

# Rapporto Ambientale

Valutazione Ambientale Strategica del  
Programma Integrato di Intervento Post Expo.

MIND: Progetto di rigenerazione per uno sviluppo  
urbano sostenibile

Allegato 12 – Valutazione di rischio sanitario per i  
vapori provenienti dalla falda

Autorità procedente: Comune di Milano – Area Pianificazione Tematica e Valorizzazione Aree

Autorità competente: Comune di Milano – Area Ambiente ed Energia

**Dicembre 2018**

**Valorizzare  
Trasformare  
Innovare**



**arexpo**

## SOMMARIO

<b>1</b>	<b>INTRODUZIONE .....</b>	<b>1</b>
1.1	BIBLIOGRAFIA .....	1
<b>2</b>	<b>INQUADRAMENTO DEL SITO – AREA VASTA.....</b>	<b>2</b>
2.1	INQUADRAMENTO GEOLOGICO.....	2
2.2	INQUADRAMENTO IDROGEOLOGICO .....	2
2.3	PIEZOMETRIA E OSCILLAZIONI PIEZOMETRICHE.....	3
<b>3</b>	<b>INQUADRAMENTO AMBIENTALE DI DETTAGLIO.....</b>	<b>5</b>
3.1	INQUADRAMENTO GEOLOGICO.....	5
3.2	INQUADRAMENTO IDROGEOLOGICO .....	6
3.2.1	<i>Piezometria dell'area e rete piezometrica di riferimento .....</i>	<i>6</i>
3.2.2	<i>Oscillazioni della falda .....</i>	<i>7</i>
3.2.3	<i>Barriera idraulica (MISE).....</i>	<i>10</i>
3.3	INQUADRAMENTO METEOCLIMATICO .....	11
3.3.1	<i>Stazioni meteorologiche di riferimento.....</i>	<i>11</i>
3.3.2	<i>Velocità del vento.....</i>	<i>12</i>
3.3.3	<i>Direzione del vento .....</i>	<i>12</i>
<b>4</b>	<b>ANALISI DEI DATI IDROCHIMICI.....</b>	<b>14</b>
4.1	CONTAMINANTI INDICATORI .....	14
4.2	ANALISI STATISTICA DELLE SERIE DI DATI .....	16
4.2.1	<i>Approccio metodologico .....</i>	<i>16</i>
4.2.2	<i>Elaborazione dei box-plot e individuazione degli outlier.....</i>	<i>17</i>
4.2.3	<i>Individuazione delle distribuzioni di dati di riferimento .....</i>	<i>19</i>
4.3	INDIVIDUAZIONE DELLE SORGENTI SECONDARIE DI CONTAMINAZIONE.....	19
4.4	DETERMINAZIONE DELLE CONCENTRAZIONI RAPPRESENTATIVE ALLA SORGENTE.....	20
<b>5</b>	<b>PROGETTO DI RIQUALIFICAZIONE DELL'AREA.....</b>	<b>22</b>
<b>6</b>	<b>VALUTAZIONE DEL RISCHIO SANITARIO PER I VAPORI PROVENIENTI DALLA FALDA .....</b>	<b>23</b>
6.1	CRITERI GENERALI DELL'ANALISI DI RISCHIO .....	23
6.1.1	<i>Risk-net .....</i>	<i>24</i>
6.2	PARAMETRI DI INPUT.....	25
6.2.1	<i>Percorsi di esposizione .....</i>	<i>25</i>
6.2.2	<i>Recettori e fattori di esposizione.....</i>	<i>25</i>
6.2.3	<i>Parametri del sito.....</i>	<i>26</i>
6.3	CALCOLO DEL RISCHIO .....	28
<b>7</b>	<b>CONCLUSIONI.....</b>	<b>29</b>

**INDICE FIGURE**

Figura 1 - Piezometria Provincia di Milano (settembre 2013).....	3
Figura 2 - Andamento piezometria su scala provinciale nel periodo 1950-1995 nell'area della Provincia di Milano.....	4
Figura 3 - Fusi granulometrici .....	6
Figura 4 - Rete di monitoraggio delle acque di falda e piezometria (marzo 2018) .....	7
Figura 5 - Oscillazioni della falda: soggiacenze rilevate periodo ottobre 2011 - marzo 2018.....	9
Figura 6 - Rappresentazione della distribuzione di PCE nel primo layer dovuta all'esistenza ipotizzata di due sorgenti storiche di contaminazione (tratto da: "Progetto Plumes: Sintesi report conclusivo febbraio 2015 – ARPA Lombardia") .....	10
Figura 7 - Ubicazione centraline meteo ARPA rispetto all'area di interesse .....	11
Figura 8 - Direzione media vento Cinisello Balsamo (2008-2017).....	13
Figura 9 - Direzione media vento Rho (2015-2017) .....	13
Figura 10 - Individuazione delle sorgenti di contaminazione .....	20
Figura 11 - Progetto di riqualificazione dell'area - Masterplan.....	22
Figura 12 – Triangolo USDA .....	27

**INDICE TABELLE**

Tabella 1 - Stratigrafia tipologica del sito (tratta da: "Relazione di caratterizzazione geotecnica – area espositiva Expo 2015 (Studio Geotecnico Italiano Srl) .....	5
Tabella 2 - Velocità media vento Cinisello Balsamo (2008-2017) .....	12
Tabella 3 - Riepilogo esiti analitici monitoraggi acque di falda. In grigio sono evidenziati i parametri non volatili. In giallo sono evidenziati i parametri volatili che presentano superamenti dei limiti di riferimento (CSC di Tab.2 per le acque sotterranee) .....	15
Tabella 4 - Outlier individuati ed esclusi dai dataset.....	18
Tabella 5 - Concentrazioni Rappresentative alla Sorgente.....	21
Tabella 6 - Dati di input .....	26
Tabella 7 - Risultati dell'AdR .....	28

## **ALLEGATI**

1. Serie storiche dati meteorologici
2. Elaborazione statistica per individuazione outlier (proUCL)
3. Elaborazione statistica per definizione Concentrazioni Rappresentative alla Sorgente (proUCL)
4. Elaborazione statistica per definizione valore rappresentativo di soggiacenza (proUCL)
5. Grafici box-plot con individuazione outlier
6. Grafici box-plot distribuzioni di dati

## 1 INTRODUZIONE

Il presente documento, redatto su incarico di Arexpo S.p.A., illustra la valutazione del rischio sanitario relativo ai vapori provenienti dalla falda dell'area MIND (ex Sito Expo Milano 2015), con riferimento alle previsioni di sviluppo urbanistico ed edilizio dell'area.

La valutazione è stata effettuata con lo strumento dell'Analisi di Rischio, in conformità con le linee guida APAT "Criteri metodologici per l'applicazione dell'analisi assoluta di rischio ai siti contaminati" (marzo 2008), applicando l'elaborazione in modalità diretta per la valutazione dei rischi sanitari per i percorsi di esposizione di inalazione dei vapori.

### 1.1 Bibliografia

Si riporta, di seguito, la bibliografia consultata per la redazione del seguente documento:

- Relazione geotecnica Human Technopole (MM Spa, maggio 2018);
- Barriera idraulica per contaminazione da solventi clorurati – Piastra Espositiva – Relazione Tecnica (MM, aprile 2015);
- Progetto Plumes: Sintesi report conclusivo (ARPA Lombardia, febbraio 2015);
- Integrazione allo studio della componente geologica, idrogeologica e sismica ai sensi della L.R. 12/05 e D.G.R. 9/2616 del 28/05/2008 (Studio Mattioli Srl, marzo 2013);
- Relazione di caratterizzazione geotecnica – area espositiva Expo 2015 (Studio Geotecnico Italiano Srl, luglio 2011);
- Criteri metodologici per l'applicazione dell'Analisi di Rischio ai siti contaminati (APAT, 2008);
- Geologia degli acquiferi Padani della Regione Lombardia (ENI-AGIP, 2002).



## 2 INQUADRAMENTO DEL SITO – AREA VASTA

### 2.1 Inquadramento geologico

L'area oggetto di studio, ubicata a Nord-Ovest di Milano fra i comuni di Rho e Pero in un contesto fortemente urbanizzato, si colloca nell'Alta Pianura Lombarda, modellata da depositi fluvioglaciali ed alluvionali.

Con riferimento a quanto riportato nella Carta Geologica d'Italia – foglio 118 Milano, l'area in esame ricade sui terreni medio-tardo pleistocenici appartenenti al Supersintema di Besnate, ed in particolare all'Unità di Bulgarograsso ed all'Unità di Minoprio, costituite da depositi fluvioglaciali ghiaiosi in matrice sabbiosa e sabbioso-limosa.

### 2.2 Inquadramento idrogeologico

Dal punto di vista idrogeologico / idrostratigrafico, con riferimento alla classificazione proposta dalla pubblicazione di Regione Lombardia - ENI-AGIP del 2002 "Geologia degli acquiferi Padani della Regione Lombardia", ed in particolare al modello idrogeologico concettuale riportato da ARPA nel Progetto Plumes relativamente all'area nord-ovest di Milano, nel sottosuolo dell'area in esame è possibile distinguere i seguenti Gruppi Acquiferi:

- Gruppo Acquifero A (o Unità ghiaioso-sabbiosa): posto fra il piano campagna e -30/-50 m, è costituito da depositi prevalentemente ghiaioso-sabbiosi con ciottoli, talora cementati. Solo localmente si riscontra la presenza di lenti costituite da materiale più fine argilloso. A letto di tale unità si riscontra la presenza di un orizzonte a bassa permeabilità di spessore medio pari a 10 m, che risulta spesso discontinuo nella porzione di area in studio determinando localmente una struttura complessiva di acquifero monostrato;
- Gruppo Acquifero B (o Unità sabbioso-ghiaioso-limosa): ha spessore pari a circa 25-30m ed è costituito da sabbie ghiaiose localmente passanti a sabbie limose, talora con la presenza di lenti di conglomerato e arenaria. A letto di tale unità si riscontra la presenza di un orizzonte a bassa permeabilità costituito da materiali argillosi localmente sabbioso fini, di notevole continuità laterale e potente, mediamente, 10 - 15m;
- Gruppo Acquifero C (o Unità sabbioso-argillosa): posta al di sotto del Gruppo Acquifero B, è costituito da sedimenti prevalentemente argillosi, con intercalazioni di lenti di sabbia ghiaiosa passanti lateralmente a sabbia argillosa fine.

Il Gruppo Acquifero A, che nell'area in esame costituisce i primi 30/50 metri dal piano campagna, è caratterizzato dalla presenza di depositi permeabili, sedi della falda acquifera freatica di interesse per le valutazioni presentate in questo documento.

### 2.3 Piezometria e oscillazioni piezometriche

Nella figura seguente si riporta la carta della piezometria provinciale della Provincia di Milano del settembre 2013, resa disponibile dal Settore risorse idriche della Città Metropolitana di Milano. In corrispondenza dell'area in esame, evidenziata dal cerchio in figura seguente, la soggiacenza della falda è indicata tra circa 5 e 15m da piano campagna, con una direzione di deflusso idrico sotterraneo NW-SE.

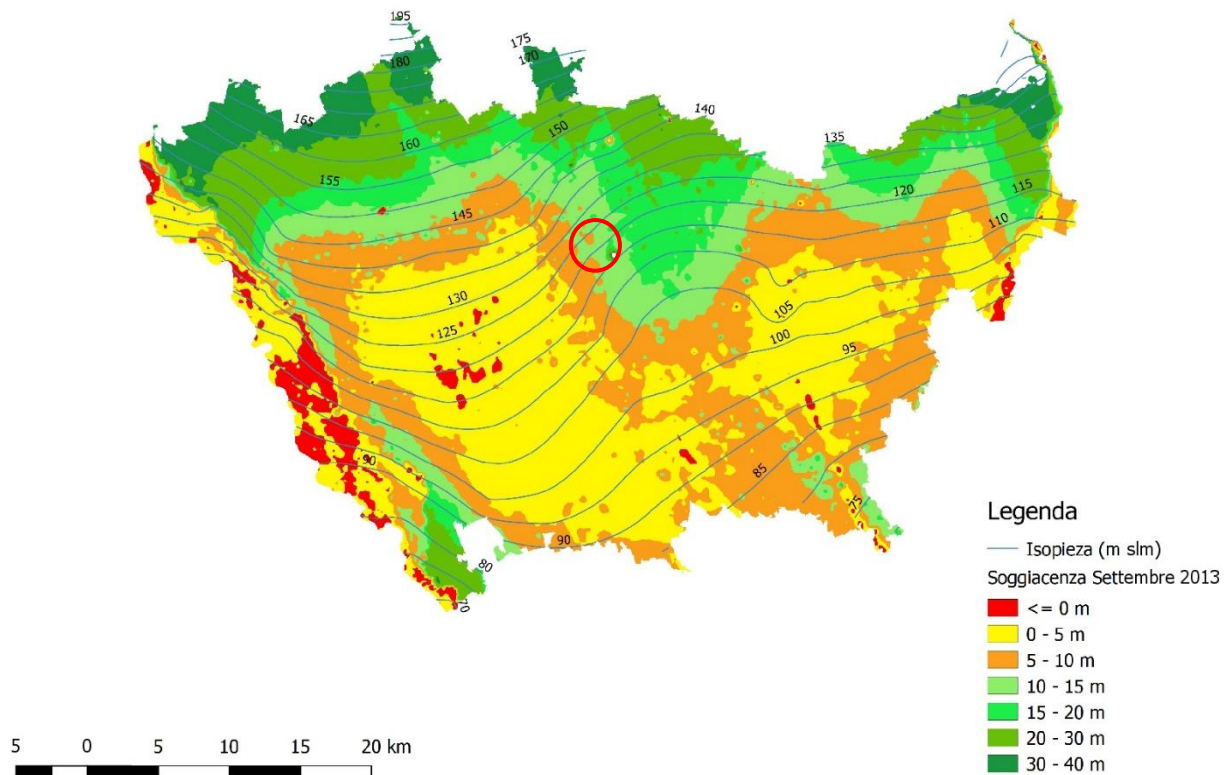


Figura 1 - Piezometria Provincia di Milano (settembre 2013)

A partire dagli anni '50, nell'area milanese si è venuto a creare un netto deficit idrico della falda acquifera, legato allo squilibrio tra prelievi ed alimentazione. Tale fenomeno si è originato per le seguenti cause:

- sfruttamento di un elevato numero di nuovi pozzi industriali e domestici;
- riduzione della ricarica della falda;
- riduzione delle irrigazioni.

Lo sfruttamento eccessivo dell'acquifero tradizionale (prima e seconda falda) si è manifestato con un abbassamento della superficie di falda e con il progressivo aumento della soggiacenza dell'acquifero.

Nel periodo temporale intercorrente dalla fine degli anni '60 ai primi anni '70, lo sbilanciamento idrico nel sottosuolo milanese ha creato una sorta di grande "cono di depressione", che, nel 1975, ha raggiunto la

condizione di massima soggiacenza. La direzione di flusso della falda, dapprima in perfetto accordo con l'andamento regionale, ha assunto, in quel periodo, una direzione radiale verso il centro di Milano.

Tra il 1975 ed il 1980, si è verificata una risalita del livello piezometrico, con variazioni anche di 10 m nel centro città.

Nel corso degli anni '80, il livello piezometrico si è mantenuto pressoché stabile, con un gradiente inferiore a quello presente nella decade precedente, salvo deboli oscillazioni, per lo più legate alla variazione delle precipitazioni. Nel periodo 1982-1991 non si sono registrate particolari variazioni della soggiacenza, che si è attestata mediamente tra 20-27 m di profondità.

Nei primi anni '90, la forte diminuzione dei prelievi idrici legata alla dismissione di alcune attività industriali, ha influenzato la salita del livello piezometrico della falda che, a seconda delle zone, è cresciuta da 0.5 ad 1 m/anno. In particolare, l'innalzamento è stato più accentuato nella parte settentrionale della città di Milano, con circa 10 m di risalita complessiva.

Nella figura seguente si riporta l'andamento piezometrico dell'area della Provincia di Milano (oggi Città Metropolitana) nel periodo 1950-1995.

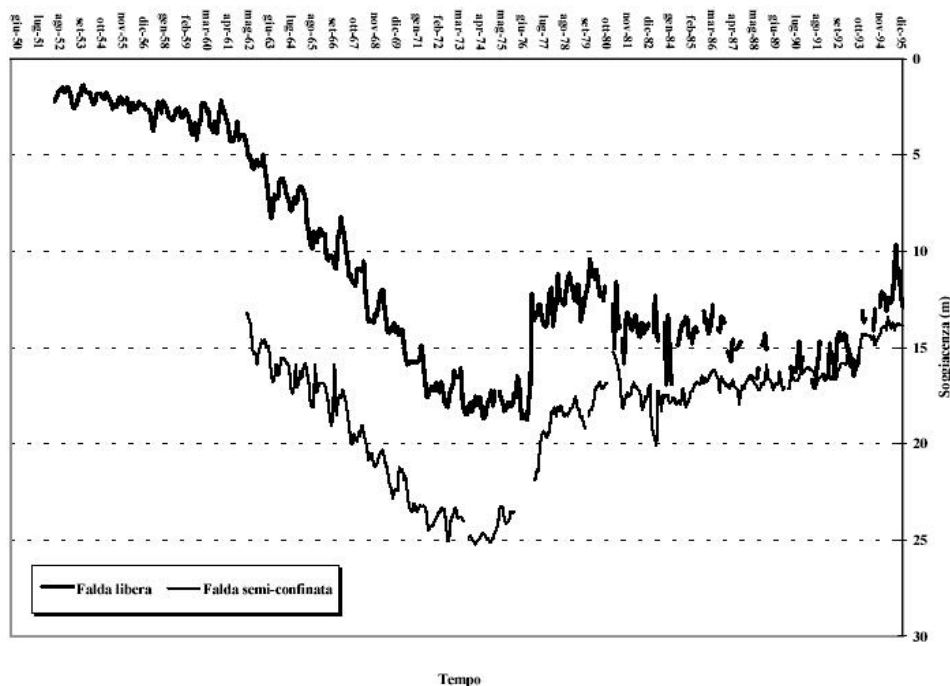


Figura 2 - Andamento piezometria su scala provinciale nel periodo 1950-1995 nell'area della Provincia di Milano

A partire dal 1997, la direzione di flusso della falda è concorde con l'andamento del flusso regionale e la superficie piezometrica non è più stata interessata dal cono di depressione.



### 3 INQUADRAMENTO AMBIENTALE DI DETTAGLIO

#### 3.1 Inquadramento geologico

Secondo quanto riportato nella “Relazione di caratterizzazione geotecnica – area espositiva Expo 2015” redatta da Studio Geotecnico Italiano Srl nel luglio 2011, la stratigrafia dell’area appare piuttosto uniforme, e risulta costituita prevalentemente da granulometrie medio-grossolane (sabbie e ghiaie), talora in matrice limosa o limoso-argillosa. Il suolo superficiale risulta costituito da un orizzonte limoso-argilloso di spessore fino a 3 m. Consistenti livelli di limo argilloso, di spessore di circa 1-2 m, si riscontrano anche più in profondità, attorno ai -16/-20 m dal piano campagna. Nella tabella a seguire, estratta dalla relazione di cui sopra, si riporta in maniera schematica il profilo stratigrafico dell’area.

Strato	Classificazione terreno	Profondità del tetto da p.c. (m da p.c.)	Spessore min/max (m)	Spessore medio (m)
<b>Strato A</b>	Terreno vegetale (localmente riporto)	0	0,3 – 1,2 (in un caso 2,4 m – BH05)	0,7
<b>Strato B</b>	Limo argilloso con rara ghiaia (localmente sabbia limosa)	0,3 -0,8 (in funzione della presenza di riporti la profondità del tetto può superare localmente il metro)	0,5 – 2,5  Localmente assente Localmente sostituito da sabbia limosa poco addensata.  Ben evidente in DPSH, ove lo spessore complessivo dello strato superiore deformabile può superare localmente i 3,0 m (si veda la Figura 3).	
<b>Strato C</b>	Ghiaia sabbiosa in matrice limosa (C1) Sabbia ghiaiosa in matrice limosa/limo sabbioso con ghiaia (C2)	0,6 – 3,0	fino alla massima profondità indagata (30 m circa)  Localmente interrotto da uno strato limoso-sabbioso a 15,0 – 16,0 m di profondità (BH26, BH30, BH34) e/o da uno strato limoso argilloso (D)	>25,0
<b>Strato D</b>	Limo argilloso/limo sabbioso	18,0+22,0	0,8 – 2,3  Non vi sono evidenze della continuità areale di questo strato, tuttavia è stato identificato in quasi tutti i sondaggi profondi (>15 m) eseguiti	≈2,0

Tabella 1 - Stratigrafia tipologica del sito (tratta da: “Relazione di caratterizzazione geotecnica – area espositiva Expo 2015 (Studio Geotecnico Italiano Srl)

Le granulometrie prevalenti dei terreni di sottosuolo del sito (appartenenti allo “Strato C”, corrispondente all’orizzonte di spessore maggiore) sono caratterizzate da un contenuto medio di sabbia e ghiaia superiore al 70% con una componente ghiaiosa fino al 50%.

