentration over the 3-year period is shown.

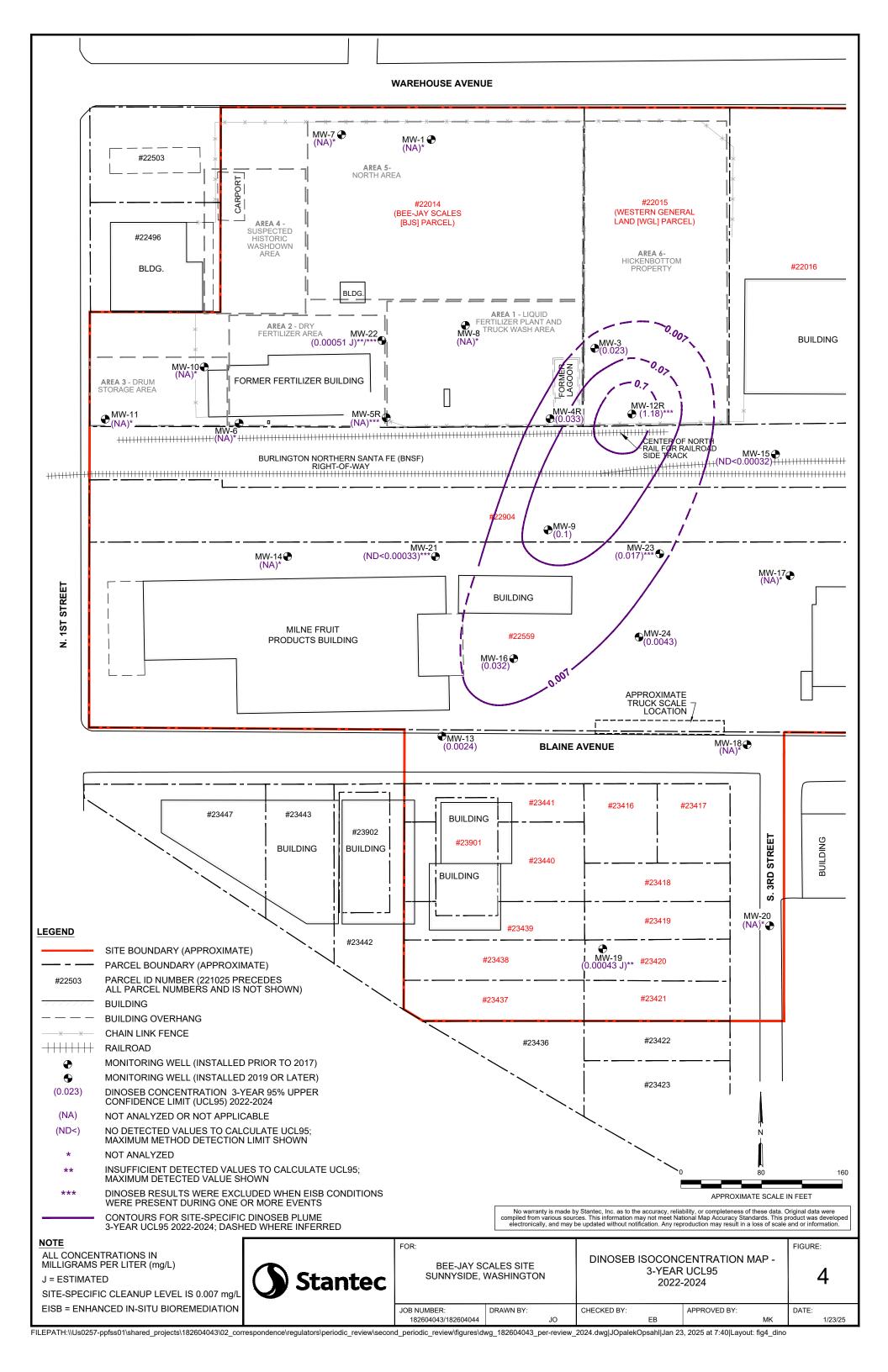
e Trend analysis was only performed for IHSs that were detected and had exceeded their CUL at least once in the last five years, with the exception of nitrate. All nitrate trend analysis results are included.

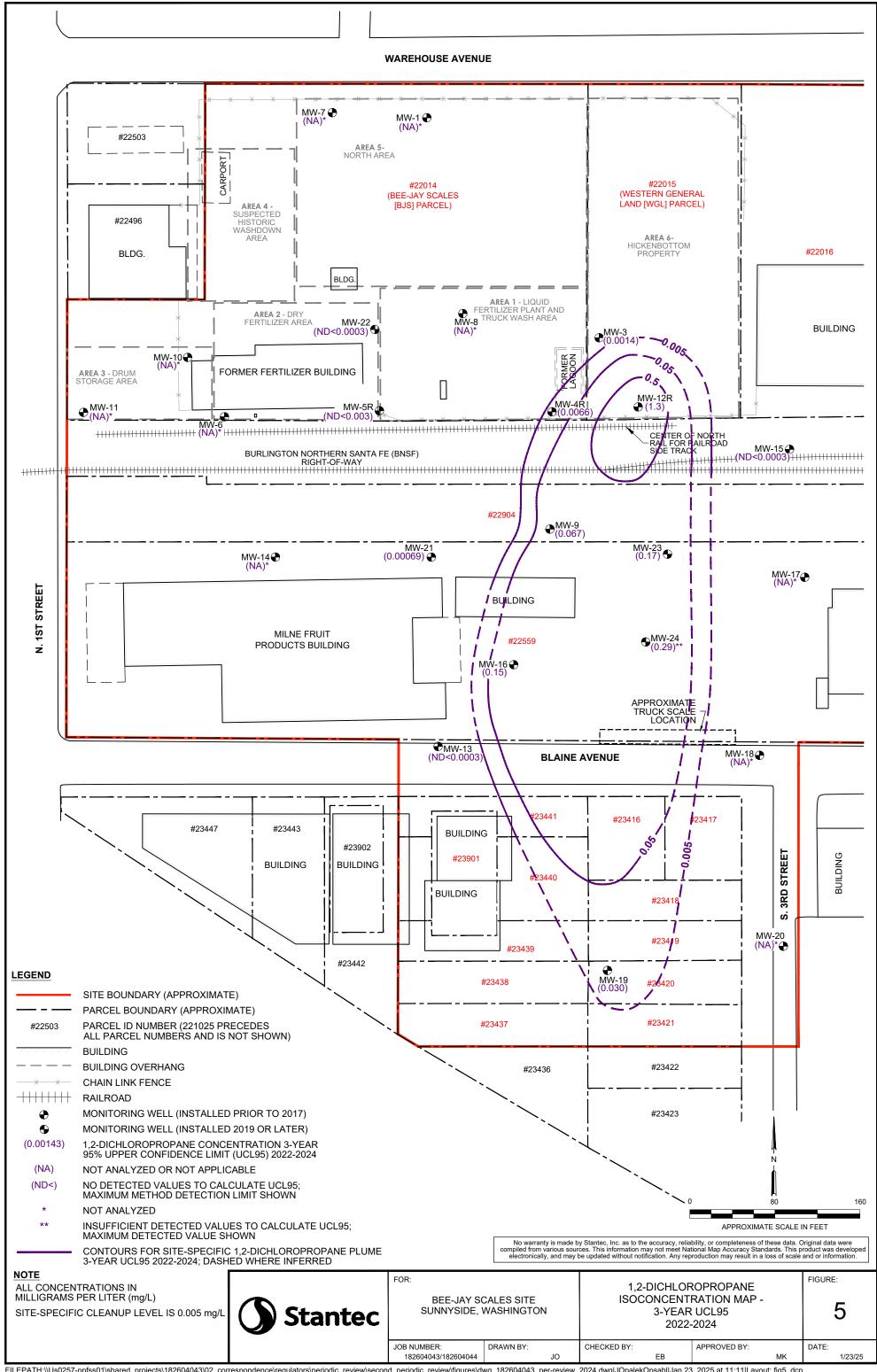


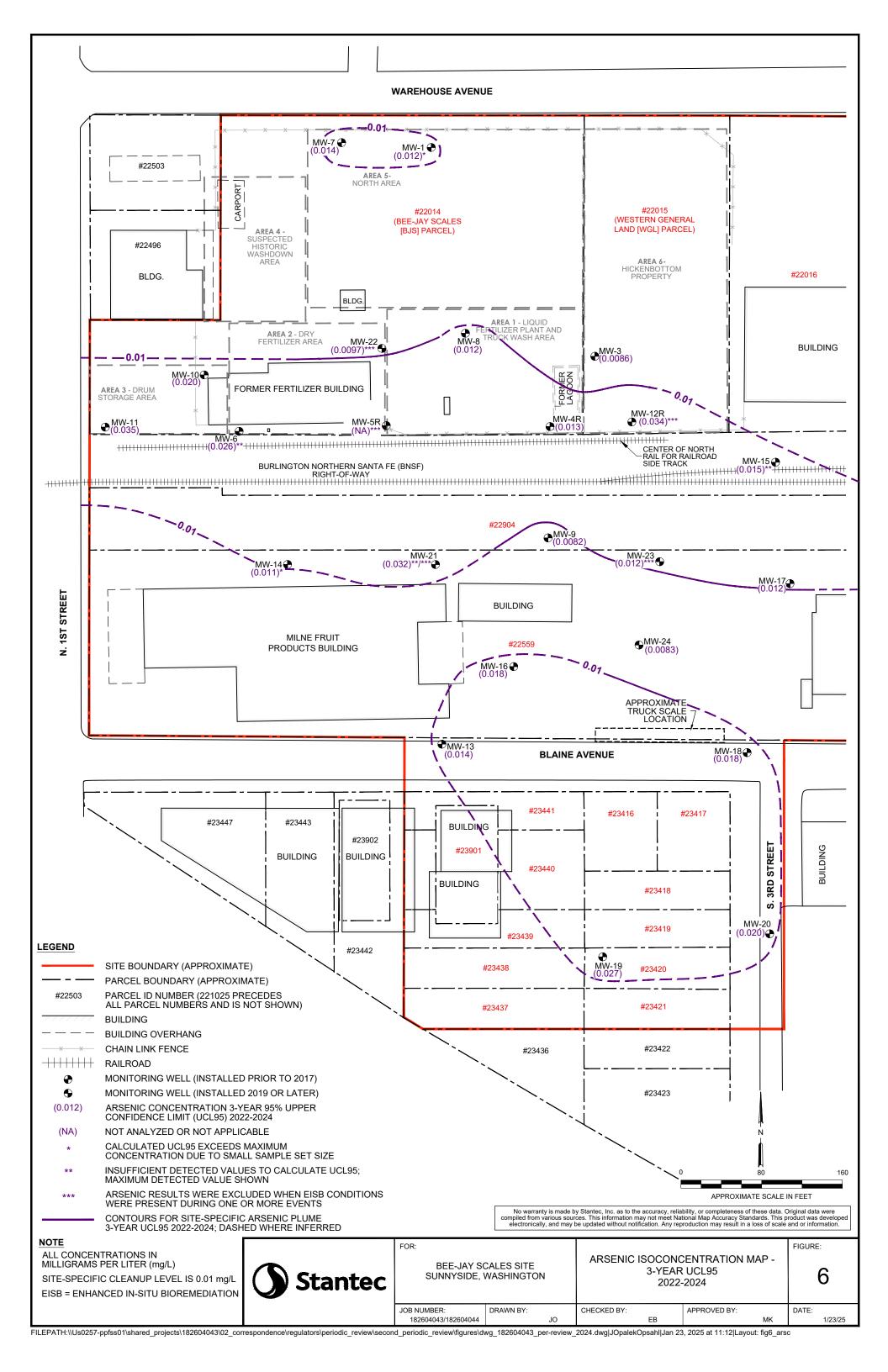












APPENDIX A Groundwater	Concentratio	on ProUCL So	ftware Outputs

	UCL Statis	tics for Unce	ensored Full Data Sets	
User Selected Options				
•	ProUCL 5.2 11/13/2024 2	2:02:15 PM		
	mw01_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-1				
iiii ate - MVV-1				
		General S		
Total N	Number of Observations	6	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	6.4	Mean	8.667
	Maximum	12	Median	8.4
	SD	1.859	Std. Error of Mean	0.759
	Coefficient of Variation	0.214	Skewness	1.155
Note: Sample size is sr	mall (e.a. <10) if data a	re collected	using incremental sampling methodology (ISM) approach,	
•			2020 and ITRC 2012) for additional guidance,	
		-		
hut note that II	TRC may recommend th	e t-UCL or th	ne Chehyshey LICL for small sample sizes (n < 7)	
but note that I	<del>-</del>		ne Chebyshev UCL for small sample sizes (n < 7).	
	The Chebyshev UCL of	ten results ir	n gross overestimates of the mean.	
	The Chebyshev UCL of	ten results ir		
	The Chebyshev UCL of	ten results ir hnical Guide	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.	
Refe	The Chebyshev UCL of r to the ProUCL 5.2 Tec	ten results ir hnical Guide Normal G	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic	ten results in hnical Guide Normal G	of gross overestimates of the mean.  of for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test	
Refe	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.906 0.713	of gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.906 0.713 0.262	on gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	Normal G 0.906 0.713 0.262 0.373	of r a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.906 0.713 0.262 0.373 ar Normal at	of radiscussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.906 0.713 0.262 0.373 ar Normal at	of r a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic Papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in	Normal G 0.906 0.713 0.262 0.373 ar Normal at	of radiscussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.906 0.713 0.262 0.373 ar Normal at	of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes	
Sh 1% Sh	The Chebyshev UCL of a to the ProUCL 5.2 Technology of the ProUCL 5.2 Tech	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	10.3
Sh 1% Sh	The Chebyshev UCL of or to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.906 0.713 0.262 0.373 ar Normal at	of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes	10.3
Sh 1% Sh	The Chebyshev UCL of a to the ProUCL 5.2 Technology of the ProUCL 5.2 Tech	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel	n gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	
Refe	The Chebyshev UCL of a to the ProUCL 5.2 Technology of the ProUCL 5.2 Tech	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Refe	The Chebyshev UCL of a to the ProUCL 5.2 Technology of the ProUCL 5.2 Tech	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic Papiro Wilk Critical Value Lilliefors Test Statistic Capital Value Data appearance Note GOF tests of Assermal UCL	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel suming Norm 10.2 Gamma G	In gross overestimates of the mean. In or a discussion of the Chebyshev UCL.  IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Paral Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	10.26
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel suming Norm 10.2  Gamma G 0.337	In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	10.26
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology to the ProUCL 5.2 Technology with the Pr	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel suming Norm 10.2  Gamma G 0.337 0.697	In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	10.26
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology to the ProUCL 5.2 Technology with the Pr	Normal G 0.906 0.713 0.262 0.373 ar Normal at may be unrel suming Norm 10.2  Gamma G 0.337 0.697 0.229 0.332	In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Pall Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test	10.26

	Gamma S	Statistics	
k hat (MLE)	27.94	k star (bias corrected MLE)	14.08
Theta hat (MLE)	0.31	Theta star (bias corrected MLE)	0.61
nu hat (MLE)	335.2	nu star (bias corrected)	168.9
MLE Mean (bias corrected)	8.667	MLE Sd (bias corrected)	2.31
		Approximate Chi Square Value (0.05)	139.9
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	130.3
Ass	uming Gamr	na Distribution	
95% Approximate Gamma UCL	10.47	95% Adjusted Gamma UCL	11.24
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.226	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at	t 10% Significance Level	
Note GOF tests i	may be unrel	iable for small sample sizes	
	Lognormal	Statistics	
Minimum of Logged Data	1.856	Mean of logged Data	2.14
Maximum of Logged Data	2.485	SD of logged Data	0.20
Assu	ming Lognor	mal Distribution	
95% H-UCL	10.52	90% Chebyshev (MVUE) UCL	10.8
95% Chebyshev (MVUE) UCL	11.83	97.5% Chebyshev (MVUE) UCL	13.2
95 % Chebyshev (WVOE) OCL			
99% Chebyshev (MVUE) UCL	15.88		
99% Chebyshev (MVUE) UCL		on Free UCL Statistics	
99% Chebyshev (MVUE) UCL  Nonparame	tric Distributi	on Free UCL Statistics Discernible Distribution	
99% Chebyshev (MVUE) UCL  Nonparame  Data appea	tric Distributi r to follow a I		
99% Chebyshev (MVUE) UCL  Nonparame  Data appea  Nonpar	tric Distributi r to follow a I	Discernible Distribution	10.1
99% Chebyshev (MVUE) UCL  Nonparame  Data appea	tric Distributi r to follow a I	Discernible Distribution ibution Free UCLs	
99% Chebyshev (MVUE) UCL  Nonparame  Data appea  Nonpar  95% CLT UCL	tric Distributi r to follow a l ametric Distr	Discernible Distribution  ibution Free UCLs  95% BCA Bootstrap UCL	10.8
99% Chebyshev (MVUE) UCL  Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL	tric Distributi r to follow a I ametric Distr 9.915 9.816	Discernible Distribution  ribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	10.8 9.83
99% Chebyshev (MVUE) UCL  Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL	tric Distributir to follow a Image: ametric Distribution 9.915 9.816 17.92	piscernible Distribution  ribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	10.8 9.83 11.9
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a I metric Distributi 9.915 9.816 17.92 10.94	Discernible Distribution  ibution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	10.8 9.83 11.9
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a I  ametric Distributi 9.915 9.816 17.92 10.94 13.41	Discernible Distribution  ibution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	10.8 9.83 11.9
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a I  ametric Distributi 9.915 9.816 17.92 10.94 13.41  Suggested U 10.2	Discernible Distribution  ribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL  USE	10.8 9.83 11.9 16.2
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	ametric Distributi 9.915 9.816 17.92 10.94 13.41  Suggested U 10.2  UCL are pro	Discernible Distribution  ibution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	10.88 9.83 11.9 16.22

		No. 11 11	
	General		
Total Number of Observations	4	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.011	Mean	0.0
Maximum	0.012	Median	0.0
	5.7735E-4	Std. Error of Mean	2.8868
Coefficient of Variation	0.0502	Skewness	0
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Ted	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.731	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.307	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appe	ar Normal at	1% Significance Level	
		liable for small sample sizes	
Δε	eumina Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0122	95% Adjusted-CLT UCL (Chen-1995)	0.0
33.0 3.000.00 1 332	0.0.22	95% Modified-t UCL (Johnson-1978)	0.0
		30% Modified 1992 (doffitison 1979)	0.0
	Gamma (		
A-D Test Statistic	0.719	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.657	Data Not Gamma Distributed at 5% Significance Lev	/el
K-S Test Statistic	0.341	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significan	ice Lev
Detected data follow Ap	pr. Gamma I	Distribution at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	528.7	k star (bias corrected MLE)	132.
Theta hat (MLE)	2.1753E-5	Theta star (bias corrected MLE)	8.6902
nu hat (MLE)	4229	nu star (bias corrected)	1059
MLE Mean (bias corrected)	0.0115	MLE Sd (bias corrected)	9.9969
·		Approximate Chi Square Value (0.05)	984.
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ao	eumina Gam	ma Distribution	
AS	summy Gam	ina pianbunun	
95% Approximate Gamma UCL	0.0124	95% Adjusted Gamma UCL	N/A

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.731	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.307	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear Approx	imate Lognorr	mal at 10% Significance Level	
Note GOF tests	may be unrelia	ble for small sample sizes	
	Lognormal S	statistics	
Minimum of Logged Data	-4.51	Mean of logged Data	-4.466
Maximum of Logged Data	-4.423	SD of logged Data	0.050
		nal Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.012
95% Chebyshev (MVUE) UCL	0.0128	97.5% Chebyshev (MVUE) UCL	0.013
99% Chebyshev (MVUE) UCL	0.0144		
Nonnoromo	trio Diotributio	n Free UCL Statistics	
<u> </u>			
Data appea	r to follow a Di	scernible Distribution	
·		oution Free UCLs	
95% CLT UCL	0.012	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
			0.040
90% Chebyshev(Mean, Sd) UCL	0.0124	95% Chebyshev(Mean, Sd) UCL	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0124 0.0133	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.012
	0.0133	99% Chebyshev(Mean, Sd) UCL	
97.5% Chebyshev(Mean, Sd) UCL	0.0133 Suggested UC	99% Chebyshev(Mean, Sd) UCL	
97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	0.0133 Suggested U0 0.0122	99% Chebyshev(Mean, Sd) UCL	
97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	0.0133 Suggested U0 0.0122	99% Chebyshev(Mean, Sd) UCL	
97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Recommended	0.0133  Suggested UC  0.0122  UCL exceeds	99% Chebyshev(Mean, Sd) UCL CL to Use the maximum observation	0.014
97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Recommended  Note: Suggestions regarding the selection of a 95%	0.0133  Suggested UC 0.0122  UCL exceeds	99% Chebyshev(Mean, Sd) UCL	0.014

User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/13/2024	2·04·50 PM		
From File	mw03_3year_data.xls	2.01.001 111		
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
trate - MW-3				
		General S	Statistics	
Total	Number of Observations	8	Number of Distinct Observations	8
			Number of Missing Observations	0
	Minimum	180	Mean	307.5
	Maximum	410	Median	345
	SD	90.67	Std. Error of Mean	32.0
	Coefficient of Variation	0.295	Skewness	-0.53
refer also to	TRC Tech Reg Guide of ITRC may recommend the	on ISM (ITRO	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	
refer also to	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL or	on ISM (ITRO e t-UCL or to ften results i	C 2020 and ITRC 2012) for additional guidance,	
refer also to but note that l	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech	on ISM (ITRO e t-UCL or the ften results i chnical Guide Normal G	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. The for a discussion of the Chebyshev UCL.  GOF Test	
refer also to but note that leading to the second s	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic	on ISM (ITRO e t-UCL or the ften results in chnical Guide  Normal G  0.872	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test	
refer also to but note that Reference	THE CHECK THE PROBLEM OF THE CHECK THE PROBLEM OF T	on ISM (ITRO e t-UCL or ti ften results i chnical Guide  Normal G  0.872  0.749	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
refer also to but note that leading to but not lead to be a second to but not lead to be a second to but not lead to but not lead to be a second to be	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL or the ProUCL 5.2 Tech hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic	on ISM (ITRO e t-UCL or the ften results in chnical Guide Normal G 0.872 0.749 0.265	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
refer also to but note that leading to but not lead to be a second to but not lead to be a second to but not lead to but not lead to be a second to be	hapiro Wilk Critical Value Lilliefors Critical Value	Normal G 0.872 0.749 0.265 0.333	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
refer also to but note that leading to but not lead to be a second to but not lead to be a second to but not lead to but not lead to be a second to be	The Chebyshev UCL of the ProUCL 5.2 Tech hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.872 0.749 0.265 0.333 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
refer also to but note that leading to but not lead to be a second to but not lead to be a second to but not lead to but not lead to be a second to be	The Chebyshev UCL of the ProUCL 5.2 Tech hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.872 0.749 0.265 0.333 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
refer also to but note that leading to but not lead to be a second to but not lead to be a second to but not lead to but not lead to be a second to be	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea	Normal G 0.872 0.749 0.265 0.333 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea	Normal G 0.872 0.749 0.265 0.333 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
refer also to but note that I	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic thapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests	Normal G 0.872 0.749 0.265 0.333 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SAOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes	353.7
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level Illiable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)	353.7 367.2
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea Note GOF tests  Assormal UCL  95% Student's-t UCL	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	367.2
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea Note GOF tests  As:  Ormal UCL  A-D Test Statistic	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unresuming Normal Security Burners Suming Normal Security Burners Security Burn	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	367.2
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data appea Note GOF tests  Assormal UCL  A-D Test Statistic  5% A-D Critical Value	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unre suming Norm 368.2  Gamma C 0.63 0.715	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  Page 18 Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	367.2
refer also to but note that I	hapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Critical Value Data apper Note GOF tests  As:  A-D Test Statistic  K-S Test Statistic  K-S Test Statistic  S% K-S Critical Value	Normal G 0.872 0.749 0.265 0.333 ar Normal at may be unressuming Norm 368.2  Gamma G 0.63 0.715 0.297 0.294	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Illiable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test	367.2 ce Leve

	Gamma	Statistics	
k hat (MLE)	11.53	k star (bias corrected MLE)	7.29
Theta hat (MLE)	26.67	Theta star (bias corrected MLE)	42.18
nu hat (MLE)	184.5	nu star (bias corrected)	116.6
MLE Mean (bias corrected)	307.5	MLE Sd (bias corrected)	113.9
		Approximate Chi Square Value (0.05)	92.71
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	87.32
As	suming Gam	ma Distribution	
95% Approximate Gamma UCL	386.9	95% Adjusted Gamma UCL	410.8
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.843	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.295	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level	
Data Not L	ognormal at	10% Significance Level	
	Lognormal	I Statistics	
Minimum of Logged Data	_	Mean of logged Data	5.68
Maximum of Logged Data		SD of logged Data	0.32
Maximan of Edgged Bala	0.010	55 51 10ggs03 54.td	0.02
		rmal Distribution	
95% H-UCL	402.8	90% Chebyshev (MVUE) UCL	416.4
95% Chebyshev (MVUE) UCL	465.3	97.5% Chebyshev (MVUE) UCL	533.2
99% Chebyshev (MVUE) UCL	666.6		
Nonparame	etric Distribut	tion Free UCL Statistics	
Data appea	ar to follow a	Discernible Distribution	
Nonpa	rametric Dist	tribution Free UCLs	
95% CLT UCL	360.2	95% BCA Bootstrap UCL	350
95% Standard Bootstrap UCL	356.5	95% Bootstrap-t UCL	360.7
95% Hall's Bootstrap UCL	347.2	95% Percentile Bootstrap UCL	355
90% Chebyshev(Mean, Sd) UCL	403.7	95% Chebyshev(Mean, Sd) UCL	447.2
97.5% Chebyshev(Mean, Sd) UCL	507.7	99% Chebyshev(Mean, Sd) UCL	626.5
	Suggested	UCL to Use	
95% Student's-t UCL	368.2		
Note: Suggestions regarding the selection of a 95%	6 UCL are pro	ovided to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size	, data distribu	ution, and skewness using results from simulation studies.	
However simulations results will not cover all Real W	orld data set	s; for additional insight the user may want to consult a statisticia	an.
Tierroro, cimalatione recalls will not sever all recall to			
	dence limite	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	

_			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.015	Minimum Non-Detect	0.0
Maximum Detect	0.87	Maximum Non-Detect	0.0
Variance Detects	0.145	Percent Non-Detects	12.
Mean Detects	0.27	SD Detects	0.3
Median Detects	0.033	CV Detects	1.4
Skewness Detects	1.184	Kurtosis Detects	-0.7
Mean of Logged Detects	-2.515	SD of Logged Detects	1.
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	e for a discussion of the Chebyshev UCL.	
Norma	al GOF Test	t on Detects Only	
Shapiro Wilk Test Statistic	0.702	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data Not Normal at 1% Significance Level	
P	0.70		
Lilliefors Test Statistic	0.328	Lilliefors GOF Test	
•			el
Lilliefors Test Statistic  1% Lilliefors Critical Value	0.328	Lilliefors GOF Test	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear	0.328 0.35 <b>Approximat</b>	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Leve	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests re	0.328 0.35 Approximate nay be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests re	0.328 0.35 Approximate may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean	0.328 0.35  Approximate may be unreful to the control of the contr	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  Normal at 1% Significance Level  Liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	0.328 0.35 Approximate may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean	0.328 0.35  Approximate may be unreful to the control of the contr	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  Normal at 1% Significance Level  Liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	0.328 0.35  Approximate may be unreconstructed to 0.238 0.34	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	0. 0. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	0.328 0.35  Approximate may be unreserved to the control of the co	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level diable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0. 0. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests re  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.328 0.35 Approximate may be unre 1g Normal C 0.238 0.34 0.484 0.452	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0. 0. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.328 0.35 Approximate nay be unre 1g Normal C 0.238 0.34 0.484 0.452 0.628 1.049	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0. 0. 0. 1. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.328 0.35 Approximate nay be unre 1g Normal C 0.238 0.34 0.484 0.452 0.628 1.049	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  e Normal at 1% Significance Level  liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0. 0. 0. 1. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear of Note GOF tests in Note GOF tests in KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.328 0.35  Approximate may be unre  19 Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0. 0. 0. 1. 0. 1.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.328 0.35  Approximate may be unrese g Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0. 0. 1. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear.  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value	0.328 0.35  Approximate may be unreside Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  e Normal at 1% Significance Level  liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0. 0. 1. 0. 1.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear and Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL Synthesis Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	0.328 0.35  Approximate may be unree  19 Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75 0.31 0.327	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Obebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0. 0. 1. 0.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear	0.328 0.35  Approximate may be unreside Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75 0.31 0.327  Gamma Dis	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0. 0. 1. 0. 1.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear A  Note GOF tests of the statistic susion of the	0.328 0.35  Approximate may be unree  19 Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75 0.31 0.327  Gamma Dis  may be unree	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Servations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level	0. 0. 1. 0. 1.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear A  Note GOF tests of the statistic susion of the	0.328 0.35  Approximate may be unree  19 Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75 0.31 0.327  Gamma Dis  may be unree	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  In Normal at 1% Significance Level  Iliable for small sample sizes  Intical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance  Stributed at 5% Significance Level  Iliable for small sample sizes	00011111
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Camma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in	0.328 0.35  Approximate may be unreside Normal C 0.238 0.34 0.484 0.452 0.628 1.049  Tests on De 0.718 0.75 0.31 0.327  Gamma Dismay be unresided in the control of the con	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level e Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Stected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level Iliable for small sample sizes  Detected Data Only	0. 0. 0. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data appear of Note GOF tests in Note GOF tests in KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Camma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in Note GOF tests in Statistic  Gamma Statistic  Gamma Statistic	0.328 0.35  Approximate may be unreside section of the section of	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  e Normal at 1% Significance Level  liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Stributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)	0. 0. 0. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.

Gamma ROS	Statistics u	sing Imputed Non-Detects	
GROS may not be used when data se	et has > 50%	6 NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is s	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS r	method may	yield incorrect values of UCLs and BTVs	
This is especia	ally true whe	en the sample size is small.	
For gamma distributed detected data, BTVs a	nd UCLs ma	y be computed using gamma distribution on KM estimates	
Minimum	0.01	Mean	0.238
Maximum	0.87	Median	0.029
SD	0.364	CV	1.532
k hat (MLE)	0.478	k star (bias corrected MLE)	0.382
Theta hat (MLE)	0.497	Theta star (bias corrected MLE)	0.622
nu hat (MLE)	7.644	nu star (bias corrected)	6.111
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (6.11, α)	1.697	Adjusted Chi Square Value (6.11, β)	1.176
95% Gamma Approximate UCL	0.855	95% Gamma Adjusted UCL	1.234
		meters using KM Estimates	
Mean (KM)	0.238	SD (KM)	0.34
Variance (KM)	0.116	SE of Mean (KM)	0.13
k hat (KM)	0.491	k star (KM)	0.39
nu hat (KM)	7.853	nu star (KM)	6.242
theta hat (KM)	0.485	theta star (KM)	0.61
80% gamma percentile (KM)	0.383	90% gamma percentile (KM)	0.676
95% gamma percentile (KM)	0.998	99% gamma percentile (KM)	1.811
Gamm	a Kanlan-M	eier (KM) Statistics	
Approximate Chi Square Value (6.24, α)	1.765	Adjusted Chi Square Value (6.24, β)	1.229
95% KM Approximate Gamma UCL	0.842	95% KM Adjusted Gamma UCL	1.209
The state of the s		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.836	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data Not Lognormal at 10% Significance Lev	/el
Lilliefors Test Statistic	0.266	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data appear	proximate	Lognormal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
Lognormal ROS	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.236	Mean in Log Scale	-3.047
SD in Original Scale	0.365	SD in Log Scale	2.219
95% t UCL (assumes normality of ROS data)	0.481	95% Percentile Bootstrap UCL	0.439
95% BCA Bootstrap UCL	0.513	95% Bootstrap t UCL	1.665
95% H-UCL (Log ROS)	161.1		
		Data and Assuming Lognormal Distribution	
KM Mean (logged)	-2.726	KM Geo Mean	0.0655
KM SD (logged)	1.625	95% Critical H Value (KM-Log)	5.084
KM Standard Error of Mean (logged)	0.621	95% H-UCL (KM -Log)	5.566
KM SD (logged)	1.625	95% Critical H Value (KM-Log)	5.084
KM Standard Error of Mean (logged)	0.621		

	DL/2 Statistics		
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.237	Mean in Log Scale	-2.8
SD in Original Scale	0.364	SD in Log Scale	1.8
95% t UCL (Assumes normality)	0.481	95% H-Stat UCL	16.
DL/2 is not a recommended met	thod, provided for co	mparisons and historical reasons	
Nonparamet	ric Distribution Free U	JCL Statistics	
Detected Data appear Approx	kimate Normal Distrib	outed at 1% Significance Level	
5	Suggested UCL to Us	se	
95% KM (t) UCL	0.484		
	•		
The calculated UCLs are based on assumption	ons that the data were	e collected in a random and unbiased manner.	
Please verify the da	ata were collected fro	m random locations.	
If the data were collected	using judgmental or o	other non-random methods,	
then contact a s	tatistician to correctly	r calculate UCLs.	
When a data set follows an appr	oximate distribution pa	assing only one of the GOF tests,	
it is suggested to use a UCL base	ed upon a distribution	passing both GOF tests in ProUCL	
Note: Constitution and the selection of a OFOC	1101	0.5% 1.01	
Note: Suggestions regarding the selection of a 95%	·		•
<u> </u>		skewness using results from simulation studies.  tional insight the user may want to consult a statisticia	

	General S	Statistics
Total Number of Observations	8	Number of Distinct Observations 6
		Number of Missing Observations 0
Minimum	0.0064	Mean 0.007
Maximum	0.0096	Median 0.007
SD	0.00132	Std. Error of Mean 4.6749B
Coefficient of Variation	0.171	Skewness 0.64
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,
<del>_</del>	-	2020 and ITRC 2012) for additional guidance,
		ne Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.
	Normal G	OF Test
Shapiro Wilk Test Statistic	0.848	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.255	Lilliefors GOF Test
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level
Data appe	ar Normal at	1% Significance Level
Note GOF tests	may be unre	liable for small sample sizes
As	suming Norn	nal Distribution
95% Normal UCL		95% UCLs (Adjusted for Skewness)
95% Student's-t UCL	0.00862	95% Adjusted-CLT UCL (Chen-1995) 0.008
		95% Modified-t UCL (Johnson-1978) 0.008
	Gamma C	GOF Test
A-D Test Statistic	0.551	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Leve
K-S Test Statistic	0.249	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Leve
Detected data appear	r Gamma Dis	tributed at 5% Significance Level
Note GOF tests	may be unre	liable for small sample sizes
	Gamma S	Statistics
k hat (MLE)	40.75	k star (bias corrected MLE) 25.5
Theta hat (MLE)	1.8988E-4	Theta star (bias corrected MLE) 3.02818
nu hat (MLE)	652	nu star (bias corrected) 408.8
MLE Mean (bias corrected)	0.00774	MLE Sd (bias corrected) 0.001
		Approximate Chi Square Value (0.05) 363
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value 352
Acc	suming Gam	ma Distribution
AS	Juining Guinn	

	Lognormal GO	OF Test	
Shapiro Wilk Test Statistic	0.865	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.234	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at 1	0% Significance Level	
Note GOF tests r	nay be unrelial	ble for small sample sizes	
	Lognormal St		
Minimum of Logged Data	-5.051	Mean of logged Data	-4.874
Maximum of Logged Data	-4.646	SD of logged Data	0.166
Деен	ming Lognorma	al Distribution	
95% H-UCL	0.00874	90% Chebyshev (MVUE) UCL	0.0091
95% Chebyshev (MVUE) UCL	0.00074	97.5% Chebyshev (MVUE) UCL	0.0106
99% Chebyshev (MVUE) UCL	0.0123	orion chaptanet (intol) act	0.010
33 /0 CHEDVSHEV (IVIVUE) UCLI			
99 % Chebyshev (WVOE) OCL	0.0120		
, , ,		n Free UCL Statistics	
Nonparamet	tric Distribution	n Free UCL Statistics scernible Distribution	
Nonparamet	tric Distribution		
Nonparamet Data appear	tric Distribution		
Nonparamet Data appear	tric Distribution	scernible Distribution	0.0085
Nonparamet  Data appear  Nonpara	tric Distribution to follow a Dis	scernible Distribution ution Free UCLs	0.0085
Nonparamet  Data appear  Nonpara  95% CLT UCL	tric Distribution to follow a Dis	ution Free UCLs  95% BCA Bootstrap UCL	
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL	tric Distribution to follow a Distribution 0.00851 0.00846	ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	0.0088
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL	tric Distribution to follow a Distribution  ametric Distribution 0.00851 0.00846 0.00852	ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	0.0088 0.0084 0.0097
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	1 tric Distribution to follow a Distribution 0.00851 0.00846 0.00852 0.00914 0.0107	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0088
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	metric Distribution  1 to follow a Distribution  1 0.00851  1 0.00846  1 0.00852  1 0.00914  1 0.0107	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0088 0.0084 0.0097
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	1 tric Distribution to follow a Distribution 0.00851 0.00846 0.00852 0.00914 0.0107	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0088 0.0084 0.0097
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	1 tric Distribution	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0088 0.0082 0.0097 0.012
Nonparamete  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%	metric Distribution  1 to follow a Distribution  2 control on the follow a Distribution  3 control on the follow a Distribution  4 control on the following a distribution of the following a	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0088 0.0084 0.0097 0.012

	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.023	Minimum Non-Detect	0.0
Maximum Detect	0.99	Maximum Non-Detect	0.0
Variance Detects	0.183	Percent Non-Detects	37
Mean Detects	0.225	SD Detects	0.
Median Detects	0.032	CV Detects	1.
Skewness Detects	2.231	Kurtosis Detects	4.
Mean of Logged Detects	-2.755	SD of Logged Detects	1.
		using incremental sampling methodology (ISM) approach,	
	-	the Chebyshev UCL for small sample sizes (n < 7).	
•		n gross overestimates of the mean.	
-		for a discussion of the Chebyshev UCL.	
		<u> </u>	
Norma	al GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.577	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.455	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data Not Normal at 1% Significance Level	
Detected Data	Not Normal	at 1% Significance Level	
Kaplan-Meier (KM) Statistics usin	g Normal Cri	itical Values and other Nonparametric UCLs	
KM Mean	0.151	KM Standard Error of Mean	0.
90KM SD	0.317	95% KM (BCA) UCL	0.
95% KM (t) UCL	0.389	95% KM (Percentile Bootstrap) UCL	0.
95% KM (z) UCL	0.357	95% KM Bootstrap t UCL	7.
90% KM Chebyshev UCL	0.527	95% KM Chebyshev UCL	0.
97.5% KM Chebyshev UCL	0.935	99% KM Chebyshev UCL	1.
		ected Observations Only	
A-D Test Statistic	0.976	Anderson-Darling GOF Test	
5% A-D Critical Value	0.711	Detected Data Not Gamma Distributed at 5% Significance	Leve
K-S Test Statistic	0.422	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.372	Detected Data Not Gamma Distributed at 5% Significance	Leve
Detected Data Not G	iamma Distri	buted at 5% Significance Level	
		Detected Data Only	
	Statistics on		
	0.502	k star (bias corrected MLE)	0.
Gamma S		k star (bias corrected MLE)  Theta star (bias corrected MLE)	
Gamma S k hat (MLE)	0.502	` '	0. 0. 3.

Gamma ROS	Statistics u	sing Imputed Non-Detects	
GROS may not be used when data se	et has > 50%	6 NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is s	mall such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS r	nethod may	yield incorrect values of UCLs and BTVs	
		en the sample size is small.	
For gamma distributed detected data, BTVs a	nd UCLs ma	by be computed using gamma distribution on KM estimates	
Minimum	0.01	Mean	0.151
Maximum	0.99	Median	0.029
SD	0.339	CV	2.245
k hat (MLE)	0.481	k star (bias corrected MLE)	0.384
Theta hat (MLE)	0.314	Theta star (bias corrected MLE)	0.394
nu hat (MLE)	7.696	nu star (bias corrected)	6.144
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (6.14, α)	1.714	Adjusted Chi Square Value (6.14, β)	1.189
95% Gamma Approximate UCL	0.542	95% Gamma Adjusted UCL	0.781
Estimates of C	ommo Doro	motors using VM Estimates	
Mean (KM)	0.151	meters using KM Estimates  SD (KM)	0.317
Variance (KM)	0.101	SE of Mean (KM)	0.317
k hat (KM)	0.101	k star (KM)	0.125
nu hat (KM)	3.626	nu star (KM)	3.599
theta hat (KM)	0.667	theta star (KM)	0.671
80% gamma percentile (KM)	0.21	90% gamma percentile (KM)	0.456
95% gamma percentile (KM)	0.754	99% gamma percentile (KM)	1.559
30 % gariina percentile (Killy)	0.704	55% garrina percentale (KW)	1.000
Gamm	a Kaplan-M	eier (KM) Statistics	
Approximate Chi Square Value (3.60, α)	0.57	Adjusted Chi Square Value (3.60, β)	0.339
95% KM Approximate Gamma UCL	0.954	95% KM Adjusted Gamma UCL	1.604
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data Not Lognormal at 10% Significance Lev	vel
Lilliefors Test Statistic	0.337	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data Not Lognormal at 10% Significance Lev	/el
Detected Data N	lot Lognorm	al at 10% Significance Level	
-		Using Imputed Non-Detects	
Mean in Original Scale	0.148	Mean in Log Scale	-3.414
SD in Original Scale	0.34	SD in Log Scale	1.693
95% t UCL (assumes normality of ROS data)	0.377	95% Percentile Bootstrap UCL	0.387
95% BCA Bootstrap UCL	0.508	95% Bootstrap t UCL	3.394
95% H-UCL (Log ROS)	4.03		
Statistics using KM astimatos	on Loaged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.095	KM Geo Mean	0.0453
KM SD (logged)	1.212	95% Critical H Value (KM-Log)	3.966
KM Standard Error of Mean (logged)	0.486	95% H-UCL (KM -Log)	0.58
KM SD (logged)	1.212	95% Critical H Value (KM-Log)	3.966
KM Standard Error of Mean (logged)	0.486	3070 Stitledi I I Valde (IMPLOS)	0.500
rum standard Error of Mean (logged)	0.400		

	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.152	Mean in Log Scale	-3.10
SD in Original Scale	0.339	SD in Log Scale	1.35
95% t UCL (Assumes normality)	0.379	95% H-Stat UCL	1.01
DL/2 is not a recommended me	thod, provi	ded for comparisons and historical reasons	
Nonparame	tric Distribu	tion Free UCL Statistics	
·		Discernible Distribution	
	Suggested	UCL to Use	
95% KM (t) UCL	0.389		
30 % run (t) 3 0 2	0.000		
The calculated UCLs are based on assumpti	ons that the	e data were collected in a random and unbiased manner.	
Please verify the d	ata were co	ollected from random locations.	
		mental or other non-random methods,	
		to correctly calculate UCLs.	
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data se	ts; for additional insight the user may want to consult a statisticia	an.

	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	1.1	Mean	1.86
Maximum	3.2	Median	1.75
SD	0.678	Std. Error of Mean	0.24
Coefficient of Variation	0.364	Skewness	1.07
		using incremental sampling methodology (ISM) approach,	
<del>_</del>	-	C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
Note: 10 the 1 1000E 0.2 1001	inical Galac	o tot a discussion of the offensystiev occ.	
		GOF Test	
Shapiro Wilk Test Statistic	0.926	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.151	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		1% Significance Level	
95% Normal UCL	uming Norr	nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.317	95% Adjusted CLT UCL (Chen-1995)	2.35
30% Stadelika ( 30E	2.017	95% Modified-t UCL (Johnson-1978)	2.3
I		(2011)	
	Gamma (		
A-D Test Statistic	0.195	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.141	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance	e Leve
		stributed at 5% Significance Level	
Note GOF tests if	nay be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	9.437	k star (bias corrected MLE)	5.98
Theta hat (MLE)	0.197	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	151	nu star (bias corrected)	95.7
MLE Mean (bias corrected)	1.863	MLE Sd (bias corrected)	0.76
	0.0105	Approximate Chi Square Value (0.05)	74.1
	0.0195	Adjusted Chi Square Value	69.3
Adjusted Level of Significance			
		ma Distribution	

	Lognormal GO	PF Test	
Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.123	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at 10	% Significance Level	
Note GOF tests n	nay be unreliab	le for small sample sizes	
	Lognormal Sta	atistics	
Minimum of Logged Data	0.0953	Mean of logged Data	0.56
Maximum of Logged Data	1.163	SD of logged Data	0.34
Assu	ming Lognorma	l Distribution	
95% H-UCL	2.473	90% Chebyshev (MVUE) UCL	2.54
95% Chebyshev (MVUE) UCL	2.857	97.5% Chebyshev (MVUE) UCL	3.2
99% Chebyshev (MVUE) UCL	4.137		
Nonnaramet	ric Distribution	Free UCL Statistics	
•		cernible Distribution	
Бата арреат	to lollow a Disc	Cernible Distribution	
Nonpara	metric Distribu	tion Free UCLs	
	mound Blounda		
-	2 257	95% BCA Bootstran LICI	2.3
95% CLT UCL	2.257	95% BCA Bootstrap UCL	2.3
95% CLT UCL 95% Standard Bootstrap UCL	2.23	95% Bootstrap-t UCL	2.3
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	2.23 2.581	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	2.5
95% CLT UCL 95% Standard Bootstrap UCL	2.23	95% Bootstrap-t UCL	2.5 2.2 2.9
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	2.23 2.581 2.582	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	2.5 2.2 2.9
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.23 2.581 2.582	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.5
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.23 2.581 2.582 3.36	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.50 2.23 2.90
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.23 2.581 2.582 3.36  Suggested UCL 2.317	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.50 2.23 2.90
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	2.23 2.581 2.582 3.36  Suggested UCL 2.317  UCL are provide	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.5 2.2 2.9

	General S	tatistics	
Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	3
Minimum Detect	4.3000E-4	Minimum Non-Detect	2.3000E-
Maximum Detect	4.8000E-4	Maximum Non-Detect	2.8000E-
Variance Detects	1.2500E-9	Percent Non-Detects	75%
Mean Detects	4.5500E-4	SD Detects	3.5355E-
Median Detects	4.5500E-4	CV Detects	0.077
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-7.697	SD of Logged Detects	0.077
Warning: Da	ata set has or	nly 2 Detected Values.	
This is not enough to comp	oute meaningf	ful or reliable statistics and estimates.	
		using incremental sampling methodology (ISM) approach,	
<del>-</del>	•	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or the	e Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend th	e t-UCL or the		
but note that ITRC may recommend th	e t-UCL or the	e Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend th	e t-UCL or the	e Chebyshev UCL for small sample sizes (n < 7). gross overestimates of the mean.	
but note that ITRC may recommend th  The Chebyshev UCL of  Refer to the ProUCL 5.2 Tec	e t-UCL or the ften results in hnical Guide	e Chebyshev UCL for small sample sizes (n < 7). gross overestimates of the mean.	
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec	e t-UCL or the ften results in hnical Guide	e Chebyshev UCL for small sample sizes (n < 7). gross overestimates of the mean. for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Norm Not End	e t-UCL or the ften results in chnical Guide nal GOF Test ough Data to I	e Chebyshev UCL for small sample sizes (n < 7). gross overestimates of the mean. for a discussion of the Chebyshev UCL. on Detects Only Perform GOF Test	
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin	e t-UCL or the ften results in hnical Guide hal GOF Test o bugh Data to I	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics using KM Mean	te t-UCL or the ften results in thinical Guide and GOF Test opugh Data to I g Normal Cri 2.8625E-4	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs  KM Standard Error of Mean	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tectors Norm  Note End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD	te t-UCL or the ften results in chnical Guide that GOF Test or the full part of the full pa	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  titical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	N/A
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL	re t-UCL or the ften results in chnical Guide and GOF Test or the fugh Data to I mg Normal Cri 2.8625E-4 9.8226E-5 3.7930E-4	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	N/A N/A
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL	re t-UCL or the ften results in chnical Guide real GOF Test or pugh Data to I results and	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	N/A N/A N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tector Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL	re t-UCL or the ften results in chnical Guide results in chnical Guide results for the first of	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  titical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	N/A N/A N/A 5.0033E
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL	re t-UCL or the ften results in chnical Guide results in chnical Guide results for the first of	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	N/A N/A N/A 5.0033E
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL	re t-UCL or the ften results in chnical Guide	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  titical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	N/A N/A N/A 5.0033E
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tector Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	re t-UCL or the ften results in chnical Guide results in chnical Guide results for the first of	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	N/A N/A N/A 5.0033E
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not Enc	re t-UCL or the ften results in chnical Guide results in the property of the p	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test   KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	N/A N/A N/A 5.0033E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not Enc	re t-UCL or the ften results in chnical Guide results in chnical Guide results in the first of the first on Detection Data to I Statistics on I	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Perform GOF Test	N/A N/A N/A 5.0033E- 7.7492E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF Not End  Gamma k hat (MLE)	re t-UCL or the ften results in chnical Guide results in thical Guide results in thical Guide results in thical Guide results in thical Guide results in the first section of the	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  ected Observations Only  Perform GOF Test  Detected Data Only  k star (bias corrected MLE)	N/A N/A N/A 5.0033E- 7.7492E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not Enc	re t-UCL or the ften results in chnical Guide results in thical Guide results in thical Guide results in thical Guide results in thical Guide results in the first section of the	e Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean.  for a discussion of the Chebyshev UCL.  on Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Perform GOF Test	N/A N/A N/A 5.0033E- 7.7492E-

Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	2.8625E-4	SD (KM)	9.8226E-5
Variance (KM)	9.6484E-9	SE of Mean (KM)	4.9113E-5
k hat (KM)	8.492	k star (KM)	5.391
nu hat (KM)	135.9	nu star (KM)	86.26
theta hat (KM)	3.3706E-5	theta star (KM)	5.3097E-5
80% gamma percentile (KM)	3.8158E-4	90% gamma percentile (KM)	4.5121E-4
95% gamma percentile (KM)	5.1447E-4	99% gamma percentile (KM)	6.4770E-4
Gamm	a Kaplan-M	eier (KM) Statistics	
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (86.26, α)	65.85	Adjusted Chi Square Value (86.26, β)	61.35
95% KM Approximate Gamma UCL	3.7497E-4	95% KM Adjusted Gamma UCL	4.0244E-4
-		etected Observations Only	
Not En	ough Data to	Perform GOF Test	
_		Using Imputed Non-Detects	
Mean in Original Scale		Mean in Log Scale	-7.998
SD in Original Scale		SD in Log Scale	0.208
95% t UCL (assumes normality of ROS data)		95% Percentile Bootstrap UCL	
95% BCA Bootstrap UCL		95% Bootstrap t UCL	4.4107E-4
95% H-UCL (Log ROS)	4.0045E-4		
_		Data and Assuming Lognormal Distribution	
KM Mean (logged)	-8.207	KM Geo Mean	
KM SD (logged)	0.296	95% Critical H Value (KM-Log)	2.053
KM Standard Error of Mean (logged)	0.148	95% H-UCL (KM -Log)	
KM SD (logged)	0.296	95% Critical H Value (KM-Log)	2.053
KM Standard Error of Mean (logged)	0.148		
	DI /0 C	tatistics	
DL/2 Normal	DU2 3	DL/2 Log-Transformed	
Mean in Original Scale	2 1/38 = /	Mean in Log Scale	-8.613
SD in Original Scale		SD in Log Scale	0.57
95% t UCL (Assumes normality)		95% H-Stat UCL	
		ded for comparisons and historical reasons	3.0433⊑-4
DELZ IS NOT A TECONIMENDED IN	etilou, provi	ueu ioi compansons and mstorical reasons	
Nonnarame	etric Distribu	tion Free UCL Statistics	
-		Discernible Distribution	
	Suggested	UCL to Use	
95% KM (t) UCL			
(/			
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UC	 L.
		ution, and skewness using results from simulation studies.	
i i		ts; for additional insight the user may want to consult a statistic	ian.

oseb - MW-3			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detects	-	Minimum Non-Detects	0.0015
Maximum Detect		Maximum Non-Detect	0.0015
Variance Detects			12.5%
Mean Detects	0.0167	Percent Non-Detects SD Detects	0.0118
Median Detects  Median Detects	0.0167	CV Detects	0.708
Skewness Detects	0.015	Kurtosis Detects	-0.304
	-4.405		0.966
Mean of Logged Detects	-4.405	SD of Logged Detects	0.900
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
<del>-</del>	•	C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
-		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.	
		t on Detects Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Lev	el
<u> </u>			
Lilliefors Test Statistic	0.169	Lilliefors GOF Test	
Lilliefors Test Statistic  1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Levi	el
Lilliefors Test Statistic  1% Lilliefors Critical Value	0.35		el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data	0.35 appear Norm	Detected Data appear Normal at 1% Significance Levi	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data  Note GOF tests	0.35 appear Norm may be unre	Detected Data appear Normal at 1% Significance Level liable for small sample sizes	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics using	0.35  appear Norm may be unre	Detected Data appear Normal at 1% Significance Level liable for small sample sizes ritical Values and other Nonparametric UCLs	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics using KM Mean	0.35 appear Norm may be unre ng Normal C 0.0148	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics using	0.35 appear Norm may be unre ng Normal C 0.0148	Detected Data appear Normal at 1% Significance Level liable for small sample sizes ritical Values and other Nonparametric UCLs	0.0043
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics using KM Mean	0.35 appear Norm may be unre ng Normal C 0.0148	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.0043
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD	0.35 appear Norm may be unre ng Normal C 0.0148 0.0114	Detected Data appear Normal at 1% Significance Levillal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	0.0043 0.0214 0.0213
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	0.35 appear Norm may be unre  ng Normal C  0.0148  0.0114  0.023  0.0219	Detected Data appear Normal at 1% Significance Levilal at 1% Significance Levilal at 1% Significance Level diable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	0.0043 0.0214 0.0213 0.0255
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.35 appear Norm may be unre  ng Normal C  0.0148  0.0114  0.023  0.0219	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.0043 0.0214 0.0213 0.0255
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.35 appear Norm may be unre  ng Normal C  0.0148  0.0114  0.023  0.0219  0.0278  0.0419	Detected Data appear Normal at 1% Significance Levilal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.0043 0.0214 0.0213 0.0255 0.0337
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF	0.35 appear Norm may be unre  10 0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De	Detected Data appear Normal at 1% Significance Levilal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.0043 0.0214 0.0215 0.0258
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219	Detected Data appear Normal at 1% Significance Levilal at 1% Significance Level Iliable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0.0043 0.0214 0.0215 0.0255 0.0333
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data:  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718	Detected Data appear Normal at 1% Significance Levilal at 1% Significance Level  Iliable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  Rected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.0043 0.0214 0.0213 0.0258 0.0333
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4. D Test Statistic  5% A-D Critical Value  K-S Test Statistic	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0.0043 0.0214 0.0255 0.033 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316	Detected Data appear Normal at 1% Significance Level  Italia at 1% Significance Level  Italiable for small sample sizes  Initical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0.0043 0.0214 0.0255 0.0337 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data:  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis	Detected Data appear Normal at 1% Significance Level  Italia at 1% Significance Level  Italiable for small sample sizes  Initical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  10 Steeted Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level	0.0043 0.0214 0.0255 0.0337 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data:  Note GOF tests  Kaplan-Meier (KM) Statistics usi  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis	Detected Data appear Normal at 1% Significance Level  Italia at 1% Significance Level  Italiable for small sample sizes  Initical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0.0043 0.0214 0.0255 0.0337 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  95% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis may be unre	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL Stected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes	0.0043 0.0214 0.0255 0.033 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4-D Test Statistic 5% A-D Critical Value  K-S Test Statistic 5% K-S Critical Value  Detected data appear  Note GOF tests  Gamma	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis may be unre	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL Stected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only	0.0043 0.0214 0.0258 0.033 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests  Gamma  k hat (MLE)	0.35 appear Norm may be unre  10 0.0148 0.0114 0.023 0.0219 0.0278 0.0419  11 0.316 0.191 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316 0.316	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL Sected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only  k star (bias corrected MLE)	0.0043 0.0213 0.0255 0.0337 0.058
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests  Gamma  k hat (MLE)  Theta hat (MLE)	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis may be unre  Statistics on  1.759 0.00947	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 100 Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only  k star (bias corrected MLE) Theta star (bias corrected MLE)	0.0043 0.0214 0.0255 0.0337 0.058 ce Level
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  4D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests  Gamma  k hat (MLE)	0.35 appear Norm may be unre  ng Normal C  0.0148 0.0114 0.023 0.0219 0.0278 0.0419  Tests on De  0.219 0.718 0.191 0.316 r Gamma Dis may be unre  Statistics on  1.759 0.00947 24.63	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL Sected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only  k star (bias corrected MLE)	0.0043 0.0214 0.0213 0.0255 0.0337 0.058

Gamma ROS	Statistics us	sing Imputed Non-Detects	
GROS may not be used when data se	et has > 50%	NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is s	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS r	method may	yield incorrect values of UCLs and BTVs	
		n the sample size is small.	
For gamma distributed detected data, BTVs a		y be computed using gamma distribution on KM estimates	
Minimum	0.0022	Mean	0.0158
Maximum	0.036	Median	0.014
SD	0.0112	CV	0.706
k hat (MLE)	1.91	k star (bias corrected MLE)	1.277
Theta hat (MLE)	0.00829	Theta star (bias corrected MLE)	0.0124
nu hat (MLE)	30.56	nu star (bias corrected)	20.43
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (20.43, α)	11.17	Adjusted Chi Square Value (20.43, β)	9.487
95% Gamma Approximate UCL	0.0289	95% Gamma Adjusted UCL	0.0341
Follow to a of O	D	and the second of the California	
	0.0148	meters using KM Estimates	0.0114
Mean (KM)		SD (KM) SE of Mean (KM)	0.0114
Variance (KM)			1.135
k hat (KM)	1.683 26.93	k star (KM)	18.17
nu hat (KM) theta hat (KM)	0.00877	nu star (KM) theta star (KM)	0.013
80% gamma percentile (KM)	0.00877	90% gamma percentile (KM)	0.013
95% gamma percentile (KM)	0.0233	99% gamma percentile (KM)	0.0329
95 % ganina percentile (KW)	0.0423	99 % gariiria percentile (KW)	0.0036
Gamm	a Kaplan-M	eier (KM) Statistics	
Approximate Chi Square Value (18.17, α)	9.51	Adjusted Chi Square Value (18.17, β)	7.977
95% KM Approximate Gamma UCL	0.0282	95% KM Adjusted Gamma UCL	0.0336
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic	0.24	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data ap	oear Lognor	mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		Using Imputed Non-Detects	4.005
Mean in Original Scale	0.0147	Mean in Log Scale	-4.695 1.212
SD in Original Scale	0.0122	SD in Log Scale	1.212
95% t UCL (assumes normality of ROS data)	0.0229	95% Percentile Bootstrap UCL 95% Bootstrap t UCL	0.0217
95% BCA Bootstrap UCL	0.0222	95% Bootstrap t OCL	0.0254
95% H-UCL (Log ROS)	0.117		
Statistics using KM estimates	on Loaaed I	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-4.667	KM Geo Mean	0.0094
KM SD (logged)	1.087	95% Critical H Value (KM-Log)	3.643
KM Standard Error of Mean (logged)	0.415	95% H-UCL (KM -Log)	0.0757
KM SD (logged)	1.087	95% Critical H Value (KM-Log)	3.643
KM Standard Error of Mean (logged)	0.415	209)	

	DL/2 St	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0147	Mean in Log Scale	-4.7
SD in Original Scale	0.0123	SD in Log Scale	1.3
95% t UCL (Assumes normality)	0.0229	95% H-Stat UCL	0.1
DL/2 is not a recommended me	thod, provi	ded for comparisons and historical reasons	
···	0	UOI As Lies	
···	Suggested	UCL to Use	
95% KM (t) UCL	Suggested 0.023	UCL to Use	
95% KM (t) UCL	0.023	UCL to Use  ovided to help the user to select the most appropriate 95% UCL	
95% KM (t) UCL  Note: Suggestions regarding the selection of a 95%	0.023		

	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	8
. 514. 7 14.11.55. 51. 5355. 74.115.15		Number of Missing Observations	0
Minimum	0.004	Mean	0.00839
Maximum	0.019	Median	0.0068
SD	0.0047	Std. Error of Mean	0.0016
Coefficient of Variation	0.561	Skewness	1.952
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or tl	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.795	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.249	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0115	95% Adjusted-CLT UCL (Chen-1995)	0.0123
		95% Modified-t UCL (Johnson-1978)	0.011
	Gamma C	GOF Test	
A-D Test Statistic	0.412	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.227	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance	e Level
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	4.798	k star (bias corrected MLE)	3.082
Theta hat (MLE)	0.00175	Theta star (bias corrected MLE)	0.0027
nu hat (MLE)	76.76	nu star (bias corrected)	49.31
MLE Mean (bias corrected)	0.00839	MLE Sd (bias corrected)	0.0047
		Approximate Chi Square Value (0.05)	34.19
	0.0195	Adjusted Chi Square Value	31.04
Adjusted Level of Significance	0.0100		
		ma Distribution	

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.198	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear I	ognormal at 1	0% Significance Level	
Note GOF tests r	nay be unrelia	ble for small sample sizes	
	Lognormal St	tatistics	
Minimum of Logged Data	-5.521	Mean of logged Data	-4.889
Maximum of Logged Data	-3.963	SD of logged Data	0.472
	0.000	02 0.109300 2010	
Assu	ming Lognorm	al Distribution	
95% H-UCL	0.0127	90% Chebyshev (MVUE) UCL	0.012
95% Chebyshev (MVUE) UCL	0.0144	97.5% Chebyshev (MVUE) UCL	0.017
99% Chebyshev (MVUE) UCL	0.0222	, , ,	
	l.		
Nonparame	tric Distribution	n Free UCL Statistics	
Data appear	to follow a Dis	scernible Distribution	
Nonpar	ametric Distrib	ution Fron LICLo	
· · · · · · · · · · · · · · · · · · ·		duon Fiee OCLS	
95% CLT UCL	0.0111	95% BCA Bootstrap UCL	0.012
	0.0111		0.012
95% CLT UCL		95% BCA Bootstrap UCL	0.014
95% CLT UCL 95% Standard Bootstrap UCL	0.011	95% BCA Bootstrap UCL 95% Bootstrap-t UCL	0.014
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.011 0.0224	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	0.011 0.0224 0.0134	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	0.014 0.011 0.015
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.011 0.0224 0.0134	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.014 0.011 0.015
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.011 0.0224 0.0134 0.0188	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.014 0.011 0.015
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.011 0.0224 0.0134 0.0188 Suggested UC 0.0115	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.014 0.011 0.015 0.024
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	0.011 0.0224 0.0134 0.0188  Suggested UC 0.0115  UCL are provide	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.014 0.011 0.015 0.024
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.011 0.0224 0.0134 0.0188  Suggested UC 0.0115  UCL are provided and distribution	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.014 0.015 0.024

	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	5.8000E-4	Mean	0.0011
Maximum	0.0019	Median	0.0011
SD	4.4262E-4	Std. Error of Mean 1	.5649E-
Coefficient of Variation	0.39	Skewness	0.375
		using incremental sampling methodology (ISM) approach,	
<del>_</del>		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
-		n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
Refer to the Prooct 5.2 Tec	innicai Guide	or a discussion of the Chebyshev OCL.	
	Normal G		
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.155	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		1% Significance Level liable for small sample sizes	
As 95% Normal UCL	suming Norn	nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00143	95% Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	0.0014
33% Students-t OCL	0.00143	95% Modified-t UCL (Johnson-1978)	0.0014
		(00.110.110.100.100	0.001
	Gamma C		
A-D Test Statistic	0.31	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic		Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance	e Level
		stributed at 5% Significance Level	
k hat (MLE)	7.103	k star (bias corrected MLE)	4.523
Theta hat (MLE)		Theta star (bias corrected MLE)	
nu hat (MLE)		nu star (bias corrected)	72.37
MLE Mean (bias corrected)	0.00113	MLE Sd (bias corrected)	
(		Approximate Chi Square Value (0.05)	53.78
	0.0195	Adjusted Chi Square Value	49.75
Adjusted Level of Significance			
	suming Gam	ma Distribution	

	Lognormal GC	OF Test	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.199	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at 10	0% Significance Level	
Note GOF tests r	nay be unreliab	ole for small sample sizes	
	Lognormal Sta	otiotico	
Minimum of Land Date			0.054
Minimum of Logged Data	-7.452	Mean of logged Data	-6.854
Maximum of Logged Data	-6.266	SD of logged Data	0.417
Assu	ming Lognorma	al Distribution	
95% H-UCL	0.00163	90% Chebyshev (MVUE) UCL	0.00164
95% Chebyshev (MVUE) UCL	0.00187	97.5% Chebyshev (MVUE) UCL	0.0021
99% Chebyshev (MVUE) UCL	0.00282		
Nonparamet	ric Distribution	Free UCL Statistics	
·		Free UCL Statistics cernible Distribution	
Data appear	to follow a Dis	cernible Distribution	
Data appear	to follow a Dis	cernible Distribution ution Free UCLs	
Data appear  Nonpara  95% CLT UCL	to follow a Disametric Distribution 0.00139	ution Free UCLs  95% BCA Bootstrap UCL	0.0013
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL	ametric Distribu 0.00139 0.00137	ution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL	0.0014
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	metric Distribu 0.00139 0.00137 0.00152	ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	0.0014
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	ametric Distribu 0.00139 0.00137	ution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	0.0014
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	metric Distribu 0.00139 0.00137 0.00152	ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	0.0014 0.0013 0.0018
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	metric Distribu 0.00139 0.00137 0.00152 0.0016 0.00211	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0014 0.0013 0.0018
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	ametric Distribu 0.00139 0.00137 0.00152 0.0016 0.00211	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0014 0.0013 0.0018
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	metric Distribu 0.00139 0.00137 0.00152 0.0016 0.00211	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0014
Nonpara 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	metric Distribu 0.00139 0.00137 0.00152 0.0016 0.00211 Suggested UCI 0.00143	graphic describition strip to the property of	0.0014 0.0013 0.0018 0.0026
Nonpare 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Note: Suggestions regarding the selection of a 95%	metric Distribution   0.00139   0.00137   0.00152   0.0016   0.00211    Suggested UCI   0.00143    UCL are provide	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0014 0.0013 0.0018 0.0026

		tics for Data		
User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/13/2024	2·08·02 PM		
From File	mw4r_3year_data.xls	2.00.02 T W		
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
tumber of Beeleding Operations	2000			
trate - MW-4R				
		General S	Statistics	
Total	Number of Observations	9	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	100	Mean	184.4
	Maximum	250	Median	180
	SD	45.86	Std. Error of Mean	15.2
	Coefficient of Variation	0.249	Skewness	-0.44
		I I		
Note: Sample size is s	small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to	=	-	C 2020 and ITRC 2012) for additional guidance,	
refer also to	=	-	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	
refer also to	TRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
refer also to but note that I	TRC may recommend the Chebyshev UCL o	ne t-UCL or the	ne Chebyshev UCL for small sample sizes (n < 7). n gross overestimates of the mean.	
refer also to but note that I	TRC may recommend the Chebyshev UCL o	ne t-UCL or the	ne Chebyshev UCL for small sample sizes (n < 7).	
refer also to but note that I	TRC may recommend the Chebyshev UCL o	ne t-UCL or the	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.	
refer also to but note that I	TRC may recommend the Chebyshev UCL o	ne t-UCL or the ften results in the characteristics in the characteristin the characteristics in the characteristics in the characteristi	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tector to the	ne t-UCL or the ften results in chnical Guide Normal G	the Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technique to the ProUCL 5.2	te t-UCL or the ten results in the chnical Guide  Normal G  0.935	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  IN GOF Test  Shapiro Wilk GOF Test	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technique to the ProUCL 5.2 Technique Wilk Test Statistic mapiro Wilk Critical Value	te t-UCL or the ten results in thinical Guide Normal G	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	Normal G 0.935 0.764 0.239 0.316	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic mapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.935 0.764 0.239 0.316 ar Normal at	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G 0.935 0.764 0.239 0.316 ar Normal at	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level 1% Significance Level liable for small sample sizes	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic mapiro Wilk Critical Value Lilliefors Test Statistic Chebyshev Critical Value Data appearance Note GOF tests	Normal G 0.935 0.764 0.239 0.316 ar Normal at	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. In GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G  0.935  0.764  0.239  0.316  ar Normal at may be unre	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic mapiro Wilk Critical Value Lilliefors Test Statistic Chebyshev Critical Value Data appearance Note GOF tests	Normal G 0.935 0.764 0.239 0.316 ar Normal at	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Page 10 June 11 June 12	207.1
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G  0.935  0.764  0.239  0.316  ar Normal at may be unre	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	207.1 212.5
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G  0.935  0.764  0.239  0.316  ar Normal at may be unre	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  Inal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G 0.935 0.764 0.239 0.316 ar Normal at may be unre	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Page 10 June 10	
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G 0.935 0.764 0.239 0.316 ar Normal at may be unresuming Normal Suming Normal S	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Paral Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	212.5
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology of th	Normal G 0.935 0.764 0.239 0.316 ar Normal at may be unre  suming Norm  212.9  Gamma G 0.478 0.721	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  Inal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	212.5
refer also to but note that I	the Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Data appear Note GOF tests  As Demail UCL  A-D Test Statistic	Normal G  0.935 0.764 0.239 0.316 ar Normal at may be unre  212.9  Gamma G  0.478	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Paral Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	212.5
refer also to but note that I	TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic Prapiro Wilk Critical Value Lilliefors Test Statistic National Value Data appear Note GOF tests  As Defended of the Prouch	Normal G 0.935 0.764 0.239 0.316 ar Normal at may be unresuming Normal G 212.9 Gamma G 0.478 0.721 0.272 0.279	ne Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Page 10 June 1	212.5

	Gamma	Statistics	
k hat (MLE)	15.99	k star (bias corrected MLE)	10.74
Theta hat (MLE)	11.53	Theta star (bias corrected MLE)	17.18
nu hat (MLE)	287.9	nu star (bias corrected)	193.2
MLE Mean (bias corrected)	184.4	MLE Sd (bias corrected)	56.29
		Approximate Chi Square Value (0.05)	162.1
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	156.1
Ass	suming Gan	nma Distribution	
95% Approximate Gamma UCL	219.9	95% Adjusted Gamma UCL	228.4
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.288	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data Not Lognormal at 10% Significance Level	
		ormal at 10% Significance Level	
		eliable for small sample sizes	
Note GOT tests	iliay be ulli	eliable for striali sample sizes	
	Lognorma	al Statistics	
Minimum of Logged Data	4.605	Mean of logged Data	5.186
Maximum of Logged Data	5.521	SD of logged Data	0.278
maximam or Loggod Data	0.021	OB OTTOGGGG Batta	0.270
Assı	ımina Loane	ormal Distribution	
95% H-UCL	225.7	90% Chebyshev (MVUE) UCL	236.5
95% Chebyshev (MVUE) UCL	259.9	97.5% Chebyshev (MVUE) UCL	292.3
99% Chebyshev (MVUE) UCL	356	57.6% S.162ya.161 ( C2) 552	
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonna	ametric Dis	tribution Free UCLs	
95% CLT UCL		95% BCA Bootstrap UCL	205.6
95% Standard Bootstrap UCL	208.5	95% Bootstrap-t UCL	213.3
95% Hall's Bootstrap UCL	210.6	95% Percentile Bootstrap UCL	207.8
90% Chebyshev(Mean, Sd) UCL	230.3	95% Chebyshev(Mean, Sd) UCL	251.1
97.5% Chebyshev(Mean, Sd) UCL	279.9	99% Chebyshev(Mean, Sd) UCL	336.5
	Suggested	UCL to Use	
95% Student's-t UCL	212.9		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	
<u> </u>		ts; for additional insight the user may want to consult a statistici	an.
Note: For highly negatively elegand date, confi	lence limite	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	
reliable. Chen's and Johnson's me	anous provi	de adjustments for positvely skewed data sets.	

