

Report Comments

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 500mL of sample in it's own container.

Asbestos: Excessive sample volumes were provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.

Note: Samples requested for asbestos testing were sub-sampled from bags provided by the client.

Asbestos-ID in soil: NEPM

This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

This is reported outside our scope of NATA accreditation.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 202289-1 for Zn. Therefore a triplicate result has been issued as laboratory sample number 202289-15.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 202289-11 for Cu, Pb and Zn. Therefore a triplicate result has been issued as laboratory sample number 202289-16.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s. - 11/11d

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	David Holden, Nicola Warton

Sample Login Details

Your reference	86514.00, Darlinghurst
Envirolab Reference	202289
Date Sample Received	04/10/2018
Date Instructions Received	04/10/2018
Date Results Expected to be Reported	11/10/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	12 Soil, 2 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	13.6
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolab.com.au	Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:

Sample ID	VTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides	PCBs in Soil	Acid Extractable metals in soil	Misc Soil - Inorg	Asbestos ID - soils	Misc Inorg - Soil	CEC	Asbestos ID - soils NEPM	Asbestos ID - materials
BH1/ 0.3-0.4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH2 / 0.1-0.2	✓	✓	✓				✓		✓				
BH2 / 0.9-1.0	✓	✓	✓				✓			✓	✓		
BH3 / 0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓				
BH4 / 0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓				
BH4/ 0.3-0.4										✓	✓		
BH5 / 0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓				
BH6 / 0.1-0.2	✓	✓	✓				✓		✓				
BH6 / 0.3-0.4	✓	✓	✓				✓		✓				
BD2/ 20181003	✓	✓	✓				✓						
SS1	✓	✓	✓				✓					✓	
SS2	✓	✓	✓	✓	✓	✓	✓	✓				✓	
AS1													✓
AS2													✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Andrew Fitzsimons

From: Ken Nguyen
Sent: Friday, 12 October 2018 1:41 PM
To: Andrew Fitzsimons
Subject: FW: Results for Registration 202289 86514.00, Darlinghurst

Regards,

Ken Nguyen | Chemist | Envirolab Services Pty Ltd
(Monday to Friday 1pm to 9pm)

Great Science, Great Service.

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ELS 202289-A

TAT: 5 days

Due: 19/10/18

Fit

Please note that all samples submitted to the Envirolab Group laboratories will be analysed under the Envirolab Group Terms and Conditions. The Terms and Conditions are accessible by clicking this link

From: Nicola Warton <Nicola.Warton@douglaspartners.com.au>
Sent: Friday, 12 October 2018 7:51 AM
To: Ken Nguyen <KNguyen@envirolab.com.au>; David Holden <David.Holden@douglaspartners.com.au>
Subject: RE: Results for Registration 202289 86514.00, Darlinghurst

Hi Ken,

Can you please schedule TCLP on the following :

- BH1/0.3-0.4 – B(a)P and metals - 1
- BH2/0.1-0.2 - metals - 2
- BH3/ 0.2-0.3 – B(a)P and metals - 4
- SS1- metals - 11

Standard TAT

Thanks,

CERTIFICATE OF ANALYSIS 202289-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	David Holden, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	86514.00, Darlinghurst
Number of Samples	12 Soil, 2 Material
Date samples received	04/10/2018
Date completed instructions received	12/10/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	19/10/2018
Date of Issue	19/10/2018
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals

Authorised By



Jacinta Hurst, Laboratory Manager

Metals in TCLP USEPA1311					
Our Reference		202289-A-1	202289-A-2	202289-A-4	202289-A-11
Your Reference	UNITS	BH1/ 0.3-0.4	BH2 / 0.1-0.2	BH3 / 0.2-0.3	SS1
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Date analysed	-	15/10/2018	15/10/2018	15/10/2018	15/10/2018
pH of soil for fluid# determ.	pH units	9.2	7.0	6.5	8.6
pH of soil TCLP (after HCl)	pH units	1.8	1.8	1.8	2.1
Extraction fluid used	-	1	1	1	1
pH of final Leachate	pH units	5.1	5.0	5.0	5.7
Arsenic in TCLP	mg/L	<0.05	<0.05	<0.05	<0.05
Cadmium in TCLP	mg/L	<0.01	<0.01	<0.01	0.01
Chromium in TCLP	mg/L	<0.01	<0.01	<0.01	<0.01
Copper in TCLP	mg/L	0.02	0.03	0.03	0.03
Lead in TCLP	mg/L	0.2	0.06	0.1	6.7
Mercury in TCLP	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Nickel in TCLP	mg/L	<0.02	<0.02	<0.02	<0.02
Zinc in TCLP	mg/L	1.3	0.2	0.4	2.0