Il grafico seguente, tratto dalla “Relazione geotecnica – Human Technopole” redatta da MM Spa nel maggio 2018, illustra i fusi granulometrici relativi alle formazioni granulari (sabbie e ghiaie) presenti sull’area fino a una profondità di -17/-18 m (“Strato C”), caratterizzate da un contenuto di fine (limo e argilla) fra il 10 e il 30% e un contenuto di ghiaia fra il 20 e il 60%.

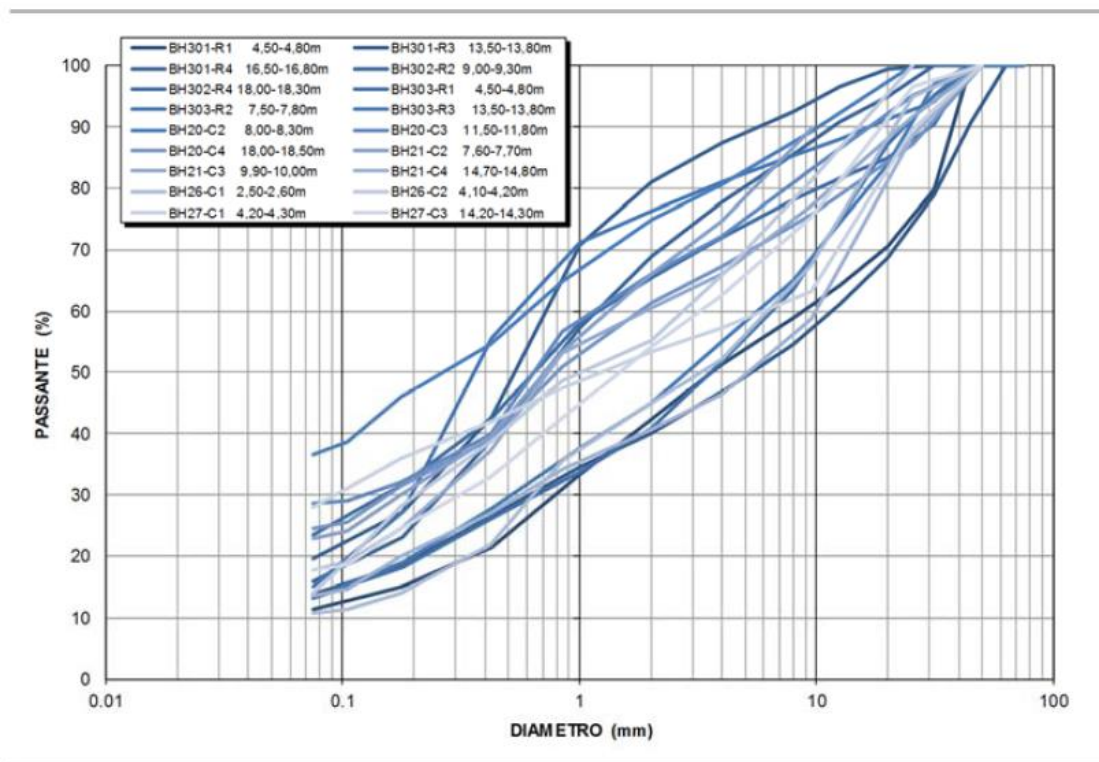


Figura 3 - Fusi granulometrici

### 3.2 Inquadramento idrogeologico

#### 3.2.1 Piezometria dell’area e rete piezometrica di riferimento

Nella figura seguente si riporta la piezometria di dettaglio dell’area in esame, redatta sulla base dei dati di soggiacenza rilevati nella rete di monitoraggio del sito nella campagna di monitoraggio di marzo 2018.

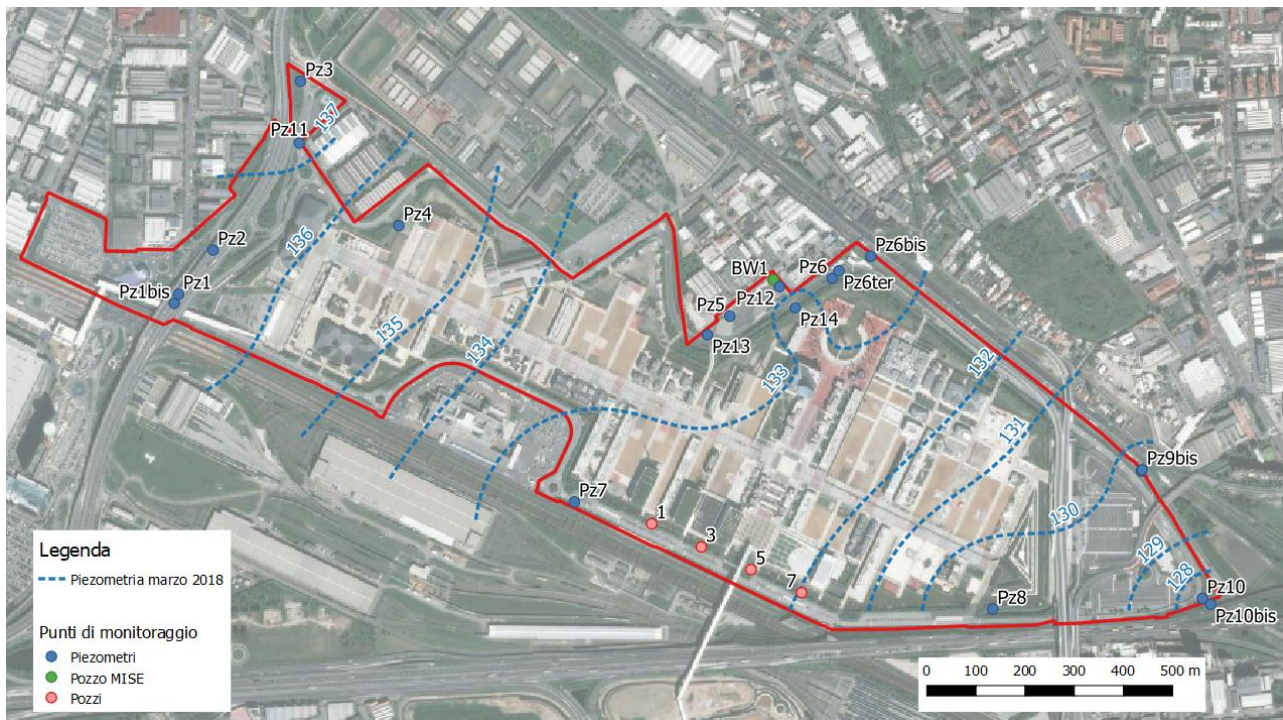


Figura 4 - Rete di monitoraggio delle acque di falda e piezometria (marzo 2018)

Nella figura di cui sopra è riportata la rete di monitoraggio delle acque di falda del sito, composta da:

- **N.14 piezometri**, profondi 25m e fenestrati nell'intervallo 9-25m di profondità;
- **N.4 coppie di pozzi**, costituiti da un pozzo superficiale (profondità circa 50m e fenestrazione indicativamente nell'intervallo 25-50m) e da un pozzo profondo (profondità circa 85m e fenestrazione indicativamente nell'intervallo 70-85m).

La direzione prevalente del flusso idrico sotterraneo risulta coerente con l'andamento provinciale. La soggiacenza della falda in corrispondenza del sito risulta compresa tra circa 8 e 11m da piano campagna.

### 3.2.2 Oscillazioni della falda

Nella tabella a seguire si riportano le soggiacenze rilevate nei piezometri della rete di monitoraggio del sito nel corso delle campagne effettuate nel periodo compreso fra ottobre 2011 e marzo 2018. Nella medesima tabella si riportano, inoltre, le soggiacenze massime e minime misurate per ciascun piezometro.

Valutazione del rischio sanitario per i vapori  
provenienti dalla falda

	Pz1/bis	Pz2	Pz3	Pz4	Pz5	Pz6/bis/ter	Pz7	Pz8	Pz9	Pz10	Pz11	Pz12	Pz13	Pz14
Ottobre 2011	6,94	8,88	8,55	8,95	8,26	7,74	7,95	8,63	8,13	10,12	8,66			
Gennaio 2012	7,78	9,77	9,4	9,835	9,35	8,565	9,455	9,47	10,34	11,16	9,87			
Aprile 2012	8,7	10,83	10,23	10,63	10,15	9,33	10,3	10,2	11,04	11,89	10,6			
Settembre 2012	7,89	10,14	9,57	10	9,5	5,86	9,66	9,66	10,47	11,41	9,96			
Dicembre 2012	7,44	6,45	9,07	9,55	8,95	5,2	9,25	9,06	9,8	10,8	9,52			
Aprile 2013	7,78	9,77	9,39	9,84	9	5,16	9,35	9,01	9,81	10,05	9,86	8,24		
Agosto 2013	6,7	8,72	8,3		8,1	6,31	8,46	7,98	8,97	9,35	8,8	7,3		
Settembre 2013	6,76	8,78	8,33		9,97	6,71	8,43	8,22	8,98	9,36	8,85	7,28		
Ottobre 2013	7,14	9,15	8,64	9,13	8,46	6,96	8,77	8,55	9,3	9,61	9,14	7,7		
Novembre 2013	6,99	9,06	8,64	9,14	8,41	6,84	8,79	8,51	9,22	9,61	9,14	7,61		
Dicembre 2013	3,49	9,45	9,95	9,41	8,63	7,18	9,78	8,78	9,51	9,79	9,48	7,91		
Gennaio 2014	5,9	8,12	7,77	8,44	7,4	5,33	8,75	7,09	7,93	8,56	8,33	6,43		
Febbraio 2014	4,96	7,12	6,69	6,52	6,35	4,57	7,86	6,55	7,2	7,72	7,22	4,48		
Marzo 2014	5,36	7,51	6,85	6,74	6,61	4,94	8,36	6,82	7,37	7,71	7,4	5,74		
Aprile 2014	6,05	8,14	7,59	7,5	7,37	5,63	9,06	7,54	8,02	8,29	8,11	6,55		
Maggio 2014	6,01	8,09	7,52	7,42	7,38	5,39	9,1	7,61	8,07	8,41	8,09	6,5		
Giugno 2014	6,53	8,93	7,93	7,9	7,87	8,18	9,41	8,07	8,92	8,93	8,52	6,99	8,39	
Luglio 2014	6,1	8,2	7,61	7,6	7,55	7,77	9,11	7,72	8,57	8,75	8,16	6,59	8,1	
Settembre 2014	4,97	7,07	6,45	6,18	5,84	6,02	7,4	5,94	6,42	7,12	7,01	4,96	6,35	
Dicembre 2014	4,66	6,68	6,05	5,8	5,24	5,16	6,93	6,78	6,05	6,55	6,56	4,28	5,8	
Gennaio 2015	5,55	7,62	6,97	6,73	6,53	6,75	7,93	7,95	7,43	7,33	7,55	5,69	6,99	
Febbraio 2015	5,43	7,53	7,01	6,81	6,51	6,6	7,86	7,91	7,4	7,4	7,57	5,62	6,99	
Marzo 2015	5,54	7,58	6,98	6,74	6,61	6,87	7,98	7,88	7,45	7,4	7,5	5,78	7,08	
Aprile 2015	5,78	7,83	7,25	7,05	7,12	7,19	8,63	8,08	7,54	7,66	7,82	7,1	7,57	8,07
Maggio 2015	5,82	7,83	7,29	7,13	7,24	7,3	8,83	8,28	7,43	7,83	7,8	7,38	7,73	8,26
Giugno 2015	5,77	7,8	7,23	7,05	6,96	7,01	8,5	7,76	7,03	7,54	7,77	7,09	7,41	7,92
Luglio 2015	6,13	7,86	7,64	7,45	7,18	6,92	8,85	7,9	6,83	7,46	7,83	7,02	7,56	7,47
Agosto 2015	5,27	7,57	6,68	6,61	6,6	6,54	8,44	7,53	6,84	7,29	7,25	6,41	7,07	7,51
Settembre 2015	5,42	7,46	6,81	6,81	6,63	6,6	8,42	7,65	6,93	7,36	7,39	6,7	7,11	7,57
Ottobre 2015	5,4	7,38	7,07	6,68	6,66	6,68	8,36	7,78	7,08	7,35	7,34	6,79	7,18	7,66
Novembre 2015	5,63	7,68	7,1	6,68	6,74	6,95	8,43	7,94	7,3	7,59	7,58	6,95	7,2	7,87
Dicembre 2015	6,36	8,39	7,8	7,7	7,82	8	9,4	9,05	8,4	8,5	8,35	7,92	8,31	8,86
Marzo 2016	6,5	8,5	7,86	7,8	7,86	8	9,4	8,84	8,36	8,4	8,4	8	8,33	8,92
Luglio 2016	6,15	8,65	7,55	7,4	7,25	7,4	8,7	8,2		8,5	8,1	7,4	7,7	8,3
Ottobre 2016	5,8	8,35	7,55	7	6,9	7,15	8,45	8	7,5	7,75	8,1	7,15	7,4	8
Marzo 2017	7,31	9,86	8,76	8,56	8,57	8,73	9,96	9,66	9,1	9,18	9,3	8,69	9,02	9,63
Giugno 2017	7,55	10,12	9,03	8,82	8,54	8,61	10,4	9,46	8,66	9,1	9,57	8,64	9	9,53
Settembre 2017	6,79	9,35	8,31	8,12	7,97	8,12	9,41	8,95	8,3	8,8	8,85	8,13	8,42	9
Dicembre 2017	7,53	10,13	9	8,8	8,7	8,92	10	9,92	9,35	9,5	9,54	8,89	9,13	9,81
Marzo 2018	8,28	10,87	9,88	9,71	9,62	9,5	11,04	10,77	9,97	10,37	10,4	9,63	10,12	10,52
SOGG. MAX	8,7	10,87	10,23	10,63	10,15	9,5	11,04	10,77	11,04	11,89	10,6	9,63	10,12	10,52
SOGG. MIN	3,49	6,45	6,05	5,8	5,24	4,57	6,93	5,94	6,05	6,55	6,56	4,28	5,8	7,47



Nel grafico di seguito si riportano gli andamenti della soggiacenza rilevati nella rete piezometrica del sito.

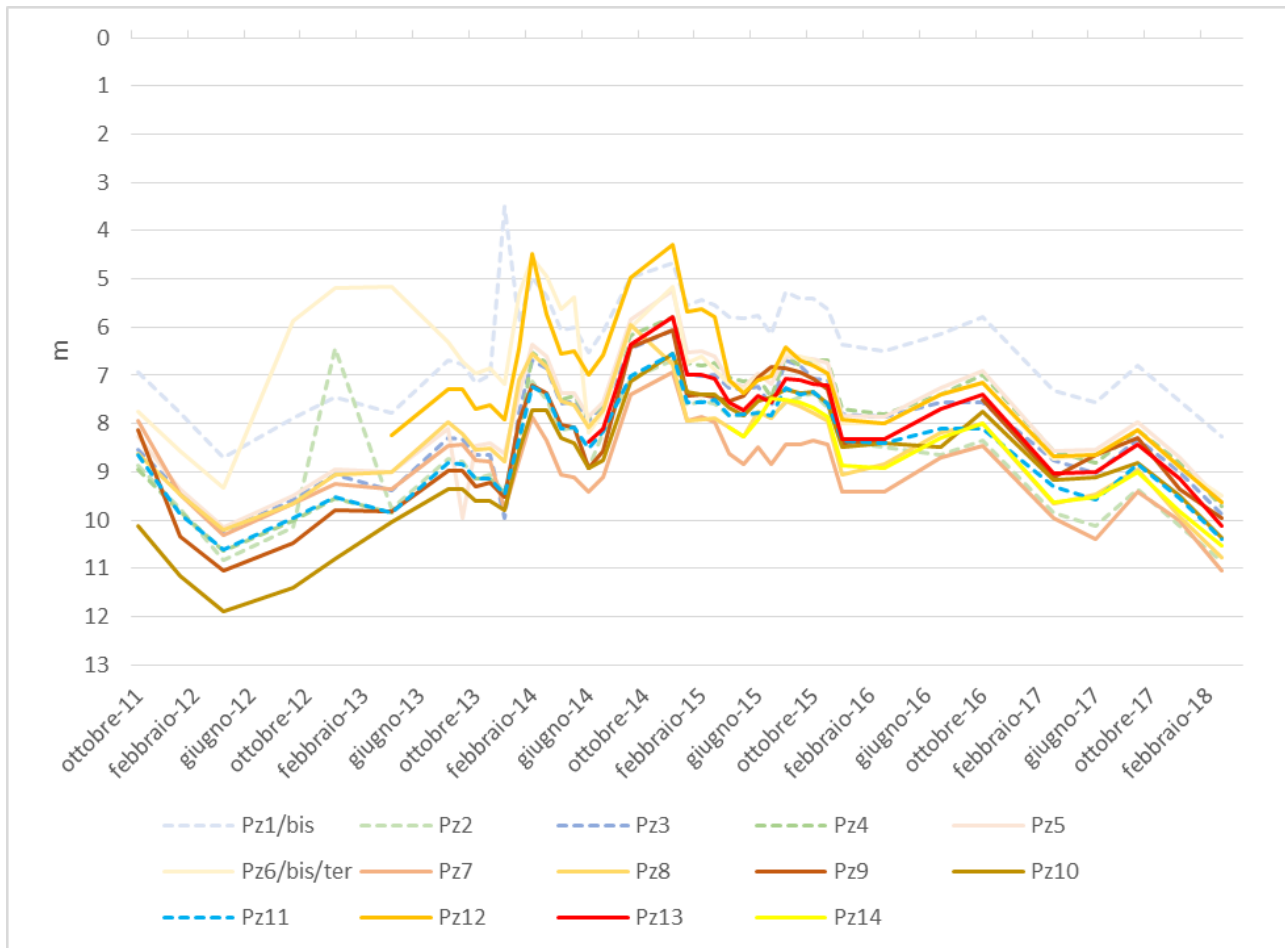


Figura 5 - Oscillazioni della falda: soggiacenze rilevate periodo ottobre 2011 - marzo 2018

Come si può osservare nel grafico sopra riportato, le soggiacenze rilevate nella rete piezometrica del sito nell'intervallo di tempo considerato sono comprese fra un minimo di 3,49 e un massimo di 11,89 m dal piano campagna. L'andamento della quota piezometrica risulta crescente fino alla campagna di dicembre 2014, quando si registra il picco di massima quota della falda in corrispondenza dell'area. A partire da tale data, la falda risulta in abbassamento, seppur con oscillazioni legate alla stagionalità.

Nella campagna di monitoraggio di marzo 2018, la soggiacenza della falda in corrispondenza dell'area risulta compresa fra circa 8 e 11 m dal p.c.



### 3.2.3 Barriera idraulica (MISE)

In prossimità del perimetro settentrionale del sito è attivo un sistema di messa in sicurezza d'emergenza (MISE) delle acque di falda, costituito da un pozzo di emungimento (BW1) che recapita ad un impianto di trattamento per la depurazione delle acque prima dello scarico in pubblica fognatura. Il sistema ha lo scopo di intercettare le acque sotterranee contaminate da solventi clorurati (tetracloroetilene, tricloroetilene, triclorometano) in ingresso all'area con provenienza da monte idrogeologico. La contaminazione è stata rilevata principalmente nel piezometro Pz12 (lungo il perimetro settentrionale del sito) con concentrazioni di PCE variabili tra 210 µg/l (agosto 2013) ed oltre 5000 µg/l (febbraio 2015). In base ai dati attualmente disponibili ed agli studi condotti da ARPA nell'ambito del Progetto "PLUMES" (Progetto Plumes: Sintesi report conclusivo febbraio 2015 – ARPA Lombardia), si ritiene che tali inquinanti provengano da aree poste in comune di Baranzate a monte idrogeologico rispetto all'area d'interesse. Nella figura seguente si riporta la simulazione condotta da ARPA nell'ambito del progetto "PLUMES", relativamente all'ubicazione del pennacchio contaminato da tetracloroetilene, prima dell'attivazione della barriera idraulica.