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	5
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.017	Minimum Non-Detect	0.015
Maximum Detect	0.16	Maximum Non-Detect	0.015
Variance Detects	0.0038	Percent Non-Detects	55.50
Mean Detects	0.0925	SD Detects	0.06
Median Detects	0.0965	CV Detects	0.66
Skewness Detects	-0.312	Kurtosis Detects	-1.02
Mean of Logged Detects	-2.661	SD of Logged Detects	0.99
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
<del>-</del>		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
		·	
Norm	al GOF Test	t on Detects Only	
Shapiro Wilk Test Statistic	0.989	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Lev	el
Lilliefors Test Statistic	0.172	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Lev	el
Detected Data a	ppear Norm	al at 1% Significance Level	
		al at 1% Significance Level	
		al at 1% Significance Level liable for small sample sizes	
Note GOF tests i	may be unre	liable for small sample sizes	
Note GOF tests i Kaplan-Meier (KM) Statistics usin	may be unre	liable for small sample sizes	
Note GOF tests i  Kaplan-Meier (KM) Statistics usir  KM Mean	ng Normal C	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.02
Note GOF tests i  Kaplan-Meier (KM) Statistics usir  KM Mean  90KM SD	ng Normal C 0.0494 0.0524	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL	0.02 N/A
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	ng Normal Ci 0.0494 0.0524 0.087	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.020 N/A N/A
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	ng Normal Ci 0.0494 0.0524 0.087 0.0826	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0.02 N/A N/A N/A
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	ng Normal Ci 0.0494 0.0524 0.087	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.02 N/A N/A N/A 0.13
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	ng Normal C 0.0494 0.0524 0.087 0.0826 0.11 0.175	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.02 N/A N/A N/A 0.13
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0.02 N/A N/A N/A 0.13
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175 Tests on De	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 400 MC Chebyshev UCL 400 MC Chebyshev UCL 401 MC Chebyshev UCL 402 MC Chebyshev UCL 403 MC Chebyshev UCL 403 MC Chebyshev UCL 404 MC Chebyshev UCL 405 MC Chebyshev UCL 406 MC Chebyshev UCL	0.020 N/A N/A N/A 0.13
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic 5% A-D Critical Value	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.020 N/A N/A N/A 0.13
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175 Tests on De	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0.02i N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic 5% A-D Critical Value	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.020 N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398  Gamma Dis	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  Tected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance stributed at 5% Significance stributed at 5% Significance Level	0.020 N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398  Gamma Dis	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0.02i N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398 Gamma Dis may be unre	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL  Stected Observations Only Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes	0.020 N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests in	may be unre  ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398 Gamma Dis may be unre	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Rected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only	0.02: N/A N/A N/A 0.13 0.25
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Camma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in  Gamma :  k hat (MLE)	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398 Gamma Dis may be unre Statistics on 1.932	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only  k star (bias corrected MLE)	0.020 N/A N/A N/A 0.13 0.25 ce Leve
Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests if  Gamma Schools (MLE) Theta hat (MLE)	may be unre  19 Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398 Gamma Dis may be unre  Statistics on 1.932 0.0479	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 100 Servations Only 100 Anderson-Darling GOF Test 100 Detected data appear Gamma Distributed at 5% Significance 100 Kolmogorov-Smirnov GOF 100 Detected data appear Gamma Distributed at 5% Significance 101 Significance Level 102 Itable for small sample sizes 103 Detected Data Only 103 k star (bias corrected MLE) 104 Theta star (bias corrected MLE)	0.020 N/A N/A 0.13 0.25 ce Leve
Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Camma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in  Gamma :  k hat (MLE)	ng Normal Ci 0.0494 0.0524 0.087 0.0826 0.11 0.175  Tests on De 0.312 0.661 0.231 0.398 Gamma Dis may be unre Statistics on 1.932	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only  k star (bias corrected MLE)	0.020 N/A N/A N/A 0.13 0.25

		sing Imputed Non-Detects	
•		6 NDs with many tied observations at multiple DLs	
·		s <1.0, especially when the sample size is small (e.g., <15-20)	
		yield incorrect values of UCLs and BTVs	
·	•	en the sample size is small.	
For gamma distributed detected data, BTVs ar	nd UCLs ma	y be computed using gamma distribution on KM estimates	
Minimum	0.01	Mean	0.0467
Maximum	0.16	Median	0.01
SD	0.0576	CV	1.234
k hat (MLE)	0.868	k star (bias corrected MLE)	0.653
Theta hat (MLE)	0.0538	Theta star (bias corrected MLE)	0.0715
nu hat (MLE)	15.63	nu star (bias corrected)	11.75
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (11.75, α)	5.064	Adjusted Chi Square Value (11.75, β)	4.177
95% Gamma Approximate UCL	0.108	95% Gamma Adjusted UCL	N/A
		meters using KM Estimates	
Mean (KM)	0.0494	SD (KM)	0.0524
Variance (KM)	0.00275	SE of Mean (KM)	0.0202
k hat (KM)	0.889	k star (KM)	0.667
nu hat (KM)	16.01	nu star (KM)	12.01
theta hat (KM)	0.0556	theta star (KM)	0.0741
80% gamma percentile (KM)	0.0814	90% gamma percentile (KM)	0.126
95% gamma percentile (KM)	0.171	99% gamma percentile (KM)	0.281
Comm	o Konlon M	eier (KM) Statistics	
Approximate Chi Square Value (12.01, α)	5.231	Adjusted Chi Square Value (12.01, β)	4.326
95% KM Approximate Gamma UCL	0.113	95% KM Adjusted Gamma UCL	0.137
95 % NW Approximate Gamma OCL	0.113	95 % KW Adjusted Gamma OCL	0.137
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance L	_evel
Lilliefors Test Statistic	0.268	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data app	ear Lognor	mal at 10% Significance Level	
Note GOF tests r	nay be unre	eliable for small sample sizes	
Lognormal ROS	Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.0436	Mean in Log Scale	-4.379
SD in Original Scale	0.0598	SD in Log Scale	1.883
95% t UCL (assumes normality of ROS data)	0.0807	95% Percentile Bootstrap UCL	0.077
95% BCA Bootstrap UCL	0.0832	95% Bootstrap t UCL	0.121
95% H-UCL (Log ROS)	2.704	·	
(13 11)			

_	on Logged L	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.516	KM Geo Mean	0.02
KM SD (logged)	0.957	95% Critical H Value (KM-Log)	3.14
KM Standard Error of Mean (logged)	0.368	95% H-UCL (KM -Log)	0.13
KM SD (logged)	0.957	95% Critical H Value (KM-Log)	3.14
KM Standard Error of Mean (logged)	0.368		
	DL/2 St	atistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0453	Mean in Log Scale	-3.90
SD in Original Scale	0.0586	SD in Log Scale	1.32
95% t UCL (Assumes normality)	0.0816	95% H-Stat UCL	0.3
DL/2 is not a recommended me	thod, provid	ded for comparisons and historical reasons	
Nonparame	tric Distribu	tion Free UCL Statistics	
•		tion Free UCL Statistics stributed at 1% Significance Level	
Detected Data appear	r Normal Dis	stributed at 1% Significance Level	
Detected Data appear	r Normal Dis		
Detected Data appear	r Normal Dis	stributed at 1% Significance Level	
Detected Data appear	Suggested 0.087	stributed at 1% Significance Level	
Detected Data appear  95% KM (t) UCL  Note: Suggestions regarding the selection of a 95%	Suggested 0.087  UCL are pro	uCL to Use	

	General		
Total Number of Observations	9	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0098	Mean	0.012
Maximum	0.016		0.012
SD Coefficient of Variation	0.00183 0.153	Std. Error of Mean 6.1 Skewness	1.23
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
<del>_</del>		he Chebyshev UCL for small sample sizes (n < 7).	
=		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
	Normal G	COF Teet	
Shapiro Wilk Test Statistic	0.866	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.273	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
Ass 95% Normal UCL	suming Norn	nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0131	95% Adjusted-CLT UCL (Chen-1995)	0.01
33% Students-t 00L	0.0131		0.01
	Gamma C	GOF Test	
A-D Test Statistic	0.525	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance	Leve
K-S Test Statistic	0.254	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance	Leve
		stributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma		
·	51.62	· · · · · · · · · · · · · · · · · · ·	34.4
k hat (MLE)		Theta star (bias corrected MLE) 3.4	
Theta hat (MLE)			320.8
Theta hat (MLE) nu hat (MLE)	929.2	` '	
Theta hat (MLE)		MLE Sd (bias corrected)	0.002
Theta hat (MLE)  nu hat (MLE)  MLE Mean (bias corrected)	929.2 0.012	MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.00 564
Theta hat (MLE) nu hat (MLE)	929.2	MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.002 564
Theta hat (MLE) nu hat (MLE) MLE Mean (bias corrected)  Adjusted Level of Significance	929.2 0.012 0.0231	MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.002

- MW-4R			
	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.038	Minimum Non-Detect	0.08
Maximum Detect	0.2	Maximum Non-Detect	0.08
Variance Detects	0.00361	Percent Non-Detects	22.22
Mean Detects	0.109	SD Detects	0.060
Median Detects	0.109	CV Detects	0.55
Skewness Detects	0.672	Kurtosis Detects	-0.948
	-2.354		0.58
Mean of Logged Detects	-2.354	SD of Logged Detects	0.58
		using incremental sampling methodology (ISM) approach,	
<del>-</del>	•	2 2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
-		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
	al GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Leve	el
1% Shapiro Wilk Chilical Value			
Lilliefors Test Statistic	0.208	Lilliefors GOF Test	
·			el
Lilliefors Test Statistic  1% Lilliefors Critical Value	0.208	Lilliefors GOF Test	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.208 0.35 ppear Norm	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Leve	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.208 0.35 ppear Norm	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests i	0.208 0.35 appear Norm may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests i	0.208 0.35 appear Norm may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin	0.208 0.35 uppear Norm may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs	0.019
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usir  KM Mean	0.208 0.35 pppear Norm may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.019
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	0.208 0.35 pppear Norm may be unre g Normal Ci 0.0979 0.0538	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	0.019 0.12 0.12
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usir  KM Mean  90KM SD  95% KM (t) UCL	0.208 0.35 ppear Norm may be unre 0.0979 0.0538 0.134	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.019 0.12 0.12 0.15
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usir  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.208 0.35 ppear Norm may be unre 19 Normal Cr 0.0979 0.0538 0.134 0.13	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	0.019 0.12 0.12 0.15 0.18
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests i  Kaplan-Meier (KM) Statistics usir  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.208 0.35 sppear Norm may be unre 19 Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.019 0.12 0.12 0.15 0.18
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF	0.208 0.35 pppear Normal Circles (1.00979) 0.0979 0.0538 0.134 0.13 0.157 0.221	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0.019 0.12 0.12 0.15 0.18
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic	0.208 0.35 ppear Normal Company be unreaded to 0.0979 0.0538 0.134 0.13 0.157 0.221	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 199% KM Chebyshev UCL 199% KM Chebyshev UCL 199% KM Chebyshev UCL 199% KM Chebyshev UCL 1006 Anderson-Darling GOF Test	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value	0.208 0.35 ppear Norm may be unre 19 Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221 Tests on De 0.24 0.71	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Detected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic	0.208 0.35 pppear Norm may be unre  1g Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Rected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Note GOF tests in KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value	0.208 0.35 ppear Norm may be unre  19 Normal Ci 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  Initical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 199% KM Chebyshev UCL 290% KM Ch	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.	0.208 0.35 ppear Norm may be unre  g Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313  Gamma Dis	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Cotted Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.	0.208 0.35 ppear Norm may be unre  g Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313  Gamma Dis	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  Initical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 199% KM Chebyshev UCL 290% KM Ch	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in	0.208 0.35 ppear Norm may be unre  19 Normal Ci 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313  Gamma Dis may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  Itical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  Tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests of the statistic susion of the statis	0.208 0.35 ppear Norm may be unre  g Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313  Gamma Dis may be unre	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level liable for small sample sizes  Pitical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  Petected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance Itributed at 5% Significance Level  liable for small sample sizes  Detected Data Only	0.019 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests I  Gamma S  k hat (MLE)	0.208 0.35 pppear Norm may be unre  Ig Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313 Gamma Dis may be unre  Statistics on 3.783	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level liable for small sample sizes  Pitical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Obebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Secretary Significance 100 Kolmogorov-Smirnov GOF 100 Detected data appear Gamma Distributed at 5% Significance 101 Significance Level 102 Significance Level 103 Detected Data Only    K star (bias corrected MLE)	0.019 0.12 0.12 0.15 0.18 0.29
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data at Note GOF tests in Note GOF tests in Kaplan-Meier (KM) Statistics usin KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests in Gamma Statistic  Gamma Statist	0.208 0.35 pppear Norm may be unre  19 Normal Ci 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313  Gamma Dis may be unre  Statistics on 3.783 0.0288	Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  Titical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Sected Observations Only 100 Anderson-Darling GOF Test 101 Detected data appear Gamma Distributed at 5% Significance 102 Kolmogorov-Smirnov GOF 103 Detected data appear Gamma Distributed at 5% Significance 103 Significance Level 104 Isable for small sample sizes  105 Detected Data Only 106 K star (bias corrected MLE) 107 Theta star (bias corrected MLE)	0.019 0.12 0.15 0.18 0.29 e Level 2.25 0.048
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests I  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests I  Gamma S  k hat (MLE)	0.208 0.35 pppear Norm may be unre  Ig Normal Cr 0.0979 0.0538 0.134 0.13 0.157 0.221  Tests on De 0.24 0.71 0.176 0.313 Gamma Dis may be unre  Statistics on 3.783	Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level liable for small sample sizes  Pitical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Obebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Secretary Significance 100 Kolmogorov-Smirnov GOF 100 Detected data appear Gamma Distributed at 5% Significance 101 Significance Level 102 Significance Level 103 Detected Data Only    K star (bias corrected MLE)	0.019 0.12 0.15 0.18 0.29

Gamma ROS S	Statistics us	sing Imputed Non-Detects	
GROS may not be used when data se	t has > 50%	NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is so	mall such as	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS m	nethod may	yield incorrect values of UCLs and BTVs	
This is especia	lly true whe	n the sample size is small.	
For gamma distributed detected data, BTVs an	nd UCLs ma	y be computed using gamma distribution on KM estimates	
Minimum	0.038	Mean	0.097
Maximum	0.2	Median	0.073
SD	0.0577	CV	0.595
k hat (MLE)	3.484	k star (bias corrected MLE)	2.397
Theta hat (MLE)	0.0278	Theta star (bias corrected MLE)	0.0405
nu hat (MLE)	62.72	nu star (bias corrected)	43.14
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (43.14, α)	29.08	Adjusted Chi Square Value (43.14, β)	26.67
95% Gamma Approximate UCL	0.144	95% Gamma Adjusted UCL	0.157
		meters using KM Estimates	
Mean (KM)	0.0979	SD (KM)	0.0538
Variance (KM)	0.00289	SE of Mean (KM)	0.0196
k hat (KM)	3.314	k star (KM)	2.283
nu hat (KM)	59.65	nu star (KM)	41.1
theta hat (KM)	0.0295	theta star (KM)	0.0429
80% gamma percentile (KM)	0.144	90% gamma percentile (KM)	0.185
95% gamma percentile (KM)	0.223	99% gamma percentile (KM)	0.307
Gamma	Kanlan-M	eier (KM) Statistics	
Approximate Chi Square Value (41.10, α)	27.41	Adjusted Chi Square Value (41.10, β)	25.07
95% KM Approximate Gamma UCL	0.147	95% KM Adjusted Gamma UCL	0.16
constant, approximate damina con	0.117	30% rum, tajastea aaniina 002	0.10
Lognormal GOF	Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic	0.15	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data app	ear Lognor	mal at 10% Significance Level	
Note GOF tests n	nay be unre	eliable for small sample sizes	
Lognormal ROS	Statistics (	Using Imputed Non-Detects	
Mean in Original Scale	0.0974	Mean in Log Scale	-2.473
SD in Original Scale	0.0572	SD in Log Scale	0.563
95% t UCL (assumes normality of ROS data)	0.133	95% Percentile Bootstrap UCL	0.129
95% BCA Bootstrap UCL	0.132	95% Bootstrap t UCL	0.16
95% H-UCL (Log ROS)	0.158		
		<u> </u>	
		Data and Assuming Lognormal Distribution	
KM Mean (logged)	-2.469	KM Geo Mean	0.0847
KM SD (logged)	0.538	95% Critical H Value (KM-Log)	2.293
KM Standard Error of Mean (logged)	0.204	95% H-UCL (KM -Log)	0.151
KM SD (logged)	0.538	95% Critical H Value (KM-Log)	2.293
KM Standard Error of Mean (logged)	0.204		

	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0937	Mean in Log Scale	-2.5
SD in Original Scale	0.0603	SD in Log Scale	0.6
95% t UCL (Assumes normality)	0.131	95% H-Stat UCL	0.1
DL/2 is not a recommended me	thod, provi	ded for comparisons and historical reasons	
	Suggested	UCL to Use	
95% KM (t) UCL	0.134		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
	•	ovided to help the user to select the most appropriate 95% UCL. ution, and skewness using results from simulation studies.	-

	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.34	Mean	0.421
Maximum	0.61	Median	0.41
SD	0.0925	Std. Error of Mean	0.030
Coefficient of Variation	0.22	Skewness	1.31
		using incremental sampling methodology (ISM) approach,	
	· ·	C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
-		in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
1.00.1 10 110 110 110 110 110 110 110 11	oar Galac	o lot a discussion of the chicayener coa.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.835	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.283	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		1% Significance Level	
95% Normal UCL	suming Norn	nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.478	95% Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	0.48
93% Students-t OCL	0.476	95% Modified-t UCL (Johnson-1978)	0.48
		00% meaned ( 00E (00miosii 1070)	
	Gamma (		
A-D Test Statistic	0.578	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.257	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance	e Leve
		stributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	26.07	k star (bias corrected MLE)	17.4
Theta hat (MLE)	0.0162	Theta star (bias corrected MLE)	0.024
nu hat (MLE)	469.2	nu star (bias corrected)	314.1
MLE Mean (bias corrected)	0.421	MLE Sd (bias corrected)	0.10
		Approximate Chi Square Value (0.05)	274.1
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	266.2
Ass	uming Gam	ma Distribution	

	Lognormal G	GOF Test	
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.245	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at	10% Significance Level	
Note GOF tests n	nay be unrelia	able for small sample sizes	
	Lognormal S		
Minimum of Logged Data	-1.079	Mean of logged Data	-0.884
Maximum of Logged Data	-0.494	SD of logged Data	0.20
Assur	mina Loanorn	nal Distribution	
95% H-UCL	0.484	90% Chebyshev (MVUE) UCL	0.50
95% Chebyshev (MVUE) UCL	0.545	97.5% Chebyshev (MVUE) UCL	0.59
OOO/ Chahyahay (MV/UE) HOL	0.705	, ,	
99% Chebyshev (MVUE) UCL	0.705		
99% Chebysnev (MVOE) OCL	0.705		
, , ,		on Free UCL Statistics	
Nonparamet	ric Distributio	on Free UCL Statistics	
Nonparamet Data appear	ric Distributio to follow a D	iscernible Distribution	
Nonparamet  Data appear  Nonpara	ric Distributio to follow a D	bution Free UCLs	0.48
Nonparamet  Data appear  Nonpara  95% CLT UCL	ric Distributio to follow a D metric Distrib	bution Free UCLs  95% BCA Bootstrap UCL	0.48
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL	ric Distributio to follow a D metric Distrib 0.472 0.471	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	0.48 0.53 0.47
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL	ric Distributio to follow a D  metric Distrit 0.472 0.471 0.793	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	0.53
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL	ric Distributio to follow a D metric Distrib 0.472 0.471	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	0.53 0.47 0.55
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL	metric Distributio 0.472 0.471 0.793 0.514	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL	0.53 0.47 0.55
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	metric Distributio 0.472 0.471 0.793 0.514	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.53
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	nic Distributio to follow a Distributio 0.472 0.471 0.793 0.514 0.614	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.53 0.47 0.55
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	nic Distributio to follow a Distributio 0.472 0.471 0.793 0.514 0.614  Suggested UC 0.478	bution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.53 0.47 0.55 0.72
Nonparamet  Data appear  Nonpara  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  Note: Suggestions regarding the selection of a 95%	nic Distributio to follow a Distributio  metric Distributio 0.472 0.471 0.793 0.514 0.614  Suggested UC 0.478	bution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.53 0.47 0.55 0.72

	General S	statistics	
Total Number of Observations	9	Number of Distinct Observations	6
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	3.0000E-4	Minimum Non-Detect	2.4000E-4
Maximum Detect	3.3000E-4	Maximum Non-Detect	2.9000E-
Variance Detects	4.500E-10	Percent Non-Detects	77.78
Mean Detects	3.1500E-4	SD Detects	2.1213E-
Median Detects	3.1500E-4	CV Detects	0.067
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-8.064	SD of Logged Detects	0.067
Warning: Da	ata set has o	nly 2 Detected Values.	
This is not enough to comp	oute meaning	ful or reliable statistics and estimates.	
Note: Sample size is small (e.g., <10), if data a	are collected (	using incremental sampling methodology (ISM) approach,	
_	on ISM (ITRC	2020 and ITRC 2012) for additional guidance,	
_	on ISM (ITRC		
but note that ITRC may recommend th	on ISM (ITRC ne t-UCL or th	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	on ISM (ITRC ne t-UCL or th ften results in	2020 and ITRC 2012) for additional guidance, e Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend th	on ISM (ITRC ne t-UCL or th ften results in	2020 and ITRC 2012) for additional guidance, e Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend th  The Chebyshev UCL of  Refer to the ProUCL 5.2 Tec	on ISM (ITRC te t-UCL or the ften results in chnical Guide	2020 and ITRC 2012) for additional guidance, e Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology.  Norm	on ISM (ITRC te t-UCL or the ften results in chnical Guide	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology.  Norm	on ISM (ITRC te t-UCL or the ften results in chnical Guide	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). The gross overestimates of the mean. The discussion of the Chebyshev UCL.  On Detects Only	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tectors Norm Not End	on ISM (ITRC te t-UCL or th ften results in chnical Guide tal GOF Test bugh Data to	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). The gross overestimates of the mean. The discussion of the Chebyshev UCL.  On Detects Only	
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin	on ISM (ITRC te t-UCL or th ften results in chnical Guide tal GOF Test bugh Data to	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test	1.5072E-
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin	on ISM (ITRC te t-UCL or th ften results in chnical Guide tal GOF Test ough Data to	e 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  itical Values and other Nonparametric UCLs	1.5072E- N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics using KM Mean	on ISM (ITRC are t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 2.5667E-4 3.1972E-5	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only Perform GOF Test  KM Standard Error of Mean	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD	on ISM (ITRC are t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 12.5667E-4 13.1972E-5 12.8469E-4	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only Perform GOF Test  Itical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	N/A
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL	on ISM (ITRC te t-UCL or the ften results in thinical Guide te tough Data to the tou	2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	N/A N/A N/A
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL	on ISM (ITRC are t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 2.5667E-4 3.1972E-5 2.8469E-4 2.8146E-4 3.0188E-4	e Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	N/A N/A N/A 3.2236E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL	on ISM (ITRC are t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 2.5667E-4 3.1972E-5 2.8469E-4 2.8146E-4 3.0188E-4 3.5079E-4	e Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL	N/A N/A N/A 3.2236E
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tector Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	on ISM (ITRC are t-UCL or the t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 2.5667E-4 3.1972E-5 2.8469E-4 2.8146E-4 3.5079E-4 Tests on Det	itical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 3.2236E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not Enc	on ISM (ITRC le t-UCL or the teu t-UCL or the ften results in chnical Guide leal GOF Test ough Data to lead to	e Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL	N/A N/A N/A 3.2236E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not Enc	on ISM (ITRC are t-UCL or the t-UCL or the ften results in chnical Guide and GOF Test bugh Data to 2.5667E-4 3.1972E-5 2.8469E-4 2.8146E-4 3.5079E-4 Tests on Detrough Data to Statistics on Statistics on	e Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  Itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  Perform GOF Test  Detected Data Only	N/A N/A N/A 3.2236E- 4.0663E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF Not End  Gamma k hat (MLE)	on ISM (ITRC are t-UCL or the t-UCL or the ften results in thinical Guide and GOF Test ough Data to 2.5667E-4 3.1972E-5 2.8469E-4 3.0188E-4 3.5079E-4 Tests on Detrough Data to Statistics on 440.7	ie Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  Itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  ected Observations Only  Perform GOF Test  Detected Data Only  k star (bias corrected MLE)	N/A N/A N/A 3.2236E- 4.0663E-
but note that ITRC may recommend th The Chebyshev UCL of Refer to the ProUCL 5.2 Tec  Norm Not Enc  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not Enc	on ISM (ITRC are t-UCL or the t-UCL or the ften results in thinical Guide and GOF Test ough Data to 2.5667E-4 3.1972E-5 2.8469E-4 3.0188E-4 3.5079E-4 Tests on Detrough Data to Statistics on 440.7	e Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  On Detects Only  Perform GOF Test  Itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  Perform GOF Test  Detected Data Only	N/A N/A N/A 3.2236E- 4.0663E-

Estimates of G	amma Parai	meters using KM Estimates	
Mean (KM)		SD (KM)	3.1972
Variance (KM)		SE of Mean (KM)	
k hat (KM)	64.45	k star (KM)	43.0
nu hat (KM)	1160	nu star (KM)	774.
theta hat (KM)	3.9827E-6	theta star (KM)	5.9637
80% gamma percentile (KM)	2.8888E-4	90% gamma percentile (KM)	3.0791
95% gamma percentile (KM)	3.2423E-4	99% gamma percentile (KM)	3.5634
	Į.		
Gamm	na Kaplan-M	eier (KM) Statistics	
		Adjusted Level of Significance (β)	0.0
Approximate Chi Square Value (774.68, α)		Adjusted Chi Square Value (774.68, β)	698.
95% KM Approximate Gamma UCL	2.7962E-4	95% KM Adjusted Gamma UCL	2.8478
		etected Observations Only	
Not En	ough Data to	Perform GOF Test	
	0.04-4 -4	Using January d Nam Bakarda	
		Using Imputed Non-Detects	-8.3
Mean in Original Scale  SD in Original Scale		Mean in Log Scale	-6.3
95% t UCL (assumes normality of ROS data)		SD in Log Scale 95% Percentile Bootstrap UCL	
95% t OCL (assumes normality of ROS data) 95% BCA Bootstrap UCL		95% Percentile Bootstrap t UCL	
95% BCA Boolstrap UCL 95% H-UCL (Log ROS)		95% Bootstrap t OCL	2.9534
95% H-UCL (Log ROS)	2./121E-4		
Statistics using KM astimates	on Logged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)		KM Geo Mean	2 5/180
KM SD (logged)		95% Critical H Value (KM-Log)	1.8
Till OD (logged)		95% H-UCL (KM -Log)	
KM Standard Error of Mean (logged)	0.0541		, 0 .0
KM Standard Error of Mean (logged) KM SD (logged)		, 2/	1.8
KM SD (logged)	0.115	95% Critical H Value (KM-Log)	1.8
	0.115	, 2/	1.8
KM SD (logged)	0.115	95% Critical H Value (KM-Log)	1.8
KM SD (logged)	0.115 0.0541	95% Critical H Value (KM-Log)	1.8
KM SD (logged) KM Standard Error of Mean (logged)	0.115 0.0541 DL/2 S	95% Critical H Value (KM-Log)	
KM SD (logged) KM Standard Error of Mean (logged)  DL/2 Normal	0.115 0.0541 DL/2 S	95% Critical H Value (KM-Log) tatistics DL/2 Log-Transformed	-8.7
KM SD (logged) KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale	0.115 0.0541 <b>DL/2 S</b> 1.7389E-4 8.0846E-5	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale	-8.7
KM SD (logged) KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality)	0.115 0.0541 <b>DL/2 S</b> 1.7389E-4 8.0846E-5 2.2400E-4	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale  SD in Log Scale	-8.7 0.3
KM SD (logged) KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality)  DL/2 is not a recommended m	0.115 0.0541 DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provide	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale  SD in Log Scale  95% H-Stat UCL  ded for comparisons and historical reasons	-8.7 0.3
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m	0.115 0.0541 DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provide	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale  SD in Log Scale  95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics	-8.7 0.3
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m	0.115 0.0541 DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provide	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale  SD in Log Scale  95% H-Stat UCL  ded for comparisons and historical reasons	-8.7 0.3
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m	0.115 0.0541 DL/2 Si 1.7389E-4 8.0846E-5 2.2400E-4 ethod, providentic Distribution of follow a Distribution of the control of	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics Discernible Distribution	-8.7 0.3
KM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m  Nonparame  Data do r	0.115 0.0541  DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provident follow a D	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale  SD in Log Scale  95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics	-8.7 0.3
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m	0.115 0.0541  DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provident follow a D	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics Discernible Distribution	-8.7 0.3
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m  Nonparame  Data do r	0.115 0.0541  DL/2 Si 1.7389E-4 8.0846E-5 2.2400E-4 ethod, providentic Distribution follow a Distribution foll	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics Discernible Distribution  UCL to Use	-8.7 0.3 2.3181
MM SD (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale  SD in Original Scale  95% t UCL (Assumes normality)  DL/2 is not a recommended m  Nonparame  Data do r  95% KM (t) UCL  Note: Suggestions regarding the selection of a 95%	0.115 0.0541  DL/2 St 1.7389E-4 8.0846E-5 2.2400E-4 ethod, provident follow a D Suggested 2.8469E-4 6 UCL are pro-	95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics Discernible Distribution	

	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
, 514. / 1425. 57. 5255. / 145.		Number of Missing Observations	0
Minimum	0.0077	Mean	0.023
Maximum	0.054	Median	0.021
SD	0.0158	Std. Error of Mean	0.005
Coefficient of Variation	0.672	Skewness	0.79
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	on ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.191	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
Ass	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0333	95% Adjusted-CLT UCL (Chen-1995)	0.03
		95% Modified-t UCL (Johnson-1978)	0.03
	Gamma (	GOF Test	
A-D Test Statistic	0.4	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.728	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.175	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.282	Detected data appear Gamma Distributed at 5% Significance	e Leve
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma	Statistics	
		k star (bias corrected MLE)	1.69
k hat (MLE)	2.436		0.01
k hat (MLE) Theta hat (MLE)	2.436 0.00964	Theta star (bias corrected MLE)	
· ·		Theta star (bias corrected MLE) nu star (bias corrected)	30.5
Theta hat (MLE)	0.00964	` ` `	
Theta hat (MLE) nu hat (MLE)	0.00964 43.84	nu star (bias corrected)	0.01
Theta hat (MLE) nu hat (MLE)	0.00964 43.84	nu star (bias corrected)  MLE Sd (bias corrected)	30.5 0.01 18.9 17.0
Theta hat (MLE) nu hat (MLE) MLE Mean (bias corrected)  Adjusted Level of Significance	0.00964 43.84 0.0235 0.0231	nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.01

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.91	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.184	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 1	10% Significance Level	
Note GOF tests	may be unrelia	ble for small sample sizes	
	Lognormal S	itatistics	
Minimum of Logged Data	-4.867	Mean of logged Data	-3.971
Maximum of Logged Data	-2.919	SD of logged Data	0.722
	ıming Lognorm	nal Distribution	
95% H-UCL	0.0482	90% Chebyshev (MVUE) UCL	0.041
95% Chebyshev (MVUE) UCL	0.0491	97.5% Chebyshev (MVUE) UCL	0.060
99% Chebyshev (MVUE) UCL	0.0817		
99% Chebyshev (MVUE) UCL	0.0817		
		n Free UCL Statistics	
Nonparame	tric Distribution	n Free UCL Statistics	
Nonparame	tric Distribution		
Nonparame Data appea	etric Distribution		
Nonparame Data appea	etric Distribution	scernible Distribution	0.032
Nonparame Data appea Nonpar	tric Distribution r to follow a Dis	scernible Distribution oution Free UCLs	0.032
Nonparame Data appea  Nonparame  Nonparame	r to follow a Distribution rametric Distrib	pution Free UCLs 95% BCA Bootstrap UCL	
Nonparame Data appea  Nonpai  95% CLT UCL  95% Standard Bootstrap UCL	r to follow a Distribution of the follow a Distribution of the following	pution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	0.035
Nonparame Data appea  Nonpai  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL	r to follow a Distribution r to follow a Distribution 0.0321 0.0315 0.0335	pution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	0.035 0.031 0.046
Nonparame Data appea  Nonpai  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL	r to follow a Distribution of the follow a Distribution of the following ametric Distribution of the followi	pution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	0.035 0.031 0.046
Nonparame Data appea  Nonpai  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL	r to follow a Distribution of the follow a Distribution of the following ametric Distribution of the followi	pution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.035 0.031 0.046
Nonparame Data appea  Nonpai  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL	r to follow a Distribution r to follow a Distribution 0.0321 0.0315 0.0335 0.0393 0.0563	pution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.035
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution r to follow a Distribution r to follow a Distribution 0.0321 0.0315 0.0335 0.0393 0.0563 Suggested UC 0.0333	pution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	0.035 0.031 0.046 0.075
Nonparame Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution r to follow a Distribution r to follow a Distribution 0.0321	pution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.035 0.031 0.046 0.075

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.0049	Mean	0.0061
Maximum	0.0072	Median	0.006
SD	7.1259E-4	Std. Error of Mean 2	2.3753E-
Coefficient of Variation	0.116	Skewness	-0.286
		using incremental sampling methodology (ISM) approach,	
<del>_</del>	-	C 2020 and ITRC 2012) for additional guidance,	
_		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.973	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.142	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
As 95% Normal UCL	suming Norn	nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Normal UCL 95% Student's-t UCL	0.0066	95% Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	0.0065
93 % Student S-t OCL	0.0000	95% Modified-t UCL (Johnson-1978)	0.0065
		33 % Woodined-1 33 E (301113011-1370)	0.0000
	Gamma G		
A-D Test Statistic	0.221	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.72	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic		Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance	e Level
· · ·		etributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	81.55	k star (bias corrected MLE)	54.44
Theta hat (MLE)	7.5484E-5	Theta star (bias corrected MLE) 1	.1307E
nu hat (MLE)	1468	nu star (bias corrected)	979.9
MLE Mean (bias corrected)	0.00616	MLE Sd (bias corrected) 8	3.3428E
		Approximate Chi Square Value (0.05)	908.2
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	893.6
Ass	suming Gam	ma Distribution	

	Lognormal GOF	Test	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.14	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 109	% Significance Level	
Note GOF tests	may be unreliable	e for small sample sizes	
	Lognormal Stat	istics	
Minimum of Logged Data	-5.319	Mean of logged Data	-5.097
Maximum of Logged Data	-4.934	SD of logged Data	0.11
Assu	ming Lognormal	Distribution	
95% H-UCL	0.00665	90% Chebyshev (MVUE) UCL	0.006
95% Chebyshev (MVUE) UCL	0.00722	97.5% Chebyshev (MVUE) UCL	0.007
99% Chebyshev (MVUE) UCL	0.00858		
Nanagana	ania Diadnikustian F	Top LICL Chainting	
		ree UCL Statistics	
Data appea	r to follow a Disc	ernible Distribution	
Nonpar 95% CLT UCL	ametric Distribut		0.000
95% (.1.1.0(.1.1	0.00655	95% BCA Bootstrap UCL	0.006
	0.00050	050/ Dt-t + 1101	
95% Standard Bootstrap UCL	0.00653	95% Bootstrap-t UCL	0.006
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.00655	95% Percentile Bootstrap UCL	0.006
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	0.00655 0.00687	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	0.006 0.006 0.007
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.00655	95% Percentile Bootstrap UCL	
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.00655 0.00687	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.006 0.006 0.007
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.00655 0.00687 0.00764	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.006 0.006 0.007
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	0.00655 0.00687 0.00764 Suggested UCL 0.0066	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.006 0.006 0.007 0.008
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Note: Suggestions regarding the selection of a 95%	0.00655 0.00687 0.00764  Suggested UCL 0.0066  UCL are provide	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	0.006 0.006 0.007 0.008
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.00655 0.00687 0.00764  Suggested UCL 0.0066  UCL are provide data distribution,	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use  d to help the user to select the most appropriate 95% UCL	0.006 0.006 0.007 0.008
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size, However, simulations results will not cover all Real Williams	0.00655 0.00687 0.00764  Suggested UCL 0.0066  UCL are provide data distribution, orld data sets; for	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL  to Use  d to help the user to select the most appropriate 95% UCL and skewness using results from simulation studies. additional insight the user may want to consult a statisticia	0.006 0.006 0.007 0.008
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size, However, simulations results will not cover all Real We	0.00655 0.00687 0.00764  Suggested UCL 0.0066  UCL are provide data distribution, orld data sets; for	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use  d to help the user to select the most appropriate 95% UCL and skewness using results from simulation studies.	0.006 0.006 0.007 0.008

orobenzene - MW-4R			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	6
		Number of Missing Observations	1
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect		Minimum Non-Detect	3.0000E-
Maximum Detect		Maximum Non-Detect	
Variance Detects		Percent Non-Detects	12.5%
Mean Detects	4.8714E-4	SD Detects	
Median Detects		CV Detects	0.183
Skewness Detects		Kurtosis Detects	2.346
Mean of Logged Detects		SD of Logged Detects	0.184
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend to	he t-UCL or ti	he Chebyshev UCL for small sample sizes (n < 7).	
_		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
		<u>-</u>	
Norr	nal GOF Test	t on Detects Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Le	vel
Lilliefors Test Statistic	0.3	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Le	vel
Detected Data	appear Norm	al at 1% Significance Level	
		liable for small sample sizes	
		<u>·</u>	
Kaplan-Meier (KM) Statistics usi	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean	4.6375E-4	KM Standard Error of Mean	3.7849E-
90KM SD	9.9113E-5	95% KM (BCA) UCL	5.1875E-
95% KM (t) UCL	5.3546E-4	95% KM (Percentile Bootstrap) UCL	5.2500E-
95% KM (z) UCL		95% KM Bootstrap t UCL	5.3029E-
90% KM Chebyshev UCL	5.7730E-4	95% KM Chebyshev UCL	6.2873E-
97.5% KM Chebyshev UCL	7.0012E-4	99% KM Chebyshev UCL	8.4035E
Commo COE	Tooto on Do	tected Observations Only	
A-D Test Statistic		Anderson-Darling GOF Test	
5% A-D Critical Value		Detected data appear Gamma Distributed at 5% Significan	co Lovel
K-S Test Statistic		Kolmogorov-Smirnov GOF	ice Level
5% K-S Critical Value		Detected data appear Gamma Distributed at 5% Significan	ice Level
		stributed at 5% Significance Level	ice Level
Note GOF tests	may be unife	liable for small sample sizes	
	Statistics on	Detected Data Only	
Gamma	Ctationio on		
Gamma k hat (MLE)		k star (bias corrected MLE)	20.05
	34.92	k star (bias corrected MLE) Theta star (bias corrected MLE)	20.05 2.4295E-
k hat (MLE)	34.92 1.3949E-5	•	

	NDs with many tied observations at multiple DLs <1.0, especially when the sample size is small (e.g., <15-20)		<u> </u>
	yield incorrect values of UCLs and BTVs		
	n the sample size is small.		
	y be computed using gamma distribution on KM estimates	•	·
0.0016	Mean	3.5000E-4	
5.0000E-		0.01	Maximum
2.007	CV	0.00336	SD
0.518	k star (bias corrected MLE)	0.695	k hat (MLE)
0.0032	Theta star (bias corrected MLE)	0.00241	Theta hat (MLE)
8.282	nu star (bias corrected)	11.12	nu hat (MLE)
	· · · · · · · · · · · · · · · · · · ·	0.0195	Adjusted Level of Significance (β)
2.157	Adjusted Chi Square Value (8.28, β)	2.899	Approximate Chi Square Value (8.28, α)
0.0064	95% Gamma Adjusted UCL	0.00479	95% Gamma Approximate UCL
	neters using KM Estimates	amma Para	Estimates of G
9.9113E	SD (KM)	4.6375E-4	Mean (KM)
3.7849E	SE of Mean (KM)	9.8234E-9	Variance (KM)
13.77	k star (KM)	21.89	k hat (KM)
220.3	nu star (KM)	350.3	nu hat (KM)
3.3687E	theta star (KM)	2.1183E-5	theta hat (KM)
6.2940E	90% gamma percentile (KM)	5.6436E-4	80% gamma percentile (KM)
8.0284E	99% gamma percentile (KM)	6.8664E-4	95% gamma percentile (KM)
	eier (KM) Statistics		
179.1	Adjusted Chi Square Value (220.26, β)	186.9	Approximate Chi Square Value (220.26, α)
5.7025E	95% KM Adjusted Gamma UCL	5.4649E-4	95% KM Approximate Gamma UCL
	etected Observations Only	E Tost on F	Lognormal GC
	Shapiro Wilk GOF Test	0.91	Shapiro Wilk Test Statistic
l evel	Detected Data appear Lognormal at 10% Significance I	0.838	10% Shapiro Wilk Critical Value
	Lilliefors GOF Test	0.27	Lilliefors Test Statistic
Level	Detected Data appear Lognormal at 10% Significance I	0.28	10% Lilliefors Critical Value
	nal at 10% Significance Level		
	liable for small sample sizes		·
	Jsing Imputed Non-Detects	S Statistics	Lognormal RO
-7.695	Mean in Log Scale	4.6532E-4	Mean in Original Scale
0.228	SD in Log Scale	1.0323E-4	SD in Original Scale
5.2500E	95% Percentile Bootstrap UCL	5.3447E-4	95% t UCL (assumes normality of ROS data)
5.4033E	95% Bootstrap t UCL		95% BCA Bootstrap UCL
		5.5365E-4	95% H-UCL (Log ROS)

KM Mean (logged)	-7.7	KM Geo Mean	4.5277E-
KM SD (logged)	0.223	95% Critical H Value (KM-Log)	1.96
KM Standard Error of Mean (logged)	0.085	95% H-UCL (KM -Log)	5.4764E
KM SD (logged)	0.223	95% Critical H Value (KM-Log)	1.96
KM Standard Error of Mean (logged)	0.085		
	DL/2 Sta	tistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.4500E-4	Mean in Log Scale	-7.78
SD in Original Scale	1.4511E-4	SD in Log Scale	0.44
95% t UCL (Assumes normality)	5.4220E-4	95% H-Stat UCL	6.7100E
DL/2 is not a recommended me	thod, provide	ed for comparisons and historical reasons	
Nonnarame	tric Distributio	on Free UCL Statistics	
•			
Detected Data appear	Nomiai Disti	ributed at 1% Significance Level	
	Suggested U	CL to Use	
95% KM (t) UCL	5.3546E-4		
Note: Suggestions regarding the selection of a 95%	UCL are prov	rided to help the user to select the most appropriate 95% UCL	
**	•	ion, and skewness using results from simulation studies.	
·		for additional insight the user may want to consult a statistici	an.
LIOWEVEL SITTUIATIONS RESULTS WILL HOL COVEL All REAL WO	oniu uata sets,	, for additional moight the user may want to consult a statistic	ail.

	UCL Statist	tics for Data	Sets with Non-Detects	
User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/13/2024 2	2:11:07 PM		
From File	mw06_3year_data.xls			
Full Precision	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-6				
iiii ate - MVV-0				
		General S		
Total	Number of Observations	4	Number of Distinct Observations	4
			Number of Missing Observations	0
	Minimum	4.4	Mean	5.65
	Maximum	6.8	Median	5.7
	SD	1.063	Std. Error of Mean	0.532
	Coefficient of Variation	0.188	Skewness	-0.198
Note: Sample size is s	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to	ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that I	TRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
	The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refe	er to the ProUCL 5.2 Tec	hnical Guide	o for a discussion of the Chebyshev UCL.	
			•	
		Normal G	OF Test	
S	hapiro Wilk Test Statistic	0.974	Shapiro Wilk GOF Test	
	napiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
	Lilliefors Test Statistic	0.198	Lilliefors GOF Test	
1'	% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
	Data appea	ar Normal at	1% Significance Level	
			liable for small sample sizes	
	Ass	suming Norm	nal Distribution	
95% No	rmal UCL		95% UCLs (Adjusted for Skewness)	
	95% Student's-t UCL	6.901	95% Adjusted-CLT UCL (Chen-1995)	6.468
			95% Modified-t UCL (Johnson-1978)	6.892
		Gamma G	GOF Test	
	A-D Test Statistic	0.243	Anderson-Darling Gamma GOF Test	
	5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance	e Level
	K-S Test Statistic	0.030	Kolmogorov-Smirnov Gamma GOF Test	
	14-0 1631 018116	0.234	Detected data appear Gamma Distributed at 5% Significance	ا مرما
	5% K-S Critical Value		Detected data appear Garrina Distributed at 5 /0 Significant	CFEAGI
	5% K-S Critical Value			
	Detected data appear	Gamma Dis	tributed at 5% Significance Level	

	Gamma	Statistics	
k hat (MLE)	36.6	k star (bias corrected MLE)	9.31
Theta hat (MLE)	0.154	Theta star (bias corrected MLE)	0.60
nu hat (MLE)	292.8	nu star (bias corrected)	74.5
MLE Mean (bias corrected)	5.65	MLE Sd (bias corrected)	1.85
		Approximate Chi Square Value (0.05)	55.6
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ass	suming Gam	nma Distribution	
95% Approximate Gamma UCL	7.567	95% Adjusted Gamma UCL	N/A
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.968	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.732	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.21	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
• •	-	•	
Note GOr tests	may be unre	eliable for small sample sizes	
	Lognorma	al Statistics	
Minimum of Logged Data	1.482	Mean of logged Data	1.7
Maximum of Logged Data	1.917	SD of logged Data	0.19
Assu	ming Logno	ormal Distribution	
95% H-UCL	7.453	90% Chebyshev (MVUE) UCL	7.28
95% Chebyshev (MVUE) UCL	8.02	97.5% Chebyshev (MVUE) UCL	9.04
99% Chebyshev (MVUE) UCL	11.06		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dis	tribution Free UCLs	
95% CLT UCL	6.524	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	7.245	95% Chebyshev(Mean, Sd) UCL	7.9
97.5% Chebyshev(Mean, Sd) UCL	8.969	99% Chebyshev(Mean, Sd) UCL	10.9
	Suggested	UCL to Use	
95% Student's-t UCL	6.901		
		ds the maximum observation	
Note: Suggestions regarding the colection of a 050/	IICI aro pr	ovided to help the user to select the most appropriate 95% UCL.	
		ution, and skewness using results from simulation studies.	
· · · · · · · · · · · · · · · · · · ·		<u> </u>	n
	onu data set	ts; for additional insight the user may want to consult a statisticia	
However, simulations results will not cover all Real W			
	lence limits	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	

Annual MWO			
Arsenic - MW-6			
	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.025	Mean	0.0253
Maximum	0.026	Median	0.025
SD	5.0000E-4	Std. Error of Mean	2.5000E-4
Coefficient of Variation	0.0198	Skewness	2
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide	on ISM (ITR	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results	in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal C	GOF Test	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.441	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data Not Normal at 1% Significance Level	
Data Not	Normal at 1	% Significance Level	
As	suming Nor	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0258	95% Adjusted-CLT UCL (Chen-1995)	0.0259
		95% Modified-t UCL (Johnson-1978)	0.0259
	Gamma	GOF Test	
A-D Test Statistic	0.992	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.657	Data Not Gamma Distributed at 5% Significance Lev	/el
K-S Test Statistic	0.479	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Data Not Gamma Distributed at 5% Significance Lev	/el
Data Not Gami	ma Distribute	ed at 5% Significance Level	
	Gommo	Statistics	
k hat (MLE)		k star (bias corrected MLE)	861.4
Theta hat (MLE)		Theta star (bias corrected MLE)	
nu hat (MLE)		nu star (bias corrected MEE)	6891
MLE Mean (bias corrected)		MLE Sd (bias corrected)	
(5.85 55.100004)		Approximate Chi Square Value (0.05)	6699
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
		ma Distribution	N1/6
95% Approximate Gamma UCL	0.026	95% Adjusted Gamma UCL	N/A

	Lognormal GOF	Test	
Shapiro Wilk Test Statistic	0.63	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.441	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data Not Lognormal at 10% Significance Level	
Data Not Lo	gnormal at 10%	Significance Level	
	Lognormal Stati	stics	
Minimum of Logged Data	-3.689	Mean of logged Data	-3.679
Maximum of Logged Data	-3.65	SD of logged Data	0.019
Assu	ming Lognormal	Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.026
95% Chebyshev (MVUE) UCL	0.0263	97.5% Chebyshev (MVUE) UCL	0.026
99% Chebyshev (MVUE) UCL	0.0277	, , ,	
Nonparame	tric Distribution F	ree UCL Statistics	
•	tric Distribution F ot follow a Disceri		
Data do no	ot follow a Disceri	nible Distribution	
Data do no		nible Distribution	
Data do no	ot follow a Disceri	nible Distribution	N/A
Data do no	ot follow a Discerr	on Free UCLs	N/A N/A
Nonpar 95% CLT UCL	ametric Distribution	on Free UCLs 95% BCA Bootstrap UCL	
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL	ametric Distribution 0.0257 N/A	on Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	N/A N/A
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	ametric Distribution 0.0257 N/A N/A	pon Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	N/A
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	ametric Distribution 0.0257 N/A N/A 0.026 0.0268	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	N/A N/A 0.026
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	ametric Distribution 0.0257 N/A N/A 0.026	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	N/A N/A 0.026
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided	ametric Distribution 0.0257 N/A N/A 0.026 0.0268  Suggested UCL 1	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.026 0.027
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided  Note: Suggestions regarding the selection of a 95%	ametric Distribution 0.0257 N/A N/A 0.026 0.0268  Suggested UCL to	prible Distribution  on Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 0 Use	N/A N/A 0.026 0.027
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,	ametric Distribution 0.0257 N/A N/A 0.026 0.0268  Suggested UCL to the control of	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.026 0.027

	General	Statistics	
Total Number of Observations	3	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.041	Mean	0.1
Maximum	0.27	Median	0.2
SD	0.124	Std. Error of Mean	0.07
Coefficient of Variation	0.678	Skewness	-1.62
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITR	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal C		
Shapiro Wilk Test Statistic	0.846	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.341	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.393	95% Adjusted-CLT UCL (Chen-1995)	0.2
		95% Modified-t UCL (Johnson-1978)	0.3
	Gamma (	GOF Test	
A-D Test Statistic	0.528	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.637	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.401	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.436	Detected data appear Gamma Distributed at 5% Significance	e Lev
Data Not Gamm	na Distribute	ed at 5% Significance Level	
	Gamma	Statistics	
k hat (MLE)	1.921	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0956	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	11.53	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
(2.22.22.100000)		Approximate Chi Square Value (0.05)	N/A
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Λοο	umina Gam	ma Distribution	
95% Approximate Gamma UCL	N/A	95% Adjusted Gamma UCL	N/A

	Lognormal GO	F Test	
Shapiro Wilk Test Statistic	0.797	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.789	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.365	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.389	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 10	% Significance Level	
Note GOF tests	may be unreliabl	le for small sample sizes	
	Lognormal Sta	atistics	
Minimum of Logged Data		Mean of logged Data	-1.97
Maximum of Logged Data	-1.309	SD of logged Data	1.0
Ass	uming Lognorma	I Distribution	
95% H-UCL		90% Chebyshev (MVUE) UCL	0.5
95% Chebyshev (MVUE) UCL		97.5% Chebyshev (MVUE) UCL	0.8
99% Chebyshev (MVUE) UCL			
Nonparam	etric Distribution I	Free UCL Statistics	
Data appe	ar to follow a Disc	cernible Distribution	
**			
**	rametric Distribut		N/A
Nonpa	rametric Distribut	tion Free UCLs	N/A N/A
Nonpa 95% CLT UCL	rametric Distribut 0.302 N/A	tion Free UCLs 95% BCA Bootstrap UCL	
Nonpa 95% CLT UCL 95% Standard Bootstrap UCL	nametric Distribut 0.302 N/A N/A	tion Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	N/A N/A
Nonpa 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.302 N/A N/A 0.399	tion Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	N/A N/A 0.49
Nonpa 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	0.302 N/A N/A 0.399	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A
Nonpa 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	0.302  N/A  N/A  0.399  0.632  Suggested UCL	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.49

	OCL Statis	tics for Unce	nsored Full Data Sets	
User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/13/2024 2	2:12:33 PM		
From File	mw07_3year_data.xls			
Full Precision	OFF			
	95%			
Number of Bootstrap Operations	2000			
Wassas ANA/ 7				
litrate - MW-7				
		General S	Statistics	
Total	Number of Observations	6	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	1.6	Mean	4.3
	Maximum	7	Median	4.4
	SD	1.788	Std. Error of Mean	0.73
	Coefficient of Variation	0.416	Skewness	-0.0189
Note: Sample size is s	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
			2020 and ITRC 2012) for additional guidance,	
but note that I	TRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
			n gross overestimates of the mean.	
Refe	<del>-</del>		for a discussion of the Chebyshev UCL.	
			·	
		Normal C		
		Nomial G	OF Test	
S	hapiro Wilk Test Statistic	0.98	OF Test Shapiro Wilk GOF Test	
	hapiro Wilk Test Statistic	0.98	Shapiro Wilk GOF Test	
	hapiro Wilk Test Statistic napiro Wilk Critical Value	0.98 0.713	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic	0.98 0.713 0.181	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	0.98 0.713 0.181 0.373	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.98 0.713 0.181 0.373 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.98 0.713 0.181 0.373 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.98 0.713 0.181 0.373 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.98 0.713 0.181 0.373 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	0.98 0.713 0.181 0.373 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution	5.494
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I Ass	0.98 0.713 0.181 0.373 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)	5.494 5.77
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I Ass	0.98 0.713 0.181 0.373 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
1% St	napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I  Assormal UCL 95% Student's-t UCL	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
1% St	A-D Test Statistic  Assignment  A-D Test Statistic	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771 Gamma G 0.298	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	5.77
1% St	Assormal UCL  A-D Test Statistic  Assormal UCL  A-D Test Statistic  Assormation A-D Test Statistic  5% A-D Critical Value	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771  Gamma G 0.298 0.698	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  all Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	5.77
1% St	A-D Test Statistic  A-D Test Statistic  A-D Critical Value  K-S Test Statistic	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771  Gamma G 0.298 0.698 0.2	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	5.77
1% St	Assormal UCL  A-D Test Statistic  A-D Test Statistic  K-S Test Statistic  Assormal UCL  A-D Test Statistic  K-S Test Statistic  S% K-S Critical Value	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771  Gamma G 0.298 0.698 0.2 0.333	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	5.77
1% St	Assormal UCL  A-D Test Statistic  A-D Test Statistic  A-D Critical Value  K-S Test Statistic  K-S Critical Value  Appear  Assormal UCL  A-D Test Statistic  S% A-D Critical Value  K-S Test Statistic  S% K-S Critical Value  Detected data appear	0.98 0.713 0.181 0.373 ar Normal at may be unrel suming Norm 5.771  Gamma G 0.298 0.698 0.2 0.333 Gamma Dis	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	ce Level

	Gamma	Statistics	
k hat (MLE)	5.702	k star (bias corrected MLE)	2.9
Theta hat (MLE)	0.754	Theta star (bias corrected MLE)	1.4
nu hat (MLE)	68.43	nu star (bias corrected)	35.5
MLE Mean (bias corrected)	4.3	MLE Sd (bias corrected)	2.49
		Approximate Chi Square Value (0.05)	22.9
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	19.3
Ası	suming Gam	nma Distribution	
95% Approximate Gamma UCL	6.673	95% Adjusted Gamma UCL	7.9
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.22	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
		eliable for small sample sizes	
		·	
	Lognorma	al Statistics	
Minimum of Logged Data	0.47	Mean of logged Data	1.3
Maximum of Logged Data	1.946	SD of logged Data	0.5
		ormal Distribution	
95% H-UCL	8.027	90% Chebyshev (MVUE) UCL	7.0
95% Chebyshev (MVUE) UCL 99% Chebyshev (MVUE) UCL	8.22 13.18	97.5% Chebyshev (MVUE) UCL	9.8
<u> </u>		tion Free UCL Statistics	
Data appea	ar to follow a	Discernible Distribution	
•		tribution Free UCLs	
95% CLT UCL	5.5	95% BCA Bootstrap UCL	5.4
95% Standard Bootstrap UCL	5.406	95% Bootstrap-t UCL	5.8
95% Hall's Bootstrap UCL	5.79	95% Percentile Bootstrap UCL	5.4
90% Chebyshev(Mean, Sd) UCL	6.49	95% Chebyshev(Mean, Sd) UCL	7.4
97.5% Chebyshev(Mean, Sd) UCL	8.858	99% Chebyshev(Mean, Sd) UCL	11.5
	Suggested	UCL to Use	
95% Student's-t UCL	5.771		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size	, data distrib	ution, and skewness using results from simulation studies.	
However simulations results will not cover all Real W	orld data se	ts; for additional insight the user may want to consult a statisticial	n.
Tiowever, simulations results will not cover all real v			
	dence limits	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.012	Mean	0.013
Maximum	0.014	Median	0.01
SD	8.1650E-4	Std. Error of Mean	4.0825E
Coefficient of Variation	0.0628	Skewness	6.585E-
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.25	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
		liable for small sample sizes	
Ass	suming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.014	95% Adjusted-CLT UCL (Chen-1995)	0.01
		95% Modified-t UCL (Johnson-1978)	0.01
A-D Test Statistic	0.331	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value			
5% A-D Critical value	0.657	Detected data appear Gamma Distributed at 5% Significant	ce Lev
K O T . O		Kalana anana Ondana an Ongara	
K-S Test Statistic	0.257	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance	ce Lev
5% K-S Critical Value  Detected data appear	0.394 Gamma Dis	Detected data appear Gamma Distributed at 5% Significand Atributed at 5% Significance Level	ce Lev
5% K-S Critical Value  Detected data appear	0.394 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance	ce Lev
5% K-S Critical Value  Detected data appear	0.394 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes	ce Lev
5% K-S Critical Value  Detected data appear	0.394 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes	
5% K-S Critical Value  Detected data appear  Note GOF tests r	0.394 Gamma Dismay be unrel	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)	84.4
5% K-S Critical Value  Detected data appear  Note GOF tests r	0.394 Gamma Dismay be unrel	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)	84.4
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)	0.394 Gamma Dismay be unrel Gamma S 337.2 3.8557E-5	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)	84.4 1.5392 675.7
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	0.394 Gamma Dismay be unrel Gamma S 337.2 3.8557E-5 2697	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	84.4 1.5392 675.7 0.00
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	0.394 Gamma Dismay be unrel Gamma S 337.2 3.8557E-5 2697	Detected data appear Gamma Distributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected)	84.4 1.5392 675.7 0.00 616.4 N/A
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)  MLE Mean (bias corrected)  Adjusted Level of Significance	0.394 Gamma Dismay be unrel Gamma S 337.2 3.8557E-5 2697 0.013	Detected data appear Gamma Distributed at 5% Significance Intributed at 5% Significance Level  Diable for small sample sizes  Research (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	84.4 1.5392 675.7 0.00 616.4

	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.259	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Lognorma	l Statistics	
Minimum of Logged Data	-4.423	Mean of logged Data	-4.344
Maximum of Logged Data	-4.269	SD of logged Data	0.063
	ıming Logno	rmal Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.0142
95% Chebyshev (MVUE) UCL	0.0148	97.5% Chebyshev (MVUE) UCL	0.0156
99% Chebyshev (MVUE) UCL	0.0171		
<del>-</del>		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dis	ribution Free UCLs	
95% CLT UCL	0.0137	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0142	95% Chebyshev(Mean, Sd) UCL	0.0148
97.5% Chebyshev(Mean, Sd) UCL	0.0155	99% Chebyshev(Mean, Sd) UCL	0.0171
•			
	Suggested	UCL to Use	
95% Student's-t UCL	0.014		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data set	s; for additional insight the user may want to consult a statisticia	n.

	UCL Statist	ics for Data	Sets with Non-Detects	
User Selected Options				
•	ProUCL 5.2 11/13/2024 2	2:14:07 PM		
	mw08_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-8				
iiuate - MVV-o				
		General S	<u> </u>	
Total N	Number of Observations	6	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	16	Mean	35.67
	Maximum	52	Median	37.5
	SD	15.65	Std. Error of Mean	6.391
	Coefficient of Variation	0.439	Skewness	-0.207
Note: Sample size is sr	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to	ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that IT	TRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
but note that IT	<del>-</del>		ne Chebyshev UCL for small sample sizes (n < 7).  n gross overestimates of the mean.	
	The Chebyshev UCL of	ten results ir		
	The Chebyshev UCL of	ten results ir	n gross overestimates of the mean.	
	The Chebyshev UCL of	ten results ir	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.	
Refe	The Chebyshev UCL of to the ProUCL 5.2 Tec	ten results ir hnical Guide	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test	
Refe	The Chebyshev UCL of it to the ProUCL 5.2 Tec	ten results ir hnical Guide Normal G	of gross overestimates of the mean.  of for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test	
Refe	The Chebyshev UCL of to the ProUCL 5.2 Tec	ten results in hnical Guide Normal G	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test	
Refe	The Chebyshev UCL of it to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value	Normal G 0.877 0.713	on gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	Normal G 0.877 0.713 0.245 0.373	of r a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.877 0.713 0.245 0.373 ar Normal at	on gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.877 0.713 0.245 0.373 ar Normal at	of radiscussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in	Normal G 0.877 0.713 0.245 0.373 ar Normal at	of radiscussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
Sh 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.877 0.713 0.245 0.373 ar Normal at	n gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level 1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	45.6
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.877 0.713 0.245 0.373 ar Normal at	n gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	45.6 48.45
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel	n gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	
Refe	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Refe	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel	n gross overestimates of the mean. of or a discussion of the Chebyshev UCL. OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Refe	The Chebyshev UCL of or to the ProUCL 5.2 Technapiro Wilk Test Statistic Papiro Wilk Critical Value Lilliefors Test Statistic Pata appear Note GOF tests IN Assembly Student's-t UCL	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel suming Norm 48.54 Gamma G	In gross overestimates of the mean. In or a discussion of the Chebyshev UCL.  IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Paral Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	48.45
Sh 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel suming Norm 48.54  Gamma G 0.438	In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	48.45
Sh 1% Sh	The Chebyshev UCL of it to the ProUCL 5.2 Technology of the ProUCL 5.2 Tec	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel suming Norm 48.54  Gamma G 0.438 0.698	In gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iiable for small sample sizes  Inal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	48.45
Sh 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Teck of t	Normal G 0.877 0.713 0.245 0.373 ar Normal at may be unrel suming Norm 48.54  Gamma G 0.438 0.698 0.276 0.333	In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. IOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level Iliable for small sample sizes  Inal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	48.45

	Gamma	Statistics	
k hat (MLE)	5.434	k star (bias corrected MLE)	2.82
Theta hat (MLE)	6.564	Theta star (bias corrected MLE)	12.6
nu hat (MLE)	65.2	nu star (bias corrected)	33.9
MLE Mean (bias corrected)	35.67	MLE Sd (bias corrected)	21.2
		Approximate Chi Square Value (0.05)	21.6
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	18.1
Ass	suming Gam	ma Distribution	
95% Approximate Gamma UCL	56	95% Adjusted Gamma UCL	66.6
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.88	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.259	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
		eliable for small sample sizes	
		·	
	Lognorma	I Statistics	
Minimum of Logged Data	2.773	Mean of logged Data	3.47
Maximum of Logged Data	3.951	SD of logged Data	0.49
Assu	ming Logno	rmal Distribution	
95% H-UCL	65.81	90% Chebyshev (MVUE) UCL	57.7
95% Chebyshev (MVUE) UCL	67.58	97.5% Chebyshev (MVUE) UCL	81.2
99% Chebyshev (MVUE) UCL	108.2		
Nonparame	tric Distribut	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	ribution Free UCLs	
95% CLT UCL		95% BCA Bootstrap UCL	45
95% Standard Bootstrap UCL	45.2	95% Bootstrap-t UCL	48.4
95% Hall's Bootstrap UCL	42.47	95% Percentile Bootstrap UCL	45.1
90% Chebyshev(Mean, Sd) UCL	54.84	95% Chebyshev(Mean, Sd) UCL	63.5
97.5% Chebyshev(Mean, Sd) UCL	75.58	99% Chebyshev(Mean, Sd) UCL	99.2
	Suggested	UCL to Use	
95% Student's-t UCL	48.54		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distribu	ution, and skewness using results from simulation studies.	
	orld doto oot	s; for additional insight the user may want to consult a statisticiar	n.
However, simulations results will not cover all Real W	uata set		
		(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.01	Mean	0.0
Maximum	0.012	Median	0.0
SD	8.1650E-4	Std. Error of Mean	4.082
Coefficient of Variation	0.0742	Skewness	6.585
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	ne t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Ted	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.25	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appe	ar Normal at	1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
As	suming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.012	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma G	GOF Test	
A-D Test Statistic	0.331	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance	ce Le
K-S Test Statistic	0.259	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance	ce Le
Detected data appear	r Gamma Dis	tributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
k hat (MLE)	<b>Gamma S</b> 241.2	k star (bias corrected MLE)	60.
Theta hat (MLE)		Theta star (bias corrected MLE)	
,	1929	nu star (bias corrected)	483.
pu bat (MLE)	0.011	MLE Sd (bias corrected)	0.00
nu hat (MLE)			
nu hat (MLE)  MLE Mean (bias corrected)	0.011	Approximate Chi Causaa Value // AFVI	433
MLE Mean (bias corrected)		Approximate Chi Square Value (0.05)	K1/*
· · ·	N/A	Approximate Chi Square Value (0.05)  Adjusted Chi Square Value	N/A
MLE Mean (bias corrected)  Adjusted Level of Significance	N/A		N/A

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.261	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 1	10% Significance Level	
Note GOF tests i	may be unrelia	ble for small sample sizes	
	Lognormal S	tatistics	
Minimum of Logged Data	-4.605	Mean of logged Data	-4.512
Maximum of Logged Data	-4.423	SD of logged Data	0.074
	ming Lognorm		
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.012
95% Chebyshev (MVUE) UCL	0.0128	97.5% Chebyshev (MVUE) UCL	0.013
99% Chebyshev (MVUE) UCL	0.0151		
•		n Free UCL Statistics	
Data appea	r to follow a Di	scernible Distribution	
· · · · · · · · · · · · · · · · · · ·		oution Free UCLs	
95% CLT UCL	0.0117	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
'			
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	N/A 0.0122	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	
•			N/A 0.012 0.015
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0122 0.0135	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0122 0.0135 Suggested UC	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0122 0.0135	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	0.0122 0.0135 Suggested UC 0.012	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Note: Suggestions regarding the selection of a 95%	0.0122 0.0135 Suggested UC 0.012	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use  ded to help the user to select the most appropriate 95% UCL.	0.012
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.0122 0.0135  Suggested UC 0.012  UCL are providedata distribution	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	0.012

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.19	Mean	0.4
Maximum	0.61	Median	0.4
SD	0.204	Std. Error of Mean	0.
Coefficient of Variation	0.467	Skewness	-0.
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tecl	nnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.874	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.287	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
Ass	uming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.678	95% Adjusted-CLT UCL (Chen-1995)	0.
		95% Modified-t UCL (Johnson-1978)	0.
		· · · · · · · · · · · · · · · · · · ·	
	Gamma G		
A-D Test Statistic	0.41	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance	e Le
K-S Test Statistic	0.314	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance	e Le
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	5.051	k star (bias corrected MLE)	1.
Theta hat (MLE)	0.0866	Theta star (bias corrected MLE)	0.
nu hat (MLE)	40.41	nu star (bias corrected)	11
MLE Mean (bias corrected)	0.438	MLE Sd (bias corrected)	0.
		Approximate Chi Square Value (0.05)	4.
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Δοο	uming Gami	ma Distribution	
	1.03	95% Adjusted Gamma UCL	N/A
95% Approximate Gamma UCL			

	Lognormal GOI	F Test	
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.276	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 10°	% Significance Level	
Note GOF tests i	may be unreliable	e for small sample sizes	
	Lognormal Sta	tistics	
Minimum of Logged Data	-1.661	Mean of logged Data	-0.92
Maximum of Logged Data	-0.494	SD of logged Data	0.5
Maximum of Logged Data	-0.494	SD 01 logged Data	0.0
Assu	ming Lognormal	Distribution	
95% H-UCL	1.612	90% Chebyshev (MVUE) UCL	0.7
95% Chebyshev (MVUE) UCL	0.961	97.5% Chebyshev (MVUE) UCL	1.1
99% Chebyshev (MVUE) UCL	1.627		
<del></del>			
<u> </u>		Free UCL Statistics	
Data appea	r to follow a Disc	ernible Distribution	
Nonnar	ametric Distribut	ion Free LICLs	
95% CLT UCL	0.605	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
•	N/A	95% Percentile Bootstrap UCL	N/A
Uh% Hall'e Bootetran I ICT	11//	30 % Fercentile Bootstrap GOL	14//~
95% Hall's Bootstrap UCL	0.744	95% Chahyshay/Maan, Sd\ LICI	Λ 8
90% Chebyshev(Mean, Sd) UCL	0.744 1.075	95% Chebyshev(Mean, Sd) UCL	
•	0.744 1.075	95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL		99% Chebyshev(Mean, Sd) UCL	0.8 1.4
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	1.075	99% Chebyshev(Mean, Sd) UCL	
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	1.075  Suggested UCL  0.678	99% Chebyshev(Mean, Sd) UCL	
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	1.075  Suggested UCL  0.678	99% Chebyshev(Mean, Sd) UCL to Use	
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Recommended	Suggested UCL 0.678 UCL exceeds the	99% Chebyshev(Mean, Sd) UCL to Use	1.4
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Recommended Note: Suggestions regarding the selection of a 95%	1.075  Suggested UCL 0.678  UCL exceeds the	99% Chebyshev(Mean, Sd) UCL to Use e maximum observation	1.4
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Recommended Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	Suggested UCL 0.678  UCL exceeds the UCL are provide data distribution.	99% Chebyshev(Mean, Sd) UCL  to Use  maximum observation  d to help the user to select the most appropriate 95% UCL.	1.4
90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Recommended Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size, However, simulations results will not cover all Real We	1.075  Suggested UCL 0.678  UCL exceeds the  UCL are provide data distribution, orld data sets; for	99% Chebyshev(Mean, Sd) UCL to Use maximum observation d to help the user to select the most appropriate 95% UCL. and skewness using results from simulation studies.	1.4

	UCL Statis	tics for Data	Sets with Non-Detects	
User Selected Options				
·	ProUCL 5.2 11/13/2024	2:15:36 PM		
	mw09_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-9				
iliale - MVV-9				
		General S		
Total I	Number of Observations	6	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	66	Mean	242.7
	Maximum	350	Median	255
	SD	104.8	Std. Error of Mean	42.79
	Coefficient of Variation	0.432	Skewness	-0.936
Note: Sample size is s	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
·			C 2020 and ITRC 2012) for additional guidance,	
		-		
but note that I	TRC mav recommend th	e t-UCL or th	he Chebyshev UCL for small sample sizes (n < 7).	
but note that I'			he Chebyshev UCL for small sample sizes (n < 7).  n gross overestimates of the mean.	
	The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
	The Chebyshev UCL o	ften results i		
	The Chebyshev UCL o	ften results i hnical Guide	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
Refe	The Chebyshev UCL or or to the ProUCL 5.2 Tec	ften results in hnical Guide Normal G	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
Refe	The Chebyshev UCL or or to the ProUCL 5.2 Technapiro Wilk Test Statistic	ten results in the hand and the	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. GOF Test Shapiro Wilk GOF Test	
Refe	The Chebyshev UCL of to the ProUCL 5.2 Technology of the ProUCL 5.2 Techno	Normal G 0.924 0.713	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
Refe St 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.924 0.713 0.175	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe St 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Technology of the ProUCL 5.2 Technolog	Normal G 0.924 0.713 0.175 0.373	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe St 1% Sh	The Chebyshev UCL of to the ProUCL 5.2 Technology of the ProUCL 5.2 Techno	Normal G 0.924 0.713 0.175 0.373 ar Normal at	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
Refe St 1% Sh	The Chebyshev UCL of to the ProUCL 5.2 Technology of the ProUCL 5.2 Techno	Normal G 0.924 0.713 0.175 0.373 ar Normal at	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe St 1% Sh	The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests	Normal G 0.924 0.713 0.175 0.373 ar Normal at	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Company Critical Value Company Critical Value Data appearance Note GOF tests	Normal G 0.924 0.713 0.175 0.373 ar Normal at	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests Assummal UCL	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	205.6
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Company Critical Value Company Critical Value Data appearance Note GOF tests	Normal G 0.924 0.713 0.175 0.373 ar Normal at	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	295.6
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests Assummal UCL	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	295.6 326.2
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests Assummal UCL	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests Assummal UCL	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Refe	The Chebyshev UCL of the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests Assumal UCL 95% Student's-t UCL	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre suming Norm 328.9	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  18	326.2
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Compared Wilk Critical Value Compared Wilk Critical Value Data appear Note GOF tests  Assumal UCL  95% Student's-t UCL  A-D Test Statistic	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre suming Norm 328.9  Gamma G 0.496	n gross overestimates of the mean.  of or a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	326.2
Refe	The Chebyshev UCL or or to the ProUCL 5.2 Technapiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests Promal UCL  95% Student's-t UCL  A-D Test Statistic S% A-D Critical Value	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre suming Norm 328.9  Gamma G 0.496 0.7	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significan	326.2
Refe	The Chebyshev UCL of the ProUCL 5.2 Technology to the ProUCL 5.2 Technology Wilk Test Statistic Property Wilk Critical Value Compared Wilk Critical Value Compared Wilk Critical Value Data appear Note GOF tests  Assumal UCL  95% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	Normal G 0.924 0.713 0.175 0.373 ar Normal at may be unre suming Norm 328.9  Gamma G 0.496 0.7 0.247 0.333	In gross overestimates of the mean. In gross overestimates over the mean. In gross over the me	326.2

	Gamma	Statistics	
k hat (MLE)	4.205	k star (bias corrected MLE)	2.21
Theta hat (MLE)	57.71	Theta star (bias corrected MLE)	109.6
nu hat (MLE)	50.46	nu star (bias corrected)	26.56
MLE Mean (bias corrected)	242.7	MLE Sd (bias corrected)	163.1
		Approximate Chi Square Value (0.05)	15.81
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	12.92
As	suming Gam	nma Distribution	
95% Approximate Gamma UCL	407.6	95% Adjusted Gamma UCL	499
	Lognormal	I GOF Test	
Shapiro Wilk Test Statistic	0.801	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.288	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear Approx	ximate Logn	ormal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorma	Il Statistics	
Minimum of Logged Data	4.19	Mean of logged Data	5.36
Maximum of Logged Data	5.858	SD of logged Data	0.61
		ormal Distribution	100.0
95% H-UCL	585.4	90% Chebyshev (MVUE) UCL	439.8
95% Chebyshev (MVUE) UCL	525.5	97.5% Chebyshev (MVUE) UCL	644.4
99% Chebyshev (MVUE) UCL	878		
Nonparame	etric Distribut	tion Free UCL Statistics	
Data appea	ar to follow a	Discernible Distribution	
Nonpa	rametric Dist	tribution Free UCLs	
95% CLT UCL	313.1	95% BCA Bootstrap UCL	296.7
95% Standard Bootstrap UCL	307.6	95% Bootstrap-t UCL	313.2
95% Hall's Bootstrap UCL	295.8	95% Percentile Bootstrap UCL	305
90% Chebyshev(Mean, Sd) UCL	371	95% Chebyshev(Mean, Sd) UCL	429.2
97.5% Chebyshev(Mean, Sd) UCL	509.9	99% Chebyshev(Mean, Sd) UCL	668.4
	Suggested	UCL to Use	
95% Student's-t UCL			
	328.9		
		ovided to help the user to select the most appropriate 95% LICL	
Note: Suggestions regarding the selection of a 95%	6 UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	-
Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size	6 UCL are pro	ovided to help the user to select the most appropriate 95% UCL. ution, and skewness using results from simulation studies. ts; for additional insight the user may want to consult a statisticia	
Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size  However, simulations results will not cover all Real W	6 UCL are pro , data distribu /orld data set	ution, and skewness using results from simulation studies.	

- MW-9			
	General	Statistics	
Total Number of Observations	6	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	4
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.015
Maximum Detect	0.081	Maximum Non-Detect	0.015
Variance Detects	0.00186	Percent Non-Detects	66.67
Mean Detects	0.0505	SD Detects	0.043
Median Detects	0.0505	CV Detects	0.85
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.213	SD of Logged Detects	0.98
Warning: Da	ata set has	only 2 Detected Values.	
		gful or reliable statistics and estimates.	
		-	
rejeralso in Lieu, Lech Ren Gilline n		. ZUZU and LLRC. ZUTZ) for additional dilidance	
_	-	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean.	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect	e t-UCL or t ten results hnical Guide	he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology	e t-UCL or t ten results hnical Guide al GOF Tes	t on Detects Only	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology	e t-UCL or t ten results hnical Guide al GOF Tes	he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tech Normal	e t-UCL or to ten results thnical Guide al GOF Tes ough Data to	ton Detects Only  Deform GOF Test	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tech Norm Not End Kaplan-Meier (KM) Statistics usin	e t-UCL or to ften results hnical Guide al GOF Tes bugh Data to ag Normal C	the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test In tritical Values and other Nonparametric UCLs	0.01
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norm Not End  Kaplan-Meier (KM) Statistics usin	e t-UCL or to ften results in the first suits all GOF Tes augh Data to 0.0268	he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.  t on Detects Only Perform GOF Test  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tech Norma Not End  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD	e t-UCL or to ften results in hnical Guide al GOF Tes ough Data to 0.0268 0.0243	ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL	N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tecl  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL	e t-UCL or to ften results innical Guide al GOF Tes bugh Data to 0.0268 0.0243 0.0551	t on Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (Percentile Bootstrap) UCL	N/A N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	e t-UCL or to ften results in hnical Guide al GOF Tes bugh Data to 0.0268 0.0243 0.0551 0.0499	he Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  It on Detects Only In Perform GOF Test  In Fittical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	N/A N/A N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In gross overestimates overestimate	N/A N/A N/A 0.08
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	e t-UCL or to ften results in hnical Guide al GOF Tes bugh Data to 0.0268 0.0243 0.0551 0.0499	he Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  In for a discussion of the Chebyshev UCL.  It on Detects Only In Perform GOF Test  In Fittical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	N/A N/A N/A 0.088
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In gross overestimates overestimate	N/A N/A N/A 0.08
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In Fittical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	N/A N/A N/A 0.08
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not End	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In gross overestimates of the mean. In gross overestimates overestimates over the mean. In gross overestimates over the mean. In gross over the mean. In	N/A N/A N/A 0.08
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not End	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test    KM Standard Error of Mean	N/A N/A N/A 0.088 0.16
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tecl  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL  Gamma GOF  Not End  Gamma S k hat (MLE)	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In Fitical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  In Perform GOF Test  In Detected Data Only  k star (bias corrected MLE)	N/A N/A N/A 0.088 0.16
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tect  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (bebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  Not End  k hat (MLE) Theta hat (MLE)	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  10 Perform GOF Test  11 Detected Data Only  12 K star (bias corrected MLE)  Theta star (bias corrected MLE)	N/A N/A N/A 0.088 0.16
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Tecl  Norma Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL  Gamma GOF  Not End  Gamma S k hat (MLE)	e t-UCL or to the results in the res	he Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. It on Detects Only In Perform GOF Test  In Fitical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  In Perform GOF Test  In Detected Data Only  k star (bias corrected MLE)	N/A N/A 0.088 0.16

		meters using KM Estimates	
Mean (KM)	0.0268	SD (KM)	0.02
Variance (KM)		SE of Mean (KM)	0.014
k hat (KM)	1.22	k star (KM)	0.72
nu hat (KM)	14.64	nu star (KM)	8.65
theta hat (KM)	0.022	theta star (KM)	0.03
80% gamma percentile (KM)	0.0441	90% gamma percentile (KM)	0.06
95% gamma percentile (KM)	0.0904	99% gamma percentile (KM)	0.14
Gamm	a Kaplan-M	eier (KM) Statistics	
		Adjusted Level of Significance (β)	0.01
Approximate Chi Square Value (8.65, $\alpha$ )	3.119	Adjusted Chi Square Value (8.65, β)	2.04
95% KM Approximate Gamma UCL	0.0744	95% KM Adjusted Gamma UCL	0.11
Lognormal GO	F Test on D	etected Observations Only	
Not End	ough Data to	Perform GOF Test	
Lognormal RO	S Statistics (	Using Imputed Non-Detects	
Mean in Original Scale	0.0175	Mean in Log Scale	-6.21
SD in Original Scale	0.0321	SD in Log Scale	2.66
95% t UCL (assumes normality of ROS data)	0.0438	95% Percentile Bootstrap UCL	0.04
95% BCA Bootstrap UCL	0.0473	95% Bootstrap t UCL	0.54
95% H-UCL (Log ROS)	12253		
Statistics using KM estimates	on Logged [	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.871	KM Geo Mean	0.02
KM SD (logged)	0.616	95% Critical H Value (KM-Log)	2.93
KM Standard Error of Mean (logged)	0.356	95% H-UCL (KM -Log)	0.05
KM SD (logged)	0.616	95% Critical H Value (KM-Log)	2.93
KM Standard Error of Mean (logged)	0.356		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0218	Mean in Log Scale	-4.33
SD in Original Scale	0.0294	SD in Log Scale	0.97
95% t UCL (Assumes normality)	0.046	95% H-Stat UCL ded for comparisons and historical reasons	0.12
DELZ IS HOL A TECOMINISHINE	stilou, provi	ued for compansons and historical reasons	
•		tion Free UCL Statistics	
Data do n	ot follow a D	Discernible Distribution	
	Suggested	UCL to Use	
Recommendation cannot be provided			
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	-
Recommendations are based upon data size	data distrib	ution, and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.007	Mean	0.007
Maximum	0.0083	Median	0.007
SD	5.9161E-4	Std. Error of Mean	2.95801
Coefficient of Variation	0.0794	Skewness	1.54
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
		2 2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
		for a discussion of the Chebyshev UCL.	
		·	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.848	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.284	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appe	ar Normal at	1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
As	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00815	95% Adjusted-CLT UCL (Chen-1995)	0.00
		95% Modified-t UCL (Johnson-1978)	0.00
	Gamma G	GOF Test	
A-D Test Statistic	0.447	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significan	ce Lev
K-S Test Statistic	0.281	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significan	ce Lev
Detected data appear	r Gamma Dis	tributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	219.6	k star (bias corrected MLE)	55.0
Theta hat (MLE)	3.3930E-5	Theta star (bias corrected MLE)	1.3531
nu hat (MLE)	1757	nu star (bias corrected)	440.5
MLE Mean (bias corrected)	0.00745	MLE Sd (bias corrected)	0.00
		Approximate Chi Square Value (0.05)	392.8
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Δα	suming Gam	ma Distribution	
	0.00835	95% Adjusted Gamma UCL	N/A
95% Approximate Gamma UCL	() IIIIX 35	45% Adilletad Lamma III I I	

	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.859	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.273	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at	t 10% Significance Level	
Note GOF tests	may be unrel	iable for small sample sizes	
	Lognormal	Statistics	
Minimum of Logged Data	-4.962	Mean of logged Data	-4.902
Maximum of Logged Data	-4.791	SD of logged Data	0.0772
		mal Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.00831
95% Chebyshev (MVUE) UCL	0.0087	97.5% Chebyshev (MVUE) UCL	0.00925
99% Chebyshev (MVUE) UCL	0.0103		
•		on Free UCL Statistics	
Data appea	r to follow a [	Discernible Distribution	
<u> </u>		ibution Free UCLs	
95% CLT UCL	0.00794	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.00834	95% Chebyshev(Mean, Sd) UCL	0.00874
97.5% Chebyshev(Mean, Sd) UCL	0.0093	99% Chebyshev(Mean, Sd) UCL	0.0104
	Suggested L	JCL to Use	
95% Student's-t UCL	0.00815		
	-	vided to help the user to select the most appropriate 95% UCL.	
		tion, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data sets	s; for additional insight the user may want to consult a statisticia	an.