PAHs in TCLP (USEPA 1311)			
Our Reference		202289-A-1	202289-A-4
Your Reference	UNITS	BH1/ 0.3-0.4	BH3 / 0.2-0.3
Date Sampled		03/10/2018	03/10/2018
Type of sample		Soil	Soil
Date extracted	-	15/10/2018	15/10/2018
Date analysed	-	19/10/2018	19/10/2018
Naphthalene in TCLP	mg/L	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001
Benzo(b,j,k)fluoranthene in TCLP	mg/L	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE
Surrogate <i>p</i> -Terphenyl-d14	%	125	78

Method ID	Methodology Summary
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			15/10/2018	1	15/10/2018	15/10/2018		15/10/2018	[NT]
Date analysed	-			15/10/2018	1	15/10/2018	15/10/2018		15/10/2018	[NT]
Arsenic in TCLP	mg/L	0.05	Metals-020 ICP-AES	<0.05	1	<0.05	<0.05	0	105	[NT]
Cadmium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	1	<0.01	<0.01	0	101	[NT]
Chromium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	1	<0.01	<0.01	0	101	[NT]
Copper in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	1	0.02	0.02	0	116	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	1	0.2	0.3	40	104	[NT]
Mercury in TCLP	mg/L	0.0005	Metals-021 CV-AAS	<0.0005	1	<0.0005	<0.0005	0	108	[NT]
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	1	<0.02	<0.02	0	105	[NT]
Zinc in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	1	1.3	1.4	7	103	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			15/10/2018	[NT]	[NT]	[NT]	[NT]	15/10/2018	[NT]
Date analysed	-			19/10/2018	[NT]	[NT]	[NT]	[NT]	19/10/2018	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	92	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	100	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	104	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	97	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	87	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(b)k)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	99	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	116	[NT]	[NT]	[NT]	[NT]	78	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	David Holden, Nicola Warton

Sample Login Details

Your reference	86514.00, Darlinghurst
Envirolab Reference	202289-A
Date Sample Received	04/10/2018
Date Instructions Received	12/10/2018
Date Results Expected to be Reported	19/10/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	12 Soil, 2 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	13.6
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Sample ID	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Arsenic in TCLP	Cadmium in TCLP	Chromium in TCLP	Copper in TCLP	Lead in TCLP	Mercury in TCLP	Nickel in TCLP	Zinc in TCLP	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(b)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	On Hold
BH1/ 0.3-0.4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2 / 0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																		
BH2 / 0.9-1.0																														✓
BH3 / 0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH4 / 0-0.1																														✓
BH4/ 0.3-0.4																														✓
BH5 / 0.1-0.2																														✓
BH6 / 0.1-0.2																														✓
BH6 / 0.3-0.4																														✓
BD2/ 20181003																														✓
SS1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																		
SS2																														✓
AS1																														✓
AS2																														✓
BH1/ 0.3-0.4	-																													✓
SS1 - [TRIPLICATE]																														✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**



Envirolab Services Pty Ltd

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Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Appendix F