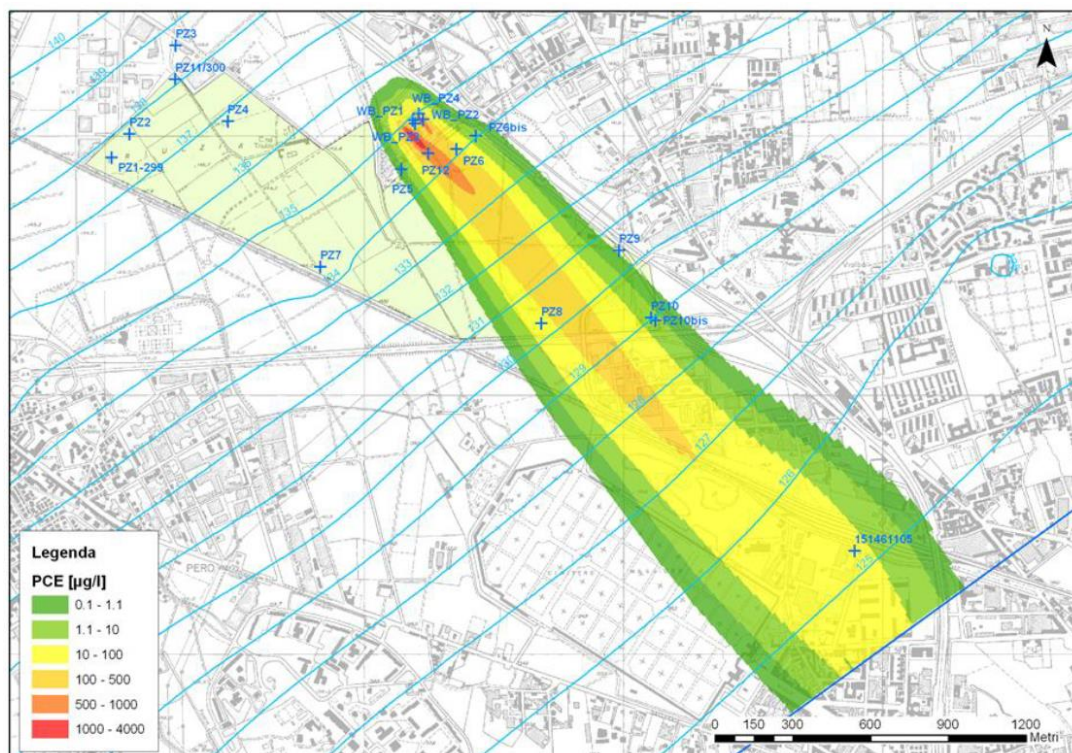


Figura 6 - Rappresentazione della distribuzione di PCE nel primo layer dovuta all'esistenza ipotizzata di due sorgenti storiche di contaminazione (tratto da: "Progetto Plumes: Sintesi report conclusivo febbraio 2015 – ARPA Lombardia")

In ragione di quanto sopra, la società Expo 2015 S.p.A., seppure non responsabile della contaminazione, ha scelto di intervenire in via preventiva al fine di evitare il proseguire del deflusso di contaminanti in ingresso

al sito e salvaguardare la salute di lavoratori e fruitori dell'area. La barriera è attiva a partire dal maggio 2015 ed è attualmente gestita da Arexpo S.p.A.

### 3.3 Inquadramento meteoclimatico

#### 3.3.1 Stazioni meteorologiche di riferimento

Per la valutazione dei dati meteoclimatici da utilizzarsi per le elaborazioni di Analisi di Rischio illustrate nel presente documento (velocità e direzione del vento) si è fatto riferimento alla stazione meteo ARPA più vicina all'area con una disponibilità di osservazioni comprendente gli ultimi dieci anni, come indicato sulle linee guida APAT (2008) "Criteri metodologici per l'applicazione dell'Analisi di Rischio ai siti contaminati". In particolare, è stata effettuata una ricerca sull'applicativo online di ARPA Lombardia per la consultazione dei dati meteorologici, da cui è risultato che la centralina adibita alla raccolta dei dati meteorologici di interesse più prossima all'area oggetto di studio e con dati disponibili comprendenti gli ultimi dieci anni di osservazioni è quella di Cinisello Balsamo – Parco Nord (Alt: 142 m s.l.m. - Lat: 45.542647 - Lon: 9.205629). La centralina maggiormente prossima al sito di interesse è quella di Rho – Scalo Fiorenza (Alt: 143 m s.l.m. - Lat: 45.517522 - Lon: 9.091567), che, tuttavia, non dispone di serie storiche di dati distribuite su di un arco temporale di lunghezza sufficiente. Per completezza di analisi, nelle elaborazioni proposte sono stati tenuti in considerazione anche i dati meteo disponibili relativi a tale centralina.



Figura 7 - Ubicazione centraline meteo ARPA rispetto all'area di interesse

Si riportano di seguito le serie storiche dei dati relative alla velocità e alla direzione del vento utilizzate e i criteri di scelta delle stesse. In allegato 1 si riportano i dati completi delle serie storiche analizzate.

### 3.3.2 Velocità del vento

Nella tabella a seguire si riportano le medie annuali di velocità del vento registrate dalla centralina di Cinisello Balsamo dal 2008 al 2017; il valore scelto per l'Analisi di Rischio, conformemente alle linee guida APAT (2008) è il minimo delle medie annuali, pari a 1,28 m/s (anno 2016). Si segnala che tale valore risulta il più cautelativo anche tenendo in considerazione i dati disponibili per la centralina di Rho – Scalo Fiorenza, dove la minima delle medie annuali di velocità del vento è pari a 1,89 m/s (anni 2015 e 2016).

ANNO	VELOCITÀ MEDIA VENTO m/s
2008	1,54
2009	1,67
2010	1,57
2011	1,47
2012	1,44
2013	1,41
2014	1,36
2015	1,36
2016	1,28
2017	1,39

Tabella 2 - Velocità media vento Cinisello Balsamo (2008-2017)

### 3.3.3 Direzione del vento

Per la valutazione della direzione media del vento si è proceduto a raggruppare i dati di direzione media oraria così come forniti dal sito ARPA per la centralina di Cinisello Balsamo in classi di direzione di ampiezza pari a 10°, al fine di individuare le classi che presentano maggiore frequenza. Le elaborazioni effettuate mostrano che le direzioni prevalenti del vento sono ESE e SW.

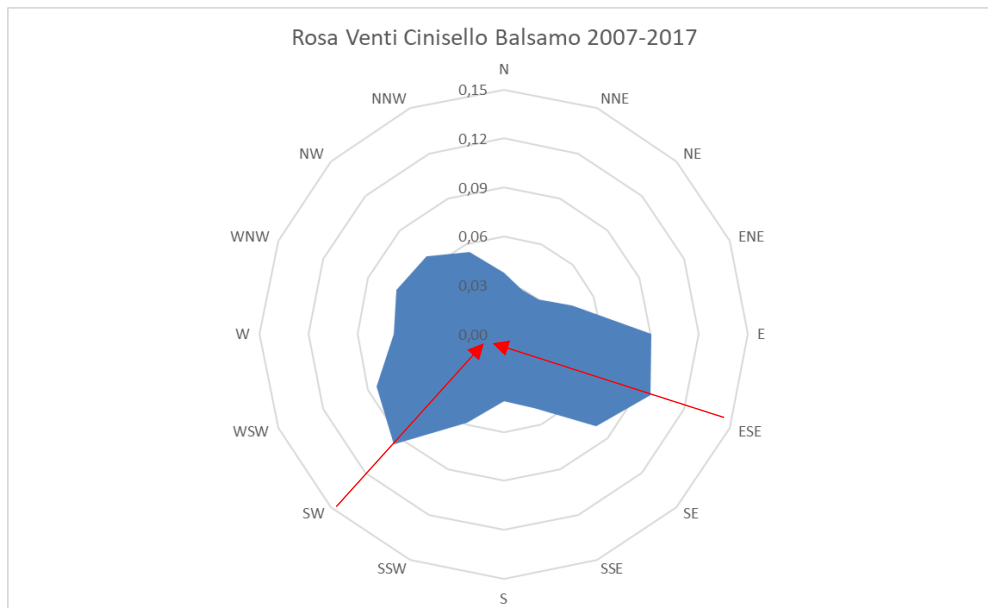


Figura 8 - Direzione media vento Cinisello Balsamo (2008-2017)

Effettuando un confronto con i dati di direzione media oraria del vento disponibili dal 2015 al 2017 per la centralina di Rho, risulta che anche in questo caso le direzioni prevalenti del vento sono le medesime.

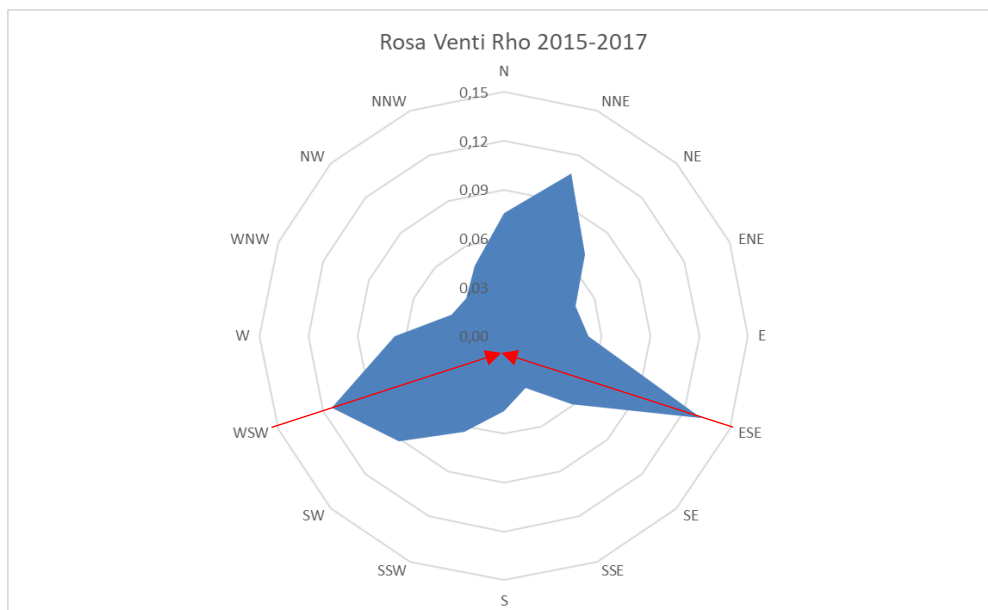


Figura 9 - Direzione media vento Rho (2015-2017)

## 4 ANALISI DEI DATI IDROCHIMICI

Nel presente capitolo è riportata l'analisi dei dati idrochimici della falda relativi ai monitoraggi periodici effettuati sulla rete piezometrica del sito a partire dal 2011, utilizzati per le elaborazioni di Analisi di Rischio.

### 4.1 Contaminanti indicatori

Per la definizione dei contaminanti indicatori da considerarsi per le elaborazioni di Analisi di Rischio, sono stati presi in considerazione tutti i dati analitici relativi ai monitoraggi periodici effettuati sulla rete piezometrica del sito nel periodo settembre 2011 – giugno 2018, per un totale di n.39 campagne di monitoraggio. Dalle elaborazioni sono stati esclusi i dati relativi ai seguenti punti di indagine, non ritenuti significativi ai fini della presente analisi:

- **Pozzi profondi**, in quanto fenestrati nei livelli inferiori della falda, lontani dalla superficie piezometrica dove avviene la volatilizzazione dei contaminanti;
- **Pozzo barriera**, non rappresentativo dello stato di contaminazione del sito in quanto realizzato appositamente per estrarre le acque contaminate provenienti da monte idrogeologico. Il punto di monitoraggio di riferimento per la qualità delle acque di falda in ingresso al sito in tale posizione è costituito dal piezometro Pz14, ubicato poche decine di metri a valle del pozzo.
- **Piezometro Pz12** (ubicato in corrispondenza del pozzo barriera), **relativamente ai dati precedenti all'attivazione della barriera idraulica**. Tali dati storici non sono rappresentativi dello stato di contaminazione delle acque di falda del sito in quanto relativi al periodo precedente all'attivazione della MISE, quando il *plume* di contaminazione proveniente da monte idrogeologico non era intercettato prima dell'ingresso al sito (cfr. paragrafo 3.2.3). Per il piezometro Pz12 sono stati, pertanto, considerati i dati a partire dalla prima campagna di monitoraggio effettuata dopo l'attivazione della MISE, corrispondente alla campagna del 26/05/2018 (la MISE è attiva dal 05/05/2015).

Nella tabella seguente si riporta il riepilogo totale dei dati analitici a disposizione.



Valutazione del rischio sanitario per i vapori  
provenienti dalla falda

	PIEZOMETRI			POZZI		
	N. dati	Sopra CSC	% superi	N. dati	Sopra CSC	% superi
Alluminio	392	15	4%	48	0	0%
Arsenico	393	1	0%	48	0	0%
Cadmio	388	0	0%	48	0	0%
Cromo totale	432	18	4%	48	0	0%
Ferro (ug/l)	392	19	5%	48	1	2%
Manganese	389	29	7%	48	2	4%
Mercurio	388	1	0	48	0	0%
Nichel	399	29	7%	48	0	0%
Piombo	393	4	1%	48	0	0%
Rame	399	0	0%	48	0	0%
Zinco	399	0	0%	48	0	0%
Cromo esavalente	423	26	6%	48	0	0%
Idrocarburi totali (n-esano)	375	0	0%	48	0	0%
1,2-dicloroetilene (cis+trans)	351	8	2%	48	0	0%
1,1,2,2-Tetracloroetano	384	5	1%	48	0	0%
1,1,2-Tricloroetano	386	6	2%	48	0	0%
1,1-Dicloroetano	393	0	0%	48	0	0%
1,1-Dicloroetilene	394	194	49%	48	43	90%
1,2,3-Tricloropropano	384	39	10%	46	10	22%
1,2-Dicloroetano	385	0	0%	48	0	0%
1,2-Dicloropropano	388	71	18%	48	2	4%
Cloroformio	382	339	89%	48	48	100%
Clorometano	384	0	0%	48	0	0%
Cloruro di vinile	387	2	1%	48	0	0%
Esaclorobutadiene	385	0	0%	48	0	0%
Tetracloroetilene	396	346	87%	48	42	88%
Tricloroetilene	396	81	20%	48	34	71%
Benzene	374	0	0%	48	0	0%
Etilbenzene	375	0	0%	48	0	0%
m,p-xilene	355	0	0%	48	0	0%
o-xilene	52	0	0%	15	0	0%
Stirene	372	0	0%	48	0	0%
Toluene	371	0	0%	48	0	0%
Benzo(a) antracene	371	1	0%	48	0	0%
Benzo(a) pirene	371	4	1%	48	0	0%
Benzo(b) fluorantene	371	2	1%	48	0	0%
Benzo(g,h,i) perilene	371	4	1%	48	0	0%
Benzo(k) fluorantene	371	2	1%	48	0	0%
Crisene	371	0	0%	47	0	0%
Dibenzo(a,h) antracene	371	1	0%	48	0	0%
indeno(1,2,3-c,d) pirene	371	1	0%	48	0	0%
Pirene	372	0	0%	48	0	0%
Sommatoria IPA	359	1	0%	48	0	0%

Tabella 3 - Riepilogo esiti analitici monitoraggi acque di falda. In grigio sono evidenziati i parametri non volatili. In giallo sono evidenziati i parametri volatili che presentano superamenti dei limiti di riferimento (CSC di Tab.2 per le acque sotterranee)

I contaminanti indicatori considerati per la presente elaborazione sono **tutti i parametri volatili riscontrati in falda che hanno mostrato almeno n. 1 esubero rispetto ai limiti di riferimento normativi** (CSC di Tabella 2, Allegato 5, Parte IV al Titolo V del D.Lgs. 152/06). Tali parametri, evidenziati in giallo in tabella, sono i seguenti:

- Mercurio;
- 1,2-dicloroetilene (cis+trans);
- 1,1,2,2-Tetracloroetano;
- 1,1,2-Tricloroetano;
- 1,1-Dicloroetilene;
- 1,2,3-Tricloropropano;
- 1,2-Dicloropropano;
- Cloroformio;
- Cloruro di vinile;
- Tetracloroetilene;
- Tricloroetilene.

I contaminanti indicatori sono costituiti in massima parte da solventi clorurati (si registra un unico superamento per il parametro mercurio, in tutte le campagne di monitoraggio effettuate).

I parametri che presentano superamenti più frequenti sono:

- cloroformio (89% di superamenti nei piezometri, 100% nei pozzi);
- tetracloroetilene (87% di superamenti nei piezometri, 88% nei pozzi);
- 1,1-dicloroetilene (49% di superamenti nei piezometri, 90% nei pozzi);
- tricloroetilene (20% di superamenti nei piezometri, 71% nei pozzi).

I superamenti più marcati rispetto alle CSC si registrano per il tetracloroetilene, cloroformio e 1,1-dicloroetilene, con valori massimi dell'ordine delle centinaia di volte rispetto alle relative CSC (migliaia, per il tetracloroetilene).

## 4.2 Analisi statistica delle serie di dati

### 4.2.1 Approccio metodologico

Per la definizione dei valori rappresentativi della contaminazione per ciascun parametro di interesse da utilizzarsi per le elaborazioni di Analisi di Rischio, in relazione all'elevato numero di dati a disposizione (superiore a 400 per ciascun parametro considerando sia i pozzi che i piezometri), conformemente alle linee guida APAT (2008) per l'Analisi di Rischio si è proceduto ad effettuare un'analisi statistica dei dati.

Per l'analisi dei dati si è proceduto secondo i seguenti *step* successivi:

- 1) Valutazione delle serie di dati relative a ciascun parametro di interesse, per ciascun punto di monitoraggio considerato, mediante l'elaborazione di grafici tipo *box-plot* (diagrammi a scatole e baffi);
- 2) Individuazione dei potenziali valori di *outlier* relativi a ciascuna popolazione di dati, corrispondenti a valori estremi che si discostano in misura significativa dal resto della popolazione;
- 3) Valutazione, mediante software proUCL tramite applicazione di test statistici, dei potenziali *outlier* individuati, ed eventuale esclusione degli stessi dal dataset;
- 4) Rielaborazione dei grafici tipo *box-plot* per ciascun parametro di interesse, per ciascun punto di monitoraggio considerato;
- 5) Identificazione di eventuali sotto-popolazioni di dati legate alla distribuzione non omogenea della contaminazione sull'area, e delle relative sub-aree di riferimento;
- 6) Determinazione delle Concentrazioni Rappresentative alla Sorgente per ciascuna sub-area.

#### 4.2.2 Elaborazione dei *box-plot* e individuazione degli *outlier*

Nei grafici in allegato 5 si riportano i diagrammi a scatole e baffi relativi alle serie di dati considerate. Con questi grafici è possibile descrivere in maniera efficace la distribuzione dei dati relativi a ciascuna serie considerata, permettendo di individuare efficacemente:

- L'ampiezza delle distribuzioni e gli indici di dispersione: i limiti della "scatola" definiscono il primo e il terzo quartile di ciascuna serie, i limiti dei "baffi" definiscono i valori minimo e massimo;
- Gli indici di posizione delle distribuzioni: in ciascuna scatola, la media è rappresentata da una croce, la mediana da una stanghetta orizzontale;
- I possibili valori di *outlier*, rappresentati come punti esterni a ciascun diagramma.

Per l'elaborazione dei dati, i valori *non-detected* sono stati considerati, cautelativamente, pari al limite di rilevabilità strumentale.

Nei grafici in allegato 5 sono evidenziati i valori di *outlier* individuati in via preliminare dall'analisi dei diagrammi. Sono stati considerati, quali potenziali *outlier*, quei valori che si discostano in maniera significativa dalla distribuzione di dati, rappresentando potenziali errori analitici o di trascrizione, o comunque valori che non sono da considerarsi rappresentativi della popolazione in esame. Si specifica che, relativamente al piezometro Pz12, per il quale è stata considerata unicamente la serie di dati a partire dall'accensione della MISE, in via cautelativa non sono stati considerati *outlier* quei valori che, pur discostandosi marcatamente dal resto della popolazione, risultino in linea con quanto registrato, nello stesso punto, prima dell'accensione della barriera idraulica (in particolare, non è stato escluso il valore di tetracloroetilene pari a 2090 µg/l registrato nella campagna del 26/05/2015).

Una volta individuati i potenziali valori di *outlier* per ciascuna serie di dati, si è proceduto ad un'analisi statistica degli stessi mediante il software proUCL. Il software, applicando i più idonei test statistici in funzione del tipo di distribuzione, consente di definire se i potenziali *outlier* individuati possono essere considerati tali dal punto di vista statistico e, quindi, esclusi dalla popolazione per le successive fasi di elaborazione dati. In allegato 2 si riportano le elaborazioni statistiche effettuate con proUCL. Nella tabella a seguire si riportano, per ciascun parametro considerato, gli *outlier* individuati ed esclusi dalle popolazioni.

Parametro	Concentrazione (µg/l)	Punto	Data	Note
Mercurio	1,9	Pz7	13/10/2015	-
1,2-dicloroetilene (cis+trans)	360	Pz12	05/07/2015	Il valore è stato considerato <i>outlier</i> in quanto si discosta marcatamente dalla popolazione anche considerando la serie completa di dati del punto (comprensiva dei dati pre-MISE).
1,1,2,2Tetracloroetano	6,4	Pz6	12/12/2012	-
1,1,2Tricloroetano	-	-	-	-
1,1Dicloroetilene	18,22	Pz7	03/12/2014	-
1,2,3Tricloropropano	-	-	-	-
1,2Dicloropropano	-	-	-	-
Cloroformio	-	-	-	-
Cloruro di vinile	1,76	Pz9	28/09/2011	-
Tetracloroetilene	-	-	-	La concentrazione di 2090 µg/l registrata nel punto Pz12 in data 26/05/2015 non è stata considerata un <i>outlier</i> in quanto valori dello stesso ordine di grandezza sono stati rilevati nel punto prima dell'accensione della MISE.
Tricloroetilene	-	-	-	La concentrazione di 45,8 µg/l registrata nel punto Pz12 in data 05/07/2016 non è stata considerata un <i>outlier</i> in quanto valori dello stesso ordine di grandezza sono stati rilevati nel punto prima dell'accensione della MISE.