	0	Na-Mada-	
	General S		
Total Number of Observations	4	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.15	Minimum Non-Detect	0.08
Maximum Detect	0.19	Maximum Non-Detect	0.08
Variance Detects		Percent Non-Detects	50%
Mean Detects	0.17	SD Detects	0.0283
Median Detects	0.17	CV Detects	0.166
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.779	SD of Logged Detects	0.167
Warning: D	ata set has o	only 2 Detected Values.	
-		gful or reliable statistics and estimates.	
		y-u	
		using incremental sampling methodology (ISM) approach,	
-	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
<del>-</del>		ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
The Chebyshev UCL o	ften results i		
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec	ften results in chnical Guide nal GOF Test	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec Norm Not End	ften results in the characteristic of the ch	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. c on Detects Only Perform GOF Test	
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin	ften results in the chain of th	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. e on Detects Only Perform GOF Test ritical Values and other Nonparametric UCLs	
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec Norm Not End	ten results in the characteristic in the cha	n gross overestimates of the mean. for a discussion of the Chebyshev UCL. c on Detects Only Perform GOF Test ritical Values and other Nonparametric UCLs KM Standard Error of Mean	0.033
Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	then results in the characteristic control of the characteristic c	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. c on Detects Only Perform GOF Test ritical Values and other Nonparametric UCLs KM Standard Error of Mean 95% KM (BCA) UCL	0.033- N/A
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL	ten results in the characteristic in the cha	n gross overestimates of the mean. for a discussion of the Chebyshev UCL. c on Detects Only Perform GOF Test ritical Values and other Nonparametric UCLs KM Standard Error of Mean	
Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	then results in the characteristic control of the characteristic c	n gross overestimates of the mean. e for a discussion of the Chebyshev UCL. c on Detects Only Perform GOF Test ritical Values and other Nonparametric UCLs KM Standard Error of Mean 95% KM (BCA) UCL	N/A
Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL	then results in the chair of th	n gross overestimates of the mean. for a discussion of the Chebyshev UCL. from Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	N/A N/A
Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	ten results in thinical Guide and GOF Test tough Data to the graph of the control	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  tion Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL	N/A N/A N/A 0.27
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	ten results in thinical Guide and GOF Test tough Data to the graph of the control	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  a on Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.27
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM Chebyshev UCL 97.5% KM Chebyshev UCL	then results in the chinical Guide that GOF Test tough Data to the chinical Guide to the	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.27
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	then results in the chinical Guide that GOF Test tough Data to the chinical Guide to the	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  a on Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.27
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  Not End	then results in the characteristic in the ch	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL	N/A N/A N/A
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  Not End	then results in the chinical Guide that GOF Test tough Data to the chinical Guide to the chinical GOF Test tough Data to the chinical GOF Test tough Data to the chinical GOF Test to the chinical GOF Test to the chinical G	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Servations Only 100 Perform GOF Test	N/A N/A N/A 0.27
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not End  Gamma k hat (MLE)	then results in the chinical Guide and GOF Test ough Data to the chinical Guide and GOF Test ough Data to the chinical GUID (1.25) (1.2	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  a on Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL  95% KM Chebyshev UCL  80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL	N/A N/A N/A 0.27 0.457
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not End  K hat (MLE)	ten results in thinical Guide that GOF Test tough Data to the graph of	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  a on Detects Only Perform GOF Test  Titical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  Tected Observations Only Perform GOF Test  Detected Data Only  k star (bias corrected MLE) Theta star (bias corrected MLE)	N/A N/A N/A 0.27 0.457
The Chebyshev UCL o Refer to the ProUCL 5.2 Tec  Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF Not End  Gamma k hat (MLE)	then results in the chinical Guide and GOF Test ough Data to the chinical Guide and GOF Test ough Data to the chinical GUID (1.25) (1.2	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  a on Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL  95% KM Chebyshev UCL  80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL 80% KM Chebyshev UCL	N/A N/A N/A 0.27 0.45

		eters using KM Estimates	
Mean (KM)	0.125	SD (KM)	0.04
Variance (KM)	0.00223	SE of Mean (KM)	0.033
k hat (KM)	7.022	k star (KM)	1.92
nu hat (KM)	56.18	nu star (KM)	15.38
theta hat (KM)	0.0178	theta star (KM)	0.06
80% gamma percentile (KM)	0.188	90% gamma percentile (KM)	0.24
95% gamma percentile (KM)	0.3	99% gamma percentile (KM)	0.42
Gamm	a Kaplan-Meie	er (KM) Statistics	
		Adjusted Level of Significance (β)	0.004
Approximate Chi Square Value (15.38, α)	7.525	Adjusted Chi Square Value (15.38, β)	4.80
95% KM Approximate Gamma UCL	0.255	95% KM Adjusted Gamma UCL	0.4
		ected Observations Only	
NOT End	ougn Data to P	Perform GOF Test	
<u> </u>		ing Imputed Non-Detects	
Mean in Original Scale	0.131	Mean in Log Scale	-2.08
SD in Original Scale	0.0488	SD in Log Scale	0.38
95% t UCL (assumes normality of ROS data)	0.188	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.263		
Statistics using KM estimates	on Logged Da	ita and Assuming Lognormal Distribution	
KM Mean (logged)	-2.152	KM Geo Mean	0.11
KM SD (logged)	0.383	95% Critical H Value (KM-Log)	3.1
KM Standard Error of Mean (logged)	0.271	95% H-UCL (KM -Log)	0.24
KM SD (logged)	0.383	95% Critical H Value (KM-Log)	3.1
KM Standard Error of Mean (logged)	0.271		
	DL/2 Stat	tistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.105	Mean in Log Scale	-2.49
SD in Original Scale	0.0768	SD in Log Scale	0.83
95% t UCL (Assumes normality)	0.195	95% H-Stat UCL d for comparisons and historical reasons	1.78
DD2 is not a recommended me	striou, provide	u ioi compansons and mistorical reasons	
•		n Free UCL Statistics	
Data do n	ot follow a Dis	cernible Distribution	
	Suggested U	CL to Use	
Recommendation cannot be provided			
Note: Suggestions regarding the selection of a 95%	UCL are provi	ided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distributi	on, and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.034	Mean	0.05
Maximum	0.078	Median	0.04
SD	0.019	Std. Error of Mean	0.00
Coefficient of Variation	0.374	Skewness	1.4
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	nnical Guide	for a discussion of the Chebyshev UCL.	
		·	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.857	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.349	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
Ass	umina Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0731	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
		·	
	Gamma G	GOF Test	
A-D Test Statistic	0.408	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.335	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance	e Lev
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	10.73	k star (bias corrected MLE)	2.8
Theta hat (MLE)	0.00473	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	85.85	nu star (bias corrected)	22.
MLE Mean (bias corrected)	0.0508	MLE Sd (bias corrected)	0.0
(**************************************		Approximate Chi Square Value (0.05)	12.
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ana	umina Gara	ma Distribution	
ASS			N/A
95% Approximate Gamma UCL	0.0894	95% Adjusted Gamma UCL	

	Lognormal GO	F Test	
Shapiro Wilk Test Statistic	0.915	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.308	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 10	% Significance Level	
Note GOF tests	may be unreliabl	le for small sample sizes	
	Lognormal Sta	atistics	
Minimum of Logged Data	-3.381	Mean of logged Data	-3.028
Maximum of Logged Data	-2.551	SD of logged Data	0.347
Appl	ming Lognorma	I Distribution	
95% H-UCL	0.0928	90% Chebyshev (MVUE) UCL	0.0767
95% Chebyshev (MVUE) UCL	0.0928	97.5% Chebyshev (MVUE) UCL	0.0767
99% Chebyshev (MVUE) UCL	0.0885	97.5% Chebysnev (MVOE) OCL	0.105
99% Chebysnev (MVOE) OCL	0.137		
Nonparame	tric Distribution I	Free UCL Statistics	
Data appea	r to follow a Disc	cernible Distribution	
Nonne	ametric Distribut	tion Free UCLs	
Nonpar			
95% CLT UCL	0.0663	95% BCA Bootstrap UCL	N/A
·	0.0663 N/A	95% BCA Bootstrap UCL 95% Bootstrap-t UCL	N/A N/A
95% CLT UCL		' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	
95% CLT UCL 95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A N/A
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	N/A N/A	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	N/A N/A 0.0921
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0792 0.11	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0792	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0921
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0792 0.11	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0921
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0792 0.11  Suggested UCL 0.0731	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.092 0.145
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	N/A N/A 0.0792 0.11  Suggested UCL 0.0731	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.092 0.145
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Note: Suggestions regarding the selection of a 95%	N/A N/A 0.0792 0.11  Suggested UCL 0.0731  UCL are provide	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 0.092 0.145

Dinoseb - MW-9			
		Statistics	
Total Number of Observations		Number of Distinct Observations	6
Number of Detects	-	Number of Non-Detects	1
Number of Distinct Detects		Number of Distinct Non-Detects	1
Minimum Detect		Minimum Non-Detect	
Maximum Detect		Maximum Non-Detect	
Variance Detects		Percent Non-Detects	16.67%
Mean Detects		SD Detects	0.0668
Median Detects		CV Detects	1.183
Skewness Detects		Kurtosis Detects	0.285
Mean of Logged Detects	-4.119	SD of Logged Detects	2.358
Note: Sample size is small (e.g., <10), if data	are collected	using incremental sampling methodology (ISM) approach,	
1		C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend t	he t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	often results i	in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Te	chnical Guide	e for a discussion of the Chebyshev UCL.	
		t on Detects Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value		Detected Data appear Normal at 1% Significance Le	vel
Lilliefors Test Statistic		Lilliefors GOF Test	
1% Lilliefors Critical Value		Detected Data appear Normal at 1% Significance Le	vel
		nal at 1% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
Kanlan-Majar (KM) Statistics us	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean		KM Standard Error of Mean	0.0267
90KM SD		95% KM (BCA) UCL	0.0267
95% KM (t) UCL		95% KM (Percentile Bootstrap) UCL	0.0878
95% KM (z) UCL		95% KM Bootstrap t UCL	0.199
90% KM Chebyshev UCL		95% KM Chebyshev UCL	0.163
97.5% KM Chebyshev UCL		99% KM Chebyshev UCL	0.313
37.0% KW Gliebyshev COL	0.214	33 % TAIN GROBYSHOV COL	0.010
Gamma GOF	Tests on De	etected Observations Only	
A-D Test Statistic	0.197	Anderson-Darling GOF Test	
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significan	ice Level
K-S Test Statistic	0.18	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.371	Detected data appear Gamma Distributed at 5% Significan	ice Level
Detected data appea	r Gamma Dis	stributed at 5% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		Detected Data Only	
k hat (MLE)		k star (bias corrected MLE)	0.337
Theta hat (MLE)		Theta star (bias corrected MLE)	0.168
nu hat (MLE)		nu star (bias corrected)	3.368
Mean (detects)	0.0565		

<u> </u>		IDs with many tied observations at multiple DLs	
		<1.0, especially when the sample size is small (e.g., <15-20)	
		eld incorrect values of UCLs and BTVs the sample size is small.	
·		be computed using gamma distribution on KM estimates	
	4.5000E-4	Mean	0.0
Maximum		Median	0.0
SD		CV	1.
k hat (MLE)		k star (bias corrected MLE)	0.3
Theta hat (MLE)		Theta star (bias corrected MLE)	0.
nu hat (MLE)		nu star (bias corrected)	4.
, ,		nu star (blas correcteu)	4.
Adjusted Level of Significance (β)	0.0122	Adjusted Obj Course Value (4.52.0)	0.4
Approximate Chi Square Value (4.53, α)		Adjusted Chi Square Value (4.53, β)	
95% Gamma Approximate UCL	0.234	95% Gamma Adjusted UCL	0.
		eters using KM Estimates	0.0
Mean (KM)		SD (KM)	0.0
Variance (KM)		SE of Mean (KM)	0.0
k hat (KM)		k star (KM)	0.
nu hat (KM)		nu star (KM)	5.
theta hat (KM)		theta star (KM)	0.
80% gamma percentile (KM)		90% gamma percentile (KM)	0.
95% gamma percentile (KM)	0.19	99% gamma percentile (KM)	0.
Gamn	na Kaplan-Meie	er (KM) Statistics	
Approximate Chi Square Value (5.23, α)		Adjusted Chi Square Value (5.23, β)	0.
95% KM Approximate Gamma UCL	0.195	95% KM Adjusted Gamma UCL	0.
	F T D	and Observations Only	
Shapiro Wilk Test Statistic		ected Observations Only Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value		Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic		Lilliefors GOF Test	
10% Lilliefors Critical Value		Detected Data appear Lognormal at 10% Significance L	evel
		al at 10% Significance Level	
<u> </u>		able for small sample sizes	
Lognormal RO	S Statistics Usi	ing Imputed Non-Detects	
Mean in Original Scale	0.0471	Mean in Log Scale	-5.0
SD in Original Scale	0.0641	SD in Log Scale	3.
95% t UCL (assumes normality of ROS data)	0.0998	95% Percentile Bootstrap UCL	0.0
95% BCA Bootstrap UCL	0.0993	95% Bootstrap t UCL	0.
95% H-UCL (Log ROS)	33201100	·	

Statistics using KM estimates of		ssuming Lognormal Distribution	
KM Mean (logged)	-4.773	KM Geo Mean	0.0084
KM SD (logged)	2.419	95% Critical H Value (KM-Log)	9.245
KM Standard Error of Mean (logged)	1.104	95% H-UCL (KM -Log)	3470
KM SD (logged)	2.419	95% Critical H Value (KM-Log)	9.245
KM Standard Error of Mean (logged)	1.104		
	DL/2 Statistics		
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0471	Mean in Log Scale	-4.889
SD in Original Scale	0.064	SD in Log Scale	2.83
95% t UCL (Assumes normality)	0.0998	95% H-Stat UCL	342118
DL/2 is not a recommended me	thad provided for som	naricone and historical reasons	
Nonparamet	tric Distribution Free U		
Nonparamet Detected Data appear	ric Distribution Free U Normal Distributed at	CL Statistics 1% Significance Level	
Nonparamet  Detected Data appear	tric Distribution Free U Normal Distributed at Suggested UCL to Use	CL Statistics 1% Significance Level	
Nonparamet  Detected Data appear	ric Distribution Free U Normal Distributed at	CL Statistics 1% Significance Level	
Nonparamet  Detected Data appear  95% KM (t) UCL	ric Distribution Free U Normal Distributed at Suggested UCL to Use	CL Statistics 1% Significance Level	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption	ric Distribution Free U Normal Distributed at Suggested UCL to Use	CL Statistics  1% Significance Level  collected in a random and unbiased manner.	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption	Suggested UCL to Use 0.101 ons that the data were ata were collected from	CL Statistics  1% Significance Level  collected in a random and unbiased manner.	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption  Please verify the data	Suggested UCL to Use 0.101 ons that the data were ata were collected from	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods,	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption  Please verify the data were collected then contact a second cont	Suggested UCL to Use 0.101 ons that the data were ata were collected from using judgmental or of statistician to correctly	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption  Please verify the data were collected  then contact a selection of a 95%	Normal Distributed at Suggested UCL to Use 0.101 ons that the data were ata were collected from using judgmental or of statistician to correctly	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.  elp the user to select the most appropriate 95% UCL	
Nonparamet  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumption  Please verify the data were collected  then contact a selection of a 95%	Suggested UCL to Use  0.101  ons that the data were ata were collected from using judgmental or of statistician to correctly  UCL are provided to he data distribution, and s	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.  elp the user to select the most appropriate 95% UCL kewness using results from simulation studies.	

orobenzene - MW-9			
	General	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	3.3000E-4	Mean	6.9333E-4
Maximum	0.001	Median	7.2500E-4
SD	2.4655E-4	Std. Error of Mean	1.0065E-4
Coefficient of Variation	0.356	Skewness	-0.359
Note: Sample size is small (e.g. <10) if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		the Chebyshev UCL for small sample sizes (n < 7).	
<del>-</del>		in gross overestimates of the mean.	
-		e for a discussion of the Chebyshev UCL.	
Refer to the Prooct 5.2 Tec	IIIIcai Guid	e for a discussion of the Chebyshev OCL.	
	Normal (	GOF Test	
Shapiro Wilk Test Statistic	0.97	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.97	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.713	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.190	Data appear Normal at 1% Significance Level	
		: 1% Significance Level	
Note GOF tests i	may be unre	eliable for small sample sizes	
	suming Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	8.9615E-4	95% Adjusted-CLT UCL (Chen-1995)	
		95% Modified-t UCL (Johnson-1978)	8.9370E-4
	Gamma	GOF Test	
A-D Test Statistic	0.264	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significan	ce Level
K-S Test Statistic	0.228	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significan	ce Level
Detected data appear	Gamma Di	stributed at 5% Significance Level	
Note GOF tests r	may be unre	eliable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	8.133	k star (bias corrected MLE)	4.177
Theta hat (MLE)		Theta star (bias corrected MLE)	
nu hat (MLE)	97.59	nu star (bias corrected)	50.13
MLE Mean (bias corrected)		MLE Sd (bias corrected)	
(		Approximate Chi Square Value (0.05)	34.87
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	30.35
	umic - O-	nna Diatribution	
	onning Gam	ıma Distribution	
95% Approximate Gamma UCL	0.0000= :	95% Adjusted Gamma UCL	0.00115

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.929	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.214	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear l	Lognormal at 1	10% Significance Level	
Note GOF tests r	may be unrelia	ble for small sample sizes	
	Lognormal S		
Minimum of Logged Data	-8.016	Mean of logged Data	-7.337
Maximum of Logged Data	-6.908	SD of logged Data	0.40
	ming Lognorm		
95% H-UCL	0.0011	90% Chebyshev (MVUE) UCL	0.001
95% Chebyshev (MVUE) UCL	0.0012	97.5% Chebyshev (MVUE) UCL	0.001
99% Chebyshev (MVUE) UCL	0.00185		
Namasana	tula Diatulkusiau	n Fran IIOI Chatiatian	
•		n Free UCL Statistics	
Data annaa	nto follow a Di	iocomible Distribution	
Data appea	r to follow a Dis	scernible Distribution	
•			
Nonpar	ametric Distrib	oution Free UCLs	9 <i>4</i> 167E
Nonpar 95% CLT UCL	ametric Distrib	oution Free UCLs 95% BCA Bootstrap UCL	
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL	ametric Distrib 8.5889E-4 8.4538E-4	oution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	8.8657E
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	8.8657E 8.4000E
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	8.8657E 8.4000E 0.001
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	8.8657E 8.4000E 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	8.8657E 8.4000E 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132  Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	8.8657E 8.4000E 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132  Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	8.8657E
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132  Suggested UC 8.9615E-4	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	8.8657E 8.4000E 0.001 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL	### ametric Distrib  ### 8.5889E-4  ### 8.4538E-4  ### 8.3395E-4  ### 9.9529E-4  ### 0.00132    Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	8.8657E 8.4000E 0.001 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132  Suggested UC 8.9615E-4  UCL are provided data distribution	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	8.8657E 8.4000E 0.001 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,	ametric Distrib 8.5889E-4 8.4538E-4 8.3395E-4 9.9529E-4 0.00132  Suggested UC 8.9615E-4  UCL are provided data distribution	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	8.8657E 8.4000E 0.001 0.001
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,  However, simulations results will not cover all Real We	### ametric Distrib  ### 8.5889E-4  ### 8.4538E-4  ### 8.3395E-4  ### 9.9529E-4  ### 0.00132    Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	8.8657E 8.4000E 0.001 0.001

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
rotal Number of Observations	-	Number of Missing Observations	0
Minimum	0.022	Mean	0.05
Maximum	0.074	Median	0.05
SD	0.0184	Std. Error of Mean	0.007
Coefficient of Variation	0.355	Skewness	-0.65
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or tl	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.972	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.149	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL	0.007	95% UCLs (Adjusted for Skewness)	0.00
95% Student's-t UCL	0.067	95% Adjusted-CLT UCL (Chen-1995)	0.06
		95% Modified-t UCL (Johnson-1978)	0.06
	Gamma C		
A-D Test Statistic	0.313	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance	e Leve
	0.198	Kolmogorov-Smirnov Gamma GOF Test	
K-S Test Statistic			e Leve
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance	
5% K-S Critical Value  Detected data appear	Gamma Dis	tributed at 5% Significance Level	
5% K-S Critical Value  Detected data appear	Gamma Dis		
5% K-S Critical Value  Detected data appear	Gamma Dis	tributed at 5% Significance Level liable for small sample sizes	
5% K-S Critical Value  Detected data appear  Note GOF tests r	Gamma Dismay be unre  Gamma S 7.505	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)	3.86
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)	Gamma Dismay be unre  Gamma S  7.505  0.00691	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)	3.86
5% K-S Critical Value  Detected data appear  Note GOF tests r	Gamma Dismay be unre  Gamma S 7.505	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	3.86 0.01 46.3
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)	Gamma Dismay be unre  Gamma S  7.505  0.00691	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)	3.80 0.01 46.3
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	Gamma S 7.505 0.00691 90.06	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	3.86 0.01 46.3 0.02
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	Gamma S 7.505 0.00691 90.06	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)	3.86 0.01 46.3 0.02 31.7 27.4
5% K-S Critical Value  Detected data appear  Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)  MLE Mean (bias corrected)  Adjusted Level of Significance	Gamma Simay be unresided and simay be unresid	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	3.86 0.01 46.3 0.02 31.7

	Lognormal GO	OF Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.214	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear l	Lognormal at 1	0% Significance Level	
Note GOF tests r	may be unreliat	ole for small sample sizes	
	Lognormal St	atistics	
Minimum of Logged Data	-3.817	Mean of logged Data	-3.028
Maximum of Logged Data	-2.604	SD of logged Data	0.434
Assu	ming Lognorma	al Distribution	
95% H-UCL	0.0862	90% Chebyshev (MVUE) UCL	0.0801
95% Chebyshev (MVUE) UCL	0.0927	97.5% Chebyshev (MVUE) UCL	0.11
99% Chebyshev (MVUE) UCL	0.145	, , ,	
•		Free UCL Statistics	
Data арреа	r to follow a Dis	cernible Distribution	
Nonpar	ametric Distribu	ution Free UCLs	
95% CLT UCL	0.0642	95% BCA Bootstrap UCL	0.062
95% Standard Bootstrap UCL	0.0633	95% Bootstrap-t UCL	0.0646
95% Hall's Bootstrap UCL	0.0631	95% Percentile Bootstrap UCL	0.0628
90% Chebyshev(Mean, Sd) UCL	0.0744	95% Chebyshev(Mean, Sd) UCL	0.0846
97.5% Chebyshev(Mean, Sd) UCL	0.0988	99% Chebyshev(Mean, Sd) UCL	0.127
	Suggested UC	I to lise	
95% Student's-t UCL	0.067		
00% 01445001	0.007		
Note: Suggestions regarding the selection of a 95%	UCL are provid	led to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distributio	n, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data sets; fo	or additional insight the user may want to consult a statisticia	n.
Note: For highly negatively-skewed data, confid	ence limits (e.c	, Chen, Johnson, Lognormal, and Gamma) may not be	
14010. I Of Highly Hegalivery-skewed data, colling	onoe mino (e.g	,, onon, comoun, cognormal, and damina/ may not be	

	UCL Statist	ics for Data	Sets with Non-Detects	
User Selected Options				
•	ProUCL 5.2 11/13/2024 2	2:19:07 PM		
	mw10_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-10				
		General S	Statistics	
Total N	Number of Observations	6	Number of Distinct Observations	5
			Number of Missing Observations	0
	Minimum	2.8	Mean	4.4
	Maximum	6.4	Median	3.9
	SD	1.541	Std. Error of Mean	0.629
	Coefficient of Variation	0.35	Skewness	0.504
Noto: Cample size is se	mall (a.g. <10) if data a	ro collected	using incremental sampling methodology (ISM) approach,	
			2 2020 and ITRC 2012) for additional guidance,	
		-	ne Chebyshev UCL for small sample sizes (n < 7).	
but note that i	<del>-</del>		io onobyonov oce for omali campio oizoo (ii • 1).	
	The Chehyshev LICL of	ten reculte in	arross overestimates of the mean	
Refe	<del>-</del>		n gross overestimates of the mean.	
Refe	<del>-</del>		n gross overestimates of the mean. for a discussion of the Chebyshev UCL.	
Refe	<del>-</del>	hnical Guide	for a discussion of the Chebyshev UCL.	
	or to the ProUCL 5.2 Tec	hnical Guide Normal G	for a discussion of the Chebyshev UCL.  OF Test	
Sh	r to the ProUCL 5.2 Tec	Normal G	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test	
Sh	napiro Wilk Test Statistic	Normal G  0.865  0.713	of Test Shapiro Wilk GOF Test Data appear Normal at 1% Significance Level	
Sh 1% Sh	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic	Normal G 0.865 0.713 0.262	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Sh 1% Sh	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value	Normal G 0.865 0.713 0.262 0.373	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Sh 1% Sh	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	Normal G 0.865 0.713 0.262 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  Significance Level  1% Significance Level	
Sh 1% Sh	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	Normal G 0.865 0.713 0.262 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Sh 1% Sh	napiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data appea	Normal G 0.865 0.713 0.262 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	Normal G 0.865 0.713 0.262 0.373 ar Normal at	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelessuming Normal	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)	5.574
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	Normal G 0.865 0.713 0.262 0.373 ar Normal at	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	5.574 5.69
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelessuming Normal	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelease suming Normal S  5.668	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests r  Ass  Tmal UCL  95% Student's-t UCL	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelessuming Norm  5.668  Gamma G  0.452	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	5.69
Sh 1% Sh 19	napiro Wilk Test Statistic papiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests r  Ass  Tmal UCL  95% Student's-t UCL	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelease suming Normal S  5.668	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Page 10 June 10 J	5.69
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests r  Ass  Tmal UCL  95% Student's-t UCL	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrelessuming Norm  5.668  Gamma G  0.452	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	5.69
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests  Ass  Tmal UCL  95% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value	Normal G 0.865 0.713 0.262 0.373 ar Normal at may be unrel suming Norm 5.668  Gamma G 0.452 0.698	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Page 10 June 10 J	5.69 e Level
Sh 1% Sh 19	napiro Wilk Test Statistic napiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests r  Ass  TMAI UCL  95% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	Normal G  0.865  0.713  0.262  0.373  ar Normal at may be unrel  suming Norm  5.668  Gamma G  0.452  0.698  0.277  0.332	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test	5.69 e Level

5.13 0.85 61.62 1.94 44.57 39.39
61.62 1.94 44.57 39.39
1.94 44.5 39.39
44.5 39.3
39.3
6.88
6.88
0.00
1.43
0.34
6.26
8.28
E 41
5.41
6.15
5.3
7.14
10.6

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	1
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.015
Maximum Detect	0.11	Maximum Non-Detect	0.015
Variance Detects	0.00162	Percent Non-Detects	16.67
Mean Detects	0.0618	SD Detects	0.040
Median Detects	0.058	CV Detects	0.65
Skewness Detects	0.19	Kurtosis Detects	-2.595
Mean of Logged Detects	-2.994	SD of Logged Detects	0.76
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRC	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or th	e Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results ir	gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tecl	hnical Guide	for a discussion of the Chebyshev UCL.	
		<u> </u>	
Norma	al GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Leve	el
Lilliefors Test Statistic	0.213	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Leve	el
Detected Data a	ppear Norma	al at 1% Significance Level	
Note GOF tests r	nay be unrel	iable for small sample sizes	
Kaplan-Meier (KM) Statistics usin	g Normal Cr	itical Values and other Nonparametric UCLs	
KM Mean	0.054	KM Standard Error of Mean	0.017
90KM SD	0.0372	95% KM (BCA) UCL	0.080
95% KM (t) UCL	0.0882	95% KM (Percentile Bootstrap) UCL	0.079
95% KM (z) UCL	0.0819	95% KM Bootstrap t UCL	0.097
90% KM Chebyshev UCL	0.105	95% KM Chebyshev UCL	0.12
07 F0/ I/M Object 100	0.16	99% KM Chebyshev UCL	0.22
97.5% KM Chebyshev UCL			
·	Tests on Det	ected Observations Only	
·	Tests on Det	ected Observations Only  Anderson-Darling GOF Test	
Gamma GOF		<b>,</b>	e Level
Gamma GOF  A-D Test Statistic	0.351	Anderson-Darling GOF Test	e Level
Gamma GOF  A-D Test Statistic  5% A-D Critical Value	0.351 0.683	Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	
Gamma GOF  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value	0.351 0.683 0.237 0.36	Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF	

Statistics on	Detected Data Only	
2.533	k star (bias corrected MLE)	1.147
0.0244	Theta star (bias corrected MLE)	0.0539
25.33	nu star (bias corrected)	11.47
0.0618		
Statistics usi	ing Imputed Non-Detects	
et has > 50%	NDs with many tied observations at multiple DLs	
small such as	<1.0, especially when the sample size is small (e.g., <15-20)	
method may y	rield incorrect values of UCLs and BTVs	
-	•	
nd UCLs may	be computed using gamma distribution on KM estimates	
0.01	Mean	0.0532
		0.042
	CV	0.785
	k star (bias corrected MLE)	0.946
		0.0562
	nu star (bias corrected)	11.36
4.806	Adjusted Chi Square Value (11.36, β)	3.392
0.126	95% Gamma Adjusted UCL	0.178
iamma Param	neters using KM Estimates	
0.054	SD (KM)	0.0372
0.00138	SE of Mean (KM)	0.017
2.109	k star (KM)	1.166
25.31	nu star (KM)	13.99
0.0256	theta star (KM)	0.0463
0.0857	90% gamma percentile (KM)	0.12
0.153	99% gamma percentile (KM)	0.23
na Kaplan-Me	ier (KM) Statistics	
-		4.847
0.115	95% KM Adjusted Gamma UCL	0.156
	<del>-</del>	
		evel
		evel
•		
	·	
0.0527	Mean in Log Scale	-3.315
0.0423	SD in Log Scale	1.04
0.0875	95% Percentile Bootstrap UCL	0.0792
	95% Percentile Bootstrap UCL 95% Bootstrap t UCL	0.0792 0.0973
	2.533 0.0244 25.33 0.0618  Statistics using the set has > 50% small such as method may yeally true where and UCLs may 0.01 0.011 0.0417 1.671 0.0318 20.05 0.0122 4.806 0.126  Samma Param 0.054 0.00138 2.109 25.31 0.0256 0.0857 0.153  PETEST ON DECEMBER OF TEST ON DECEMBER OF DECEMB	Theta star (bias corrected MLE) 25.33

Statistics using KM estimates of	n Logged Data a	nd Assuming Lognormal Distribution	
KM Mean (logged)	-3.195	KM Geo Mean	0.0
KM SD (logged)	0.767	95% Critical H Value (KM-Log)	3.3
KM Standard Error of Mean (logged)	0.35	95% H-UCL (KM -Log)	0.1
KM SD (logged)	0.767	95% Critical H Value (KM-Log)	3.3
KM Standard Error of Mean (logged)	0.35		
	DL/2 Statisti	ne -	
DL/2 Normal	DDE Otation	DL/2 Log-Transformed	
Mean in Original Scale	0.0528	Mean in Log Scale	-3.3
SD in Original Scale	0.0423	SD in Log Scale	1.0
95% t UCL (Assumes normality)	0.0875	95% H-Stat UCL	0.4
DL/2 is not a recommended me	thod, provided fo	r comparisons and historical reasons	
Nonparamet	ric Distribution F	ree UCL Statistics	
Detected Data appear	Normal Distribu	ed at 1% Significance Level	
;	Suggested UCL	to Use	
95% KM (t) UCL	0.0882		
Note: Suggestions regarding the selection of a 95%	UCL are provided	to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size,	data distribution,	and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.015	Mean	0.017
Maximum	0.021	Median	0.017
SD	0.00234	Std. Error of Mean	9.5452E
Coefficient of Variation	0.132	Skewness	0.31
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide or	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or tl	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nnical Guide	o for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.901	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.262	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
Ass	uming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0196	95% Adjusted-CLT UCL (Chen-1995)	0.01
		95% Modified-t UCL (Johnson-1978)	0.01
	Gamma C	GOF Test	
A-D Test Statistic	0.44	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significant	ce Leve
K-S Test Statistic	0.28	Kolmogorov-Smirnov Gamma GOF Test	
K-S Test Statistic 5% K-S Critical Value	0.28 0.332	Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	ce Leve
5% K-S Critical Value	0.332	<del>_</del>	ce Leve
5% K-S Critical Value  Detected data appear	0.332 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance	ce Leve
5% K-S Critical Value  Detected data appear	0.332 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes	ce Leve
5% K-S Critical Value  Detected data appear	0.332 Gamma Dis	Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes	
5% K-S Critical Value  Detected data appear  Note GOF tests n	0.332  Gamma Dis  may be unre  Gamma S  69.21	Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level liable for small sample sizes	34.7
5% K-S Critical Value  Detected data appear  Note GOF tests n	0.332  Gamma Dis  may be unre  Gamma S  69.21	Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)	34.72 5.0888E
5% K-S Critical Value  Detected data appear  Note GOF tests n  k hat (MLE)  Theta hat (MLE) 2	0.332  Gamma Dismay be unre  Gamma S 69.21 2.5526E-4	Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)	34.7; 5.0888E 416.6
5% K-S Critical Value  Detected data appear  Note GOF tests n  k hat (MLE)  Theta hat (MLE) 2  nu hat (MLE)	0.332  Gamma Dismay be unre  Gamma S 69.21 2.5526E-4 830.5	Detected data appear Gamma Distributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	34.7. 5.0888 416.6 0.003
5% K-S Critical Value  Detected data appear  Note GOF tests n  k hat (MLE)  Theta hat (MLE) 2  nu hat (MLE)	0.332  Gamma Dismay be unre  Gamma S 69.21 2.5526E-4 830.5	Detected data appear Gamma Distributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)	34.72
5% K-S Critical Value  Detected data appear  Note GOF tests n  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)  MLE Mean (bias corrected)  Adjusted Level of Significance	0.332  Gamma Dismay be unre  Gamma S 69.21 2.5526E-4 830.5 0.0177	Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	34.7: 5.0888E 416.6 0.003 370.3

	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.257	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Lognorma	l Statistics	
Minimum of Logged Data	-4.2	Mean of logged Data	-4.043
Maximum of Logged Data	-3.863	SD of logged Data	0.132
		rmal Distribution	
95% H-UCL	0.0199	90% Chebyshev (MVUE) UCL	0.0205
95% Chebyshev (MVUE) UCL	0.0218	97.5% Chebyshev (MVUE) UCL	0.0236
99% Chebyshev (MVUE) UCL	0.0271		
<del>-</del>		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
· ,		ribution Free UCLs	
95% CLT UCL	0.0192	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0205	95% Chebyshev(Mean, Sd) UCL	0.0218
97.5% Chebyshev(Mean, Sd) UCL	0.0236	99% Chebyshev(Mean, Sd) UCL	0.0272
	Suggested	UCL to Use	
95% Student's-t UCL	0.0196		
	·	ovided to help the user to select the most appropriate 95% UCL.	
•		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data set	s; for additional insight the user may want to consult a statisticia	n.

	UCL Statist	ics for Data	Sets with Non-Detects	
User Selected Options				
•	ProUCL 5.2 11/13/2024 2	2:20:12 PM		
	mw11_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
litrate - MW-11				
illiate - MVV-11				
		General S		
Total N	Number of Observations	6	Number of Distinct Observations	4
			Number of Missing Observations	0
	Minimum	4.6	Mean	5.283
	Maximum	6.1	Median	5.4
	SD	0.531	Std. Error of Mean	0.217
	Coefficient of Variation	0.1	Skewness	0.236
Note: Sample size is sr	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
•			2 2020 and ITRC 2012) for additional guidance,	
		-	ne Chebyshev UCL for small sample sizes (n < 7).	
pacing tilleri	The Chebyshev UCL of	ten results in		
			gross overestimates of the mean.	
		hnical Guide	n gross overestimates of the mean.  for a discussion of the Chebyshev UCL.	
Refe	r to the ProUCL 5.2 Tec	hnical Guide Normal G	n gross overestimates of the mean. for a discussion of the Chebyshev UCL.  OF Test	
Refe	r to the ProUCL 5.2 Tec	Normal G	of gross overestimates of the mean.  If for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test	
Refe	r to the ProUCL 5.2 Tec	Normal G 0.912 0.713	of gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
Refe	r to the ProUCL 5.2 Tec napiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic	Normal G 0.912 0.713 0.254	or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic 6 Lilliefors Critical Value	Normal G 0.912 0.713 0.254 0.373	of a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	r to the ProUCL 5.2 Technology of the ProUCL	Normal G 0.912 0.713 0.254 0.373 ar Normal at	of gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
Refe	r to the ProUCL 5.2 Technology of the ProUCL	Normal G 0.912 0.713 0.254 0.373 ar Normal at	of a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.912 0.713 0.254 0.373 ar Normal at	of a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assets	Normal G 0.912 0.713 0.254 0.373 ar Normal at	of gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assemble Control Co	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrelessuming Normal	n gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)	5.662
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assets	Normal G 0.912 0.713 0.254 0.373 ar Normal at	n gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assemble Control Co	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrelessuming Normal	n gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  all Distribution  95% UCLs (Adjusted for Skewness)	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assemble Control Co	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrelessuming Normal	n gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  all Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests in Assemble Control Co	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrel suming Norm	n gross overestimates of the mean. If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  all Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests of Assermal UCL	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unressuming Norm 5.72	In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	5.723
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests of Assermal UCL  95% Student's-t UCL	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrel suming Norm 5.72  Gamma G 0.429	In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Illiable for small sample sizes  Inal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	5.723
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appearance Note GOF tests of Assemble 195% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrel suming Norm 5.72  Gamma G 0.429 0.696	In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  all Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	5.723 e Level
Sh 1% Sh	r to the ProUCL 5.2 Technapiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests results of March 195% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	Normal G 0.912 0.713 0.254 0.373 ar Normal at may be unrel suming Norm 5.72  Gamma G 0.429 0.696 0.273 0.332	In gross overestimates of the mean.  If or a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Pal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test	

	Gamma	Statistics	
k hat (MLE)	119.3	k star (bias corrected MLE)	59.75
Theta hat (MLE)	0.0443	Theta star (bias corrected MLE)	0.088
nu hat (MLE)	1431	nu star (bias corrected)	717
MLE Mean (bias corrected)	5.283	MLE Sd (bias corrected)	0.68
		Approximate Chi Square Value (0.05)	655.9
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	634.5
Ass	suming Gan	nma Distribution	
95% Approximate Gamma UCL	5.776	95% Adjusted Gamma UCL	5.97
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.269	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal	at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorms	ıl Statistics	
Minimum of Logged Data	1.526	Mean of logged Data	1.66
Maximum of Logged Data	1.808	SD of logged Data	0.1
		55 7779957 2778	
		ormal Distribution	
95% H-UCL	5.77	90% Chebyshev (MVUE) UCL	5.93
95% Chebyshev (MVUE) UCL	6.227	97.5% Chebyshev (MVUE) UCL	6.63
99% Chebyshev (MVUE) UCL	7.437		
Nonparame			
	tric Distribu	tion Free UCL Statistics	
Data appea		tion Free UCL Statistics Discernible Distribution	
**	r to follow a		
Nonpar	r to follow a	Discernible Distribution	N/A
**	r to follow a	Discernible Distribution tribution Free UCLs	N/A N/A
Nonpai 95% CLT UCL	r to follow a rametric Dis	tribution Free UCLs  95% BCA Bootstrap UCL	
Nonpai 95% CLT UCL 95% Standard Bootstrap UCL	r to follow a rametric Dis 5.64 N/A	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL	N/A N/A
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	r to follow a rametric Dis 5.64 N/A N/A	tribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	N/A N/A 6.22
Nonpai 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	r to follow a rametric Dis 5.64 N/A N/A 5.933 6.636	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 6.22
Nonpai 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	r to follow a rametric Dis 5.64 N/A N/A 5.933 6.636	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	N/A N/A 6.22
Nonpai 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	r to follow a rametric Dis 5.64 N/A N/A 5.933 6.636  Suggested 5.72	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	N/A N/A 6.22 7.43

Nitrite - MW-11			
		A	
		Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	1
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.027	Minimum Non-Detect	0.015
Maximum Detect	0.07	Maximum Non-Detect	0.015
Variance Detects		Percent Non-Detects	16.67%
Mean Detects	0.0446	SD Detects	0.0168
Median Detects	0.046	CV Detects	0.376
Skewness Detects	0.791	Kurtosis Detects	0.461
Mean of Logged Detects	-3.166	SD of Logged Detects	0.373
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or t	the Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results	in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
		t on Detects Only	
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Lev	el
Lilliefors Test Statistic	0.22	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Lev	el
		nal at 1% Significance Level eliable for small sample sizes	
Kaplan-Meier (KM) Statistics usi	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean	0.0397	KM Standard Error of Mean	0.00803
90KM SD	0.0176	95% KM (BCA) UCL	0.0523
95% KM (t) UCL	0.0558	95% KM (Percentile Bootstrap) UCL	0.0523
95% KM (z) UCL	0.0529	95% KM Bootstrap t UCL	0.0567
90% KM Chebyshev UCL	0.0638	95% KM Chebyshev UCL	0.0747
97.5% KM Chebyshev UCL	0.0898	99% KM Chebyshev UCL	0.12
Gamma GOF		etected Observations Only	
A-D Test Statistic	0.261	Anderson-Darling GOF Test	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significand	ce Level
K-S Test Statistic	0.199	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significant	ce Level
• • • • • • • • • • • • • • • • • • • •		stributed at 5% Significance Level	
Note GOF tests	may be unre	pliable for small sample sizes	
Gamma	Statistics or	Detected Data Only	
k hat (MLE)	9.132	k star (bias corrected MLE)	3.786
Theta hat (MLE)	0.00488	Theta star (bias corrected MLE)	0.0118
nu hat (MLE)	91.32	nu star (bias corrected)	37.86
Mean (detects)	0.0446		

		NDs with many tied observations at multiple DLs
-		<1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS n	nethod may yi	ield incorrect values of UCLs and BTVs
		the sample size is small.
For gamma distributed detected data, BTVs ar	nd UCLs may	be computed using gamma distribution on KM estimates
Minimum	0.01	Mean
Maximum	0.07	Median
SD	0.0206	CV
k hat (MLE)	3.338	k star (bias corrected MLE)
Theta hat (MLE)	0.0116	Theta star (bias corrected MLE)
nu hat (MLE)	40.06	nu star (bias corrected)
Adjusted Level of Significance (β)	0.0122	
Approximate Chi Square Value (21.36, α)	11.86	Adjusted Chi Square Value (21.36, β)
95% Gamma Approximate UCL	0.0699	95% Gamma Adjusted UCL
Fetimates of G	amma Param	eters using KM Estimates
Mean (KM)	0.0397	SD (KM)
Variance (KM)		SE of Mean (KM)
k hat (KM)	5.083	k star (KM)
nu hat (KM)	60.99	nu star (KM)
theta hat (KM)	0.0078	theta star (KM)
80% gamma percentile (KM)	0.0574	90% gamma percentile (KM)
95% gamma percentile (KM)	0.0863	99% gamma percentile (KM)
coro gamma percentila (min)	0.0000	consignation percentage (cum)
Gamm	a Kaplan-Mei	er (KM) Statistics
Approximate Chi Square Value (31.83, α)	19.94	Adjusted Chi Square Value (31.83, β)
95% KM Approximate Gamma UCL	0.0633	95% KM Adjusted Gamma UCL
Lognormal GO	E Test on De	tected Observations Only
Shapiro Wilk Test Statistic	0.961	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance
Lilliefors Test Statistic	0.192	Lilliefors GOF Test
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance
Detected Data app	pear Lognorm	nal at 10% Significance Level
Note GOF tests I	may be unreli	able for small sample sizes
		sing Imputed Non-Detects
Mean in Original Scale	0.0399	Mean in Log Scale
SD in Original Scale	0.019	SD in Log Scale
95% t UCL (assumes normality of ROS data)	0.0555	95% Percentile Bootstrap UCL
95% BCA Bootstrap UCL	0.0528	95% Bootstrap t UCL
95% H-UCL (Log ROS)	0.076	

KM Mean (logged)	-3.338	KM Geo Mean	0.035
( 33 /			
KM SD (logged)	0.491	95% Critical H Value (KM-Log)	2.61
KM Standard Error of Mean (logged)	0.224	95% H-UCL (KM -Log)	0.071
KM SD (logged)	0.491	95% Critical H Value (KM-Log)	2.61
KM Standard Error of Mean (logged)	0.224		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0384	Mean in Log Scale	-3.454
SD in Original Scale	0.0213	SD in Log Scale	0.78
95% t UCL (Assumes normality)	0.056	95% H-Stat UCL	0.14
DL/2 is not a recommended me	thod, provi	ded for comparisons and historical reasons	
Nonparame	tric Distribu	tion Free UCL Statistics	
Detected Data appear	r Normal Di	stributed at 1% Significance Level	
	Suggested	UCL to Use	
95% KM (t) UCL	0.0558		
,		1	
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data se	ts; for additional insight the user may want to consult a statisticia	ın.

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.023	Mean	0.03
Maximum	0.038	Median	0.03
SD	0.00509	Std. Error of Mean	0.00
Coefficient of Variation	0.166	Skewness	-0.06
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL or	ften results in	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
		·	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.974	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.205	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
Ass	suming Norm	nal Distribution	
95% Normal UCL	-	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0349	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma G	GOF Test	
A-D Test Statistic	0.24	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance	ce Lev
K-S Test Statistic	0.212	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance	ce Lev
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	42.4	k star (bias corrected MLE)	21.
Theta hat (MLE)		Theta star (bias corrected MLE)	0.00
nu hat (MLE)	508.8	nu star (bias corrected)	255.
MLE Mean (bias corrected)	0.0307	MLE Sd (bias corrected)	0.00
(2.22 231100104)		Approximate Chi Square Value (0.05)	219.
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	207.
Λος	uming Gam	ma Distribution	
	0.0357	95% Adjusted Gamma UCL	0.0
95% Approximate Gamma UCL			

	Lognormal GO	F Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.231	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at 10	% Significance Level	
Note GOF tests r	nay be unreliab	e for small sample sizes	
	Lognormal Sta	tistics	
Minimum of Logged Data	-3.772	Mean of logged Data	-3.49
Maximum of Logged Data	-3.27	SD of logged Data	0.1
Assu	ming Lognorma	Distribution	
95% H-UCL	0.0359	90% Chebyshev (MVUE) UCL	0.03
95% Chebyshev (MVUE) UCL	0.04	97.5% Chebyshev (MVUE) UCL	0.04
99% Chebyshev (MVUE) UCL	0.0519		
Nonnarame	tric Distribution	Free UCL Statistics	
·		ernible Distribution	
·			
Nonpara	ametric Distribu	tion Free UCLs	
95% CLT UCL	0.0341	95% BCA Bootstrap UCL	0.03
95% Standard Bootstrap UCL	0.0338	95% Bootstrap-t UCL	0.03
95% Hall's Bootstrap UCL	0.0359	95% Percentile Bootstrap UCL	0.03
90% Chebyshev(Mean, Sd) UCL	0.0369	95% Chebyshev(Mean, Sd) UCL	0.03
97.5% Chebyshev(Mean, Sd) UCL	0.0436	99% Chebyshev(Mean, Sd) UCL	0.0
	Suggested UCL	to Use	
95% Student's-t UCL	0.0349		
Note: Suggestions regarding the selection of a 95%	UCL are provide	ed to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distribution	, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data sets; fo	r additional insight the user may want to consult a statisticia	n.
Note: For highly negatively-skewed data, confid	ence limits (e.g.	, Chen, Johnson, Lognormal, and Gamma) may not be	
Note: For highly negatively-skewed data, confid	ence limits (e.g.	, Chen, Johnson, Lognormal, and Gamma) may not be	

	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.023	Minimum Non-Detect	0.08
Maximum Detect	0.028	Maximum Non-Detect	0.08
Variance Detects	1.2500E-5	Percent Non-Detects	50%
Mean Detects	0.0255	SD Detects	0.0035
Median Detects	0.0255	CV Detects	0.139
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.674	SD of Logged Detects	0.139
Worning: D	esta est bas	only 2 Detected Values.	
i his is not enough to comp	pute meanin	gful or reliable statistics and estimates.	
_		C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the		he Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend the The Chebyshev UCL o	ften results	he Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean.	
but note that ITRC may recommend the The Chebyshev UCL o	ften results	he Chebyshev UCL for small sample sizes (n < 7).	
but note that ITRC may recommend the The Chebyshev UCL on Refer to the ProUCL 5.2 Tectors	ften results chnical Guide	the Chebyshev UCL for small sample sizes (n < 7).  in gross overestimates of the mean.  e for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL on Refer to the ProUCL 5.2 Technology.  Norm	often results chnical Guide nal GOF Tes	the Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL. t on Detects Only	
but note that ITRC may recommend the The Chebyshev UCL on Refer to the ProUCL 5.2 Technology.  Norm	often results chnical Guide nal GOF Tes	the Chebyshev UCL for small sample sizes (n < 7).  in gross overestimates of the mean.  e for a discussion of the Chebyshev UCL.	
but note that ITRC may recommend the The Chebyshev UCL on Refer to the ProUCL 5.2 Technology.  Norm Not End	ften results chnical Guide nal GOF Tes ough Data to	the Chebyshev UCL for small sample sizes (n < 7).  in gross overestimates of the mean.  e for a discussion of the Chebyshev UCL.  t on Detects Only  Perform GOF Test	
but note that ITRC may recommend the The Chebyshev UCL on Refer to the ProUCL 5.2 Technology.  Norm Not End	often results in chnical Guiden nal GOF Testough Data to the growth of t	the Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL. t on Detects Only	0.0025
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Norm Not End	often results chnical Guide nal GOF Tes ough Data to ng Normal C 0.0255	the Chebyshev UCL for small sample sizes (n < 7).  in gross overestimates of the mean.  e for a discussion of the Chebyshev UCL.  t on Detects Only Deform GOF Test  ritical Values and other Nonparametric UCLs	0.0025 N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Norman Not English Kaplan-Meier (KM) Statistics using KM Mean	chnical Guidenal GOF Testough Data to 0.0255	the Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.  t on Detects Only perform GOF Test  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Norman Not English Kaplan-Meier (KM) Statistics using KM Mean 90KM SD	chnical Guidenal GOF Testough Data to 0.0255	the Chebyshev UCL for small sample sizes (n < 7). in gross overestimates of the mean. in for a discussion of the Chebyshev UCL. it on Detects Only in Perform GOF Test  White the perform GOF Test  KM Standard Error of Mean  95% KM (BCA) UCL	N/A
Norm Not End  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314	the Chebyshev UCL for small sample sizes (n < 7).  in gross overestimates of the mean.  e for a discussion of the Chebyshev UCL.  t on Detects Only Deform GOF Test  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL	N/A N/A N/A
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Note End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	nal GOF Tesough Data to 0.0255 0.0025 0.0314 0.0296	ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL	N/A N/A N/A 0.036
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411	ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.036
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De	ton Detects Only Perform GOF Test  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	N/A N/A N/A 0.036
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De	ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.036
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not End	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De ough Data to	ton Detects Only Perform GOF Test  Standard Error of Mean  95% KM (BCA) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL  95% KM Chebyshev UCL	N/A N/A N/A 0.036
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not End	chnical Guide mal GOF Tes ough Data to ng Normal C 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De ough Data to	ton Detects Only Perform GOF Test  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.036 0.050
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Refer to the ProUCL 5.2 Tech	chnical Guide mal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De ough Data to	ton Detects Only Perform GOF Test  Standard Error of Mean  95% KM (BCA) UCL  95% KM Chebyshev UCL	N/A N/A N/A 0.036 0.050
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Text Norm  Not End  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF Not End  Gamma K hat (MLE) Theta hat (MLE)	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De ough Data to Statistics on 103.7 2.4589E-4	ton Detects Only Perform GOF Test  Standard Error of Mean  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL	N/A N/A N/A 0.036 0.050
but note that ITRC may recommend the The Chebyshev UCL of Refer to the ProUCL 5.2 Technology Refer to the ProUCL 5.2 Tech	chnical Guide nal GOF Tes ough Data to 0.0255 0.0025 0.0314 0.0296 0.033 0.0411  Tests on De ough Data to Statistics on 103.7 2.4589E-4	ton Detects Only Perform GOF Test  Standard Error of Mean  95% KM (BCA) UCL  95% KM Chebyshev UCL	N/A N/A N/A 0.036 0.050

Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.0255	SD (KM)	0.0025
Variance (KM)	6.2500E-6	SE of Mean (KM)	0.0025
k hat (KM)	104	k star (KM)	26.18
nu hat (KM)	832.3	nu star (KM)	209.4
theta hat (KM)		theta star (KM)	9.7415E-4
80% gamma percentile (KM)	0.0296	90% gamma percentile (KM)	0.0321
95% gamma percentile (KM)	0.0342	99% gamma percentile (KM)	0.0385
Gamm	a Kaplan-M	eier (KM) Statistics	
		Adjusted Level of Significance (β)	0.0049
Approximate Chi Square Value (209.41, α)	176.9	Adjusted Chi Square Value (209.41, β)	160.4
95% KM Approximate Gamma UCL	0.0302	95% KM Adjusted Gamma UCL	0.0333
Lognormal GC	F Test on D	Detected Observations Only	
Not En	ough Data to	o Perform GOF Test	
Lognormal RO	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.0255	Mean in Log Scale	-3.674
SD in Original Scale	0.00289	SD in Log Scale	0.114
95% t UCL (assumes normality of ROS data)	0.0289	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.0296		
Statistics using KM estimates	on Logged	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.674	KM Geo Mean	0.0254
KM SD (logged)	0.0984	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0984	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0984	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0984		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0328	Mean in Log Scale	-3.446
SD in Original Scale	0.00862	SD in Log Scale	0.275
95% t UCL (Assumes normality)	0.0429	95% H-Stat UCL	0.0507
DL/2 is not a recommended m	ethod, provi	ded for comparisons and historical reasons	
Nonparame	etric Distribu	tion Free UCL Statistics	
		Discernible Distribution	
	Cuggostod	LICI to Line	
Recommendation cannot be provided	Suygested	UCL to Use	
·			
		ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data se	ts; for additional insight the user may want to consult a statistici	an.

	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.041	Mean	1.
Maximum	3.2	Median	0.
SD	1.399	Std. Error of Mean	0.
Coefficient of Variation	1.206	Skewness	1.
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.835	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.343	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
Ass	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.806	95% Adjusted-CLT UCL (Chen-1995)	2.
		95% Modified-t UCL (Johnson-1978)	2.
	'	,	
	Gamma (	GOF Test	
A-D Test Statistic	0.245	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.672	Detected data appear Gamma Distributed at 5% Significand	e Le
K-S Test Statistic	0.201	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.406	Detected data appear Gamma Distributed at 5% Significance	e Le
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	0.714	k star (bias corrected MLE)	0.
Theta hat (MLE)	1.624	Theta star (bias corrected MLE)	3.
nu hat (MLE)	5.715	nu star (bias corrected)	2.
MLE Mean (bias corrected)	1.16	MLE Sd (bias corrected)	1.
		Approximate Chi Square Value (0.05)	0.
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ace	umina Cam	ma Distribution	
95% Approximate Gamma UCL	10.49	95% Adjusted Gamma UCL	N/A
95% Anninginala Gamma I I I I			

	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.937	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.279	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal	at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorma	al Statistics	
Minimum of Logged Data	-3.194	Mean of logged Data	-0.695
Maximum of Logged Data	1.163	SD of logged Data	1.823
		ormal Distribution	
95% H-UCL		90% Chebyshev (MVUE) UCL	4.452
95% Chebyshev (MVUE) UCL	5.834	97.5% Chebyshev (MVUE) UCL	7.753
99% Chebyshev (MVUE) UCL	11.52		
•		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
·		tribution Free UCLs	
95% CLT UCL	2.311	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	3.259	95% Chebyshev(Mean, Sd) UCL	4.209
97.5% Chebyshev(Mean, Sd) UCL	5.528	99% Chebyshev(Mean, Sd) UCL	8.12
	Oumants -	HCI to Hoo	
95% Student's-t UCL	2.806	UCL to Use	
93% Studefit S-t OCL	2.000		
The calculated LICLs are based on assumpt	ione that the	e data were collected in a random and unbiased manner.	
		bllected from random locations.	
•		mental or other non-random methods,	
		to correctly calculate UCLs.	
uien contact a	siausticial I	to contour calculate coles.	
Note: Suggestions regarding the selection of a 95%	UCL are nr	ovided to help the user to select the most appropriate 95% UCL.	
		ution, and skewness using results from simulation studies.	:
<u>'</u>	,	ts; for additional insight the user may want to consult a statisticia	n
113WOVOI, SIMULULIONS TESUILS WIII NOT COVER All INCAI VV	ona data se	to, ioi additional moight the door may want to consult a statisticia	••••

	UCL Statis	tics for Data	Sets with Non-Detects	
User Selected Options	ProUCL 5.2 11/18/2024	0.44.24 AM		
Date/Time of Computation From File	mw12r_3year_data.xls	8:44:34 AIVI		
Full Precision	OFF			
	95%			
Confidence Coefficient				
Number of Bootstrap Operations	2000			
itrate - MW-12R				
		General	Statistics	
Tota	I Number of Observations	8	Number of Distinct Observations	7
			Number of Missing Observations	0
	Minimum	150	Mean	287.5
	Maximum	490	Median	250
	SD	134.8	Std. Error of Mean	47.65
	Coefficient of Variation	0.469	Skewness	0.477
Note: Sample size is	small (a.g. <10) if data a	re collected	using incremental sampling methodology (ISM) approach,	
			C 2020 and ITRC 2012) for additional guidance,	
			the Chebyshev UCL for small sample sizes (n < 7).	
Dut note that			in gross overestimates of the mean.	
D-v			<del>_</del>	
Re'	er to the Prouch 5.2 Tec	nnicai Guide	e for a discussion of the Chebyshev UCL.	
			GOF Test	
	Shapiro Wilk Test Statistic	0.874	Shapiro Wilk GOF Test	
1% 8	Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
	Lilliefors Test Statistic	0.242	Lilliefors GOF Test	
	1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
			1% Significance Level	
	Note GOF tests	may be unre	eliable for small sample sizes	
	As	sumina Norr	mal Distribution	
95% N	lormal UCL		95% UCLs (Adjusted for Skewness)	
	95% Student's-t UCL	377.8	95% Adjusted-CLT UCL (Chen-1995)	374.5
	0070 01000110 1 002	077.0	95% Modified-t UCL (Johnson-1978)	379.1
			(66.11.60.11.67.67)	0.0
		Gamma (	GOF Test	
		adiiiiia (	401 1001	
	A-D Test Statistic	0 499	Anderson-Darling Gamma GOF Test	
	A-D Test Statistic	0.499	Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant	ce I evel
	5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance	ce Level
	5% A-D Critical Value K-S Test Statistic	0.719 0.237	Detected data appear Gamma Distributed at 5% Significand Kolmogorov-Smirnov Gamma GOF Test	
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	0.719 0.237 0.295	Detected data appear Gamma Distributed at 5% Significand Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significand	
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	0.719 0.237 0.295 Gamma Dis	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level	
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	0.719 0.237 0.295 Gamma Dis	Detected data appear Gamma Distributed at 5% Significand Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significand	
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	0.719 0.237 0.295 Gamma Dis	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level sliable for small sample sizes	
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests	0.719 0.237 0.295 Gamma Dismay be unre	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant Stributed at 5% Significance Level Sliable for small sample sizes  Statistics	ce Level
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests	0.719 0.237 0.295 Gamma Dismay be unre Gamma 5.262	Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE)	ce Level
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE)	0.719 0.237 0.295 Gamma Dismay be unre Gamma 5.262 54.63	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE)	3.372 85.25
M	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE) nu hat (MLE)	0.719 0.237 0.295 Gamma Dismay be unres Gamma 5.262 54.63 84.2	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected)	3.372 85.25 53.96
M	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE)	0.719 0.237 0.295 Gamma Dismay be unre Gamma 5.262 54.63	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected)	3.372 85.25 53.96 156.6
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE) nu hat (MLE) ILE Mean (bias corrected)	0.719 0.237 0.295 Gamma Die may be unre Gamma 5.262 54.63 84.2 287.5	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level bliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected) Approximate Chi Square Value (0.05)	3.372 85.25 53.96 156.6 38.08
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE) nu hat (MLE)	0.719 0.237 0.295 Gamma Dismay be unres Gamma 5.262 54.63 84.2	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected)	3.372 85.25 53.96 156.6
	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE) nu hat (MLE) ILE Mean (bias corrected) sted Level of Significance	0.719 0.237 0.295 Gamma Dismay be unres Gamma 5.262 54.63 84.2 287.5	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level eliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected) Approximate Chi Square Value Adjusted Chi Square Value	3.372 85.25 53.96 156.6 38.08
Adju	5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests  k hat (MLE) Theta hat (MLE) nu hat (MLE) ILE Mean (bias corrected) sted Level of Significance	0.719 0.237 0.295 Gamma Dismay be unres Gamma 5.262 54.63 84.2 287.5	Detected data appear Gamma Distributed at 5% Significant Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significant stributed at 5% Significance Level bliable for small sample sizes  Statistics  k star (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected) MLE Sd (bias corrected) Approximate Chi Square Value (0.05)	3.372 85.25 53.96 156.6 38.08

	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.884	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.212	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
Note GOF tests	may be unre	oliable for small sample sizes	
	Lognormo	I Statistics	
Minimum of Logged Data	5.011	Mean of logged Data	5.563
Maximum of Logged Data	6.194	SD of logged Data	0.474
Waximum or Logged Data	0.134	3D of logged Data	0.474
Assu	ming Logno	ormal Distribution	
95% H-UCL	441.5	90% Chebyshev (MVUE) UCL	433.2
95% Chebyshev (MVUE) UCL	499.3	97.5% Chebyshev (MVUE) UCL	591
99% Chebyshev (MVUE) UCL	771.2		
Nonnoromo	trio Diotribur	tion Free UCL Statistics	
•		Discernible Distribution	
Баш арреа	i to ioliow a	Discernible Distribution	
Nonpar	ametric Dist	tribution Free UCLs	
95% CLT UCL	365.9	95% BCA Bootstrap UCL	366.3
95% Standard Bootstrap UCL	361.7	95% Bootstrap-t UCL	402.4
95% Hall's Bootstrap UCL	358.5	95% Percentile Bootstrap UCL	363.8
90% Chebyshev(Mean, Sd) UCL	430.5	95% Chebyshev(Mean, Sd) UCL	495.2
97.5% Chebyshev(Mean, Sd) UCL	585.1	99% Chebyshev(Mean, Sd) UCL	761.6
	Suggested	UCL to Use	
95% Student's-t UCL	377.8	OCL to use	
95% Student S-t OCE	3//.0		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	•
		s; for additional insight the user may want to consult a statisticia	an.
trite - MW-12R			
		Statistics	
Total Number of Observations	8	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Marriage Only one distinct data value was datasta	di Decilioi	(as any other actives) should not be used as such a data act	
		(or any other software) should not be used on such a data set Project Team to estimate environmental parameters (e.g., El	
t is suggested to use atternative site specific values determ	inieu by ule	1 TOJOGE TOGITH TO COMMINGE CHANGE HITELETS (C.G., EI	O, DIV
The data set t	or variable l	Nitrite was not processed!	
data oot i			

enic - MW-12R			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.01	Mean	0.0214
Maximum	0.064	Median	0.014
SD	0.0182	Std. Error of Mean	0.0064
Coefficient of Variation	0.85	Skewness	2.315
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal (	GOF Test	
Shapiro Wilk Test Statistic	0.676	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic		<u> </u>	
	0.28	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		rmal at 1% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
Ass	sumina Norr	nal Distribution	
95% Normal UCL	Ū	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0335	95% Adjusted-CLT UCL (Chen-1995)	0.037
		95% Modified-t UCL (Johnson-1978)	0.034
	0	2057	
A-D Test Statistic	0.761	GOF Test	
		Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.723	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic	0.231	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance	e Level
		Distribution at 5% Significance Level	
Note don tests i	illay be unite	mable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	2.519	k star (bias corrected MLE)	1.658
Theta hat (MLE)	0.00849	Theta star (bias corrected MLE)	0.012
nu hat (MLE)	40.3	nu star (bias corrected)	26.52
MLE Mean (bias corrected)	0.0214	MLE Sd (bias corrected)	0.016
		Approximate Chi Square Value (0.05)	15.78
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	13.73
95% Approximate Gamma UCL	0.0359	ma Distribution  95% Adjusted Gamma UCL	0.041
33 % Approximate damina ooc	0.0000	30 % Adjusted damina doc	0.041
	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.839	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.219	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
		ormal at 10% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Lognorma	I Statistics	
Minimum of Logged Data	-4.605	Mean of logged Data	-4.057
Maximum of Logged Data	-2.749	SD of logged Data	0.63

Assu	ming Logno	rmal Distribution	
95% H-UCL	0.0391	90% Chebyshev (MVUE) UCL	0.0344
95% Chebyshev (MVUE) UCL	0.0407	97.5% Chebyshev (MVUE) UCL	0.049
99% Chebyshev (MVUE) UCL	0.0667		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appear	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	ribution Free UCLs	
95% CLT UCL	0.0319	95% BCA Bootstrap UCL	0.038
95% Standard Bootstrap UCL	0.0315	95% Bootstrap-t UCL	0.062
95% Hall's Bootstrap UCL	0.0726	95% Percentile Bootstrap UCL	0.033
90% Chebyshev(Mean, Sd) UCL	0.0407	95% Chebyshev(Mean, Sd) UCL	0.049
97.5% Chebyshev(Mean, Sd) UCL	0.0615	99% Chebyshev(Mean, Sd) UCL	0.085
	Suggested	UCL to Use	
95% Student's-t UCL	0.0335		
When a data set follows an ann	rovimata dis	tribution passing only one of the GOF tests,	
		istribution passing both GOF tests in ProUCL	
it is suggested to use a OOL basi	oa upon a u	candation passing both don tools in 1 1000E	
		ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data set	s; for additional insight the user may want to consult a statisticia	n.