Results Summary

Table 17: Soil Results Summary Table

	Metals										BTEX										TRH										PAH											
	Arsenic	Cadmium	Chromium (II+VI)	Copper	Lead	Lead in TCLP	Mercury	Nickel	Zinc	Zinc in TCLP	Benzene	Ethylbenzene	Toluene	C6 - C9	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	C6-C10	Naphthalene	C10-C16	C16-C34	C34-C40	C10 - C16 (F2) less Naphthalene	C10 - C14	C15 - C28	C29-C36	C10 - C40 (Sum of total)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene in TCLP	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc (half)	Benzo(a)pyrene TEQ calc (POL)	Benzo(b,j,k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
POL	4	0.4	1	1	1		0.1	1	1		0.2	1	0.5	25	2	1	1	25	25	1	50	100	100	50	50	100	100	50	0.1	0.1	0.1	0.1	0.05			0.5	0.5	0.5	0.2	0.1	0.1	0.1
Site Assessment Criteria																																										
NEPM 2013 Table 1A(1) HILs Residential A Soil	100	20	100	6000	300		40	400	7400																												3					
NEPM 2013 Table 1A(3) Residential A Soil HSL for Vapour Intrusion, Sand 0-1m											0.5	55	160				40	45		3					110																	
NEPM 2013 Table 1(A)1 Residential A Soil HSL for Direct Contact											100	4500	14,000				1200	4400		1400				4500	6300	3300																
NEPM 2013 Table 1B(5) ESLs for Urban Residential and Plublic Space, Coarse/Sand											50	70	85				105	180		170				300	2800	120						0.7										
NEPM 2013 EILS for Residential/ Open Space	100		100	90	1100			90	440																																	
NEPM 2013 Table 1B(6) Management Limits for Residential/Parkland, Coarse Soil																			700		1000	2500	10000																			

Field ID	Sample Depth Range	Sample Date	Matrix Description	6	1	14	56	370	0.2	0.9	5	660	1.3	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	0.2	0.2	1	1.3	<0.001	1.9	1.9	1.9	2	0.8	1	0.2
BH1	0.3-0.4	3/10/2018	Filling	6	1	14	56	370	0.2	0.9	5	660	1.3	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	0.2	0.2	1	1.3	<0.001	1.9	1.9	1.9	2	0.8	1	0.2
BH2	0.1-0.2	3/10/2018	Filling	4	0.5	15	140	530	0.06	0.3	9	210	0.2	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	180	150	<50	<50	<100	210	330	<0.1	<0.1	<0.1	0.2	0.1	-	<0.5	<0.5	<0.5	0.2	<0.1	0.2	<0.1
BH2	0.9-1.0	3/10/2018	Natural	8	<0.4	18	16	130	-	0.2	2	140	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	0.2	0.2	-	<0.5	<0.5	<0.5	0.4	0.2	0.2	<0.1
BH3	0.2-0.3	3/10/2018	Filling	9	0.8	20	45	370	0.1	0.2	5	200	0.4	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	360	120	<50	<50	200	210	480	<0.1	0.2	0.2	1	0.96	<0.001	1.4	1.4	1.4	2	0.6	0.9	0.2
BH4	0-0.1	3/10/2018	Filling	<4	<0.4	7	12	38	-	<0.1	3	69	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	0.2	0.2	-	<0.5	<0.5	<0.5	0.4	0.2	0.2	<0.1
BH4	0.3-0.4	3/10/2018	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH5	0.1-0.2	3/10/2018	Filling	<4	<0.4	7	52	64	-	<0.1	4	68	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	150	<100	<50	<50	<100	<100	150	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.5	<0.5	<0.5	<0.2	<0.1	<0.1	<0.1
BH6	0.1-0.2	3/10/2018	Filling	7	0.4	16	73	49	-	0.1	8	110	-	<0.2	<1	<0.5	<25	<2	4	4	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.5	<0.5	<0.5	<0.2	<0.1	<0.1	<0.1
BH6	0.3-0.4	3/10/2018	Filling	<4	<0.4	6	6	7	-	<0.1	5	24	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.5	<0.5	<0.5	<0.2	<0.1	<0.1	<0.1
BD2/ 20181003	0.3-0.4	3/10/2018	Filling	<4	<0.4	6	8	13	-	<0.1	3	40	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.5	<0.5	<0.5	<0.2	<0.1	<0.1	<0.1
SS1	-	3/10/2018	Surface Sample	<4	0.6	6	18	1400	6.7	0.2	2	460	2	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	0.5	0.56	-	0.7	0.8	0.8	1	0.4	0.6	<0.1
SS2	-	3/10/2018	Surface Sample	<4	<0.4	5	15	160	-	1.3	2	110	-	<0.2	<1	<0.5	<25	<2	<1	<1	<25	<25	<1	<50	<100	<100	<50	<50	<100	<100	<50	<0.1	<0.1	<0.1	0.1	0.2	-	<0.5	<0.5	<0.5	0.3	0.1	0.2	<0.1
AS1	-	3/10/2018	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AS2	-	3/10/2018	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