Tabella 4 - Outlier individuati ed esclusi dai dataset

In merito al mercurio, si specifica che per il parametro è stato registrato un unico superamento dei limiti di legge in tutte le campagne di monitoraggio considerate, nell'intera rete piezometrica del sito. Il superamento è stato registrato nel Pz7 nella campagna di ottobre 2015, con una concentrazione rilevata pari a 1,9 µg/l, a fronte di una CSC pari a 1 µg/l. Nelle rimanenti campagne di monitoraggio, la concentrazione nel punto è sempre stata inferiore al limite di rilevabilità strumentale. Il superamento registrato, valutato con il software proUCL, è stato considerato un *outlier* e il parametro è stato, pertanto, escluso dall'elaborazione in quanto non caratteristico dello stato di contaminazione della falda.

#### 4.2.3 Individuazione delle distribuzioni di dati di riferimento

A seguito dell'esclusione degli *outlier* di cui al paragrafo precedente, si è proceduto alla rielaborazione dei *box-plot*, come riportati in allegato 6.

Come evidente dall'analisi dei suddetti diagrammi, per ciascun parametro sono chiaramente distinguibili due sotto-popolazioni di dati:

- **Distribuzione n.1:** comprende le serie di dati che presentano distribuzioni maggiormente ampie (maggiore variabilità dei dati), con valori medi e mediani più elevati e i picchi di concentrazione più alti. Tale distribuzione di dati è da ritenersi rappresentativa dei piezometri e, più in generale, delle aree del sito interessate maggiormente dal transito e dall'escursione laterale del pennacchio contaminato proveniente da monte idrogeologico (cfr. paragrafo 3.2.3). Le serie di dati appartenenti alla Distribuzione n.1 sono indicate con una freccia nei grafici in allegato 6;
- **Distribuzione n.2:** comprende le rimanenti serie di dati, che presentano distribuzioni più ristrette (minore variabilità dei dati), e valori medi e mediani più ridotti. Tale distribuzione di dati è da ritenersi rappresentativa delle aree del sito non interessate (od interessate in maniera molto minore) dal transito e dall'escursione laterale del pennacchio contaminato proveniente da monte idrogeologico. L'eventuale stato di contaminazione delle acque di falda in tali aree è da ritenersi legato ad uno stato di contaminazione diffusa che interessa tutto l'intorno del sito.

#### 4.3 Individuazione delle sorgenti secondarie di contaminazione

Analizzando le due distribuzioni di dati di cui al paragrafo precedente dal punto di vista areale, è possibile notare che punti di monitoraggio di cui alla distribuzione n.1 risultano ubicati tutti nella porzione orientale del sito (pozzi 1÷7, piezometri Pz5, Pz6, Pz7, Pz8, Pz9, Pz10, Pz12, Pz14), corrispondente all'area maggiormente impattata dal transito del pennacchio (cfr. paragrafo 3.2.3).

In ragione di quanto sopra, in relazione all'eterogeneità della contaminazione in falda in corrispondenza dell'area in esame, al fine di definire i valori di concentrazione rappresentativa di ciascun parametro per l'applicazione dell'Analisi di Rischio, sono state individuate due sorgenti secondarie di contaminazione distinte:

- **Sorgente secondaria n.1:** corrispondente alla porzione orientale dell'area, che presenta una falda maggiormente impattata dal transito del pennacchio contaminato proveniente da monte idrogeologico.
- **Sorgente secondaria n.2:** corrispondente alla porzione occidentale dell'area, che presenta una falda non impattata (o, comunque, impattata in misura minore) dal transito del pennacchio contaminato proveniente da monte idrogeologico.



La separazione tra le due sorgenti secondarie di contaminazione è stata individuata a nord del piezometro Pz7, lungo l'ipotetica linea di flusso passante a monte della sorgente primaria di contaminazione individuata all'esterno del sito, da cui ha origine il pennacchio (cfr. Progetto Plumes – Sintesi report conclusivo – ARPA Lombardia, febbraio 2015). Nella figura seguente si riporta la suddivisione tra le due aree.

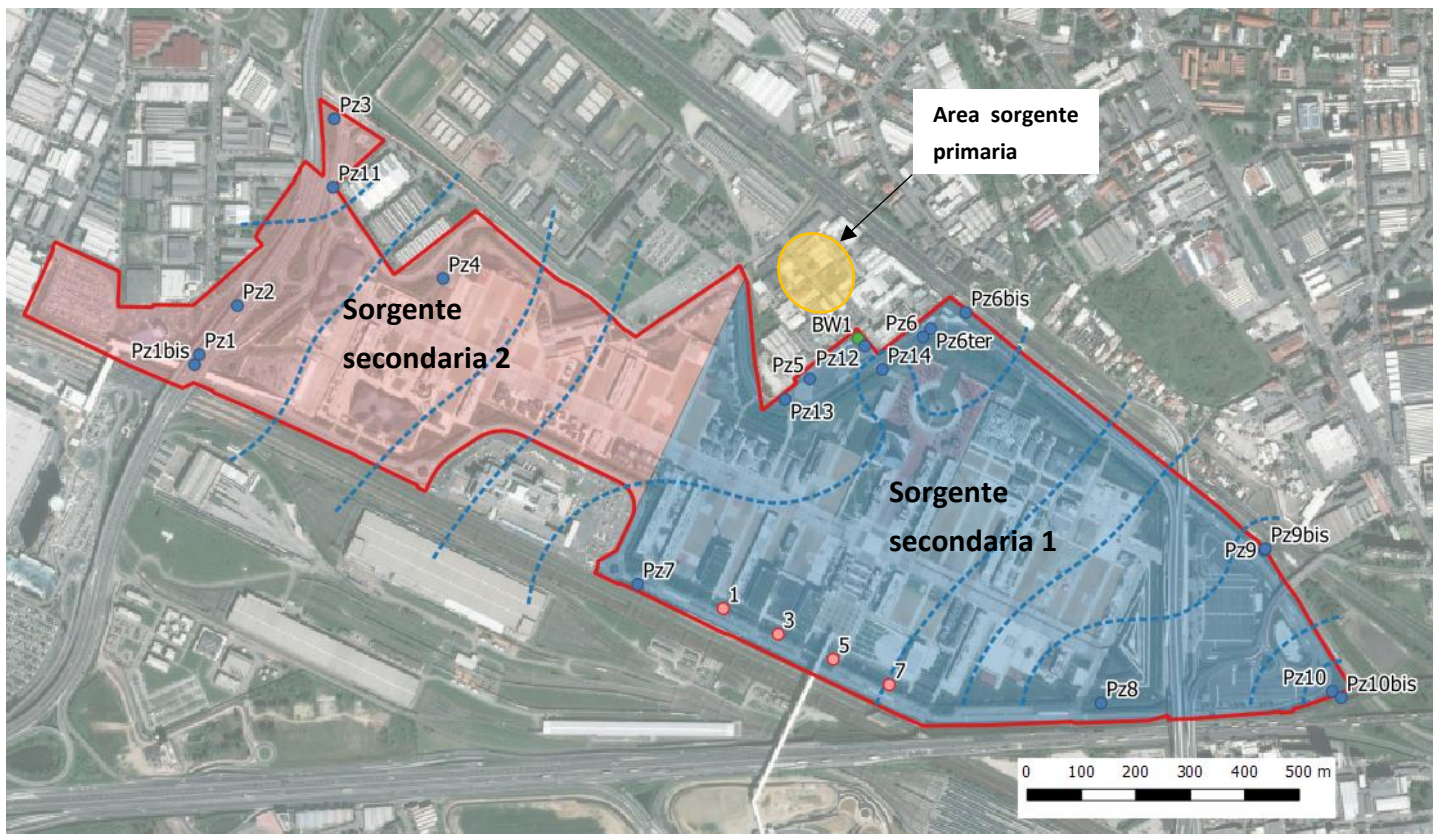


Figura 10 - Individuazione delle sorgenti di contaminazione

#### 4.4 Determinazione delle Concentrazioni Rappresentative alla Sorgente

Per la determinazione delle Concentrazioni Rappresentative alla Sorgente dei contaminanti indicatori, relativamente a ciascuna delle due sorgenti secondarie di contaminazione individuate al paragrafo precedente, si è proceduto all'analisi statistica dei dati con il software proUCL. Conformemente a quanto previsto dalle linee guida APAT (2008) per l'Analisi di Rischio la concentrazione rappresentativa è stata posta, per ciascun contaminante, pari al valore di UCL 95% (*Upper Confidence Limit*) relativo alla distribuzione considerata. Ciascuna distribuzione è stata composta considerando le serie di dati relative a tutti i piezometri facenti parte della distribuzione stessa; in particolare, per la sorgente secondaria n.1 sono state considerate le serie di dati facenti parte della distribuzione n.1, per la sorgente secondaria n.2 sono state considerate le serie di dati facenti parte della distribuzione n.2. In allegato 3 si riportano le elaborazioni effettuate.

Nella tabella di seguito si riassumono, per ciascuna delle due sorgenti, le serie di dati considerate ed i valori di UCL 95% ottenuti dall'analisi statistica, corrispondenti ai valori di Concentrazione Rappresentativa alla Sorgente considerati per l'Analisi di Rischio.

	Serie di dati considerate Sorgente 1	UCL 95 Sorgente 1	Serie di dati considerate Sorgente 2	UCL 95 Sorgente 2
<b>1,2-dicloroetilene (cis+trans) (µg/l)</b>	PZ6 PZ9 PZ12 PZ14	<b>25,42</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ7 PZ8 PZ10 PZ11	<b>1,24</b>
<b>1,1,2,2-Tetracloroetano (µg/l)</b>	PZ6 PZ9 PZ10 PZ12 PZ14	<b>0,0185</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ7 PZ8 PZ11	<b>0,00727</b>
<b>1,1,2-Tricloroetano (µg/l)</b>	PZ12 PZ14	<b>0,198</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ6 PZ7 PZ8 PZ9 PZ10 PZ11	<b>0,0218</b>
<b>1,1-Dicloroetilene (µg/l)</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ5 PZ7 PZ12 PZ14	<b>2,867</b>	PZ1 PZ2 PZ3 PZ4 PZ6 PZ8 PZ9 PZ10 PZ11	<b>0,326</b>
<b>1,2,3-Tricloropropano (µg/l)</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ4 PZ5 PZ7 PZ12 PZ14	<b>0,0115</b>	PZ1 PZ2 PZ3 PZ6 PZ8 PZ9 PZ10 PZ11	<b>0,00573</b>
<b>1,2-Dicloropropano (µg/l)</b>	PZ6 PZ9 PZ12 PZ14	<b>0,366</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ7 PZ8 PZ10 PZ11	<b>0,0593</b>
<b>Cloroformio (µg/l)</b>	PZ6 PZ9 PZ12 PZ14	<b>15,5</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ7 PZ8 PZ10 PZ11	<b>1,148</b>
<b>Cloruro di vinile (µg/l)</b>	PZ9	<b>0,257</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ6 PZ7 PZ8 PZ10 PZ11 PZ12 PZ14	<b>0,0438</b>
<b>Tetracloroetilene (µg/l)</b>	PZ12 PZ14	<b>337,8</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ1 PZ2 PZ3 PZ4 PZ5 PZ6 PZ7 PZ8 PZ9 PZ10 PZ11	<b>14,15</b>
<b>Tricloroetilene (µg/l)</b>	POZZO 1 POZZO 3 POZZO 5 POZZO 7 PZ5 PZ6 PZ9 PZ10 PZ12 PZ14	<b>3,607</b>	PZ1 PZ2 PZ3 PZ4 PZ7 PZ8 PZ11	<b>0,365</b>

Tabella 5 - Concentrazioni Rappresentative alla Sorgente

Si specifica che preliminarmente alla scelta di adottare, quale valore rappresentativo della contaminazione, l'UCL 95% delle serie storiche dei dati, è stata effettuata un'analisi temporale degli stessi al fine di verificarne la stazionarietà. In particolare, è stato verificato che i monitoraggi periodici effettuati sull'area non mostrano attualmente la presenza di trend positivi di concentrazione per i contaminanti indicatori considerati. I valori di CRS individuati, pertanto, possono essere considerati rappresentativi, con un adeguato margine di sicurezza, dello stato di contaminazione delle acque sotterranee del sito, e pertanto idonei per le elaborazioni di Analisi di Rischio di cui al presente documento.

## 5 PROGETTO DI RIQUALIFICAZIONE DELL'AREA

L'obiettivo del PII Post Expo è quello di creare un punto di unione fra il tessuto urbano milanese e il polo fieristico Rho-Pero attraverso la riqualificazione definitiva dell'ex sito espositivo Expo 2015, creando una nuova centralità connessa con il mondo.

Il progetto di riqualificazione, illustrato nella figura seguente, prevede differenti destinazioni d'uso all'interno della superficie in esame, con una prevalenza di servizi di carattere pubblico e di spazi a destinazione culturale. In particolare, l'area accoglierà un parco scientifico e tecnologico, denominato Milano Innovation District (MIND), con l'obiettivo di creare un connubio fra sviluppo economico, innovazione e conoscenza. Al suo interno troveranno posto il polo di ricerca scientifica Human Technopole, il campus universitario scientifico dell'Università degli studi di Milano, l'Istituto Ortopedico Galeazzi e gli uffici e i laboratori di una lunga serie di imprese private attive nei settori della ricerca scientifica, medica e farmaceutica, delle life sciences.



Figura 11 - Progetto di riqualificazione dell'area - Masterplan

## 6 VALUTAZIONE DEL RISCHIO SANITARIO PER I VAPORI PROVENIENTI DALLA FALDA

Nel presente capitolo è presentata la valutazione del rischio sanitario relativa ai vapori provenienti dalla falda, con riferimento alle previsioni urbanistiche e edilizie in progetto per l'area.

### 6.1 Criteri generali dell'Analisi di Rischio

Il Risk Assessment (o Valutazione del Rischio) è definito come il “processo sistematico per la stima di tutti i fattori di rischio significativi che intervengono in uno scenario di esposizione causato dalla presenza di pericoli”, ovvero la stima delle conseguenze sulla salute umana di un evento potenzialmente dannoso, in termini di probabilità che le stesse conseguenze si verifichino.

Il processo di valutazione - per sua stessa natura - fornisce il grado di importanza dei rischi potenziali esaminati per il caso specifico, da confrontare con una base di riferimento univoca; tale giudizio è il livello di accettabilità/attenzione/necessità di bonifica fissato in linee guida stabilite da parte di Enti ed Organismi di programmazione e salvaguardia ambientale nazionali e/o internazionali.

Il rischio (R) è inteso come la concomitanza della probabilità di accadimento di un evento dannoso (P) e dell'entità del danno provocato dall'evento stesso (D):

$$R = P * D$$

Il danno conseguente all'evento accidentale (D) è dato dal prodotto tra un fattore di pericolosità (Fp), dipendente dall'entità del possibile danno, ed un fattore di contatto (Fe), funzione della durata dell'esposizione:

$$D = Fp * Fe$$

Nel caso di siti inquinati, la probabilità (P) di accadimento dell'evento è conclamata ( $P=1$ ), il fattore di pericolosità è dato dalla tossicità dell'inquinante ( $T [mg/kg d]^{-1}$ ) ed il fattore di contatto è espresso in funzione della portata effettiva di esposizione ( $E [mg/kg d]$ ), per cui il rischio (R) derivante da un sito contaminato è dato dalla seguente espressione:

$$R = E * T$$

Dove  $E [mg/kg d]$  rappresenta l'assunzione cronica giornaliera del contaminante e  $T [mg/kg d]^{-1}$  la tossicità dello stesso. Il risultato R viene poi confrontato con i criteri di accettabilità individuali e cumulativi del rischio sanitario, per decidere se esistono o meno condizioni in grado di causare effetti sanitari nocivi.

Il calcolo del rischio si differenzia a seconda che l'inquinante sia cancerogeno oppure non-cancerogeno.

Per le sostanze cancerogene:



$$R = E * SF$$

Dove R (Rischio [adim]) rappresenta la probabilità di casi incrementali di tumore nel corso della vita, causati dall'esposizione alla sostanza, rispetto alle condizioni di vita usuali, SF (Slope Factor [mg/kg d]<sup>-1</sup>) indica la probabilità di casi incrementali di tumore nella vita per unità di dose.

Per le sostanze non cancerogene:

$$HQ = E / RID$$

Dove HQ (Hazard Quotient [adim]) è un "Indice di Pericolo" che esprime quanto l'esposizione alla sostanza supera la dose tollerabile di riferimento, RID (Reference Dose [mg/kg d]) è la stima dell'esposizione media giornaliera che non produce effetti avversi apprezzabili sull'organismo umano durante il corso della vita.

La procedura di analisi di rischio può essere condotta in modalità diretta (forward mode) o inversa (backward mode). La modalità diretta permette di stimare il rischio sanitario per il recettore esposto, sia posto in prossimità del sito (on-site) che ad una certa distanza (off-site), conoscendo la concentrazione in corrispondenza della sorgente di contaminazione.

Avendo invece fissato il livello di rischio per la salute ritenuto accettabile per il recettore esposto, la modalità inversa permette il calcolo della massima concentrazione in sorgente compatibile con la condizione di accettabilità del rischio.

Nel caso in esame, lo strumento di Analisi di Rischio è stato utilizzato unicamente per effettuare una valutazione in modalità diretta dei rischi sanitari legati ai percorsi di volatilizzazione, in relazione alle concentrazioni di contaminanti rilevate nelle acque di falda.

Le elaborazioni di Analisi di Rischio sono state effettuate con il software Risk-net 3.0.

### 6.1.1 Risk-net

Il software Risk-net è stato sviluppato nell'ambito della rete RECONnet (Rete Nazionale sulla gestione e la Bonifica dei Siti Contaminati) su iniziativa del Dipartimento di Ingegneria Civile dell'Università di Roma "Tor Vergata". Il software permette di calcolare il rischio e gli obiettivi di bonifica legato alla presenza di contaminanti all'interno di un sito, applicando la procedura APAT-ISPRA di analisi di rischio sanitaria ("Criteri metodologici l'applicazione dell'analisi assoluta di rischio ai siti contaminati"; APAT-ISPRA 2008) in accordo con quanto previsto dalla normativa italiana (D.Lgs.152/06 e D.Lgs.04/08). Per la presente elaborazione è stato utilizzato il software Risk-net nell'ultima release, corrispondente alla versione 3.0.

Il calcolo del rischio per l'uomo con il software Risk-net avviene in modo diretto ("Forward"), ossia in associazione alla concentrazione rilevata in sorgente, mentre quella degli obiettivi di bonifica sito-specifici



(CSR, concentrazioni soglia di rischio) avviene in maniera indiretta ("Backward"), definendo i limiti di accettabilità del rischio e dell'indice di pericolo.

Per ogni percorso di esposizione attivato dall'utente vengono calcolate, attraverso i modelli analitici di trasporto descritti nelle linee guida APAT-ISPRA (2008), le concentrazioni massime attese in condizioni stazionarie al punto di esposizione. I suddetti modelli considerano la ripartizione dei contaminanti nelle diverse fasi del suolo e l'attenuazione subita durante la migrazione dalla sorgente al punto di esposizione.

Sulla base dei parametri di esposizione definiti dall'utente, viene successivamente calcolata la dose giornaliera dei diversi ricettori, che, combinata con i corrispondenti parametri tossicologici e con le concentrazioni al punto di esposizione, viene utilizzata nel calcolo del rischio e degli obiettivi di bonifica (CSR). Per ciascun contaminante vengono in seguito cumulati gli effetti legati alla presenza di più vie di esposizione attive e vengono calcolati gli obiettivi di bonifica e i rischi individuali (legati alla singola sostanza) e cumulativi (derivanti dalla presenza di più sostanze).

Riguardo le proprietà chimico-fisiche e tossicologiche degli inquinanti indicatori il software descritto utilizza i valori contenuti nella Banca dati ISS-ISPEL (marzo 2018).

## **6.2 Parametri di input**

### **6.2.1 Percorsi di esposizione**

Le vie di esposizione della contaminazione considerata sono i percorsi indiretti di volatilizzazione da falda:

- Inalazione di vapori indoor;
- Inalazione di vapori outdoor.

### **6.2.2 Recettori e fattori di esposizione**

In merito alla via di esposizione indoor, i locali interrati previsti dal progetto edilizio dell'area saranno adibiti a parcheggi o locali tecnici, e non prevedranno la presenza continuativa di persone. In via cautelativa, è stato considerato, comunque, un potenziale recettore adulto in scenario di esposizione di tipo commerciale/industriale (esposizione di 8 h/gg).

Dal momento che sull'area è prevista la realizzazione di edifici ad uso residenziale, per maggiore cautela è stata implementata anche un'elaborazione prevedendo un recettore indoor adulto/bambino in scenario residenziale, considerando una possibile presenza continuativa di persone nei locali posti a piano terra.

Per ciascuno dei due recettori (residenziale/commerciale) è stata valutata anche la via di esposizione outdoor.

### 6.2.3 Parametri del sito

Nella tabella seguente si riporta il riepilogo dei parametri del sito, relativamente alle due sorgenti considerate.