IW-12R			
	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.051	Minimum Non-Detect	0.08
Maximum Detect	0.15	Maximum Non-Detect	0.08
Variance Detects	0.00129	Percent Non-Detects	12.5
Mean Detects	0.0884	SD Detects	0.03
Median Detects	0.078	CV Detects	0.40
Skewness Detects	0.835	Kurtosis Detects	-0.05
Mean of Logged Detects	-2.494	SD of Logged Detects	0.39
Note: Comple size is small (a.g. <10) if data	ro collected	using incremental compling mathedalogy (ICM) approach	
		using incremental sampling methodology (ISM) approach, 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	for a discussion of the Chebyshev UCL.	
Norm	al GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk GOF Test	
			_ I
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Leve	eı
Lilliefors Test Statistic	0.186	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Leve	el
Detected Data a	ppear Norm	al at 1% Significance Level	
Note GOF tests r	nav be unre	liable for small sample sizes	
		<u> </u>	
Kanlan-Major (KM) Statistics usin	a Normal Ci	ritical Values and other Nonparametric UCLs	
			0.04
KM Mean	0.0854	KM Standard Error of Mean	0.01
90KM SD	0.0323	95% KM (BCA) UCL	0.10
95% KM (t) UCL	0.109	95% KM (Percentile Bootstrap) UCL	0.10
95% KM (z) UCL	0.106	95% KM Bootstrap t UCL	0.1
90% KM Chebyshev UCL	0.123	95% KM Chebyshev UCL	0.1
97.5% KM Chebyshev UCL	0.163	99% KM Chebyshev UCL	0.2
		1	
*		tected Observations Only	
A-D Test Statistic	0.267	Anderson-Darling GOF Test	
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.164	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance	o I ove
			e Leve
<del></del>		stributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
Gamma S	Statistics on	Detected Data Only	
k hat (MLE)	7.503	k star (bias corrected MLE)	4.38
K Hat (WLE)	0.0118	Theta star (bias corrected MLE)	0.02
Theta hat (MLE)		nu star (bias corrected)	613
	105 0.0884	nu star (bias corrected)	61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)	105 0.0884		61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS	105 0.0884 Statistics us	ing Imputed Non-Detects	61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data se	105 0.0884 Statistics us et has > 50%	ing Imputed Non-Detects  NDs with many tied observations at multiple DLs	61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when data se	105 0.0884 Statistics us et has > 50% mall such as	ing Imputed Non-Detects  NDs with many tied observations at multiple DLs s <1.0, especially when the sample size is small (e.g., <15-20)	61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when data se	105 0.0884 Statistics us et has > 50% mall such as	ing Imputed Non-Detects  NDs with many tied observations at multiple DLs	61.3
Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n	105 0.0884 Statistics us et has > 50% mall such as nethod may y	ing Imputed Non-Detects  NDs with many tied observations at multiple DLs s <1.0, especially when the sample size is small (e.g., <15-20)	61.3
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia	105 0.0884  Statistics us at has > 50% mall such as nethod may yally true where	ing Imputed Non-Detects  NDs with many tied observations at multiple DLs s <1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs n the sample size is small.	61.3
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia	Statistics us at has > 50% mall such as nethod may yally true when and UCLs may	sing Imputed Non-Detects  NDs with many tied observations at multiple DLs s < 1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs in the sample size is small.  If y be computed using gamma distribution on KM estimates	
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia For gamma distributed detected data, BTVs ar	Statistics us at has > 50% mall such as nethod may yally true when d UCLs may 0.051	sing Imputed Non-Detects  NDs with many tied observations at multiple DLs s < 1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs n the sample size is small. y be computed using gamma distribution on KM estimates  Mean	0.08
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia For gamma distributed detected data, BTVs ar Minimum Maximum	Statistics us et has > 50% mall such as nethod may yally true when d UCLs may 0.051 0.15	sing Imputed Non-Detects  NDs with many tied observations at multiple DLs s < 1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs n the sample size is small. y be computed using gamma distribution on KM estimates  Mean Median	0.08 0.07
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia For gamma distributed detected data, BTVs ar Minimum Maximum SD	Statistics us at has > 50% mall such as nethod may yally true when d UCLs may 0.051 0.15 0.0343	sing Imputed Non-Detects  NDs with many tied observations at multiple DLs s <1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs n the sample size is small. y be computed using gamma distribution on KM estimates  Mean Median CV	0.08 0.07 0.40
Theta hat (MLE) nu hat (MLE) Nean (detects)  Gamma ROS GROS may not be used when data se GROS may not be used when kstar of detects is s For such situations, GROS n This is especia For gamma distributed detected data, BTVs ar Minimum Maximum	Statistics us et has > 50% mall such as nethod may yally true when d UCLs may 0.051 0.15	sing Imputed Non-Detects  NDs with many tied observations at multiple DLs s < 1.0, especially when the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs n the sample size is small. y be computed using gamma distribution on KM estimates  Mean Median	0.08 0.07

nu hat (MLE)	126	nu star (bias corrected)	80.1
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (80.10, α)	60.48	Adjusted Chi Square Value (80.10, β)	56.18
95% Gamma Approximate UCL	0.113	95% Gamma Adjusted UCL	0.122
		meters using KM Estimates	
Mean (KM)	0.0854	SD (KM)	0.0323
Variance (KM)	0.00105	SE of Mean (KM)	0.0125
k hat (KM)	6.975	k star (KM)	4.443
nu hat (KM)	111.6	nu star (KM)	71.09
theta hat (KM) 80% gamma percentile (KM)	0.0122	theta star (KM) 90% gamma percentile (KM)	0.0192
95% gamma percentile (KM)	0.116	99% gamma percentile (KM)	0.14
95 % gamma percentile (KW)	0.101	99 % gariina percentile (Kivi)	0.207
Gamm	a Kanlan <sub>-</sub> M	eier (KM) Statistics	
Approximate Chi Square Value (71.09, α)	52.67	Adjusted Chi Square Value (71.09, β)	48.69
95% KM Approximate Gamma UCL	0.115	95% KM Adjusted Gamma UCL	0.125
oo /o ram / approximate damina o o o	01110	5575 13117 (8)45555 54111114 552	020
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic	0.154	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data app	pear Lognor	mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		Using Imputed Non-Detects	
Mean in Original Scale	0.0854	Mean in Log Scale	-2.526
SD in Original Scale	0.0343	SD in Log Scale	0.378
95% t UCL (assumes normality of ROS data)	0.108	95% Percentile Bootstrap UCL	0.105
95% BCA Bootstrap UCL	0.108	95% Bootstrap t UCL	0.126
95% H-UCL (Log ROS)	0.117		
Statistics using KM astimates	on Logged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-2.527	KM Geo Mean	0.0799
KM SD (logged)	0.362	95% Critical H Value (KM-Log)	2.14
KM Standard Error of Mean (logged)	0.141	95% H-UCL (KM -Log)	0.114
KM SD (logged)	0.362	95% Critical H Value (KM-Log)	2.14
KM Standard Error of Mean (logged)	0.141	SON STREET IT VALUE (I'M 1299)	2.11
(*35**)	*****		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0824	Mean in Log Scale	-2.584
SD in Original Scale	0.0374	SD in Log Scale	0.448
95% t UCL (Assumes normality)	0.107	95% H-Stat UCL	0.122
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	
		tion Free UCL Statistics	
Detected Data appea	r Normal Dis	stributed at 1% Significance Level	
		UCL to Use	
95% KM (t) UCL	0.109		
Netes Occasions in P. d. J. C. 0727	HOL	and data belong the constant and said.	
		ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	n .
inowever, simulations results will flot cover all Real W	onu uata set	ts; for additional insight the user may want to consult a statisticia	111.
İ			

anganese - MW-12R			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
Total Number of Observations		Number of Missing Observations	0
Minimum	0.9	Mean	1.209
Maximum	1.8	Median	1.15
SD	0.321	Std. Error of Mean	0.113
Coefficient of Variation	0.265	Skewness	0.819
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
	Normal (	GOF Test	
Shapiro Wilk Test Statistic	0.868	Shapiro Wilk GOF Test	
		-	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.242	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level  1 1% Significance Level	
		eliable for small sample sizes	
Ace	sumina Nor	mal Distribution	
95% Normal UCL	summy Non	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.424	95% Adjusted-CLT UCL (Chen-1995)	1.43
		95% Modified-t UCL (Johnson-1978)	1.429
A-D Test Statistic	<b>Gamma</b> 0.529	GOF Test  Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance	na Laval
K-S Test Statistic	0.253	Kolmogorov-Smirnov Gamma GOF Test	C LCVCI
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance	e Level
	Gamma Di	stributed at 5% Significance Level	
		eliable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	17.3	k star (bias corrected MLE)	10.9
Theta hat (MLE)	0.0699	Theta star (bias corrected MLE)	0.11
nu hat (MLE)	276.8	nu star (bias corrected)	174.4
MLE Mean (bias corrected)	1.209	MLE Sd (bias corrected)	0.366
Adjusted Level of Cignificance	0.0105	Approximate Chi Square Value (0.05)  Adjusted Chi Square Value	144.8
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	138
Ass	uming Gam	ma Distribution	
95% Approximate Gamma UCL	1.455	95% Adjusted Gamma UCL	1.527
	Lognorma	GOF Test	
	0.881	Shapiro Wilk Lognormal GOF Test	
Shapiro Wilk Test Statistic	0.054	Data appear Lognormal at 10% Significance Level	
-	0.851	,	
Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value  Lilliefors Test Statistic		Lilliefors Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851 0.235 0.265	Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value	0.235 0.265	-	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.235 0.265 Lognormal a	Data appear Lognormal at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.235 0.265 Lognormal a may be unre	Data appear Lognormal at 10% Significance Level at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.235 0.265 Lognormal a may be unre	Data appear Lognormal at 10% Significance Level at 10% Significance Level eliable for small sample sizes	0.16
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear L Note GOF tests r	0.235 0.265 Lognormal a may be unre	Data appear Lognormal at 10% Significance Level at 10% Significance Level bliable for small sample sizes	0.16 0.25

Assu	ming Logno	ormal Distribution	
95% H-UCL	1.471	90% Chebyshev (MVUE) UCL	1.53
95% Chebyshev (MVUE) UCL	1.684	97.5% Chebyshev (MVUE) UCL	1.8
99% Chebyshev (MVUE) UCL	2.294		
Nonparamet	tric Distribu	tion Free UCL Statistics	
Data appear	r to follow a	Discernible Distribution	
Nonpara	ametric Dis	tribution Free UCLs	
95% CLT UCL	1.395	95% BCA Bootstrap UCL	1.4
95% Standard Bootstrap UCL	1.389	95% Bootstrap-t UCL	1.4
95% Hall's Bootstrap UCL	1.409	95% Percentile Bootstrap UCL	1.4
90% Chebyshev(Mean, Sd) UCL	1.549	95% Chebyshev(Mean, Sd) UCL	1.7
97.5% Chebyshev(Mean, Sd) UCL	1.917	99% Chebyshev(Mean, Sd) UCL	2.3
	Suggested	UCL to Use	
95% Student's-t UCL	1.424		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
		s; for additional insight the user may want to consult a statistician	n

	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	6
Number of Detects	3	Number of Non-Detects	6
Number of Distinct Detects	3	Number of Distinct Non-Detects	4
Minimum Detect	2.6000E-4	Minimum Non-Detect 2	2.4000E
Maximum Detect	0.0045	Maximum Non-Detect	0.005
Variance Detects	5.3160E-6	Percent Non-Detects	66.67
Mean Detects	0.00186	SD Detects	0.002
Median Detects	8.1000E-4	CV Detects	1.24
Skewness Detects	1.622	Kurtosis Detects	N/A
Mean of Logged Detects	-6.926	SD of Logged Detects	1.43
Warning: D	ata set has o	only 3 Detected Values.	
This is not enough to com	pute meaning	gful or reliable statistics and estimates.	
Note: Sample size is small (e.g., <10), if data	are collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
		•	
Norm	nal GOF Test	t on Detects Only	
Shapiro Wilk Test Statistic	0.845	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Lev	rel .
Lilliefors Test Statistic	0.342	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Lev	rel
Detected Data	appear Norm	nal at 1% Significance Level	
Note GOF tests		eliable for small sample sizes	
Kaplan-Meier (KM) Statistics usi	may be unre	eliable for small sample sizes ritical Values and other Nonparametric UCLs	6 0327F
Kaplan-Meier (KM) Statistics usi KM Mean	may be unre	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD	may be unre ng Normal C 8.4675E-4 0.00139	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL	N/A
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL	may be unre ng Normal C 8.4675E-4 0.00139 0.00197	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	N/A N/A
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	N/A N/A N/A
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	N/A N/A N/A 0.003
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266 0.00461	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL)  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	N/A N/A N/A 0.003
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266 0.00461	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL)  95% KM (Percentile Bootstrap) UCL)  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	N/A N/A N/A 0.003
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL)  95% KM (Percentile Bootstrap) UCL)  95% KM Bootstrap t UCL)  95% KM Chebyshev UCL  99% KM Chebyshev UCL	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic 5% A-D Critical Value	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00266  0.00461  Tests on De  0.312  0.642	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL)  95% KM (Percentile Bootstrap) UCL)  95% KM Bootstrap t UCL)  95% KM Chebyshev UCL)  99% KM Chebyshev UCL  99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00266  0.00461  Tests on De  0.312  0.642  0.296	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL Steeted Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266 0.00461 Tests on De 0.312 0.642 0.296 0.441	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL)  95% KM (Percentile Bootstrap) UCL)  95% KM Bootstrap t UCL)  95% KM Chebyshev UCL)  99% KM Chebyshev UCL  99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266 0.00461 Tests on De 0.312 0.642 0.296 0.441	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 000000000000000000000000000000000000	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not (	may be unre ng Normal C 8.4675E-4 0.00139 0.00197 0.00184 0.00266 0.00461 Tests on De 0.312 0.642 0.296 0.441 Gamma Distr	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 000000000000000000000000000000000000	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not (	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL 4. Chebyshev UCL 5. Chebyshev UCL 6. Chebyshev UCL 7. Chebyshev UCL 7. Chebyshev UCL 8. Chebyshev UCL 8. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 8. Chebyshev UCL 97. Chebyshev UCL	may be unrest  The unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest. The unrest	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Note  Gamma k hat (MLE)	may be unrest  The unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest. The unrest	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL	N/A N/A N/A 0.003 0.006
Kaplan-Meier (KM) Statistics usi KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL 4. Chebyshev UCL 5. Chebyshev UCL 6. Chebyshev UCL 7. Chebyshev UCL 7. Chebyshev UCL 8. Chebyshev UCL 8. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 97. Chebyshev UCL 8. Chebyshev UCL 97. Chebyshev UCL	may be unrest  The unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest may be unrest. The unrest may be unrest. The unrest may be unrest. The unrest	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Retected Observations Only Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  I Detected Data Only  k star (bias corrected MLE) Theta star (bias corrected MLE)	N/A N/A N/A 0.003 0.006 ce Leve
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on  0.916  0.00203  5.497  0.00186	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 99% KM Chebyshev UCL 99% K	N/A N/A N/A 0.003 0.006 ce Leve
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on  0.916  0.00203  5.497  0.00186	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 99% KM Chebyshev UCL 99% K	N/A N/A N/A 0.003 0.006 ce Leve
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data s	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on  0.916  0.00203  5.497  0.00186	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 99% KM Chebyshev UCL 99% K	N/A N/A N/A 0.003 0.006 ce Leve
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Critical Value K-S Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  GROS may not be used when data so	may be unre  ng Normal C  8.4675E-4  0.00139  0.00197  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on  0.916  0.00203  5.497  0.00186  Statistics use thas > 50% small such as small small small such as small	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 99% KM Chebyshev UCL 99% K	N/A N/A N/A 0.003 0.006 ce Leve
Kaplan-Meier (KM) Statistics usi  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected Data Not  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  GROS may not be used when data s GROS may not be used when kstar of detects is For such situations, GROS	may be unre  ng Normal C  8.4675E-4  0.00139  0.00184  0.00266  0.00461  Tests on De  0.312  0.642  0.296  0.441  Gamma Distr  Statistics on  0.916  0.00203  5.497  0.00186  S Statistics uset has > 50% small such as method may	ritical Values and other Nonparametric UCLs  KM Standard Error of Mean (95% KM (BCA) UCL) 95% KM (Percentile Bootstrap) UCL) 95% KM Bootstrap t UCL) 95% KM Chebyshev UCL) 95% KM Chebyshev UCL) 99% KM Chebyshev UCL 99% K	N/A N/A N/A 0.003 0.006 ce Leve

Minimum	2.6000E-4	Mean	0.00729
Maximum	0.01	Median	0.00723
SD		CV	0.581
k hat (MLE)	1.235	k star (bias corrected MLE)	0.897
Theta hat (MLE)		Theta star (bias corrected MLE)	0.00812
nu hat (MLE)		nu star (bias corrected)	16.15
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (16.15, α)	8.067	Adjusted Chi Square Value (16.15, β)	6.897
95% Gamma Approximate UCL	0.0146	95% Gamma Adjusted UCL	N/A
		meters using KM Estimates	
Mean (KM)		SD (KM)	0.00139
Variance (KM)		SE of Mean (KM)	
k hat (KM)		k star (KM)	0.32
nu hat (KM)		nu star (KM)	5.766
theta hat (KM)		theta star (KM)	0.00264
80% gamma percentile (KM)	0.00132	90% gamma percentile (KM)	0.00248
95% gamma percentile (KM)	0.00379	99% gamma percentile (KM)	0.00718
Gamr	a Kanlan M	eier (KM) Statistics	
Approximate Chi Square Value (5.77, α)		Adjusted Chi Square Value (5.77, β)	1.11
95% KM Approximate Gamma UCL	0.00321	95% KM Adjusted Gamma UCL	0.0044
OOM TAIN Approximate dumina GOL	0.00021	55% Min Adjusted Gamma 552	0.0011
Lognormal GC	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance I	Level
Lilliefors Test Statistic	0.22	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance I	Level
		mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		Using Imputed Non-Detects	
Mean in Original Scale		Mean in Log Scale	-9.67
SD in Original Scale		SD in Log Scale	2.351
95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL	0.00155 0.0021	95% Percentile Bootstrap UCL 95% Bootstrap t UCL	0.00155
95% BCA BOOISHAP OCE 95% H-UCL (Log ROS)		93 % Bootstrap t OCL	0.0112
93 % 11-0CL (Log NOS)	0.246		
Statistics using KM estimates	on Logged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)		KM Geo Mean	4.0793E-4
KM SD (logged)		95% Critical H Value (KM-Log)	3.215
KM Standard Error of Mean (logged)		95% H-UCL (KM -Log)	0.00205
KM SD (logged)		95% Critical H Value (KM-Log)	3.215
KM Standard Error of Mean (logged)		,	
	ļ.		
	DL/2 S	tatistics	
		DL/2 Log-Transformed	
DL/2 Normal			
Mean in Original Scale		Mean in Log Scale	-7.936
		-	-7.936 1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality)	0.00155 0.00195	Mean in Log Scale SD in Log Scale 95% H-Stat UCL	
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality)	0.00155 0.00195	Mean in Log Scale SD in Log Scale	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00155 0.00195 ethod, provi	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00155 0.00195 ethod, provi	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons tion Free UCL Statistics	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00155 0.00195 ethod, provi	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00155 0.00195 ethod, providentic Distributor Normal Dis	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appea	0.00155 0.00195 ethod, providentic Distributer Normal Distributer Suggested	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons tion Free UCL Statistics	1.426
Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m Nonparame	0.00155 0.00195 ethod, providentic Distributor Normal Dis	Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	1.426

	The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.  Please verify the data were collected from random locations.
	·
	If the data were collected using judgmental or other non-random methods,
	then contact a statistician to correctly calculate UCLs.
1	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
Нс	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

oseb - MW-12R			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
	-	Number of Missing Observations	0
Minimum	0.0039	Mean	0.79
Maximum	1.8	Median	0.81
SD	0.574	Std. Error of Mean	0.20
Coefficient of Variation	0.718	Skewness	0.23
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G		
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.175	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
A		Disable at	
	suming Norn	nal Distribution	
95% Normal UCL	1 102	95% UCLs (Adjusted for Skewness)	1 10
95% Student's-t UCL	1.183	95% Adjusted-CLT UCL (Chen-1995)	1.15
		95% Modified-t UCL (Johnson-1978)	1.18
	Gamma (	POE Took	
A-D Test Statistic	0.774	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.774	Data Not Gamma Distributed at 5% Significance Leve	ı
K-S Test Statistic	0.743	Kolmogorov-Smirnov Gamma GOF Test	1
5% K-S Critical Value	0.320	Data Not Gamma Distributed at 5% Significance Leve	
		ed at 5% Significance Level	
Data Not Ganin	na Distribute	d at 5 % digitificance Level	
	Gamma	Statistics	
k hat (MLE)	0.798	k star (bias corrected MLE)	0.58
Theta hat (MLE)	1.002	Theta star (bias corrected MLE)	1.37
nu hat (MLE)	12.77	nu star (bias corrected)	9.31
MLE Mean (bias corrected)	0.799	MLE Sd (bias corrected)	1.04
(**************************************		Approximate Chi Square Value (0.05)	3.5
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	2.67
		·	
Ass	uming Gam	ma Distribution	
95% Approximate Gamma UCL	2.116	95% Adjusted Gamma UCL	2.78
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.716	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.352	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level	
		10% Significance Level	
	Lognorma	Statistics	
Minimum of Logged Data	-5.547	Mean of logged Data	-0.96
	0.588	SD of logged Data	2.01
Maximum of Logged Data	UBOO	SIJ OT IOOOEO LISTA	

Assu	ıming Logno	ormal Distribution	
95% H-UCL	318.8	90% Chebyshev (MVUE) UCL	5.32
95% Chebyshev (MVUE) UCL	6.941	97.5% Chebyshev (MVUE) UCL	9.1
99% Chebyshev (MVUE) UCL	13.61		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	tribution Free UCLs	
95% CLT UCL	1.133	95% BCA Bootstrap UCL	1.1
95% Standard Bootstrap UCL	1.108	95% Bootstrap-t UCL	1.2
95% Hall's Bootstrap UCL	1.232	95% Percentile Bootstrap UCL	1.0
90% Chebyshev(Mean, Sd) UCL	1.408	95% Chebyshev(Mean, Sd) UCL	1.6
97.5% Chebyshev(Mean, Sd) UCL	2.066	99% Chebyshev(Mean, Sd) UCL	2.8
	Suggested	UCL to Use	
95% Student's-t UCL	1.183		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data set	s; for additional insight the user may want to consult a statisticiar	n.

enzene - MW-12R			
	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	9
Total Number of Observations		Number of Missing Observations	0
Minimum	0.0056	Mean	0.013
Maximum	0.022	Median	0.013
SD	0.00579	Std. Error of Mean	0.00193
Coefficient of Variation	0.444	Skewness	0.00130
Coefficient of Variation	0.444	Orewitess	0.270
		using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		the Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guid	e for a discussion of the Chebyshev UCL.	
	Normal (	GOF Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.164	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		: 1% Significance Level	
		eliable for small sample sizes	
<b>A</b>	! NI	Distinction	
95% Normal UCL	suming Non	nal Distribution 95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0166	95% Adjusted-CLT UCL (Chen-1995)	0.0164
		95% Modified-t UCL (Johnson-1978)	0.0167
A-D Test Statistic	<b>Gamma</b> 0.251	GOF Test Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance	امرام ا م
K-S Test Statistic	0.723	Kolmogorov-Smirnov Gamma GOF Test	e revei
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significance	e l evel
		stributed at 5% Significance Level	0 2010.
		eliable for small sample sizes	
		Statistics	0.000
k hat (MLE)	5.346	k star (bias corrected MLE)	3.638
Theta hat (MLE)	0.00244	Theta star (bias corrected MLE)	0.00359
nu hat (MLE)	96.24	nu star (bias corrected)	65.49
MLE Mean (bias corrected)	0.013	MLE Sd (bias corrected)	0.00684
		Approximate Chi Square Value (0.05)	47.87
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	44.71
Δος	suming Gam	nma Distribution	
95% Approximate Gamma UCL	0.0178	95% Adjusted Gamma UCL	0.0191
		, , , , , , , , , , , , , , , , , , ,	
	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.163	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
	may be unre	eliable for small sample sizes	
Note GOF tests			
Note GOF tests	Lognorma	I Statistics	
Note GOF tests	Lognorma -5.185	I Statistics  Mean of logged Data	-4.436
		· · · · · · · · · · · · · · · · · · ·	-4.436 0.479

Assur	ming Logno	ormal Distribution	
95% H-UCL	0.0193	90% Chebyshev (MVUE) UCL	0.019
95% Chebyshev (MVUE) UCL	0.0223	97.5% Chebyshev (MVUE) UCL	0.026
99% Chebyshev (MVUE) UCL	0.0342		
Nonparamet	ric Distribu	tion Free UCL Statistics	
Data appear	to follow a	Discernible Distribution	
Nonpara	ametric Dis	tribution Free UCLs	
95% CLT UCL	0.0162	95% BCA Bootstrap UCL	0.016
95% Standard Bootstrap UCL	0.0161	95% Bootstrap-t UCL	0.016
95% Hall's Bootstrap UCL	0.0164	95% Percentile Bootstrap UCL	0.016
90% Chebyshev(Mean, Sd) UCL	0.0188	95% Chebyshev(Mean, Sd) UCL	0.021
97.5% Chebyshev(Mean, Sd) UCL	0.0251	99% Chebyshev(Mean, Sd) UCL	0.032
	Suggested	UCL to Use	
95% Student's-t UCL	0.0166		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	rld data set	ts; for additional insight the user may want to consult a statisticia	n.

obenzene - MW-12R			
	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
Total Number of esservations	•	Number of Missing Observations	0
Minimum	0.12	Mean	0.202
Maximum	0.29	Median	0.2
SD	0.0689	Std. Error of Mean	0.023
Coefficient of Variation	0.341	Skewness	0.207
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal C	GOF Test	
Shapiro Wilk Test Statistic	0.886	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.175	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	may be unre	sliable for small sample sizes	
Ass	suming Norr	nal Distribution	
95% Normal UCL	Junining 11011	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.245	95% Adjusted-CLT UCL (Chen-1995)	0.242
		95% Modified-t UCL (Johnson-1978)	0.245
	Gamma (	GOF Test	
A-D Test Statistic	0.426	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance	a Laval
K-S Test Statistic	0.184	Kolmogorov-Smirnov Gamma GOF Test	C LCVCI
5% K-S Critical Value	0.104	Detected data appear Gamma Distributed at 5% Significance	e I evel
		stributed at 5% Significance Level	C LCVCI
		eliable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	9.493	k star (bias corrected MLE)	6.403
Theta hat (MLE)	0.0213	Theta star (bias corrected MLE)	0.0316
nu hat (MLE)	170.9	nu star (bias corrected)	115.3
MLE Mean (bias corrected)	0.202	MLE Sd (bias corrected)	0.0799
WEE Weart (bias corrected)	0.202	Approximate Chi Square Value (0.05)	91.47
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	87.01
· · · · · · · · · · · · · · · · · · ·			
Ass 95% Approximate Gamma UCL	uming Gam 0.255	ma Distribution  95% Adjusted Gamma UCL	0.268
30 % Approximate damina 302	0.200	30% Adjusted duffilled GOL	0.200
		GOF Test	
<b>2.</b>		Shapiro Wilk Lognormal GOF Test	
Shapiro Wilk Test Statistic	0.899		
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic	0.859 0.169	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value	0.859 0.169 0.252	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.859 0.169 0.252 Lognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level at 10% Significance Level	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.859 0.169 0.252 Lognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level  at 10% Significance Level  Iliable for small sample sizes	
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I Note GOF tests r	0.859 0.169 0.252 Lognormal a may be unre	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level at 10% Significance Level sliable for small sample sizes	1052
10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear I	0.859 0.169 0.252 Lognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level  at 10% Significance Level  Iliable for small sample sizes	-1.652 0.35

Assu	ming Logno	rmal Distribution	
95% H-UCL	0.263	90% Chebyshev (MVUE) UCL	0.27
95% Chebyshev (MVUE) UCL	0.306	97.5% Chebyshev (MVUE) UCL	0.35
99% Chebyshev (MVUE) UCL	0.439		
Nonparamet	tric Distribut	ion Free UCL Statistics	
Data appear	to follow a	Discernible Distribution	
Nonpara	ametric Dist	ribution Free UCLs	
95% CLT UCL	0.24	95% BCA Bootstrap UCL	0.23
95% Standard Bootstrap UCL	0.238	95% Bootstrap-t UCL	0.24
95% Hall's Bootstrap UCL	0.234	95% Percentile Bootstrap UCL	0.23
90% Chebyshev(Mean, Sd) UCL	0.271	95% Chebyshev(Mean, Sd) UCL	0.30
97.5% Chebyshev(Mean, Sd) UCL	0.346	99% Chebyshev(Mean, Sd) UCL	0.43
·	Suggested I	JCL to Use	
95% Student's-t UCL	0.245		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distribu	ntion, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data sets	s; for additional insight the user may want to consult a statistician	٦.

P - MW-12R			
	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
7 (3.4. 114.11.20. 3. 6.2.20.114.10.13		Number of Missing Observations	0
Minimum	0.37	Mean	1.01
Maximum	1.9	Median	1.1
SD	0.486	Std. Error of Mean	0.16
Coefficient of Variation	0.481	Skewness	0.4
Coefficient of Variation	0.401	Orewitess	0.4
		using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide or	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL off	ten results i	in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G		
Shapiro Wilk Test Statistic	0.958	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.141	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		: 1% Significance Level	
Note GOF tests n	nay be unre	eliable for small sample sizes	
Ass	umina Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.311	95% Adjusted-CLT UCL (Chen-1995)	1.3
		95% Modified-t UCL (Johnson-1978)	1.3
'		` '	
	Gamma (		
A-D Test Statistic	0.219	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance	Lev
K-S Test Statistic	0.189	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significance	Lev
		stributed at 5% Significance Level	
Note GOF tests m	nay be unre	eliable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	4.576	k star (bias corrected MLE)	3.1
Theta hat (MLE)	0.221	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	82.37	nu star (bias corrected)	56.2
MLE Mean (bias corrected)	1.01	MLE Sd (bias corrected)	0.5
WEE Wear (blas corrected)	1.01	Approximate Chi Square Value (0.05)	40.0
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	37.
,			
		ma Distribution	
95% Approximate Gamma UCL	1.42	95% Adjusted Gamma UCL	1.5
		GOF Test	
	Lognormal	adi lest	
*	Lognormal	Shapiro Wilk Lognormal GOF Test	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Lognormal GOF Test  Data appear Lognormal at 10% Significance Level	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value	0.965 0.859	Data appear Lognormal at 10% Significance Level	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic	0.965 0.859 0.204	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value	0.965 0.859 0.204 0.252	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value  Data appear L	0.965 0.859 0.204 0.252 .ognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value  Data appear L	0.965 0.859 0.204 0.252 .ognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level at 10% Significance Level	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value Data appear L Note GOF tests m	0.965 0.859 0.204 0.252 .ognormal a	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level at 10% Significance Level eliable for small sample sizes  I Statistics	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value Lilliefors Test Statistic 10% Lilliefors Critical Value  Data appear L	0.965 0.859 0.204 0.252 .ognormal anay be unre	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test  Data appear Lognormal at 10% Significance Level at 10% Significance Level eliable for small sample sizes	-0.10 0.52

	ming Logno	ormal Distribution	
95% H-UCL	1.57	90% Chebyshev (MVUE) UCL	1.556
95% Chebyshev (MVUE) UCL	1.8	97.5% Chebyshev (MVUE) UCL	2.139
99% Chebyshev (MVUE) UCL	2.805		
<u> </u>		tion Free UCL Statistics	
Data appear	to follow a	Discernible Distribution	
Nonpara	ametric Dis	tribution Free UCLs	
95% CLT UCL	1.276	95% BCA Bootstrap UCL	1.269
95% Standard Bootstrap UCL	1.261	95% Bootstrap-t UCL	1.353
95% Hall's Bootstrap UCL	1.327	95% Percentile Bootstrap UCL	1.27
90% Chebyshev(Mean, Sd) UCL	1.496	95% Chebyshev(Mean, Sd) UCL	1.716
97.5% Chebyshev(Mean, Sd) UCL	2.021	99% Chebyshev(Mean, Sd) UCL	2.621
-		<u>'</u>	
(	Suggested	UCL to Use	
95% Student's-t UCL	1.311		
Recommendations are based upon data size,	data distrib	ovided to help the user to select the most appropriate 95% UCL. ution, and skewness using results from simulation studies. ts; for additional insight the user may want to consult a statisticial.	
-Methylnaphthalene - MW-12R			
	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	5
Number of Detects	1	Number of Non-Detects	8
Number of Distinct Detects	1	Number of Distinct Non-Detects	4
Warning: Only one distinct data value was detected	d! ProUCL	(or any other software) should not be used on such a data set	<u> </u>
		e Project Team to estimate environmental parameters (e.g., EF	
The date set for verial	olo 2 Moth	/Inaphthalene was not processed!	
The data set for variat	JIE Z-IVIEKN	/maphulalene was not processed!	

	UCL Statist	tics for Data	Sets with Non-Detects	
User Selected Options				
•	ProUCL 5.2 11/13/2024 2	2:23:57 PM		
	mw13_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations 2	2000			
litrate - MW-13				
nitrate - MW-13				
		General S	Statistics	
Total N	lumber of Observations	9	Number of Distinct Observations	7
			Number of Missing Observations	0
	Minimum	16	Mean	20.89
	Maximum	28	Median	21
	SD	3.516	Std. Error of Mean	1.172
	Coefficient of Variation	0.168	Skewness	0.695
Note: Sample size is sn	nall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
-			C 2020 and ITRC 2012) for additional guidance,	
		-	he Chebyshev UCL for small sample sizes (n < 7).	
			n gross overestimates of the mean.	
	<del>-</del>		o for a discussion of the Chebyshev UCL.	
			, <u></u>	
		Normal G	GOF Test	
Sh	apiro Wilk Test Statistic	0.933	Shapiro Wilk GOF Test	
	apiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
	•			
	Lilliefors Test Statistic	0 179	LIMPTORS (i) P. Lest	
1%	Lilliefors Test Statistic	0.179	Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
1%	6 Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
1%	6 Lilliefors Critical Value  Data appea	0.316 ar Normal at	Data appear Normal at 1% Significance Level  1% Significance Level	
1%	6 Lilliefors Critical Value  Data appea	0.316 ar Normal at	Data appear Normal at 1% Significance Level	
1%	6 Lilliefors Critical Value  Data appea  Note GOF tests r	0.316 ar Normal at may be unre	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
	Control of Lilliefors Critical Value  Data appear  Note GOF tests in Assets  Assets	0.316 ar Normal at may be unre	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution	
1% 95% Nor	6 Lilliefors Critical Value  Data appea  Note GOF tests i  Ass mal UCL	0.316 ar Normal at may be unressuming Norm	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)	23.11
	Control of Lilliefors Critical Value  Data appear  Note GOF tests in Assets  Assets	0.316 ar Normal at may be unre	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution	23.11
	6 Lilliefors Critical Value  Data appea  Note GOF tests i  Ass mal UCL	0.316 ar Normal at may be unressuming Norm	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
	Data appea Note GOF tests r  Ass  That UCL  95% Student's-t UCL	0.316 ar Normal at may be unressuming Norm 23.07	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
	Data appea Note GOF tests I  Ass TMAI UCL  95% Student's-t UCL	0.316 ar Normal at may be unressuming Norm 23.07 Gamma G 0.327	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	23.11
	A-D Test Statistic  At appear  A-D Critical Value  Data appear  Ass  Mass  Ass  Ass  Ass  A-D Test Statistic  5% A-D Critical Value	0.316 ar Normal at may be unrel suming Norm 23.07  Gamma G 0.327 0.721	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	23.11
	A-D Test Statistic  5 A-D Critical Value  A-C Test Statistic  5 A-D Test Statistic  5 A-D Critical Value  K-S Test Statistic	0.316 ar Normal at may be unrelessuming Norm 23.07  Gamma G 0.327 0.721 0.201	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	23.11
	Ass Malue  Data appea  Note GOF tests i  Ass Malue  Ass Malue  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value	0.316 ar Normal at may be unrel suming Norm 23.07  Gamma G 0.327 0.721 0.201 0.279	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	23.11
	Ass Mal UCL 95% Student's-t UCL  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	0.316 ar Normal at may be unrel suming Norm 23.07  Gamma G 0.327 0.721 0.201 0.279  Gamma Dis	Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	23.11

	Gamma	Statistics	
k hat (MLE)	40.92	k star (bias corrected MLE)	27.
Theta hat (MLE)	0.51	Theta star (bias corrected MLE)	0.
nu hat (MLE)	736.6	nu star (bias corrected)	492
MLE Mean (bias corrected)	20.89	MLE Sd (bias corrected)	3.9
		Approximate Chi Square Value (0.05)	442
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	431
As	suming Garr	nma Distribution	
95% Approximate Gamma UCL	23.27	95% Adjusted Gamma UCL	23
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.952	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.209	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
		eliable for small sample sizes	
Minimum of Logged Data	2.773	al Statistics  Mean of logged Data	3.0
Maximum of Logged Data	3.332	SD of logged Data	
Maximum of Logged Data	3.332	SD 01 logged Data	0.
		ormal Distribution	
95% H-UCL	23.35	90% Chebyshev (MVUE) UCL	24
95% Chebyshev (MVUE) UCL	25.92	97.5% Chebyshev (MVUE) UCL	28
99% Chebyshev (MVUE) UCL	32.37		
Nonparame	tric Distribu	tion Free UCL Statistics	
<del>-</del>		tion Free UCL Statistics Discernible Distribution	
Data appea	r to follow a		
Data appea	r to follow a	Discernible Distribution	22
Data appea	r to follow a	Discernible Distribution tribution Free UCLs	
Nonpa 95% CLT UCL	rametric Dist	tribution Free UCLs  95% BCA Bootstrap UCL	23
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL	rametric Dist	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL	23
Nonpal 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	rametric Dist 22.82 22.74 24.18	tribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	23. 22. 26
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	rametric Dist 22.82 22.74 24.18 24.4 28.21	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	23 22 26
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	rametric Dist 22.82 22.74 24.18 24.4 28.21	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	23 22 26
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	rametric Dist 22.82 22.74 24.18 24.4 28.21 Suggested 23.07	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL UCL to Use	23 22 26 32
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	rametric Dist 22.82 22.74 24.18 24.4 28.21  Suggested 23.07	tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	32.

	General S	Statistics		
Total Number of Observations	9	Number of Distinct Observations	7	
Number of Detects	6	Number of Non-Detects	3	
Number of Distinct Detects	6	Number of Distinct Non-Detects	1	
Minimum Detect	0.018	Minimum Non-Detect	0.015	
Maximum Detect	0.087	Maximum Non-Detect	0.015	
Variance Detects	8.8120E-4	Percent Non-Detects	33.33	
Mean Detects	0.046	SD Detects	0.029	
Median Detects	0.032	CV Detects	0.64	
Skewness Detects	0.832	Kurtosis Detects	-1.72	
Mean of Logged Detects	-3.249	SD of Logged Detects	0.63	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	using incremental sampling methodology (ISM) approach, 2020 and ITRC 2012) for additional guidance, ne Chebyshev UCL for small sample sizes (n < 7).		
<u> </u>		n gross overestimates of the mean.		
Refer to the ProUCL 5.2 Tecl	hnical Guide	for a discussion of the Chebyshev UCL.		
Norm	al GOF Test	on Detects Only		
Shapiro Wilk Test Statistic	0.816	Shapiro Wilk GOF Test		
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Lev	el	
Lilliefors Test Statistic	0.299			
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Lev	el	
Detected Data a	ppear Norm	al at 1% Significance Level		
		liable for small sample sizes		
		·		
Kaplan-Meier (KM) Statistics usin	g Normal Cı	ritical Values and other Nonparametric UCLs		
KM Mean	0.0357	KM Standard Error of Mean	0.009	
90KM SD	0.0265	95% KM (BCA) UCL	0.05	
95% KM (t) UCL	0.0537	95% KM (Percentile Bootstrap) UCL		
**			0.05	
95% KM (z) UCL	0.0516	95% KM Bootstrap t UCL		
95% KM (z) UCL 90% KM Chebyshev UCL	0.0516 0.0647	95% KM Bootstrap t UCL	0.08	
		, , , , , , , , , , , , , , , , , , , ,	0.08	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	0.0647 0.0961	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0.08	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	0.0647 0.0961 Tests on De	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL tected Observations Only	0.082	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.0647 0.0961 Tests on De	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL tected Observations Only Anderson-Darling GOF Test	0.08 <sup>2</sup> 0.07 <sup>2</sup> 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value	0.0647 0.0961 Tests on De 0.506 0.701	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.08 <sup>2</sup> 0.07 <sup>2</sup> 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic	0.0647 0.0961 Tests on De 0.506 0.701 0.254	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0.08 0.07 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value  K-S Test Statistic 5% K-S Critical Value	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0.08 0.07 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value  Detected data appear	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334 Gamma Dis	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level	0.08 0.07 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value  Detected data appear	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334 Gamma Dis	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	0.083 0.077 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value  Detected data appear  Note GOF tests r	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334 Gamma Dis	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Rected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance Stributed at 5% Significance Level	0.083 0.077 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value  Detected data appear  Note GOF tests r	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334 Gamma Dis	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance tributed at 5% Significance Level		
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests r	0.0647 0.0961 Tests on De 0.506 0.701 0.254 0.334 Gamma Dis may be unre	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Rected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level liable for small sample sizes  Detected Data Only	0.082 0.077 0.13	
90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests r	0.0647 0.0961  Tests on De 0.506 0.701 0.254 0.334  Gamma Dis may be unre	95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level  liable for small sample sizes  Detected Data Only  k star (bias corrected MLE)	0.082 0.07 0.13 ce Leve	

•		NDs with many tied observations at multiple DLs	
		<1.0, especially when the sample size is small (e.g., <15-20)	
· · · · · · · · · · · · · · · · · · ·		ield incorrect values of UCLs and BTVs	
•		the sample size is small.	
		be computed using gamma distribution on KM estimates	0.00
Minimum	0.01	Mean	0.034
Maximum	0.087	Median	0.02
SD	0.0296	CV	0.87
k hat (MLE)	1.71	k star (bias corrected MLE)	1.21
Theta hat (MLE)	0.0199	Theta star (bias corrected MLE)	0.02
nu hat (MLE)	30.79	nu star (bias corrected)	21.8
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (21.86, α)	12.23	Adjusted Chi Square Value (21.86, β)	10.7
95% Gamma Approximate UCL	0.0608	95% Gamma Adjusted UCL	0.06
		eters using KM Estimates	
Mean (KM)	0.0357	SD (KM)	0.02
Variance (KM)		SE of Mean (KM)	0.009
k hat (KM)	1.809	k star (KM)	1.28
nu hat (KM)	32.57	nu star (KM)	23.0
theta hat (KM)	0.0197	theta star (KM)	0.02
80% gamma percentile (KM)	0.0561	90% gamma percentile (KM)	0.07
95% gamma percentile (KM)	0.098	99% gamma percentile (KM)	0.14
		440 6	
		er (KM) Statistics	44.5
Approximate Chi Square Value (23.04, α)	13.12	Adjusted Chi Square Value (23.04, β)	11.5
95% KM Approximate Gamma UCL	0.0626	95% KM Adjusted Gamma UCL	0.07
Lognormal GO	F Test on Det	tected Observations Only	
Shapiro Wilk Test Statistic	0.894	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance L	امریما
Lilliefors Test Statistic	0.214	Lilliefors GOF Test	CVCI
10% Lilliefors Critical Value	0.214	Detected Data appear Lognormal at 10% Significance L	امریما
		nal at 10% Significance Level	
		able for small sample sizes	
Note GOF tests in	nay be unlend	able for small sample sizes	
Lognormal POS	Statistics I Is	sing Imputed Non-Detects	
Mean in Original Scale	0.0332	Mean in Log Scale	-3.80
SD in Original Scale	0.0303	SD in Log Scale	0.99
95% t UCL (assumes normality of ROS data)	0.0503	95% Percentile Bootstrap UCL	0.04
95% t OCL (assumes normality of ROS data) 95% BCA Bootstrap UCL	0.052	95% Percentile Bootstrap UCL	0.04
•		95% Bootstrap t UCL	0.07
95% H-UCL (Log ROS)	0.113		

Otatiotics doing it in estimates	on Logged	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.566	KM Geo Mean	0.02
KM SD (logged)	0.651	95% Critical H Value (KM-Log)	2.5
KM Standard Error of Mean (logged)	0.238	95% H-UCL (KM -Log)	0.0
KM SD (logged)	0.651	95% Critical H Value (KM-Log)	2.5
KM Standard Error of Mean (logged)	0.238		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0332	Mean in Log Scale	-3.7
SD in Original Scale	0.0304	SD in Log Scale	0.9
OEO/ + LICL /Accument married by	0.052	95% H-Stat UCL	0.1
95% t UCL (Assumes normality)	0.052	95% H-Stat UCL	0.1
, , , , , , , , , , , , , , , , , , , ,		ded for comparisons and historical reasons	0.1
DL/2 is not a recommended me	ethod, provi		0.1
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	0.1
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons tion Free UCL Statistics	0.1
DL/2 is not a recommended me  Nonparame  Detected Data appea	ethod, provi etric Distribu r Normal Di	ded for comparisons and historical reasons tion Free UCL Statistics	0.1
DL/2 is not a recommended me  Nonparame  Detected Data appea	ethod, provi etric Distribu r Normal Di	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	0.1
DL/2 is not a recommended me  Nonparame  Detected Data appea	ethod, provi stric Distribu r Normal Di Suggested 0.0537	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	
DL/2 is not a recommended me  Nonparame  Detected Data appea  95% KM (t) UCL  Note: Suggestions regarding the selection of a 95%	ethod, provi etric Distribu r Normal Di Suggested 0.0537	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level UCL to Use	

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	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.012	Mean	0.01
Maximum	0.014	Median	0.01
SD	6.6667E-4	Std. Error of Mean 2	2.2222
Coefficient of Variation	0.0504	Skewness	-0.25
		using incremental sampling methodology (ISM) approach,	
	•	C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
-		n gross overestimates of the mean.	
Refer to the Prouct 5.2 Ted	nnicai Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	20E Toot	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.297	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		1% Significance Level	
		liable for small sample sizes	
100 401 10313	may be unio	inable for small sample sizes	
As	sumina Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0136	95% Adjusted-CLT UCL (Chen-1995)	0.01
		95% Modified-t UCL (Johnson-1978)	0.01
		<u> </u>	
	Gamma (	GOF Test	
A-D Test Statistic	0.942	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.72	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic	0.299	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.279	Data Not Gamma Distributed at 5% Significance Leve	el
Data Not Gamr	ma Distribute	ed at 5% Significance Level	
	Gamma	Statistics	
k hat (MLE)		k star (bias corrected MLE)	292.4
Theta hat (MLE)		Theta star (bias corrected MLE)	
nu hat (MLE)		`	5264
MLE Mean (bias corrected)	0.0132	` `	7.7318
MEE Wear (blue corrected)	0.0102		5096
Adjusted Level of Significance	0.0231		5061
		<u>'</u>	
A	numina Ca	ma Distribution	

	Lognormal GO	F Test	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.289	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data Not Lognormal at 10% Significance Level	
Data Not Lo	ognormal at 10%	Significance Level	
	Lognormal Sta		
Minimum of Logged Data	-4.423	Mean of logged Data	-4.327
Maximum of Logged Data	-4.269	SD of logged Data	0.050
Assı	ıming Lognormal	Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.013
95% Chebyshev (MVUE) UCL	0.0142	97.5% Chebyshev (MVUE) UCL	0.014
99% Chebyshev (MVUE) UCL	0.0154	c c	
Nonparame	tric Distribution I	Free UCL Statistics	
Data appea	r to follow a Disc	ernible Distribution	
Nonpa	rametric Distribut	ion Free UCLs	
95% CLT UCL	0.0136	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0139	95% Chebyshev(Mean, Sd) UCL	0.014
97.5% Chebyshev(Mean, Sd) UCL	0.0146	99% Chebyshev(Mean, Sd) UCL	0.01
	Suggested UCL	to Use	
95% Student's-t UCL	0.0136		
Note: Suggestions regarding the sole-tion of a OEW	LICI are preside	ed to help the user to select the most appropriate 95% UCL.	
	•		
		, and skewness using results from simulation studies.	_
However, simulations results will not cover all Real W	oria data sets; foi	r additional insight the user may want to consult a statisticial	n.
Note: For highly negatively-skewed data, confid	dence limits (e.g.	, Chen, Johnson, Lognormal, and Gamma) may not be	

Iron - MW-13			
	General	Ctatistics	
Total Number of Observations			6
Number of Detects	9	Number of Distinct Observations  Number of Non-Detects	6 5
Number of Detects  Number of Distinct Detects	4	Number of Distinct Non-Detects	
			2
Minimum Detect	0.023	Minimum Non-Detect	0.02
Maximum Detect	0.15	Maximum Non-Detect	0.08
Variance Detects	0.00331	Percent Non-Detects	55.56%
Mean Detects	0.0778	SD Detects	0.0576
Median Detects	0.069	CV Detects	0.74
Skewness Detects	0.596	Kurtosis Detects	-1.9
Mean of Logged Detects	-2.799	SD of Logged Detects	0.843
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITR	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
Norm	ol COE Too	t on Detects Only	
Shapiro Wilk Test Statistic	0.94	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Lev	ol.
Lilliefors Test Statistic	0.087	Lilliefors GOF Test	<u> </u>
1% Lilliefors Critical Value	0.238	Detected Data appear Normal at 1% Significance Lev	ol.
		nal at 1% Significance Level	ei .
		sliable for small sample sizes	
Kaplan-Meier (KM) Statistics usi	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean	0.0477	KM Standard Error of Mean	0.0168
90KM SD	0.0431	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0789	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0753	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.098	95% KM Chebyshev UCL	0.121
97.5% KM Chebyshev UCL	0.153	99% KM Chebyshev UCL	0.215
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Gamma GOF	Tests on De	stected Observations Only	
A-D Test Statistic	0.258	Anderson-Darling GOF Test	
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.232	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.398	Detected data appear Gamma Distributed at 5% Significance	e Level
Detected data appear	Gamma Di	stributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
Gamma	Statistics on	Detected Data Only	
k hat (MLE)	2.194	k star (bias corrected MLE)	0.715
Theta hat (MLE)	0.0354	Theta star (bias corrected MLE)	0.109
nu hat (MLE)	17.55	nu star (bias corrected)	5.721
Mean (detects)	0.0778		

		NDs with many tied observations at multiple DLs
		<1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS n	nethod may yie	eld incorrect values of UCLs and BTVs
·		the sample size is small.
For gamma distributed detected data, BTVs ar		be computed using gamma distribution on KM estimates
Minimum	0.01	Mean
Maximum	0.15	Median
SD	0.0491	CV
k hat (MLE)	1.103	k star (bias corrected MLE)
Theta hat (MLE)	0.0384	Theta star (bias corrected MLE)
nu hat (MLE)	19.85	nu star (bias corrected)
Adjusted Level of Significance (β)	0.0231	
Approximate Chi Square Value (14.57, α)	6.961	Adjusted Chi Square Value (14.57, β)
95% Gamma Approximate UCL	0.0887	95% Gamma Adjusted UCL
Estimates of Ga	mma Darama	eters using KM Estimates
Mean (KM)	0.0477	SD (KM)
Variance (KM)	0.00186	SE of Mean (KM)
k hat (KM)	1.222	k star (KM)
nu hat (KM)	22	nu star (KM)
theta hat (KM)	0.039	theta star (KM)
80% gamma percentile (KM)	0.0774	90% gamma percentile (KM)
95% gamma percentile (KM)	0.149	99% gamma percentile (KM)
3		
Gamma	a Kaplan-Mei	er (KM) Statistics
Approximate Chi Square Value (16.00, α)	7.964	Adjusted Chi Square Value (16.00, β)
95% KM Approximate Gamma UCL	0.0958	95% KM Adjusted Gamma UCL
Lognormal GO	E Test on Det	ected Observations Only
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance
Lilliefors Test Statistic	0.21	Lilliefors GOF Test
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance
Detected Data app	ear Lognorma	al at 10% Significance Level
Note GOF tests r	nay be unrelia	able for small sample sizes
I agnormal DOS	Statistice He	ing Imputed Non-Detects
Mean in Original Scale	0.0422	Mean in Log Scale
SD in Original Scale	0.0493	SD in Log Scale
95% t UCL (assumes normality of ROS data)	0.0728	95% Percentile Bootstrap UCL
95% BCA Bootstrap UCL	0.0783	95% Bootstrap t UCL
95% H-UCL (Log ROS)	0.191	
337 332 (239 1100)		

Statistics using KM estimates of	on Logged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-3.346	KM Geo Mean	0.03
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.64
KM Standard Error of Mean (logged)	0.289	95% H-UCL (KM -Log)	0.08
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.6
KM Standard Error of Mean (logged)	0.289		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0501	Mean in Log Scale	-3.34
SD in Original Scale	0.0454	SD in Log Scale	0.9
95% t UCL (Assumes normality)	0.0783	95% H-Stat UCL	0.1
oo to coe (neodineo normanty)		00,011 0101 002	
· · · · · · · · · · · · · · · · · · ·		ded for comparisons and historical reasons	
DL/2 is not a recommended me	ethod, provi		
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons tion Free UCL Statistics	
DL/2 is not a recommended me Nonparame Detected Data appear	ethod, provi tric Distribu r Normal Di	ded for comparisons and historical reasons tion Free UCL Statistics	
DL/2 is not a recommended me Nonparame Detected Data appear	ethod, provi tric Distribu r Normal Di	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	
DL/2 is not a recommended me  Nonparame  Detected Data appear  95% KM (t) UCL	ethod, provi tric Distribu r Normal Di Suggested 0.0789	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level	
DL/2 is not a recommended me  Nonparame  Detected Data appear  95% KM (t) UCL  Note: Suggestions regarding the selection of a 95%	ethod, provi tric Distribu r Normal Di Suggested 0.0789	ded for comparisons and historical reasons tion Free UCL Statistics stributed at 1% Significance Level UCL to Use	-

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se - MW-13			
	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	1
Minimum	0.2	Mean	0.4
Maximum	0.92	Median	0.4
SD	0.239	Std. Error of Mean	0.08
Coefficient of Variation	0.48	Skewness	0.6
Note: Sample size is small (e.g., <10), if data an	e collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	t-UCL or tl	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.246	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
Ass	uming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.659	95% Adjusted-CLT UCL (Chen-1995)	0.6
		95% Modified-t UCL (Johnson-1978)	0.6
	Gamma C	GOF Test	
A-D Test Statistic	0.311	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.24	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance	e Lev
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	4.907	k star (bias corrected MLE)	3.1
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.1
nu hat (MLE)	78.51	nu star (bias corrected)	50.4
	0.499	MLE Sd (bias corrected)	0.2
MLE Mean (bias corrected)		Approximate Chi Square Value (0.05)	35.
MLE Mean (bias corrected)			31.
MLE Mean (bias corrected)  Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	
Adjusted Level of Significance		Adjusted Chi Square Value	

Lognormal GOF Test	Le		
est Statistic 0.951 Shapiro Wilk Lognormal GOF Test	Shapiro Wilk Test Statistic	GOF Test	
itical Value 0.851 Data appear Lognormal at 10% Significance	10% Shapiro Wilk Critical Value	Significance Level	
est Statistic 0.211 Lilliefors Lognormal GOF Test	Lilliefors Test Statistic	3OF Test	
ritical Value 0.265 Data appear Lognormal at 10% Significance	10% Lilliefors Critical Value	Significance Level	
ata appear Lognormal at 10% Significance Level	Data appear Log		
GOF tests may be unreliable for small sample sizes	Note GOF tests ma		
Lognormal Statistics			
ogged Data -1.609 Mean of logged	Minimum of Logged Data -	ean of logged Data	-0.80
ogged Data -0.0834 SD of logged	Maximum of Logged Data -	SD of logged Data	0.5
Assuming Lognormal Distribution			
	95% H-UCL	` ,	0.76
	95% Chebyshev (MVUE) UCL	shev (MVUE) UCL	1.05
IVUE) UCL 1.389	99% Chebyshev (MVUE) UCL		
Nonparametric Distribution Free UCL Statistics	·		
Nonparametric Distribution Free UCL Statistics  Data appear to follow a Discernible Distribution	·		
Data appear to follow a Discernible Distribution	Data appear to		
Data appear to follow a Discernible Distribution  Nonparametric Distribution Free UCLs	Data appear to		
Nonparametric Distribution Free UCLs  6 CLT UCL 0.638 95% BCA Bootstrap	Data appear to  Nonparam  95% CLT UCL		
Nonparametric Distribution Free UCLs  CLT UCL 0.638 95% BCA Bootstrap otstrap UCL 0.628 95% Bootstrap-t	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL	% Bootstrap-t UCL	0.64 0.67
Nonparametric Distribution Free UCLs  6 CLT UCL 0.638 95% BCA Bootstrap Ustrap UCL 0.628 95% Bootstrap-testrap UCL 0.657 95% Percentile Bootstrap	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	% Bootstrap-t UCL	0.67
Nonparametric Distribution   Free UCLs	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL	0.67 0.63 0.86
Nonparametric Distribution   Free UCLs	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL	0.67 0.63 0.86
Nonparametric Distribution Free UCLs  CCLT UCL 0.638 95% BCA Bootstrap etstrap UCL 0.628 95% Bootstrap-testrap UCL 0.657 95% Percentile Bootstrap etstrap UCL 0.753 95% Chebyshev(Mean, Sd) en, Sd) UCL 1.027 99% Chebyshev(Mean, Sd)	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL	0.67 0.63 0.86
Nonparametric Distribution Free UCLs  CLT UCL 0.638 95% BCA Bootstrap  International UCL 0.657 95% Percentile Bootstrap  International UCL 0.753 95% Chebyshev(Mean, Sd)  Suggested UCL to Use	Nonparam  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL	0.67 0.63 0.86
Nonparametric Distribution Free UCLs  CLT UCL 0.638 95% BCA Bootstrap  International Distribution Free UCLs  CLT UCL 0.628 95% Bootstrap-testrap UCL 0.657 95% Percentile Bootstrap  International Distribution Free UCLs  Suggested UCL to Use	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL	0.67
Nonparametric Distribution Free UCLs  CLT UCL 0.638 95% BCA Bootstrap bitstrap UCL 0.628 95% Bootstrap-t bitstrap UCL 0.657 95% Percentile Bootstrap n, Sd) UCL 0.753 95% Chebyshev(Mean, Sd) n, Sd) UCL 1.027 99% Chebyshev(Mean, Sd)  Suggested UCL to Use ent's-t UCL 0.659	Nonparam 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL  Su 95% Student's-t UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL ev(Mean, Sd) UCL	0.67 0.63 0.86 1.34
Nonparametric Distribution Free UCLs  CLT UCL 0.638 95% BCA Bootstrap  International UCL 0.657 95% Percentile Bootstrap  International UCL 0.753 95% Chebyshev(Mean, Sd)  Suggested UCL to Use	Nonparam  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  Su  95% Student's-t UCL	% Bootstrap-t UCL tile Bootstrap UCL ev(Mean, Sd) UCL ev(Mean, Sd) UCL	0.67 0.63 0.86 1.34

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	4.6000E-4	Mean	0.0019
Maximum	0.0032	Median	0.0016
SD	8.3297E-4	Std. Error of Mean	2.7766E
Coefficient of Variation	0.434	Skewness	-0.107
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	ne t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
		for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.204	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		1% Significance Level	
		liable for small sample sizes	
95% Normal UCL		nal Distribution  95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00243	95% Adjusted-CLT UCL (Chen-1995)	0.002
		95% Modified-t UCL (Johnson-1978)	0.002
	Gamma G	GOF Test	
A-D Test Statistic	0.499	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significan	ice Leve
K-S Test Statistic	0.257	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significan	nce Leve
		tributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	4.448	k star (bias corrected MLE)	3.03
Theta hat (MLE)	4.3118E-4	Theta star (bias corrected MLE)	6.3101E
nu hat (MLE)	80.06	nu star (bias corrected)	54.7
MLE Mean (bias corrected)	0.00192	MLE Sd (bias corrected)	0.001
, ,		Approximate Chi Square Value (0.05)	38.7
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	35.8
Ass	suming Gami	ma Distribution	

	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.834	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.3	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data Not Lognormal at 10% Significance Level	
Data Not Lo	ognormal at	10% Significance Level	
	Lognorma	I Statistics	
Minimum of Logged Data	-7.684	Mean of logged Data	-6.373
Maximum of Logged Data	-5.745	SD of logged Data	0.572
Assı	ımina Loand	ormal Distribution	
95% H-UCL	0.00325	90% Chebyshev (MVUE) UCL	0.00312
95% Chebyshev (MVUE) UCL	0.00364	97.5% Chebyshev (MVUE) UCL	0.00436
99% Chebyshev (MVUE) UCL	0.00577	07.070 chobyenet (mt o2) 002	0.00100
00% 0.1025ja.ia. (111702)			
Nonparame	tric Distribu	tion Free UCL Statistics	
•		Discernible Distribution	
Nonna	ametric Dis	tribution Free UCLs	
95% CLT UCL	0.00237	95% BCA Bootstrap UCL	0.00231
95% Standard Bootstrap UCL	0.00234	95% Bootstrap-t UCL	0.00244
95% Hall's Bootstrap UCL	0.00238	95% Percentile Bootstrap UCL	0.0023
90% Chebyshev(Mean, Sd) UCL	0.00275	95% Chebyshev(Mean, Sd) UCL	0.00200
97.5% Chebyshev(Mean, Sd) UCL	0.00275	99% Chebyshev(Mean, Sd) UCL	0.00313
37.3% Chebyshev(weah, 3u) OCL	0.00303	99 % Chebyshev(Weah, 3u) OCL	0.00400
	Suggested	UCL to Use	
95% Student's-t UCL	0.00243	OOL 10 036	
95% Student S-t OCL	0.00243		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
	•	ution, and skewness using results from simulation studies.	
•		ts; for additional insight the user may want to consult a statisticia	n.
		,	
Note: For highly negatively-skewed data, confid	lence limits	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	
reliable. Chen's and Johnson's me	thods provi	de adjustments for positvely skewed data sets.	
		· · · · · · · · · · · · · · · · · · ·	

	UCL Statist	tics for Data	Sets with Non-Detects	
	1			
User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/13/2024 2	2:25:29 PM		
From File	mw14_3year_data.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
litrate - MW-14				
		General	Statistics	
Total	Number of Observations	6	Number of Distinct Observations	5
	Number of Detects	5	Number of Non-Detects	1
N	umber of Distinct Detects	4	Number of Distinct Non-Detects	1
	Minimum Detect	0.21	Minimum Non-Detect	0.04
	Maximum Detect	2	Maximum Non-Detect	0.04
	Variance Detects	0.608	Percent Non-Detects	16.67
	Mean Detects	1.248	SD Detects	0.78
	Median Detects	1.7	CV Detects	0.625
	Skewness Detects	-0.654	Kurtosis Detects	-2.225
				2.220
Note: Sample size is	Mean of Logged Detects	-0.0537	SD of Logged Detects using incremental sampling methodology (ISM) approach,	0.959
Note: Sample size is a refer also to	Mean of Logged Detects small (e.g., <10), if data a to ITRC Tech Reg Guide of	-0.0537  re collected on ISM (ITRO e t-UCL or t	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	0.959
Note: Sample size is a refer also to	Mean of Logged Detects small (e.g., <10), if data a to ITRC Tech Reg Guide of	-0.0537  re collected on ISM (ITRO e t-UCL or t	SD of Logged Detects using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	0.959
Note: Sample size is a refer also to but note that	Mean of Logged Detects small (e.g., <10), if data a p ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of	-0.0537  re collected on ISM (ITRO e t-UCL or to the results in th	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	0.959
Note: Sample size is a refer also to but note that	Mean of Logged Detects small (e.g., <10), if data a p ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of fer to the ProUCL 5.2 Tec	-0.0537  re collected on ISM (ITRO e t-UCL or t ften results i hnical Guide	SD of Logged Detects using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. For a discussion of the Chebyshev UCL.	0.959
Note: Sample size is a refer also to but note that	Mean of Logged Detects small (e.g., <10), if data a b ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of ier to the ProUCL 5.2 Tec	-0.0537  re collected on ISM (ITRO e t-UCL or t ften results i hnical Guide	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. For a discussion of the Chebyshev UCL.	0.959
Note: Sample size is a refer also to but note that	Mean of Logged Detects small (e.g., <10), if data a p ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of er to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic	-0.0537  re collected on ISM (ITRO e t-UCL or the tresults in	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).  In gross overestimates of the mean.  For a discussion of the Chebyshev UCL.	
Note: Sample size is a refer also to but note that	Mean of Logged Detects small (e.g., <10), if data a portion of Track Reg Guide of ITRC may recommend the The Chebyshev UCL of the Trough Track Reg Guide of the Trough Track Reg Guide of the Chebyshev UCL of the Trough Track Reg Guide of the Track Reg Guide of the Track Reg Guide of the Track Reg Guide of	-0.0537  re collected on ISM (ITRO e t-UCL or t ften results i hnical Guide	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It on Detects Only  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level	
Note: Sample size is a refer also to but note that  Ref	Mean of Logged Detects  small (e.g., <10), if data a b ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of ier to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic	-0.0537  re collected on ISM (ITRO e t-UCL or the tresults in	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL. It on Detects Only  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test	el
Note: Sample size is a refer also to but note that  Ref	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of For to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value	re collected on ISM (ITRO e t-UCL or to the results in the collected on ISM (ITRO e t-UCL or to the results in the collected on ISM (ITRO e t-UCL or to the collected on ISM (ITRO to the	using incremental sampling methodology (ISM) approach, 2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. For a discussion of the Chebyshev UCL.  It on Detects Only  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level	el
Note: Sample size is a refer also to but note that  Ref	Mean of Logged Detects  small (e.g., <10), if data a control Trach Reg Guide of ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of iter to the ProUCL 5.2 Tech Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Detected Data a	re collected on ISM (ITRO e t-UCL or to the translated of translated of the translated of translated of the translated of the translated of translated of tr	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level and at 1% Significance Level	el
Note: Sample size is a refer also to but note that  Ref	Mean of Logged Detects  small (e.g., <10), if data a control Trach Reg Guide of ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of iter to the ProUCL 5.2 Tech Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Detected Data a	re collected on ISM (ITRO e t-UCL or to the translated of translated of the translated of translated of the translated of the translated of translated of tr	using incremental sampling methodology (ISM) approach, 2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. For a discussion of the Chebyshev UCL.  It on Detects Only  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level	el
Note: Sample size is a refer also to but note that  Ref  S 1% S	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of er to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value  Detected Data a Note GOF tests in	-0.0537  re collected on ISM (ITRO e t-UCL or to the tresults in the tresults	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level and at 1% Significance Level	el
Note: Sample size is a refer also to but note that  Ref  S 1% S	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of er to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value  Detected Data a Note GOF tests in	-0.0537  re collected on ISM (ITRO e t-UCL or to the tresults in the tresults	using incremental sampling methodology (ISM) approach, 2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It on Detects Only  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level and at 1% Significance Level Uliable for small sample sizes	el
Note: Sample size is a refer also to but note that  Ref  S 1% S	Mean of Logged Detects  small (e.g., <10), if data a control Trech Reg Guide of ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of iter to the ProUCL 5.2 Tech Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Detected Data a Note GOF tests of Meier (KM) Statistics usin	re collected on ISM (ITRO et-UCL or to the ISM) (ITRO et-UCL et UCL et U	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level Italiat 1% Significance Level Uliable for small sample sizes	el
Note: Sample size is a refer also to but note that  Ref  S 1% S	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of fer to the ProUCL 5.2 Tech  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Detected Data a Note GOF tests if  Meier (KM) Statistics usin	-0.0537  re collected on ISM (ITRO et-UCL or to the results in thinical Guide al GOF Teston 1998)  0.361  0.686  0.319  0.396  appear Norman be unreading Normal Control 1.047	using incremental sampling methodology (ISM) approach, 2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In gross overestimates	el 0.356
Note: Sample size is a refer also to but note that  Ref  S 1% S	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of ier to the ProUCL 5.2 Tec  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Detected Data a Note GOF tests I  Meier (KM) Statistics usin  KM Mean 90KM SD	-0.0537  re collected on ISM (ITRO e t-UCL or t ften results i hnical Guide 0.861 0.866 0.319 0.396 ppear Normay be unresults in the collection of the colle	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In gross overestimates	el 0.356 N/A
Note: Sample size is a refer also to but note that  Ref  S 1% S  Kaplan-	Mean of Logged Detects  small (e.g., <10), if data a to ITRC Tech Reg Guide of ITRC may recommend th The Chebyshev UCL of Fer to the ProUCL 5.2 Tech  Norm Shapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Detected Data a Note GOF tests I  KM Mean 90KM SD 95% KM (t) UCL	re collected on ISM (ITRO et-UCL or to ften results in hnical Guide al GOF Testors 0.861 0.396 0.396 appear Normany be unresults in the collection of the co	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Level Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level Italiat 1% Significance Level Italiable for small sample sizes  It was significance UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	el 0.356 N/A N/A

Gamma GOF	Tests on De	etected Observations Only	
A-D Test Statistic	0.54	Anderson-Darling GOF Test	
5% A-D Critical Value	0.685	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.355	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.361	Detected data appear Gamma Distributed at 5% Significance	e Level
Detected data appear	Gamma Di	stributed at 5% Significance Level	
Note GOF tests i	nay be unre	eliable for small sample sizes	
Gamma	Statistics or	Detected Data Only	
k hat (MLE)	1.967	k star (bias corrected MLE)	0.92
Theta hat (MLE)	0.634	Theta star (bias corrected MLE)	1.356
nu hat (MLE)	19.67	nu star (bias corrected)	9.202
Mean (detects)	1.248		
Gamma POS	Statistics u	sing Imputed Non-Detects	
		6 NDs with many tied observations at multiple DLs	
		s <1.0, especially when the sample size is small (e.g., <15-20)	
<u> </u>		· · · · · · · · · · · · · · · · · · ·	
		yield incorrect values of UCLs and BTVs	
	-	en the sample size is small.	
		y be computed using gamma distribution on KM estimates	
Minimum	0.0244	Mean	1.044
Maximum	2	Median	1.165
SD	0.858	CV	0.822
k hat (MLE)	0.835	k star (bias corrected MLE)	0.529
Theta hat (MLE)	1.25	Theta star (bias corrected MLE)	1.975
nu hat (MLE)	10.02	nu star (bias corrected)	6.345
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (6.34, α)	1.818	Adjusted Chi Square Value (6.34, β)	1.076
95% Gamma Approximate UCL	3.643	95% Gamma Adjusted UCL	6.154
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	1.047	SD (KM)	0.78
Variance (KM)	0.608	SE of Mean (KM)	0.356
k hat (KM)	1.801	k star (KM)	1.012
nu hat (KM)	21.61	nu star (KM)	12.14
theta hat (KM)	0.581	theta star (KM)	1.035
80% gamma percentile (KM)	1.683	90% gamma percentile (KM)	2.403
95% gamma percentile (KM)	3.123	99% gamma percentile (KM)	4.792
	a Kanlan M	eier (KM) Statistics	
	5.319		2 012
Approximate Chi Square Value (12.14, α)		Adjusted Chi Square Value (12.14, β)	3.812
95% KM Approximate Gamma UCL	2.389	95% KM Adjusted Gamma UCL	3.333

<del>-</del>	F Test on Det	-	
Shapiro Wilk Test Statistic	0.821	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic	0.329	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data Not Lognormal at 10% Significance Leg	vel
		gnormal at 10% Significance Level	
Note GOF tests r	nay be unrelia	able for small sample sizes	
-	Statistics Us	ing Imputed Non-Detects	
Mean in Original Scale	1.057	Mean in Log Scale	-0.4
SD in Original Scale	0.84	SD in Log Scale	1.2
95% t UCL (assumes normality of ROS data)	1.748	95% Percentile Bootstrap UCL	1.5
95% BCA Bootstrap UCL	1.552	95% Bootstrap t UCL	1.7
95% H-UCL (Log ROS)	23.07		
	·		
<u> </u>		ta and Assuming Lognormal Distribution	
KM Mean (logged)	-0.581	KM Geo Mean	0.5
KM SD (logged)	1.416	95% Critical H Value (KM-Log)	5.5
KM Standard Error of Mean (logged)	0.646	95% H-UCL (KM -Log)	52.
KM SD (logged)	1.416	95% Critical H Value (KM-Log)	5.5
KM Standard Error of Mean (logged)	0.646		
DI (O.N.	DL/2 Stat		
DL/2 Normal	1.040	DL/2 Log-Transformed	0.0
Mean in Original Scale	1.043	Mean in Log Scale	-0.6
SD in Original Scale	0.859	SD in Log Scale	1.7
95% t UCL (Assumes normality)	1.75	95% H-Stat UCL	653.
DL/2 is not a recommended me	thod, provide	d for comparisons and historical reasons	
•		n Free UCL Statistics	
Detected Data appear	Normal Distr	ibuted at 1% Significance Level	
	Suggested U	CL TO USE	
95% KM (t) UCL	1.764		
Note: Suggestions regarding the extention of a OFO/	IICI oza zaz-	ided to help the wear to coloct the weest approximate OFO/ LO	
		ided to help the user to select the most appropriate 95% UCL	•
Recommendations are based upon data size,	นสเส นเรเาเป็นไ	on, and skewness using results from simulation studies.	

- MW-14			
	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	2
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.022	Minimum Non-Detect	0.01
Maximum Detect	0.16	Maximum Non-Detect	0.01
Variance Detects	0.00409	Percent Non-Detects	33.3
Mean Detects	0.0783	SD Detects	0.06
Median Detects	0.0655	CV Detects	0.8
Skewness Detects	0.721	Kurtosis Detects	-1.76
Mean of Logged Detects	-2.846	SD of Logged Detects	0.9
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results in	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tecl	hnical Guide	for a discussion of the Chebyshev UCL.	
Norm:	al GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.91	Shapiro Wilk GOF Test	
	0.0.	Shapilo wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Levi	el
1% Shapiro Wilk Critical Value Lilliefors Test Statistic		•	el
·	0.687	Detected Data appear Normal at 1% Significance Levi	
Lilliefors Test Statistic  1% Lilliefors Critical Value	0.687 0.26 0.413	Detected Data appear Normal at 1% Significance Leve	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.687 0.26 0.413	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests re	0.687 0.26 0.413 ppear Norm	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi al at 1% Significance Level liable for small sample sizes	
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin	0.687 0.26 0.413 ppear Norm may be unrel	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs	el
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean	el 0.02
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL	0.02 N/A
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.02 N/A N/A
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0.02 N/A N/A N/A
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	0.02 N/A N/A N/A 0.1
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests in  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0.02 N/A N/A N/A
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134 0.217	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.02 N/A N/A N/A
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests re  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134 0.217  Tests on Der 0.317	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  100 Steeted Observations Only  Anderson-Darling GOF Test	0.02 N/A N/A N/A 0.16 0.3
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests r  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134 0.217  Tests on Det 0.317 0.661	Detected Data appear Normal at 1% Significance Levi  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Levi al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.02 N/A N/A N/A 0.10
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests re  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134 0.217  Tests on Der 0.317	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  100 Steeted Observations Only  Anderson-Darling GOF Test	0.02 N/A N/A N/A 0.10
Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests of the statistic susion of the statis	0.687 0.26 0.413 ppear Norm may be unrel g Normal Cr 0.0572 0.0542 0.109 0.0992 0.134 0.217  Tests on Det 0.317 0.661	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	0.02 N/A N/A N/A 0.10 0.3

Statistics on	Detected Data Only	
1.827	k star (bias corrected MLE)	0.623
0.0428	Theta star (bias corrected MLE)	0.126
14.62	nu star (bias corrected)	4.987
0.0783		
S Statistics usi	ing Imputed Non-Detects	
set has > 50%	NDs with many tied observations at multiple DLs	
small such as	<1.0, especially when the sample size is small (e.g., <15-20)	
method may y	rield incorrect values of UCLs and BTVs	
ially true when	the sample size is small.	
and UCLs may	be computed using gamma distribution on KM estimates	
0.01	Mean	0.055
0.16	Median	0.0275
0.0608	CV	1.096
1.06	k star (bias corrected MLE)	0.641
0.0524	Theta star (bias corrected MLE)	0.0866
12.72	nu star (bias corrected)	7.693
0.0122		
2.559	Adjusted Chi Square Value (7.69, β)	1.62
0.167	95% Gamma Adjusted UCL	N/A
amma Param	neters using KM Estimates	
0.0572	SD (KM)	0.0542
0.00294	SE of Mean (KM)	0.025
1.113	k star (KM)	0.668
13.35	nu star (KM)	8.011
0.0514	theta star (KM)	0.0856
0.0941	90% gamma percentile (KM)	0.145
0.198	99% gamma percentile (KM)	0.325
na Kaplan-Me	ier (KM) Statistics	
	Adjusted Chi Square Value (8.01, β)	1.759
2 741		
2.741 0.167	95% KM Adjusted Gamma UCL	0.26
0.167	95% KM Adjusted Gamma UCL	0.26
0.167  DF Test on De	95% KM Adjusted Gamma UCL	0.26
0.167  DF Test on De 0.933	95% KM Adjusted Gamma UCL etected Observations Only Shapiro Wilk GOF Test	
0.167  DF Test on De  0.933  0.792	95% KM Adjusted Gamma UCL  etected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance L	
0.167  DF Test on De 0.933 0.792 0.23	95% KM Adjusted Gamma UCL  stected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance L  Lilliefors GOF Test	.evel
0.167  DF Test on De 0.933 0.792 0.23 0.346	95% KM Adjusted Gamma UCL  etected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance L	.evel
	1.827 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000428 1.000429 1.000429 1.000429 1.00041 1.00041 1.00041	Theta star (bias corrected MLE) 14.62 nu star (bias corrected) 0.0783  Setatistics using Imputed Non-Detects set has > 50% NDs with many tied observations at multiple DLs small such as <1.0, especially when the sample size is small (e.g., <15-20) method may yield incorrect values of UCLs and BTVs cially true when the sample size is small. and UCLs may be computed using gamma distribution on KM estimates 10.01 Mean 10.16 Median 10.06 k star (bias corrected MLE) 11.06 k star (bias corrected MLE) 11.07 nu star (bias corrected MLE) 11.72 nu star (bias corrected) 11.72 nu star (bias corrected) 11.73 nu star (bias corrected) 11.74 nu star (bias corrected) 11.75 Samma Parameters using KM Estimates 10.0572 SD (KM) 11.113 k star (KM) 11.113 k star (KM) 11.113 k star (KM) 11.113 k star (KM) 11.114 theta star (KM) 11.115 nu star (KM) 11.116 theta star (KM) 11.117 theta star (KM) 11.118 theta star (KM) 11.119 theta star (KM)

· · · · · · · · · · · · · · · · · · ·		ing Imputed Non-Detects	
Mean in Original Scale	0.0537	Mean in Log Scale	-3.7
SD in Original Scale	0.0625	SD in Log Scale	1.
95% t UCL (assumes normality of ROS data)	0.105	95% Percentile Bootstrap UCL	0.0
95% BCA Bootstrap UCL	0.102	95% Bootstrap t UCL	0.
95% H-UCL (Log ROS)	5.037		
Statistics using KM estimates	on Logged Dat	ta and Assuming Lognormal Distribution	
KM Mean (logged)	-3.297	KM Geo Mean	0.0
KM SD (logged)	0.913	95% Critical H Value (KM-Log)	3.8
KM Standard Error of Mean (logged)	0.431	95% H-UCL (KM -Log)	0.2
KM SD (logged)	0.913	95% Critical H Value (KM-Log)	3.8
KM Standard Error of Mean (logged)	0.431		
	DL/2 Stati	istics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0547	Mean in Log Scale	-3.5
SD in Original Scale	0.0616	SD in Log Scale	1.2
95% t UCL (Assumes normality)	0.105	95% H-Stat UCL	1.2
DL/2 is not a recommended m	ethod, provided	d for comparisons and historical reasons	
Nonparame	etric Distribution	n Free UCL Statistics	
<u> </u>		buted at 1% Significance Level	
	Suggested UC	21 to Liea	
95% KM (t) UCL	0.109	)	
33 % RWI (I) OCL	0.103		
Note: Suggestions regarding the selection of a 95%	UCL are provi	ded to help the user to select the most appropriate 95% UCL.	•
Percommendations are based upon data size	. data distributio	on, and skewness using results from simulation studies.	