BD2/20181003 Taken at BH6/0.3-0.4

BD2/20181003 Taken at BH6/0.3-0.4

Appendix G

Results of Statistical Analysis

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.126/10/2018 2:06:03 PM								
5	From File			WorkSheet_a.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	B(a)P											
11												
12	General Statistics											
13	Total Number of Observations				11		Number of Distinct Observations				6	
14	Number of Detects				7		Number of Non-Detects				4	
15	Number of Distinct Detects				5		Number of Distinct Non-Detects				1	
16	Minimum Detect				0.1		Minimum Non-Detect				0.05	
17	Maximum Detect				1.3		Maximum Non-Detect				0.05	
18	Variance Detects				0.214		Percent Non-Detects				36.36%	
19	Mean Detects				0.503		SD Detects				0.463	
20	Median Detects				0.2		CV Detects				0.92	
21	Skewness Detects				1.068		Kurtosis Detects				-0.324	
22	Mean of Logged Detects				-1.07		SD of Logged Detects				0.955	
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic				0.824		Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value				0.803		Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic				0.315		Lilliefors GOF Test					
28	5% Lilliefors Critical Value				0.304		Detected Data Not Normal at 5% Significance Level					
29	Detected Data appear Approximate Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean				0.338		KM Standard Error of Mean				0.132	
33	KM SD				0.405		95% KM (BCA) UCL				0.559	
34	95% KM (t) UCL				0.577		95% KM (Percentile Bootstrap) UCL				0.549	
35	95% KM (z) UCL				0.555		95% KM Bootstrap t UCL				0.843	
36	90% KM Chebyshev UCL				0.734		95% KM Chebyshev UCL				0.914	
37	97.5% KM Chebyshev UCL				1.163		99% KM Chebyshev UCL				1.652	
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic				0.526		Anderson-Darling GOF Test					
41	5% A-D Critical Value				0.722		Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic				0.32		Kolmogorov-Smimov GOF					
43	5% K-S Critical Value				0.317		Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)				1.452		k star (bias corrected MLE)				0.925	
48	Theta hat (MLE)				0.346		Theta star (bias corrected MLE)				0.544	
49	nu hat (MLE)				20.32		nu star (bias corrected)				12.95	
50	Mean (detects)				0.503							
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											