Geometria sorgente	Simbolo	Sorgente 1	Sorgente 2	UM	Note
Altezza della zona di miscelazione in aria	$\delta_{air}$	2	2	m	default
Estensione della sorgente nella direzione principale del vento	W'	1332	1172	m	sito-specifico
Soggiacenza della falda da p.c.	Lgw	6,63	6,02	m	sito-specifico
Zona insatura	Simbolo	Sorgente 1	Sorgente 2	UM	
Tessitura rappresentativa del suolo insaturo	-	Loamy sand	Loamy sand	-	sito-specifico
pH del suolo	pH	6.8	6.8	-	default
Ambiente outdoor	Simbolo	Sorgente 1	Sorgente 2	UM	
Velocità del vento	Uair	0.86	0.86	m/s	sito-specifico
Velocità del vento misurata nella centralina meteo	Uair,sm	1.28	1.28	m/s	sito-specifico
Altezza della centralina meteo	Hsm	10	10	m	default
Coefficiente di dispersione trasversale	$\sigma_y$	15.69	15.69	m	sito-specifico
Coefficiente di dispersione verticale	$\sigma_z$	13.79	13.79	m	sito-specifico
Ambiente indoor	Simbolo	Sorgente 1	Sorgente 2	UM	
Profondità delle fondazioni da p.c.	Z crack	0.15-4	0.15-4	m	sito-specifico
Spessore delle fondazioni	L crack	0.15	0.15	m	default
Frazione areale di fratture indoor	$\eta$	0.01	0.01	m <sup>2</sup> /m <sup>2</sup>	default
Rapporto tra volume indoor ed area di infiltrazione	Lb	2	2	m	default
Contenuto volumetrico di acqua nelle fondazioni	$\theta_{w,crack}$	0.12	0.12	-	default
Contenuto volumetrico di aria nelle fondazioni	$\theta_{a,crack}$	0.26	0.26	-	default
Tasso di ricambio di aria indoor	ER	0.00014	0.00014	1/s	default
Differenza di pressione tra outdoor e indoor	$\Delta p$	0	0	g/cm/s <sup>2</sup>	default

Tabella 6 - Dati di input

Note ai parametri introdotti:

- Estensione della sorgente nella direzione prevalente del vento: per ciascuna sorgente è stata definita l'estensione in relazione alla direzione prevalente del vento (cfr. paragrafo 3.3.3). La direzione considerata, tra le due maggiormente frequenti, è ESE, in quanto corrispondente a quella maggiormente cautelativa in relazione allo sviluppo planimetrico dell'area (dimensione massima);
- Soggiacenza della falda: in relazione all'elevato numero di dati a disposizione (>10 per ciascun piezometro), è stato valutato il valore maggiormente conservativo per ciascun piezometro corrispondente all'LCL 95% di ciascuna serie di dati. Per ciascuna sorgente è stato considerato il valore minimo dei LCL relativi ai piezometri ricadenti sulla stessa. In allegato 4 si riportano le elaborazioni effettuate con il software proUCL;
- Tessitura del suolo: per i parametri del suolo insaturo sono stati considerati i valori di default proposti dal software per la tessitura loamy-sand, ritenuta rappresentativa delle granulometrie prevalenti dei terreni del sito sulla base delle analisi granulometriche a disposizione. In particolare, con riferimento

### Valutazione del rischio sanitario per i vapori provenienti dalla falda

a quanto riportato al paragrafo 3.1, è stato elaborato il triangolo USDA come previsto dalle linee guida APAT (2008), al fine di identificare la frazione granulometrica prevalente come riportato in figura seguente.

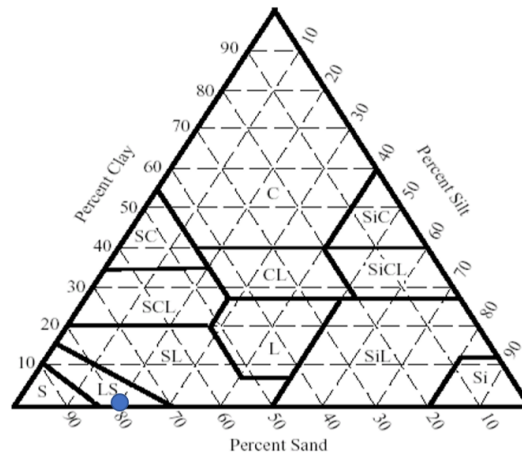


Figura 12 – Triangolo USDA

- Velocità del vento: è stata considerata la velocità minima tra le medie annue relative agli ultimi 10 anni di osservazioni nella centralina meteo ARPA di riferimento (cfr. paragrafo 3.3.3). Per i coefficienti di dispersione in atmosfera è stata considerata una classe di stabilità atmosferica "D" relativa al suolo urbano che, secondo le linee guida APAT (2008) corrisponde a quella che si verifica con maggiore frequenza;
- Profondità delle fondazioni: per la simulazione in scenario indoor residenziale è stata considerata una profondità delle fondazioni pari a 0,15, corrispondente al valore di default previsto dal software (la simulazione riguarda un locale indoor a piano terra). Per la simulazione in scenario indoor commerciale/industriale è considerata la presenza di un piano interrato, conformemente alle previsioni edilizie di progetto per l'area. La profondità delle fondazioni è stata posta, cautelativamente, pari a 4m. **Si evidenzia in ogni caso che, pur variando la profondità dell'interrato (fin oltre il livello di falda), il risultato della simulazione non cambia in termini di accettabilità del rischio;**
- Parametri locali indoor: In merito agli altri parametri relativi all'ambiente indoor, in assenza di dati sito-specifici relativi agli edifici in progetto, è stato considerato il valore di default cautelativo previsto dal software. Si specifica, in particolare, che, per lo scenario residenziale (piano terra), il valore di rapporto tra volume indoor ed area di infiltrazione considerato è cautelativo in quanto l'area di infiltrazione teorica considerata risulta estesa anche alle pareti del locale.

### 6.3 Calcolo del rischio

Si riportano, di seguito, i risultati della valutazione diretta del rischio per gli scenari di esposizione considerati.

Nella tabella sono indicati i valori di rischio cancerogeno (R) e di indice di pericolo (HI) per ciascun parametro e per ciascuno scenario considerato. Per ciascuno scenario sono riportati, inoltre, i valori cumulati di rischio ed indice di pericolo per le vie di esposizione indoor ed outdoor.

Contaminante	Sorgente 1 - scenario residenziale		Sorgente 1 - scenario commerciale		Sorgente 2 - scenario residenziale		Sorgente 2 - scenario commerciale	
	R (HH)	HI (HH)	R (HH)	HI (HH)	R (HH)	HI (HH)	R (HH)	HI (HH)
	-	-	-	-	-	-	-	-
Dicloroetilene (1,2)	-	2.12e-3	-	3.95e-4	-	1.05e-4	-	2.15e-5
Tetracloroetano (1,1,2,2)	3.31e-10	-	3.63e-11	-	1.33e-10	-	1.50e-11	-
Tricloroetano (1,1,2)	2.20e-9	1.61e-3	2.75e-10	2.40e-4	2.47e-10	1.80e-4	3.24e-11	2.83e-5
Dicloroetilene (1,1)	-	2.77e-4	-	5.63e-5	-	3.18e-5	-	7.27e-6
Tricloropropano (1,2,3)	-	2.96e-5	-	3.94e-6	-	1.51e-5	-	2.07e-6
Dicloropropano (1,2)	1.97e-9	3.11e-4	2.94e-10	5.56e-5	3.23e-10	5.09e-5	5.26e-11	9.96e-6
Triclorometano	6.52e-7	6.75e-4	9.92e-8	1.23e-4	4.88e-8	5.05e-5	8.15e-9	1.01e-5
Cloruro di vinile	1.45e-8	6.42e-5	2.06e-9	1.31e-5	2.49e-9	1.10e-5	3.98e-10	2.53e-6
Tetracloroetilene	3.31e-7	7.43e-2	5.49e-8	1.48e-2	1.40e-8	3.14e-3	2.60e-9	6.99e-4
Tricloroetilene	8.33e-8	1.32e-2	7.55e-9	2.58e-3	8.50e-9	1.34e-3	8.60e-10	2.94e-4
<b>Cumulato Outdoor (On-site)</b>	<b>2.81e-7</b>	<b>2.30e-2</b>	<b>5.39e-8</b>	<b>5.47e-3</b>	<b>1.71e-8</b>	<b>1.09e-3</b>	<b>3.21e-9</b>	<b>2.59e-4</b>
<b>Cumulato Indoor (On-site)</b>	<b>1.09e-6</b>	<b>9.26e-2</b>	<b>1.64e-7</b>	<b>1.82e-2</b>	<b>7.44e-8</b>	<b>4.92e-3</b>	<b>1.21e-8</b>	<b>1.07e-3</b>

Tabella 7 - Risultati dell'AdR

Conformemente alle linee guida APAT (2008) per l'Analisi di Rischio, il rischio cancerogeno per singola sostanza risulta tollerabile per  $R < 10E-06$ , il rischio cumulato per  $R < 10E-05$ . L'indice di pericolo risulta tollerabile per  $H < 1$ , sia per singola sostanza che cumulato.

**Come si può osservare in tabella, il rischio risulta accettabile per tutte le sostanze e vie di esposizione considerate, sia per l'uso residenziale che per l'uso commerciale.**

## 7 CONCLUSIONI

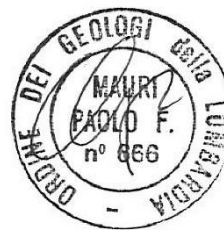
Nel presente documento è illustrata la valutazione del rischio sanitario relativo ai vapori provenienti dalla falda dell'area MIND (ex sito Expo Milano 2015) per i futuri fruitori dell'area, in relazione alle previsioni di sviluppo della stessa. La valutazione è stata condotta con lo strumento dell'Analisi di Rischio a partire dai dati idrochimici relativi ai monitoraggi periodici effettuati sulle acque sotterranee del sito nel periodo 2011-2018, con riferimento allo stato di contaminazione residua della falda in considerazione dell'attuale attività della barriera idraulica in essere sul sito.

Le elaborazioni hanno mostrato rischi accettabili sia per l'uso residenziale che commerciale, pur con le assunzioni cautelative adottate relativamente all'uso futuro delle aree ed alle caratteristiche delle strutture di progetto.

Si evidenzia che, in considerazione dei parametri cautelativi adottati relativamente agli edifici ed agli ambienti indoor/outdoor, nonché alla tipologia di recettori considerati e relativi fattori di esposizione, le simulazioni descritte nel presente documento possono ritenersi valide anche per l'uso attuale dell'area, attestando l'assenza di rischi relativi ai vapori provenienti dalla falda anche nello scenario attuale.

**AMBIENTE SPA**

Paolo Mauri  
Dot. Geol. O.G.L. 666





# ALLEGATI

---

**ALLEGATO 1 – SERIE STORICHE DATI METEOCLIMATICI**

---

**SOLO SU SUPPORTO INFORMATICO**

---

**ALLEGATO 2 – ELABORAZIONE STATISTICA PER INDIVIDUAZIONE OUTLIER (PROUCL)**

---

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 16:58:46

From File Base.xls

Full Precision OFF

**1,1Dichloroethylene**

### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 5,223 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,117

For 10% significance level, 5,223 is not an outlier.

For 5% significance level, 5,223 is not an outlier.

For 1% significance level, 5,223 is not an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,157

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 6,8 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,408

For 10% significance level, 6,8 is not an outlier.

For 5% significance level, 6,8 is not an outlier.

For 1% significance level, 6,8 is not an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,155

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.



### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 5,219 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,098

For 10% significance level, 5,219 is not an outlier.

For 5% significance level, 5,219 is not an outlier.

For 1% significance level, 5,219 is not an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,193

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 7,9 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,368

For 10% significance level, 7,9 is not an outlier.

For 5% significance level, 7,9 is not an outlier.

For 1% significance level, 7,9 is not an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,212

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,0204  
**Standard Deviation** 0,0289  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,0204	0,0284	0,130	25,00	3,855	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,130

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,130

### Rosner's Outlier Test for PZ2

**Mean** 0,382  
**Standard Deviation** 0,275  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,382	0,270	1,100	13,00	2,657	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ3

**Mean** 0,0477  
**Standard Deviation** 0,0599  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,0477	0,0589	0,270	1,000	3,772	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,270

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,270

#### Rosner's Outlier Test for PZ4

**Mean** 0,376  
**Standard Deviation** 1,354  
**Number of data** 32  
**Number of suspected outliers** 1

			Potential		Obs.	Test	Critical	Critical
#	Mean	sd	outlier		Number	value	value (5%)	value (1%)
1	0,376	1,333	7,770		12,00	5,548	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 7,770

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 7,770

#### Rosner's Outlier Test for PZ5

**Mean** 2,297  
**Standard Deviation** 3,087  
**Number of data** 33  
**Number of suspected outliers** 1

			Potential		Obs.	Test	Critical	Critical
#	Mean	sd	outlier		Number	value	value (5%)	value (1%)
1	2,297	3,040	12,87		9,000	3,476	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 12,87

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 12,87

#### Rosner's Outlier Test for PZ6

**Mean** 0,238  
**Standard Deviation** 0,514  
**Number of data** 33  
**Number of suspected outliers** 1

			Potential		Obs.	Test	Critical	Critical
#	Mean	sd	outlier		Number	value	value (5%)	value (1%)
1	0,238	0,506	2,380		1,000	4,232	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 2,380

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 2,380

#### Rosner's Outlier Test for PZ7

**Mean** 1,421  
**Standard Deviation** 3,102  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1,421	3,055	18,22	13,00	5,500	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 18,22

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 18,22

#### Rosner's Outlier Test for PZ8

**Mean** 0,0526  
**Standard Deviation** 0,100  
**Number of data** 34  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0526	0,0987	0,570	33,00	5,245	2,970	3,300

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,570

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,570

#### Rosner's Outlier Test for PZ9

**Mean** 0,338  
**Standard Deviation** 1,010  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,338	0,994	5,600	1,000	5,294	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,600

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,600

#### Rosner's Outlier Test for PZ10

Mean 0,0204  
Standard Deviation 0,0222  
Number of data 33  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,0204	0,0219	0,0900	1,000	3,181	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,0900

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,0825  
Standard Deviation 0,114  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,0825	0,112	0,600	26,00	4,629	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,600

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,600



### Dixon's Outlier Test for PZ12

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 7,3 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,368

For 10% significance level, 7,3 is not an outlier.

For 5% significance level, 7,3 is not an outlier.

For 1% significance level, 7,3 is not an outlier.

#### 2. Observation Value 0,005 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,047

For 10% significance level, 0,005 is not an outlier.

For 5% significance level, 0,005 is not an outlier.

For 1% significance level, 0,005 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 4,7 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,418

For 10% significance level, 4,7 is not an outlier.

For 5% significance level, 4,7 is not an outlier.

For 1% significance level, 4,7 is not an outlier.

#### 2. Observation Value 0,005 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,238

For 10% significance level, 0,005 is not an outlier.

For 5% significance level, 0,005 is not an outlier.

For 1% significance level, 0,005 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 16:39:03

From File Base.xls

Full Precision OFF

### 1,2-dicloroetilene (cis-trans)

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 1 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,602

For 10% significance level, 1 is an outlier.

For 5% significance level, 1 is an outlier.

For 1% significance level, 1 is an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,318

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 2,3 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,668

For 10% significance level, 2,3 is an outlier.

For 5% significance level, 2,3 is an outlier.

For 1% significance level, 2,3 is an outlier.

#### 2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,102

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,677

For 10% significance level, 1 is an outlier.

For 5% significance level, 1 is an outlier.

For 1% significance level, 1 is an outlier.

#### **2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,506

For 10% significance level, 0,016 is an outlier.

For 5% significance level, 0,016 is an outlier.

For 1% significance level, 0,016 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 6,68 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,692

For 10% significance level, 6,68 is an outlier.

For 5% significance level, 6,68 is an outlier.

For 1% significance level, 6,68 is an outlier.

#### **2. Observation Value 0,016 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,240

For 10% significance level, 0,016 is not an outlier.

For 5% significance level, 0,016 is not an outlier.

For 1% significance level, 0,016 is not an outlier.

### Dixon's Outlier Test for PZ1

Number of Observations = 15

10% critical value: 0,472

5% critical value: 0,525

1% critical value: 0,616

#### 1. Observation Value 2,9 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,850

For 10% significance level, 2,9 is an outlier.

For 5% significance level, 2,9 is an outlier.

For 1% significance level, 2,9 is an outlier.

#### 2. Observation Value 0,02 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,119

For 10% significance level, 0,02 is not an outlier.

For 5% significance level, 0,02 is not an outlier.

For 1% significance level, 0,02 is not an outlier.

### Rosner's Outlier Test for PZ2

**Mean** 0,748  
**Standard Deviation** 1,452  
**Number of data** 31  
**Number of suspected outliers** 1

#	Potential			Obs. Number	Test value	Critical value (5%)	Critical value (1%)
	Mean	sd	outlier				
1	0,748	1,428	5,000	4,000	2,978	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 5,000

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ3

**Mean** 0,717  
**Standard Deviation** 1,458  
**Number of data** 31  
**Number of suspected outliers** 1

#	Potential			Obs. Number	Test value	Critical value (5%)	Critical value (1%)
	Mean	sd	outlier				
1	0,717	1,435	5,000	4,000	2,985	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 5,000

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ4

**Mean** 0,640  
**Standard Deviation** 1,226  
**Number of data** 30  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,640	1,206	5,000	4,000	3,617	2,910	3,240

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 5,000

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 5,000

#### Rosner's Outlier Test for PZ5

**Mean** 0,885  
**Standard Deviation** 1,461  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,885	1,437	5,000	4,000	2,864	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ6

**Mean** 12,10  
**Standard Deviation** 13,57  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	12,10	13,35	47,30	28,00	2,637	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier



#### Rosner's Outlier Test for PZ7

**Mean** 0,787  
**Standard Deviation** 1,480  
**Number of data** 30  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,787	1,455	5,000	3,000	2,895	2,910	3,240

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

**Mean** 1,217  
**Standard Deviation** 1,433  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	1,217	1,409	5,000	4,000	2,684	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 14,01  
**Standard Deviation** 20,46  
**Number of data** 30  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	14,01	20,12	98,70	9,000	4,210	2,910	3,240

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 98,70

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 98,70

### Rosner's Outlier Test for PZ10

Mean 1,789  
Standard Deviation 1,641  
Number of data 31  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	1,789	1,614	5,000	4,000	1,989	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ11

Mean 0,715  
Standard Deviation 1,483  
Number of data 30  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,715	1,458	5,000	3,000	2,940	2,910	3,240

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

For 1% Significance Level, there is no Potential Outlier

### Dixon's Outlier Test for PZ12

Number of Observations = 15  
10% critical value: 0,472  
5% critical value: 0,525  
1% critical value: 0,616

#### 1. Observation Value 360 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,731

For 10% significance level, 360 is an outlier.  
For 5% significance level, 360 is an outlier.  
For 1% significance level, 360 is an outlier.

#### 2. Observation Value 0,044 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,042

For 10% significance level, 0,044 is not an outlier.  
For 5% significance level, 0,044 is not an outlier.  
For 1% significance level, 0,044 is not an outlier.

### **Dixon's Outlier Test for PZ14**

Number of Observations = 15

10% critical value: 0,472

5% critical value: 0,525

1% critical value: 0,616

#### **1. Observation Value 87,7 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,347

For 10% significance level, 87,7 is not an outlier.

For 5% significance level, 87,7 is not an outlier.

For 1% significance level, 87,7 is not an outlier.

#### **2. Observation Value 12,7 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,030

For 10% significance level, 12,7 is not an outlier.

For 5% significance level, 12,7 is not an outlier.

For 1% significance level, 12,7 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:09:59

From File Base.xls

Full Precision OFF

### 1,2 Dicloropropano

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,12 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,12 is not an outlier.

For 5% significance level, 0,12 is not an outlier.

For 1% significance level, 0,12 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,055

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,13 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,333

For 10% significance level, 0,13 is not an outlier.

For 5% significance level, 0,13 is not an outlier.

For 1% significance level, 0,13 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,476 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,807

For 10% significance level, 0,476 is an outlier.

For 5% significance level, 0,476 is an outlier.

For 1% significance level, 0,476 is an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 0,159 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,195

For 10% significance level, 0,159 is not an outlier.

For 5% significance level, 0,159 is not an outlier.