Total Number of Observations   4		General S	Statistics	
Number of Distinct Detects 3 Number of Distinct Non-Detects 1 Minimum Detect 0.0061 Minimum Detect 1.0061 Minimum Non-Detect 1.68000 Maximum Detect 0.0061 Minimum Non-Detect 1.68000 Maximum Detect 0.0071 Maximum Non-Detect 2.85% Mean Detects 4.0438-6 Percent Non-Detects 2.25% Mean Detects 0.00777 SD Detects 0.0077 Detects 0.0072 CV Detects 0.25% Median Detects 0.25% Median Detects 0.25% Median Detects 0.0072 CV Detects 0.25% Median Detects 0.25% Median Detects 0.0072 CV Detects 0.25% Median Detects 0.25% Median Detects 0.25% Median Detects 0.0072 CV Detects 0.25% Median Detects 0.25% Median Detects 0.25% Median Detects 0.0072 CV Detects 0.25% Median Detects 0.25% Detected Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Kaplan-Meler (KM) Statistics using Normal Critical Values and other Nonparametric UCLs Median Detects Data Spear Normal at 1% Significance Level 0.006 Median Detects Detects Detected Detected Detected Detects Detect	Total Number of Observations			4
Minimum Detect 0.0061 Maximum Mon-Detect 6.80001 Maximum Non-Detect 6.80001 Maximum Detect 0.011 Maximum Non-Detect 6.80001 Maximum Non-Detect 6.80001 Variance Detects 4.4433E-6 Percent Non-Detects 25% Median Detects 0.0077 SD Detects 0.0021 Median Detects 0.0077 SD Detects 0.0021 Median Detects 0.0072 CV Detects 0.0021 Skewness Detects 1.167 Kurtosis Detects NNA Mean of Logged Detects 4.879 SD of Logged Detects 0.212 Maximum Non-Detects 0.0212 Stewness Detects 1.167 Kurtosis Detects NNA Mean of Logged Detects 4.879 SD of Logged Detects 0.212 Warning: Deta set has only 3 Detected Values.  This is not enough to compute meaningful or reliable statistics and estimates.  Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Gulde on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test on Detects Only  Shapiro Wilk Test Statistic 0.94 Shapiro Wilk GOF Test 1% Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level Lilliefors Test Statistic 0.278 Lilliefors GOF Test 1% Lilliefors Test Statistic 0.278 Lilliefors GOF Test 1% Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Kaplan-Meler (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006 KM Standard Error of Mean 0.006 NM Standard Error of Mean 0.006		3		1
Maximum Detect	Number of Distinct Detects	3		1
Variance Detects   4.0438E-6   Percent Non-Detects   25%		0.0061		6.8000E
Mean Detects 0.00777 SD Detects 0.0072  Median Detects 0.0072 CV Detects 0.25  Skewness Detects 1.167 Kurtosis Detects N/A  Mean of Logged Detects 4.879 SD of Logged Detects 0.25  Warning: Data set has only 3 Detected Values.  This is not enough to compute meaningful or reliable statistics and estimates.  Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test on Detects Only  Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level 1% Lilliefors Test Statistic 0.278 Lilliefors GOF Test 1% Lilliefors Test Statistic 0.278 Lilliefors GOF Test 1% Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006 KM Standard Error of Mean 0.000  90KM SD 0.00338 95% KM (Percentile Bootstrap) UCL N/A 95% KM 0.005trap I UCL N/A 95% KM (Debyshev UCL 0.0199 95% KM (Percentile Bootstrap) UCL N/A 95% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.0129 99% KM Cheb	Maximum Detect	0.01	Maximum Non-Detect 6	6.8000E
Skewness Detects   1,167   Kurtosis Detects   N/A	Variance Detects	4.0433E-6	Percent Non-Detects	25%
Skewness Detects	Mean Detects	0.00777	SD Detects	0.002
Mean of Logged Detects	Median Detects	0.0072	CV Detects	0.25
Warning: Data set has only 3 Detected Values.  This is not enough to compute meaningful or reliable statistics and estimates.  Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test on Detects Only  Shapiro Wilk Test Statistic 0.94 Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level Detected Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006 KM Standard Error of Mean 0.005  Manual Critical Value 0.0094 95% KM (Percentile Booistrap) UCL N/A 95% KM (0) UCL 0.0109 95% KM (Percentile Booistrap) UCL N/A 95% KM (chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.012 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.019 99% KM Chebyshev UCL 0.020 0.004 0.006 0	Skewness Detects	1.167	Kurtosis Detects	N/A
This is not enough to compute meaningful or reliable statistics and estimates.  Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test on Detects Only  Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value  0.753  Detected Data appear Normal at 1% Significance Level  Lilliefors Test Statistic  1% Lilliefors Critical Value  0.429  Detected Data appear Normal at 1% Significance Level  Note GOF Tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean  0.006  KM Standard Error of Mean  0.006  90KM SD  0.00338  95% KM (BCA) UCL  0.0094  95% KM (Percentile Bootstrap) UCL  0.0129  95% KM (Percentile Bootstrap) UCL  0.0129  95% KM Chebyshev UCL  0.0120  97.5% KM Chebyshev UCL  0.0120  99% KM Chebyshev UCL  0.0120  99% KM Chebyshev UCL  0.0120  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic  0.306  Anderson-Darling GOF Test  5% A-D Critical Value  0.635  Detected data appear Gamma Distributed at 5% Significance Level	Mean of Logged Detects	-4.879	SD of Logged Detects	0.25
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test on Detects Only  Shapiro Wilk Test Statistic  9.94  Shapiro Wilk GOF Test 1% Shapiro Wilk Critical Value Lilliefors Test Statistic 0.278  Lilliefors GOF Test 1% Lilliefors Critical Value Detected Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 9.006  KM Standard Error of Mean 9.0038 95% KM (BCA) UCL N/A 95% KM (1) UCL 0.0109 95% KM (Percentile Bootstrap) UCL N/A 95% KM (2) UCL 0.0094 95% KM (Percentile Bootstrap) UCL N/A 90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.0149 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.019  Gamma GOF Tests on Detected Observations Only A-D Test Statistic 0.306 Anderson-Darling GOF Test 5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	<u> </u>		·	
Normal GOF Test on Detects Only  Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  0.278  Lilliefors GOF Test  1% Lilliefors Critical Value  0.753  Detected Data appear Normal at 1% Significance Level  Lilliefors Critical Value  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unrellable for small sample sizes  Kaplan-Meler (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006  KM Standard Error of Mean 0.006  90KM SD 0.00338  95% KM (BCA) UCL N/A  95% KM (t) UCL 0.0109  95% KM (Percentile Bootstrap) UCL N/A  95% KM (z) UCL 0.0094  95% KM Chebyshev UCL 0.0122  95% KM Chebyshev UCL 0.012  97.5% KM Chebyshev UCL 0.0189  99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic  5% A-D Critical Value  0.94  Shapiro Wilk GOF Test  1% S	refer also to ITRC Tech Reg Guide of but note that ITRC may recommend the	on ISM (ITRO	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	
Normal GOF Test on Detects Only  Shapiro Wilk Test Statistic 0.94 Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.278 Lilliefors GOF Test  1% Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006 KM Standard Error of Mean 0.006  90KM SD 0.00338 95% KM (BCA) UCL N/A  95% KM (t) UCL 0.0109 95% KM (Percentile Bootstrap) UCL N/A  95% KM (z) UCL 0.0094 95% KM (Percentile Bootstrap) UCL N/A  90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01  97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level				
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  0.278  Lilliefors GOF Test  1% Lilliefors Critical Value  Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  1% Lilliefors Critical Value  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean  0.006  KM Standard Error of Mean  0.002  90KM SD  0.00338  95% KM (BCA) UCL  N/A  95% KM (t) UCL  0.0109  95% KM (Percentile Bootstrap) UCL  N/A  95% KM (z) UCL  0.0094  95% KM Chebyshev UCL  0.0122  95% KM Chebyshev UCL  0.012  97.5% KM Chebyshev UCL  0.0189  99% KM Chebyshev UCL  0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic  5% A-D Critical Value  0.635  Detected data appear Gamma Distributed at 5% Significance Level	Refer to the Prooct 5.2 Ted	milical Guide	e for a discussion of the Chebyshev OCL.	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  0.278  Lilliefors GOF Test  1% Lilliefors Critical Value  Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  1% Lilliefors Critical Value  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean  0.006  KM Standard Error of Mean  0.002  90KM SD  0.00338  95% KM (BCA) UCL  N/A  95% KM (t) UCL  0.0109  95% KM (Percentile Bootstrap) UCL  N/A  95% KM (z) UCL  0.0094  95% KM Chebyshev UCL  0.0122  95% KM Chebyshev UCL  0.012  97.5% KM Chebyshev UCL  0.0189  99% KM Chebyshev UCL  0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic  5% A-D Critical Value  0.635  Detected data appear Gamma Distributed at 5% Significance Level	Norm	nal GOF Test	t on Detects Only	
1% Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.278 Lilliefors GOF Test  1% Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean 0.006 KM Standard Error of Mean 0.002  90KM SD 0.00338 95% KM (BCA) UCL N/A  95% KM (t) UCL 0.0109 95% KM (Percentile Bootstrap) UCL N/A  95% KM (z) UCL 0.0094 95% KM Chebyshev UCL 0.012  90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01  97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level				
Lilliefors Test Statistic  1% Lilliefors Critical Value  0.429  Detected Data appear Normal at 1% Significance Level  Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  KM Mean  0.006  KM Standard Error of Mean  0.002  90KM SD  0.00338  95% KM (BCA) UCL  N/A  95% KM (b UCL  0.0109  95% KM (Percentile Bootstrap) UCL  N/A  95% KM (2) UCL  0.0094  95% KM Chebyshev UCL  0.0122  95% KM Chebyshev UCL  0.012  97.5% KM Chebyshev UCL  0.0189  99% KM Chebyshev UCL  0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic  0.306  Anderson-Darling GOF Test  5% A-D Critical Value  0.635  Detected data appear Gamma Distributed at 5% Significance Level	·	0.753	<u> </u>	el
Detected Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes    Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs   KM Mean   0.006   KM Standard Error of Mean   0.002	Lilliefors Test Statistic	0.278	Lilliefors GOF Test	
Note GOF tests may be unreliable for small sample sizes    Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs   KM Mean   0.006   KM Standard Error of Mean   0.002     90KM SD   0.00338   95% KM (BCA) UCL   N/A     95% KM (t) UCL   0.0109   95% KM (Percentile Bootstrap) UCL   N/A     95% KM (z) UCL   0.0094   95% KM Bootstrap t UCL   N/A     90% KM Chebyshev UCL   0.0122   95% KM Chebyshev UCL   0.01     97.5% KM Chebyshev UCL   0.0189   99% KM Chebyshev UCL   0.02     Gamma GOF Tests on Detected Observations Only     A-D Test Statistic   0.306   Anderson-Darling GOF Test     5% A-D Critical Value   0.635   Detected data appear Gamma Distributed at 5% Significance Level	1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Leve	el
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs   KM Mean   0.006   KM Standard Error of Mean   0.002     90KM SD   0.00338   95% KM (BCA) UCL   N/A     95% KM (t) UCL   0.0109   95% KM (Percentile Bootstrap) UCL   N/A     95% KM (z) UCL   0.0094   95% KM Bootstrap t UCL   N/A     95% KM Chebyshev UCL   0.0122   95% KM Chebyshev UCL   0.01     97.5% KM Chebyshev UCL   0.0189   99% KM Chebyshev UCL   0.02     Gamma GOF Tests on Detected Observations Only     A-D Test Statistic   0.306   Anderson-Darling GOF Test     5% A-D Critical Value   0.635   Detected data appear Gamma Distributed at 5% Significance Level	Detected Data a	appear Norm	al at 1% Significance Level	
KM Mean         0.006         KM Standard Error of Mean         0.002           90KM SD         0.00338         95% KM (BCA) UCL         N/A           95% KM (t) UCL         0.0109         95% KM (Percentile Bootstrap) UCL         N/A           95% KM (z) UCL         0.0094         95% KM Bootstrap t UCL         N/A           90% KM Chebyshev UCL         0.0122         95% KM Chebyshev UCL         0.01           97.5% KM Chebyshev UCL         0.0189         99% KM Chebyshev UCL         0.02           Gamma GOF Tests on Detected Observations Only           A-D Test Statistic         0.306         Anderson-Darling GOF Test           5% A-D Critical Value         0.635         Detected data appear Gamma Distributed at 5% Significance Level	Note GOF tests	may be unre	liable for small sample sizes	
KM Mean         0.006         KM Standard Error of Mean         0.002           90KM SD         0.00338         95% KM (BCA) UCL         N/A           95% KM (t) UCL         0.0109         95% KM (Percentile Bootstrap) UCL         N/A           95% KM (z) UCL         0.0094         95% KM Bootstrap t UCL         N/A           90% KM Chebyshev UCL         0.0122         95% KM Chebyshev UCL         0.01           97.5% KM Chebyshev UCL         0.0189         99% KM Chebyshev UCL         0.02           Gamma GOF Tests on Detected Observations Only           A-D Test Statistic         0.306         Anderson-Darling GOF Test           5% A-D Critical Value         0.635         Detected data appear Gamma Distributed at 5% Significance Level				
90KM SD 0.00338 95% KM (BCA) UCL N/A 95% KM (t) UCL 0.0109 95% KM (Percentile Bootstrap) UCL N/A 95% KM (z) UCL 0.0094 95% KM Bootstrap t UCL N/A 90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test 5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	Kaplan-Meier (KM) Statistics usin	ng Normal Cr	ritical Values and other Nonparametric UCLs	
95% KM (t) UCL 0.0109 95% KM (Percentile Bootstrap) UCL N/A 95% KM (z) UCL 0.0094 95% KM Bootstrap t UCL N/A 90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test 5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	KM Mean	0.006	KM Standard Error of Mean	0.002
95% KM (z) UCL 0.0094 95% KM Bootstrap t UCL N/A 90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test 5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level		0.00338	95% KM (BCA) UCL	N/A
90% KM Chebyshev UCL 0.0122 95% KM Chebyshev UCL 0.01 97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	0=0(145.4)1101	0.0109	,	N/A
97.5% KM Chebyshev UCL 0.0189 99% KM Chebyshev UCL 0.02  Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level		0.0094	95% KM Bootstrap t UCL	N/A
Gamma GOF Tests on Detected Observations Only  A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level		0.0001	OF 0/ I/M Chabushau LICI	0.01
A-D Test Statistic 0.306 Anderson-Darling GOF Test  5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	95% KM (z) UCL		95% KW Chebyshev UCL	
5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance Level	95% KM (z) UCL 90% KM Chebyshev UCL	0.0122	-	0.026
	95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	0.0122 0.0189	99% KM Chebyshev UCL	0.026
K-S Test Statistic 0.282 Kolmogorov-Smirnov GOF	95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL Gamma GOF	0.0122 0.0189	99% KM Chebyshev UCL tected Observations Only	0.026
	95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.0122 0.0189 <b>Tests on De</b>	99% KM Chebyshev UCL tected Observations Only Anderson-Darling GOF Test	
5% K-S Critical Value 0.431 Detected data appear Gamma Distributed at 5% Significance Leve	95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value	0.0122 0.0189 Tests on De 0.306 0.635	99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	

Gamma	Statistics or	Detected Data Only	
k hat (MLE)	23.4	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.3196E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	140.4	nu star (bias corrected)	N/A
Mean (detects)	0.00777		
Gamma ROS	Statistics u	sing Imputed Non-Detects	
GROS may not be used when data s	et has > 50%	6 NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
		yield incorrect values of UCLs and BTVs	
This is especi	ally true whe	en the sample size is small.	
For gamma distributed detected data, BTVs a	nd UCLs ma	ay be computed using gamma distribution on KM estimates	
Minimum	0.0061	Mean	0.00833
Maximum	0.01	Median	0.0086
SD	0.00199	CV	0.239
k hat (MLE)	22.51	k star (bias corrected MLE)	5.794
Theta hat (MLE)	3.6986E-4	Theta star (bias corrected MLE)	0.00144
nu hat (MLE)	180.1	nu star (bias corrected)	46.35
Adjusted Level of Significance (β)	0.00498		
Approximate Chi Square Value (46.35, α)	31.73	Adjusted Chi Square Value (46.35, β)	N/A
95% Gamma Approximate UCL	0.0122	95% Gamma Adjusted UCL	N/A
		1	
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.006	SD (KM)	0.00338
Variance (KM)	1.1438E-5	SE of Mean (KM)	0.00207
k hat (KM)	3.142	k star (KM)	0.952
nu hat (KM)	25.14	nu star (KM)	7.618
theta hat (KM)	0.00191	theta star (KM)	0.0063
80% gamma percentile (KM)	0.00969	90% gamma percentile (KM)	0.014
95% gamma percentile (KM)	0.0183	99% gamma percentile (KM)	0.0283
		eier (KM) Statistics	
Approximate Chi Square Value (7.62, α)	2.516	Adjusted Chi Square Value (7.62, β)	1.211
95% KM Approximate Gamma UCL	0.0182	95% KM Adjusted Gamma UCL	0.0377
Lognormal GC	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk GOF Test	
Chapito Trint 100t Otationo	0.789	Detected Data appear Lognormal at 10% Significance L	evel
10% Shapiro Wilk Critical Value			
·		Lilliefors GOF Test	
10% Shapiro Wilk Critical Value		Lilliefors GOF Test  Detected Data appear Lognormal at 10% Significance L	evel
10% Shapiro Wilk Critical Value  Lilliefors Test Statistic  10% Lilliefors Critical Value	0.252 0.389		evel

Lognormal ROS	S Statistics I	Jsing Imputed Non-Detects	
Mean in Original Scale	0.00675	Mean in Log Scale	-5.058
SD in Original Scale	0.00261	SD in Log Scale	0.412
95% t UCL (assumes normality of ROS data)	0.00201	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	0.00962 N/A	95% Percentile Bootstrap UCL	N/A
·		95% Bootstrap t OCL	IN/A
95% H-UCL (Log ROS)	0.0149		
Obstitution units of I/Ad antissands		Debugge of Accounting Language Distribution	
_		Data and Assuming Lognormal Distribution	
KM Mean (logged)	-5.483	KM Geo Mean	0.00416
KM SD (logged)	1.06	95% Critical H Value (KM-Log)	7.052
KM Standard Error of Mean (logged)	0.649	95% H-UCL (KM -Log)	0.547
KM SD (logged)	1.06	95% Critical H Value (KM-Log)	7.052
KM Standard Error of Mean (logged)	0.649		
	DL/2 St	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00591	Mean in Log Scale	-5.656
SD in Original Scale	0.00406	SD in Log Scale	1.567
95% t UCL (Assumes normality)	0.0107	95% H-Stat UCL	133.9
DL/2 is not a recommended me	ethod, provid	ded for comparisons and historical reasons	
Nonparame	tric Distribut	tion Free UCL Statistics	
Detected Data appear	r Normal Dis	stributed at 1% Significance Level	
	Currented	UCL to Use	
	Suggested	332 13 333	
95% KM (t) UCL	0.0109		
95% KM (t) UCL	0.0109	ceeds the maximum observation	
95% KM (t) UCL	0.0109		
95% KM (t) UCL Warning: Recommen	0.0109 ded UCL ex		
95% KM (t) UCL  Warning: Recommen  Note: Suggestions regarding the selection of a 95%	0.0109  ded UCL ex	ceeds the maximum observation	

	UCL Statist			
Llacy Calacted Options				
User Selected Options	roUCL 5.2 11/13/2024 2	).07.01 DM		
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	nw15_3year_data.xls			
	5%			
	000			
Number of Bootstrap Operations 20				
litrate - MW-15				
		General Stat	istics	
Total Nu	umber of Observations	6	Number of Distinct Observations	5
			Number of Missing Observations	0
	Minimum	3.4	Mean	5.033
	Maximum	12	Median	3.65
	SD	3.417	Std. Error of Mean	1.395
(	Coefficient of Variation	0.679	Skewness	2.437
refer also to IT but note that ITF	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of	n ISM (ITRC 20 e t-UCL or the 0 ten results in gr	ng incremental sampling methodology (ISM) approach, 20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). coss overestimates of the mean. The a discussion of the Chebyshev UCL.	
refer also to IT but note that ITF	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of	n ISM (ITRC 20 e t-UCL or the 0 ten results in gi nnical Guide for	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). coss overestimates of the mean. a discussion of the Chebyshev UCL.	
refer also to IT but note that ITF T Refer t	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech	n ISM (ITRC 20 e t-UCL or the 0 ten results in gi nnical Guide for Normal GOF	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). coss overestimates of the mean. Ta discussion of the Chebyshev UCL.	
refer also to IT but note that ITF T Refer t	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech	n ISM (ITRC 20 e t-UCL or the 0 ten results in gr nnical Guide for Normal GOF 0.542	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). coss overestimates of the mean. a discussion of the Chebyshev UCL.  Test Shapiro Wilk GOF Test	
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech apiro Wilk Test Statistic piro Wilk Critical Value	n ISM (ITRC 20 e t-UCL or the 0 ten results in granical Guide for Normal GOF 0.542 0.713	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level	
refer also to IT but note that ITF T Refer t Sha 1% Sha	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. Ta discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test	
refer also to IT but note that ITF T Refer t Sha 1% Sha	TRC Tech Reg Guide of RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level	
refer also to IT but note that ITF T Refer t Sha 1% Sha	TRC Tech Reg Guide of RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. Ta discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test	
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refer also to IT but note that ITF T Refer t Sha 1% Sha	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% Suming Normal	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)	
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data Not  Ass	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% S	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% Suming Normal	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)	8.811 8.075
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% Suming Normal	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% Suming Normal 7.844	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL  95% Student's-t UCL	n ISM (ITRC 20 e t-UCL or the O ten results in granical Guide for  Normal GOF  0.542  0.713  0.463  0.373  Normal at 1% S  suming Normal  7.844  Gamma GOF	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	8.075
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data Not  Ass mal UCL  95% Student's-t UCL	n ISM (ITRC 20 e t-UCL or the O ten results in granical Guide for  Normal GOF  0.542  0.713  0.463  0.373  Normal at 1% S  suming Normal  7.844  Gamma GOF  1.443	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  Test  Anderson-Darling Gamma GOF Test	8.075
refer also to IT but note that ITF T Refer to Sha 1% Shap	TRC Tech Reg Guide o RC may recommend the The Chebyshev UCL of to the ProUCL 5.2 Tech  apiro Wilk Test Statistic piro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value  Data Not  Ass mal UCL  95% Student's-t UCL  A-D Test Statistic  5% A-D Critical Value	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.542 0.713 0.463 0.373 Normal at 1% Suming Normal 7.844 Gamma GOF 1.443 0.7	20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Coss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  Test  Anderson-Darling Gamma GOF Test  Data Not Gamma Distributed at 5% Significance Level	8.075

	Gamma Stati	stics	
k hat (MLE)	4.124	k star (bias corrected MLE)	2.17
Theta hat (MLE)	1.22	Theta star (bias corrected MLE)	2.3
nu hat (MLE)	49.49	nu star (bias corrected)	26.0
MLE Mean (bias corrected)	5.033	MLE Sd (bias corrected)	3.4
		Approximate Chi Square Value (0.05)	15.4
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	12.5
Ass	suming Gamma I	Distribution	
95% Approximate Gamma UCL	8.501	95% Adjusted Gamma UCL	10.4
	Lognormal GO	F Test	
Shapiro Wilk Test Statistic	0.583	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.437	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data Not Lognormal at 10% Significance Level	
Data Not Lo	gnormal at 10%	Significance Level	
	Lognormal Sta	tistics	
Minimum of Logged Data	1.224	Mean of logged Data	1.4
Maximum of Logged Data	2.485	SD of logged Data	0.4
Assu	ming Lognorma	Distribution	
95% H-UCL	8.861	90% Chebyshev (MVUE) UCL	7.8
95% Chebyshev (MVUE) UCL	9.155	97.5% Chebyshev (MVUE) UCL	11
99% Chebyshev (MVUE) UCL	14.62		
Nonparame	tric Distribution I	Free UCL Statistics	
		rnible Distribution	
N	anasada Distribut	Van Francisco	
	ametric Distribut	tion Free OCLS	
	7 220	OFO/ DCA Pastetran LICI	7.0
95% CLT UCL	7.328	95% BCA Bootstrap UCL	7.8
95% Standard Bootstrap UCL	7.128	95% Bootstrap-t UCL	49.7
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	7.128 41.7	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	49.7
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	7.128 41.7 9.218	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	49.7 7.7 11.1
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	7.128 41.7	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	49.7 7.7 11.1
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	7.128 41.7 9.218	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	49.7 7.7 11.1
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	7.128 41.7 9.218 13.74	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	49.7 7.7 11.1
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided  Note: Suggestions regarding the selection of a 95%	7.128 41.7 9.218 13.74  Suggested UCL  UCL are provide	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	49.7 7.7 11.1 18.9
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided  Note: Suggestions regarding the selection of a 95%	7.128 41.7 9.218 13.74  Suggested UCL  UCL are provide	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	49.7 7.73 11.1 18.9

	General	Statistics	
Total Number of Observations	6	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.014	Mean	0.014
Maximum	0.015	Median	0.015
SD	5.1640E-4	Std. Error of Mean 2	2.1082E
Coefficient of Variation	0.0352	Skewness	-0.968
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide	on ISM (ITR	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Ted	chnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.64	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.407	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data Not Normal at 1% Significance Level	
Data Not	Normal at 1	% Significance Level	
As	suming Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0151	95% Adjusted-CLT UCL (Chen-1995)	0.014
		95% Modified-t UCL (Johnson-1978)	0.01
	Gamma (	GOF Test	
A-D Test Statistic	1.239	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.696	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic		Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.332	Data Not Gamma Distributed at 5% Significance Leve	el
		ed at 5% Significance Level	
	Gamma	Statistics	
k hat (MLE)		k star (bias corrected MLE)	476.6
Theta hat (MLE)		Theta star (bias corrected MLE) (	3.0774E
nu hat (MLE)		· · ·	5719
MLE Mean (bias corrected)	0.0147		6.7183E
, ,			5544
Adjusted Level of Significance	0.0122		5481
Α.σ.	eumina Co-	ma Distribution	
As: 95% Approximate Gamma UCL	suming Gam 0.0151	ma Distribution  95% Adjusted Gamma UCL	0.01

	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.64	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.407	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data Not Lognormal at 10% Significance Level	
Data Not Lo	gnormal at	10% Significance Level	
	Lognormo	al Statistics	
Minimum of Logged Data	-4.269	Mean of logged Data	-4.223
Maximum of Logged Data	-4.2	SD of logged Data	0.035
Assu	ming Logno	ormal Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.015
95% Chebyshev (MVUE) UCL	0.0156	97.5% Chebyshev (MVUE) UCL	0.016
99% Chebyshev (MVUE) UCL	0.0168		
-			
Nonparame	tric Distribu	tion Free UCL Statistics	
Data do no	ot follow a D	Discernible Distribution	
Nonpar	ametric Dis	tribution Free UCLs	
95% CLT UCL	0.015	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0153	95% Chebyshev(Mean, Sd) UCL	0.015
97.5% Chebyshev(Mean, Sd) UCL	0.016	99% Chebyshev(Mean, Sd) UCL	0.016
	Suggested	UCL to Use	
Recommendation cannot be provided			
	· ·	ovided to help the user to select the most appropriate 95% UCL.	
		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	orld data se	ts; for additional insight the user may want to consult a statisticia	ın.
Note: For highly negatively-skewed data, confid	ence limits	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	
		de adjustments for positvely skewed data sets.	

	OCE Statis	doo loi Data	Sets with Non-Detects	
User Selected Options				
•	ProUCL 5.2 11/13/2024	2:28:57 PM		
From File	mw16_3year_data.xls			
Full Precision	OFF			
	95%			
Number of Bootstrap Operations	2000			
itrate - MW-16				
		General	Statistics	
Total	Number of Observations	6	Number of Distinct Observations	6
			Number of Missing Observations	0
	Minimum	13	Mean	76.67
	Maximum	130	Median	80.5
	SD	39.89	Std. Error of Mean	16.29
	Coefficient of Variation	0.52	Skewness	-0.478
	o ITRC Tech Reg Guide o	e t-UCL or t	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7).	
refer also to	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of	e t-UCL or the ften results in the hands	2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.	
refer also to but note that I	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the to the ProUCL 5.2 Tec	e t-UCL or the ten results in the characteristic depth of	2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.	
refer also to but note that I	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the Total to the ProUCL 5.2 Tech	te t-UCL or the ten results in the characteristic through the characteristi	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test	
refer also to but note that I	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Technology with the ProUCL 5.2 Technology with the ProUCL Statistic chapiro Wilk Critical Value	Normal G 0.985 0.713	2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
Refe	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic Chapiro Wilk Critical Value Lilliefors Test Statistic	Normal G 0.985 0.713 0.144	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. IN GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic chapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value	Normal G 0.985 0.713 0.144 0.373	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Refe	TRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic Chapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear	Normal G 0.985 0.713 0.144 0.373 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL. IN GOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Refe	The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic chapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Data appear	Normal G 0.985 0.713 0.144 0.373 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In gross overestimates overestima	
refer also to but note that I  Refe	The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic chapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Data appear	Normal G 0.985 0.713 0.144 0.373 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
refer also to but note that I  Refe	The Chebyshev UCL of the ProUCL 5.2 Tech the ProUCL 5.2 Tech thapiro Wilk Test Statistic thapiro Wilk Critical Value Lilliefors Test Statistic Statistic Chapter Critical Value Data appear Note GOF tests in Asset Control of the Cont	Normal G 0.985 0.713 0.144 0.373 ar Normal at	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	100.1
refer also to but note that I  Refe	The Chebyshev UCL of the rest of the ProUCL 5.2 Tech thapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests of the ProUCL 5.2 Tech thapiro Wilk Critical Value Lilliefors Test Statistic Associated Associated Control of the ProUCL 5.2 Tech thapiro Wilk Test Statistic Patrick Test Statistic Note GOF tests of the ProUCL 5.2 Tech thapiro Wilk Test Statistic Patrick Test Statistic Pa	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unressuming Normal	2 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  page 10 10 10 10 10 10 10 10 10 10 10 10 10	100.1
refer also to but note that I  Refe	The Chebyshev UCL of the rest of the ProUCL 5.2 Tech thapiro Wilk Test Statistic hapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests of the ProUCL 5.2 Tech thapiro Wilk Critical Value Lilliefors Test Statistic Associated Associated Control of the ProUCL 5.2 Tech thapiro Wilk Test Statistic Patrick Test Statistic Note GOF tests of the ProUCL 5.2 Tech thapiro Wilk Test Statistic Patrick Test Statistic Pa	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I  Refe	o ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic Chapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Data appear Note GOF tests of Assormal UCL  95% Student's-t UCL	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I  Refe	The Chebyshev UCL of the ProUCL 5.2 Tech the ProUCL 5.2 Tech thapiro Wilk Test Statistic thapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests of Note GOF tests of Assormal UCL  A-D Test Statistic	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unre	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  page 195% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	109
refer also to but note that I  Refe	The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic thapiro Wilk Critical Value Lilliefors Test Statistic Note GOF tests of Note GOF tests of Assormal UCL  A-D Test Statistic  A-D Test Statistic  A-D Test Statistic	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unresuming Normal 109.5  Gamma C 0.438 0.702	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	109
refer also to but note that I  Refe	ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic Chapiro Wilk Critical Value Lilliefors Test Statistic % Lilliefors Critical Value Data appear Note GOF tests of Note GOF tests of Assormal UCL  95% Student's-t UCL  A-D Test Statistic  5% A-D Critical Value K-S Test Statistic	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unressuming Normal 109.5  Gamma C 0.438 0.702 0.235	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. In for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  Iliable for small sample sizes  Parall Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	109
refer also to but note that I  Refe	ITRC Tech Reg Guide of ITRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech chapiro Wilk Test Statistic thapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appear Note GOF tests of Note GOF tests of Assormal UCL  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value K-S Test Statistic 5% K-S Critical Value	Normal G 0.985 0.713 0.144 0.373 ar Normal at may be unre suming Norm 109.5  Gamma C 0.438 0.702 0.235 0.335	C 2020 and ITRC 2012) for additional guidance, the Chebyshev UCL for small sample sizes (n < 7). In gross overestimates of the mean. It for a discussion of the Chebyshev UCL.  SOF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  and Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	109 ce Level

	Gamma St	· · · · · · · · · · · · · · · · · · ·	
k hat (MLE)		k star (bias corrected MLE)	1.43
Theta hat (MLE)	28.9	Theta star (bias corrected MLE)	53.3
nu hat (MLE)		nu star (bias corrected)	17.2
MLE Mean (bias corrected)	76.67	MLE Sd (bias corrected)	63.94
		Approximate Chi Square Value (0.05)	8.85
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	6.79
As	suming Gamm	a Distribution	
95% Approximate Gamma UCL	149.4	95% Adjusted Gamma UCL	194.7
	Lognormal G	GOF Test	
Shapiro Wilk Test Statistic	0.813	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.287	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear Appro	ximate Lognor	mal at 10% Significance Level	
Note GOF tests	may be unrelia	able for small sample sizes	
	Lognormal S	Statistics	
Minimum of Logged Data	2.565	Mean of logged Data	4.13
Maximum of Logged Data	4.868	SD of logged Data	0.82
Ass	uming Lognorn	nal Distribution	
95% H-UCL	322	90% Chebyshev (MVUE) UCL	164.2
95% Chebyshev (MVUE) UCL	201.3	97.5% Chebyshev (MVUE) UCL	252.8
99% Chebyshev (MVUE) UCL	354	, , ,	
<u> </u>		I	
Nonparame	etric Distributio	n Free UCL Statistics	
•		iscemible Distribution	
Nonpa	rametric Distril	bution Free UCLs	
95% CLT UCL	103.5	95% BCA Bootstrap UCL	99
95% Standard Bootstrap UCL	101	95% Bootstrap-t UCL	105.9
95% Hall's Bootstrap UCL	102.4	95% Percentile Bootstrap UCL	100.5
90% Chebyshev(Mean, Sd) UCL	125.5	95% Chebyshev(Mean, Sd) UCL	147.7
97.5% Chebyshev(Mean, Sd) UCL	178.4	99% Chebyshev(Mean, Sd) UCL	238.7
- Chiese Chesysher (Mean, ea) 662	170.1	oo /o onobjenov(moun, ou) ooz	200.7
	Suggested U	CL to Use	
95% Student's-t UCL	109.5		
30% Gladents-t GGE			
Note: Suggestions regarding the selection of a 95%	6 UCL are prov	ided to help the user to select the most appropriate 95% UCL	
		on, and skewness using results from simulation studies.	•
		for additional insight the user may want to consult a statisticia	an
However, simulations results will flot cover all field W	onu uata SEIS,	To additional moight the user may want to consult a statisticie	411.
Note: For highly negatively-skewed data, confi	dence limite (e	.g., Chen, Johnson, Lognormal, and Gamma) may not be	
reliable. Chen's and Johnson's me			

	General S	Statistics	
Total Number of Observations			6
Total Number of Observations	6	Number of Distinct Observations	6
Minimum	0.22	Number of Missing Observations	0.
Maximum	1.8	Mean Median	0.
SD	0.592	Std. Error of Mean	0.
Coefficient of Variation	0.693	Skewness	0.
Coefficient of Variation	0.033	Orewitess	· ·
Note: Sample size is small (e.g., <10), if data ar	e collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide or	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	t-UCL or ti	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL off	en results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.262	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
Ass	uming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.34	95% Adjusted-CLT UCL (Chen-1995)	1.
		95% Modified-t UCL (Johnson-1978)	1.
	Gamma G	GOF Test	
A-D Test Statistic	0.213	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.703	Detected data appear Gamma Distributed at 5% Significance	e Le
K-S Test Statistic	0.189	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significance	e Le
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
	0	District	
L bot (MLF)	<b>Gamma S</b> 2.389	k star (bias corrected MLE)	1.
k hat (MLE)	0.357	, , , , , , , , , , , , , , , , , , , ,	0.
Theta hat (MLE)		Theta star (bias corrected MLE)	15
nu hot /MI F\	28.66 0.853	nu star (bias corrected)	0.
nu hat (MLE)		MLE Sd (bias corrected)	
nu hat (MLE)  MLE Mean (bias corrected)	0.000	Approvingets Ohi Carrara Value (O.OF)	7.
MLE Mean (bias corrected)		Approximate Chi Square Value (0.05)	_
	0.0122	Approximate Chi Square Value (0.05)  Adjusted Chi Square Value	5.
MLE Mean (bias corrected)  Adjusted Level of Significance	0.0122		5.

	Lognormal GOI	F Test	
Shapiro Wilk Test Statistic	0.971	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.173	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear l	ognormal at 10°	% Significance Level	
Note GOF tests r	nay be unreliable	e for small sample sizes	
	Lognormal Sta	tistics	
Minimum of Logged Data	-1.514	Mean of logged Data	-0.38
Maximum of Logged Data	0.588	SD of logged Data	0.76
Assu	ming Lognormal	Distribution	
95% H-UCL	2.891	90% Chebyshev (MVUE) UCL	1.66
95% Chebyshev (MVUE) UCL	2.031	97.5% Chebyshev (MVUE) UCL	2.53
99% Chebyshev (MVUE) UCL	3.529		
		1	
Nonparame	tric Distribution I	Free UCL Statistics	
<u> </u>		ernible Distribution	
Manna	ametric Distribut	ion Free UCLs	
Nonpar			
Nonpara 95% CLT UCL	1.251	95% BCA Bootstrap UCL	1.3
<u></u>	1.251		
95% CLT UCL		95% BCA Bootstrap UCL	1.7
95% CLT UCL 95% Standard Bootstrap UCL	1.22	95% BCA Bootstrap UCL 95% Bootstrap-t UCL	1.7
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	1.22 4.583	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	1.7
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	1.22 4.583 1.578	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	1.70 1.20 1.90
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	1.22 4.583 1.578	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.7
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	1.22 4.583 1.578 2.361	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.30 1.70 1.20 1.90 3.29
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	1.22 4.583 1.578 2.361	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.7 1.2 1.9
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	1.22 4.583 1.578 2.361 Suggested UCL 1.34	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	1.7 1.2 1.9 3.2
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	1.22 4.583 1.578 2.361  Suggested UCL 1.34  UCL are provide	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	1.70 1.20 1.90 3.25

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	1
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.0061	Minimum Non-Detect 6	.8000E-
Maximum Detect	0.019	Maximum Non-Detect 6	.8000E-
Variance Detects	5.5470E-5	Percent Non-Detects	25%
Mean Detects	0.0104	SD Detects	0.0074
Median Detects	0.0061	CV Detects	0.716
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-4.721	SD of Logged Detects	0.656
<del>-</del>		only 3 Detected Values.  Iful or reliable statistics and estimates.	
		using incremental sampling methodology (ISM) approach,	
	<u> </u>	C 2020 and ITRC 2012) for additional guidance,	
<u> </u>		ne Chebyshev UCL for small sample sizes (n < 7).	
<del>-</del>		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	of or a discussion of the Chebyshev UCL.	
Norm	nal GOF Test	on Detects Only	
Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.385	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Leve	el
Detected Data appear	Approximate	e Normal at 1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
Kaplan-Meier (KM) Statistics usi	ng Normal Cı	ritical Values and other Nonparametric UCLs	
KM Mean	0.00797	KM Standard Error of Mean	0.004
90KM SD	0.00674	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0177	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0148	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0204	95% KM Chebyshev UCL	0.026
97.5% KM Chebyshev UCL	0.0338	99% KM Chebyshev UCL	0.049
	Tests on De	tected Observations Only	
Gamma GOF	0.62	Anderson-Darling GOF Test	
Gamma GOF  A-D Test Statistic	0.02	_	ا میما
A-D Test Statistic		Detected data appear Gamma Distributed at 5% Significance	C FCACI
	0.636	Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF	e Level
A-D Test Statistic 5% A-D Critical Value	0.636 0.429	Kolmogorov-Smirnov GOF	
A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	0.636 0.429 0.434		

Gamma	Statistics on	Detected Data Only	
k hat (MLE)	3.388	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00307	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	20.33	nu star (bias corrected)	N/A
Mean (detects)	0.0104		
		sing Imputed Non-Detects	
		NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS	method may	yield incorrect values of UCLs and BTVs	
·	-	n the sample size is small.	
For gamma distributed detected data, BTVs a		y be computed using gamma distribution on KM estimates	
Minimum	0.0061	Mean	0.0103
Maximum	0.019	Median	0.0080
SD	0.00608	CV	0.591
k hat (MLE)	4.461	k star (bias corrected MLE)	1.282
Theta hat (MLE)	0.00231	Theta star (bias corrected MLE)	0.00803
nu hat (MLE)	35.69	nu star (bias corrected)	10.26
Adjusted Level of Significance (β)	0.00498		
Approximate Chi Square Value (10.26, α)	4.102	Adjusted Chi Square Value (10.26, β)	N/A
95% Gamma Approximate UCL	0.0258	95% Gamma Adjusted UCL	N/A
Estimates of G	amma Parai	meters using KM Estimates	
Mean (KM)	0.00797	SD (KM)	0.00674
Variance (KM)	4.5450E-5	SE of Mean (KM)	0.00413
k hat (KM)	1.398	k star (KM)	0.516
nu hat (KM)	11.18	nu star (KM)	4.129
theta hat (KM)	0.0057	theta star (KM)	0.0154
80% gamma percentile (KM)	0.0131	90% gamma percentile (KM)	0.0214
95% gamma percentile (KM)	0.0303	99% gamma percentile (KM)	0.052
Gamm	a Kaplan-M	eier (KM) Statistics	
Approximate Chi Square Value (4.13, α)	0.773	Adjusted Chi Square Value (4.13, β)	0.251
95% KM Approximate Gamma UCL	0.0426	95% KM Adjusted Gamma UCL	0.131
Lognormal GO	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789	Detected Data Not Lognormal at 10% Significance Lev	rel
Lilliefors Test Statistic	0.385	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Lognormal	evel
		Lognormal at 10% Significance Level	
•••	•	eliable for small sample sizes	
Lagrarmal PO	S Statistics I	Using Imputed Non-Detects	
Mean in Original Scale	0.00822	Mean in Log Scale	-5.14
SD in Original Scale	0.00822	SD in Log Scale	0.994
<b>~</b>	0.00749	95% Percentile Bootstrap UCL	0.994 N/A
95% t UCL (assumes normality of ROS data)	0.017 N/A	-	
95% BCA Bootstrap UCL 95% H-UCL (Log ROS)	0.433	95% Bootstrap t UCL	N/A
93 % 11-00L (Log ROS)	0.433		

Statistics using KM estimates of	on Logged D	ata and Assuming Lognormal Distribution	-
KM Mean (logged)	-5.364	KM Geo Mean	0.004
KM SD (logged)	1.207	95% Critical H Value (KM-Log)	7.98
KM Standard Error of Mean (logged)	0.739	95% H-UCL (KM -Log)	2.53
KM SD (logged)	1.207	95% Critical H Value (KM-Log)	7.98
KM Standard Error of Mean (logged)	0.739		
	DL/2 Sta	atistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00789	Mean in Log Scale	-5.53
SD in Original Scale	0.00789	SD in Log Scale	1.7
95% t UCL (Assumes normality)	0.0172	95% H-Stat UCL	1258
DL/2 is not a recommended me	thod, provid	ed for comparisons and historical reasons	
Nonparame	tric Distributi	on Free UCL Statistics	
Detected Data appear Appro	ximate Norn	nal Distributed at 1% Significance Level	
	Suggested l	JCL to Use	
95% KM (t) UCL	0.0177		
When a data set follows an appr	roximate dist	ribution passing only one of the GOF tests,	
it is suggested to use a UCL base	ed upon a dis	stribution passing both GOF tests in ProUCL	
Note: Suggestions regarding the colection of a 0.50/	LICI are pro	vided to help the user to select the most appropriate 95% UCL	
Note. Suggestions regarding the selection of a 35 %	OCL are pro	vided to help the user to select the most appropriate 35 % OCL	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	1
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.045	Minimum Non-Detect	0.08
Maximum Detect	1.6	Maximum Non-Detect	0.08
Variance Detects	0.796	Percent Non-Detects	25%
Mean Detects	0.57	SD Detects	0.89
Median Detects	0.064	CV Detects	1.56
Skewness Detects	1.731	Kurtosis Detects	N/A
Mean of Logged Detects	-1.793	SD of Logged Detects	1.96
		only 3 Detected Values.  Iful or reliable statistics and estimates.	
refer also to ITRC Tech Reg Guide or	n ISM (ITRO	using incremental sampling methodology (ISM) approach,	
<u> </u>		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
	aniaal Cuida	for a discussion of the Chabushau LICI	
Refer to the ProUCL 5.2 Tech	nnical Guide	e for a discussion of the Chebyshev UCL.	
		e for a discussion of the Chebyshev UCL.	
		•	
Norma	al GOF Test	t on Detects Only	rel
Norma Shapiro Wilk Test Statistic	al GOF Test 0.759	t on Detects Only Shapiro Wilk GOF Test	rel
Norma Shapiro Wilk Test Statistic 1% Shapiro Wilk Critical Value	0.759 0.753	shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value	0.759 0.753 0.381 0.429	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.759 0.753 0.381 0.429 ppear Norm	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n	0.759 0.753 0.381 0.429 ppear Norm	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev lal at 1% Significance Level	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n	0.759 0.753 0.381 0.429 ppear Norm	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev lal at 1% Significance Level  liable for small sample sizes	rel
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n	0.759 0.753 0.381 0.429 ppear Norm nay be unre	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev lal at 1% Significance Level liable for small sample sizes	rel
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	vel 0.41
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci 0.441 0.669	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev lal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL	0.41 N/A
Norma Shapiro Wilk Test Statistic 1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci 0.441 0.669 1.405	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev  al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.4* N/A N/A N/A
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci 0.441 0.669 1.405 1.115	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev al at 1% Significance Level Iliable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.41 N/A N/A N/A 2.22
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci 0.441 0.669 1.405 1.115 1.67	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev lal at 1% Significance Level  Iliable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL	0.41 N/A N/A N/A 2.22
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.759 0.753 0.381 0.429 ppear Norm nay be unre g Normal Ci 0.441 0.669 1.405 1.115 1.67	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev al at 1% Significance Level  Iliable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.41 N/A N/A N/A 2.22
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.759 0.753 0.381 0.429 ppear Norm nay be unre  g Normal Ci 0.441 0.669 1.405 1.115 1.67 3	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev  lal at 1% Significance Level  Iliable for small sample sizes  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.41 N/A N/A N/A 2.22 4.51
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF T  A-D Test Statistic	0.759 0.753 0.381 0.429 ppear Norm nay be unre  0.441 0.669 1.405 1.115 1.67 3  Tests on De 0.53	Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Lev Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Lev al at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL	0.41 N/A N/A N/A 2.22 4.51

Gamma S	Statistics on I	Detected Data Only	
k hat (MLE)	0.514	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.108	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.084	nu star (bias corrected)	N/A
Mean (detects)	0.57		
		ng Imputed Non-Detects	
		NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is s	mall such as	<1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS n	nethod may yi	ield incorrect values of UCLs and BTVs	
·	-	the sample size is small.	
For gamma distributed detected data, BTVs ar	nd UCLs may	be computed using gamma distribution on KM estimates	
Minimum	0.0367	Mean	0.436
Maximum	1.6	Median	0.0545
SD	0.776	CV	1.778
k hat (MLE)	0.477	k star (bias corrected MLE)	0.286
Theta hat (MLE)	0.915	Theta star (bias corrected MLE)	1.527
nu hat (MLE)	3.815	nu star (bias corrected)	2.287
Adjusted Level of Significance (β)	0.00498		
Approximate Chi Square Value (2.29, α)	0.197	Adjusted Chi Square Value (2.29, β)	N/A
95% Gamma Approximate UCL	5.069	95% Gamma Adjusted UCL	N/A
Estimates of Ga	amma Param	eters using KM Estimates	
Mean (KM)	0.441	SD (KM)	0.669
Variance (KM)	0.448	SE of Mean (KM)	0.41
k hat (KM)	0.434	k star (KM)	0.275
nu hat (KM)	3.471	nu star (KM)	2.201
theta hat (KM)	1.016	theta star (KM)	1.602
80% gamma percentile (KM)	0.661	90% gamma percentile (KM)	1.313
95% gamma percentile (KM)	2.073	99% gamma percentile (KM)	4.07
0	- Kanlan Mai	Tou (VAI) Obstication	
		ier (KM) Statistics	0.0475
Approximate Chi Square Value (2.20, α)	0.181	Adjusted Chi Square Value (2.20, β)	0.0475
95% KM Approximate Gamma UCL	5.351	95% KM Adjusted Gamma UCL	20.43
Lognormal GOI	F Test on De	tected Observations Only	
Shapiro Wilk Test Statistic	0.823	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Lognormal	evel
Lilliefors Test Statistic	0.353	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Lognormal	evel
Detected Data app	ear Lognorm	nal at 10% Significance Level	
Note GOF tests n	nay be unreli	iable for small sample sizes	
Lognormal ROS	Statistics Us	sing Imputed Non-Detects	
Mean in Original Scale	0.443	Mean in Log Scale	-2.038
	0.771	SD in Log Scale	1.679
SD in Original Scale			
SD in Original Scale 95% t UCL (assumes normality of ROS data)	1.351	95% Percentile Bootstrap UCL	N/A
· ·	1.351 N/A	95% Percentile Bootstrap UCL 95% Bootstrap t UCL	N/A N/A

Statistics using KM estimates of	on Logged	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-2.076	KM Geo Mean	0.1
KM SD (logged)	1.478	95% Critical H Value (KM-Log)	9.7
KM Standard Error of Mean (logged)	0.907	95% H-UCL (KM -Log)	1510
KM SD (logged)	1.478	95% Critical H Value (KM-Log)	9.7
KM Standard Error of Mean (logged)	0.907		
	DI /2 C	statistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.437	Mean in Log Scale	-2.1
SD in Original Scale	0.437	SD in Log Scale	1.7
95% t UCL (Assumes normality)	1.349	95% H-Stat UCL	
,		ided for comparisons and historical reasons	
	, p. c		
Nonparame	tric Distribu	tion Free UCL Statistics	
<b>'</b>		stributed at 1% Significance Level	
	Suggested	UCL to Use	
95% KM (t) UCL	1.405		
		1	
The calculated UCLs are based on assumpti	ons that the	e data were collected in a random and unbiased manner.	
Please verify the d	ata were co	ollected from random locations.	
If the data were collected	using judg	mental or other non-random methods,	
		to correctly calculate UCLs.	
then contact a s	statistician		
then contact a	statistician		
		rovided to help the user to select the most appropriate 95% UCL	
Note: Suggestions regarding the selection of a 95%	UCL are pr	rovided to help the user to select the most appropriate 95% UCL oution, and skewness using results from simulation studies.	

Total Number of Observations 4 Number of Distinct Observations Number of Detects 3 Number of Non-Detects Number of Distinct Detects 4 Number of Distinct Non-Detects Number of Distinct Detects 4 Number of Distinct Non-Detects 5 Number of Distinct Non-Detects 6 Number of Distinct Non-Detects 7 Number of Distinct Non-Detects 9.5 Number of Number of Non-Detects 9.5 Number of Distinct Non-Detects 9.5 Nu
Number of Detects  Number of Distinct Detects  Number of Distinct Non-Detects  Minimum Non-Detect 9.50  Maximum Detect 1.5 Maximum Non-Detect 9.50  Variance Detects 0.115 Percent Non-Detects 2.20  Mean Detects 1.213 SD Detects  Median Detects 1.3 CV Detects  Skewness Detects -1.077 Kurtosis Detects Non-Detects 2.20  Number of Non-Detects 9.50  Maximum Non-Detect 9.50  Mean Detects 0.115 Percent Non-Detects 2.20  SD Detects 3.20  Warning: Data set has only 3 Detected Values.
Minimum Detect 0.84 Minimum Non-Detect 9.5  Maximum Detect 1.5 Maximum Non-Detect 9.5  Variance Detects 0.115 Percent Non-Detects 2  Mean Detects 1.213 SD Detects  Median Detects 1.3 CV Detects  Skewness Detects -1.077 Kurtosis Detects N  Mean of Logged Detects 0.164 SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Maximum Detect 1.5 Maximum Non-Detect 9.5  Variance Detects 0.115 Percent Non-Detects 2  Mean Detects 1.213 SD Detects  Median Detects 1.3 CV Detects  Skewness Detects -1.077 Kurtosis Detects N  Mean of Logged Detects 0.164 SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Variance Detects 0.115 Percent Non-Detects 2  Mean Detects 1.213 SD Detects  Median Detects 1.3 CV Detects  Skewness Detects -1.077 Kurtosis Detects N  Mean of Logged Detects 0.164 SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Mean Detects  Median Detects  1.213  SD Detects  Median Detects  1.3  CV Detects  Skewness Detects -1.077  Kurtosis Detects  Mean of Logged Detects  0.164  SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Median Detects  Skewness Detects -1.077  Kurtosis Detects  Mean of Logged Detects  0.164  SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Skewness Detects -1.077 Kurtosis Detects N Mean of Logged Detects 0.164 SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Mean of Logged Detects 0.164 SD of Logged Detects  Warning: Data set has only 3 Detected Values.
Warning: Data set has only 3 Detected Values.
Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.
Trefer to the F1000L 5.2 Fedimical dulae for a discussion of the Offebyshev COL.
Normal GOF Test on Detects Only
Shapiro Wilk Test Statistic 0.951 Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value 0.753 Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic 0.268 Lilliefors GOF Test
1% Lilliefors Critical Value 0.429 Detected Data appear Normal at 1% Significance Level
Detected Data appear Normal at 1% Significance Level
Note GOF tests may be unreliable for small sample sizes
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs
KM Mean 0.91 KM Standard Error of Mean
90KM SD 0.577 95% KM (BCA) UCL N
95% KM (t) UCL 1.742 95% KM (Percentile Bootstrap) UCL N
95% KM (z) UCL 1.491 95% KM Bootstrap t UCL N
90% KM Chebyshev UCL 1.97 95% KM Chebyshev UCL
97.5% KM Chebyshev UCL 3.117 99% KM Chebyshev UCL
Gamma GOF Tests on Detected Observations Only
A-D Test Statistic 0.343 Anderson-Darling GOF Test
5% A-D Critical Value 0.635 Detected data appear Gamma Distributed at 5% Significance I
V. C. Took Charleston 0.211 Volume groups Confirmate COE
K-S Test Statistic 0.311 <b>Kolmogorov-Smirnov GOF</b> 5% K-S Critical Value 0.432 Detected data appear Gamma Distributed at 5% Significance I

	Gamma 9	Statistics or	n Detected Data Only	
	k hat (MLE)	17.48	k star (bias corrected MLE)	N/A
	Theta hat (MLE)	0.0694	Theta star (bias corrected MLE)	N/A
	nu hat (MLE)	104.9	nu star (bias corrected)	N/A
	Mean (detects)	1.213		
	Gamma ROS	Statistics us	sing Imputed Non-Detects	
	GROS may not be used when data se	et has > 50%	6 NDs with many tied observations at multiple DLs	
GRC	OS may not be used when kstar of detects is s	mall such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
	For such situations, GROS r	nethod may	yield incorrect values of UCLs and BTVs	
	This is especia	ally true whe	en the sample size is small.	
F	or gamma distributed detected data, BTVs a	nd UCLs ma	ay be computed using gamma distribution on KM estimates	
	Minimum	0.385	Mean	1.006
	Maximum	1.5	Median	1.07
	SD	0.498	CV	0.495
	k hat (MLE)	4.277	k star (bias corrected MLE)	1.236
	Theta hat (MLE)	0.235	Theta star (bias corrected MLE)	0.814
	nu hat (MLE)	34.21	nu star (bias corrected)	9.88
	Adjusted Level of Significance (β)	0.00498		
	Approximate Chi Square Value (9.89, α)	3.871	Adjusted Chi Square Value (9.89, β)	N/A
	OFO/ Commo Amerovimeto LICI	0.53	050/ 0 Adinated HOL	N/A
	95% Gamma Approximate UCL	2.57	95% Gamma Adjusted UCL	IN/A
	95% Gamma Approximate OCL	2.57	95% Gamma Adjusted UCL	IN/A
			meters using KM Estimates	IN/A
			, ,	
	Estimates of Ga	amma Para	meters using KM Estimates	0.577
	Estimates of Ga Mean (KM)	amma Para	meters using KM Estimates  SD (KM)	0.57
	Estimates of Ga  Mean (KM)  Variance (KM)	0.91 0.333	meters using KM Estimates  SD (KM)  SE of Mean (KM)	0.577 0.355 0.789
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)	0.91 0.333 2.489	meters using KM Estimates  SD (KM)  SE of Mean (KM)  k star (KM)	0.57 0.35 0.789 6.31
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)	0.91 0.333 2.489 19.91	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM)	0.57° 0.35° 0.78° 6.31° 1.15°
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)	0.91 0.333 2.489 19.91 0.366	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM)	0.577 0.353 0.789 6.311 1.154 2.222
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)	0.91 0.333 2.489 19.91 0.366 1.489 2.968	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.353 0.789 6.311 1.154 2.222 4.733
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)	0.91 0.333 2.489 19.91 0.366 1.489 2.968	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.353 0.789 6.311 1.154 2.222 4.733
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)	0.91 0.333 2.489 19.91 0.366 1.489 2.968	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.353 0.789 6.311 1.154 2.222 4.733
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)	0.91 0.333 2.489 19.91 0.366 1.489 2.968	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.353 0.789 6.311 1.154 2.222 4.733
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)  95% KM Approximate Gamma UCL	0.91 0.333 2.489 19.91 0.366 1.489 2.968 <b>a Kaplan-M</b> 1.801 3.19	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.350 0.789 6.31 1.154 2.22 4.730
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)  95% KM Approximate Gamma UCL	0.91 0.333 2.489 19.91 0.366 1.489 2.968 <b>a Kaplan-M</b> 1.801 3.19	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.57° 0.35° 0.78° 6.31° 1.15° 2.22° 4.73° 0.77°
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)  95% KM Approximate Gamma UCL  Lognormal GO	0.91 0.333 2.489 19.91 0.366 1.489 2.968 <b>a Kaplan-M</b> 1.801 3.19	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.57 0.35 0.78 6.31 1.15 2.22 4.73 0.77 7.38
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)  95% KM Approximate Gamma UCL  Lognormal GO  Shapiro Wilk Test Statistic	0.91 0.333 2.489 19.91 0.366 1.489 2.968 <b>Example 1.801</b> 3.19 <b>F Test on D</b> 0.921	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.57 0.35 0.78 6.31 1.15 2.22 4.73 0.77 7.38
	Estimates of Ga  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  80% gamma percentile (KM)  95% gamma percentile (KM)  Gamma  Approximate Chi Square Value (6.31, α)  95% KM Approximate Gamma UCL  Lognormal GO  Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value	0.91 0.333 2.489 19.91 0.366 1.489 2.968 <b>a Kaplan-M</b> 1.801 3.19 <b>F Test on D</b> 0.921 0.789	meters using KM Estimates  SD (KM) SE of Mean (KM) k star (KM) nu star (KM) theta star (KM) 90% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM) 99% gamma percentile (KM)	0.577 0.353 0.789 6.311 1.154 2.222 4.733 0.779 7.38

	Statistics U	sing Imputed Non-Detects	
Mean in Original Scale	1.04	Mean in Log Scale	-0.04
SD in Original Scale	0.443	SD in Log Scale	0.47
95% t UCL (assumes normality of ROS data)	1.562	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	2.86		
Statistics using KM estimates of	on Logged Da	ata and Assuming Lognormal Distribution	
KM Mean (logged)	-1.616	KM Geo Mean	0.19
KM SD (logged)	3.092	95% Critical H Value (KM-Log)	20.2
KM Standard Error of Mean (logged)	1.893	95% H-UCL (KM -Log)	1.079E
KM SD (logged)	3.092	95% Critical H Value (KM-Log)	20.2
KM Standard Error of Mean (logged)	1.893		
	DL/2 Sta	itistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.91	Mean in Log Scale	-1.79
SD in Original Scale	0.666	SD in Log Scale	3.9
95% t UCL (Assumes normality)	1.694	95% H-Stat UCL	4.501E
DL/2 is not a recommended me	ethod, provide	ed for comparisons and historical reasons	
Nonparame	tric Distribution	on Free UCL Statistics	
-		ributed at 1% Significance Level	
	Suggested U	ICL to Use	
95% KM (t) UCL	1.742		
Warning: Recommen	ded UCL exc	eeds the maximum observation	
		vided to help the user to select the most appropriate 95% UCL	
Note: Suggestions regarding the selection of a 95%	UCL are prov		
	•	tion, and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0042	Mean	0.0
Maximum	0.045	Median	0.0
SD	0.0161	Std. Error of Mean	0.00
Coefficient of Variation	0.841	Skewness	0.9
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or tl	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.232	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
Ass	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0324	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma C	GOF Test	
A-D Test Statistic	0.26	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.212	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.337	Detected data appear Gamma Distributed at 5% Significance	e Lev
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	1.637	k star (bias corrected MLE)	0.9
Theta hat (MLE)	0.0117	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	19.65	nu star (bias corrected)	11.
MLE Mean (bias corrected)	0.0191	MLE Sd (bias corrected)	0.0
(2.22.2.2)		Approximate Chi Square Value (0.05)	4.6
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	3.2
Ass	suming Gam	ma Distribution	
	0.0456	95% Adjusted Gamma UCL	0.0
95% Approximate Gamma UCL	U.U4:5h	95% Adulsted Gamma Cic.i 1	

	Lognormal G	OF Test	
Shapiro Wilk Test Statistic	0.954	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.165	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear L	ognormal at 1	10% Significance Level	
Note GOF tests n	nay be unrelia	ble for small sample sizes	
	Lognormal S	tatistics	
Minimum of Logged Data	-5.473	Mean of logged Data	-4.292
Maximum of Logged Data	-3.101	SD of logged Data	0.93
	"	·	
Assu	ming Lognorm	al Distribution	
95% H-UCL	0.105	90% Chebyshev (MVUE) UCL	0.041
95% Chebyshev (MVUE) UCL	0.0508	97.5% Chebyshev (MVUE) UCL	0.064
99% Chebyshev (MVUE) UCL	0.0912		
		·	
Nonparame	tric Distribution	n Free UCL Statistics	
Data appear	to follow a Di	scernible Distribution	
	and the District		
Nonpara	ametric Distrib	oution Free UCLs	
Nonpara 95% CLT UCL	0.0299	95% BCA Bootstrap UCL	0.031
<u></u>			0.031
95% CLT UCL	0.0299	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	
95% CLT UCL 95% Standard Bootstrap UCL	0.0299 0.029	95% BCA Bootstrap UCL 95% Bootstrap-t UCL	0.040
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.0299 0.029 0.0413	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	0.040
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0299 0.029 0.0413 0.0388 0.0601	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.040
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0299 0.029 0.0413 0.0388 0.0601 Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.040
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0299 0.029 0.0413 0.0388 0.0601	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.040
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0299 0.029 0.0413 0.0388 0.0601  Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.040 0.029 0.04 0.084
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	0.0299 0.029 0.0413 0.0388 0.0601  Suggested UC 0.0324  UCL are provide	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	0.040 0.029 0.04 0.084
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.0299 0.029 0.0413 0.0388 0.0601  Suggested UC 0.0324  UCL are provided at a distribution	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.040 0.029 0.047 0.084

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.029	Mean	0.
Maximum	0.18	Median	0.0
SD	0.0542	Std. Error of Mean	0.0
Coefficient of Variation	0.525	Skewness	0.
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or tl	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.983	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.172	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests n	nay be unre	liable for small sample sizes	
Ass	uming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.148	95% Adjusted-CLT UCL (Chen-1995)	0.
		95% Modified-t UCL (Johnson-1978)	0.
		<u>'</u>	
	Gamma C	GOF Test	
A-D Test Statistic	0.229	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance	e Le
K-S Test Statistic	0.18	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance	e Le
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	3.504	k star (bias corrected MLE)	1.
Theta hat (MLE)	0.0294	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	42.05	nu star (bias corrected)	22
MLE Mean (bias corrected)	0.103	MLE Sd (bias corrected)	0.0
. /		Approximate Chi Square Value (0.05)	12
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	10
Δος	umina Gam	ma Distribution	
<u> </u>	0.183	95% Adjusted Gamma UCL	0.
95% Approximate Gamma UCL			

Lognorma	I GOF Test	
0.929	Shapiro Wilk Lognormal GOF Test	
0.826	Data appear Lognormal at 10% Significance Level	
0.198	Lilliefors Lognormal GOF Test	
0.298	Data appear Lognormal at 10% Significance Level	
Lognormal	at 10% Significance Level	
may be unre	eliable for small sample sizes	
Lognorma	l Statistics	
-3.54	Mean of logged Data	-2.421
-1.715	SD of logged Data	0.65
.+		
uming Logno	ormal Distribution	
0.265	90% Chebyshev (MVUE) UCL	0.189
0.227	97.5% Chebyshev (MVUE) UCL	0.28
0.383		
etric Distribu	tion Free UCL Statistics	
ar to follow a	Discernible Distribution	
rametric Dis	tribution Free UCLs	
0.14	95% BCA Bootstrap UCL	0.139
0.137	95% Bootstrap-t UCL	0.151
0.14	95% Percentile Bootstrap UCL	0.137
0.169	95% Chebyshev(Mean, Sd) UCL	0.2
0.241	99% Chebyshev(Mean, Sd) UCL	0.323
_		
	UCL to Use	
	UCL to Use	
Suggested	UCL to Use	
Suggested 0.148	UCL to Use  ovided to help the user to select the most appropriate 95% UCL.	
Suggested 0.148 % UCL are pr		
	0.929   0.826   0.198   0.298	Data appear Lognormal at 10% Significance Level Col. 198 Lilliefors Lognormal GOF Test Data appear Lognormal at 10% Significance Level T Lognormal at 10% Significance Level T Lognormal at 10% Significance Level T Lognormal Statistics  Data appear Lognormal at 10% Significance Level T Lognormal Statistics  Data appear Lognormal at 10% Significance Level T Lognormal Statistics  Data appear Lognormal at 10% Significance Level T Lognormal Statistics  Data appear Lognormal at 10% Significance Level T Lognormal At 10% Signific

	UCL Statis	tics for Unce	nsored Full Data Sets	
User Selected Options				
·	ProUCL 5.2 11/13/2024 2	2:34:39 PM		
	mw17_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
Librara BANA/ 47				
litrate - MW-17				
		General S		
Total N	Number of Observations	6	Number of Distinct Observations	5
			Number of Missing Observations	0
	Minimum	3	Mean	3.833
	Maximum	4.6	Median	3.8
	SD	0.524	Std. Error of Mean	0.214
	Coefficient of Variation	0.137	Skewness	-0.232
Note: Sample size is sr	mall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
			2 2020 and ITRC 2012) for additional guidance,	
but note that IT	TRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
	-			
	The Chebyshev UCL of	ten results ir	n gross overestimates of the mean.	
Refe	· ·		n gross overestimates of the mean.  for a discussion of the Chebyshev UCL.	
Refe	· ·		n gross overestimates of the mean. for a discussion of the Chebyshev UCL.	
Refe	· ·		for a discussion of the Chebyshev UCL.	
	r to the ProUCL 5.2 Tec	hnical Guide Normal G	for a discussion of the Chebyshev UCL.  OF Test	
Sh	r to the ProUCL 5.2 Tec	Normal G	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test	
Sh	r to the ProUCL 5.2 Tec	Normal G 0.948 0.713	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
Sh 1% Sh	r to the ProUCL 5.2 Tec napiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic	Normal G 0.948 0.713 0.233	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
Sh 1% Sh	r to the ProUCL 5.2 Tec napiro Wilk Test Statistic apiro Wilk Critical Value Lilliefors Test Statistic 6 Lilliefors Critical Value	Normal G 0.948 0.713 0.233 0.373	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Sh 1% Sh	r to the ProUCL 5.2 Tec	Normal G 0.948 0.713 0.233 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  Significance Level  1% Significance Level	
Sh 1% Sh	r to the ProUCL 5.2 Tec	Normal G 0.948 0.713 0.233 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
Sh 1% Sh	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  Significance Level  1% Significance Level	
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology approved the ProUCL 5.2 Technology approved to the ProUCL 5.2 Technology appr	Normal G 0.948 0.713 0.233 0.373 ar Normal at	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)	4.164
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel	for a discussion of the Chebyshev UCL.  OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes	
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	4.164 4.261
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology in the ProUCL	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel suming Norm 4.264	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level liable for small sample sizes  pal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
Sh 1% Sh 1%	r to the ProUCL 5.2 Tec	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel suming Norm 4.264 Gamma G	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	4.261
Sh 1% Sh 1%	r to the ProUCL 5.2 Tec	Normal G  0.948  0.713  0.233  0.373  ar Normal at may be unrel  suming Norm  4.264  Gamma G  0.341	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test	4.261
Sh 1% Sh 1%	r to the ProUCL 5.2 Technology approved the ProUCL 5.2 Technology approved to the ProUCL 5.2 Technology appr	Normal G 0.948 0.713 0.233 0.373 ar Normal at may be unrel suming Norm 4.264  Gamma G 0.341 0.697	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  Pal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	4.261
Sh 1% Sh 1%	r to the ProUCL 5.2 Tec	Normal G  0.948  0.713  0.233  0.373  ar Normal at may be unrel  suming Norm  4.264  Gamma G  0.341  0.697  0.24  0.332	OF Test  Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  liable for small sample sizes  nal Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov Gamma GOF Test	4.261

	Gamma	Statistics	
k hat (MLE)	62.13	k star (bias corrected MLE)	31.1
Theta hat (MLE)	0.0617	Theta star (bias corrected MLE)	0.1
nu hat (MLE)	745.5	nu star (bias corrected)	374.1
MLE Mean (bias corrected)	3.833	MLE Sd (bias corrected)	0.68
		Approximate Chi Square Value (0.05)	330.3
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	315.3
Ass	suming Gam	nma Distribution	
95% Approximate Gamma UCL	4.342	95% Adjusted Gamma UCL	4.5
	Lamama	LOOF Total	
Shapiro Wilk Test Statistic	0.933	I GOF Test	
•		Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.256	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorma	al Statistics	
Minimum of Logged Data	1.099	Mean of logged Data	1.3
Maximum of Logged Data	1.526	SD of logged Data	0.1
Assu	ming Logno	ormal Distribution	
95% H-UCL	4.352	90% Chebyshev (MVUE) UCL	4.4
95% Chebyshev (MVUE) UCL	4.793	97.5% Chebyshev (MVUE) UCL	5.2
99% Chebyshev (MVUE) UCL	6.024		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dis	tribution Free UCLs	
95% CLT UCL	4.185	95% BCA Bootstrap UCL	4.1
95% Standard Bootstrap UCL	4.159	95% Bootstrap-t UCL	4.2
95% Hall's Bootstrap UCL	4.328	95% Percentile Bootstrap UCL	4.1
90% Chebyshev(Mean, Sd) UCL	4.475	95% Chebyshev(Mean, Sd) UCL	4.7
97.5% Chebyshev(Mean, Sd) UCL	5.169	99% Chebyshev(Mean, Sd) UCL	5.9
	Suggested	UCL to Use	
95% Student's-t UCL	4.264		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	<u> </u>
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
	orld data set	ts; for additional insight the user may want to consult a statisticia	ın.
However, simulations results will not cover all Real W			
		(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	

	General S	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.0083	Mean	0.00
Maximum	0.012	Median	0.009
SD	0.00169	Std. Error of Mean	8.4397
Coefficient of Variation	0.174	Skewness	1.0
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		2 2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
<del>-</del>		n gross overestimates of the mean.	
		for a discussion of the Chebyshev UCL.	
1.6161 to the 1 1000£ 3.2 160	illical Guide	Total discussion of the onebyshev cor.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.902	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.247	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
		1% Significance Level	
		liable for small sample sizes	
Note don tests i	may be unie	liable for Small Sample Sizes	
		I Division in	
	suming Norm	nal Distribution	
95% Normal UCL	0.0447	95% UCLs (Adjusted for Skewness)	0.0
95% Student's-t UCL	0.0117	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma G	GOF Test	
A-D Test Statistic	0.34	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significan	ce Lev
K-S Test Statistic	0.28	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significan	ce Lev
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	46.37	k star (bias corrected MLE)	11.
Theta hat (MLE)	2.0974E-4	Theta star (bias corrected MLE)	8.2708
nu hat (MLE)	370.9	nu star (bias corrected)	94.0
MLE Mean (bias corrected)	0.00973	MLE Sd (bias corrected)	0.00
(	-	Approximate Chi Square Value (0.05)	72.
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
A	umina Carri	ma Distribution	
Ass	suming Gami	ma Distribution	
95% Approximate Gamma UCL	0.0126	95% Adjusted Gamma UCL	N/A

	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.916	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.248	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	t 10% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Lognormal	Statistics	
Minimum of Logged Data	-4.791	Mean of logged Data	-4.644
Maximum of Logged Data	-4.423	SD of logged Data	0.168
Acci	ımina Loano	rmal Distribution	
95% H-UCL	0.0123	90% Chebyshev (MVUE) UCL	0.0122
95% Chebyshev (MVUE) UCL	0.0123	97.5% Chebyshev (MVUE) UCL	0.0148
99% Chebyshev (MVUE) UCL	0.0178	37.5 % Gliebyshev (MVGE) 66E	0.0140
33 % 3.132,3.131 ( 3.2.) 3.32	0.0170		
Nonparame	tric Distribut	ion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpa	rametric Dist	ribution Free UCLs	
95% CLT UCL	0.0111	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0123	95% Chebyshev(Mean, Sd) UCL	0.0134
97.5% Chebyshev(Mean, Sd) UCL	0.015	99% Chebyshev(Mean, Sd) UCL	0.0181
	Suggested I	LICI to Lice	
95% Student's-t UCL	0.0117	DOL to use	
93% Student S-t OCL	0.0117		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% LICL	
	-	ovided to help the user to select the most appropriate 95% UCL. ution, and skewness using results from simulation studies.	