A	B	C	D	E	F	G	H	I	J	K	L
56	This is especially true when the sample size is small.										
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
58	Minimum				0.01	Mean				0.324	
59	Maximum				1.3	Median				0.2	
60	SD				0.436	CV				1.348	
61	k hat (MLE)				0.515	k star (bias corrected MLE)				0.435	
62	Theta hat (MLE)				0.628	Theta star (bias corrected MLE)				0.744	
63	nu hat (MLE)				11.33	nu star (bias corrected)				9.576	
64	Adjusted Level of Significance (β)				0.0278						
65	Approximate Chi Square Value (9.58, α)				3.678	Adjusted Chi Square Value (9.58, β)				3.106	
66	95% Gamma Approximate UCL (use when $n \geq 50$)				0.843	95% Gamma Adjusted UCL (use when $n < 50$)				0.998	
67											
68	Estimates of Gamma Parameters using KM Estimates										
69	Mean (KM)				0.338	SD (KM)				0.405	
70	Variance (KM)				0.164	SE of Mean (KM)				0.132	
71	k hat (KM)				0.696	k star (KM)				0.567	
72	nu hat (KM)				15.32	nu star (KM)				12.47	
73	theta hat (KM)				0.486	theta star (KM)				0.597	
74	80% gamma percentile (KM)				0.557	90% gamma percentile (KM)				0.891	
75	95% gamma percentile (KM)				1.242	99% gamma percentile (KM)				2.096	
76											
77	Gamma Kaplan-Meier (KM) Statistics										
78	Approximate Chi Square Value (12.47, α)				5.539	Adjusted Chi Square Value (12.47, β)				4.807	
79	95% Gamma Approximate KM-UCL (use when $n \geq 50$)				0.761	95% Gamma Adjusted KM-UCL (use when $n < 50$)				0.877	
80											
81	Lognormal GOF Test on Detected Observations Only										
82	Shapiro Wilk Test Statistic				0.9	Shapiro Wilk GOF Test					
83	5% Shapiro Wilk Critical Value				0.803	Detected Data appear Lognormal at 5% Significance Level					
84	Lilliefors Test Statistic				0.285	Lilliefors GOF Test					
85	5% Lilliefors Critical Value				0.304	Detected Data appear Lognormal at 5% Significance Level					
86	Detected Data appear Lognormal at 5% Significance Level										
87											
88	Lognormal ROS Statistics Using Imputed Non-Detects										
89	Mean in Original Scale				0.332	Mean in Log Scale				-1.991	
90	SD in Original Scale				0.43	SD in Log Scale				1.52	
91	95% t UCL (assumes normality of ROS data)				0.567	95% Percentile Bootstrap UCL				0.544	
92	95% BCA Bootstrap UCL				0.614	95% Bootstrap t UCL				0.831	
93	95% H-UCL (Log ROS)				3.072						
94											
95	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution										
96	KM Mean (logged)				-1.77	KM Geo Mean				0.17	
97	KM SD (logged)				1.164	95% Critical H Value (KM-Log)				3.322	
98	KM Standard Error of Mean (logged)				0.379	95% H-UCL (KM -Log)				1.139	
99	KM SD (logged)				1.164	95% Critical H Value (KM-Log)				3.322	
100	KM Standard Error of Mean (logged)				0.379						
101											
102	DL/2 Statistics										
103	DL/2 Normal				DL/2 Log-Transformed						
104	Mean in Original Scale				0.329	Mean in Log Scale				-2.022	
105	SD in Original Scale				0.432	SD in Log Scale				1.514	
106	95% t UCL (Assumes normality)				0.565	95% H-Stat UCL				2.915	
107	DL/2 is not a recommended method, provided for comparisons and historical reasons										
108											
109	Nonparametric Distribution Free UCL Statistics										
110	Detected Data appear Approximate Normal Distributed at 5% Significance Level										