For 1% significance level, 0,159 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,0225  
**Standard Deviation** 0,0265  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0225	0,0261	0,140	1,000	4,502	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,140

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,140

### Rosner's Outlier Test for PZ2

**Mean** 0,0534  
**Standard Deviation** 0,156  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0534	0,153	0,900	3,000	5,524	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,900

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,900

### Rosner's Outlier Test for PZ3

**Mean** 0,0165  
**Standard Deviation** 0,0127  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0165	0,0125	0,0500	3,000	2,669	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ4

Mean 0,0342  
Standard Deviation 0,0530  
Number of data 31  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0342	0,0521	0,277	16,00	4,658	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,277

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,277

#### Rosner's Outlier Test for PZ5

Mean 0,0575  
Standard Deviation 0,0436  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0575	0,0430	0,140	25,00	1,920	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ6

Mean 0,349  
Standard Deviation 0,327  
Number of data 33  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,349	0,322	0,960	27,00	1,901	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier



#### Rosner's Outlier Test for PZ7

**Mean** 0,0558  
**Standard Deviation** 0,0598  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0558	0,0589	0,188	16,00	2,246	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

**Mean** 0,0515  
**Standard Deviation** 0,0590  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0515	0,0581	0,280	1,000	3,931	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,280

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,280

#### Rosner's Outlier Test for PZ9

**Mean** 0,235  
**Standard Deviation** 0,241  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,235	0,237	1,130	9,000	3,775	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,130

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,130

#### Rosner's Outlier Test for PZ10

Mean 0,0448  
Standard Deviation 0,0468  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0448	0,0461	0,193	16,00	3,217	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,193

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,0160  
Standard Deviation 0,0117  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0160	0,0116	0,0500	3,000	2,945	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0500

For 1% Significance Level, there is no Potential Outlier

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 0,45 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,350

For 10% significance level, 0,45 is not an outlier.  
For 5% significance level, 0,45 is not an outlier.  
For 1% significance level, 0,45 is not an outlier.

##### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.  
For 5% significance level, 0,01 is not an outlier.  
For 1% significance level, 0,01 is not an outlier.

### **Dixon's Outlier Test for PZ14**

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### **1. Observation Value 0,509 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,397

For 10% significance level, 0,509 is not an outlier.

For 5% significance level, 0,509 is not an outlier.

For 1% significance level, 0,509 is not an outlier.

#### **2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 16:52:57

From File Base.xls

Full Precision OFF

### 1,1,2 Tricloroetano

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,037 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,630

For 10% significance level, 0,037 is an outlier.

For 5% significance level, 0,037 is an outlier.

For 1% significance level, 0,037 is an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,02 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,02 is not an outlier.

For 5% significance level, 0,02 is not an outlier.

For 1% significance level, 0,02 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,02 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,02 is not an outlier.

For 5% significance level, 0,02 is not an outlier.

For 1% significance level, 0,02 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,458

For 10% significance level, 0,05 is not an outlier.

For 5% significance level, 0,05 is not an outlier.

For 1% significance level, 0,05 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Rosner's Outlier Test for PZ1

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ2

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ3

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ4

**Mean** 0,0163  
**Standard Deviation** 0,00496  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0163	0,00488	0,00500	1,000	2,320	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ5

**Mean** 0,0171  
**Standard Deviation** 0,00643  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0171	0,00633	0,0400	13,00	3,624	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0400

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0400

#### Rosner's Outlier Test for PZ6

**Mean** 0,0349  
**Standard Deviation** 0,0820  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0349	0,0807	0,480	1,000	5,515	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,480

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,480



#### Rosner's Outlier Test for PZ7

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

Mean 0,0286  
Standard Deviation 0,0679  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0286	0,0669	0,400	1,000	5,554	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,400

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,400

#### Rosner's Outlier Test for PZ10

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,0164  
Standard Deviation 0,00492  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0164	0,00485	0,00500	1,000	2,360	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Dixon's Outlier Test for PZ12

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 0,653 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,891

For 10% significance level, 0,653 is an outlier.

For 5% significance level, 0,653 is an outlier.

For 1% significance level, 0,653 is an outlier.

##### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,626 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,659

For 10% significance level, 0,626 is an outlier.

For 5% significance level, 0,626 is an outlier.

For 1% significance level, 0,626 is an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:04:28

From File Base.xls

Full Precision OFF

**1,2,3Tricloropropano**

### Dixon's Outlier Test for POZZO 1

Number of Observations = 9

10% critical value: 0,441

5% critical value: 0,512

1% critical value: 0,635

#### 1. Observation Value 0,021 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,021 is not an outlier.

For 5% significance level, 0,021 is not an outlier.

For 1% significance level, 0,021 is not an outlier.

#### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,043

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,021 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,005

For 10% significance level, 0,021 is not an outlier.

For 5% significance level, 0,021 is not an outlier.

For 1% significance level, 0,021 is not an outlier.

#### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,043

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,0579 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,473

For 10% significance level, 0,0579 is an outlier.

For 5% significance level, 0,0579 is not an outlier.

For 1% significance level, 0,0579 is not an outlier.

#### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,029

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,0371 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,252

For 10% significance level, 0,0371 is not an outlier.

For 5% significance level, 0,0371 is not an outlier.

For 1% significance level, 0,0371 is not an outlier.

#### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,032

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,00341  
**Standard Deviation** 0,00673  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00341	0,00663	0,0210	23,00	2,655	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ2

**Mean** 0,00344  
**Standard Deviation** 0,00672  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00344	0,00662	0,0210	23,00	2,654	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ3

**Mean** 0,00472  
**Standard Deviation** 0,00765  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00472	0,00753	0,0210	23,00	2,162	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ4

Mean 0,00810  
Standard Deviation 0,0143  
Number of data 31  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00810	0,0140	0,0528	15,00	3,185	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,0528

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ5

Mean 0,00406  
Standard Deviation 0,00679  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00406	0,00668	0,0210	23,00	2,536	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ6

Mean 0,00356  
Standard Deviation 0,00671  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00356	0,00661	0,0210	23,00	2,639	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier



#### Rosner's Outlier Test for PZ7

**Mean** 0,00653  
**Standard Deviation** 0,00831  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00653	0,00818	0,0210	10,00	1,769	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

**Mean** 0,00344  
**Standard Deviation** 0,00672  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00344	0,00662	0,0210	23,00	2,654	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 0,00355  
**Standard Deviation** 0,00681  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00355	0,00670	0,0210	23,00	2,605	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ10

Mean 0,00434  
Standard Deviation 0,00719  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00434	0,00708	0,0210	23,00	2,354	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,00431  
Standard Deviation 0,00734  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00431	0,00722	0,0248	20,00	2,837	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Dixon's Outlier Test for PZ12

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 0,209 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,822

For 10% significance level, 0,209 is an outlier.

For 5% significance level, 0,209 is an outlier.

For 1% significance level, 0,209 is an outlier.

##### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,024

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,209 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,904

For 10% significance level, 0,209 is an outlier.

For 5% significance level, 0,209 is an outlier.

For 1% significance level, 0,209 is an outlier.

#### 2. Observation Value 0,0001 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,043

For 10% significance level, 0,0001 is not an outlier.

For 5% significance level, 0,0001 is not an outlier.

For 1% significance level, 0,0001 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 16:47:18

From File Base.xls

Full Precision OFF

**1,1,2,2Tetrachloroetano**

### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,016 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,991

For 10% significance level, 0,016 is an outlier.

For 5% significance level, 0,016 is an outlier.

For 1% significance level, 0,016 is an outlier.

#### 2. Observation Value 0,0049 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,0049 is not an outlier.

For 5% significance level, 0,0049 is not an outlier.

For 1% significance level, 0,0049 is not an outlier.

### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,998

For 10% significance level, 0,05 is an outlier.

For 5% significance level, 0,05 is an outlier.

For 1% significance level, 0,05 is an outlier.

#### 2. Observation Value 0,0005 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,978

For 10% significance level, 0,0005 is an outlier.

For 5% significance level, 0,0005 is an outlier.

For 1% significance level, 0,0005 is an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,016 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,991

For 10% significance level, 0,016 is an outlier.

For 5% significance level, 0,016 is an outlier.

For 1% significance level, 0,016 is an outlier.

#### 2. Observation Value 0,0049 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,0049 is not an outlier.

For 5% significance level, 0,0049 is not an outlier.

For 1% significance level, 0,0049 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 0,016 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,995

For 10% significance level, 0,016 is an outlier.

For 5% significance level, 0,016 is an outlier.

For 1% significance level, 0,016 is an outlier.

#### 2. Observation Value 0,0049 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,400

For 10% significance level, 0,0049 is not an outlier.

For 5% significance level, 0,0049 is not an outlier.

For 1% significance level, 0,0049 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,00787  
**Standard Deviation** 0,00857  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00787	0,00844	0,0500	26,00	4,993	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0500

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0500

### Rosner's Outlier Test for PZ2

**Mean** 0,00787  
**Standard Deviation** 0,00857  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00787	0,00844	0,0500	26,00	4,993	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0500

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0500

### Rosner's Outlier Test for PZ3

**Mean** 0,00615  
**Standard Deviation** 0,00298  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00615	0,00293	0,0160	14,00	3,362	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

#### Rosner's Outlier Test for PZ4

**Mean** 0,00602  
**Standard Deviation** 0,00294  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00602	0,00289	0,0160	13,00	3,448	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

#### Rosner's Outlier Test for PZ5

**Mean** 0,00662  
**Standard Deviation** 0,00385  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00662	0,00378	0,0200	4,000	3,536	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

#### Rosner's Outlier Test for PZ6

**Mean** 0,217  
**Standard Deviation** 1,128  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,217	1,111	6,400	4,000	5,567	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 6,400

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 6,400



#### Rosner's Outlier Test for PZ7

**Mean** 0,00615  
**Standard Deviation** 0,00298  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00615	0,00293	0,0160	14,00	3,362	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

#### Rosner's Outlier Test for PZ8

**Mean** 0,00671  
**Standard Deviation** 0,00397  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,00671	0,00390	0,0200	4,000	3,405	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

#### Rosner's Outlier Test for PZ9

**Mean** 0,0135  
**Standard Deviation** 0,0151  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0135	0,0149	0,0660	8,000	3,530	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0660

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0660

### Rosner's Outlier Test for PZ10

Mean 0,00658  
Standard Deviation 0,00313  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00658	0,00308	0,0160	14,00	3,057	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0160

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ11

Mean 0,00646  
Standard Deviation 0,00380  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,00646	0,00375	0,0200	4,000	3,615	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,0200

### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,838

For 10% significance level, 0,05 is an outlier.  
For 5% significance level, 0,05 is an outlier.  
For 1% significance level, 0,05 is an outlier.

#### 2. Observation Value 0,0049 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,014

For 10% significance level, 0,0049 is not an outlier.  
For 5% significance level, 0,0049 is not an outlier.  
For 1% significance level, 0,0049 is not an outlier.

### **Dixon's Outlier Test for PZ14**

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### **1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,556

For 10% significance level, 0,05 is an outlier.

For 5% significance level, 0,05 is an outlier.

For 1% significance level, 0,05 is not an outlier.

#### **2. Observation Value 0,0049 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,005

For 10% significance level, 0,0049 is not an outlier.

For 5% significance level, 0,0049 is not an outlier.

For 1% significance level, 0,0049 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:19:54

From File Base.xls

Full Precision OFF

**Cloruro di vinile**

### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,05 is not an outlier.

For 5% significance level, 0,05 is not an outlier.

For 1% significance level, 0,05 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,05 is not an outlier.

For 5% significance level, 0,05 is not an outlier.

For 1% significance level, 0,05 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 0,05 is not an outlier.

For 5% significance level, 0,05 is not an outlier.

For 1% significance level, 0,05 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 0,05 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,700

For 10% significance level, 0,05 is an outlier.

For 5% significance level, 0,05 is an outlier.

For 1% significance level, 0,05 is an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,0347  
**Standard Deviation** 0,0219  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ2

**Mean** 0,0347  
**Standard Deviation** 0,0219  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ3

**Mean** 0,0347  
**Standard Deviation** 0,0219  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ4

**Mean** 0,0326  
**Standard Deviation** 0,0187  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0326	0,0184	0,0100	23,00	1,229	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ5

**Mean** 0,0362  
**Standard Deviation** 0,0246  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0362	0,0242	0,100	6,000	2,630	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ6

**Mean** 0,0470  
**Standard Deviation** 0,0721  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0470	0,0710	0,430	1,000	5,391	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,430

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,430

#### Rosner's Outlier Test for PZ7

**Mean** 0,0347  
**Standard Deviation** 0,0219  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

**Mean** 0,0341  
**Standard Deviation** 0,0218  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,0341	0,0215	0,100	6,000	3,071	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 0,180  
**Standard Deviation** 0,330  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,180	0,325	1,760	1,000	4,864	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,760

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,760



#### Rosner's Outlier Test for PZ10

Mean 0,0347  
Standard Deviation 0,0219  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,0347  
Standard Deviation 0,0219  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,0347	0,0215	0,100	6,000	3,032	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,100

For 1% Significance Level, there is no Potential Outlier

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 0,26 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,840

For 10% significance level, 0,26 is an outlier.  
For 5% significance level, 0,26 is an outlier.  
For 1% significance level, 0,26 is an outlier.

##### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.  
For 5% significance level, 0,01 is not an outlier.  
For 1% significance level, 0,01 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,25 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,133

For 10% significance level, 0,25 is not an outlier.

For 5% significance level, 0,25 is not an outlier.

For 1% significance level, 0,25 is not an outlier.

#### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,000

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 14:19:20

From File Mercurio.xls

Full Precision OFF

### Mercurio

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,721

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,938

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,668

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,640

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,000

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,864

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

#### Rosner's Outlier Test for PZ1

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ2

**Mean** 0,196  
**Standard Deviation** 0,208  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,196	0,205	1,000	1,000	3,918	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ3

**Mean** 0,322  
**Standard Deviation** 0,863  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,322	0,850	5,000	14,00	5,502	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

#### Rosner's Outlier Test for PZ4

**Mean** 0,179  
**Standard Deviation** 0,203  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,179	0,200	1,000	1,000	4,106	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ5

**Mean** 0,195  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ6

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ7

**Mean** 0,246  
**Standard Deviation** 0,362  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,246	0,357	1,900	21,00	4,634	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

#### Rosner's Outlier Test for PZ8

**Mean** 0,220  
**Standard Deviation** 0,253  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,220	0,249	1,000	1,000	3,129	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 0,195  
**Standard Deviation** 0,213  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,210	1,000	1,000	3,842	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ10

Mean 0,195  
Standard Deviation 0,210  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ11

Mean 0,204  
Standard Deviation 0,217  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,204	0,213	1,000	1,000	3,735	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.  
For 5% significance level, 0,2 is an outlier.  
For 1% significance level, 0,2 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.  
For 5% significance level, 0,0316 is an outlier.  
For 1% significance level, 0,0316 is an outlier.



### **Dixon's Outlier Test for PZ14**

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### **1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.

For 5% significance level, 0,2 is an outlier.

For 1% significance level, 0,2 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 14:19:20

From File Mercurio.xls

Full Precision OFF

### Mercurio

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,721

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,938

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,668

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,640

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,000

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,864

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

### Rosner's Outlier Test for PZ1

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

### Rosner's Outlier Test for PZ2

**Mean** 0,196  
**Standard Deviation** 0,208  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,196	0,205	1,000	1,000	3,918	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

### Rosner's Outlier Test for PZ3

**Mean** 0,322  
**Standard Deviation** 0,863  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,322	0,850	5,000	14,00	5,502	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

#### Rosner's Outlier Test for PZ4

**Mean** 0,179  
**Standard Deviation** 0,203  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,179	0,200	1,000	1,000	4,106	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ5

**Mean** 0,195  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ6

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ7

**Mean** 0,246  
**Standard Deviation** 0,362  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,246	0,357	1,900	21,00	4,634	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

#### Rosner's Outlier Test for PZ8

**Mean** 0,220  
**Standard Deviation** 0,253  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,220	0,249	1,000	1,000	3,129	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 0,195  
**Standard Deviation** 0,213  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,210	1,000	1,000	3,842	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ10

**Mean** 0,195  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ11

**Mean** 0,204  
**Standard Deviation** 0,217  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,204	0,213	1,000	1,000	3,735	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.  
For 5% significance level, 0,2 is an outlier.  
For 1% significance level, 0,2 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.  
For 5% significance level, 0,0316 is an outlier.  
For 1% significance level, 0,0316 is an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.

For 5% significance level, 0,2 is an outlier.

For 1% significance level, 0,2 is an outlier.

#### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.



## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 14:19:20

From File Mercurio.xls

Full Precision OFF

### Mercurio

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,721

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,938

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,668

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,640

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,000

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 0,5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,864

For 10% significance level, 0,5 is an outlier.

For 5% significance level, 0,5 is an outlier.

For 1% significance level, 0,5 is an outlier.

#### **2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,311

For 10% significance level, 0,0316 is not an outlier.

For 5% significance level, 0,0316 is not an outlier.

For 1% significance level, 0,0316 is not an outlier.

#### Rosner's Outlier Test for PZ1

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ2

**Mean** 0,196  
**Standard Deviation** 0,208  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,196	0,205	1,000	1,000	3,918	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ3

**Mean** 0,322  
**Standard Deviation** 0,863  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,322	0,850	5,000	14,00	5,502	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 5,000

#### Rosner's Outlier Test for PZ4

**Mean** 0,179  
**Standard Deviation** 0,203  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,179	0,200	1,000	1,000	4,106	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ5

**Mean** 0,195  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ6

**Mean** 0,192  
**Standard Deviation** 0,210  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,192	0,207	1,000	1,000	3,905	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ7

**Mean** 0,246  
**Standard Deviation** 0,362  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,246	0,357	1,900	21,00	4,634	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,900

#### Rosner's Outlier Test for PZ8

**Mean** 0,220  
**Standard Deviation** 0,253  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,220	0,249	1,000	1,000	3,129	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 0,195  
**Standard Deviation** 0,213  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,195	0,210	1,000	1,000	3,842	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ10

Mean 0,195  
Standard Deviation 0,210  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,195	0,206	1,000	1,000	3,903	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Rosner's Outlier Test for PZ11

Mean 0,204  
Standard Deviation 0,217  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,204	0,213	1,000	1,000	3,735	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,000

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.  
For 5% significance level, 0,2 is an outlier.  
For 1% significance level, 0,2 is an outlier.

##### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.  
For 5% significance level, 0,0316 is an outlier.  
For 1% significance level, 0,0316 is an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 0,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,859

For 10% significance level, 0,2 is an outlier.

For 5% significance level, 0,2 is an outlier.

For 1% significance level, 0,2 is an outlier.

#### 2. Observation Value 0,0316 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,760

For 10% significance level, 0,0316 is an outlier.

For 5% significance level, 0,0316 is an outlier.

For 1% significance level, 0,0316 is an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:25:06

From File Base.xls

Full Precision OFF

### Tetrachloroethylene

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 3,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,305

For 10% significance level, 3,5 is not an outlier.

For 5% significance level, 3,5 is not an outlier.

For 1% significance level, 3,5 is not an outlier.

##### 2. Observation Value 0,8 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,039

For 10% significance level, 0,8 is not an outlier.

For 5% significance level, 0,8 is not an outlier.

For 1% significance level, 0,8 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 26,3 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,806

For 10% significance level, 26,3 is an outlier.

For 5% significance level, 26,3 is an outlier.

For 1% significance level, 26,3 is an outlier.

##### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,168

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.



### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 5,1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,244

For 10% significance level, 5,1 is not an outlier.

For 5% significance level, 5,1 is not an outlier.

For 1% significance level, 5,1 is not an outlier.

#### **2. Observation Value 1,44 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,133

For 10% significance level, 1,44 is not an outlier.

For 5% significance level, 1,44 is not an outlier.

For 1% significance level, 1,44 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 86,1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,594

For 10% significance level, 86,1 is an outlier.

For 5% significance level, 86,1 is an outlier.

For 1% significance level, 86,1 is not an outlier.

#### **2. Observation Value 5,7 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,029

For 10% significance level, 5,7 is not an outlier.

For 5% significance level, 5,7 is not an outlier.

For 1% significance level, 5,7 is not an outlier.

#### Rosner's Outlier Test for PZ1

**Mean** 5,808  
**Standard Deviation** 9,228  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	5,808	9,087	40,90	13,00	3,862	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 40,90

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 40,90

#### Rosner's Outlier Test for PZ2

**Mean** 4,718  
**Standard Deviation** 7,642  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,718	7,525	36,55	15,00	4,230	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 36,55

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 36,55

#### Rosner's Outlier Test for PZ3

**Mean** 4,041  
**Standard Deviation** 6,642  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,041	6,541	33,33	15,00	4,478	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 33,33

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 33,33

#### Rosner's Outlier Test for PZ4

**Mean** 7,353  
**Standard Deviation** 6,309  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	7,353	6,209	35,60	11,00	4,549	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 35,60

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 35,60

#### Rosner's Outlier Test for PZ5

**Mean** 8,220  
**Standard Deviation** 23,23  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	8,220	22,88	127,2	14,00	5,201	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 127,2

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 127,2

#### Rosner's Outlier Test for PZ6

**Mean** 73,15  
**Standard Deviation** 146,3  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	73,15	144,1	850,0	1,000	5,391	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 850,0

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 850,0

#### Rosner's Outlier Test for PZ7

**Mean** 5,172  
**Standard Deviation** 13,02  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	5,172	12,82	69,60	13,00	5,026	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 69,60

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 69,60

#### Rosner's Outlier Test for PZ8

**Mean** 11,28  
**Standard Deviation** 17,22  
**Number of data** 34  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	11,28	16,97	96,19	14,00	5,005	2,970	3,300

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 96,19

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 96,19

#### Rosner's Outlier Test for PZ9

**Mean** 39,82  
**Standard Deviation** 114,0  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	39,82	112,2	650,0	1,000	5,438	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 650,0

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 650,0

#### Rosner's Outlier Test for PZ10

**Mean** 7,892  
**Standard Deviation** 9,464  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	7,892	9,320	50,10	15,00	4,529	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 50,10

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 50,10

#### Rosner's Outlier Test for PZ11

**Mean** 4,978  
**Standard Deviation** 10,27  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,978	10,11	58,51	15,00	5,293	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 58,51

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 58,51

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 2090 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,907

For 10% significance level, 2090 is an outlier.  
For 5% significance level, 2090 is an outlier.  
For 1% significance level, 2090 is an outlier.