	UCL Statist		soled I dii Data Sets	
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User Selected Options	D. LIOL E 0 44/40/0004 6	05 40 DM		
•	ProUCL 5.2 11/13/2024 2	2:35:46 PM		
	mw18_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations	2000			
itrate - MW-18				
		General Sta	atistics	
Total I	Number of Observations	6	Number of Distinct Observations	5
			Number of Missing Observations	0
	Minimum	2.8	Mean	4.05
	Maximum	8.8	Median	3.05
	SD	2.342	Std. Error of Mean	0.956
	Coefficient of Variation	0.578	Skewness	2.38
refer also to but note that I	TRC Tech Reg Guide on TRC may recommend the The Chebyshev UCL of	n ISM (ITRC 2 e t-UCL or the ten results in (	sing incremental sampling methodology (ISM) approach, 2020 and ITRC 2012) for additional guidance, 2020 Chebyshev UCL for small sample sizes (n < 7).  1. Chebyshev UCL for small sample sizes (n < 7).  1. Chebyshev UCL for small sample sizes (n < 7).	
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refer also to but note that I'	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic	n ISM (ITRC 2 e t-UCL or the ten results in on inical Guide for Normal GO	2020 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7).  gross overestimates of the mean. or a discussion of the Chebyshev UCL.  F Test  Shapiro Wilk GOF Test	
refer also to but note that I'	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough to the Prough 5.2 Tech thapiro Wilk Test Statistic mapiro Wilk Critical Value	n ISM (ITRC 2 e t-UCL or the ten results in a nnical Guide for Normal GO 0.594 0.713	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 or a discussion of the Chebyshev UCL. 2 F Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level	
Refe	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic mapiro Wilk Critical Value Lilliefors Test Statistic	n ISM (ITRC 2 e t-UCL or the ten results in on nnical Guide for Normal GO 0.594 0.713 0.41	2020 and ITRC 2012) for additional guidance, c Chebyshev UCL for small sample sizes (n < 7). gross overestimates of the mean. or a discussion of the Chebyshev UCL.  F Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test	
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refer also to but note that I'  Refer	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough Tro	n ISM (ITRC 2 e t-UCL or the ten results in g nnical Guide for Normal GO 0.594 0.713 0.41 0.373 Normal at 1%	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 or a discussion of the Chebyshev UCL. 2 F Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  I Distribution	6.616
refer also to but note that I'  Refer	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough the Trough	n ISM (ITRC 2 e t-UCL or the ten results in g nnical Guide for Normal GO 0.594 0.713 0.41 0.373 Normal at 1%	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 or a discussion of the Chebyshev UCL. 2	6.616 6.132
refer also to but note that I'  Refer	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough the Trough	Normal GO 0.594 0.713 0.41 0.373 Normal at 1% suming Norma	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 Or a discussion of the Chebyshev UCL. 2 Or a discussion of the Chebyshev UCL. 2 Or a discussion of the Chebyshev UCL. 3 Or a discussion of the Chebyshev UCL. 4 Or Test	
refer also to but note that I'  Refer	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough t	n ISM (ITRC 2 e t-UCL or the ten results in granical Guide for Normal GO 0.594 0.713 0.41 0.373 Normal at 1% suming Norma 5.977	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 or a discussion of the Chebyshev UCL.  2 F Test  2 Shapiro Wilk GOF Test  2 Data Not Normal at 1% Significance Level  2 Lilliefors GOF Test  2 Data Not Normal at 1% Significance Level  3 Significance Level  3 I Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to but note that I'  Refer	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough t	n ISM (ITRC 2 et-UCL or the ten results in granical Guide for Normal GO 0.594 0.713 0.41 0.373 Normal at 1% suming Normal 5.977 Gamma GC 1.183	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 Or a discussion of the Chebyshev UCL. 2 F Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  I Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  OF Test  Anderson-Darling Gamma GOF Test	6.132
refer also to but note that I'  Refe	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the ProUCL 5.2 Tech thapiro Wilk Test Statistic mapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data Not Assormal UCL  A-D Test Statistic  5% A-D Critical Value	Normal GO 0.594 0.713 0.41 0.373 Normal at 1% suming Norma 5.977 Gamma GC 1.183 0.698	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 Or a discussion of the Chebyshev UCL. 2 OF Test	6.132
refer also to but note that I'  Refe	TRC Tech Reg Guide of TRC may recommend the The Chebyshev UCL of the Trough t	n ISM (ITRC 2 et-UCL or the ten results in granical Guide for Normal GO 0.594 0.713 0.41 0.373 Normal at 1% suming Normal 5.977 Gamma GC 1.183	2020 and ITRC 2012) for additional guidance, 2 Chebyshev UCL for small sample sizes (n < 7). 2 Gross overestimates of the mean. 2 Or a discussion of the Chebyshev UCL. 2 F Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  I Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  OF Test  Anderson-Darling Gamma GOF Test	6.132

	Gamma St	atistics	
k hat (MLE)	5.348	k star (bias corrected MLE)	2.78
Theta hat (MLE)	0.757	Theta star (bias corrected MLE)	1.4
nu hat (MLE)	64.18	nu star (bias corrected)	33.4
MLE Mean (bias corrected)	4.05	MLE Sd (bias corrected)	2.42
		Approximate Chi Square Value (0.05)	21.2
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	17.7
Ass	suming Gamm	a Distribution	
95% Approximate Gamma UCL	6.384	95% Adjusted Gamma UCL	7.6
	Lognormal G	GOF Test	
Shapiro Wilk Test Statistic	0.659	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.353	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data Not Lognormal at 10% Significance Level	
Data Not Lo	ognormal at 10	0% Significance Level	
	Lognormal S	Statistics	
Minimum of Logged Data	1.03	Mean of logged Data	1.3
Maximum of Logged Data	2.175	SD of logged Data	0.4
Assu	ıming Lognorn	nal Distribution	
95% H-UCL	6.567	90% Chebyshev (MVUE) UCL	6.0
95% Chebyshev (MVUE) UCL	7.056	97.5% Chebyshev (MVUE) UCL	8.3
99% Chebyshev (MVUE) UCL	11.01		
Nonparame	tric Distributio	n Free UCL Statistics	
Data do n	ot follow a Dis	cernible Distribution	
Nonnai	ametric Distrib	oution Free UCLs	
95% CLT UCL	5.623	95% BCA Bootstrap UCL	6.1
95% Standard Bootstrap UCL	5.488	95% Bootstrap-t UCL	25.0
95% Hall's Bootstrap UCL	19.01	95% Percentile Bootstrap UCL	5.8
90% Chebyshev(Mean, Sd) UCL	6.919	95% Chebyshev(Mean, Sd) UCL	8.2
• • • • • • • • • • • • • • • • • • • •		99% Chebyshev(Mean, Sd) UCL	13.5
97.5% Chebyshev(Mean, Sd) UCL	10.02	33 % Offebysite (Weart, Ou) OCL	
97.5% Chebyshev(Mean, Sd) UCL			
97.5% Chebyshev(Mean, Sd) UCL  Recommendation cannot be provided	10.02 Suggested U		
Recommendation cannot be provided	Suggested U(	CL to Use	
Recommendation cannot be provided  Note: Suggestions regarding the selection of a 95%	Suggested UC		

	General	Statistics	
Total Number of Observations	6	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.016	Mean	0.0173
Maximum	0.018	Median	0.0175
SD	8.1650E-4	Std. Error of Mean	3.3333E-4
Coefficient of Variation	0.0471	Skewness	-0.857
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Ted	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.821	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.293	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL	0.010	95% UCLs (Adjusted for Skewness)	0.0170
95% Student's-t UCL	0.018	95% Adjusted-CLT UCL (Chen-1995) 95% Modified-t UCL (Johnson-1978)	0.0178
		95% Modified-LOCE (Johnson-1978)	0.016
	Gamma (	GOF Test	
A-D Test Statistic	0.615	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significant	ce Level
K-S Test Statistic	0.313	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significant	ce Level
		stributed at 5% Significance Level	
		eliable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	530.4	k star (bias corrected MLE)	265.3
Theta hat (MLE)	3.2680E-5	Theta star (bias corrected MLE)	6.5332E-
nu hat (MLE)	6365	nu star (bias corrected)	3184
MLE Mean (bias corrected)	0.0173	MLE Sd (bias corrected)	0.0010
		Approximate Chi Square Value (0.05)	3054
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	3007
Ass	suming Gam	ma Distribution	
			0.018

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JCL 0.0
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User Selected Options  Date/Time of Computation From File mw/19_year_data_xis Full Precision OFF Confidence Coefficient 95% Number of Bootstrap Operations 2000  Iltrate - MW-19  General Statistics Total Number of Observations 6 Number of Distinct Observations 6 Number of Missing Observations 5 Number of Missing Observations 9 Nu		UCL Statist	ics for Data	Sets with Non-Detects	
ProUCL 5.2 11/13/2024 2:37:30 PM   From File   mw/19, year, data.xis   Full Procision   OFF					
From File   mw19_3year_data.xis   Full Precision   OFF   Condence Coefficient   55%   Number of Bootstrap Operations   2000      Rirato - MW-19	·				
Full Pracision Confidence Coefficient Number of Bootstrap Operations    Sys   Support   Statistics   Support   Suppo	·		2:37:30 PM		
Second   S					
Number of Bootstrap Operations   2000					
Command   Comm					
Camma GOF Test   Shapiro Wilk Critical Value   0.713   Data appear Normal at 1% Significance Level   Data CF Test   Data	Number of Bootstrap Operations	2000			
Cameral Statistics   Total Number of Distinct Observations   6   Number of Distinct Observations   6   Number of Missing Observations   0	itrate - MW-19				
Total Number of Observations 6 Number of Distinct Observations 6 Number of Missing Observations 0 Minimum 0.28 Mean 5.28 Maximum 13 Median 3.4 SD 4.928 Std. Error of Mean 2.012 Coefficient of Variation 0.933 Skewness 0.916 Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Test Statistic 0.888 Shapiro Wilk GOF Test 1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level 1% Lilliefors Critical Value 0.373 Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.333 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  S% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Dis					
Number of Missing Observations   Number of Missing Observations   Number of Missing Observations   Number of Missing Observations   Section	T	N 1 (0) "			
Minimum   0.28   Mean   5.28	Total	Number of Observations	б		
Maximum 13 Median 3.4  SD 4.928 Std. Error of Mean 2.012  Coefficient of Variation 0.933 Skewness 0.916  Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level Lilliefors Test Statistic 0.285 Lilliefors GOF Test  1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% Adjusted-CLT UCL (Chen-1995) 9.393  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  S% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level Kolmogorov-Smirnov Gamma GOF Test  Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level Detected De					
SD   4.928   Std. Error of Mean   2.012					
Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.    Normal GOF Test			-		
Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Test Statistic 0.888 Shapiro Wilk QOF Test  1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.285 Lilliefors GOF Test  1% Lilliefors Critical Value 0.373 Data appear Normal at 1% Significance Level  Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% UCLs (Adjusted for Skewness)  95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.393  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level				Std. Error of Mean	
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Test Statistic 1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Test Statistic 1% Lilliefors Critical Value Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% UCLs (Adjusted for Skewness) 95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test 5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level		Coefficient of Variation	0.933	Skewness	0.916
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).  The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Test Statistic	Note: Sample size is	small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
The Chebyshev UCL often results in gross overestimates of the mean.  Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.  Normal GOF Test  Shapiro Wilk Test Statistic 0.888 Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.285 Lilliefors GOF Test  1% Lilliefors Critical Value 0.373 Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% UCLs (Adjusted for Skewness)  95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.393  95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	refer also to	ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
Normal GOF Test	but note that	ITRC may recommend the	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
Normal GOF Test		The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Shapiro Wilk Test Statistic 0.888 Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.285 Lilliefors GOF Test  1% Lilliefors Critical Value 0.373 Data appear Normal at 1% Significance Level  Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% UCLs (Adjusted for Skewness)  95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.393  95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	Ref	er to the ProUCL 5.2 Tecl	hnical Guide	for a discussion of the Chebyshev UCL.	
Shapiro Wilk Test Statistic 0.888 Shapiro Wilk GOF Test  1% Shapiro Wilk Critical Value 0.713 Data appear Normal at 1% Significance Level  Lilliefors Test Statistic 0.285 Lilliefors GOF Test  1% Lilliefors Critical Value 0.373 Data appear Normal at 1% Significance Level  Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 9.334 95% Adjusted for Skewness)  95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.393  95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level					
1% Shapiro Wilk Critical Value Lilliefors Test Statistic Lilliefors GOF Test  1% Lilliefors Critical Value Data appear Normal at 1% Significance Level  Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL 95% VCLs (Adjusted for Skewness) 95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 95% Modified-t UCL (Johnson-1978) 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test 5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test 5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level Detected data appear Gamma Distributed at 5% Significance Level			Normal G	OF Test	
Lilliefors Test Statistic  1% Lilliefors Critical Value  0.373  Data appear Normal at 1% Significance Level  Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL  95% UCLs (Adjusted for Skewness)  95% Student's-t UCL  9.334  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  9.459  Gamma GOF Test  A-D Test Statistic  0.23  Anderson-Darling Gamma GOF Test  5% A-D Critical Value  0.714  Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic  0.173  Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value  0.341  Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	S	hapiro Wilk Test Statistic	0.888	Shapiro Wilk GOF Test	
Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL  95% UCLs (Adjusted for Skewness)  95% Student's-t UCL  9.334  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  95% Modified-t UCL (Johnson-1978)  95% A-D Test Statistic  0.23  Anderson-Darling Gamma GOF Test  5% A-D Critical Value  0.714  Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic  0.341  Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	1% S	hapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Data appear Normal at 1% Significance Level  Note GOF tests may be unreliable for small sample sizes  Assuming Normal Distribution  95% Normal UCL  95% UCLs (Adjusted for Skewness)  95% Student's-t UCL 9.334  95% Adjusted-CLT UCL (Chen-1995) 9.393  95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23  Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714  Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173  Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341  Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		Lilliefors Test Statistic	0.285	Lilliefors GOF Test	
Assuming Normal Distribution  95% Normal UCL  95% UCLs (Adjusted for Skewness)  95% Student's-t UCL  9.334  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  9.459  Gamma GOF Test  A-D Test Statistic  0.23  Anderson-Darling Gamma GOF Test  5% A-D Critical Value  0.714  Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic  0.341  Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	1	% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Assuming Normal Distribution  95% Normal UCL 95% VCLs (Adjusted for Skewness)  95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 9.393 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		Data appea	r Normal at	1% Significance Level	
95% Normal UCL 95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 95% Modified-t UCL (Johnson-1978) 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		Note GOF tests r	may be unre	liable for small sample sizes	
95% Normal UCL 95% Student's-t UCL 9.334 95% Adjusted-CLT UCL (Chen-1995) 95% Modified-t UCL (Johnson-1978) 95% Modified-t UCL (Johnson-1978) 9.459  Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		Ass	suming Norm	nal Distribution	
Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level	95% No		-		
Gamma GOF Test  A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		95% Student's-t UCL	9.334	95% Adjusted-CLT UCL (Chen-1995)	9.393
A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level					9.459
A-D Test Statistic 0.23 Anderson-Darling Gamma GOF Test  5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level			Gamma C	GOF Test	
5% A-D Critical Value 0.714 Detected data appear Gamma Distributed at 5% Significance Level  K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level		A-D Test Statistic			
K-S Test Statistic 0.173 Kolmogorov-Smirnov Gamma GOF Test  5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level				<del>-</del>	e l evel
5% K-S Critical Value 0.341 Detected data appear Gamma Distributed at 5% Significance Level  Detected data appear Gamma Distributed at 5% Significance Level					LOVE
Detected data appear Gamma Distributed at 5% Significance Level				<del>-</del>	a Level
					LEVE
NOTA (-i) IL TARTE MAN DA UNTRIBADIO FOR AMAIL COMPIO OITAG		Detected data appear			

	Gamma	Statistics	
k hat (MLE)	1.043	k star (bias corrected MLE)	0.6
Theta hat (MLE)	5.061	Theta star (bias corrected MLE)	8.3
nu hat (MLE)	12.52	nu star (bias corrected)	7.5
MLE Mean (bias corrected)	5.28	MLE Sd (bias corrected)	6.6
		Approximate Chi Square Value (0.05)	2.5
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	1.5
Ası	suming Gam	nma Distribution	
95% Approximate Gamma UCL	16.03	95% Adjusted Gamma UCL	25.4
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.918	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.213	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
<del>-</del> -		eliable for small sample sizes	
		Il Statistics	
Minimum of Logged Data	-1.273	Mean of logged Data	1.1
Maximum of Logged Data	2.565	SD of logged Data	1.3
Assu	ıming Logno	ormal Distribution	
95% H-UCL	211.1	90% Chebyshev (MVUE) UCL	16.0
95% Chebyshev (MVUE) UCL	20.54	97.5% Chebyshev (MVUE) UCL	26.
95% Chebyshev (MVUE) UCL 99% Chebyshev (MVUE) UCL	20.54 38.96	97.5% Chebyshev (MVUE) UCL	26.7
99% Chebyshev (MVUE) UCL	38.96	97.5% Chebyshev (MVUE) UCL tion Free UCL Statistics	26.7
99% Chebyshev (MVUE) UCL  Nonparame	38.96		26.7
99% Chebyshev (MVUE) UCL  Nonparame  Data appea	38.96 etric Distribu r to follow a	tion Free UCL Statistics	26.7
99% Chebyshev (MVUE) UCL  Nonparame  Data appea	38.96 etric Distribu r to follow a	tion Free UCL Statistics Discernible Distribution	8.9
99% Chebyshev (MVUE) UCL  Nonparame  Data appea	38.96 etric Distribu er to follow a	tion Free UCL Statistics Discernible Distribution tribution Free UCLs	
99% Chebyshev (MVUE) UCL  Nonparame Data appea  Nonpar	38.96 etric Distribu ir to follow a rametric Dis	tion Free UCL Statistics Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL	8.9
99% Chebyshev (MVUE) UCL  Nonparame  Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL	38.96  etric Distribu ir to follow a  rametric Dis 8.589 8.318	tion Free UCL Statistics Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL	8.9 15.9 8.6
99% Chebyshev (MVUE) UCL  Nonparame Data appea  Nonpar  95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	38.96 etric Distribu ir to follow a rametric Dis 8.589 8.318 40.37	tion Free UCL Statistics  Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	8.9
Nonparame Data appea  Nonpar  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	38.96 etric Distribu ir to follow a rametric Dis 8.589 8.318 40.37 11.32 17.84	tion Free UCL Statistics  Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	8.9 15.9 8.6 14.0
Nonparame Data appea  Nonpar  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	38.96 etric Distribu ir to follow a rametric Dis 8.589 8.318 40.37 11.32 17.84	tion Free UCL Statistics  Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	8.9 15.9 8.6 14.0
Nonparame Data appea  Nonpar  Solution 195% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	38.96 etric Distribu ir to follow a rametric Dis 8.589 8.318 40.37 11.32 17.84  Suggested 9.334	tion Free UCL Statistics  Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL UCL to Use	8.99 15.9 8.66 14.0 25.3
Nonparame Data appea  Nonpar  Posta appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	38.96  etric Distribu r to follow a  rametric Dis 8.589 8.318 40.37 11.32 17.84  Suggested 9.334	tion Free UCL Statistics  Discernible Distribution  tribution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	8.99 15.9 8.66 14.0 25.3

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	2
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.017	Minimum Non-Detect	0.01
Maximum Detect	0.32	Maximum Non-Detect	0.01
Variance Detects	0.02	Percent Non-Detects	33.3
Mean Detects	0.118	SD Detects	0.14
Median Detects	0.067	CV Detects	1.2
Skewness Detects	1.518	Kurtosis Detects	1.99
Mean of Logged Detects	-2.788	SD of Logged Detects	1.3
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance, he Chebyshev UCL for small sample sizes (n < 7).	
<del>-</del>		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tecl	hnical Guide	e for a discussion of the Chebyshev UCL.	
Norma	al GOF Test	t on Detects Only	
Shapiro Wilk Test Statistic	0.827	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Leve	el
Lilliefors Test Statistic	0.272	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Leve	el
Detected Data a	ppear Norm	nal at 1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
		ritical Values and other Nonparametric UCLs	
KM Mean			
	0.0835	KM Standard Error of Mean	
90KM SD	0.111	95% KM (BCA) UCL	N/A
90KM SD 95% KM (t) UCL 95% KM (z) UCL	0.111 0.189 0.17	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL	N/A N/A N/A
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL	0.111 0.189 0.17 0.241	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.3
90KM SD 95% KM (t) UCL 95% KM (z) UCL	0.111 0.189 0.17	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL	N/A N/A N/A 0.3
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	0.111 0.189 0.17 0.241 0.41	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL	N/A N/A N/A 0.3
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic	0.111 0.189 0.17 0.241 0.41	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  stected Observations Only Anderson-Darling GOF Test	N/A N/A N/A 0.3
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value	0.111 0.189 0.17 0.241 0.41 Tests on De 0.344 0.668	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance	N/A N/A N/A 0.3
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic	0.111 0.189 0.17 0.241 0.41 Tests on De	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  stected Observations Only Anderson-Darling GOF Test	N/A N/A N/A 0.3°
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	0.111 0.189 0.17 0.241 0.41 Tests on De 0.344 0.668 0.293 0.403	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	N/A N/A N/A 0.3 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value	0.111 0.189 0.17 0.241 0.41 Tests on De 0.344 0.668 0.293 0.403	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	N/A N/A N/A 0.3° 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear	0.111 0.189 0.17 0.241 0.41 Tests on De 0.344 0.668 0.293 0.403 Gamma Dis	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance  Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	N/A N/A N/A 0.3 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear  Note GOF tests re	0.111 0.189 0.17 0.241 0.41  Tests on De 0.344 0.668 0.293 0.403  Gamma Dis may be unre	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Steeted Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level  Stributed at 5% Significance Level	N/A N/A N/A 0.3° 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear  Note GOF tests re	0.111 0.189 0.17 0.241 0.41  Tests on De 0.344 0.668 0.293 0.403  Gamma Dis may be unre	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level	N/A N/A N/A 0.3 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests re	0.111 0.189 0.17 0.241 0.41  Tests on De 0.344 0.668 0.293 0.403 Gamma Dis may be unre	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Stected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance Level  Stributed at 5% Significance Level  Stributed Data Only	N/A N/A 0.3 <sup>-</sup> 0.60
90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Detected data appear Note GOF tests results of the company of the comp	0.111 0.189 0.17 0.241 0.41  Tests on De 0.344 0.668 0.293 0.403  Gamma Dis nay be unre	95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 99% KM Chebyshev UCL  Stected Observations Only Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF Detected data appear Gamma Distributed at 5% Significance stributed at 5% Significance stributed at 5% Significance Level  Stributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)	N/A N/A N/A 0.3° 0.60 ce Leve

ch situations, GROS r This is especia	method may yi ally true when	<1.0, especially when the sample size is small (e.g., <15-20) rield incorrect values of UCLs and BTVs the sample size is small.  The be computed using gamma distribution on KM estimates	
This is especial letected data, BTVs a Minimum Maximum SD	ally true when nd UCLs may	the sample size is small.  be computed using gamma distribution on KM estimates	
etected data, BTVs a Minimum Maximum SD	nd UCLs may	be computed using gamma distribution on KM estimates	
Minimum Maximum SD	0.01		
Maximum SD		1	
SD	0.32	Mean	0.08
		Median	0.02
k hat (MLE)	0.123	CV	1.5
	0.681	k star (bias corrected MLE)	0.4
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.1
nu hat (MLE)	8.175	nu star (bias corrected)	5.4
vel of Significance (β)	0.0122		
quare Value (5.42, α)	1.351	Adjusted Chi Square Value (5.42, β)	0.7
na Approximate UCL	0.328	95% Gamma Adjusted UCL	N/A
			0.1
` ′		` '	0.0
		` '	0.3
		` 1	4.7
` '		, ,	0.2
. , ,		• • • • • • • • • • • • • • • • • • • •	0.2
mma percentile (KM)	0.349	99% gamma percentile (KM)	0.6
Gamm	a Kaplan-Mei	ier (KM) Statistics	
	1.028		0.5
	0.384	95% KM Adjusted Gamma UCL	0.7
Lognormal GO	F Test on Det	tected Observations Only	
iro Wilk Test Statistic	0.923	Shapiro Wilk GOF Test	
ro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance L	evel
illiefors Test Statistic	0.255	Lilliefors GOF Test	
illiefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance L	evel
Detected Data ap	pear Lognorm	nal at 10% Significance Level	
Note GOF tests	may be unreli	iable for small sample sizes	-
Lognormal ROS	S Statistics I Is	sing Imputed Non-Detects	
			-4.0
_		-	2.2
ŭ		-	0.1
			0.9
		33 /	
	Estimates of G  Mean (KM)  Variance (KM)  k hat (KM)  nu hat (KM)  theta hat (KM)  mma percentile (KM)  mma percentile (KM)  Gamm  quare Value (4.73, α)  eximate Gamma UCL  Lognormal GO  iro Wilk Test Statistic iro Wilk Critical Value  Lilliefors Test Statistic iro Wilk Critical Value  Detected Data app  Note GOF tests  Lognormal ROS  ean in Original Scale  SD in Original Scale  ormality of ROS data)  BCA Bootstrap UCL	Estimates of Gamma Param Mean (KM) 0.0835 Variance (KM) 0.0123 k hat (KM) 0.565 nu hat (KM) 0.148 mma percentile (KM) 0.135 mma percentile (KM) 0.349  Gamma Kaplan-Me Quare Value (4.73, α) 1.028 eximate Gamma UCL 0.384  Lognormal GOF Test on De siro Wilk Test Statistic 0.923 iro Wilk Critical Value 0.792 cilliefors Test Statistic 0.255 iilliefors Critical Value 0.346  Detected Data appear Lognorm Note GOF tests may be unrel  Lognormal ROS Statistics U  lean in Original Scale 0.079 SD in Original Scale 0.125 cormality of ROS data) 0.182	quare Value (5.42, α) 1.351 Adjusted Chi Square Value (5.42, β) 95% Gamma Adjusted UCL  Estimates of Gamma Parameters using KM Estimates  Mean (KM) 0.0835 SD (KM)  Variance (KM) 0.0123 SE of Mean (KM)  k hat (KM) 0.565 k star (KM)  nu hat (KM) 6.786 nu star (KM)  theta hat (KM) 0.148 theta star (KM)  mma percentile (KM) 0.349 99% gamma percentile (KM)  mma percentile (KM) 0.349 99% gamma percentile (KM)  Gamma Kaplan-Meier (KM) Statistics  quare Value (4.73, α) 1.028 Adjusted Chi Square Value (4.73, β)  eximate Gamma UCL 0.384 95% KM Adjusted Gamma UCL  Lognormal GOF Test on Detected Observations Only  iro Wilk Test Statistic 0.923 Shapiro Wilk GOF Test  iro Wilk Critical Value 0.792 Detected Data appear Lognormal at 10% Significance Level  Note GOF tests may be unreliable for small sample sizes  Lognormal ROS Statistics Using Imputed Non-Detects  ean in Original Scale 0.079 Mean in Log Scale or BCOA Bootstrap UCL 0.00 BCOA BCOA BCOA BCOA BCOA BCOA BCOA BCOA

KM Mean (logged)	-3.258	KM Geo Mean	0.038
KM SD (logged)	1.173	95% Critical H Value (KM-Log)	4.729
KM Standard Error of Mean (logged)	0.553	95% H-UCL (KM -Log)	0.914
KM SD (logged)	1.173	95% Critical H Value (KM-Log)	4.729
KM Standard Error of Mean (logged)	0.553		
	DL/2 Statistics		
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.081	Mean in Log Scale	-3.489
SD in Original Scale	0.123	SD in Log Scale	1.51
95% t UCL (Assumes normality)	0.182	95% H-Stat UCL	5.42
DL/2 is not a recommended me	etnoa, provided for con	nparisons and historical reasons	
DL/2 is not a recommended me	etnoa, provided for con	nparisons and historical reasons	
Nonparame	tric Distribution Free U	CL Statistics	
Nonparame	tric Distribution Free U		
Nonparame Detected Data appear	tric Distribution Free U r Normal Distributed at	CL Statistics 1% Significance Level	
Nonparame Detected Data appear	tric Distribution Free U r Normal Distributed at Suggested UCL to Use	CL Statistics 1% Significance Level	
Nonparame Detected Data appear	tric Distribution Free U r Normal Distributed at	CL Statistics 1% Significance Level	
Nonparame Detected Data appear	tric Distribution Free Urn Normal Distributed at Suggested UCL to Use 0.189	CL Statistics 1% Significance Level	
Nonparame Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti	tric Distribution Free Ur Normal Distributed at Suggested UCL to Use 0.189	CL Statistics  1% Significance Level  e  collected in a random and unbiased manner.	
Nonparame Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti	tric Distribution Free Urn Normal Distributed at Suggested UCL to Use 0.189	CL Statistics  1% Significance Level  e  collected in a random and unbiased manner.	
Nonparame Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror	CL Statistics  1% Significance Level  e  collected in a random and unbiased manner.	
Nonparame Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti Please verify the d  If the data were collected	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror	CL Statistics  1% Significance Level  e  collected in a random and unbiased manner. In random locations.  ther non-random methods,	
Nonparame  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti  Please verify the d  If the data were collected  then contact a s	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror using judgmental or or statistician to correctly	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.	
Nonparame  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti  Please verify the d  If the data were collected then contact a s  Note: Suggestions regarding the selection of a 95%	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror using judgmental or of statistician to correctly	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.  clip the user to select the most appropriate 95% UCL.	
Nonparame  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti  Please verify the d  If the data were collected	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror using judgmental or of	CL Statistics  1% Significance Level  e  collected in a random and unbiased manner. In random locations.  ther non-random methods,	
Nonparame  Detected Data appear  95% KM (t) UCL  The calculated UCLs are based on assumpti  Please verify the d  If the data were collected then contact a s  Note: Suggestions regarding the selection of a 95%	r Normal Distributed at Suggested UCL to Use 0.189 ons that the data were ata were collected fror using judgmental or of statistician to correctly	CL Statistics  1% Significance Level  collected in a random and unbiased manner. In random locations. Ither non-random methods, calculate UCLs.	

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.0074	Mean	0.0
Maximum	0.038	Median	0.0
SD	0.0116	Std. Error of Mean	0.0
Coefficient of Variation	0.665	Skewness	1
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		2020 and ITRC 2012) for additional guidance,	
<del>-</del>		ne Chebyshev UCL for small sample sizes (n < 7).	
-		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G		
Shapiro Wilk Test Statistic	0.825	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.315	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0269	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma G		
A-D Test Statistic	0.448	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance	e Le
K-S Test Statistic	0.29	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance	e Le
•••		tributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	3.279	k star (bias corrected MLE)	1.
Theta hat (MLE)	0.00531	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	39.35	nu star (bias corrected)	21
MLE Mean (bias corrected)	0.0174	MLE Sd (bias corrected)	0.0
-		Approximate Chi Square Value (0.05)	11
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	9.
Ass	uming Gam	ma Distribution	

	Lognormal GOF	F Test	
Shapiro Wilk Test Statistic	0.92	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.253	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear I	ognormal at 10°	% Significance Level	
Note GOF tests r	nay be unreliable	e for small sample sizes	
	Lognormal Stat		
Minimum of Logged Data	-4.906	Mean of logged Data	-4.211
Maximum of Logged Data	-3.27	SD of logged Data	0.599
	ming Lognormal		
95% H-UCL	0.0385	90% Chebyshev (MVUE) UCL	0.029
95% Chebyshev (MVUE) UCL	0.0354	97.5% Chebyshev (MVUE) UCL	0.043
99% Chebyshev (MVUE) UCL	0.0588		
-		Free UCL Statistics	
Data appear	to follow a Disc	ernible Distribution	
<u></u>			
<u> </u>	ametric Distribut		
95% CLT UCL	0.0252	95% BCA Bootstrap UCL	0.026
95% Standard Bootstrap UCL	0.0244	95% Bootstrap-t UCL	0.054
'		'	
95% Hall's Bootstrap UCL	0.0858	95% Percentile Bootstrap UCL	0.024
'	0.0858 0.0316	'	0.024
95% Hall's Bootstrap UCL		95% Percentile Bootstrap UCL	
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0316 0.0469	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.024
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0316 0.0469 Suggested UCL	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.024
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0316 0.0469	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.024
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL	0.0316 0.0469 Suggested UCL 0.0269	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	0.02 <sup>4</sup> 0.038 0.06 <sup>4</sup>
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%	0.0316 0.0469 Suggested UCL 0.0269	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	0.02 <sup>2</sup> 0.038 0.06 <sup>2</sup>
95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.0316 0.0469  Suggested UCL 0.0269  UCL are provide data distribution,	95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL to Use	0.02 <sup>2</sup> 0.038 0.06 <sup>2</sup>

	General Sta	atistics	
Total Number of Observations	4	Number of Distinct Observations	4
Total Number of Observations	<u> </u>	Number of Missing Observations	0
Minimum	0.58	Mean	1.3
Maximum	3.7	Median	0.6
SD	1.552	Std. Error of Mean	0.7
Coefficient of Variation	1.131	Skewness	2
	-		
		sing incremental sampling methodology (ISM) approach, 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or the	Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results in (	gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nnical Guide fo	or a discussion of the Chebyshev UCL.	
	Normal GO	F Test	
Shapiro Wilk Test Statistic	0.637	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.438	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data Not Normal at 1% Significance Level	
Data Not	Normal at 1%	Significance Level	
Ass	suming Norma	Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	3.198	95% Adjusted-CLT UCL (Chen-1995)	3.4
		95% Modified-t UCL (Johnson-1978)	3.3
	Gamma GO	E Toot	
A-D Test Statistic	0.925	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.925	Data Not Gamma Distributed at 5% Significance Leve	
K-S Test Statistic	0.663	Kolmogorov-Smirnov Gamma GOF Test	·I
5% K-S Critical Value	0.407	Data Not Gamma Distributed at 5% Significance Leve	.I
		at 5% Significance Level	-
Data Not Gailli		at 070 dignilicance cover	
	Gamma Sta	atistics	
k hat (MLE)	1.471	k star (bias corrected MLE)	0.5
Theta hat (MLE)	0.933	Theta star (bias corrected MLE)	2.5
nu hat (MLE)	11.77	nu star (bias corrected)	4.2
MLE Mean (bias corrected)	1.373	MLE Sd (bias corrected)	1.8
` '		Approximate Chi Square Value (0.05)	0.8
	NI/A	Adjusted Chi Square Value	N/A
Adjusted Level of Significance	N/A		
	uming Gamma	· · · · · · · · · · · · · · · · · · ·	

	Lognormal GC	PF Test	
Shapiro Wilk Test Statistic	0.652	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.433	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data Not Lognormal at 10% Significance Level	
Data Not Lo	ognormal at 10%	6 Significance Level	
	Lognormal Sta	atistics	
Minimum of Logged Data	-0.545	Mean of logged Data	-0.060
Maximum of Logged Data	1.308	SD of logged Data	0.91
Assu	mina Lagnarma	J Distribution	
	ming Lognorma		2.00
95% H-UCL	35.87	90% Chebyshev (MVUE) UCL	2.89
95% Chebyshev (MVUE) UCL	3.628	97.5% Chebyshev (MVUE) UCL	4.65
99% Chebyshev (MVUE) UCL	6.661		
Nonparame	tric Distribution	Free UCL Statistics	
Data do no	ot follow a Disce	ernible Distribution	
		tion Free UCLs	
95% CLT UCL	2.649	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	3.7	95% Chebyshev(Mean, Sd) UCL	4.75
97.5% Chebyshev(Mean, Sd) UCL	6.218	99% Chebyshev(Mean, Sd) UCL	9.09
	Suggested UCI	to Use	
Recommendation cannot be provided			
		ta were collected in a random and unbiased manner	
The calculated UCLs are based on assumpti	ons that the dat		
The calculated UCLs are based on assumpti			
Please verify the d	ata were collec	ted from random locations.	
Please verify the d	ata were collectusing judgment	ted from random locations.	
Please verify the d If the data were collected then contact a	ata were collect using judgment statistician to co	ted from random locations. tal or other non-random methods, prrectly calculate UCLs.	
Please verify the d  If the data were collected then contact a s  Note: Suggestions regarding the selection of a 95%	ata were collect using judgment statistician to co	ted from random locations. tal or other non-random methods, prrectly calculate UCLs. ed to help the user to select the most appropriate 95% UCL.	
Please verify the d  If the data were collected then contact a s  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	ata were collect using judgment statistician to co  UCL are provid- data distribution	ted from random locations. tal or other non-random methods, prrectly calculate UCLs.	

	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
Total Number of Observations	7	Number of Missing Observations	0
Minimum	0.17	Mean	0.44
Maximum	0.17	Median	0.44
SD	0.336	Std. Error of Mean	0.16
Coefficient of Variation	0.755	Skewness	1.22
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tecl	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	GOF Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.239	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
Data appea	r Normal at	1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
Ass	suming Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.84	95% Adjusted-CLT UCL (Chen-1995)	0.8
		95% Modified-t UCL (Johnson-1978)	0.8
	Gamma (	GOF Test	
A-D Test Statistic	0.291	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.264	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.397	Detected data appear Gamma Distributed at 5% Significance	e Lev
Detected data annear	Gamma Dis	stributed at 5% Significance Level	
Detected data appear	nov he unre	liable for small sample sizes	
	nay be unit		
	Gamma :	Statistics	
		Statistics k star (bias corrected MLE)	0.7
Note GOF tests r	Gamma		
Note GOF tests r	<b>Gamma</b> 3	k star (bias corrected MLE)	0.5
Note GOF tests r  k hat (MLE)  Theta hat (MLE)	<b>Gamma</b> 3 2.501 0.178	k star (bias corrected MLE) Theta star (bias corrected MLE)	0.5 6.3
Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	Gamma 9 2.501 0.178 20.01	k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	0.5 6.3 0.5
Note GOF tests r  k hat (MLE)  Theta hat (MLE)  nu hat (MLE)	Gamma 9 2.501 0.178 20.01	k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)	0.7 0.5 6.3 0.5 1.8 N/A
k hat (MLE) Theta hat (MLE) nu hat (MLE) MLE Mean (bias corrected)  Adjusted Level of Significance	2.501 0.178 20.01 0.445	k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.5 6.3 0.5 1.8

	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.956	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.224	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	t 10% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Lognormal	Statistics	
Minimum of Logged Data	-1.772	Mean of logged Data	-1.023
Maximum of Logged Data	-0.0943	SD of logged Data	0.752
Assu	ming Logno	rmal Distribution	
95% H-UCL	4.389	90% Chebyshev (MVUE) UCL	0.917
95% Chebyshev (MVUE) UCL	1.133	97.5% Chebyshev (MVUE) UCL	1.432
99% Chebyshev (MVUE) UCL	2.021		
	,		
Nonparame	tric Distribut	ion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	ribution Free UCLs	
95% CLT UCL	0.721	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.949	95% Chebyshev(Mean, Sd) UCL	1.177
97.5% Chebyshev(Mean, Sd) UCL	1.494	99% Chebyshev(Mean, Sd) UCL	2.117
		,	
	Suggested l	UCL to Use	
95% Student's-t UCL	0.84		
	'		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size,	data distribu	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data sets	s; for additional insight the user may want to consult a statisticia	an.

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	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0042	Mean	0.0
Maximum	0.038	Median	0.0
SD	0.0119	Std. Error of Mean	0.00
Coefficient of Variation	0.582	Skewness	0.2
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
		•	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.989	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.144	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
		liable for small sample sizes	
Ass	sumina Norm	nal Distribution	
95% Normal UCL	Janning Hom	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0301	95% Adjusted-CLT UCL (Chen-1995)	0.0
3373 314431113 1 3 3 2	0.000.	95% Modified-t UCL (Johnson-1978)	0.0
		(	
	Gamma C		
A-D Test Statistic	0.235	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.702	Detected data appear Gamma Distributed at 5% Significance	ce Lev
K-S Test Statistic	0.184	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significano	ce Lev
• • • • • • • • • • • • • • • • • • • •		tributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	2.656	k star (bias corrected MLE)	1.4
Theta hat (MLE)	0.00767	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	31.88	nu star (bias corrected)	17.
MLE Mean (bias corrected)	0.0204	MLE Sd (bias corrected)	0.0
		Approximate Chi Square Value (0.05)	8.8
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	6.8
Ass	suming Gami	ma Distribution	
			0.0
95% Approximate Gamma UCL	0.0397	95% Adjusted Gamma UCL	0

	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.207	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal a	at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorma	l Statistics	
Minimum of Logged Data	-5.473	Mean of logged Data	-4.094
Maximum of Logged Data	-3.27	SD of logged Data	0.776
		ormal Distribution	
95% H-UCL	0.0733	90% Chebyshev (MVUE) UCL	0.0413
95% Chebyshev (MVUE) UCL	0.0504	97.5% Chebyshev (MVUE) UCL	0.063
99% Chebyshev (MVUE) UCL	0.0877		
<del>-</del>		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
· ,		tribution Free UCLs	
95% CLT UCL	0.0283	95% BCA Bootstrap UCL	0.0283
95% Standard Bootstrap UCL	0.0277	95% Bootstrap-t UCL	0.0315
95% Hall's Bootstrap UCL	0.0292	95% Percentile Bootstrap UCL	0.0278
90% Chebyshev(Mean, Sd) UCL	0.0349	95% Chebyshev(Mean, Sd) UCL	0.0415
97.5% Chebyshev(Mean, Sd) UCL	0.0506	99% Chebyshev(Mean, Sd) UCL	0.0685
		UCL to Use	
95% Student's-t UCL	0.0301		
	·	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data set	s; for additional insight the user may want to consult a statisticia	n.

User Selected Options				
•	OUCL 5.2 11/13/2024 2	0.20.26 DM		
·		2.38.30 PIVI		
Full Precision OFI	v20_3year_data.xls			
Confidence Coefficient 95%				
Number of Bootstrap Operations 200				
Number of Bootstrap Operations 200				
litrate - MW-20				
		General Stat	istics	
Total Num	mber of Observations	6	Number of Distinct Observations	5
			Number of Missing Observations	0
	Minimum	3.3	Mean	4.167
	Maximum	7	Median	3.6
	SD	1.407	Std. Error of Mean	0.574
Co	oefficient of Variation	0.338	Skewness	2.31
refer also to ITF but note that ITRO Th	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of	n ISM (ITRC 20 e t-UCL or the 0 ten results in gr	ng incremental sampling methodology (ISM) approach, 20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). ross overestimates of the mean. r a discussion of the Chebyshev UCL.	
refer also to ITF but note that ITRO Th	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of	n ISM (ITRC 20 e t-UCL or the 0 ten results in gi nnical Guide for	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). ross overestimates of the mean. r a discussion of the Chebyshev UCL.	
refer also to ITF but note that ITRO Th Refer to	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech	n ISM (ITRC 20 e t-UCL or the 0 ten results in gr nnical Guide for Normal GOF	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). ross overestimates of the mean. r a discussion of the Chebyshev UCL.	
refer also to ITF but note that ITRO Th Refer to	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech	n ISM (ITRC 20 e t-UCL or the 0 ten results in gr nnical Guide for Normal GOF	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). ross overestimates of the mean. r a discussion of the Chebyshev UCL.  Test Shapiro Wilk GOF Test	
refer also to ITF but note that ITRO Th Refer to Shapi	RC Tech Reg Guide of C may recommend the Chebyshev UCL of the ProUCL 5.2 Tech wire Wilk Test Statistic iro Wilk Critical Value	n ISM (ITRC 20 e t-UCL or the 0 ten results in granical Guide for Normal GOF 0.642 0.713	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL. Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level	
refer also to ITF but note that ITRO Th Refer to Shapi	RC Tech Reg Guide of C may recommend the Chebyshev UCL of the ProUCL 5.2 Tech circ Wilk Test Statistic iro Wilk Critical Value williefors Test Statistic	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The adiscussion of the Chebyshev UCL. Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test	
refer also to ITF but note that ITRO Th Refer to Shapi 1% Shapi	RC Tech Reg Guide of C may recommend the Chebyshev UCL of the ProUCL 5.2 Tech wire Wilk Test Statistic iro Wilk Critical Value williefors Test Statistic illiefors Critical Value	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level	
refer also to ITF but note that ITRO Th Refer to Shapi 1% Shapi	RC Tech Reg Guide of C may recommend the Chebyshev UCL of the ProUCL 5.2 Tech wire Wilk Test Statistic iro Wilk Critical Value williefors Test Statistic illiefors Critical Value	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The adiscussion of the Chebyshev UCL. Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech iro Wilk Test Statistic iro Wilk Critical Value illiefors Critical Value Data Not  Ass	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech siro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value  Data Not  Ass al UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373 Normal at 1% Suming Normal	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech iro Wilk Test Statistic iro Wilk Critical Value illiefors Critical Value Data Not  Ass	n ISM (ITRC 20 e t-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	5.69
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech siro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value  Data Not  Ass al UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373 Normal at 1% Suming Normal	220 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech siro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value  Data Not  Ass al UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373 Normal at 1% Suming Normal	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7).  Toss overestimates of the mean.  T a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi L 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech siro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value  Data Not  Ass al UCL	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373 Normal at 1% Suming Normal 5.324	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7).  Toss overestimates of the mean.  T a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
refer also to ITR but note that ITRO Th Refer to Shapi 1% Shapi 1% Li 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech iro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value Data Not  Ass al UCL 95% Student's-t UCL	n ISM (ITRC 20 e t-UCL or the O ten results in granical Guide for  Normal GOF  0.642  0.713  0.38  0.373  Normal at 1% S  suming Normal  5.324	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	5.414
refer also to ITR but note that ITRO Th Refer to  Shapi 1% Shapi 1% Li  1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech iro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value  Data Not  Ass al UCL 95% Student's-t UCL	n ISM (ITRC 20 e t-UCL or the O ten results in granical Guide for  Normal GOF  0.642  0.713  0.38  0.373  Normal at 1% S  suming Normal  5.324  Gamma GOF  1.043	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  F Test  Anderson-Darling Gamma GOF Test	5.414
refer also to ITR but note that ITRO Th Refer to  Shapi 1% Shapii 1% Li 1% Li	RC Tech Reg Guide o C may recommend the ne Chebyshev UCL of the ProUCL 5.2 Tech siro Wilk Test Statistic iro Wilk Critical Value illiefors Test Statistic illiefors Critical Value Data Not  Ass al UCL 95% Student's-t UCL  A-D Test Statistic	n ISM (ITRC 20 et-UCL or the Otten results in granical Guide for Normal GOF 0.642 0.713 0.38 0.373 Normal at 1% Suming Normal 5.324 Gamma GOF 1.043 0.698	D20 and ITRC 2012) for additional guidance, Chebyshev UCL for small sample sizes (n < 7). Toss overestimates of the mean. The a discussion of the Chebyshev UCL.  Test  Shapiro Wilk GOF Test  Data Not Normal at 1% Significance Level  Lilliefors GOF Test  Data Not Normal at 1% Significance Level  Significance Level  Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  F Test  Anderson-Darling Gamma GOF Test  Data Not Gamma Distributed at 5% Significance Level	5.414

	Gamma Sta	ristics	
k hat (MLE)	13.68	k star (bias corrected MLE)	6.9
Theta hat (MLE)	0.305	Theta star (bias corrected MLE)	0.5
nu hat (MLE)	164.2	nu star (bias corrected)	83.4
MLE Mean (bias corrected)	4.167	MLE Sd (bias corrected)	1.5
		Approximate Chi Square Value (0.05)	63.
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	57.
Ass	suming Gamma	Distribution	
95% Approximate Gamma UCL	5.485	95% Adjusted Gamma UCL	6.0
	Lognormal GC	PF Test	
Shapiro Wilk Test Statistic	0.696	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.339	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data Not Lognormal at 10% Significance Level	
Data Not Lo	ognormal at 10%	6 Significance Level	
	Lognormal St	atistics	
Minimum of Logged Data	1.194	Mean of logged Data	1.3
Maximum of Logged Data	1.946	SD of logged Data	0.2
Assı	ming Lognorma	al Distribution	
95% H-UCL	5.49	90% Chebyshev (MVUE) UCL	5.5
95% Chebyshev (MVUE) UCL	6.209	97.5% Chebyshev (MVUE) UCL	7.1
99% Chebyshev (MVUE) UCL	8.853		
Nonparame	tric Distribution	Free UCL Statistics	
<u> </u>		ernible Distribution	
None	ematria Diatrib	tion Free UCL a	
95% CLT UCL	5.111	stion Free UCLs 95% BCA Bootstrap UCL	E 1
			5.3
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	5.042 11.41	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	11. 5.2
90% Chebyshev(Mean, Sd) UCL	5.889	95% Chebyshev(Mean, Sd) UCL	6.6
97.5% Chebyshev(Mean, Sd) UCL	7.753	99% Chebyshev(Mean, Sd) UCL	9.8
,			
	Suggested UC	to Use	
B 1.2	l l		
Recommendation cannot be provided			
Note: Suggestions regarding the selection of a 95%	•	ed to help the user to select the most appropriate 95% UCL.	
Note: Suggestions regarding the selection of a 95%	•	ed to help the user to select the most appropriate 95% UCL.  n, and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	6	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.016	Mean	0.0
Maximum	0.02	Median	0.0
SD	0.00137	Std. Error of Mean	5.577
Coefficient of Variation	0.0745	Skewness	-0.
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend th	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.926	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.237	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level	
Data appea	ar Normal at	1% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
Ass	suming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0195	95% Adjusted-CLT UCL (Chen-1995)	0.0
		95% Modified-t UCL (Johnson-1978)	0.0
	Gamma G	OF Test	
A-D Test Statistic	0.371	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significan	ice Le
K-S Test Statistic	0.238	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significan	ice Le
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	208.7	k star (bias corrected MLE)	104
Theta hat (MLE)	8.7825E-5	Theta star (bias corrected MLE)	1.754
nu hat (MLE)	2505	nu star (bias corrected)	125
MLE Mean (bias corrected)	0.0183	MLE Sd (bias corrected)	0.0
(11111111111111111111111111111111111111		Approximate Chi Square Value (0.05)	117
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	114
Ana	umina Co	no Distribution	
ASS	uning Gami	ma Distribution	
95% Approximate Gamma UCL	0.0196	95% Adjusted Gamma UCL	0.0

	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.912	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.251	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level	
Data appear l	Lognormal a	at 10% Significance Level	
Note GOF tests i	may be unre	eliable for small sample sizes	
	Lognorma	I Statistics	
Minimum of Logged Data	-4.135	Mean of logged Data	-4.001
Maximum of Logged Data	-3.912	SD of logged Data	0.0765
Δεει	mina Loano	ormal Distribution	
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.0201
95% Chebyshev (MVUE) UCL	0.0208	97.5% Chebyshev (MVUE) UCL	0.0219
99% Chebyshev (MVUE) UCL	0.024	, , ,	
<u> </u>		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonnor	omotrio Diet	tribution Free UCLs	
95% CLT UCL	0.0193	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	0.0193 N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.02	95% Chebyshev(Mean, Sd) UCL	0.0208
97.5% Chebyshev(Mean, Sd) UCL	0.0218	99% Chebyshev(Mean, Sd) UCL	0.0239
	Suggested	UCL to Use	
95% Student's-t UCL	0.0195		
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
	•	ution, and skewness using results from simulation studies.	
·		s; for additional insight the user may want to consult a statisticia	ın.
Note: For highly negatively-skewed data, confid	ence limits	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be	
reliable. Chen's and Johnson's me	thods provi	de adjustments for positvely skewed data sets.	

UCL S	tatisti	cs for Data	Sets with Non-Detects	
User Selected Options				
Date/Time of Computation ProUCL 5.2 11/18/2	024 8	·46·19 AM		
From File   mw21_3year_data.x		.40.107111		
Full Precision OFF				
Confidence Coefficient 95%				
Number of Bootstrap Operations 2000				
Trainist of Bestellar operations				
itrate - MW-21				
		General S	Statistics	
Total Number of Observat	ions	8	Number of Distinct Observations	7
			Number of Missing Observations	0
Minir	num	19	Mean	61.5
Maxir	num	110	Median	55
	SD	34.22	Std. Error of Mean	12.1
Coefficient of Varia		0.556	Skewness	0.5
Note: Sample size is small (e.g. <10) if d	ata ar	e collected	using incremental sampling methodology (ISM) approach,	
			2 2020 and ITRC 2012) for additional guidance,	
			ne Chebyshev UCL for small sample sizes (n < 7).	
			n gross overestimates of the mean.	
<del>-</del>			for a discussion of the Chebyshev UCL.	
Refer to the Prooct 5.2	. reci	inicai Guide	for a discussion of the Chebysnev OCL.	
		Normal G	OF Took	
Observing Mills Total Observ	.:_*:_			
Shapiro Wilk Test Stat		0.911	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical V		0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Stat		0.172	Lilliefors GOF Test	
1% Lilliefors Critical V		0.333	Data appear Normal at 1% Significance Level	
			1% Significance Level	
Note GOF to	ests n	nay be unre	liable for small sample sizes	
	Ass	uming Norm	nal Distribution	
95% Normal UCL			95% UCLs (Adjusted for Skewness)	
95% Student's-t	UCL	84.42	95% Adjusted-CLT UCL (Chen-1995)	83.69
			95% Modified-t UCL (Johnson-1978)	84.78
	ı		<u> </u>	
		Gamma G	GOF Test	
A-D Test Stat	tistic	0.24	Anderson-Darling Gamma GOF Test	
5% A-D Critical V	alue	0.72	Detected data appear Gamma Distributed at 5% Significance	ce Level
	tistic	0.163	Kolmogorov-Smirnov Gamma GOF Test	
K-S Test Stat				
K-S Test Stat 5% K-S Critical V	alue	0.296	Detected data appear Gamma Distributed at 5% Significance	ce Level
5% K-S Critical V			Detected data appear Gamma Distributed at 5% Significand tributed at 5% Significance Level	ce Level
5% K-S Critical V Detected data ap	pear	Gamma Dis	tributed at 5% Significance Level	ce Level
5% K-S Critical V Detected data ap	pear	Gamma Dis	<del>-</del> <del>-</del>	ce Level
5% K-S Critical V Detected data ap	pear	Gamma Dis	tributed at 5% Significance Level liable for small sample sizes	ce Level
5% K-S Critical V  Detected data ap  Note GOF to	pear ests n	Gamma Dis	tributed at 5% Significance Level liable for small sample sizes Statistics	
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N	ests n	Gamma Dis nay be unre Gamma S 3.396	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)	2.20
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N	ests n	Gamma Dis nay be unre Gamma S 3.396 18.11	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)	2.20
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N)  nu hat (N)	ppear mests multiple	Gamma Dis nay be unre Gamma S 3.396 18.11 54.33	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)	2.20 27.88 35.29
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N	ppear mests multiple	Gamma Dis nay be unre Gamma S 3.396 18.11	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)	2.20 <sup>0</sup> 27.88 35.29 41.41
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N)  nu hat (N)	ppear numbers	Gamma Dis nay be unre Gamma S 3.396 18.11 54.33 61.5	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	2.20 27.88 35.29
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N  nu hat (N  MLE Mean (bias correct	ppear numbers	Gamma Dis nay be unre Gamma S 3.396 18.11 54.33	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)	2.20 27.88 35.29 41.41 22.7
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N  nu hat (N  MLE Mean (bias correct	ntender (ntender)	Gamma Dis nay be unre Gamma S 3.396 18.11 54.33 61.5	Itributed at 5% Significance Level Iliable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)  Adjusted Chi Square Value	2.20 27.88 35.29 41.41 22.7
5% K-S Critical V  Detected data ap  Note GOF to  k hat (N  Theta hat (N  nu hat (N  MLE Mean (bias correct	MLE) MLE) MLE) MLE) MLE) MARKET MARKE	Gamma Dis nay be unre Gamma S 3.396 18.11 54.33 61.5	tributed at 5% Significance Level liable for small sample sizes  Statistics  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	2.20 27.88 35.29 41.41 22.7

	Lognormal GO		
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.15	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data appear	Lognormal at 1	0% Significance Level	
Note GOF tests	may be unrelial	ble for small sample sizes	
	Lognormal St	tatistics	
Minimum of Logged Data	2.944	Mean of logged Data	3.96
Maximum of Logged Data	4.7	SD of logged Data	0.62
	<u> </u>		
Assu	ming Lognorma	al Distribution	
95% H-UCL	117.1	90% Chebyshev (MVUE) UCL	103.8
95% Chebyshev (MVUE) UCL	122.6	97.5% Chebyshev (MVUE) UCL	148.8
99% Chebyshev (MVUE) UCL	200.1		
•		n Free UCL Statistics	
•		n Free UCL Statistics scernible Distribution	
Data appea	r to follow a Dis		
Data appea	r to follow a Dis	scernible Distribution	81.7
Data appea  Nonpar	r to follow a Dis	scernible Distribution ution Free UCLs	
Data appea  Nonpar  95% CLT UCL	r to follow a Dis	ution Free UCLs 95% BCA Bootstrap UCL	
Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL	r to follow a Distribution 81.4 80.42	ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	91.3
Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL	r to follow a Distribution of the following states and states are states as a second of the following states are states	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL	91.3 81 114.2
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution   81.4 80.42 96.33 97.8 137.1	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	91.3 81 114.2
Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution   81.4	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	91.3 81 114.2
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution   81.4 80.42 96.33 97.8 137.1	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	81.7 91.3 81 114.2 181.9
Data appea  Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution   81.4	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	91.3 81 114.2 181.9
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	r to follow a Distribution   81.4	scernible Distribution  ution Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL  95% Percentile Bootstrap UCL  95% Chebyshev(Mean, Sd) UCL  99% Chebyshev(Mean, Sd) UCL	91.3 81 114.2 181.9

	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.31	Mean	1.6
Maximum	3.8	Median	0.9
SD	1.463	Std. Error of Mean	0.5
Coefficient of Variation	0.908	Skewness	0.9
		using incremental sampling methodology (ISM) approach,	
		2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G		
Shapiro Wilk Test Statistic	0.805	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.287	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	may be unre	liable for small sample sizes	
	suming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.591	95% Adjusted-CLT UCL (Chen-1995)	2.6
		95% Modified-t UCL (Johnson-1978)	2.6
	Gamma G	NOE Took	
A-D Test Statistic	0.424	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.424	Detected data appear Gamma Distributed at 5% Significance	Lov
K-S Test Statistic	0.73	Kolmogorov-Smirnov Gamma GOF Test	LEV
5% K-S Critical Value	0.212	Detected data appear Gamma Distributed at 5% Significance	a L ov
		tributed at 5% Significance Level	LEV
		liable for small sample sizes	
11010 401 10001	nay be anno	nuble for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	1.371	k star (bias corrected MLE)	0.9
Theta hat (MLE)	1.175	Theta star (bias corrected MLE)	1.7
nu hat (MLE)	21.94	nu star (bias corrected)	15.0
MLE Mean (bias corrected)	1.611	MLE Sd (bias corrected)	1.6
(**************************************	-	Approximate Chi Square Value (0.05)	7.2
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	5.9
.,		7	
Ass	uming Gami	ma Distribution	
95% Approximate Gamma UCL	3.324	95% Adjusted Gamma UCL	4.0
• •		,	
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.905	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.153	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
		<del>-</del>	
Data appear I	ognormal a	t 10% Significance Level	

	Lognorma	l Statistics	
Minimum of Logged Data	-1.171	Mean of logged Data	0.07
Maximum of Logged Data	1.335	SD of logged Data	1
Appl	ımina Loan	ormal Distribution	
95% H-UCL			2 204
	6.456	90% Chebyshev (MVUE) UCL	3.394
95% Chebyshev (MVUE) UCL	4.194	97.5% Chebyshev (MVUE) UCL	5.303
99% Chebyshev (MVUE) UCL	7.483		
Nonparame	tric Distribu	tion Free UCL Statistics	
 Data appea	r to follow a	Discernible Distribution	
Nonpai	ametric Dis	tribution Free UCLs	
95% CLT UCL	2.462	95% BCA Bootstrap UCL	2.61
95% Standard Bootstrap UCL	2.412	95% Bootstrap-t UCL	3.521
95% Hall's Bootstrap UCL	2.826	95% Percentile Bootstrap UCL	2.44
90% Chebyshev(Mean, Sd) UCL	3.163	95% Chebyshev(Mean, Sd) UCL	3.865
97.5% Chebyshev(Mean, Sd) UCL	4.841	99% Chebyshev(Mean, Sd) UCL	6.757
	Sunnested	LICI to lise	
0E% Student's t LICI			
55 % Students-t OCL	2.031		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data se	ts; for additional insight the user may want to consult a statisticia	n.
97.5% Chebyshev(Mean, Sd) UCL 95% Student's-t UCL Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size.	4.841  Suggested 2.591  UCL are pr data distrib	99% Chebyshev(Mean, Sd) UCL  UCL to Use  ovided to help the user to select the most appropriate 95% UCL.	6.7

c - MW-21			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.0015	Mean	0.004
Maximum	0.014	Median	0.0028
SD	0.00405	Std. Error of Mean	0.0014
Coefficient of Variation	0.973	Skewness	2.62
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	n ISM (ITR	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	e for a discussion of the Chebyshev UCL.	
	Normal C	GOF Test	
Shapiro Wilk Test Statistic	0.602	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.381	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data Not Normal at 1% Significance Level	
		% Significance Level	
But not	rioimai at i	70 Olgrimounico Edvor	
	suming Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00687	95% Adjusted-CLT UCL (Chen-1995)	0.007
		95% Modified-t UCL (Johnson-1978)	0.007
	Gamma (	GOF Test	
A-D Test Statistic	0.951	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.724	Data Not Gamma Distributed at 5% Significance Leve	el
K-S Test Statistic	0.294	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance	e Leve
Detected data follow App	r. Gamma l	Distribution at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	2.186	k star (bias corrected MLE)	1.45
Theta hat (MLE)	0.0019	Theta star (bias corrected MLE)	0.002
nu hat (MLE)	34.98	nu star (bias corrected)	23.2
MLE Mean (bias corrected)	0.00416	MLE Sd (bias corrected)	0.003
,		Approximate Chi Square Value (0.05)	13.2
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	11.3
·			
A		and a Direction of the contract of the contrac	
·		ma Distribution  95% Adjusted Gamma UCI	0 008
Ass 95% Approximate Gamma UCL	uming Gam 0.00729	ma Distribution 95% Adjusted Gamma UCL	0.008
95% Approximate Gamma UCL	0.00729 Lognormal	95% Adjusted Gamma UCL GOF Test	0.008
95% Approximate Gamma UCL Shapiro Wilk Test Statistic	0.00729 <b>Lognormal</b> 0.84	95% Adjusted Gamma UCL  GOF Test  Shapiro Wilk Lognormal GOF Test	0.008
95% Approximate Gamma UCL  Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value	0.00729 <b>Lognormal</b> 0.84 0.851	95% Adjusted Gamma UCL  GOF Test  Shapiro Wilk Lognormal GOF Test  Data Not Lognormal at 10% Significance Level	0.008
95% Approximate Gamma UCL  Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value Lilliefors Test Statistic	0.00729 <b>Lognormal</b> 0.84 0.851 0.242	95% Adjusted Gamma UCL  GOF Test  Shapiro Wilk Lognormal GOF Test  Data Not Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test	300.0
95% Approximate Gamma UCL  Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value Lilliefors Test Statistic  10% Lilliefors Critical Value	0.00729 <b>Lognormal</b> 0.84 0.851 0.242 0.265	95% Adjusted Gamma UCL  GOF Test  Shapiro Wilk Lognormal GOF Test  Data Not Lognormal at 10% Significance Level	0.008

	Lognormal	Statistics	
Minimum of Logged Data	-6.502	Mean of logged Data	-5.727
Maximum of Logged Data	-4.269	SD of logged Data	0.66
Assu	mina Loano	rmal Distribution	
95% H-UCL	0.00786	90% Chebyshev (MVUE) UCL	0.006
95% Chebyshev (MVUE) UCL	0.00798	97.5% Chebyshev (MVUE) UCL	0.009
99% Chebyshev (MVUE) UCL	0.0132		
Nonparame	tric Distribut	ion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	ribution Free UCLs	
95% CLT UCL	0.00652	95% BCA Bootstrap UCL	0.008
95% Standard Bootstrap UCL	0.00641	95% Bootstrap-t UCL	0.015
95% Hall's Bootstrap UCL	0.019	95% Percentile Bootstrap UCL	0.006
90% Chebyshev(Mean, Sd) UCL	0.00846	95% Chebyshev(Mean, Sd) UCL	0.010
97.5% Chebyshev(Mean, Sd) UCL	0.0131	99% Chebyshev(Mean, Sd) UCL	0.01
	Suggested l	JCL to Use	
Recommendation cannot be provided			
When a data set follows an app	roximate dist	tribution passing only one of the GOF tests,	
it is suggested to use a UCL bas	ed upon a di	stribution passing both GOF tests in ProUCL	
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	<u> </u>
Recommendations are based upon data size,	data distribu	ition, and skewness using results from simulation studies.	
However simulations results will not cover all Real We	orld data sets	s; for additional insight the user may want to consult a statisticia	n

n - MW-21			
	General	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.042	Minimum Non-Detect	0.02
Maximum Detect	0.75	Maximum Non-Detect	0.08
Variance Detects	0.0891	Percent Non-Detects	37.5
Mean Detects	0.233	SD Detects	0.2
Median Detects	0.097	CV Detects	1.2
Skewness Detects	1.91	Kurtosis Detects	3.6
Mean of Logged Detects	-2.059	SD of Logged Detects	1.1
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		the Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
		·	
Norm	al GOF Tes	t on Detects Only	
Shapiro Wilk Test Statistic	0.742	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Lev	el
Lilliefors Test Statistic	0.305	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Lev	el
Detected Data a	appear Norn	nal at 1% Significance Level	
		eliable for small sample sizes	
Kapian-Meier (KM) Statistics usir KM Mean	0.158	critical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.09
90KM SD	0.233	95% KM (BCA) UCL	0.3
95% KM (t) UCL	0.332	95% KM (Percentile Bootstrap) UCL	0.3
95% KM (z) UCL	0.309	95% KM Bootstrap t UCL	1.0
90% KM Chebyshev UCL	0.434	95% KM Chebyshev UCL	0.5
97.5% KM Chebyshev UCL	0.733	99% KM Chebyshev UCL	1.0
		-	
The state of the s		etected Observations Only	
A-D Test Statistic	0.415	Anderson-Darling GOF Test	
5% A-D Critical Value	0.692	Detected data appear Gamma Distributed at 5% Significance	ce Leve
K-S Test Statistic	0.252	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.365	Detected data appear Gamma Distributed at 5% Significance	ce Leve
		stributed at 5% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
Gamma	Statistics or	n Detected Data Only	
k hat (MLE)	0.96	k star (bias corrected MLE)	0.5
Theta hat (MLE)	0.243	Theta star (bias corrected MLE)	0.4
nu hat (MLE)	9.597	nu star (bias corrected)	5.1
Mean (detects)	0.233	na star (sias corrected)	0.1
		sing Imputed Non-Detects	
		6 NDs with many tied observations at multiple DLs	
		s <1.0, especially when the sample size is small (e.g., <15-20)	
		yield incorrect values of UCLs and BTVs	
<u> </u>	-	en the sample size is small.	
Fan are many a distable at a distable at a distable DTM and	nd LICL c ma	y be computed using gamma distribution on KM estimates	

Minimum	0.01	Mean	0.15
Maximum	0.75	Median	0.045
SD	0.254	CV	1.695
k hat (MLE)	0.56	k star (bias corrected MLE)	0.433
Theta hat (MLE)	0.267	Theta star (bias corrected MLE)	0.345
nu hat (MLE)	8.962	nu star (bias corrected)	6.935
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (6.93, α)	2.135	Adjusted Chi Square Value (6.93, β)	1.527
95% Gamma Approximate UCL	0.486	95% Gamma Adjusted UCL	0.68
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.158	SD (KM)	0.233
Variance (KM)	0.0542	SE of Mean (KM)	0.0921
k hat (KM)	0.458	k star (KM)	0.369
nu hat (KM)	7.325	nu star (KM)	5.911
theta hat (KM)	0.344	theta star (KM)	0.426
80% gamma percentile (KM)	0.252	90% gamma percentile (KM)	0.451
95% gamma percentile (KM)	0.673	99% gamma percentile (KM)	1.235
co /o gamma porcontino (run)	0.070	oo is gamma personale (ran)	
Gamm	a Kanlan-M	leier (KM) Statistics	
Approximate Chi Square Value (5.91, α)	1.595	Adjusted Chi Square Value (5.91, β)	1.095
95% KM Approximate Gamma UCL	0.584	95% KM Adjusted Gamma UCL	0.85
30 % KM / Approximate damina 002	0.004	30% NW / Najusteu Gumma GOL	0.00
Lognormal GO	F Test on F	Detected Observations Only	
Shapiro Wilk Test Statistic	0.915	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance	ovol
Lilliefors Test Statistic	0.300	Lilliefors GOF Test	CVCI
10% Lilliefors Critical Value	0.192	Detected Data appear Lognormal at 10% Significance	ovol
		rmal at 10% Significance Level	CVCI
		eliable for small sample sizes	
Note doi tests i	illay be ulli	eliable for small sample sizes	
Lognormal PO	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.154	Mean in Log Scale	-2.828
SD in Original Scale	0.154	SD in Log Scale	1.472
95% t UCL (assumes normality of ROS data)	0.322	95% Percentile Bootstrap UCL	0.316
95% t OCL (assumes normality of ROS data)	0.322	95% Bootstrap t UCL	1.167
•		95% Bootstrap t OCL	1.107
95% H-UCL (Log ROS)	2.338		
Otabiatian wales 1/84 anti-cata		Data and Assuming Lagrange Distribution	
		Data and Assuming Lognormal Distribution	0.0700
KM Mean (logged)	-2.619	KM Geo Mean	0.0728
KM SD (logged)	1.141	95% Critical H Value (KM-Log)	3.782
KM Standard Error of Mean (logged)	0.462	95% H-UCL (KM -Log)	0.714
KM SD (logged)	1.141	95% Critical H Value (KM-Log)	3.782
KM Standard Error of Mean (logged)	0.462		
	DL/2 S	statistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.157	Mean in Log Scale	-2.667
SD in Original Scale	0.249	SD in Log Scale	1.307
95% t UCL (Assumes normality)	0.324	95% H-Stat UCL	1.312
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	
		tion Free UCL Statistics	
Detected Data appea	r Normal Di	stributed at 1% Significance Level	
· · · · · · · · · · · · · · · · · · ·			

	Suggested UCL to Use
95% KM (t) UC	CL 0.332
The calculated UCLs are based on assum	nptions that the data were collected in a random and unbiased manner.
	e data were collected from random locations.
If the data were collected	ted using judgmental or other non-random methods,
then contact	t a statistician to correctly calculate UCLs.
Note: Suggestions regarding the selection of a 95	5% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data siz	ze, data distribution, and skewness using results from simulation studies.
However simulations results will not cover all Real	World data sets; for additional insight the user may want to consult a statistician.

	General S	Statistics	
Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	1.4	Mean	2.03
Maximum	3.1	Median	1.95
SD	0.573	Std. Error of Mean	0.20
Coefficient of Variation	0.281	Skewness	0.80
		using incremental sampling methodology (ISM) approach,	
		2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	hnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G		
Shapiro Wilk Test Statistic	0.926	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.152	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	suming Norn	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.421	95% Adjusted-CLT UCL (Chen-1995)	2.4
		95% Modified-t UCL (Johnson-1978)	2.4
	Gamma C	GOE Test	
A-D Test Statistic	0.266	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.169	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance	e Lev
		stributed at 5% Significance Level	
		liable for small sample sizes	
		•	
	Gamma S	Statistics	
k hat (MLE)	15.29	k star (bias corrected MLE)	9.6
Theta hat (MLE)	0.133	Theta star (bias corrected MLE)	0.2
nu hat (MLE)	244.6	nu star (bias corrected)	154.2
MLE Mean (bias corrected)	2.038	MLE Sd (bias corrected)	0.6
<u>,                                      </u>		Approximate Chi Square Value (0.05)	126.5
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	120.2
A 0.0	···mina Com	no Distribution	
95% Approximate Gamma UCL	2.484	ma Distribution  95% Adjusted Gamma UCL	2.6
33 % Approximate damina occ	2.404	33 % Aujusted danima oct	2.0
	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.153	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	
Data anneau l	ognormal a	t 10% Significance Level	
Data appear i	Logilolillai a	t 10 % Significance Level	

	Lognorma	al Statistics	
Minimum of Logged Data	0.336	Mean of logged Data	0.67
Maximum of Logged Data	1.131	SD of logged Data	0.27
Assur	ning Logno	ormal Distribution	
95% H-UCL	2.52	90% Chebyshev (MVUE) UCL	2.62
95% Chebyshev (MVUE) UCL	2.894	97.5% Chebyshev (MVUE) UCL	3.26
99% Chebyshev (MVUE) UCL	3.993		
Nonparamet	ric Distribu	tion Free UCL Statistics	
Data appear	to follow a	Discernible Distribution	
Nonpara	metric Dis	tribution Free UCLs	
95% CLT UCL	2.371	95% BCA Bootstrap UCL	2.4
30 % 321 332	2.07 1	55.5 <u> </u>	2.4
95% Standard Bootstrap UCL	2.362	95% Bootstrap-t UCL	2.56
		·	2.56
95% Standard Bootstrap UCL	2.362	95% Bootstrap-t UCL	2.56
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	2.362 2.479	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.362 2.479 2.645 3.303	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	2.56 2.37 2.92
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.362 2.479 2.645 3.303	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.56 2.37 2.92
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.362 2.479 2.645 3.303	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.56 2.37 2.92
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	2.362 2.479 2.645 3.303 Suggested 2.421	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	2.56 2.37 2.92 4.05
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	2.362 2.479 2.645 3.303 Suggested 2.421	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL  UCL to Use	2.56 2.37 2.92 4.05

CP - MW-21		
	General	Statistics
Total Number of Observations	9	Number of Distinct Observations 8
		Number of Missing Observations 0
Minimum	3.9000E-4	Mean 5.8778E
	9.4000E-4	Median 5.7000E
	1.7138E-4	Std. Error of Mean 5.7125E
Coefficient of Variation	0.292	Skewness 0.98
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,
		C 2020 and ITRC 2012) for additional guidance,
		he Chebyshev UCL for small sample sizes (n < 7).
		in gross overestimates of the mean.
		e for a discussion of the Chebyshev UCL.
		·
	Normal C	GOF Test
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.203	Lilliefors GOF Test
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level
	ar Normal at	1% Significance Level
		liable for small sample sizes
100 00. 1000		
As	sumina Norr	nal Distribution
95% Normal UCL		95% UCLs (Adjusted for Skewness)
95% Student's-t UCL	6 9400F-4	95% Adjusted-CLT UCL (Chen-1995) 7.01838
00% 014401110 1 0 0 2	0.0.002	95% Modified-t UCL (Johnson-1978) 6.9714E
		(60,000,000,000,000,000,000,000,000,000,
	Gamma (	GOF Test
A-D Test Statistic	0.229	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Leve
K-S Test Statistic	0.163	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Leve
		stributed at 5% Significance Level
• •		liable for small sample sizes
100 45. 100		
	Gamma	Statistics
k hat (MLE)	14.22	k star (bias corrected MLE) 9.55
Theta hat (MLE)		Theta star (bias corrected MLE) 6.15238
nu hat (MLE)	256	nu star (bias corrected) 172
MLE Mean (bias corrected)		MLE Sd (bias corrected) 1.90168
(Jido Goostou)	0.07702	Approximate Chi Square Value (0.05) 142.6
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value 137
, ajustica Ecver of digrillication	0.0201	, agustou om oquare value
Δο	suming Gam	ma Distribution
95% Approximate Gamma UCL		95% Adjusted Gamma UCL 7.3776
33 % Approximate Gamina OCL	,.000ZL-4	33 % Adjusted Gainina OCE 7.37701
	Lognorma	GOF Test
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.059	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.153	Data appear Lognormal at 10% Significance Level
		at 10% Significance Level
Data appear		it 10/0 Olyminative Level
Note COE tests	may be upre	eliable for small sample sizes

	Lognorma	l Statistics	
Minimum of Logged Data	-7.849	Mean of logged Data	-7.475
Maximum of Logged Data	-6.97	SD of logged Data	0.28
Assu	ming Logno	ormal Distribution	
95% H-UCL	7.1831E-4	90% Chebyshev (MVUE) UCL	7.5255E-4
95% Chebyshev (MVUE) UCL 8	8.2741E-4	97.5% Chebyshev (MVUE) UCL	9.3132E-4
99% Chebyshev (MVUE) UCL	0.00114		
Nonnaramai	tric Dietribu	tion Free UCL Statistics	
<u> </u>		Discernible Distribution	
Дата арреат	i to ioliow a	Discernible Distribution	
Nonnor	omotrio Dio	tribution Free UCLs	
95% CLT UCL		95% BCA Bootstrap UCL	C OFFCE A
95% Standard Bootstrap UCL (		95% Bootstrap UCL	
-		•	
95% Hall's Bootstrap UCL 8		95% Percentile Bootstrap UCL	
90% Chebyshev(Mean, Sd) UCL		95% Chebyshev(Mean, Sd) UCL	
97.5% Chebyshev(Mean, Sd) UCL	9.4452E-4	99% Chebyshev(Mean, Sd) UCL	0.00116
	Suggested	UCL to Use	
95% Student's-t UCL			
Note: Suggestions regarding the selection of a 05%	LICL are pr	avided to help the user to colect the most appropriate 05% LIC	
<u> </u>			
97.5% Chebyshev(Mean, Sd) UCL 995% Student's-t UCL 695% Student's-t UCL	9.4452E-4  Suggested 6.9400E-4  UCL are pridata distrib	99% Chebyshev(Mean, Sd) UCL  UCL to Use  ovided to help the user to select the most appropriate 95% UCl ution, and skewness using results from simulation studies. ts; for additional insight the user may want to consult a statistic	

UCL Statist	ics for Data	Sets with Non-Detects	
	).04.02 AM		
	7:04:03 AIVI		
· · · · · · · · · · · · · · · · · · ·			
2000			
	General	Statistics	
Number of Observations	7		7
Transpor or observations	,		0
Minimum	0.16		27.18
Maximum	70	Median	17
SD	28.38	Std. Error of Mean	10.73
Coefficient of Variation	1.044	Skewness	1.007
	II4-d	using increase and a compling weath adoleses (ICM) conseque	
er to the Prouct 5.2 Tech	nnicai Guide	e for a discussion of the Chebysnev UCL.	
	Normal G	POE Toet	
Shaniro Wilk Test Statistic			
		and Disadhadian	
	suming Norn		
	40.00		40.10
95% Student's-t UCL	48.02		49.18 48.7
		95% Modified-LOCE (Johnson-1978)	46.7
	Gamma (	GOF Test	
A-D Test Statistic	0.342	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.198	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.324	Detected data appear Gamma Distributed at 5% Significance	e Level
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests r	nay be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	0.669	k star (bias corrected MLE)	0.47
Theta hat (MLE)	40.63	Theta star (bias corrected MLE)	56.93
nu hat (MLE)	9.364	nu star (bias corrected)	6.68
I = NA (1:	27.18	MLE Sd (bias corrected)	39.34
LE Mean (bias corrected)			
LE Mean (bias corrected)		Approximate Chi Square Value (0.05)	1.99
sted Level of Significance	0.0158	Approximate Chi Square Value (0.05) Adjusted Chi Square Value	
sted Level of Significance	0.0158		1.99
	mw22_3year_data.xls  OFF  95%  2000  Number of Observations  Minimum  Maximum  SD  Coefficient of Variation  small (e.g., <10), if data a o ITRC Tech Reg Guide o ITRC may recommend th  The Chebyshev UCL of fer to the ProUCL 5.2 Tech  Shapiro Wilk Test Statistic Shapiro Wilk Critical Value  Lilliefors Test Statistic Shapiro Wilk Critical Value  Lilliefors Critical Value  Data appea  Note GOF tests r  Ass  Ormal UCL  95% Student's-t UCL  A-D Test Statistic  5% A-D Critical Value  K-S Test Statistic  5% K-S Critical Value  Detected data appear  Note GOF tests r	ProUCL 5.2 11/18/2024 9:04:03 AM mw22_3year_data.xls  OFF 95% 2000  Minimum 0.16 Maximum 70 SD 28.38 Coefficient of Variation 1.044  Small (e.g., <10), if data are collected to ITRC Tech Reg Guide on ISM (ITRC ITRC may recommend the t-UCL or to The Chebyshev UCL often results if the tothe ProUCL 5.2 Technical Guide the prouch of the Pro	ProUCL 5.2 11/18/2024 9:04:03 AM   mw22_3year_data.xis     OFF     95%     2000     Number of Observations   7

	Lognorma	al GOF Test	
Shapiro Wilk Test Statistic	0.819	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.838	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.291	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.28	Data Not Lognormal at 10% Significance Level	
Data Not L	ognormal at	10% Significance Level	
	Lognorma	al Statistics	
Minimum of Logged Data	-1.833	Mean of logged Data	2.393
Maximum of Logged Data	4.248	SD of logged Data	2.051
	•		
		ormal Distribution	
95% H-UCL	29097	90% Chebyshev (MVUE) UCL	156.6
95% Chebyshev (MVUE) UCL	204.8	97.5% Chebyshev (MVUE) UCL	271.8
99% Chebyshev (MVUE) UCL	403.3		
•		ution Free UCL Statistics	
Data appea	r to follow a	a Discernible Distribution	
		stribution Free UCLs	10.10
95% CLT UCL	44.82	95% BCA Bootstrap UCL	46.43
95% Standard Bootstrap UCL	43.74	95% Bootstrap-t UCL	88.65
95% Hall's Bootstrap UCL	199.8	95% Percentile Bootstrap UCL	44.73
90% Chebyshev(Mean, Sd) UCL	59.36	95% Chebyshev(Mean, Sd) UCL	73.93
97.5% Chebyshev(Mean, Sd) UCL	94.16	99% Chebyshev(Mean, Sd) UCL	133.9
	0	IIIOL to Hor	
0F0/ Object - 1001		UCL to Use	
95% Student's-t UCL	48.02		
The colouisted LICLs are based an accumul	lana shas sh	a data waya aallaatad in a yandaya and wahisaaad wannay	
		e data were collected in a random and unbiased manner.  ollected from random locations.	
-		mental or other non-random methods,	
		to correctly calculate UCLs.	
then contact a	əidüəlicidi	to correctly calculate OCLS.	
Note: Suggestions regarding the selection of a 05%	IICI are n	rovided to help the user to select the most appropriate 95% UCL	
		pution, and skewness using results from simulation studies.	•
•		ets; for additional insight the user may want to consult a statisticia	an .
Tiomover, simulations results will not cover all Near W	ond data se	55, for additional insignit the user may want to consult a statistick	411.