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112	Suggested UCL to Use											
113	95% KM (t) UCL					0.577						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.126/10/2018 7:47:55 AM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Pb											
12												
13	General Statistics											
14	Total Number of Observations				10		Number of Distinct Observations				9	
15							Number of Missing Observations				0	
16	Minimum				7		Mean				173.1	
17	Maximum				530		Median				97	
18	SD				184.3		Std. Error of Mean				58.28	
19	Coefficient of Variation				1.065		Skewness				1.027	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.834		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.842		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.228		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.262		Data appear Normal at 5% Significance Level					
26	Data appear Approximate Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL				279.9		95% Adjusted-CLT UCL (Chen-1995)				289.2	
31							95% Modified-t UCL (Johnson-1978)				283.1	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.27		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.755		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.172		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.275		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				0.812		k star (bias corrected MLE)				0.635	
42	Theta hat (MLE)				213.2		Theta star (bias corrected MLE)				272.6	
43	nu hat (MLE)				16.24		nu star (bias corrected)				12.7	
44	MLE Mean (bias corrected)				173.1		MLE Sd (bias corrected)				217.2	
45							Approximate Chi Square Value (0.05)				5.69	
46	Adjusted Level of Significance				0.0267		Adjusted Chi Square Value				4.9	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))				386.3		95% Adjusted Gamma UCL (use when n<50)				448.6	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.946		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.842		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.147		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.262		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				1.946		Mean of logged Data				4.424	
60	Maximum of Logged Data				6.273		SD of logged Data				1.455	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				1757		90% Chebyshev (MVUE) UCL				496	
64	95% Chebyshev (MVUE) UCL				629.2		97.5% Chebyshev (MVUE) UCL				814.2	
65	99% Chebyshev (MVUE) UCL				1178							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				269		95% Jackknife UCL				279.9	
72	95% Standard Bootstrap UCL				263.6		95% Bootstrap-t UCL				313.4	
73	95% Hall's Bootstrap UCL				261.9		95% Percentile Bootstrap UCL				263.9	
74	95% BCA Bootstrap UCL				284.2							
75	90% Chebyshev(Mean, Sd) UCL				347.9		95% Chebyshev(Mean, Sd) UCL				427.2	
76	97.5% Chebyshev(Mean, Sd) UCL				537.1		99% Chebyshev(Mean, Sd) UCL				753	
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL				279.9							
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.126/10/2018 2:10:01 PM								
5	From File			WorkSheet_b.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	TRH											
11												
12	General Statistics											
13	Total Number of Observations				11		Number of Distinct Observations				4	
14	Number of Detects				3		Number of Non-Detects				8	
15	Number of Distinct Detects				3		Number of Distinct Non-Detects				1	
16	Minimum Detect				150		Minimum Non-Detect				100	
17	Maximum Detect				360		Maximum Non-Detect				100	
18	Variance Detects				12900		Percent Non-Detects				72.73%	
19	Mean Detects				230		SD Detects				113.6	
20	Median Detects				180		CV Detects				0.494	
21	Skewness Detects				1.597		Kurtosis Detects				N/A	
22	Mean of Logged Detects				5.363		SD of Logged Detects				0.462	
23												
24	Warning: Data set has only 3 Detected Values.											
25	This is not enough to compute meaningful or reliable statistics and estimates.											
26												
27												
28	Normal GOF Test on Detects Only											
29	Shapiro Wilk Test Statistic				0.855		Shapiro Wilk GOF Test					
30	5% Shapiro Wilk Critical Value				0.767		Detected Data appear Normal at 5% Significance Level					
31	Lilliefors Test Statistic				0.337		Lilliefors GOF Test					
32	5% Lilliefors Critical Value				0.425		Detected Data appear Normal at 5% Significance Level					
33	Detected Data appear Normal at 5% Significance Level											
34												
35	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
36	KM Mean				135.5		KM Standard Error of Mean				27.87	
37	KM SD				75.48		95% KM (BCA) UCL				N/A	
38	95% KM (t) UCL				186		95% KM (Percentile Bootstrap) UCL				N/A	
39	95% KM (z) UCL				181.3		95% KM Bootstrap t UCL				N/A	
40	90% KM Chebyshev UCL				219.1		95% KM Chebyshev UCL				257	
41	97.5% KM Chebyshev UCL				309.5		99% KM Chebyshev UCL				412.8	
42												
43	Gamma GOF Tests on Detected Observations Only											
44	Not Enough Data to Perform GOF Test											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)				6.843		k star (bias corrected MLE)				N/A	
48	Theta hat (MLE)				33.61		Theta star (bias corrected MLE)				N/A	
49	nu hat (MLE)				41.06		nu star (bias corrected)				N/A	
50	Mean (detects)				230							
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58	Minimum				0.01	Mean				62.73		
59	Maximum				360	Median				0.01		
60	SD				118.8	CV				1.894		
61	k hat (MLE)				0.13	k star (bias corrected MLE)				0.155		
62	Theta hat (MLE)				482	Theta star (bias corrected MLE)				404		
63	nu hat (MLE)				2.863	nu star (bias corrected)				3.416		