##### 2. Observation Value 8,3 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,021

For 10% significance level, 8,3 is not an outlier.  
For 5% significance level, 8,3 is not an outlier.  
For 1% significance level, 8,3 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 1000 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,584

For 10% significance level, 1000 is an outlier.

For 5% significance level, 1000 is an outlier.

For 1% significance level, 1000 is an outlier.

#### 2. Observation Value 29,8 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,029

For 10% significance level, 29,8 is not an outlier.

For 5% significance level, 29,8 is not an outlier.

For 1% significance level, 29,8 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:25:06

From File Base.xls

Full Precision OFF

### Tetrachloroethylene

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 3,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,305

For 10% significance level, 3,5 is not an outlier.

For 5% significance level, 3,5 is not an outlier.

For 1% significance level, 3,5 is not an outlier.

##### 2. Observation Value 0,8 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,039

For 10% significance level, 0,8 is not an outlier.

For 5% significance level, 0,8 is not an outlier.

For 1% significance level, 0,8 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 26,3 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,806

For 10% significance level, 26,3 is an outlier.

For 5% significance level, 26,3 is an outlier.

For 1% significance level, 26,3 is an outlier.

##### 2. Observation Value 0,01 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,168

For 10% significance level, 0,01 is not an outlier.

For 5% significance level, 0,01 is not an outlier.

For 1% significance level, 0,01 is not an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 5,1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,244

For 10% significance level, 5,1 is not an outlier.

For 5% significance level, 5,1 is not an outlier.

For 1% significance level, 5,1 is not an outlier.

#### **2. Observation Value 1,44 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,133

For 10% significance level, 1,44 is not an outlier.

For 5% significance level, 1,44 is not an outlier.

For 1% significance level, 1,44 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 86,1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,594

For 10% significance level, 86,1 is an outlier.

For 5% significance level, 86,1 is an outlier.

For 1% significance level, 86,1 is not an outlier.

#### **2. Observation Value 5,7 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,029

For 10% significance level, 5,7 is not an outlier.

For 5% significance level, 5,7 is not an outlier.

For 1% significance level, 5,7 is not an outlier.



#### Rosner's Outlier Test for PZ1

**Mean** 5,808  
**Standard Deviation** 9,228  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	5,808	9,087	40,90	13,00	3,862	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 40,90

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 40,90

#### Rosner's Outlier Test for PZ2

**Mean** 4,718  
**Standard Deviation** 7,642  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,718	7,525	36,55	15,00	4,230	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 36,55

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 36,55

#### Rosner's Outlier Test for PZ3

**Mean** 4,041  
**Standard Deviation** 6,642  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,041	6,541	33,33	15,00	4,478	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 33,33

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 33,33

#### Rosner's Outlier Test for PZ4

**Mean** 7,353  
**Standard Deviation** 6,309  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	7,353	6,209	35,60	11,00	4,549	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 35,60

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 35,60

#### Rosner's Outlier Test for PZ5

**Mean** 8,220  
**Standard Deviation** 23,23  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	8,220	22,88	127,2	14,00	5,201	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 127,2

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 127,2

#### Rosner's Outlier Test for PZ6

**Mean** 73,15  
**Standard Deviation** 146,3  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	73,15	144,1	850,0	1,000	5,391	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 850,0

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 850,0

#### Rosner's Outlier Test for PZ7

**Mean** 5,172  
**Standard Deviation** 13,02  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	5,172	12,82	69,60	13,00	5,026	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 69,60

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 69,60

#### Rosner's Outlier Test for PZ8

**Mean** 11,28  
**Standard Deviation** 17,22  
**Number of data** 34  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	11,28	16,97	96,19	14,00	5,005	2,970	3,300

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 96,19

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 96,19

#### Rosner's Outlier Test for PZ9

**Mean** 39,82  
**Standard Deviation** 114,0  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	39,82	112,2	650,0	1,000	5,438	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 650,0

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 650,0

#### Rosner's Outlier Test for PZ10

**Mean** 7,892  
**Standard Deviation** 9,464  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	7,892	9,320	50,10	15,00	4,529	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 50,10

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 50,10

#### Rosner's Outlier Test for PZ11

**Mean** 4,978  
**Standard Deviation** 10,27  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	4,978	10,11	58,51	15,00	5,293	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 58,51

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 58,51

#### Dixon's Outlier Test for PZ12

Number of Observations = 17  
10% critical value: 0,438  
5% critical value: 0,49  
1% critical value: 0,577

##### 1. Observation Value 2090 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,907

For 10% significance level, 2090 is an outlier.  
For 5% significance level, 2090 is an outlier.  
For 1% significance level, 2090 is an outlier.

##### 2. Observation Value 8,3 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,021

For 10% significance level, 8,3 is not an outlier.  
For 5% significance level, 8,3 is not an outlier.  
For 1% significance level, 8,3 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 1000 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,584

For 10% significance level, 1000 is an outlier.

For 5% significance level, 1000 is an outlier.

For 1% significance level, 1000 is an outlier.

#### 2. Observation Value 29,8 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,029

For 10% significance level, 29,8 is not an outlier.

For 5% significance level, 29,8 is not an outlier.

For 1% significance level, 29,8 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:29:58

From File Base.xls

Full Precision OFF

### Trichloroethylene

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 2,6 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,000

For 10% significance level, 2,6 is not an outlier.

For 5% significance level, 2,6 is not an outlier.

For 1% significance level, 2,6 is not an outlier.

##### 2. Observation Value 1,1 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,120

For 10% significance level, 1,1 is not an outlier.

For 5% significance level, 1,1 is not an outlier.

For 1% significance level, 1,1 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 3,3 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,455

For 10% significance level, 3,3 is an outlier.

For 5% significance level, 3,3 is not an outlier.

For 1% significance level, 3,3 is not an outlier.

##### 2. Observation Value 0,7 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,250

For 10% significance level, 0,7 is not an outlier.

For 5% significance level, 0,7 is not an outlier.

For 1% significance level, 0,7 is not an outlier.

### **Dixon's Outlier Test for POZZO 5**

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### **1. Observation Value 3 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,211

For 10% significance level, 3 is not an outlier.

For 5% significance level, 3 is not an outlier.

For 1% significance level, 3 is not an outlier.

#### **2. Observation Value 0,7 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,211

For 10% significance level, 0,7 is not an outlier.

For 5% significance level, 0,7 is not an outlier.

For 1% significance level, 0,7 is not an outlier.

### **Dixon's Outlier Test for POZZO 7**

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### **1. Observation Value 4,2 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,621

For 10% significance level, 4,2 is an outlier.

For 5% significance level, 4,2 is an outlier.

For 1% significance level, 4,2 is not an outlier.

#### **2. Observation Value 1,3 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,269

For 10% significance level, 1,3 is not an outlier.

For 5% significance level, 1,3 is not an outlier.

For 1% significance level, 1,3 is not an outlier.

#### Rosner's Outlier Test for PZ1

**Mean** 0,312  
**Standard Deviation** 0,306  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,312	0,301	1,800	26,00	4,937	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,800

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,800

#### Rosner's Outlier Test for PZ2

**Mean** 0,266  
**Standard Deviation** 0,142  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,266	0,140	0,680	23,00	2,965	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,680

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ3

**Mean** 0,163  
**Standard Deviation** 0,155  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,163	0,153	0,830	26,00	4,374	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,830

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 0,830



#### Rosner's Outlier Test for PZ4

**Mean** 0,407  
**Standard Deviation** 0,212  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	0,407	0,208	0,830	22,00	2,027	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ5

**Mean** 1,064  
**Standard Deviation** 0,629  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	1,064	0,620	3,100	1,000	3,287	2,950	3,290

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 3,100

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ6

**Mean** 2,894  
**Standard Deviation** 2,375  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
			outlier				
1	2,894	2,339	9,200	1,000	2,696	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ7

Mean 0,427  
Standard Deviation 0,223  
Number of data 33  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,427	0,220	0,930	1,000	2,292	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

Mean 0,519  
Standard Deviation 0,262  
Number of data 34  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,519	0,259	1,250	24,00	2,828	2,970	3,300

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

Mean 3,201  
Standard Deviation 2,896  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	3,201	2,851	15,20	1,000	4,209	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 15,20

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 15,20

### Rosner's Outlier Test for PZ10

Mean 0,949  
Standard Deviation 0,573  
Number of data 33  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,949	0,564	2,340	23,00	2,466	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for PZ11

Mean 0,263  
Standard Deviation 0,141  
Number of data 33  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,263	0,139	0,570	23,00	2,213	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Dixon's Outlier Test for PZ12

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### 1. Observation Value 45,8 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,796

For 10% significance level, 45,8 is an outlier.

For 5% significance level, 45,8 is an outlier.

For 1% significance level, 45,8 is an outlier.

#### 2. Observation Value 0,37 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,003

For 10% significance level, 0,37 is not an outlier.

For 5% significance level, 0,37 is not an outlier.

For 1% significance level, 0,37 is not an outlier.

### **Dixon's Outlier Test for PZ14**

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

#### **1. Observation Value 11,7 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0,573

For 10% significance level, 11,7 is an outlier.

For 5% significance level, 11,7 is an outlier.

For 1% significance level, 11,7 is not an outlier.

#### **2. Observation Value 1 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0,083

For 10% significance level, 1 is not an outlier.

For 5% significance level, 1 is not an outlier.

For 1% significance level, 1 is not an outlier.

## Outlier Tests for Selected Uncensored Variables

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:15:10

From File Base.xls

Full Precision OFF

### Cloroformio

#### Dixon's Outlier Test for POZZO 1

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

##### 1. Observation Value 5,2 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,600

For 10% significance level, 5,2 is an outlier.

For 5% significance level, 5,2 is an outlier.

For 1% significance level, 5,2 is an outlier.

##### 2. Observation Value 0,61 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,048

For 10% significance level, 0,61 is not an outlier.

For 5% significance level, 0,61 is not an outlier.

For 1% significance level, 0,61 is not an outlier.

#### Dixon's Outlier Test for POZZO 3

Number of Observations = 17

10% critical value: 0,438

5% critical value: 0,49

1% critical value: 0,577

##### 1. Observation Value 2,8 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,297

For 10% significance level, 2,8 is not an outlier.

For 5% significance level, 2,8 is not an outlier.

For 1% significance level, 2,8 is not an outlier.

##### 2. Observation Value 0,4 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,120

For 10% significance level, 0,4 is not an outlier.

For 5% significance level, 0,4 is not an outlier.

For 1% significance level, 0,4 is not an outlier.

### Dixon's Outlier Test for POZZO 5

Number of Observations = 10

10% critical value: 0,409

5% critical value: 0,477

1% critical value: 0,597

#### 1. Observation Value 2,37 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,451

For 10% significance level, 2,37 is an outlier.

For 5% significance level, 2,37 is not an outlier.

For 1% significance level, 2,37 is not an outlier.

#### 2. Observation Value 0,59 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,229

For 10% significance level, 0,59 is not an outlier.

For 5% significance level, 0,59 is not an outlier.

For 1% significance level, 0,59 is not an outlier.

### Dixon's Outlier Test for POZZO 7

Number of Observations = 11

10% critical value: 0,517

5% critical value: 0,576

1% critical value: 0,679

#### 1. Observation Value 6,16 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,516

For 10% significance level, 6,16 is not an outlier.

For 5% significance level, 6,16 is not an outlier.

For 1% significance level, 6,16 is not an outlier.

#### 2. Observation Value 0,61 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,160

For 10% significance level, 0,61 is not an outlier.

For 5% significance level, 0,61 is not an outlier.

For 1% significance level, 0,61 is not an outlier.

#### Rosner's Outlier Test for PZ1

**Mean** 0,614  
**Standard Deviation** 0,332  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,614	0,327	1,880	16,00	3,873	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,880

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,880

#### Rosner's Outlier Test for PZ2

**Mean** 0,562  
**Standard Deviation** 0,358  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,562	0,352	1,850	16,00	3,660	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,850

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,850

#### Rosner's Outlier Test for PZ3

**Mean** 0,232  
**Standard Deviation** 0,282  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,232	0,277	1,180	16,00	3,421	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,180

For 1% Significance Level, there is 1 Potential Outlier  
Potential outliers is: 1,180

#### Rosner's Outlier Test for PZ4

**Mean** 0,312  
**Standard Deviation** 0,322  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,312	0,317	1,670	15,00	4,281	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,670

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,670

#### Rosner's Outlier Test for PZ5

**Mean** 0,555  
**Standard Deviation** 0,530  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,555	0,521	2,490	16,00	3,711	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 2,490

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 2,490

#### Rosner's Outlier Test for PZ6

**Mean** 5,456  
**Standard Deviation** 5,756  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	5,456	5,663	19,20	20,00	2,427	2,920	3,250

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier



#### Rosner's Outlier Test for PZ7

**Mean** 0,916  
**Standard Deviation** 0,706  
**Number of data** 32  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	0,916	0,694	2,960	13,00	2,944	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 2,960

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ8

**Mean** 1,729  
**Standard Deviation** 1,316  
**Number of data** 33  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	1,729	1,296	4,640	22,00	2,247	2,950	3,290

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ9

**Mean** 5,751  
**Standard Deviation** 7,953  
**Number of data** 31  
**Number of suspected outliers** 1

#	Mean	sd	Potential	Obs.	Test	Critical	Critical
			outlier	Number	value	value (5%)	value (1%)
1	5,751	7,824	41,71	9,000	4,596	2,920	3,250

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 41,71

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 41,71

#### Rosner's Outlier Test for PZ10

Mean 1,668  
Standard Deviation 1,491  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1,668	1,468	5,510	12,00	2,618	2,940	3,270

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for PZ11

Mean 0,483  
Standard Deviation 0,422  
Number of data 32  
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0,483	0,415	1,880	16,00	3,363	2,940	3,270

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,880

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1,880

#### Dixon's Outlier Test for PZ12

Number of Observations = 16

10% critical value: 0,454

5% critical value: 0,507

1% critical value: 0,595

##### 1. Observation Value 63 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,748

For 10% significance level, 63 is an outlier.

For 5% significance level, 63 is an outlier.

For 1% significance level, 63 is an outlier.

##### 2. Observation Value 1,6 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,074

For 10% significance level, 1,6 is not an outlier.

For 5% significance level, 1,6 is not an outlier.

For 1% significance level, 1,6 is not an outlier.

### Dixon's Outlier Test for PZ14

Number of Observations = 16

10% critical value: 0,454

5% critical value: 0,507

1% critical value: 0,595

#### 1. Observation Value 64,5 is a Potential Outlier (Upper Tail)?

Test Statistic: 0,712

For 10% significance level, 64,5 is an outlier.

For 5% significance level, 64,5 is an outlier.

For 1% significance level, 64,5 is an outlier.

#### 2. Observation Value 1,6 is a Potential Outlier (Lower Tail)?

Test Statistic: 0,112

For 10% significance level, 1,6 is not an outlier.

For 5% significance level, 1,6 is not an outlier.

For 1% significance level, 1,6 is not an outlier.

---

**ALLEGATO 3 – ELABORAZIONE STATISTICA PER DEFINIZIONE CONCENTRAZIONI RAPPRESENTATIVE  
ALLA SORGENTE (PROUCL)**

---

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:29:55  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,1Dichloroethylene

### General Statistics

Total Number of Observations	147,0	Number of Distinct Observations	107,0
		Number of Missing Observations	23,00
Minimum	0,00500	Mean	2,093
Maximum	12,87	Median	1,355
SD	2,151	Std. Error of Mean	0,177
Coefficient of Variation	1,028	Skewness	1,754

### Normal GOF Test

Shapiro Wilk Test Statistic	0,833
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,166
5% Lilliefors Critical Value	0,0735

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	2,387
---------------------	-------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	2,412
95% Modified-t UCL (Johnson-1978)	2,391

### Gamma GOF Test

A-D Test Statistic	2,278
5% A-D Critical Value	0,802
K-S Test Statistic	0,105
5% K-S Critical Value	0,0808

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	0,682	k star (bias corrected MLE)	0,672
Theta hat (MLE)	3,070	Theta star (bias corrected MLE)	3,113
nu hat (MLE)	200,5	nu star (bias corrected)	197,7
MLE Mean (bias corrected)	2,093	MLE Sd (bias corrected)	2,553
		Approximate Chi Square Value (0,0500)	166,2
Adjusted Level of Significance	0,0484	Adjusted Chi Square Value	165,9

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	2,490	95% Adjusted Gamma UCL (use when $n < 50$ )	2,495
---	-------	---	-------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,800
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,194
5% Lilliefors Critical Value	0,0735

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	-0,151
Maximum of Logged Data	2,555	SD of logged Data	1,917

#### Assuming Lognormal Distribution

95% H-UCL	8,957	90% Chebyshev (MVUE) UCL	9,142
95% Chebyshev (MVUE) UCL	10,92	97,5% Chebyshev (MVUE) UCL	13,39
99% Chebyshev (MVUE) UCL	18,23		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	2,385	95% Jackknife UCL	2,387
95% Standard Bootstrap UCL	2,386	95% Bootstrap-t UCL	2,417
95% Hall's Bootstrap UCL	2,402	95% Percentile Bootstrap UCL	2,381
95% BCA Bootstrap UCL	2,434		
90% Chebyshev(Mean, Sd) UCL	2,625	95% Chebyshev(Mean, Sd) UCL	2,867
97,5% Chebyshev(Mean, Sd) UCL	3,201	99% Chebyshev(Mean, Sd) UCL	3,858

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	2,867
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:27:45  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### 1,2dicloroetilene (cis+trans)

#### General Statistics

Total Number of Observations	90,00	Number of Distinct Observations	80,00
		Number of Missing Observations	16,00
Minimum	0,00500	Mean	19,65
Maximum	101,0	Median	11,65
SD	23,39	Std. Error of Mean	2,466
Coefficient of Variation	1,191	Skewness	1,872

#### Normal GOF Test

Shapiro Wilk Test Statistic	0,771
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,201
5% Lilliefors Critical Value	0,0936

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL	23,75
---------------------	-------

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	24,23
95% Modified-t UCL (Johnson-1978)	23,83

#### Gamma GOF Test

A-D Test Statistic	0,608
5% A-D Critical Value	0,815
K-S Test Statistic	0,0819
5% K-S Critical Value	0,0994

#### Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

**Detected data appear Gamma Distributed at 5% Significance Level**

#### Gamma Statistics

k hat (MLE)	0,533	k star (bias corrected MLE)	0,523
Theta hat (MLE)	36,87	Theta star (bias corrected MLE)	37,60
nu hat (MLE)	95,93	nu star (bias corrected)	94,06
MLE Mean (bias corrected)	19,65	MLE Sd (bias corrected)	27,18
		Approximate Chi Square Value (0,0500)	72,70
Adjusted Level of Significance	0,0473	Adjusted Chi Square Value	72,39

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	25,42	95% Adjusted Gamma UCL (use when $n < 50$ )	25,53
---	-------	---	-------

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,851
5% Shapiro Wilk P Value	6,763E-13
Lilliefors Test Statistic	0,165
5% Lilliefors Critical Value	0,0936

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	1,798
Maximum of Logged Data	4,615	SD of logged Data	2,247

#### Assuming Lognormal Distribution

95% H-UCL	182,2	90% Chebyshev (MVUE) UCL	149,0
95% Chebyshev (MVUE) UCL	185,3	97,5% Chebyshev (MVUE) UCL	235,8
99% Chebyshev (MVUE) UCL	334,9		

#### Nonparametric Distribution Free UCL Statistics

#### Data appear to follow a Discernible Distribution at 5% Significance Level

#### Nonparametric Distribution Free UCLs

95% CLT UCL	23,70	95% Jackknife UCL	23,75
95% Standard Bootstrap UCL	23,70	95% Bootstrap-t UCL	24,80
95% Hall's Bootstrap UCL	24,34	95% Percentile Bootstrap UCL	23,72
95% BCA Bootstrap UCL	24,56		
90% Chebyshev(Mean, Sd) UCL	27,05	95% Chebyshev(Mean, Sd) UCL	30,40
97,5% Chebyshev(Mean, Sd) UCL	35,05	99% Chebyshev(Mean, Sd) UCL	44,18

#### Suggested UCL to Use

95% Approximate Gamma UCL	25,42
---------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:31:19  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### 1,2Dicloropropano

#### General Statistics

Total Number of Observations	99,00	Number of Distinct Observations	58,00
		Number of Missing Observations	7,000
Minimum	0,00500	Mean	0,255
Maximum	1,130	Median	0,197
SD	0,253	Std. Error of Mean	0,0254
Coefficient of Variation	0,993	Skewness	1,293

#### Normal GOF Test

Shapiro Wilk Test Statistic	0,848
5% Shapiro Wilk P Value	4,885E-15
Lilliefors Test Statistic	0,162
5% Lilliefors Critical Value	0,0893

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL	0,297
---------------------	-------

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,300
95% Modified-t UCL (Johnson-1978)	0,298