Nitrite - MW-22			
	Comoral	Chabinhina	
Total Number of Observations	1	Statistics	7
Total Number of Observations		Number of Distinct Observations	7
Number of Detects		Number of Non-Detects	1
Number of Distinct Detects		Number of Distinct Non-Detects	1
Minimum Detect		Minimum Non-Detect	0.015
Maximum Detect		Maximum Non-Detect	0.015
Variance Detects		Percent Non-Detects	14.29%
Mean Detects		SD Detects	2.928
Median Detects	1.85	CV Detects	1.118
Skewness Detects	1.195	Kurtosis Detects	0.991
Mean of Logged Detects	-0.179	SD of Logged Detects	2.16
		l using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		the Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.	
Norm	nal GOF Tes	t on Detects Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value		Detected Data appear Normal at 1% Significance Lev	/el
Lilliefors Test Statistic	0.224	Lilliefors GOF Test	
1% Lilliefors Critical Value		Detected Data appear Normal at 1% Significance Lev	/el
		nal at 1% Significance Level	
		eliable for small sample sizes	
Hote dor tests	may be unit	Silable for Small Sample Sizes	
Kaplan Major (KM) Statistics usi	na Normal C	critical Values and other Nonparametric UCLs	
	1	KM Standard Error of Mean	1 000
KM Mean			1.092
90KM SD		95% KM (BCA) UCL	3.931
95% KM (t) UCL		95% KM (Percentile Bootstrap) UCL	3.937
95% KM (z) UCL		95% KM Bootstrap t UCL	6.24
90% KM Chebyshev UCL		95% KM Chebyshev UCL	7.007
97.5% KM Chebyshev UCL	9.066	99% KM Chebyshev UCL	13.11
	1	etected Observations Only	
A-D Test Statistic		Anderson-Darling GOF Test	
5% A-D Critical Value	0.733	Detected data appear Gamma Distributed at 5% Significant	ce Level
K-S Test Statistic	0.234	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.348	Detected data appear Gamma Distributed at 5% Significant	ce Level
Detected data appea	r Gamma Di	stributed at 5% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
Gamma	Statistics on	Detected Data Only	
k hat (MLE)	0.548	k star (bias corrected MLE)	0.385
Theta hat (MLE)	4.776	Theta star (bias corrected MLE)	6.798
nu hat (MLE)		nu star (bias corrected)	4.623
Mean (detects)	+	(5-65-55-55-57)	
(4010010)		<u> </u>	
Gamma ROS	Statistics us	sing Imputed Non-Detects	
		6 NDs with many tied observations at multiple DLs	
·		s <1.0, especially when the sample size is small (e.g., <15-20)	
		yield incorrect values of UCLs and BTVs	
		en the sample size is small.	
		y be computed using gamma distribution on KM estimates	0.040
Minimum		Mean	2.246
Maximum		Median	1.5
20		CV	1.269
SD			
k hat (MLE)	0.405	k star (bias corrected MLE)	0.327
	0.405		0.327 6.874
k hat (MLE)	0.405 5.544	k star (bias corrected MLE)	

Approximate Chi Square Value (4.57, α)	0.961	Adjusted Chi Square Value (4.57, β)	0.558
95% Gamma Approximate UCL	10.69	95% Gamma Adjusted UCL	18.41
		•	
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	2.247	SD (KM)	2.637
Variance (KM)	6.955	SE of Mean (KM)	1.092
k hat (KM)	0.726	k star (KM)	0.51
nu hat (KM)	10.16	nu star (KM)	7.14
theta hat (KM)	3.096	theta star (KM)	4.406
80% gamma percentile (KM)	3.693	90% gamma percentile (KM)	6.054
95% gamma percentile (KM)	8.571	99% gamma percentile (KM)	14.75
gamma percentile (run)	0.071	co /o gamma porcontino (rum)	1 1.70
Gamm	a Kaplan-M	eier (KM) Statistics	
Approximate Chi Square Value (7.14, α)	2.248	Adjusted Chi Square Value (7.14, β)	1.511
95% KM Approximate Gamma UCL	7.137	95% KM Adjusted Gamma UCL	10.61
50% run approximate damma 502	7.107	00% Nim / tajastoa damina 002	10.01
Lognormal GO	F Test on D	Detected Observations Only	
Shapiro Wilk Test Statistic	0.832	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic	0.273	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.298	Detected Data appear Lognormal at 10% Significance I	evel
		rmal at 10% Significance Level	20101
		eliable for small sample sizes	
11010 001 10010	may be ann	onable for official cample onable	
Lognormal RO	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	2.245	Mean in Log Scale	-0.911
SD in Original Scale	2.85	SD in Log Scale	2.764
95% t UCL (assumes normality of ROS data)	4.339	95% Percentile Bootstrap UCL	3.945
95% BCA Bootstrap UCL	4.315	95% Bootstrap t UCL	6.749
95% H-UCL (Log ROS)			
Statistics using KM estimates	on Logged	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-0.754	KM Geo Mean	0.471
KM SD (logged)	2.305	95% Critical H Value (KM-Log)	7.715
KM Standard Error of Mean (logged)	0.954	95% H-UCL (KM -Log)	9526
KM SD (logged)	2.305	95% Critical H Value (KM-Log)	7.715
KM Standard Error of Mean (logged)	0.954		
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	2.246	Mean in Log Scale	-0.853
SD in Original Scale	2.85	SD in Log Scale	2.658
95% t UCL (Assumes normality)	4.339	95% H-Stat UCL	213906
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	
· · · · · · · · · · · · · · · · · · ·		tion Free UCL Statistics	
Detected Data appea	r Normal Di	stributed at 1% Significance Level	
	Cummantad	HOL to Hoo	
95% KM (t) UCL	4.369	UCL to Use	
93 % KWI (t) OCL	4.303		
The calculated LICLs are based on assumpt	ions that the	e data were collected in a random and unbiased manner.	
		ollected from random locations.	
		mental or other non-random methods,	
		to correctly calculate UCLs.	
and a distribution of the state			
Note: Suggestions regarding the selection of a 95%	UCL are nr	ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	
•		ts; for additional insight the user may want to consult a statistici	an.
in the state of th		-,	- **

enic - MW-22			
	General	Statistics	
Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	1
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.0012	Minimum Non-Detect 6	
Maximum Detect	0.017	Maximum Non-Detect 6	
Variance Detects		Percent Non-Detects	14.29
Mean Detects	0.00638	SD Detects	0.005
Median Detects	0.0052	CV Detects	0.87
Skewness Detects  Mean of Logged Detects	1.733 -5.364	Kurtosis Detects SD of Logged Detects	3.53 0.89
Mean of Logged Detects	-0.004	OB OI LOGGED DELECTS	0.00
		using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	e for a discussion of the Chebyshev UCL.	
Norm	al GOF Tes	t on Detects Only	
Shapiro Wilk Test Statistic	0.833	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Leve	el
Lilliefors Test Statistic	0.296	Lilliefors GOF Test	-
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Leve	el
		nal at 1% Significance Level	· ·
		liable for small sample sizes	
	, 20		
Kaplan-Meier (KM) Statistics usin	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean		KM Standard Error of Mean	0.002
90KM SD	0.00513	95% KM (BCA) UCL	0.009
95% KM (t) UCL	0.00969	95% KM (Percentile Bootstrap) UCL	0.009
95% KM (z) UCL	0.00906	95% KM Bootstrap t UCL	0.013
90% KM Chebyshev UCL	0.0119	95% KM Chebyshev UCL	0.014
97.5% KM Chebyshev UCL	0.0188	99% KM Chebyshev UCL	0.026
		tected Observations Only  Anderson-Darling GOF Test	
A-D Test Statistic 5% A-D Critical Value	0.227 0.706	Detected data appear Gamma Distributed at 5% Significance	o L ovo
K-S Test Statistic	0.706	Kolmogorov-Smirnov GOF	e Leve
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance	0 1 01/0
		stributed at 5% Significance Level	e Leve
		liable for small sample sizes	
Gamma	Statistics on	Detected Data Only	
k hat (MLE)	1.763	k star (bias corrected MLE)	0.99
Theta hat (MLE)	0.00362	Theta star (bias corrected MLE)	0.006
nu hat (MLE)	21.16	nu star (bias corrected)	11.91
Mean (detects)	0.00638		
Commo DOS	Statistics	sing Imputed Non-Datacts	
		sing Imputed Non-Detects  NDs with many tied observations at multiple DLs	
		s <1.0, especially when the sample size is small (e.g., <15-20)	
		yield incorrect values of UCLs and BTVs	
		n the sample size is small.	
Car same distributed detected deta DTVs a	nd UCLs ma	y be computed using gamma distribution on KM estimates	

N. dissipations	0.0010	NA	0.000
Minimum		Mean	0.0069
Maximum	0.017	Median	0.0057
SD	0.00528	CV	0.765
k hat (MLE)	1.942	k star (bias corrected MLE)	1.205
Theta hat (MLE)		Theta star (bias corrected MLE)	0.00573
` '		` '	
nu hat (MLE)	27.19	nu star (bias corrected)	16.87
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (16.87, α)	8.578	Adjusted Chi Square Value (16.87, β)	6.87
95% Gamma Approximate UCL	0.0136	95% Gamma Adjusted UCL	0.0169
30% danina Approximate 302	0.0100	30% damma / tajusted 00E	0.0103
Fallmata at O	B		
		meters using KM Estimates	
Mean (KM)		SD (KM)	0.00513
Variance (KM)	2.6267E-5	SE of Mean (KM)	0.00212
k hat (KM)	1.181	k star (KM)	0.77
nu hat (KM)		nu star (KM)	10.78
theta hat (KM)		theta star (KM)	0.00723
80% gamma percentile (KM)	0.00912	90% gamma percentile (KM)	0.0137
95% gamma percentile (KM)	0.0183	99% gamma percentile (KM)	0.0293
		<u> </u>	
Gamm	a Kanlan-M	eier (KM) Statistics	
Approximate Chi Square Value (10.78, α)		Adjusted Chi Square Value (10.78, β)	3.291
95% KM Approximate Gamma UCL	0.0135	95% KM Adjusted Gamma UCL	0.0182
Lognormal GC	F Test on D	etected Observations Only	
Shapiro Wilk Test Statistic	0.982	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic		Lilliefors GOF Test	.0001
10% Lilliefors Critical Value		Detected Data appear Lognormal at 10% Significance L	.evel
Detected Data ap	pear Lognor	mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		· · · · · · · · · · · · · · · · · · ·	
Lognormal PO	S Statistics	Using Imputed Non Detects	
Logioina No			
Manufactional Carla		Using Imputed Non-Detects	F 000
Mean in Original Scale	0.00554	Mean in Log Scale	-5.683
SD in Original Scale	0.00554	Mean in Log Scale SD in Log Scale	-5.683 1.172
	0.00554	Mean in Log Scale	
SD in Original Scale 95% t UCL (assumes normality of ROS data)	0.00554 0.00556 0.00963	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL	1.172 0.00909
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL	0.00554 0.00556 0.00963 0.0101	Mean in Log Scale SD in Log Scale	1.172
SD in Original Scale 95% t UCL (assumes normality of ROS data)	0.00554 0.00556 0.00963 0.0101	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL	1.172 0.00909
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)	0.00554 0.00556 0.00963 0.0101 0.0504	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL	1.172 0.00909
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Data and Assuming Lognormal Distribution	1.172 0.00909 0.0128
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Data and Assuming Lognormal Distribution KM Geo Mean	1.172 0.00909 0.0128 0.00356
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Data and Assuming Lognormal Distribution	1.172 0.00909 0.0128
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Data and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log)	1.172 0.00909 0.0128 0.00356 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log)	0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Data and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log)	1.172 0.00909 0.0128 0.00356 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log)	0.00909 0.0128 0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00909 0.0128 0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged) KM SD (logged) KM STandard Error of Mean (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00909 0.0128 0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00909 0.0128 0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged) KM SD (logged) KM STandard Error of Mean (logged)	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011 0.419	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00909 0.0128 0.00356 3.73 0.0277
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM SD (logged) KM SD (logged) KM SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  Mean in Original Scale	0.00554 0.00556 0.00963 0.0101 0.0504 on Logged I -5.639 1.011 0.419 1.011 0.419	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log) 95% Critical H Value (KM-Log) 95% Critical H Value (KM-Log)	0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00356 3.73 0.0277 3.73 -5.738 1.282
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  NM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00909 0.0128 0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provi	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  95% Bootstrap t UCL  SD ata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)  95% Critical H Value (KM-Log)  95% Critical H Value (KM-Log)  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons	0.00909 0.0128 0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  DL/2 Normal  Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provi	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  NM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)	0.00356 3.73 0.0277 3.73 -5.738 1.282
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD (Logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, proviestric Distribu	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL  95% Bootstrap t UCL  SD ata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)  95% Critical H Value (KM-Log)  95% Critical H Value (KM-Log)  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  ded for comparisons and historical reasons	0.00909 0.0128 0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD (Logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, proviestric Distribu	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  SD ata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons	0.00356 3.73 0.0277 3.73 -5.738 1.282
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD (Logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, proviestric Distribustr Normal Dis	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log) 95% Critical H Value (KM-Log)  But at istics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  Meded for comparisons and historical reasons  tion Free UCL Statistics stributed at 1% Significance Level	0.00356 3.73 0.0277 3.73 -5.738 1.282
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD Error of Mean (logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appea	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, proviestric Distribustr Normal Dis	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  SD ata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log)  tatistics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL ded for comparisons and historical reasons	0.00909 0.0128 0.00356 3.73 0.0277 3.73
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD (Logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, proviestric Distribustr Normal Dis	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log) 95% Critical H Value (KM-Log)  But at istics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  Meded for comparisons and historical reasons  tion Free UCL Statistics stributed at 1% Significance Level	0.00356 3.73 0.0277 3.73 -5.738 1.282
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appea	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provice tric Distributor Normal Distributor Normal Distribution Suggested 0.00969	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  STATE OF THE SCALE OF THE SCALE OF THE SCALE SD IN LOG Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics stributed at 1% Significance Level  UCL to Use	0.00356 3.73 0.0277 3.73 -5.738 1.282 0.0782
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) SD (logged) KM Standard Error of Mean (logged) KM Standard Error of Mean (logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appea	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provice tric Distributor Normal Distributor Normal Distribution Suggested 0.00969	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  Pata and Assuming Lognormal Distribution  KM Geo Mean 95% Critical H Value (KM-Log) 95% H-UCL (KM -Log) 95% Critical H Value (KM-Log) 95% Critical H Value (KM-Log)  But at istics  DL/2 Log-Transformed  Mean in Log Scale SD in Log Scale 95% H-Stat UCL  Meded for comparisons and historical reasons  tion Free UCL Statistics stributed at 1% Significance Level	0.00356 3.73 0.0277 3.73 -5.738 1.282 0.0782
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM ST (logged) KM SD (logged) KM ST (logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appear	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provice tric Distribution Normal Distribution of the company of	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  STATE OF THE SCALE OF THE SCALE OF THE SCALE SD IN LOG Scale 95% H-Stat UCL  ded for comparisons and historical reasons  tion Free UCL Statistics stributed at 1% Significance Level  UCL to Use	0.00356 3.73 0.0277 3.73 -5.738 1.282 0.0782
SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS)  Statistics using KM estimates KM Mean (logged) KM SD (logged) KM STANDARD Error of Mean (logged)  DL/2 Normal Mean in Original Scale SD in Original Scale 95% t UCL (Assumes normality) DL/2 is not a recommended m  Nonparame Detected Data appear  95% KM (t) UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size	0.00554 0.00556 0.00963 0.0101 0.0504  on Logged I -5.639 1.011 0.419 1.011 0.419  DL/2 S  0.00552 0.00559 0.00962 ethod, provident Distribution Normal Distribution of the company of the	Mean in Log Scale SD in Log Scale 95% Percentile Bootstrap UCL 95% Bootstrap t UCL 95% Bootstrap t UCL  STATE OF THE SCALE OF THE SCALE OF THE SCALE SD IN LOG Scale 95% H-Stat UCL  ded for comparisons and historical reasons  STIPLIE STATE OF THE SCALE STATE OF THE SCALE OF THE SCALE STATE OF THE SCALE OF THE SC	0.00356 3.73 0.0277 3.73 -5.738 1.282 0.0782

ron - MW-22			
	General	Statistics	
Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	1
Number of Detects  Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.087	Minimum Non-Detect	0.08
Maximum Detect	1.7	Maximum Non-Detect	0.08
Variance Detects	0.361	Percent Non-Detects	14.29%
Mean Detects	0.506	SD Detects	0.601
Median Detects	0.325	CV Detects	1.187
Skewness Detects	2.166	Kurtosis Detects	4.933
Mean of Logged Detects	-1.149	SD of Logged Detects	1.025
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
Nom	ol COE Too	t on Detocte Only	
Shapiro Wilk Test Statistic	0.711	t on Detects Only Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.711	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.713	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.371	Detected Data appear Normal at 1% Significance Levi	ام
		e Normal at 1% Significance Level	CI
		e Normal at 176 Significance Level	
Note GOF tests	iliay be ullie	silable for sitial sample sizes	
Kanlan-Meier (KM) Statistics usi	ng Normal C	ritical Values and other Nonparametric UCLs	
KM Mean	0.445	KM Standard Error of Mean	0.219
90KM SD	0.529	95% KM (BCA) UCL	0.863
95% KM (t) UCL	0.871	95% KM (Percentile Bootstrap) UCL	0.838
95% KM (z) UCL	0.806	95% KM Bootstrap t UCL	1.685
90% KM Chebyshev UCL	1.103	95% KM Chebyshev UCL	1.4
97.5% KM Chebyshev UCL	1.814	99% KM Chebyshev UCL	2.626
07.0% Tuli Gliobyoliov GG2	1.011	30 % TAIN GROBY GGE	2.020
Gamma GOF	Tests on De	etected Observations Only	
A-D Test Statistic	0.382	Anderson-Darling GOF Test	
5% A-D Critical Value	0.712	Detected data appear Gamma Distributed at 5% Significance	e I evel
K-S Test Statistic	0.261	Kolmogorov-Smirnov GOF	20.0.
5% K-S Critical Value	0.339	Detected data appear Gamma Distributed at 5% Significance	e I evel
		stributed at 5% Significance Level	0 20101
		eliable for small sample sizes	
		Detected Data Only	0.715
k hat (MLE)	1.207	k star (bias corrected MLE)	0.715
Theta hat (MLE)	0.419	Theta star (bias corrected MLE)	0.708
nu hat (MLE)	14.48	nu star (bias corrected)	8.575
Mean (detects)	0.506		
Gamma ROS	Statistics us	sing Imputed Non-Detects	
		5 NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is	small such as	s <1.0, especially when the sample size is small (e.g., <15-20)	
<u> </u>		yield incorrect values of UCLs and BTVs	
This is especi	ally true whe	n the sample size is small.	
		y be computed using gamma distribution on KM estimates	
Minimum	0.01	Mean	0.435
	1.7	Median	0.26
Maximum		2.1	1.332
Maximum SD	0.58	CV	
	0.58 0.739	k star (bias corrected MLE)	0.518
SD			
SD k hat (MLE)	0.739	k star (bias corrected MLE)	0.518

Approximate Chi Square Value (7.25, α)	2.308	Adjusted Chi Square Value (7.25, β)	1.559
95% Gamma Approximate UCL	1.367	95% Gamma Adjusted UCL	2.024
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.445	SD (KM)	0.529
Variance (KM)	0.28	SE of Mean (KM)	0.219
k hat (KM)	0.708	k star (KM)	0.5
nu hat (KM)	9.91	nu star (KM)	6.996
theta hat (KM)	0.629	theta star (KM)	0.891
80% gamma percentile (KM)	0.731	90% gamma percentile (KM)	1.205
95% gamma percentile (KM)	1.711	99% gamma percentile (KM)	2.955
30 % gamma percentile (raw)	1.711	33 % gamma percentile (raw)	2.000
Gamm	a Kanlan M	eier (KM) Statistics	
Approximate Chi Square Value (7.00, α)	2.169	Adjusted Chi Square Value (7.00, β)	1.45
95% KM Approximate Gamma UCL	1.437	95% KM Adjusted Gamma UCL	2.149
95% KW Approximate Gamina OCL	1.437	95% KW Aujusteu Gamma OCL	2.149
1 100		and the deal Oh a smoother a Coult	
		etected Observations Only	
Shapiro Wilk Test Statistic	0.968	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Lognormal	evei
Lilliefors Test Statistic	0.199	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.298	Detected Data appear Lognormal at 10% Significance Le	evel
		mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.437	Mean in Log Scale	-1.519
SD in Original Scale	0.578	SD in Log Scale	1.354
95% t UCL (assumes normality of ROS data)	0.862	95% Percentile Bootstrap UCL	0.83
95% BCA Bootstrap UCL	0.931	95% Bootstrap t UCL	1.614
95% H-UCL (Log ROS)	7.518		
Statistics using KM estimates	on Logged I	Data and Assuming Lognormal Distribution	
KM Mean (logged)	-1.346	KM Geo Mean	0.26
KM SD (logged)	0.991	95% Critical H Value (KM-Log)	3.674
KM Standard Error of Mean (logged)	0.411	95% H-UCL (KM -Log)	1.883
KM SD (logged)	0.991	95% Critical H Value (KM-Log)	3.674
KM Standard Error of Mean (logged)	0.411	( )	
, 55 /			
	DL/2 S	tatistics	
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.44	Mean in Log Scale	-1.445
SD in Original Scale	0.576	SD in Log Scale	1.22
95% t UCL (Assumes normality)		95% H-Stat UCL	4.299
		ded for comparisons and historical reasons	
Nonnarame	tric Dietribu	tion Free UCL Statistics	
		mal Distributed at 1% Significance Level	
Detected Bata appeal Apple	DAIIIIGIO 1401	mai bistribatea at 170 olgrinicarice Ecver	
	Suggested	UCL to Use	
95% KM (t) UCL	0.871		
95 % KW (t) OCE	0.671		
The calculated LICLs are based on accumus	ione that the	e data were collected in a random and unbiased manner.	
•			
-		ollected from random locations.	
		mental or other non-random methods,	
tnen contact a	งเสมรมเติสก์ โ	to correctly calculate UCLs.	
AAH	wasde	stribution magning only orfit- OOF t- :	
		stribution passing only one of the GOF tests,	
it is suggested to use a UCL bas	sea upon a d	istribution passing both GOF tests in ProUCL	
N. O. T.			
		ovided to help the user to select the most appropriate 95% UCL.	
		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data se	ts; for additional insight the user may want to consult a statisticia	n.

Manganese - MW-22			
	General	Statistics	
Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.099	Mean	2.714
Maximum	6.2	Median	2.4
SD (5) in the state of the stat	2.106	Std. Error of Mean	0.796
Coefficient of Variation	0.776	Skewness	0.4
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	hnical Guide	e for a discussion of the Chebyshev UCL.	
	NI 1 4	20F T 4	
Shapiro Wilk Test Statistic	0.95	GOF Test Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.93	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.75	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Data appear Normal at 1% Significance Level	
		t 1% Significance Level	
		eliable for small sample sizes	
	suming Norr	mal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.261	95% Adjusted-CLT UCL (Chen-1995)	4.152
		95% Modified-t UCL (Johnson-1978)	4.281
	Gamma	GOF Test	
A-D Test Statistic	0.416	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.265	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance	e Level
		stributed at 5% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
		Over the state of	
Librar (AULE)		Statistics	0.004
k hat (MLE) Theta hat (MLE)	1.047 2.591	k star (bias corrected MLE) Theta star (bias corrected MLE)	0.694 3.912
nu hat (MLE)	14.66	nu star (bias corrected)	9.713
MLE Mean (bias corrected)	2.714	MLE Sd (bias corrected)	3.258
(		Approximate Chi Square Value (0.05)	3.763
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	2.733
Ass	uming Gam	ma Distribution	
95% Approximate Gamma UCL	7.005	95% Adjusted Gamma UCL	9.646
Chaning Will, Took Chabiatia		GOF Test	
Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value	0.843 0.838	Shapiro Wilk Lognormal GOF Test	
Lilliefors Test Statistic	0.838	Data appear Lognormal at 10% Significance Level  Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.300	Data Not Lognormal at 10% Significance Level	
		ormal at 10% Significance Level	
		eliable for small sample sizes	
		l Statistics	-
Minimum of Logged Data	-2.313	Mean of logged Data	0.45
Maximum of Logged Data	1.825	SD of logged Data	1.454

	ıming Logno	ormal Distribution	
95% H-UCL	90.22	90% Chebyshev (MVUE) UCL	9.347
95% Chebyshev (MVUE) UCL	11.96	97.5% Chebyshev (MVUE) UCL	15.59
99% Chebyshev (MVUE) UCL	22.72		
Nonnarame	tric Distribu	tion Free UCL Statistics	
·		Discernible Distribution	
Nonpar 95% CLT UCL	4.023	tribution Free UCLs 95% BCA Bootstrap UCL	3.943
95% Standard Bootstrap UCL	3.939	95% Bootstrap-t UCL	4.612
95% Hall's Bootstrap UCL	4.372	95% Percentile Bootstrap UCL	3.914
90% Chebyshev(Mean, Sd) UCL	5.102	95% Chebyshev(Mean, Sd) UCL	6.18
97.5% Chebyshev(Mean, Sd) UCL	7.685		10.63
97.5% Chebysnev(Mean, Sd) UCL	7.000	99% Chebyshev(Mean, Sd) UCL	10.03
	Suggested	UCL to Use	
95% Student's-t UCL	4.261		
Note: Suggestions regarding the collection of a 0.5%	LICL are pr	rayided to help the uper to celest the most appropriate OE9/ LICI	
		rovided to help the user to select the most appropriate 95% UCL.	
		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	oria data se	ts; for additional insight the user may want to consult a statisticia	n.
-D - MW-22			
-D - WWY-22			
	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	6
Number of Detects	1	Number of Non-Detects	8
Number of Distinct Detects	1	Number of Distinct Non-Detects	5
	d! ProUCL	(or any other software) should not be used on such a data set!	
Warning: Only one distinct data value was detecte		(or any other software) should not be used on such a data setled Project Team to estimate environmental parameters (e.g., EF	
Warning: Only one distinct data value was detecte			
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values determ	nined by the		
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values determ	nined by the	e Project Team to estimate environmental parameters (e.g., EF	
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values determ	nined by the	e Project Team to estimate environmental parameters (e.g., EF	
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values determ	nined by the	e Project Team to estimate environmental parameters (e.g., EF	
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values detern  The data set to the set of the s	nined by the	e Project Team to estimate environmental parameters (e.g., EF 2,4-D was not processed!  Statistics	
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values determ	nined by the	e Project Team to estimate environmental parameters (e.g., EF 2,4-D was not processed!	
Warning: Only one distinct data value was detecte is suggested to use alternative site specific values detern  The data set to the set of the s	nined by the for variable General	e Project Team to estimate environmental parameters (e.g., EF 2,4-D was not processed!  Statistics	PC, BTV
Warning: Only one distinct data value was detected is suggested to use alternative site specific values determined by the data set of the data	for variable  General	e Project Team to estimate environmental parameters (e.g., EF 2,4-D was not processed!  Statistics  Number of Distinct Observations	PC, BT\
Warning: Only one distinct data value was detected is suggested to use alternative site specific values determined by the data set of the data	General 7 1	Statistics  Number of Distinct Observations Number of Distinct Non-Detects Number of Distinct Non-Detects	6 6 5
Warning: Only one distinct data value was detected is suggested to use alternative site specific values determined by the data set of the data	General 7 1 1 dd! ProUCL	Project Team to estimate environmental parameters (e.g., EF 2,4-D was not processed!  Statistics  Number of Distinct Observations Number of Non-Detects	6 6 5
Warning: Only one distinct data value was detected is suggested to use alternative site specific values determing the data set of the data set	General 7 1 1 ddl ProUCL nined by the	Project Team to estimate environmental parameters (e.g., EF  2,4-D was not processed!  Statistics  Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects (or any other software) should not be used on such a data setter a Project Team to estimate environmental parameters (e.g., EF	6 6 5
Warning: Only one distinct data value was detected is suggested to use alternative site specific values determing the data set of the data set	General 7 1 1 ddl ProUCL nined by the	Statistics  Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects	6 6 5

		Statistics	
Total Number of Observations	9	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	9
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
		erefore all statistics and estimates should also be NDs!	
		stics are also NDs lying below the largest detection limit!	
The Project Team may decide to use alternative sit	e specific v	values to estimate environmental parameters (e.g., EPC, BTV).	
The data set for	variable B	enzene was not processed!	
ilorobenzene - MW-22			
Total Number of Observations		Statistics  Number of Distinct Observations	- 1
Number of Detects	9	Number of Distinct Observations  Number of Non-Detects	9
Number of Distinct Detects	0	Number of Non-Detects	1
Number of Distiller Detects		Number of Distillet Nort-Detects	'
		prefore all statistics and estimates should also be NDsl	
		stics are also NDs lying below the largest detection limit! values to estimate environmental parameters (e.g., EPC, BTV).	
·	•		
2-DCP - MW-22			
2-DCP - MW-22			
		Statistics  Number of Distinct Observations	1
Total Number of Observations	9	Number of Distinct Observations	1
			1 9 1
Total Number of Observations Number of Detects Number of Distinct Detects	9 0 0	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects	9 0 0 (NDs), the	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects strefore all statistics and estimates should also be NDs!	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and	9 0 0 (NDs), the	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Prefore all statistics and estimates should also be NDs! Stics are also NDs lying below the largest detection limit!	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati	Number of Distinct Observations  Number of Non-Detects  Number of Distinct Non-Detects  Perefore all statistics and estimates should also be NDs!  Stics are also NDs lying below the largest detection limit!  Values to estimate environmental parameters (e.g., EPC, BTV).	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Prefore all statistics and estimates should also be NDs! Stics are also NDs lying below the largest detection limit!	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati	Number of Distinct Observations  Number of Non-Detects  Number of Distinct Non-Detects  Perefore all statistics and estimates should also be NDs!  Stics are also NDs lying below the largest detection limit!  Values to estimate environmental parameters (e.g., EPC, BTV).	9
Total Number of Observations Number of Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati	Number of Distinct Observations  Number of Non-Detects  Number of Distinct Non-Detects  Perefore all statistics and estimates should also be NDs!  Stics are also NDs lying below the largest detection limit!  Values to estimate environmental parameters (e.g., EPC, BTV).	9
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati e specific v	Number of Distinct Observations  Number of Non-Detects  Number of Distinct Non-Detects  Perefore all statistics and estimates should also be NDs!  Stics are also NDs lying below the largest detection limit!  Values to estimate environmental parameters (e.g., EPC, BTV).	9
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit	9 0 0 (NDs), the other stati e specific v	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  Perfore all statistics and estimates should also be NDsI stics are also NDs lying below the largest detection limit! ralues to estimate environmental parameters (e.g., EPC, BTV).  p.2-DCP was not processed!  Statistics  Number of Distinct Observations	9
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit  The data set for  Methylnaphthalene - MW-22	9 0 0 (NDs), the other stati e specific v	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  prefore all statistics and estimates should also be NDs! stics are also NDs lying below the largest detection limit! values to estimate environmental parameters (e.g., EPC, BTV).  p.2-DCP was not processed!	9 1
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit  The data set for  Methylnaphthalene - MW-22  Total Number of Observations	9 0 0 (NDs), the other stati e specific v	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  Perfore all statistics and estimates should also be NDsI stics are also NDs lying below the largest detection limit! ralues to estimate environmental parameters (e.g., EPC, BTV).  p.2-DCP was not processed!  Statistics  Number of Distinct Observations	9 1
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit  The data set for  Methylnaphthalene - MW-22  Total Number of Observations Number of Detects Number of Distinct Detects	9 0 0 (NDs), the other stati e specific v	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  Perfore all statistics and estimates should also be NDsI Stics are also NDs lying below the largest detection limit! Values to estimate environmental parameters (e.g., EPC, BTV).	9 1 2 8 1
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit  The data set for  Methylnaphthalene - MW-22  Total Number of Observations Number of Detects Number of Distinct Detects Warning: Only one distinct data value was detected	9 0 0 (NDs), the other statice specific variable 1 General 9 1 1	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  Perfore all statistics and estimates should also be NDsI Stics are also NDs lying below the largest detection limit! Values to estimate environmental parameters (e.g., EPC, BTV).   9 1	
Total Number of Observations Number of Detects Number of Distinct Detects Number of Distinct Detects Warning: All observations are Non-Detects Specifically, sample mean, UCLs, UPLs, and The Project Team may decide to use alternative sit  The data set for  Methylnaphthalene - MW-22  Total Number of Observations Number of Detects Number of Distinct Detects Warning: Only one distinct data value was detected is suggested to use alternative site specific values determ	9 0 0 (NDs), the other statice specific variable 1 General 9 1 1 1 dl ProUCL ined by the	Number of Distinct Observations Number of Non-Detects Number of Distinct Non-Detects Number of Distinct Non-Detects  Perfore all statistics and estimates should also be NDsI Stics are also NDs lying below the largest detection limit! Values to estimate environmental parameters (e.g., EPC, BTV).   9 1	

	UCL Statist	ics for Data	Sets with Non-Detects	
User Selected Options				
Date/Time of Computation	ProUCL 5.2 11/18/2024 9	2·05·12 ΛΜ		
From File	mw23_3year_data.xls	7.03. 12 AIVI		
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
trate - MW-23				
		General	Statistics	
Tota	Number of Observations	4	Number of Distinct Observations	4
		•	Number of Missing Observations	0
	Minimum	13	Mean	89.25
	Maximum	160	Median	92
	SD	76.51	Std. Error of Mean	38.26
	Coefficient of Variation	0.857	Skewness	-0.050
Note: Sample size is	small (e.g. <10) if data a	re collected	using incremental sampling methodology (ISM) approach,	
			C 2020 and ITRC 2012) for additional guidance,	
			he Chebyshev UCL for small sample sizes (n < 7).	
but note that			in gross overestimates of the mean.	
Per			e for a discussion of the Chebyshev UCL.	
T G	er to the Frodel 3.2 reci	illical Guide	e for a discussion of the onebyshev ook.	
		Normal C	OF Test	
	Shapiro Wilk Test Statistic	0.826	Shapiro Wilk GOF Test	
	Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
	Lilliefors Test Statistic	0.286	Lilliefors GOF Test	
	1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
	Data appea	r Normal at	: 1% Significance Level	
			eliable for small sample sizes	
	A		usal Distribution	
050/ N		suming Norr	mal Distribution	
95% N	ormal UCL	170.2	95% UCLs (Adjusted for Skewness)	151.0
	95% Student's-t UCL	179.3	95% Adjusted-CLT UCL (Chen-1995)	151.2
			95% Modified-t UCL (Johnson-1978)	179.1
		Gamma (	GOF Test	
	A-D Test Statistic	0.443	Anderson-Darling Gamma GOF Test	
	5% A-D Critical Value	0.664	Detected data appear Gamma Distributed at 5% Significand	ce Level
	K-S Test Statistic	0.323	Kolmogorov-Smirnov Gamma GOF Test	
	5% K-S Critical Value	0.401	Detected data appear Gamma Distributed at 5% Significant	ce Level
			stributed at 5% Significance Level	
			eliable for small sample sizes	
			·	
		Gamma	Statistics	
	k hat (MLE)	1.259	k star (bias corrected MLE)	0.48
	Theta hat (MLE)	70.91	Theta star (bias corrected MLE)	185.4
	nu hat (MLE)	10.07	nu star (bias corrected)	3.85
N.A.	LE Mean (bias corrected)	89.25	MLE Sd (bias corrected)	128.6
IVI	(		Approximate Chi Square Value (0.05)	0.66
IVI			11 1	N/A
	sted Level of Significance	N/A	Adjusted Chi Square Value	IN/A
			, , ,	N/A
Adju			Adjusted Chi Square Value  ma Distribution  95% Adjusted Gamma UCL	N/A

	Lognormal	GOF Test	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value		Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.286	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
	Lognorma	Statistics	
Minimum of Logged Data		Mean of logged Data	4.04
Maximum of Logged Data		SD of logged Data	1.21
		30.4	
Assı	uming Logno	ormal Distribution	
95% H-UCL	34794	90% Chebyshev (MVUE) UCL	249.7
95% Chebyshev (MVUE) UCL	319.9	97.5% Chebyshev (MVUE) UCL	417.5
99% Chebyshev (MVUE) UCL	609		
<u>-</u>		tion Free UCL Statistics	
Data appea	ir to follow a	Discernible Distribution	
Nonna	rametric Diet	tribution Free UCLs	
95% CLT UCL		95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	204	95% Chebyshev(Mean, Sd) UCL	256
97.5% Chebyshev(Mean, Sd) UCL	328.2	99% Chebyshev(Mean, Sd) UCL	469.9
• ( ' ' '			
		LICI to Lieu	
	Suggested	OCL to Use	
95% Student's-t UCL	179.3		
	179.3	Is the maximum observation	
Recommended	179.3 UCL exceed	Is the maximum observation	
Recommended  Note: Suggestions regarding the selection of a 95%	179.3  UCL exceed	Is the maximum observation  ovided to help the user to select the most appropriate 95% UCL.	
Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size.	179.3  UCL exceed  UCL are pro , data distribu	Is the maximum observation  ovided to help the user to select the most appropriate 95% UCL ation, and skewness using results from simulation studies.	
Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size.	179.3  UCL exceed  UCL are pro , data distribu	Is the maximum observation  ovided to help the user to select the most appropriate 95% UCL.	
Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size. However, simulations results will not cover all Real W	179.3  UCL exceed  UCL are pro , data distributorid data set	Is the maximum observation  ovided to help the user to select the most appropriate 95% UCL ation, and skewness using results from simulation studies.	

te - MW-23			
	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.025	Mean	0.411
Maximum	0.91	Median	0.354
SD	0.435	Std. Error of Mean	0.218
Coefficient of Variation	1.059	Skewness	0.314
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ten results	in gross overestimates of the mean.	
<del>-</del>		e for a discussion of the Chebyshev UCL.	
		·	
	Normal C	GOF Test	
Shapiro Wilk Test Statistic	0.873	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.285	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
		: 1% Significance Level	
		eliable for small sample sizes	
Ass	umina Norr	nal Distribution	
95% Normal UCL	Julining 11011	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.923	95% Adjusted-CLT UCL (Chen-1995)	0.805
93 % Stadent S-t OCL	0.323	95% Modified-t UCL (Johnson-1978)	0.928
		95% Modified-LOCE (Johnson-1978)	0.920
	Commo	GOF Test	
A D Toot Statistic	0.4		
A-D Test Statistic		Anderson-Darling Gamma GOF Test	ا میرما
5% A-D Critical Value	0.672	Detected data appear Gamma Distributed at 5% Significance	e Levei
K-S Test Statistic	0.285	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.406	Detected data appear Gamma Distributed at 5% Significance	e Level
		stributed at 5% Significance Level	
Note GOF tests r	nay be unre	eliable for small sample sizes	
	0	Oh-al-al-	
		Statistics	0.046
k hat (MLE)	0.717	k star (bias corrected MLE)	0.346
Theta hat (MLE)	0.573	Theta star (bias corrected MLE)	1.187
nu hat (MLE)	5.738	nu star (bias corrected)	2.768
MLE Mean (bias corrected)	0.411	MLE Sd (bias corrected)	0.698
		Approximate Chi Square Value (0.05)	0.307
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ass	uming Gam	ma Distribution	
95% Approximate Gamma UCL	3.702	95% Adjusted Gamma UCL	N/A
	Lognorma	GOF Test	
Shapiro Wilk Test Statistic	0.892	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic			
	0.27	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
	_oanormal a	at 10% Significance Level	
		aliable for small sample sizes	
	may be unre	sliable for small sample sizes	
Note GOF tests r	nay be unre	I Statistics	
	may be unre		-1.729 1.74

Assu	ımina Loano	ormal Distribution	
95% H-UCL	77374	90% Chebyshev (MVUE) UCL	1.432
95% Chebyshev (MVUE) UCL	1.873	97.5% Chebyshev (MVUE) UCL	2.484
99% Chebyshev (MVUE) UCL	3.685		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dis	tribution Free UCLs	
95% CLT UCL	0.769	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	1.063	95% Chebyshev(Mean, Sd) UCL	1.359
97.5% Chebyshev(Mean, Sd) UCL	1.77	99% Chebyshev(Mean, Sd) UCL	2.576
	Suggested	UCL to Use	
95% Student's-t UCL	0.923		
Recommended	UCL exceed	ds the maximum observation	
		e data were collected in a random and unbiased manner.	
<u> </u>		ellected from random locations.	
		mental or other non-random methods,	
then contact a	statistician t	to correctly calculate UCLs.	
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL	
		ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real W	orld data set	ts; for additional insight the user may want to consult a statisticia	in.

enic - MW-23			
	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.0056	Mean	0.008
Maximum	0.013	Median	0.0067
SD	0.00338	Std. Error of Mean	0.00169
Coefficient of Variation	0.423	Skewness	1.828
Note: Sample size is small (e.g. <10) if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
	Normal	005 T	
Chapira Willy Toot Statistic	0.784	GOF Test	
Shapiro Wilk Test Statistic  1% Shapiro Wilk Critical Value		Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
•	0.687	•	
Lilliefors Test Statistic	0.366	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
<del>-</del> -		1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
As	suming Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.012	95% Adjusted-CLT UCL (Chen-1995)	0.0124
		95% Modified-t UCL (Johnson-1978)	0.0122
	Gamma	GOF Test	
A-D Test Statistic	0.53	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.658	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic	0.359	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance	e Level
		stributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	8.941	k star (bias corrected MLE)	2.402
Theta hat (MLE)		Theta star (bias corrected MLE)	0.00333
nu hat (MLE)	71.53	nu star (bias corrected)	19.22
MLE Mean (bias corrected)	0.008	MLE Sd (bias corrected)	0.00516
MEE Moun (Sido concessor)	0.000	Approximate Chi Square Value (0.05)	10.28
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
Ass 95% Approximate Gamma UCL	o.015	ma Distribution  95% Adjusted Gamma UCL	N/A
33 % Approximate damina del	0.013	35 % Aujusted danima GCL	IN/A
		GOF Test	
Shapiro Wilk Test Statistic	0.844	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.331	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
		at 10% Significance Level sliable for small sample sizes	
Minimum of Logged Data	-5.185	I Statistics	-4.885
iviii iii ui ii ogged Data	-0.100	Mean of logged Data	
Maximum of Logged Data	-4.343	SD of logged Data	0.373

Assu	mina Loand	ormal Distribution	
95% H-UCL	0.0157	90% Chebyshev (MVUE) UCL	0.0124
95% Chebyshev (MVUE) UCL	0.0144	97.5% Chebyshev (MVUE) UCL	0.0171
99% Chebyshev (MVUE) UCL	0.0226		
Nonparame	tric Distribu	tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
<u>.</u>		tribution Free UCLs	
95% CLT UCL	0.0108	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0131	95% Chebyshev(Mean, Sd) UCL	0.0154
97.5% Chebyshev(Mean, Sd) UCL	0.0186	99% Chebyshev(Mean, Sd) UCL	0.0248
	Suggested	UCL to Use	
95% Student's-t UCL	0.012		
Note: Currentians remarking the colection of a OFO/	LICI ava mu	evided to help the wearte select the most emprepriets OFO/ LICI	
	•	ovided to help the user to select the most appropriate 95% UCL	
· · · · · · · · · · · · · · · · · · ·		ution, and skewness using results from simulation studies.	-
However, simulations results will not cover all Real Wo	orld data se	ts; for additional insight the user may want to consult a statisticia	an.

	General		
Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	1
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.17	Minimum Non-Detect	0.08
Maximum Detect	0.25	Maximum Non-Detect	0.08
Variance Detects	0.00163	Percent Non-Detects	25%
Mean Detects	0.207	SD Detects	0.04
Median Detects	0.2	CV Detects	0.19
Skewness Detects	0.722	Kurtosis Detects	N/A
Mean of Logged Detects	-1.589	SD of Logged Detects	0.19
Warning: D	ata set has	only 3 Detected Values.	
<del>-</del>		gful or reliable statistics and estimates.	
Note: Comple size is small (o.g. <10) if date of	una aallaatad	using ingremental compling methodology (ICM) approach	
		using incremental sampling methodology (ISM) approach, C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
		•	
Norm	al GOF Tes	t on Detects Only	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Lev	el
Lilliefors Test Statistic	0.232	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Lev	el
Detected Data a	appear Norm	nal at 1% Significance Level	
		ritical Values and other Nonparametric UCLs	
KM Mean	0.175	KM Standard Error of Mean	0.03
90KM SD	0.0618	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.264	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.237	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.289	95% KM Chebyshev UCL	0.34
97.5% KM Chebyshev UCL	0.412	99% KM Chebyshev UCL	0.5
Gamma GOF	Tests on De	stected Observations Only	
A-D Test Statistic	0.262	Anderson-Darling GOF Test	
5% A-D Critical Value	0.634	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.235	Kolmogorov-Smirnov GOF	
	0.235	Kolmogorov-Smirnov GOF  Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic 5% K-S Critical Value	0.431	<del>_</del>	e Leve
K-S Test Statistic 5% K-S Critical Value Detected Data Not 0	0.431 Gamma Dist	Detected data appear Gamma Distributed at 5% Significance Level	ce Leve
K-S Test Statistic 5% K-S Critical Value Detected Data Not C Gamma	0.431 Gamma Dist	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only	
K-S Test Statistic 5% K-S Critical Value Detected Data Not C Gamma k hat (MLE)	0.431 Gamma Distr Statistics on 39.91	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)	N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE)	0.431 Gamma District Statistics on 39.91 0.00518	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)  Theta star (bias corrected MLE)	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE)	0.431 Gamma District Statistics on 39.91 0.00518 239.4	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)	N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE)	0.431 Gamma District Statistics on 39.91 0.00518	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)  Theta star (bias corrected MLE)	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics us	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  sing Imputed Non-Detects	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data so	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics use thas > 50%	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  sing Imputed Non-Detects  NDs with many tied observations at multiple DLs	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data so	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics uset has > 50% small such as	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  k star (bias corrected MLE)  Theta star (bias corrected MLE)  nu star (bias corrected)  sing Imputed Non-Detects  NDs with many tied observations at multiple DLs  s <1.0, especially when the sample size is small (e.g., <15-20)	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data so GROS may not be used when kstar of detects is so For such situations, GROS n	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics uset has > 50% small such as method may	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  Research (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected)  Sing Imputed Non-Detects NDs with many tied observations at multiple DLs second of the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data so GROS may not be used when kstar of detects is so For such situations, GROS rapical for the source of the source o	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics uset has > 50% cmall such as method may ally true whee	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  Restar (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected)  Sing Imputed Non-Detects NDs with many tied observations at multiple DLs selected Significance Level	N/A N/A
K-S Test Statistic 5% K-S Critical Value Detected Data Not C  Gamma k hat (MLE) Theta hat (MLE) nu hat (MLE) Mean (detects)  Gamma ROS GROS may not be used when data so GROS may not be used when kstar of detects is so For such situations, GROS rapical for the source of the source o	0.431  Gamma Districts on 39.91 0.00518 239.4 0.207  Statistics uset has > 50% cmall such as method may ally true whee	Detected data appear Gamma Distributed at 5% Significance ributed at 5% Significance Level  Detected Data Only  Research (bias corrected MLE) Theta star (bias corrected MLE) nu star (bias corrected)  Sing Imputed Non-Detects NDs with many tied observations at multiple DLs second of the sample size is small (e.g., <15-20) yield incorrect values of UCLs and BTVs	N/A N/A

Minimum	0.0995	Mean	0.18
Maximum	0.25	Median	0.185
SD	0.063	CV	0.35
k hat (MLE)	9.53	k star (bias corrected MLE)	2.549
Theta hat (MLE)	0.0189	Theta star (bias corrected MLE)	0.0706
nu hat (MLE)	76.24	nu star (bias corrected)	20.39
Adjusted Level of Significance (β)	0.00498		
Approximate Chi Square Value (20.39, α)	11.14	Adjusted Chi Square Value (20.39, β)	N/A
95% Gamma Approximate UCL	0.329	95% Gamma Adjusted UCL	N/A
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.175	SD (KM)	0.0618
Variance (KM)	0.00383	SE of Mean (KM)	0.0379
k hat (KM)	8.007	k star (KM)	2.168
nu hat (KM)	64.05	nu star (KM)	17.35
theta hat (KM)	0.0219	theta star (KM)	0.0807
80% gamma percentile (KM)	0.26	90% gamma percentile (KM)	0.334
95% gamma percentile (KM)	0.405	99% gamma percentile (KM)	0.561
33 % gamma percentile (KW)	0.403	33% gariina percentile (KW)	0.001
Gomm	a Kanlan M	eier (KM) Statistics	
Approximate Chi Square Value (17.35, α)	8.92		5.89
		Adjusted Chi Square Value (17.35, β)	
95% KM Approximate Gamma UCL	0.34	95% KM Adjusted Gamma UCL	0.515
		etected Observations Only	
Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance L	evel
Lilliefors Test Statistic		Lilliefors GOF Test	
10% Lilliefors Critical Value		Detected Data appear Lognormal at 10% Significance L	evel
		mal at 10% Significance Level	
Note GOF tests	may be unre	eliable for small sample sizes	
Lognormal RO	S Statistics I	Using Imputed Non-Detects	
Mean in Original Scale	0.184	Mean in Log Scale	-1.728
SD in Original Scale	0.0556	SD in Log Scale	0.319
95% t UCL (assumes normality of ROS data)	0.25	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.316		
		<del> </del>	
Statistics using KM estimates	on Logged [	Data and Assuming Lognormal Distribution	
KM Mean (logged)		KM Geo Mean	0.161
KM SD (logged)	0.428	95% Critical H Value (KM-Log)	3.302
KM Standard Error of Mean (logged)		95% H-UCL (KM -Log)	0.4
KM SD (logged)	0.428	95% Critical H Value (KM-Log)	3.302
·	0.428	95 % Chilcarti Value (NW-Log)	3.302
KM Standard Error of Mean (logged)	0.202		
	DI /0 0	Anklaklan	
DI /O Normani	DL/2 5	tatistics	
DL/2 Normal	0.405	DL/2 Log-Transformed	4.007
Mean in Original Scale		Mean in Log Scale	-1.997
SD in Original Scale		SD in Log Scale	0.83
95% t UCL (Assumes normality)	0.27	95% H-Stat UCL	2.805
DL/2 is not a recommended me	ethod, provi	ded for comparisons and historical reasons	
·		tion Free UCL Statistics	
Detected Data appea	r Normal Dis	stributed at 1% Significance Level	
		UCL to Use	
95% KM (t) UCL	0.264		
Warning: Recommer	nded UCL ex	ceeds the maximum observation	
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL	
Recommendations are based upon data size	, data distrib	ution, and skewness using results from simulation studies.	
		ts; for additional insight the user may want to consult a statisticia	an
Tiowever, simulations results will not cover all freal vi			

Manganese - MW-23			
	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.03	Mean	0.535
Maximum	1.2	Median	0.456
SD	0.597	Std. Error of Mean	0.299
Coefficient of Variation	1.116	Skewness	0.243
Note: Sample size is small (e.g., <10), if data a	re collected	l using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		the Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
	Normal (	GOF Test	
Shapiro Wilk Test Statistic	0.837	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.301	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
		t 1% Significance Level	
		eliable for small sample sizes	
100 401 656	may bo anno	Side to the control of the control o	
Δο	sumina Nor	mal Distribution	
95% Normal UCL	Julilling 11011	95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.238	95% Adjusted-CLT UCL (Chen-1995)	1.065
30% Stadents ( OCE	1.200	95% Modified-t UCL (Johnson-1978)	1.244
		30% Modified ( OCE (OCITISOTI 1370)	1.277
	Gamma	GOF Test	
A-D Test Statistic	0.589	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance	e l evel
K-S Test Statistic	0.339	Kolmogorov-Smirnov Gamma GOF Test	0 20101
5% K-S Critical Value	0.409	Detected data appear Gamma Distributed at 5% Significance	e l evel
		stributed at 5% Significance Level	00 20101
		eliable for small sample sizes	
11010 401 10010	may be anne	siable for official campie cames	
	Gamma	Statistics	
k hat (MLE)	0.564	k star (bias corrected MLE)	0.308
Theta hat (MLE)	0.95	Theta star (bias corrected MLE)	1.74
nu hat (MLE)	4.509	nu star (bias corrected)	2.461
MLE Mean (bias corrected)	0.535	MLE Sd (bias corrected)	0.965
( ( )		Approximate Chi Square Value (0.05)	0.232
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A
, lajasta 2010. d. d.giiiildandd	•	, wjastou o oquato valuo	
Ass	suming Gam	nma Distribution	
95% Approximate Gamma UCL	5.668	95% Adjusted Gamma UCL	N/A
oo is representate damma oo i	0.000	0077714,40004 044 002	
	Lognorma	I GOF Test	
Shapiro Wilk Test Statistic	0.772	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.304	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level	
		ormal at 10% Significance Level	
		eliable for small sample sizes	
Note GOF lests	ay be unit	onable for sinal sample sizes	
	Lognorma	Il Statistics	
Minimum of Logged Data	-3.507	Mean of logged Data	-1.731
Maximum of Logged Data  Maximum of Logged Data	0.182	SD of logged Data	2.035
iviaximum or Logged Data	0.102	SD of logged Data	2.000

		181.11.1	
		rmal Distribution	
95% H-UCL	8926739	90% Chebyshev (MVUE) UCL	2.033
95% Chebyshev (MVUE) UCL	2.676	97.5% Chebyshev (MVUE) UCL	3.569
99% Chebyshev (MVUE) UCL	5.323		
Namanana	ania Diatella	Non-Free HOL Ototickies	
·		tion Free UCL Statistics	
Data appea	ir to follow a	Discernible Distribution	
Nonpa	rametric Dist	ribution Free UCLs	
95% CLT UCL	1.026	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	1.431	95% Chebyshev(Mean, Sd) UCL	1.837
97.5% Chebyshev(Mean, Sd) UCL	2.4	99% Chebyshev(Mean, Sd) UCL	3.507
	Suggested	LICI to lise	
95% Student's-t UCL	1.238	002 10 000	
		Is the maximum observation	
T (OOO) IIII OOO	002 00000	o are maximum observation	
The calculated UCLs are based on assumpt	ions that the	data were collected in a random and unbiased manner.	
Please verify the c	lata were co	llected from random locations.	
If the data were collected	l using judgn	nental or other non-random methods,	
then contact a	statistician t	o correctly calculate UCLs.	
Note: Suggestions regarding the selection of a 95%	UCL are pro	ovided to help the user to select the most appropriate 95% UCL.	
•		ution, and skewness using results from simulation studies.	
		s; for additional insight the user may want to consult a statisticia	_

o - MW-23			
	General	Statistics	
Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.0013	Mean	0.0092
Maximum	0.017	Median	0.0093
SD	0.00643	Std. Error of Mean	0.0032
Coefficient of Variation	0.695	Skewness	-0.092
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		C 2020 and ITRC 2012) for additional guidance,	
		he Chebyshev UCL for small sample sizes (n < 7).	
		in gross overestimates of the mean. e for a discussion of the Chebyshev UCL.	
110101 10 110 1 10002 0.2 1001	iiiioai aala	o lot a allocation of the chebyonet coe.	
		GOF Test	
Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.216	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level	
		1% Significance Level	
Note GOF tests r	nay be unre	eliable for small sample sizes	
Ass	sumina Norr	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0168	95% Adjusted-CLT UCL (Chen-1995)	0.014
		95% Modified-t UCL (Johnson-1978)	0.016
1		· · · · · · · · · · · · · · · · · · ·	
A.D. Took Chatichia		GOF Test	
A-D Test Statistic	0.391	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.662 0.324	Detected data appear Gamma Distributed at 5% Significance	e Level
K-S Test Statistic 5% K-S Critical Value	0.324	Kolmogorov-Smirnov Gamma GOF Test  Detected data appear Gamma Distributed at 5% Significance	o Lovol
		stributed at 5% Significance Level	e Level
		eliable for small sample sizes	
k hat (MLE)	<b>Gamma</b> 3	Statistics  k star (bias corrected MLE)	0.57
k hat (MLE) Theta hat (MLE)	0.00563	Theta star (bias corrected MLE)	0.016
nu hat (MLE)	13.14	nu star (bias corrected MLE)	4.61
		MLE Sd (bias corrected)	
MLE Mean (bias corrected)	0.00925	Approximate Chi Square Value (0.05)	0.012
Adjusted Level of Significance	N/A	Approximate Chi Square Value (0.03)  Adjusted Chi Square Value	N/A
		Division of the second of the	
95% Approximate Gamma UCL	0.0436	ma Distribution  95% Adjusted Gamma UCL	N/A
oo // Approximate damma oo z	0.0100	30 % / Kajubiou dumina 302	1477
		GOF Test	
Shapiro Wilk Test Statistic	0.847	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.346	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.346	Data Not Lognormal at 10% Significance Level	
	imoto I oan	ormal at 10% Significance Level	
Data appear Approx			
Data appear Approx		eliable for small sample sizes	
Data appear Approx		eliable for small sample sizes	
Data appear Approx	may be unre	eliable for small sample sizes	-5.017

Assu	iming Logno	ormal Distribution	
95% H-UCL	1.56	90% Chebyshev (MVUE) UCL	0.025
95% Chebyshev (MVUE) UCL	0.0331	97.5% Chebyshev (MVUE) UCL	0.042
99% Chebyshev (MVUE) UCL	0.0623		
<u> </u>		tion Free UCL Statistics	
Data appea	r to follow a	Discernible Distribution	
Nonpar	ametric Dist	tribution Free UCLs	
95% CLT UCL	0.0145	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.0189	95% Chebyshev(Mean, Sd) UCL	0.02
97.5% Chebyshev(Mean, Sd) UCL	0.0293	99% Chebyshev(Mean, Sd) UCL	0.04
	Suggested	UCL to Use	
95% Student's-t UCL	0.0168		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.027	Mean	0.11
Maximum	0.24	Median	0.05
SD	0.0883	Std. Error of Mean	0.02
Coefficient of Variation	0.787	Skewness	0.43
		using incremental sampling methodology (ISM) approach, 2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
		e for a discussion of the Chebyshev UCL.	
Refer to the Product 5.2 Tech	illical Guide	tion a discussion of the Chebyshev OCL.	
	Normal G	OF Toot	
Shapiro Wilk Test Statistic	0.814		
1% Shapiro Wilk Critical Value		Shapiro Wilk GOF Test	
Lilliefors Test Statistic	0.764	Data appear Normal at 1% Significance Level	
	0.304	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
		1% Significance Level liable for small sample sizes	
	-	·	
95% Normal UCL	suming Norm	nal Distribution 95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.167	95% Adjusted-CLT UCL (Chen-1995)	0.1
30% 314401113 1 332	0.107	95% Modified-t UCL (Johnson-1978)	0.1
		, , , , , , , , , , , , , , , , , , ,	
A-D Test Statistic	<b>Gamma G</b> 0.774	GOF Test  Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.774	Data Not Gamma Distributed at 5% Significance Leve	i
K-S Test Statistic	0.733	Kolmogorov-Smirnov Gamma GOF Test	1
5% K-S Critical Value	0.273	Detected data appear Gamma Distributed at 5% Significance	0 1 004
		Distribution at 5% Significance Level	e Levi
		liable for small sample sizes	
11. (01.5)	Gamma S		4 4
k hat (MLE)	1.651	k star (bias corrected MLE)	1.1
Theta hat (MLE)	0.068	Theta star (bias corrected MLE)	0.09
nu hat (MLE)	29.71	nu star (bias corrected)	21.1
MLE Mean (bias corrected)	0.112	MLE Sd (bias corrected)	0.1
		Approximate Chi Square Value (0.05)	11.7
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	10.2
Ass	uming Gamı	ma Distribution	
95% Approximate Gamma UCL	0.203	95% Adjusted Gamma UCL	0.2
	Lognormal		
Shapiro Wilk Test Statistic	0.844	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.243	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level	
		ormal at 10% Significance Level liable for small sample sizes	
Note GOF tests in	iiay be uiifei	ilable for sitiali satifyle sizes	
	Lognormal	Statistics	
1411			~
Minimum of Logged Data  Maximum of Logged Data	-3.612 -1.427	Mean of logged Data SD of logged Data	-2.52 0.89

Assui	ning Logno	ormal Distribution	
95% H-UCL	0.311	90% Chebyshev (MVUE) UCL	0.218
95% Chebyshev (MVUE) UCL	0.266	97.5% Chebyshev (MVUE) UCL	0.331
99% Chebyshev (MVUE) UCL	0.461		
Nonparamet	ric Distribu	tion Free UCL Statistics	
Data appear	to follow a	Discernible Distribution	
Nonpara	ametric Dis	tribution Free UCLs	
95% CLT UCL	0.161	95% BCA Bootstrap UCL	0.161
95% Standard Bootstrap UCL	0.158	95% Bootstrap-t UCL	0.176
95% Hall's Bootstrap UCL	0.146	95% Percentile Bootstrap UCL	0.158
90% Chebyshev(Mean, Sd) UCL	0.201	95% Chebyshev(Mean, Sd) UCL	0.241
97.5% Chebyshev(Mean, Sd) UCL	0.296	99% Chebyshev(Mean, Sd) UCL	0.405
	Suggested	UCL to Use	
95% Student's-t UCL	0.167		
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.	
However, simulations results will not cover all Real Wo	rld data se	ts; for additional insight the user may want to consult a statisticia	n.

	UCL Statist	tics for Data	Sets with Non-Detects	
User Selected Options				
·	ProUCL 5.2 11/13/2024 2	2:45:45 PM		
	nw24_3year_data.xls			
	OFF			
	95%			
Number of Bootstrap Operations 2	2000			
Weeks ANN OA				
litrate - MW-24				
		General S	Statistics	
Total N	lumber of Observations	9	Number of Distinct Observations	8
			Number of Missing Observations	0
	Minimum	7.7	Mean	32.3
	Maximum	51	Median	35
	SD	11.85	Std. Error of Mean	3.949
	Coefficient of Variation	0.367	Skewness	-0.813
Note: Sample size is sm	nall (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
· ·			2020 and ITRC 2012) for additional guidance,	
	-	-	e Chebyshev UCL for small sample sizes (n < 7).	
			n gross overestimates of the mean.	
	<del>-</del>		for a discussion of the Chebyshev UCL.	
		Normal G	OF Test	
Shi	apiro Wilk Test Statistic	Normal G		
	apiro Wilk Test Statistic	0.927	Shapiro Wilk GOF Test	
	apiro Wilk Critical Value	0.927 0.764	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic	0.927 0.764 0.19	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value	0.927 0.764 0.19 0.316	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.927 0.764 0.19 0.316 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.927 0.764 0.19 0.316 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea	0.927 0.764 0.19 0.316 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes	
1% Sha	Asse	0.927 0.764 0.19 0.316 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	0.927 0.764 0.19 0.316 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)	37.65
1% Sha	Asse	0.927 0.764 0.19 0.316 ar Normal at	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)	37.65
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	0.927 0.764 0.19 0.316 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)	37.65 39.46
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	0.927 0.764 0.19 0.316 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
1% Sha	apiro Wilk Critical Value Lilliefors Test Statistic Lilliefors Critical Value Data appea Note GOF tests I	0.927 0.764 0.19 0.316 ar Normal at may be unrel	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	
1% Sha	Assemal UCL  Appiro Wilk Critical Value  Lilliefors Test Statistic  Data appear  Note GOF tests I	0.927 0.764 0.19 0.316 ar Normal at may be unrel suming Norm 39.64 Gamma G	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)	39.46
1% Sha	Assemal UCL  A-D Test Statistic	0.927 0.764 0.19 0.316 ar Normal at may be unrel suming Norm 39.64 Gamma G	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  iOF Test  Anderson-Darling Gamma GOF Test	39.46
1% Sha	Ass mal UCL  A-D Test Statistic  A-D Test Statistic  Appiro Wilk Critical Value  Lilliefors Test Statistic  Data appear  Note GOF tests in  Ass  Ass  A-D Test Statistic	0.927 0.764 0.19 0.316 ar Normal at may be unrel suming Norm 39.64 Gamma G 0.789 0.723	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  GOF Test  Anderson-Darling Gamma GOF Test  Data Not Gamma Distributed at 5% Significance Level	39.46
1% Sha	Assemal UCL  A-D Test Statistic  A-D Test Statistic  A-D Critical Value  K-S Test Statistic  SK-S Critical Value  Data appear  Assemal UCL  A-D Test Statistic  SK-S Test Statistic	0.927 0.764 0.19 0.316 ar Normal at may be unrel suming Norm 39.64 Gamma G 0.789 0.723 0.244 0.28	Shapiro Wilk GOF Test  Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Data appear Normal at 1% Significance Level  1% Significance Level  iable for small sample sizes  al Distribution  95% UCLs (Adjusted for Skewness)  95% Adjusted-CLT UCL (Chen-1995)  95% Modified-t UCL (Johnson-1978)  COF Test  Anderson-Darling Gamma GOF Test  Data Not Gamma Distributed at 5% Significance Level  Kolmogorov-Smirnov Gamma GOF Test	39.46

	Gamma	Statistics	
k hat (MLE)	5.289	k star (bias corrected MLE)	3.6
Theta hat (MLE)	6.107	Theta star (bias corrected MLE)	8.9
nu hat (MLE)	95.19	nu star (bias corrected)	64.8
MLE Mean (bias corrected)	32.3	MLE Sd (bias corrected)	17.0
		Approximate Chi Square Value (0.05)	47.2
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	44.
As	suming Gam	ma Distribution	
95% Approximate Gamma UCL		95% Adjusted Gamma UCL	47.4
	Lognormai	GOF Test	
Shapiro Wilk Test Statistic		Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value		Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic		Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	-	Data Not Lognormal at 10% Significance Level	
		10% Significance Level	
Data Not L		10% Significance Level	
	Lognorma	I Statistics	
Minimum of Logged Data		Mean of logged Data	3.3
Maximum of Logged Data	3.932	SD of logged Data	0.5
Ass	uming Logno	ormal Distribution	
95% H-UCL		90% Chebyshev (MVUE) UCL	51.6
95% Chebyshev (MVUE) UCL		97.5% Chebyshev (MVUE) UCL	71.5
99% Chebyshev (MVUE) UCL	94.22		
Nonparamo	etric Distribut	tion Free UCL Statistics	
Data appea	ar to follow a	Discernible Distribution	
Nonpa	rametric Dist	tribution Free UCLs	
95% CLT UCL	. 38.8	95% BCA Bootstrap UCL	37.5
95% Standard Bootstrap UCL	. 38.32	95% Bootstrap-t UCL	38.4
95% Hall's Bootstrap UCL	. 38.52	95% Percentile Bootstrap UCL	38
90% Chebyshev(Mean, Sd) UCL	. 44.15	95% Chebyshev(Mean, Sd) UCL	49.5
97.5% Chebyshev(Mean, Sd) UCL	. 56.96	99% Chebyshev(Mean, Sd) UCL	71.5
	Suggested	UCL to Use	
95% Student's-t UCL			
Note: Suggestions regarding the calcution of a 05%	ALICI are pro	ovided to help the user to select the most appropriate QE% LICL	
		ovided to help the user to select the most appropriate 95% UCL.	
Recommendations are based upon data size	e, data distribu	ovided to help the user to select the most appropriate 95% UCL. ution, and skewness using results from simulation studies.  s; for additional insight the user may want to consult a statisticial	
Recommendations are based upon data size  However, simulations results will not cover all Real W	e, data distribu Vorld data set	ution, and skewness using results from simulation studies.	

	Company	Ptetiation	
	General S		
Total Number of Observations	9	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	4
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.018	Minimum Non-Detect	0.015
Maximum Detect	0.062	Maximum Non-Detect	0.015
Variance Detects	3.3500E-4	Percent Non-Detects	44.449
Mean Detects	0.035	SD Detects	0.0183
Median Detects	0.031	CV Detects	0.523
Skewness Detects	0.82	Kurtosis Detects	-0.511
Mean of Logged Detects	-3.461	SD of Logged Detects	0.522
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide of	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	e t-UCL or tl	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL o	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Ted	hnical Guide	e for a discussion of the Chebyshev UCL.	
Norm	al COE Test	t on Detects Only	
Shapiro Wilk Test Statistic	0.916	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Levi	ام
Lilliefors Test Statistic	0.080	Lilliefors GOF Test	C1
1% Lilliefors Critical Value			ما
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Levi	el
Detected Data a	0.396 appear Norm	Detected Data appear Normal at 1% Significance Level	el
Detected Data a	0.396 appear Norm	Detected Data appear Normal at 1% Significance Levi	el
Detected Data a Note GOF tests	0.396 appear Norm may be unre	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes	el
Detected Data a Note GOF tests  Kaplan-Meier (KM) Statistics usin	0.396 appear Norm may be unre	Detected Data appear Normal at 1% Significance Level liable for small sample sizes ritical Values and other Nonparametric UCLs	
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean	0.396 appear Norm may be unre ng Normal Ci 0.0261	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean	0.0058
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD	0.396 appear Norm may be unre ng Normal Ci 0.0261 0.0157	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL	0.0058
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL	0.396 appear Norm may be unre  ng Normal Ci  0.0261  0.0157  0.037	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.0058 0.035 0.035
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.396 appear Norm may be unre  1.00261 0.0157 0.037 0.0358	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0.0058 0.035 0.035 0.041
Detected Data a Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL	0.396 appear Norm may be unre  10.0261 0.0157 0.037 0.0358 0.0437	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.0058 0.035 0.035 0.041 0.051
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL	0.396 appear Norm may be unre  1.00261 0.0157 0.037 0.0358	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL	0.0058 0.035 0.035 0.041 0.051
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.396 appear Norm may be unre  1.00261 0.0261 0.0157 0.037 0.0358 0.0437 0.0627	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.0058 0.035 0.035 0.041 0.051
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL	0.396 appear Norm may be unre  1.00261 0.0261 0.0157 0.037 0.0358 0.0437 0.0627	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.0058 0.035 0.035; 0.0410 0.051;
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL	0.396 appear Norm may be unre  1.00261 0.0261 0.0157 0.037 0.0358 0.0437 0.0627  Tests on De	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL	0.0058 0.035 0.0352 0.0410 0.051
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic	0.396 appear Norm may be unre  1.00261 0.0261 0.0157 0.037 0.0358 0.0437 0.0627  Tests on De  0.277	Detected Data appear Normal at 1% Significance Level lial at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  stected Observations Only  Anderson-Darling GOF Test	0.0058 0.035 0.035 0.041 0.051
Note GOF tests  Kaplan-Meier (KM) Statistics usin  KM Mean  90KM SD  95% KM (t) UCL  95% KM (z) UCL  90% KM Chebyshev UCL  97.5% KM Chebyshev UCL  Gamma GOF  A-D Test Statistic  5% A-D Critical Value	0.396 appear Norm may be unre  1.00261 0.0261 0.0157 0.037 0.0358 0.0437 0.0627  1.00627  1.00627	Detected Data appear Normal at 1% Significance Level liable for small sample sizes  ritical Values and other Nonparametric UCLs  KM Standard Error of Mean 95% KM (BCA) UCL 95% KM (Percentile Bootstrap) UCL 95% KM Bootstrap t UCL 95% KM Chebyshev UCL 99% KM Chebyshev UCL 100 Sected Observations Only  Anderson-Darling GOF Test Detected data appear Gamma Distributed at 5% Significance	0.0058 0.035 0.035; 0.0410 0.051

Gamma	Statistics or	Detected Data Only	
k hat (MLE)	4.745	k star (bias corrected MLE)	2.031
Theta hat (MLE)	0.00738	Theta star (bias corrected MLE)	0.0172
nu hat (MLE)	47.45	nu star (bias corrected)	20.31
Mean (detects)	0.035		
Gamma ROS	Statistics us	sing Imputed Non-Detects	
ROS may not be used when data se	et has > 50%	NDs with many tied observations at multiple DLs	
ot be used when kstar of detects is	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS r	method may	yield incorrect values of UCLs and BTVs	
This is especi	ally true whe	n the sample size is small.	
a distributed detected data, BTVs a	nd UCLs ma	y be computed using gamma distribution on KM estimates	
Minimum	0.01	Mean	0.0239
Maximum	0.062	Median	0.018
SD	0.0185	CV	0.773
k hat (MLE)	2.276	k star (bias corrected MLE)	1.592
Theta hat (MLE)	0.0105	Theta star (bias corrected MLE)	0.015
nu hat (MLE)	40.98	nu star (bias corrected)	28.65
Adjusted Level of Significance (β)	0.0231		
ximate Chi Square Value (28.65, α)	17.43	Adjusted Chi Square Value (28.65, β)	15.62
95% Gamma Approximate UCL	0.0393	95% Gamma Adjusted UCL	0.043
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.0261	SD (KM)	0.015
Variance (KM)	2.4765E-4	SE of Mean (KM)	0.0058
k hat (KM)	2.753	k star (KM)	1.909
nu hat (KM)	49.55	nu star (KM)	34.37
theta hat (KM)	0.00948	theta star (KM)	0.013
80% gamma percentile (KM)	0.0393	90% gamma percentile (KM)	0.051
95% gamma percentile (KM)	0.0629	99% gamma percentile (KM)	0.088
0.000	- Kanlan M	sion (I/AA) Obstication	
	a Kapian-ivi		40.00
simpata Chi Cassara Malua (24 27 at)	21.06		
ximate Chi Square Value (34.37, α)	21.96	Adjusted Chi Square Value (34.37, β)	19.89
ximate Chi Square Value (34.37, α) 95% KM Approximate Gamma UCL	21.96 0.0409	Adjusted Chi Square Value (34.37, β) 95% KM Adjusted Gamma UCL	
95% KM Approximate Gamma UCL Lognormal GO	0.0409 F Test on D	95% KM Adjusted Gamma UCL etected Observations Only	0.045
95% KM Approximate Gamma UCL  Lognormal GO  Shapiro Wilk Test Statistic	0.0409 F Test on D 0.94	95% KM Adjusted Gamma UCL etected Observations Only Shapiro Wilk GOF Test	0.045
Lognormal GO Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value	0.0409 F Test on D 0.94 0.806	etected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance Sign	0.045
95% KM Approximate Gamma UCL  Lognormal GO  Shapiro Wilk Test Statistic	0.0409 F Test on D 0.94	95% KM Adjusted Gamma UCL etected Observations Only Shapiro Wilk GOF Test	0.045
Lognormal GO Shapiro Wilk Test Statistic 10% Shapiro Wilk Critical Value	0.0409 F Test on D 0.94 0.806	etected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance Sign	0.045 evel
	nu hat (MLE) Mean (detects)  Gamma ROS ROS may not be used when data so to be used when kstar of detects is so For such situations, GROS in This is especial a distributed detected data, BTVs a Minimum Maximum SD k hat (MLE) Theta hat (MLE) Theta hat (MLE) Adjusted Level of Significance (β) kimate Chi Square Value (28.65, α) 95% Gamma Approximate UCL  Estimates of G Mean (KM) Variance (KM) k hat (KM) nu hat (KM) nu hat (KM) 100 theta hat (KM) 80% gamma percentile (KM) 80% gamma percentile (KM)	nu hat (MLE)  Mean (detects)  Gamma ROS Statistics usus ROS may not be used when data set has > 50% of the used when kstar of detects is small such as For such situations, GROS method may This is especially true where a distributed detected data, BTVs and UCLs may Minimum 0.01  Maximum 0.062  SD 0.0185  k hat (MLE) 2.276  Theta hat (MLE) 0.0105  nu hat (MLE) 40.98  Adjusted Level of Significance (β) 0.0231  kimate Chi Square Value (28.65, α) 17.43  95% Gamma Approximate UCL 0.0393  Estimates of Gamma Paral Mean (KM) 0.0261  Variance (KM) 2.4765E-4  k hat (KM) 2.753  nu hat (KM) 49.55  theta hat (KM) 0.0393  95% gamma percentile (KM) 0.0393	nu hat (MLE) 47.45 nu star (bias corrected)  Mean (detects) 0.035  Gamma ROS Statistics using Imputed Non-Detects  ROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs on be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)  For such situations, GROS method may yield incorrect values of UCLs and BTVs  This is especially true when the sample size is small.  a distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates  Minimum 0.01 Mean  Maximum 0.062 Median  SD 0.0185 CVV  k hat (MLE) 2.276 k star (bias corrected MLE)  Theta hat (MLE) 0.0105 Theta star (bias corrected MLE)  Theta hat (MLE) 40.98 nu star (bias corrected)  Adjusted Level of Significance (β) 0.0231 cimate Chi Square Value (28.65, β)  95% Gamma Approximate UCL 0.0393 95% Gamma Adjusted UCL  Estimates of Gamma Parameters using KM Estimates  Mean (KM) 0.0261 SD (KM)  Variance (KM) 2.4765E-4 SE of Mean (KM)  k hat (KM) 2.753 k star (KM)  nu hat (KM) 49.55 nu star (KM)  theta hat (KM) 0.00948 theta star (KM)  80% gamma percentile (KM) 0.0393 99% gamma percentile (KM)

Lognormal RO	S Statistics	Using Imputed Non-Detects	
Mean in Original Scale	0.0226	Mean in Log Scale	-4.157
SD in Original Scale	0.0197	SD in Log Scale	0.945
95% t UCL (assumes normality of ROS data)	0.0348	95% Percentile Bootstrap UCL	0.0332
95% BCA Bootstrap UCL	0.0349	95% Bootstrap t UCL	0.042
95% H-UCL (Log ROS)	0.0693		
Statistica uning KM actimates	on Loggod	Data and Assuming Lognormal Distribution	
<del>_</del>		KM Geo Mean	0.0226
KM Mean (logged)			
KM SD (logged)		95% Critical H Value (KM-Log)	2.236
KM Standard Error of Mean (logged)		95% H-UCL (KM -Log)	0.0383
KM SD (logged)		95% Critical H Value (KM-Log)	2.236
KM Standard Error of Mean (logged)	0.188		
	DL/2 S	tatistics	
DL/2 Normal			
Mean in Original Scale	0.0228	Mean in Log Scale	-4.098
SD in Original Scale	0.0194	SD in Log Scale	0.84
95% t UCL (Assumes normality)	0.0348	95% H-Stat UCL	0.0558
DL/2 is not a recommended m	ethod, provi	ded for comparisons and historical reasons	
•		tion Free UCL Statistics	
Detected Data appea	r Normal Di	stributed at 1% Significance Level	
	0	HOLE III	
		UCL to Use	
050/ 1/14 (0) 1101	0.037		
95% KM (t) UCL	0.007		
· · · · · · · · · · · · · · · · · · ·		ovided to help the user to select the most appropriate 95% LICL	
Note: Suggestions regarding the selection of a 95%	6 UCL are pr	ovided to help the user to select the most appropriate 95% UCL ution, and skewness using results from simulation studies.	