64	Adjusted Level of Significance (β)				0.0278							
65	Approximate Chi Square Value (3.42, α)				0.506	Adjusted Chi Square Value (3.42, β)				0.361		
66	95% Gamma Approximate UCL (use when $n \geq 50$)				423.9	95% Gamma Adjusted UCL (use when $n < 50$)				N/A		
67												
68	Estimates of Gamma Parameters using KM Estimates											
69	Mean (KM)				135.5	SD (KM)				75.48		
70	Variance (KM)				5698	SE of Mean (KM)				27.87		
71	k hat (KM)				3.22	k star (KM)				2.403		
72	nu hat (KM)				70.85	nu star (KM)				52.86		
73	theta hat (KM)				42.06	theta star (KM)				56.38		
74	80% gamma percentile (KM)				198.4	90% gamma percentile (KM)				252.5		
75	95% gamma percentile (KM)				303.5	99% gamma percentile (KM)				415.5		
76												
77	Gamma Kaplan-Meier (KM) Statistics											
78	Approximate Chi Square Value (52.86, α)				37.16	Adjusted Chi Square Value (52.86, β)				35.02		
79	95% Gamma Approximate KM-UCL (use when $n \geq 50$)				192.7	95% Gamma Adjusted KM-UCL (use when $n < 50$)				204.4		
80												
81	Lognormal GOF Test on Detected Observations Only											
82	Shapiro Wilk Test Statistic				0.898	Shapiro Wilk GOF Test						
83	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Lognormal at 5% Significance Level						
84	Lilliefors Test Statistic				0.31	Lilliefors GOF Test						
85	5% Lilliefors Critical Value				0.425	Detected Data appear Lognormal at 5% Significance Level						
86	Detected Data appear Lognormal at 5% Significance Level											
87												
88	Lognormal ROS Statistics Using Imputed Non-Detects											
89	Mean in Original Scale				87.47	Mean in Log Scale				3.843		
90	SD in Original Scale				106.6	SD in Log Scale				1.206		
91	95% t UCL (assumes normality of ROS data)				145.7	95% Percentile Bootstrap UCL				143.9		
92	95% BCA Bootstrap UCL				159.6	95% Bootstrap t UCL				197.3		
93	95% H-UCL (Log ROS)				354.2							
94												
95	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
96	KM Mean (logged)				4.812	KM Geo Mean				123		
97	KM SD (logged)				0.391	95% Critical H Value (KM-Log)				2.044		
98	KM Standard Error of Mean (logged)				0.144	95% H-UCL (KM -Log)				170.9		
99	KM SD (logged)				0.391	95% Critical H Value (KM-Log)				2.044		
100	KM Standard Error of Mean (logged)				0.144							
101												
102	DL/2 Statistics											
103	DL/2 Normal					DL/2 Log-Transformed						
104	Mean in Original Scale				99.09	Mean in Log Scale				4.308		
105	SD in Original Scale				98.23	SD in Log Scale				0.709		
106	95% t UCL (Assumes normality)				152.8	95% H-Stat UCL				166.4		
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Normal Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112	Suggested UCL to Use											
113	95% KM (t) UCL					186						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.126/10/2018 12:06:49 PM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Zn											
12												
13	General Statistics											
14	Total Number of Observations				11		Number of Distinct Observations				10	
15							Number of Missing Observations				0	
16	Minimum				24		Mean				190.1	
17	Maximum				660		Median				110	
18	SD				197.3		Std. Error of Mean				59.48	
19	Coefficient of Variation				1.038		Skewness				1.763	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.773		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.85		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.278		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.251		Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL				297.9		95% Adjusted-CLT UCL (Chen-1995)				321.7	
31							95% Modified-t UCL (Johnson-1978)				303.2	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.337		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.746		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.159		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.261		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				1.289		k star (bias corrected MLE)				0.998	
42	Theta hat (MLE)				147.4		Theta star (bias corrected MLE)				190.4	
43	nu hat (MLE)				28.36		nu star (bias corrected)				21.96	
44	MLE Mean (bias corrected)				190.1		MLE Sd (bias corrected)				190.3	
45							Approximate Chi Square Value (0.05)				12.31	
46	Adjusted Level of Significance				0.0278		Adjusted Chi Square Value				11.15	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)				339.1		95% Adjusted Gamma UCL (use when n<50)				374.5	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.98		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.85		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.112		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.251		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				3.178		Mean of logged Data				4.812	
60	Maximum of Logged Data				6.492		SD of logged Data				0.987	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				506.4		90% Chebyshev (MVUE) UCL				367	
64	95% Chebyshev (MVUE) UCL				447.7		97.5% Chebyshev (MVUE) UCL				559.9	
65	99% Chebyshev (MVUE) UCL				780.1							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				287.9		95% Jackknife UCL				297.9	
72	95% Standard Bootstrap UCL				283.3		95% Bootstrap-t UCL				457.8	
73	95% Hall's Bootstrap UCL				832.8		95% Percentile Bootstrap UCL				288.1	
74	95% BCA Bootstrap UCL				314.5							
75	90% Chebyshev(Mean, Sd) UCL				368.5		95% Chebyshev(Mean, Sd) UCL				449.4	
76	97.5% Chebyshev(Mean, Sd) UCL				561.6		99% Chebyshev(Mean, Sd) UCL				781.9	
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL				374.5							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												