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.006	Mean	0.007
Maximum	0.009	Median	0.008
SD	0.00103	Std. Error of Mean	3.4391E
Coefficient of Variation	0.134	Skewness	-0.49
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,	
		2020 and ITRC 2012) for additional guidance,	
		ne Chebyshev UCL for small sample sizes (n < 7).	
		n gross overestimates of the mean.	
-		for a discussion of the Chebyshev UCL.	
1.6161 to the 1.1000E 3.2 160	illical Guide	Total discussion of the onebyshev occ.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic 0.178 Lilliefors GOF Test			
		Data appear Normal at 1% Significance Level  1% Significance Level	
		liable for small sample sizes	
Note don tests i	nay be unite	liable for sitiali sample sizes	
•		ALDIA PLANT	
	suming Norm	nal Distribution	
95% Normal UCL	0.00000	95% UCLs (Adjusted for Skewness)	0.00
95% Student's-t UCL	0.00832	95% Adjusted-CLT UCL (Chen-1995)	0.00
		95% Modified-t UCL (Johnson-1978)	0.00
	Gamma G		
A-D Test Statistic	0.377	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.72	Detected data appear Gamma Distributed at 5% Significan	ce Leve
K-S Test Statistic	0.197	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significan	ce Leve
Detected data appear	Gamma Dis	tributed at 5% Significance Level	
Note GOF tests i	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	59.46	k star (bias corrected MLE)	39.7
Theta hat (MLE)	1.2912E-4	Theta star (bias corrected MLE)	1.9332
nu hat (MLE)	1070	nu star (bias corrected)	714.9
MLE Mean (bias corrected)	0.00768	MLE Sd (bias corrected)	0.00
		Approximate Chi Square Value (0.05)	653.8
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	641.5
Ann	umina Gora	ma Distribution	
ASS			0.008
95% Approximate Gamma UCL	0.00839	95% Adjusted Gamma UCL	

	Lognormal GC	OF Test			
Shapiro Wilk Test Statistic	0.92	Shapiro Wilk Lognormal GOF Test			
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level			
Lilliefors Test Statistic	0.194	Lilliefors Lognormal GOF Test			
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level			
Data appear l	ognormal at 10	0% Significance Level			
Note GOF tests r	nay be unreliab	le for small sample sizes			
	Lognormal St	atistics			
Minimum of Logged Data	-5.116	Mean of logged Data	-4.878		
Maximum of Logged Data	-4.711	SD of logged Data	0.139		
	ming Lognorma				
95% H-UCL	0.00842	90% Chebyshev (MVUE) UCL	0.00875		
95% Chebyshev (MVUE) UCL	0.00924	97.5% Chebyshev (MVUE) UCL	0.0099		
99% Chebyshev (MVUE) UCL	0.0112				
		Free UCL Statistics			
Data appear	r to follow a Dis	cernible Distribution			
None	bis bis bis	when Free HOLe			
·		ntion Free UCLs	0.00010		
95% CLT UCL	0.00824	95% BCA Bootstrap UCL	0.0081		
95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.00822	95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	0.0082		
90% Chebyshev(Mean, Sd) UCL	0.00813	95% Percentile Bootstrap OCL 95% Chebyshev(Mean, Sd) UCL	0.00022		
97.5% Chebyshev(Mean, Sd) UCL	0.00871	99% Chebyshev(Mean, Sd) UCL	0.0091		
97.3% Chebyshev(Weah, 3d) OCL	0.00963	99 % Chebyshev (Mean, 3u) OCL	0.0111		
	Suggested UC	to Use			
95% Student's-t UCL	0.00832	- 10 000			
3379 314431113 1 332	5.00002				
Note: Suggestions regarding the selection of a 95%	UCL are provid	ed to help the user to select the most appropriate 95% UCL			
		n, and skewness using results from simulation studies.			
However, simulations results will not cover all Real Wo	orld data sets; fo	or additional insight the user may want to consult a statisticia	ın.		
		<u> </u>			
Note: For highly negatively-skewed data, confid	ence limits (e.g	., Chen, Johnson, Lognormal, and Gamma) may not be			
P. L.L. Ob L. L	de e de la coma tidada	adjustments for positvely skewed data sets.			

	General S	Statistics					
Total Number of Observations	9	Number of Distinct Observations	8				
Number of Detects	7	Number of Non-Detects	2				
Number of Distinct Detects	7	Number of Distinct Non-Detects					
Minimum Detect	0.026	Minimum Non-Detect					
Maximum Detect	0.25	Maximum Non-Detect					
Variance Detects	0.00525	Percent Non-Detects	22.2				
Mean Detects	0.113	SD Detects	0.072				
Median Detects	0.11	CV Detects	0.64				
Skewness Detects	1.06	Kurtosis Detects	1.68				
Mean of Logged Detects	-2.377	SD of Logged Detects	0.72				
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,					
refer also to ITRC Tech Reg Guide o	n ISM (ITRC	2020 and ITRC 2012) for additional guidance,					
but note that ITRC may recommend the	e t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).					
The Chebyshev UCL of	ten results ir	n gross overestimates of the mean.					
Refer to the ProUCL 5.2 Tech	nnical Guide	for a discussion of the Chebyshev UCL.					
Norma	al GOF Test	on Detects Only					
Shapiro Wilk Test Statistic		<u> </u>					
Chapito Wilk 1000 Ctations	0.931	Shapiro Wilk GOF Test					
·	0.931		el				
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic		Shapiro Wilk GOF Test  Detected Data appear Normal at 1% Significance Leve  Lilliefors GOF Test	el				
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Leve					
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value	0.73 0.213 0.35	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test					
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.73 0.213 0.35 ppear Norma	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level					
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a	0.73 0.213 0.35 ppear Norma	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  al at 1% Significance Level					
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n	0.73 0.213 0.35 ppear Normanay be unrel	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level  al at 1% Significance Level					
1% Shapiro Wilk Critical Value  Lilliefors Test Statistic  1% Lilliefors Critical Value  Detected Data a  Note GOF tests n	0.73 0.213 0.35 ppear Normanay be unrel	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes	ėl				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value Detected Data a Note GOF tests n  Kaplan-Meier (KM) Statistics using	0.73 0.213 0.35 ppear Normanay be unrel	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs	0.02				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value Detected Data a Note GOF tests n  Kaplan-Meier (KM) Statistics using	0.73 0.213 0.35 ppear Normal nay be unrel g Normal Cr	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL	0.023 0.14				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL	0.73 0.213 0.35 ppear Normal Crimonal C	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.02 0.14				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	0.73 0.213 0.35 ppear Normal Cr 0.1 0.0648 0.144 0.139	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.02 0.14 0.15				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL	0.73 0.213 0.35 ppear Normal Crimonal C	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL	0.02 0.14 0.15 0.20				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL	0.73 0.213 0.35  ppear Normal Cri 0.1 0.0648 0.144 0.139 0.171	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL	0.02 0.14 0.15 0.20				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL	0.73 0.213 0.35 ppear Normal Crimal C	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL					
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF T  A-D Test Statistic	0.73 0.213 0.35 ppear Normal Crimon   0.1 0.0648 0.144 0.139 0.171 0.248  Tests on Det   0.182	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  tected Observations Only  Anderson-Darling GOF Test	0.023 0.14 0.14 0.15 0.20				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF T  A-D Test Statistic 5% A-D Critical Value	0.73 0.213 0.35 ppear Normal Cri 0.1 0.0648 0.144 0.139 0.171 0.248  Tests on Det 0.182 0.713	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  199% KM Chebyshev UCL  1006  1007	0.023 0.14 0.14 0.15 0.20				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a Note GOF tests n  Kaplan-Meier (KM) Statistics using KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 95% KM (z) UCL 97.5% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF TA-D Test Statistic 5% A-D Critical Value K-S Test Statistic	0.73 0.213 0.35  ppear Normal Crimary be unrel  g Normal Crimary be unrel  0.1 0.0648 0.144 0.139 0.171 0.248  Tests on Det 0.182 0.713 0.144	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  99% KM Chebyshev UCL  Detected Observations Only  Anderson-Darling GOF Test  Detected data appear Gamma Distributed at 5% Significance Kolmogorov-Smirnov GOF	0.02 0.14 0.15 0.20 0.33				
1% Shapiro Wilk Critical Value Lilliefors Test Statistic 1% Lilliefors Critical Value  Detected Data a  Note GOF tests n  Kaplan-Meier (KM) Statistics using  KM Mean 90KM SD 95% KM (t) UCL 95% KM (z) UCL 90% KM Chebyshev UCL 97.5% KM Chebyshev UCL  Gamma GOF T  A-D Test Statistic 5% A-D Critical Value	0.73 0.213 0.35 ppear Normal Cri 0.1 0.0648 0.144 0.139 0.171 0.248  Tests on Det 0.182 0.713	Detected Data appear Normal at 1% Significance Level  Lilliefors GOF Test  Detected Data appear Normal at 1% Significance Level al at 1% Significance Level liable for small sample sizes  itical Values and other Nonparametric UCLs  KM Standard Error of Mean  95% KM (BCA) UCL  95% KM (Percentile Bootstrap) UCL  95% KM Bootstrap t UCL  95% KM Chebyshev UCL  99% KM Chebyshev UCL  199% KM Chebyshev UCL  1006  1007	0.02 0.14 0.15 0.20 0.33				

Gamma	Statistics or	Detected Data Only	
k hat (MLE)	2.686	k star (bias corrected MLE)	1.63
Theta hat (MLE)	0.0421	Theta star (bias corrected MLE)	0.0694
nu hat (MLE)	37.6	nu star (bias corrected)	22.82
Mean (detects)	Mean (detects) 0.113		
Gamma ROS	Statistics us	sing Imputed Non-Detects	
GROS may not be used when data s	et has > 50%	NDs with many tied observations at multiple DLs	
GROS may not be used when kstar of detects is	small such a	s <1.0, especially when the sample size is small (e.g., <15-20)	
For such situations, GROS	method may	yield incorrect values of UCLs and BTVs	
This is especi	ally true whe	n the sample size is small.	
For gamma distributed detected data, BTVs a	nd UCLs ma	y be computed using gamma distribution on KM estimates	
Minimum	0.026	Mean	0.0987
Maximum	0.25	Median	0.075
SD	0.0694	CV	0.703
k hat (MLE)	2.431	k star (bias corrected MLE)	1.695
Theta hat (MLE)	0.0406	Theta star (bias corrected MLE)	0.0583
nu hat (MLE)	43.75	nu star (bias corrected)	30.5
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (30.50, α)	18.89	Adjusted Chi Square Value (30.50, β)	16.99
95% Gamma Approximate UCL	0.159	95% Gamma Adjusted UCL	0.177
Estimates of G	amma Para	meters using KM Estimates	
Mean (KM)	0.1	SD (KM)	0.0648
Variance (KM)	0.0042	SE of Mean (KM)	0.0238
k hat (KM)	2.381	k star (KM)	1.661
nu hat (KM)	42.85	nu star (KM)	29.9
theta hat (KM)	0.042	theta star (KM)	0.0602
80% gamma percentile (KM)	0.153	90% gamma percentile (KM)	0.203
95% gamma percentile (KM)	0.252	99% gamma percentile (KM)	0.361
Comm	o Konlon M	eier (KM) Statistics	
Approximate Chi Square Value (29.90, α)	•	Adjusted Chi Square Value (29.90, β)	16.54
95% KM Approximate Gamma UCL	18.42 0.162	95% KM Adjusted Gamma UCL	0.181
· · · · · · · · · · · · · · · · · · ·		,	
		etected Observations Only	
·		-	
			evel
			evel
Shapiro Wilk Test Statistic  10% Shapiro Wilk Critical Value  Lilliefors Test Statistic  10% Lilliefors Critical Value  Detected Data ap	0.966 0.838 0.164 0.28 pear Lognor	etected Observations Only  Shapiro Wilk GOF Test  Detected Data appear Lognormal at 10% Significance Lognormal at 10% Signific	

-2.523 0.7	ion-Detects	Statistics U	Lognormal ROS	
0.7	Mean in Log Scale	0.0989	Mean in Original Scale	
	SD in Log Scale	0.069	SD in Original Scale	
0.137	95% t UCL (assumes normality of ROS data) 0.142 95% Percentile Bootstrap UCL			
0.162	95% Bootstrap t UCL	95% BCA Bootstrap UCL 0.145 95% Boo		
		0.196	95% H-UCL (Log ROS)	
	ing Lognormal Distribution	on Logged [	Statistics using KM estimates of	
0.0806	KM Geo Mean	-2.518	KM Mean (logged)	
2.588	95% Critical H Value (KM-Log)	0.682	KM SD (logged)	
0.19	95% H-UCL (KM -Log)	0.265	KM Standard Error of Mean (logged)	
2.588	95% Critical H Value (KM-Log)	0.682	KM SD (logged)	
		0.265	KM Standard Error of Mean (logged)	
		DL/2 St		
	DL/2 Log-Transformed		DL/2 Normal	
-2.564	Mean in Log Scale	0.0969	Mean in Original Scale	
0.728	SD in Log Scale	0.0706	SD in Original Scale	
0.2	95% H-Stat UCL	0.141	95% t UCL (Assumes normality)	
	sons and historical reasons	thod, provid	DL/2 is not a recommended me	
			Nonparame	
	Significance Level	Normal Dis	Detected Data appear	
		U.144	95% KM (t) UCL	
	a upor to color the most engraprists 05% LICL	LICI are	Note: Suggestions regarding the coloration of a 05%	
	e user to select the most appropriate 95% UCL.	-		
	ace using results from simulation studies		necommendations are based upon data size,	
			However, simulations results will not cover all Real Wo	
-	Significance Level	Suggested 0.144  UCL are pro	Detected Data appear	

	General S	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.0048	Mean	0.010
Maximum	0.016	Median	0.011
SD	0.00417	Std. Error of Mean	0.001
Coefficient of Variation	0.401	Skewness	-0.10
Note: Sample size is small (e.g., <10), if data a	are collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide o	on ISM (ITRO	2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	ne t-UCL or th	ne Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tec	chnical Guide	for a discussion of the Chebyshev UCL.	
	Normal G	OF Test	
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.159	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level	
Data appe	ar Normal at	1% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
Asa	suming Norm	nal Distribution	
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.013	95% Adjusted-CLT UCL (Chen-1995)	0.01
		95% Modified-t UCL (Johnson-1978)	0.01
	Gamma G	GOF Test	
A-D Test Statistic	0.417	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance	e Leve
K-S Test Statistic	0.182	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significance	e Leve
Detected data appear	r Gamma Dis	tributed at 5% Significance Level	
Note GOF tests	may be unre	liable for small sample sizes	
	Gamma S	Statistics	
k hat (MLE)	6.161	k star (bias corrected MLE)	4.18
	0.00169	Theta star (bias corrected MLE)	0.002
		, , , , ,	75.2
Theta hat (MLE)	110.9	nu star (bias corrected)	70.2
Theta hat (MLE) nu hat (MLE)	110.9	nu star (bias corrected)  MLE Sd (bias corrected)	
Theta hat (MLE)		MLE Sd (bias corrected)	0.00
Theta hat (MLE) nu hat (MLE)	110.9		
Theta hat (MLE) nu hat (MLE) MLE Mean (bias corrected)  Adjusted Level of Significance	0.0104 0.0231	MLE Sd (bias corrected)  Approximate Chi Square Value (0.05)	0.005 56.2

	Lognormal GO					
Shapiro Wilk Test Statistic	0.896	Shapiro Wilk Lognormal GOF Test				
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Leve				
Lilliefors Test Statistic	0.206	Lilliefors Lognormal GOF Test				
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level				
Data appear l	Lognormal at 10	% Significance Level				
Note GOF tests r	may be unreliabl	le for small sample sizes				
	Lognormal Sta	ntistics				
Minimum of Logged Data	-5.339	Mean of logged Data	-4.6			
Maximum of Logged Data	-4.135	SD of logged Data	0.			
Assu	ming Lognorma	l Distribution				
95% H-UCL	0.015	90% Chebyshev (MVUE) UCL	0.0			
95% Chebyshev (MVUE) UCL	0.0174	97.5% Chebyshev (MVUE) UCL	0.0			
99% Chebyshev (MVUE) UCL	0.0263					
Nanarama	trio Diotribution	Evan LICI. Statistica				
-		Free UCL Statistics				
Data annea						
	r to follow a Disc	cernible Distribution				
· ·						
· ·	ametric Distribut					
· ·			0.0			
Nonpar	ametric Distribu	tion Free UCLs				
Nonpar 95% CLT UCL	ametric Distribut	tion Free UCLs 95% BCA Bootstrap UCL	0.0			
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL	ametric Distribut 0.0127 0.0125	tion Free UCLs  95% BCA Bootstrap UCL  95% Bootstrap-t UCL	0.0			
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.0127 0.0125 0.0124	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	0.0 0.0 0.0 0.0			
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0127 0.0125 0.0124 0.0146	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0			
Nonpar 95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.0127 0.0125 0.0124 0.0146 0.0191	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0			
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL	0.0127 0.0125 0.0124 0.0146 0.0191 Suggested UCL 0.013	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0			
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%	0.0127 0.0125 0.0124 0.0146 0.0191 Suggested UCL 0.013	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0			
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,	0.0127 0.0125 0.0124 0.0146 0.0191  Suggested UCL 0.013  UCL are provided data distribution	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 4. to Use	0.0			
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size,	0.0127 0.0125 0.0124 0.0146 0.0191  Suggested UCL 0.013  UCL are provided data distribution	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0			
Nonpar  95% CLT UCL  95% Standard Bootstrap UCL  95% Hall's Bootstrap UCL  90% Chebyshev(Mean, Sd) UCL  97.5% Chebyshev(Mean, Sd) UCL  95% Student's-t UCL  Note: Suggestions regarding the selection of a 95%  Recommendations are based upon data size, However, simulations results will not cover all Real Wo	ametric Distribut  0.0127  0.0125  0.0124  0.0146  0.0191  Suggested UCL  0.013  UCL are provide data distribution orld data sets; for ence limits (e.g.	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL 4. to Use	0.0			

MW-24					
	General S	Statistics			
Total Number of Observations	9	Number of Distinct Observations	9		
		Number of Missing Observations	0		
Minimum	0.001	Mean	0.003		
Maximum	0.0064	Median	0.002		
SD	0.00169 Std. Error of Me				
Coefficient of Variation	0.52	Skewness	0.65		
Note: Sample size is small (e.g., <10), if data a	re collected	using incremental sampling methodology (ISM) approach,			
		2020 and ITRC 2012) for additional guidance,			
		ne Chebyshev UCL for small sample sizes (n < 7).			
The Chebyshev UCL of	ften results i	n gross overestimates of the mean.			
		for a discussion of the Chebyshev UCL.			
	Normal G	OF Test			
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk GOF Test			
1% Shapiro Wilk Critical Value	0.764	Data appear Normal at 1% Significance Level			
Lilliefors Test Statistic	0.174	Lilliefors GOF Test			
1% Lilliefors Critical Value	0.316	Data appear Normal at 1% Significance Level			
Data appea	ar Normal at	1% Significance Level			
		liable for small sample sizes			
Ass	sumina Norm	nal Distribution			
95% Normal UCL	January 110m	95% UCLs (Adjusted for Skewness)			
95% Student's-t UCL	0.00431	95% Adjusted-CLT UCL (Chen-1995)	0.00		
oon cladelike ( cel	0.00101	95% Modified-t UCL (Johnson-1978)	0.00		
		30% Modified ( GGE (GGIIIISGIT 1376)	0.00		
	Gamma C				
A-D Test Statistic	0.168	Anderson-Darling Gamma GOF Test			
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significant	ce Leve		
K-S Test Statistic	0.123	Kolmogorov-Smirnov Gamma GOF Test			
5% K-S Critical Value	0.281	Detected data appear Gamma Distributed at 5% Significant	ce Leve		
Detected data appear	Gamma Dis	tributed at 5% Significance Level			
Note GOF tests i	may be unre	liable for small sample sizes			
	Gamma S	Statistics			
k hat (MLE)	3.879	k star (bias corrected MLE)	2.6		
Theta hat (MLE)	8.3924E-4	Theta star (bias corrected MLE)	0.00		
nu hat (MLE)	69.82	nu star (bias corrected)	47.8		
MLE Mean (bias corrected)	0.00326	MLE Sd (bias corrected)	0.00		
· · · · · · · · · · · · · · · · · · ·		Approximate Chi Square Value (0.05)	33		
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	30.4		
Δεσ	uming Gam	ma Distribution			
V92	anning dann	IIG PIGNIPUUII			
95% Approximate Gamma UCL	0.00472	95% Adjusted Gamma UCL	0.00		

	Lognormal G	OF Test				
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test				
10% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 10% Significance Level				
Lilliefors Test Statistic	0.161	Lilliefors Lognormal GOF Test				
10% Lilliefors Critical Value	0.252	Data appear Lognormal at 10% Significance Level				
Data appear l	Lognormal at 1	0% Significance Level				
Note GOF tests r	may be unrelia	ble for small sample sizes				
	Lognormal S					
Minimum of Logged Data	-6.908	Mean of logged Data	-5.862			
Maximum of Logged Data	-5.051	SD of logged Data	0.576			
	ming Lognorm					
95% H-UCL	0.00546	90% Chebyshev (MVUE) UCL	0.0052			
95% Chebyshev (MVUE) UCL	0.0061	97.5% Chebyshev (MVUE) UCL	0.0073			
99% Chebyshev (MVUE) UCL	0.0097					
•		n Free UCL Statistics				
Data appea	r to follow a Di	scernible Distribution				
Nonpar	ametric Distrib	ution Free UCLs				
·						
95% CLT UCL	0.00418	95% BCA Bootstrap UCL	0.0042			
95% CLT UCL 95% Standard Bootstrap UCL	0.00412	95% BCA Bootstrap UCL 95% Bootstrap-t UCL	0.0045			
95% CLT UCL	0.00412 0.00505	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	0.0045			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL	0.00412	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL	0.0045			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL	0.00412 0.00505	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL	0.0045			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.00412 0.00505 0.00495 0.00678	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0045 0.0041 0.0057			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.00412 0.00505 0.00495 0.00678	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0045 0.0041 0.0057			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	0.00412 0.00505 0.00495 0.00678	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.0045 0.004 0.0057			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	0.00412 0.00505 0.00495 0.00678 Suggested UC	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.004 0.004 0.005 0.008			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL	0.00412 0.00505 0.00495 0.00678 Suggested UC 0.00431	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL CL to Use	0.004 0.004 0.005 0.008			
95% CLT UCL 95% Standard Bootstrap UCL 95% Hall's Bootstrap UCL 90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL 97.5% Student's-t UCL  Note: Suggestions regarding the selection of a 95% Recommendations are based upon data size,	0.00412 0.00505 0.00495 0.00678  Suggested UC 0.00431  UCL are provided data distribution	95% BCA Bootstrap UCL 95% Bootstrap-t UCL 95% Percentile Bootstrap UCL 95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	0.004 0.004 0.005 0.008			

	General	Statistics	
Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.032	Mean	0.10
Maximum	0.29	Median	0.06
SD	0.0782	Std. Error of Mean	0.02
Coefficient of Variation	0.774	Skewness	2.1
Note: Sample size is small (e.g., <10), if data ar	e collected	using incremental sampling methodology (ISM) approach,	
refer also to ITRC Tech Reg Guide or	n ISM (ITRO	C 2020 and ITRC 2012) for additional guidance,	
but note that ITRC may recommend the	t-UCL or t	he Chebyshev UCL for small sample sizes (n < 7).	
The Chebyshev UCL oft	en results i	n gross overestimates of the mean.	
Refer to the ProUCL 5.2 Tech	nical Guide	e for a discussion of the Chebyshev UCL.	
	Normal G	POE Toot	
Shapiro Wilk Test Statistic	0.747	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.319	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Data Not Normal at 1% Significance Level	
		% Significance Level	
	uming Norn	nal Distribution	
95% Normal UCL	0.140	95% UCLs (Adjusted for Skewness)	0.1
95% Student's-t UCL	0.149	95% Adjusted-CLT UCL (Chen-1995)	0.1
		95% Modified-t UCL (Johnson-1978)	0.
	Gamma (	GOF Test	
A-D Test Statistic	0.529	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.728	Detected data appear Gamma Distributed at 5% Significance	e Lev
K-S Test Statistic	0.249	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.282	Detected data appear Gamma Distributed at 5% Significance	e Lev
Detected data appear	Gamma Dis	stributed at 5% Significance Level	
Note GOF tests m	nay be unre	liable for small sample sizes	
	Gamma	Statistics	
k hat (MLE)	2.687	k star (bias corrected MLE)	1.8
Theta hat (MLE)	0.0376	Theta star (bias corrected MLE)	0.0
nu hat (MLE)	48.36	nu star (bias corrected)	33.
MLE Mean (bias corrected)	0.101	MLE Sd (bias corrected)	0.0
· '		Approximate Chi Square Value (0.05)	21.
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	19.
	ımina Co	ma Distribution	
		0.0 L/30000000	

	Lognorma	I GOF Test				
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Lognormal GOF Test				
10% Shapiro Wilk Critical Value	0.859	0.859 Data appear Lognormal at 10% Significance Level				
Lilliefors Test Statistic	0.206	206 Lilliefors Lognormal GOF Test				
10% Lilliefors Critical Value	0.252	252 Data appear Lognormal at 10% Significance Level				
Data appear	Lognormal	at 10% Significance Level				
Note GOF tests	may be unre	eliable for small sample sizes				
	Lognorma	al Statistics				
Minimum of Logged Data	-3.442	Mean of logged Data	-2.49			
Maximum of Logged Data	-1.238	SD of logged Data	0.632			
		<u> </u>				
Assu	ming Logno	ormal Distribution				
95% H-UCL	0.177	90% Chebyshev (MVUE) UCL	0.162			
95% Chebyshev (MVUE) UCL	0.191	97.5% Chebyshev (MVUE) UCL	0.231			
99% Chebyshev (MVUE) UCL	0.31					
		1				
Nonparame	tric Distribu	tion Free UCL Statistics				
Data appea	r to follow a	Discernible Distribution				
Nonpar	ametric Dis	tribution Free UCLs				
95% CLT UCL	0.144	95% BCA Bootstrap UCL	0.165			
95% Standard Bootstrap UCL	0.141	95% Bootstrap-t UCL	0.245			
95% Hall's Bootstrap UCL	0.373	95% Percentile Bootstrap UCL	0.145			
90% Chebyshev(Mean, Sd) UCL	0.179	95% Chebyshev(Mean, Sd) UCL	0.215			
97.5% Chebyshev(Mean, Sd) UCL	0.264	99% Chebyshev(Mean, Sd) UCL	0.36			
	Suggested	UCL to Use				
Recommendation cannot be provided						
Note: Suggestions regarding the selection of a 95%	UCL are pr	ovided to help the user to select the most appropriate 95% UCL.	•			
Recommendations are based upon data size,	data distrib	ution, and skewness using results from simulation studies.				
However, simulations results will not cover all Real W	orld data se	ts; for additional insight the user may want to consult a statisticia	ın.			

APPENDIX B
Trend Analysis Software Outputs

Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-1
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

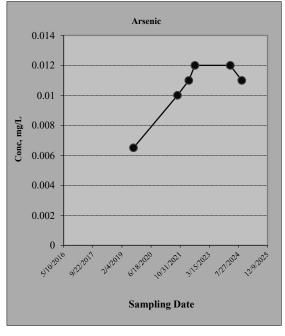
			Haz	zardous Substa	nces (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic				
#1	2/28/2017	7.1					
#2	9/19/2017	6.9					
#3	3/6/2018	2.8					
#4	8/30/2018	7.7					
#5	3/19/2019	4.9					
#6	8/20/2019	7.5	0.0065				
#7	3/10/2020	7.3					
#8	8/31/2020	8.2					
#9	2/23/2021	7.6					
#10	9/14/2021	7	0.01				
#11	3/28/2022	6.4	0.011				
#12	7/11/2022	8.5	0.012				
#13	3/6/2023	12					
#14	8/21/2023	8.3					
#15	3/11/2024	7.8	0.012				
#16	9/23/2024	9	0.011				

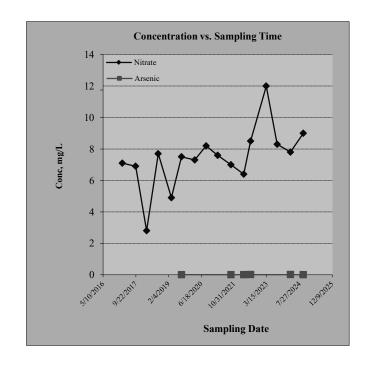
# 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	99.40%	93.20%	NA	NA	NA	NA
Plume Stability?	Expanding	Expanding	NA	NA	NA	NA
Coefficient of Variation?			n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	56	9	0	0	0	0
Number of Sampling Rounds?	16	6	0	0	0	0
Average Concentration?	7.44	0.01	NA	NA	NA	NA
Standard Deviation?	1.92	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.26	0.20	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Expanding





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-3
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

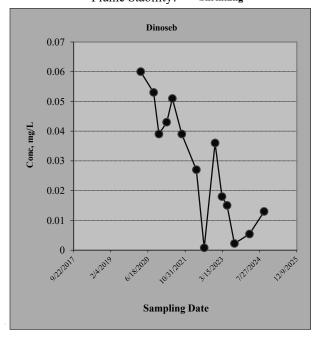
			Haz	zardous Substa	ances (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	
#1	3/21/2019	87.2					
#2	8/22/2019	147					
#3	3/12/2020	263	1	0.0096	1.04	0.06	
#4	9/3/2020	270	4.6	0.011	0.91	0.053	
#5	11/12/2020	320	0.49	0.0093	0.95	0.039	
#6	2/25/2021	360	0.41	0.0081	1.5	0.043	
#7	5/12/2021	24	0.49	0.0093	1.5	0.051	
#8	9/17/2021	330	0.5	0.008	1.6	0.039	
#9	3/31/2022	410	0.87	0.007	3.2	0.027	
#10	7/14/2022	360	0.025	0.0064	2.1	0.00075	
#11	12/8/2022	390	0.77	0.0096	1.9	0.036	
#12	3/9/2023	350	0.017	0.0064	2.3	0.018	
#13	5/18/2023	190	0.16	0.0071	1.6	0.015	
#14	8/24/2023	340	0.0075	0.0085	1.4	0.0022	
#15	3/14/2024	180	0.015	0.0073	1.3	0.0054	
#16	9/26/2024	240	0.033	0.0096	1.1	0.013	

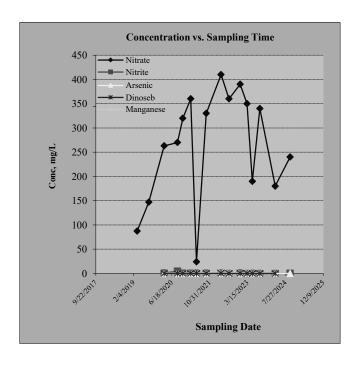
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	
Confidence Level Calculated?	82.50%	99.50%	88.30%	77.50%	100.00%	NA
Plume Stability?	Stable	Shrinking	Shrinking	Stable	Shrinking	NA
Coefficient of Variation?	CV <= 1			CV <= 1		n<4
Mann-Kendall Statistic "S" value?	23	-48	-24	15	-64	0
Number of Sampling Rounds?	16	14	14	14	14	0
Average Concentration?	266.33	0.67	0.01	1.60	0.03	NA
Standard Deviation?	113.11	1.18	0.00	0.62	0.02	NA
Coefficient of Variation?	0.42	1.76	0.17	0.39	0.69	NA
Blank if No Errors found						n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Dinoseb
Plume Stability? Shrinking





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-4R

Level of Confidence (Decision Criteria)?

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

85%

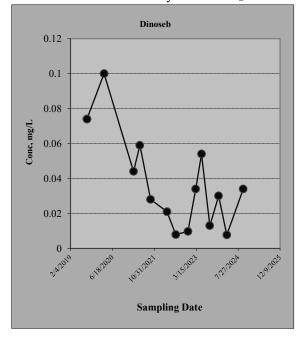
			Haz	ardous Substa	ances (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic	Dinoseb	1,2-DCP		
#1	8/20/2019	316	0.0147	0.074	0.007		
#2	3/12/2020	302	0.0169	0.1	0.006		
#3	9/3/2020				0.0064		
#4	11/12/2020				0.0062		
#5	2/25/2021	230	0.011	0.044	0.0048		
#6	5/12/2021	17	0.0099	0.059	0.0065		
#7	9/17/2021	350	0.012	0.028	0.0097		
#8	4/1/2022	250	0.01	0.021	0.006		
#9	7/14/2022	230	0.012	0.0079	0.0065		
#10	12/6/2022	180	0.0098	0.0097	0.0056		
#11	3/9/2023	180	0.012	0.034	0.0057		
#12	5/18/2023	180	0.011	0.054	0.006		
#13	8/24/2023	220	0.012	0.013	0.0072		
#14	12/7/2023	140	0.012	0.03	0.0068		
#15	3/14/2024	100	0.016	0.0077	0.0049		
#16	9/26/2024	180	0.013	0.034	0.0067		

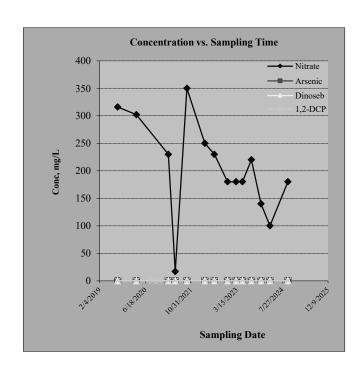
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic	Dinoseb	1,2-DCP		
Confidence Level Calculated?	99.30%	66.60%	96.90%	51.80%	NA	NA
Plume Stability?	Shrinking	Stable	Shrinking	Stable	NA	NA
Coefficient of Variation?		CV <= 1		CV <= 1	n<4	n<4
Mann-Kendall Statistic "S" value?	-46	10	-36	-2	0	0
Number of Sampling Rounds?	14	14	14	16	0	0
Average Concentration?	205.36	0.01	0.04	0.01	NA	NA
Standard Deviation?	87.42	0.00	0.03	0.00	NA	NA
Coefficient of Variation?	0.43	0.18	0.74	0.17	NA	NA
Blank if No Errors found					n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Dinoseb
Plume Stability? Shrinking





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description: Well (Sampling) Location? **MW-6** 

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

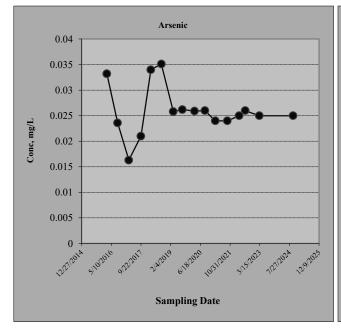
			Haz	ardous Substa	nces (unit is n	ng/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic				
#1	2/25/2016	18.8	0.0332				
#2	8/24/2016	4.9	0.0236				
#3	2/28/2017	129	0.0163				
#4	9/20/2017	5.8	0.021				
#5	3/7/2018	15.1	0.034				
#6	8/30/2018	5.5	0.0351				
#7	3/20/2019	34.4	0.0258				
#8	8/20/2019	5.5	0.0262				
#9	3/11/2020	5.9	0.0259				
#10	9/2/2020	5.3	0.026				
#11	2/24/2021	5.6	0.024				
#12	9/15/2021	2.6	0.024				
#13	4/1/2022	4.4	0.025				
#14	7/12/2022	6.8	0.026				
#15	3/7/2023	5.2	0.025				
#16	9/25/2024	6.2	0.025				

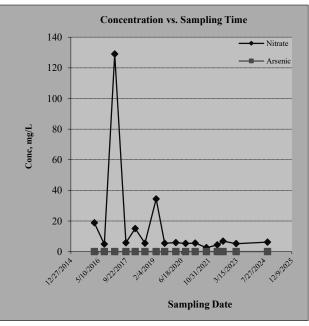
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	90.30%	55.30%	NA	NA	NA	NA
Plume Stability?	Shrinking	Stable	NA	NA	NA	NA
Coefficient of Variation?		CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-31	-5	0	0	0	0
Number of Sampling Rounds?	16	16	0	0	0	0
Average Concentration?	16.31	0.03	NA	NA	NA	NA
Standard Deviation?	31.09	0.00	NA	NA	NA	NA
Coefficient of Variation?	1.91	0.18	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic Plume Stability? Stable





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-7
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

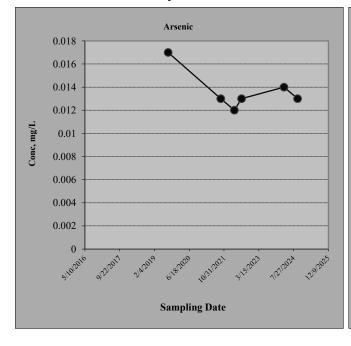
			Haz	zardous Substa	nces (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic				
#1	2/28/2017	4					
#2	9/19/2017	4.1					
#3	3/6/2018	4.1					
#4	8/28/2018	4.1					
#5	3/19/2019	2.7					
#6	8/20/2019	5.3	0.017				
#7	3/10/2020	3.9					
#8	8/31/2020	3.8					
#9	2/23/2021	4.2					
#10	9/14/2021	3.9	0.013				
#11	3/28/2022	3.4	0.012				
#12	7/11/2022	5	0.013				
#13	3/6/2023	7					
#14	8/21/2023	4.2					
#15	3/11/2024	1.6	0.014				
#16	9/23/2024	4.6	0.013				

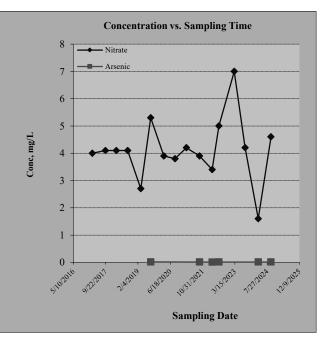
# 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	65.50%	50.00%	NA	NA	NA	NA
Plume Stability?	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	11	-2	0	0	0	0
Number of Sampling Rounds?	16	6	0	0	0	0
Average Concentration?	4.12	0.01	NA	NA	NA	NA
Standard Deviation?	1.15	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.28	0.13	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Stable





Site Name: Bee-Jay Scales Site Address: 110 N. 1st Street, Sunnyside, WA Additional Description:

**MW-8** Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

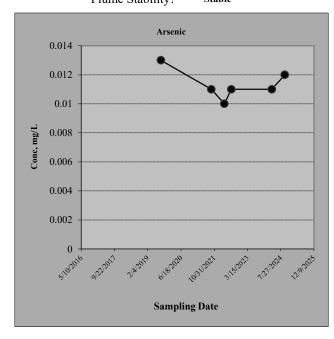
			Наг	zardous Subst	ances (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic				
#1	3/2/2017	74.3					
#2	9/21/2017	141					
#3	3/8/2018	57.3					
# <b>4</b>	8/29/2018	41.1					
#5	3/20/2019	58.7					
#6	8/21/2019	41.1	0.013				
#7	3/11/2020	64.9					
#8	9/3/2020	38					
#9	2/25/2021	65					
#10	9/17/2021	1.6	0.011				
#11	3/31/2022	52	0.01				
#12	7/14/2022	29	0.011				
#13	3/9/2023	50					
#14	8/24/2023	21					
#15	3/14/2024	46	0.011				
#16	9/26/2024	16	0.012				

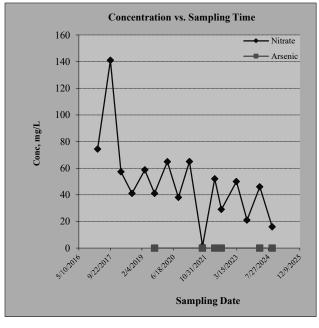
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	99.40%	-500.00%	NA	NA	NA	NA
Plume Stability?	Shrinking	Stable	NA	NA	NA	NA
Coefficient of Variation?		CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-57	0	0	0	0	0
Number of Sampling Rounds?	16	6	0	0	0	0
Average Concentration?	49.81	0.01	NA	NA	NA	NA
Standard Deviation?	31.14	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.63	0.09	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic Plume Stability? Stable





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA Additional Description:

**MW-9** Well (Sampling) Location? 85%

Level of Confidence (Decision Criteria)?

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

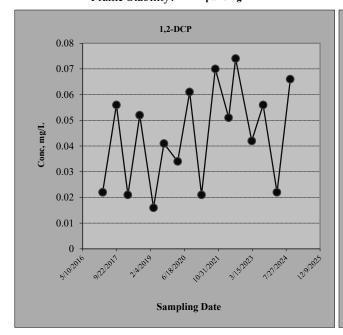
			Haz	ardous Substa	ances (unit is mg/L)	
Sampling Event	Date Sampled	Nitrate	Dinoseb	1,2-DCP		
#1	3/2/2017	124	0.068	0.022		
#2	9/20/2017	359	0.31	0.056		
#3	3/7/2018	30	0.0099	0.021		
#4	8/29/2018	314	0.1	0.052		
#5	3/21/2019	110	0.046	0.016		
#6	8/21/2019	302	0.076	0.041		
#7	3/11/2020	236	0.041	0.034		
#8	9/2/2020	360	0.1	0.061		
#9	2/25/2021	130	0.031	0.021		
#10	9/16/2021	520	0.2	0.07		
#11	4/1/2022	220	0.085	0.051		
#12	7/13/2022	330	0.006	0.074		
#13	3/8/2023	200	0.00016	0.042		
#14	8/22/2023	290	0.031	0.056		
#15	3/13/2024	66	0.00045	0.022		
#16	9/25/2024	350	0.16	0.066		

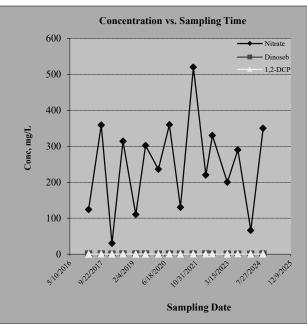
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Dinoseb	1,2-DCP			
Confidence Level Calculated?	65.50%	88.60%	90.30%	NA	NA	NA
Plume Stability?	Stable	Shrinking	Expanding	NA	NA	NA
Coefficient of Variation?	CV <= 1			n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	10	-28	31	0	0	0
Number of Sampling Rounds?	16	16	16	0	0	0
Average Concentration?	246.31	0.08	0.04	NA	NA	NA
Standard Deviation?	130.94	0.08	0.02	NA	NA	NA
Coefficient of Variation?	0.53	1.06	0.44	NA	NA	NA
Blank if No Errors found				n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? 1,2-DCP Plume Stability? Expanding





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA
Additional Description:

Well (Sampling) Location? MW-10
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

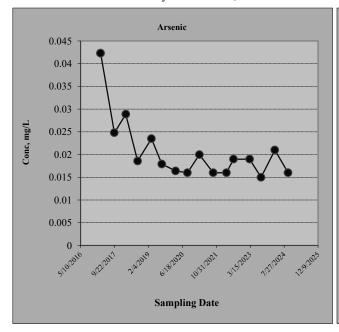
			Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	Arsenic					
#1	2/28/2017	0.45	0.0423					
#2	9/19/2017	11.3	0.0248					
#3	3/6/2018	3.9	0.0289					
#4	8/28/2018	4	0.0186					
#5	3/20/2019	2.7	0.0235					
#6	8/20/2019	4.7	0.0179					
#7	3/10/2020	3.7	0.0164					
#8	9/1/2020	5.5	0.016					
#9	2/23/2021	4.6	0.02					
#10	9/15/2021	2.4	0.016					
#11	3/29/2022	3.3	0.016					
#12	7/12/2022	4.5	0.019					
#13	3/6/2023	3.3	0.019					
#14	8/21/2023	6.4	0.015					
#15	3/11/2024	2.8	0.021					
#16	9/23/2024	6.1	0.016					

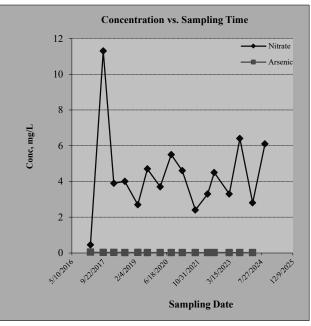
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	62.20%	99.20%	NA	NA	NA	NA
Plume Stability?	Stable	Shrinking	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1		n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	9	-55	0	0	0	0
Number of Sampling Rounds?	16	16	0	0	0	0
Average Concentration?	4.35	0.02	NA	NA	NA	NA
Standard Deviation?	2.37	0.01	NA	NA	NA	NA
Coefficient of Variation?	0.54	0.33	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Shrinking





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA Additional Description:

MW-11 Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

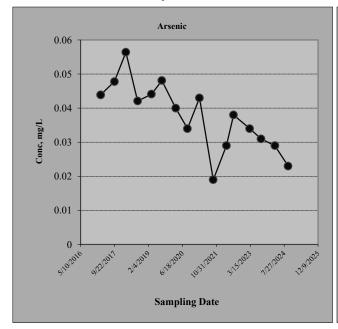
8			Haz	zardous Substa	ances (unit is mg/L)
Sampling Event	Date Sampled	Nitrate	Arsenic	Manganese	
#1	3/1/2017	8.7	0.0439		
#2	9/20/2017	32.5	0.0478		
#3	3/7/2018	6.2	0.0564		
#4	8/28/2018	6.3	0.0421		
#5	3/20/2019	5.8	0.0441		
#6	8/20/2019	6.5	0.0481		
#7	3/11/2020	2.6	0.04		
#8	9/1/2020	6	0.034		
#9	2/24/2021	5.6	0.043		
#10	9/15/2021	2.4	0.019	5.3	
#11	3/28/2022	4.6	0.029	0.041	
#12	7/12/2022	6.1	0.038	0.83	
#13	3/7/2023	4.8	0.034		
#14	8/21/2023	5.4	0.031		
#15	3/12/2024	5.4	0.029	0.57	
#16	9/23/2024	5.4	0.023	3.2	

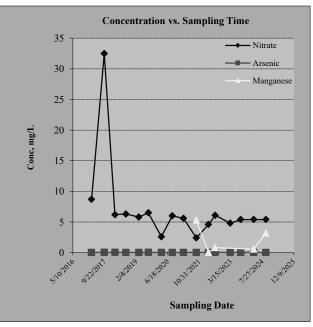
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic	Manganese			
Confidence Level Calculated?	99.20%	100.00%	40.80%	NA	NA	NA
Plume Stability?	Shrinking	Shrinking	Undetermined	NA	NA	NA
Coefficient of Variation?			CV > 1	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-55	-74	0	0	0	0
Number of Sampling Rounds?	16	16	5	0	0	0
Average Concentration?	7.14	0.04	1.99	NA	NA	NA
Standard Deviation?	6.92	0.01	2.21	NA	NA	NA
Coefficient of Variation?	0.97	0.26	1.11	NA	NA	NA
Blank if No Errors found				n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic Plume Stability? Shrinking





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA
Additional Description:

Well (Sampling) Location? N

Level of Confidence (Decision Criteria)?

MW-12R 85%

#### 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

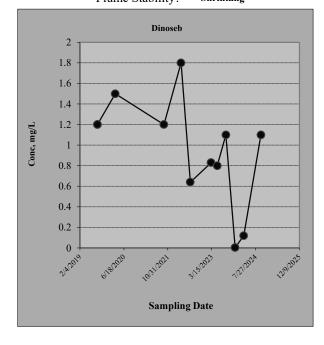
			Hazardous Substances (unit is mg/L)						
Sampling Event	Date Sampled	Nitrate	Arsenic	Dinoseb	Benzene	Chlorobenzene	1,2-DCP		
#1	8/22/2019	411	0.0687	1.2	0.014	0.16	1.3		
#2	3/12/2020	353	0.064	1.5	0.01	0.18	0.75		
#3	9/3/2020				0.011	0.14	0.89		
#4	11/12/2020				0.02	0.22	1.8		
#5	2/25/2021				0.015	0.17	1.2		
#6	5/12/2021				0.014	0.17	1.4		
#7	9/17/2021	4	0.0039	1.2	0.026	0.29	2.3		
#8	3/31/2022	300	0.011	1.8	0.022	0.29	1.9		
#9	7/14/2022	200	0.064	0.64	0.011	0.16	0.76		
#10	12/8/2022				0.013	0.22	1.1		
#11	3/9/2023	170	0.027	0.83	0.0075	0.14	0.61		
#12	5/18/2023	150	0.02	0.8	0.0073	0.13	0.55		
#13	8/24/2023	490	0.012	1.1	0.02	0.29	1.4		
#14	12/7/2023	440	0.011	0.0039	0.017	0.27	1.1		
#15	3/14/2024	170	0.016	0.12	0.0056	0.12	0.37		
#16	9/26/2024	380	0.01	1.1	0.014	0.2	1.3		

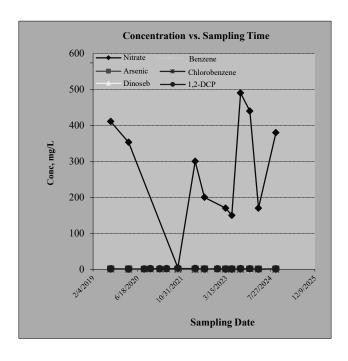
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic	Dinoseb	Benzene	Chlorobenzene	1,2-DCP
Confidence Level Calculated?	-1000.00%	95.70%	95.70%	71.80%	48.20%	80.10%
Plume Stability?	Stable	Shrinking	Shrinking	Stable	Stable	Stable
Coefficient of Variation?	CV <= 1			CV <= 1	CV <= 1	$CV \le 1$
Mann-Kendall Statistic "S" value?	0	-23	-23	-15	-1	-21
Number of Sampling Rounds?	11	11	11	16	16	16
Average Concentration?	278.91	0.03	0.94	0.01	0.20	1.17
Standard Deviation?	150.42	0.02	0.54	0.01	0.06	0.52
Coefficient of Variation?	0.54	0.89	0.58	0.40	0.30	0.45
Blank if No Errors found						

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Dinoseb
Plume Stability? Shrinking





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description: Well (Sampling) Location? **MW-12R** 

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

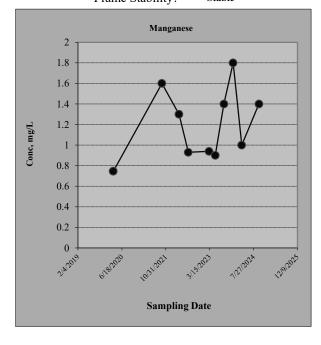
			Hazardous Substances (unit is mg/L)
Sampling Event	Date Sampled	Manganese	
#1	3/12/2020	0.746	
#2	9/3/2020		
#3	11/12/2020		
#4	2/25/2021		
#5	5/12/2021		
#6	9/17/2021	1.6	
#7	3/31/2022	1.3	
#8	7/14/2022	0.93	
#9	12/8/2022		
#10	3/9/2023	0.94	
#11	5/18/2023	0.9	
#12	8/24/2023	1.4	
#13	12/7/2023	1.8	
#14	3/14/2024	1	
#15	9/26/2024	1.4	
#16			

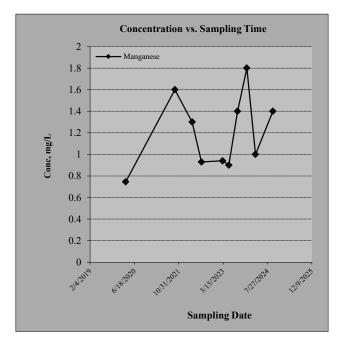
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Manganese					
Confidence Level Calculated?	81.00%	NA	NA	NA	NA	NA
Plume Stability?	Stable	NA	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	n<4	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	12	0	0	0	0	0
Number of Sampling Rounds?	10	0	0	0	0	0
Average Concentration?	1.20	NA	NA	NA	NA	NA
Standard Deviation?	0.35	NA	NA	NA	NA	NA
Coefficient of Variation?	0.29	NA	NA	NA	NA	NA
Blank if No Errors found		n<4	n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Manganese Plume Stability? Stable





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-13
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

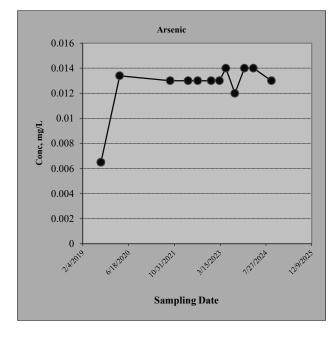
		Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	Arsenic	Manganese			
#1	8/21/2019	23.9	0.0065				
#2	3/12/2020	1.1	0.0134	0.009			
#3	9/2/2020						
#4	11/11/2020						
#5	2/24/2021						
#6	5/11/2021						
#7	9/16/2021	20	0.013	0.48			
#8	3/30/2022	21	0.013	0.7			
#9	7/13/2022	28	0.013	0.34			
#10	12/7/2022	22	0.013	0.61			
#11	3/8/2023	23	0.013	0.33			
#12	5/16/2023	21	0.014	0.7			
#13	8/23/2023	21	0.012	0.34			
#14	12/6/2023	19	0.014	0.2			
#15	3/13/2024	17	0.014	0.55			
#16	9/25/2024	16	0.013	0.92			

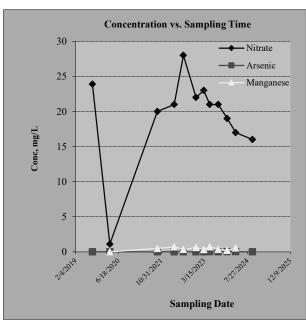
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic	Manganese			
Confidence Level Calculated?	90.20%	84.50%	77.70%	NA	NA	NA
Plume Stability?	Shrinking	Stable	Stable	NA	NA	NA
Coefficient of Variation?		CV <= 1	CV <= 1	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-21	16	11	0	0	0
Number of Sampling Rounds?	12	12	11	0	0	0
Average Concentration?	19.42	0.01	0.47	NA	NA	NA
Standard Deviation?	6.57	0.00	0.26	NA	NA	NA
Coefficient of Variation?	0.34	0.16	0.55	NA	NA	NA
Blank if No Errors found				n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Stable





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-14
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

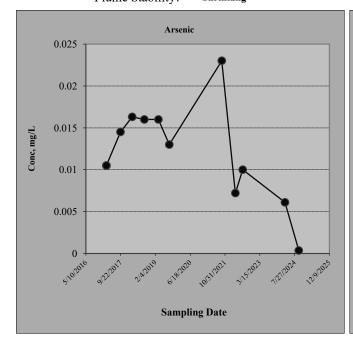
			Hazardous Substances (unit is mg/L)						
Sampling Event	Date Sampled	Nitrate	Arsenic						
#1	3/2/2017	7.8	0.0105						
#2	9/20/2017	4.2	0.0145						
#3	3/6/2018	3.1	0.0163						
#4	8/28/2018	3.2	0.016						
#5	3/20/2019	5.3	0.016						
#6	8/22/2019	3	0.013						
#7	3/11/2020	3.7							
#8	9/1/2020	2.4							
#9	2/23/2021	0.19							
#10	9/14/2021	1.2	0.023						
#11	3/29/2022	1.7	0.0072						
#12	7/12/2022	1.7	0.01						
#13	3/7/2023	0.63							
#14	8/22/2023	0.02							
#15	3/11/2024	0.21	0.0061						
#16	9/25/2024	2	0.00034						

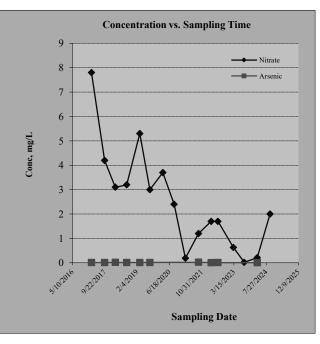
# 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	100.00%	95.70%	NA	NA	NA	NA
Plume Stability?	Shrinking	Shrinking	NA	NA	NA	NA
Coefficient of Variation?			n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-75	-24	0	0	0	0
Number of Sampling Rounds?	16	11	0	0	0	0
Average Concentration?	2.52	0.01	NA	NA	NA	NA
Standard Deviation?	2.08	0.01	NA	NA	NA	NA
Coefficient of Variation?	0.82	0.51	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Shrinking





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-15
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

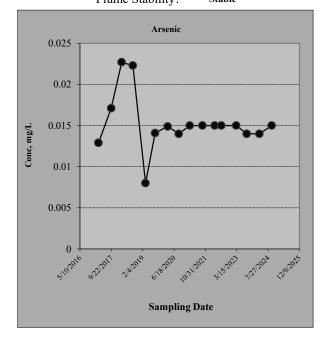
			Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	Arsenic					
#1	3/1/2017	4	0.0129					
#2	9/19/2017	4.1	0.0171					
#3	3/6/2018	4.1	0.0227					
#4	8/30/2018	4.2	0.0223					
#5	3/20/2019	3.5	0.008					
#6	8/20/2019	3.5	0.0141					
# <i>7</i>	3/10/2020	3.5	0.0149					
#8	9/1/2020	3.4	0.014					
#9	2/23/2021	4	0.015					
#10	9/14/2021	3.3	0.015					
#11	3/30/2022	3.4	0.015					
#12	7/12/2022	3.6	0.015					
#13	3/7/2023	3.7	0.015					
#14	8/22/2023	3.6	0.014					
#15	3/11/2024	3.9	0.014					
#16	9/23/2024	12	0.015					

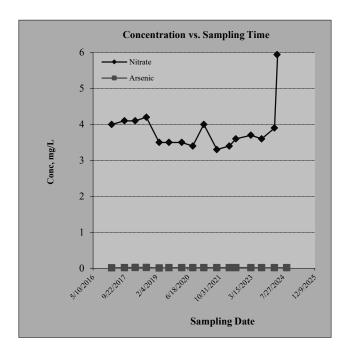
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	58.80%	58.80%	NA	NA	NA	NA
Plume Stability?	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-7	-6	0	0	0	0
Number of Sampling Rounds?	16	16	0	0	0	0
Average Concentration?	4.24	0.02	NA	NA	NA	NA
Standard Deviation?	2.09	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.49	0.22	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Stable





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-16
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

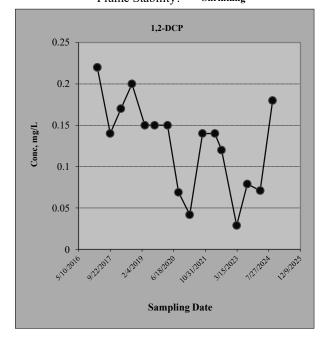
			Hazardous Substances (unit is mg/L)						
Sampling Event	Date Sampled	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	1,2-DCP		
#1	3/1/2017	116	3.3			0.0028	0.22		
#2	9/20/2017	80.2	0.83			0.0061	0.14		
#3	3/7/2018	128	2.4			0.014	0.17		
#4	8/29/2018	151	2.6			0.021	0.2		
#5	3/20/2019	57.3	1.3			0.015	0.15		
#6	8/21/2019	89.3	5.8	0.013		0.018	0.15		
#7	3/13/2020	145	1.6			0.054	0.15		
#8	9/2/2020						0.069		
#9	2/25/2021						0.042		
#10	9/16/2021	25	0.98	0.022	0.92	0.0097	0.14		
#11	3/30/2022	99	0.4	0.0061	1.3	0.031	0.14		
#12	7/13/2022	57	1.8	0.019	0.84	0.0042	0.12		
#13	3/9/2023	13	0.22			0.0064	0.029		
#14	8/23/2023	89	0.71			0.0092	0.079		
#15	3/14/2024	72	0.69	0.0061	1.5	0.019	0.071		
#16	9/25/2024	130	1.3	0.00034	0.000475	0.045	0.18		

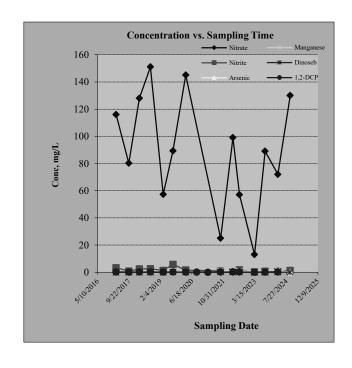
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	1,2-DCP
Confidence Level Calculated?	80.60%	96.90%	86.40%	59.20%	88.30%	99.00%
Plume Stability?	Stable	Shrinking	Shrinking	Stable	Expanding	Shrinking
Coefficient of Variation?	CV <= 1			CV <= 1		
Mann-Kendall Statistic "S" value?	-17	-36	-8	-2	23	-52
Number of Sampling Rounds?	14	14	6	5	14	16
Average Concentration?	89.41	1.71	0.01	0.91	0.02	0.13
Standard Deviation?	42.31	1.47	0.01	0.58	0.02	0.06
Coefficient of Variation?	0.47	0.86	0.76	0.63	0.84	0.43
Blank if No Errors found						

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? 1,2-DCP
Plume Stability? Shrinking





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA
Additional Description:

Well (Sampling) Location? MW-17
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

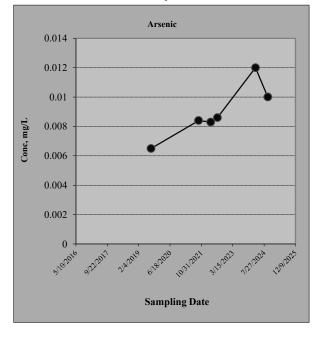
			Hazardous Substances (unit is mg/L)						
Sampling Event	Date Sampled	Nitrate	Arsenic						
#1	2/28/2017	6.2							
#2	9/19/2017	3.8							
#3	3/7/2018	3.9							
#4	8/28/2018	3.5							
#5	3/21/2019	4.9							
#6	8/21/2019	3.4	0.0065						
#7	3/11/2020	2.1							
#8	9/1/2020	3.3							
#9	2/24/2021	3.8							
#10	9/16/2021	3.6	0.0084						
#11	3/29/2022	3	0.0083						
#12	7/13/2022	4.1	0.0086						
#13	3/8/2023	4.6							
#14	8/22/2023	3.8							
#15	3/12/2024	3.8	0.012						
#16	9/24/2024	3.7	0.01						

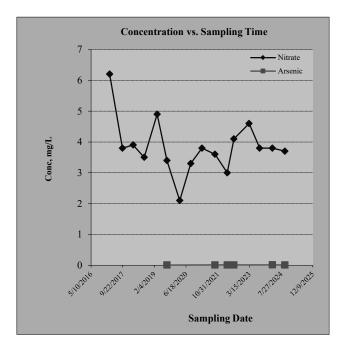
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	68.70%	97.20%	NA	NA	NA	NA
Plume Stability?	Stable	Expanding	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1		n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-12	11	0	0	0	0
Number of Sampling Rounds?	16	6	0	0	0	0
Average Concentration?	3.84	0.01	NA	NA	NA	NA
Standard Deviation?	0.89	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.23	0.21	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Expanding





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-18
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

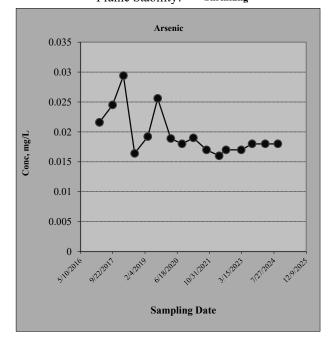
			Ha	azardous Substances (unit is mg/L)
Sampling Event	Date Sampled	Nitrate	Arsenic	
#1	2/28/2017	3.2	0.0216	
#2	9/19/2017	3.5	0.0245	
#3	3/6/2018	3.5	0.0294	
#4	8/28/2018	4.2	0.0164	
#5	3/19/2019	2.7	0.0192	
#6	8/20/2019	3.1	0.0256	
#7	3/10/2020	3.2	0.0189	
#8	9/1/2020	3.1	0.018	
#9	2/24/2021	3.5	0.019	
#10	9/15/2021	2.9	0.017	
#11	3/29/2022	2.8	0.016	
#12	7/13/2022	3.6	0.017	
#13	3/8/2023	3	0.017	
#14	8/23/2023	3	0.018	
#15	3/12/2024	3.1	0.018	
#16	9/24/2024	8.8	0.018	

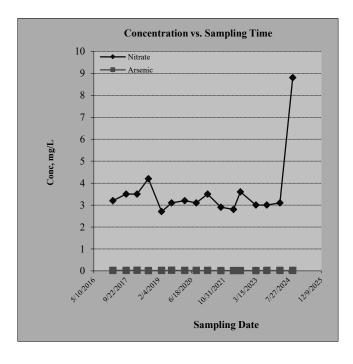
# 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	62.20%	97.40%	NA	NA	NA	NA
Plume Stability?	Stable	Shrinking	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1		n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-8	-45	0	0	0	0
Number of Sampling Rounds?	16	16	0	0	0	0
Average Concentration?	3.58	0.02	NA	NA	NA	NA
Standard Deviation?	1.44	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.40	0.19	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Shrinking





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA Additional Description:

MW-19 Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

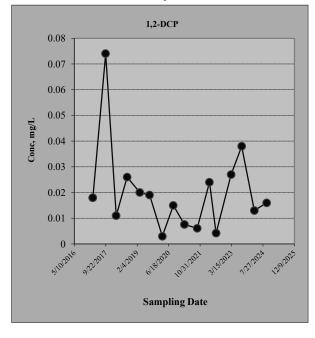
			Haz	ardous Substa	nces (unit is m	ıg/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic	Manganese	1,2-DCP		
#1	3/1/2017	10.9	0.0833		0.018		
#2	9/19/2017	9.3	0.0585		0.074		
#3	3/6/2018	9.6	0.045		0.011		
#4	8/28/2018	4.4	0.0229		0.026		
#5	3/19/2019	0.82	0.044		0.02		
#6	8/20/2019	0.84	0.0446		0.019		
#7	3/10/2020	2.9	0.0182		0.003		
#8	8/31/2020	2.9	0.046		0.015		
#9	2/24/2021	2	0.012		0.0076		
#10	9/15/2021	4	0.011	0.17	0.0061		
#11	3/29/2022	2	0.0074	0.91	0.024		
#12	7/12/2022	9.6	0.013	0.47	0.0042		
#13	3/8/2023	0.28	0.011		0.027		
#14	8/23/2023	3	0.024		0.038		
#15	3/12/2024	3.8	0.011	0.17	0.013		
#16	9/24/2024	13	0.038	0.23	0.016		

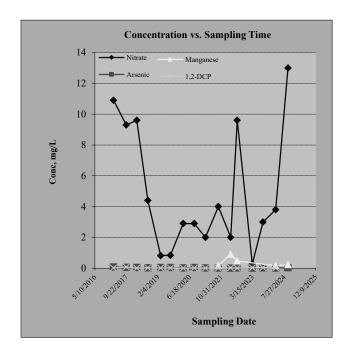
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic	Manganese	1,2-DCP		
Confidence Level Calculated?	62.20%	99.60%	40.80%	65.50%	NA	NA
Plume Stability?	Stable	Shrinking	Stable	Stable	NA	NA
Coefficient of Variation?	CV <= 1		CV <= 1	CV <= 1	n<4	n<4
Mann-Kendall Statistic "S" value?	-9	-59	-1	-10	0	0
Number of Sampling Rounds?	16	16	5	16	0	0
Average Concentration?	4.96	0.03	0.39	0.02	NA	NA
Standard Deviation?	4.08	0.02	0.32	0.02	NA	NA
Coefficient of Variation?	0.82	0.71	0.81	0.85	NA	NA
Blank if No Errors found					n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? 1,2-DCP Plume Stability? Stable





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA Additional Description:

MW-20 Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

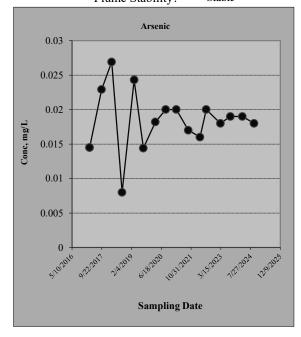
			Haz	ardous Substai	nces (unit is m	g/L)	
Sampling Event	Date Sampled	Nitrate	Arsenic				
#1	3/1/2017	4.1	0.0145				
#2	9/19/2017	4.2	0.0229				
#3	3/6/2018	4.1	0.0269				
#4	8/28/2018	3.9	0.008				
#5	3/19/2019	2.9	0.0243				
#6	8/20/2019	3.5	0.0144				
#7	3/10/2020	3.2	0.0182				
#8	8/31/2020	3.4	0.02				
#9	2/24/2021	3.6	0.02				
#10	9/15/2021	3.2	0.017				
#11	3/29/2022	3.3	0.016				
#12	7/12/2022	3.6	0.02				
#13	3/8/2023	3.6	0.018				
#14	8/23/2023	3.5	0.019				
#15	3/12/2024	7	0.019				
#16	9/24/2024	4	0.018				

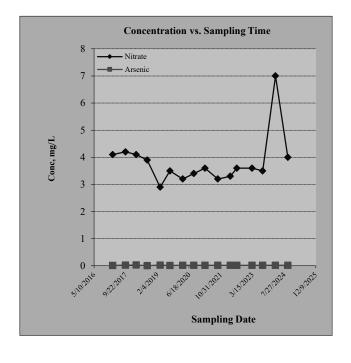
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Arsenic				
Confidence Level Calculated?	55.30%	58.80%	NA	NA	NA	NA
Plume Stability?	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-4	-7	0	0	0	0
Number of Sampling Rounds?	16	16	0	0	0	0
Average Concentration?	3.82	0.02	NA	NA	NA	NA
Standard Deviation?	0.93	0.00	NA	NA	NA	NA
Coefficient of Variation?	0.24	0.23	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic Plume Stability? Stable





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA Additional Description:

MW-21 Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

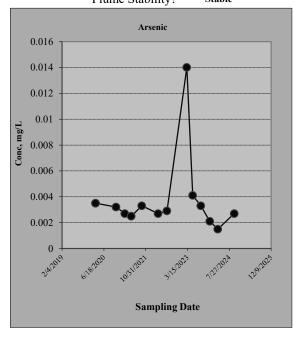
		Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	Nitrite	Arsenic	Manganese		
#1	3/11/2020	161	0.0075	0.0035	0.0605		
#2	9/1/2020						
#3	11/11/2020	140	12	0.0032	3.4		
#4	2/24/2021	140	2.4	0.0027	3.2		
#5	5/11/2021	23	3	0.0025	3.3		
#6	9/15/2021	120	0.77	0.0033	2.9		
#7	3/29/2022	110	0.31	0.0027	1.9		
#8	7/12/2022	110	0.91	0.0029	1.5		
#9	12/7/2022						
#10	3/7/2023	19	2.1	0.014	1.6		
#11	5/16/2023	27	3.8	0.0041	2		
#12	8/22/2023	45	3.8	0.0033	2.4		
#13	12/6/2023	50	1	0.0021	3.1		
#14	3/12/2024	60	0.31	0.0015	1.4		
#15	9/24/2024	71	0.66	0.0027	2.4		
#16							

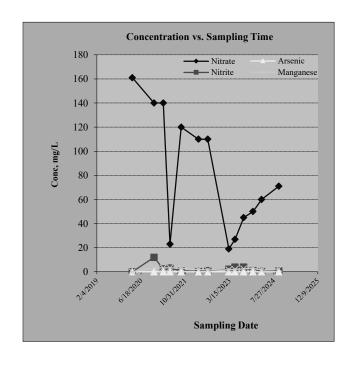
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Nitrite	Arsenic	Manganese		
Confidence Level Calculated?	96.20%	61.70%	81.60%	74.50%	NA	NA
Plume Stability?	Shrinking	Undetermined	Stable	Stable	NA	NA
Coefficient of Variation?		CV > 1	CV <= 1	CV <= 1	n<4	n<4
Mann-Kendall Statistic "S" value?	-30	-6	-16	-13	0	0
Number of Sampling Rounds?	13	13	13	13	0	0
Average Concentration?	82.77	2.39	0.00	2.24	NA	NA
Standard Deviation?	49.54	3.17	0.00	0.97	NA	NA
Coefficient of Variation?	0.60	1.33	0.85	0.43	NA	NA
Blank if No Errors found					n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic Plume Stability? Stable





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description:

Well (Sampling) Location? MW-22
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

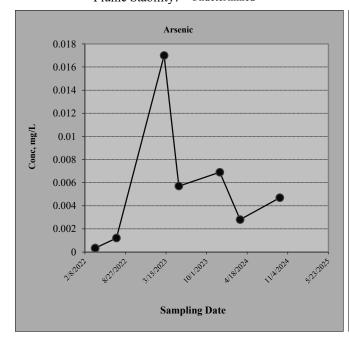
,		Hazardous Substances (unit is mg/L)						
C1: Et	D-4- C1-1	NI:44 -			`	(S/L)		
Sampling Event	Date Sampled	Nitrate	Nitrite	Arsenic	Manganese			
#1	3/31/2022	70	0.056	0.00034	0.5			
#2	7/14/2022	65	0.057	0.0012	0.099			
#3	12/6/2022							
#4	3/6/2023	7.8	2.2	0.017	6.2			
#5	5/17/2023	9.3	7.7	0.0057	3.8			
#6	8/24/2023							
#7	12/5/2023	17	4.2	0.0069	3.8			
#8	3/14/2024	21	1.5	0.0028	2.4			
#9	9/26/2024	0.16	0.0075	0.0047	2.2			
#10								
#11								
#12								
#13								
#14								
#15								
#16								

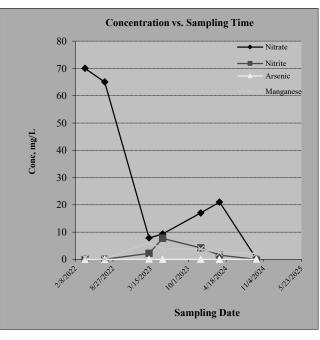
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Nitrite	Arsenic	Manganese		
Confidence Level Calculated?	88.10%	50.00%	71.90%	-600.00%	NA	NA
Plume Stability?	Shrinking	Undetermined	Undetermined	Stable	NA	NA
Coefficient of Variation?		CV > 1	CV > 1	CV <= 1	n<4	n<4
Mann-Kendall Statistic "S" value?	-9	1	5	0	0	0
Number of Sampling Rounds?	7	7	7	7	0	0
Average Concentration?	27.18	2.25	0.01	2.71	NA	NA
Standard Deviation?	28.38	2.85	0.01	2.11	NA	NA
Coefficient of Variation?	1.04	1.27	1.01	0.78	NA	NA
Blank if No Errors found					n<4	n<4

# 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? Arsenic
Plume Stability? Undetermined





Site Name: Bee-Jay Scales
Site Address: 116 N. 1st Street, Sunnyside, WA
Additional Description:

Well (Sampling) Location? MW-23
Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

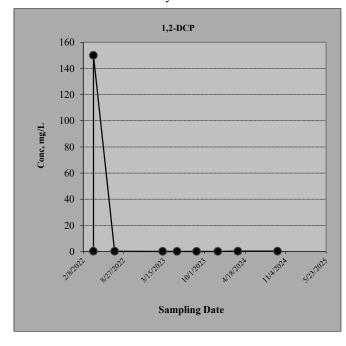
		Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	1,2-DCP
#1	3/30/2022	150	0.068	0.0056	0.031	0.017	0.18
#2	7/13/2022	160	0.025	0.0064	0.03	0.0013	0.17
#3	12/7/2022						0.05
#4	3/7/2023	34	0.64	0.007	0.88	0.0087	0.053
#5	5/17/2023	13	0.91	0.013	1.2	0.01	0.035
#6	8/22/2023						0.027
#7	12/5/2023						0.035
#8	3/13/2024						0.24
#9	9/25/2024						0.22
#10							
#11							
#12							
#13							
#14							
#15							
#16							

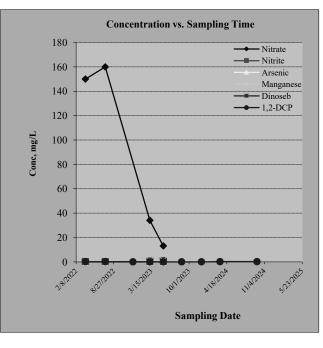
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	Nitrite	Arsenic	Manganese	Dinoseb	1,2-DCP
Confidence Level Calculated?	83.30%	83.30%	95.80%	83.30%	37.50%	54.00%
Plume Stability?	Stable	Undetermined	Expanding	Undetermined	Stable	Stable
Coefficient of Variation?	CV <= 1	CV > 1		CV > 1	CV <= 1	CV <= 1
Mann-Kendall Statistic "S" value?	-4	4	6	4	0	-3
Number of Sampling Rounds?	4	4	4	4	4	9
Average Concentration?	89.25	0.41	0.01	0.54	0.01	0.11
Standard Deviation?	76.51	0.44	0.00	0.60	0.01	0.09
Coefficient of Variation?	0.86	1.06	0.42	1.12	0.70	0.79
Blank if No Errors found						

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? 1,2-DCP
Plume Stability? Stable





Site Name: Bee-Jay Scales Site Address: 116 N. 1st Street, Sunnyside, WA

Additional Description: MW-24 Well (Sampling) Location?

Level of Confidence (Decision Criteria)?

85% 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

		Hazardous Substances (unit is mg/L)					
Sampling Event	Date Sampled	Nitrate	1,2-DCP				
#1	3/30/2022	24	0.066				
#2	7/13/2022	40	0.093				
#3	12/7/2022	35	0.068				
#4	3/8/2023	36	0.09				
#5	5/16/2023	51	0.15				
#6	8/23/2023	33	0.068				
#7	12/6/2023	29	0.032				
#8	3/13/2024	7.7	0.29				
#9	9/24/2024	35	0.052				
#10							
#11							
#12							
#13							
#14							
#15							
#16							

#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Nitrate	1,2-DCP				
Confidence Level Calculated?	69.40%	46.00%	NA	NA	NA	NA
Plume Stability?	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-7	-1	0	0	0	0
Number of Sampling Rounds?	9	9	0	0	0	0
Average Concentration?	32.30	0.10	NA	NA	NA	NA
Standard Deviation?	11.85	0.08	NA	NA	NA	NA
Coefficient of Variation?	0.37	0.77	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? 1,2-DCP Plume Stability? Stable