#### Gamma GOF Test

A-D Test Statistic	2,718
5% A-D Critical Value	0,795
K-S Test Statistic	0,155
5% K-S Critical Value	0,0934

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

**Data Not Gamma Distributed at 5% Significance Level**

#### Gamma Statistics

k hat (MLE)	0,752	k star (bias corrected MLE)	0,736
Theta hat (MLE)	0,339	Theta star (bias corrected MLE)	0,346
nu hat (MLE)	149,0	nu star (bias corrected)	145,8
MLE Mean (bias corrected)	0,255	MLE Sd (bias corrected)	0,297
		Approximate Chi Square Value (0,0500)	118,9
Adjusted Level of Significance	0,0476	Adjusted Chi Square Value	118,5

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	0,312	95% Adjusted Gamma UCL (use when $n < 50$ )	0,313
---	-------	---	-------

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,844
5% Shapiro Wilk P Value	1,554E-15
Lilliefors Test Statistic	0,214
5% Lilliefors Critical Value	0,0893

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	-2,163
Maximum of Logged Data	0,122	SD of logged Data	1,570

#### Assuming Lognormal Distribution

95% H-UCL	0,622	90% Chebyshev (MVUE) UCL	0,640
95% Chebyshev (MVUE) UCL	0,756	97,5% Chebyshev (MVUE) UCL	0,918
99% Chebyshev (MVUE) UCL	1,234		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,297	95% Jackknife UCL	0,297
95% Standard Bootstrap UCL	0,296	95% Bootstrap-t UCL	0,302
95% Hall's Bootstrap UCL	0,303	95% Percentile Bootstrap UCL	0,295
95% BCA Bootstrap UCL	0,301		
90% Chebyshev(Mean, Sd) UCL	0,331	95% Chebyshev(Mean, Sd) UCL	0,366
97,5% Chebyshev(Mean, Sd) UCL	0,414	99% Chebyshev(Mean, Sd) UCL	0,508

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,366
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:29:14  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,1,2Tricloroetano

### General Statistics

Total Number of Observations	35,00	Number of Distinct Observations	13,00
		Number of Missing Observations	0
Minimum	0,0100	Mean	0,0817
Maximum	0,653	Median	0,0100
SD	0,158	Std. Error of Mean	0,0267
Coefficient of Variation	1,934	Skewness	2,883

### Normal GOF Test

Shapiro Wilk Test Statistic	0,521
5% Shapiro Wilk Critical Value	0,934
Lilliefors Test Statistic	0,325
5% Lilliefors Critical Value	0,148

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	0,127
---------------------	-------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,139
95% Modified-t UCL (Johnson-1978)	0,129

### Gamma GOF Test

A-D Test Statistic	4,431
5% A-D Critical Value	0,806
K-S Test Statistic	0,305
5% K-S Critical Value	0,157

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

**Data Not Gamma Distributed at 5% Significance Level**

### Gamma Statistics

k hat (MLE)	0,560	k star (bias corrected MLE)	0,531
Theta hat (MLE)	0,146	Theta star (bias corrected MLE)	0,154
nu hat (MLE)	39,21	nu star (bias corrected)	37,18
MLE Mean (bias corrected)	0,0817	MLE Sd (bias corrected)	0,112
		Approximate Chi Square Value (0,0500)	24,22
Adjusted Level of Significance	0,0425	Adjusted Chi Square Value	23,72

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0,125	95% Adjusted Gamma UCL (use when n<50)	0,128
---	-------	--	-------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,747
5% Shapiro Wilk Critical Value	0,934
Lilliefors Test Statistic	0,310
5% Lilliefors Critical Value	0,148

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,605	Mean of logged Data	-3,620
Maximum of Logged Data	-0,426	SD of logged Data	1,348

#### Assuming Lognormal Distribution

95% H-UCL	0,130	90% Chebyshev (MVUE) UCL	0,118
95% Chebyshev (MVUE) UCL	0,142	97,5% Chebyshev (MVUE) UCL	0,176
99% Chebyshev (MVUE) UCL	0,243		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,126	95% Jackknife UCL	0,127
95% Standard Bootstrap UCL	0,125	95% Bootstrap-t UCL	0,171
95% Hall's Bootstrap UCL	0,157	95% Percentile Bootstrap UCL	0,129
95% BCA Bootstrap UCL	0,139		
90% Chebyshev(Mean, Sd) UCL	0,162	95% Chebyshev(Mean, Sd) UCL	0,198
97,5% Chebyshev(Mean, Sd) UCL	0,248	99% Chebyshev(Mean, Sd) UCL	0,347

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,198
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:30:35  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### 1,2,3Tricloropropano

#### General Statistics

Total Number of Observations	173,0	Number of Distinct Observations	29,00
		Number of Missing Observations	31,00
Minimum	1,0000E-4	Mean	0,00769
Maximum	0,0579	Median	0,00100
SD	0,0115	Std. Error of Mean	8,7363E-4
Coefficient of Variation	1,494	Skewness	1,779

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,659  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,385  
 5% Lilliefors Critical Value 0,0678

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 0,00914

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,00925  
 95% Modified-t UCL (Johnson-1978) 0,00916

#### Gamma GOF Test

A-D Test Statistic 19,90  
 5% A-D Critical Value 0,820  
 K-S Test Statistic 0,386  
 5% K-S Critical Value 0,0747

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,506	k star (bias corrected MLE)	0,501
Theta hat (MLE)	0,0152	Theta star (bias corrected MLE)	0,0153
nu hat (MLE)	175,1	nu star (bias corrected)	173,4
MLE Mean (bias corrected)	0,00769	MLE Sd (bias corrected)	0,0109
		Approximate Chi Square Value (0,0500)	144,0
Adjusted Level of Significance	0,0486	Adjusted Chi Square Value	143,7

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,00926      95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,00928

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,790  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,347  
 5% Lilliefors Critical Value 0,0678

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-9,210	Mean of logged Data	-6,120
Maximum of Logged Data	-2,849	SD of logged Data	1,664

#### Assuming Lognormal Distribution

95% H-UCL	0,0126	90% Chebyshev (MVUE) UCL	0,0135
95% Chebyshev (MVUE) UCL	0,0157	97,5% Chebyshev (MVUE) UCL	0,0187
99% Chebyshev (MVUE) UCL	0,0247		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,00913	95% Jackknife UCL	0,00914
95% Standard Bootstrap UCL	0,00914	95% Bootstrap-t UCL	0,00928
95% Hall's Bootstrap UCL	0,00924	95% Percentile Bootstrap UCL	0,00918
95% BCA Bootstrap UCL	0,00928		
90% Chebyshev(Mean, Sd) UCL	0,0103	95% Chebyshev(Mean, Sd) UCL	0,0115
97,5% Chebyshev(Mean, Sd) UCL	0,0131	99% Chebyshev(Mean, Sd) UCL	0,0164

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,0115
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:28:36  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,1,2,2Tetracloroetano

### General Statistics

Total Number of Observations	128,0	Number of Distinct Observations	25,00
		Number of Missing Observations	12,00
Minimum	0,00490	Mean	0,0125
Maximum	0,0849	Median	0,00500
SD	0,0156	Std. Error of Mean	0,00138
Coefficient of Variation	1,249	Skewness	2,468

### Normal GOF Test

Shapiro Wilk Test Statistic	0,554
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,341
5% Lilliefors Critical Value	0,0787

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	0,0148
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,0151
95% Modified-t UCL (Johnson-1978)	0,0148

### Gamma GOF Test

A-D Test Statistic	20,55
5% A-D Critical Value	0,775
K-S Test Statistic	0,383
5% K-S Critical Value	0,0841

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	1,314	k star (bias corrected MLE)	1,288
Theta hat (MLE)	0,00952	Theta star (bias corrected MLE)	0,00971
nu hat (MLE)	336,3	nu star (bias corrected)	329,7
MLE Mean (bias corrected)	0,0125	MLE Sd (bias corrected)	0,0110
		Approximate Chi Square Value (0,0500)	288,7
Adjusted Level of Significance	0,0481	Adjusted Chi Square Value	288,2

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0,0143	95% Adjusted Gamma UCL (use when n<50)	0,0143
---	--------	--	--------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,659
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,387
5% Lilliefors Critical Value	0,0787

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,319	Mean of logged Data	-4,808
Maximum of Logged Data	-2,466	SD of logged Data	0,796

#### Assuming Lognormal Distribution

95% H-UCL	0,0129	90% Chebyshev (MVUE) UCL	0,0138
95% Chebyshev (MVUE) UCL	0,0151	97,5% Chebyshev (MVUE) UCL	0,0167
99% Chebyshev (MVUE) UCL	0,0200		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,0148	95% Jackknife UCL	0,0148
95% Standard Bootstrap UCL	0,0148	95% Bootstrap-t UCL	0,0152
95% Hall's Bootstrap UCL	0,0152	95% Percentile Bootstrap UCL	0,0149
95% BCA Bootstrap UCL	0,0153		
90% Chebyshev(Mean, Sd) UCL	0,0166	95% Chebyshev(Mean, Sd) UCL	0,0185
97,5% Chebyshev(Mean, Sd) UCL	0,0211	99% Chebyshev(Mean, Sd) UCL	0,0262

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,0185
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:33:13  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### Cloruro di vinile

#### General Statistics

Total Number of Observations	31,00	Number of Distinct Observations	16,00
		Number of Missing Observations	5,000
Minimum	0,0100	Mean	0,130
Maximum	0,560	Median	0,0500
SD	0,163	Std. Error of Mean	0,0293
Coefficient of Variation	1,260	Skewness	1,513

#### Normal GOF Test

Shapiro Wilk Test Statistic	0,722
5% Shapiro Wilk Critical Value	0,929
Lilliefors Test Statistic	0,300
5% Lilliefors Critical Value	0,156

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL	0,179
---------------------	-------

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,186
95% Modified-t UCL (Johnson-1978)	0,181

#### Gamma GOF Test

A-D Test Statistic	1,298
5% A-D Critical Value	0,787
K-S Test Statistic	0,234
5% K-S Critical Value	0,164

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,758	k star (bias corrected MLE)	0,706
Theta hat (MLE)	0,171	Theta star (bias corrected MLE)	0,183
nu hat (MLE)	46,99	nu star (bias corrected)	43,78
MLE Mean (bias corrected)	0,130	MLE Sd (bias corrected)	0,154
		Approximate Chi Square Value (0,0500)	29,60
Adjusted Level of Significance	0,0413	Adjusted Chi Square Value	28,95

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	0,192	95% Adjusted Gamma UCL (use when $n < 50$ )	0,196
---	-------	---	-------

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,909
5% Shapiro Wilk Critical Value	0,929
Lilliefors Test Statistic	0,162
5% Lilliefors Critical Value	0,156

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,605	Mean of logged Data	-2,833
Maximum of Logged Data	-0,580	SD of logged Data	1,324

#### Assuming Lognormal Distribution

95% H-UCL	0,281	90% Chebyshev (MVUE) UCL	0,253
95% Chebyshev (MVUE) UCL	0,306	97,5% Chebyshev (MVUE) UCL	0,380
99% Chebyshev (MVUE) UCL	0,526		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,178	95% Jackknife UCL	0,179
95% Standard Bootstrap UCL	0,176	95% Bootstrap-t UCL	0,194
95% Hall's Bootstrap UCL	0,179	95% Percentile Bootstrap UCL	0,180
95% BCA Bootstrap UCL	0,186		
90% Chebyshev(Mean, Sd) UCL	0,217	95% Chebyshev(Mean, Sd) UCL	0,257
97,5% Chebyshev(Mean, Sd) UCL	0,313	99% Chebyshev(Mean, Sd) UCL	0,421

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,257
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.103/09/2018 15:27:02  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## Mercurio

### General Statistics

Total Number of Observations	435,0	Number of Distinct Observations	18,00
		Number of Missing Observations	87,00
Minimum	0,0316	Mean	0,184
Maximum	1,900	Median	0,100
SD	0,213	Std. Error of Mean	0,0102
Coefficient of Variation	1,160	Skewness	3,130

### Normal GOF Test

Shapiro Wilk Test Statistic	0,558
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,414
5% Lilliefors Critical Value	0,0429

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	0,201
---------------------	-------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,202
95% Modified-t UCL (Johnson-1978)	0,201

### Gamma GOF Test

A-D Test Statistic	64,16
5% A-D Critical Value	0,773
K-S Test Statistic	0,413
5% K-S Critical Value	0,0443

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	1,497	k star (bias corrected MLE)	1,488
Theta hat (MLE)	0,123	Theta star (bias corrected MLE)	0,124
nu hat (MLE)	1302	nu star (bias corrected)	1295
MLE Mean (bias corrected)	0,184	MLE Sd (bias corrected)	0,151
		Approximate Chi Square Value (0,0500)	1212
Adjusted Level of Significance	0,0494	Adjusted Chi Square Value	1212

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	0,196	95% Adjusted Gamma UCL (use when $n < 50$ )	0,196
---	-------	---	-------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,752
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,383
5% Lilliefors Critical Value	0,0429

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-3,455	Mean of logged Data	-2,063
Maximum of Logged Data	0,642	SD of logged Data	0,771

#### Assuming Lognormal Distribution

95% H-UCL	0,184	90% Chebyshev (MVUE) UCL	0,192
95% Chebyshev (MVUE) UCL	0,202	97,5% Chebyshev (MVUE) UCL	0,216
99% Chebyshev (MVUE) UCL	0,242		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,201	95% Jackknife UCL	0,201
95% Standard Bootstrap UCL	0,201	95% Bootstrap-t UCL	0,202
95% Hall's Bootstrap UCL	0,203	95% Percentile Bootstrap UCL	0,200
95% BCA Bootstrap UCL	0,202		
90% Chebyshev(Mean, Sd) UCL	0,215	95% Chebyshev(Mean, Sd) UCL	0,228
97,5% Chebyshev(Mean, Sd) UCL	0,248	99% Chebyshev(Mean, Sd) UCL	0,286

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,228
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.110/10/2018 16:53:29  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### Tetrachloroethylene

#### General Statistics

Total Number of Observations	34,00	Number of Distinct Observations	34,00
		Number of Missing Observations	0
Minimum	8,300	Mean	203,5
Maximum	2090	Median	61,30
SD	390,5	Std. Error of Mean	66,97
Coefficient of Variation	1,919	Skewness	3,900

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,503  
 5% Shapiro Wilk Critical Value 0,933  
 Lilliefors Test Statistic 0,309  
 5% Lilliefors Critical Value 0,150

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 316,8

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 361,5  
 95% Modified-t UCL (Johnson-1978) 324,3

#### Gamma GOF Test

A-D Test Statistic 2,007  
 5% A-D Critical Value 0,795  
 K-S Test Statistic 0,255  
 5% K-S Critical Value 0,158

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,676	k star (bias corrected MLE)	0,636
Theta hat (MLE)	301,2	Theta star (bias corrected MLE)	320,1
nu hat (MLE)	45,94	nu star (bias corrected)	43,22
MLE Mean (bias corrected)	203,5	MLE Sd (bias corrected)	255,2
		Approximate Chi Square Value (0,0500)	29,15
Adjusted Level of Significance	0,0422	Adjusted Chi Square Value	28,57

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 301,7

95% Adjusted Gamma UCL (use when  $n < 50$ ) 307,8

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,955  
 5% Shapiro Wilk Critical Value 0,933  
 Lilliefors Test Statistic 0,191  
 5% Lilliefors Critical Value 0,150

#### Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

**Data appear Approximate Lognormal at 5% Significance Level**

**Lognormal Statistics**

Minimum of Logged Data	2,116	Mean of logged Data	4,417
Maximum of Logged Data	7,645	SD of logged Data	1,261

**Assuming Lognormal Distribution**

95% H-UCL	337,8	90% Chebyshev (MVUE) UCL	316,0
95% Chebyshev (MVUE) UCL	379,3	97,5% Chebyshev (MVUE) UCL	467,1
99% Chebyshev (MVUE) UCL	639,7		

**Nonparametric Distribution Free UCL Statistics**

**Data appear to follow a Discernible Distribution at 5% Significance Level**

**Nonparametric Distribution Free UCLs**

95% CLT UCL	313,6	95% Jackknife UCL	316,8
95% Standard Bootstrap UCL	308,8	95% Bootstrap-t UCL	496,8
95% Hall's Bootstrap UCL	752,3	95% Percentile Bootstrap UCL	318,6
95% BCA Bootstrap UCL	379,9		
90% Chebyshev(Mean, Sd) UCL	404,4	95% Chebyshev(Mean, Sd) UCL	495,4
97,5% Chebyshev(Mean, Sd) UCL	621,7	99% Chebyshev(Mean, Sd) UCL	869,8

**Suggested UCL to Use**

95% H-UCL	337,8
-----------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**

**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**

**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**

**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation    ProUCL 5.110/10/2018 16:54:39  
 From File                      WorkSheet.xls  
 Full Precision                OFF  
 Confidence Coefficient      95%  
 Number of Bootstrap Operations    2000

### Tricloroetilene

#### General Statistics

Total Number of Observations	213,0	Number of Distinct Observations	119,0
		Number of Missing Observations	29,00
Minimum	0,0160	Mean	2,482
Maximum	45,80	Median	1,610
SD	3,767	Std. Error of Mean	0,258
Coefficient of Variation	1,518	Skewness	7,830

#### Normal GOF Test

Shapiro Wilk Test Statistic    0,481  
 5% Shapiro Wilk P Value      0  
 Lilliefors Test Statistic       0,256  
 5% Lilliefors Critical Value    0,0611

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL    2,908

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)    3,054  
 95% Modified-t UCL (Johnson-1978)    2,931

#### Gamma GOF Test

A-D Test Statistic    2,922  
 5% A-D Critical Value    0,780  
 K-S Test Statistic      0,107  
 5% K-S Critical Value    0,0637

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	1,164	k star (bias corrected MLE)	1,151
Theta hat (MLE)	2,132	Theta star (bias corrected MLE)	2,157
nu hat (MLE)	495,9	nu star (bias corrected)	490,2
MLE Mean (bias corrected)	2,482	MLE Sd (bias corrected)	2,313
		Approximate Chi Square Value (0,0500)	439,9
Adjusted Level of Significance	0,0489	Adjusted Chi Square Value	439,6

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ )    2,766                      95% Adjusted Gamma UCL (use when  $n < 50$ )    2,768

#### Lognormal GOF Test

Shapiro Wilk Test Statistic    0,950  
 5% Shapiro Wilk P Value      3,3905E-7  
 Lilliefors Test Statistic       0,0684  
 5% Lilliefors Critical Value    0,0611

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,135	Mean of logged Data	0,421
Maximum of Logged Data	3,824	SD of logged Data	1,041

#### Assuming Lognormal Distribution

95% H-UCL	3,062	90% Chebyshev (MVUE) UCL	3,296
95% Chebyshev (MVUE) UCL	3,606	97,5% Chebyshev (MVUE) UCL	4,038
99% Chebyshev (MVUE) UCL	4,885		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	2,906	95% Jackknife UCL	2,908
95% Standard Bootstrap UCL	2,913	95% Bootstrap-t UCL	3,179
95% Hall's Bootstrap UCL	4,807	95% Percentile Bootstrap UCL	2,947
95% BCA Bootstrap UCL	3,081		
90% Chebyshev(Mean, Sd) UCL	3,256	95% Chebyshev(Mean, Sd) UCL	3,607
97,5% Chebyshev(Mean, Sd) UCL	4,094	99% Chebyshev(Mean, Sd) UCL	5,050

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	3,607
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation    ProUCL 5.110/10/2018 16:52:11  
 From File    WorkSheet.xls  
 Full Precision    OFF  
 Confidence Coefficient    95%  
 Number of Bootstrap Operations    2000

### Cloroformio

#### General Statistics

Total Number of Observations	94,00	Number of Distinct Observations	81,00
		Number of Missing Observations	12,00
Minimum	0,0160	Mean	8,084
Maximum	64,50	Median	4,125
SD	11,77	Std. Error of Mean	1,214
Coefficient of Variation	1,456	Skewness	3,222

#### Normal GOF Test

Shapiro Wilk Test Statistic	0,607
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,247
5% Lilliefors Critical Value	0,0916

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL	10,10
---------------------	-------

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	10,51
95% Modified-t UCL (Johnson-1978)	10,17

#### Gamma GOF Test

A-D Test Statistic	1,115
5% A-D Critical Value	0,793
K-S Test Statistic	0,0982
5% K-S Critical Value	0,0958

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

**Data Not Gamma Distributed at 5% Significance Level**

#### Gamma Statistics

k hat (MLE)	0,775	k star (bias corrected MLE)	0,758
Theta hat (MLE)	10,43	Theta star (bias corrected MLE)	10,67
nu hat (MLE)	145,7	nu star (bias corrected)	142,4
MLE Mean (bias corrected)	8,084	MLE Sd (bias corrected)	9,288
		Approximate Chi Square Value (0,0500)	115,8
Adjusted Level of Significance	0,0474	Adjusted Chi Square Value	115,5

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	9,938	95% Adjusted Gamma UCL (use when $n < 50$ )	9,970
---	-------	---	-------

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,935
5% Shapiro Wilk P Value	1,3063E-4
Lilliefors Test Statistic	0,0816
5% Lilliefors Critical Value	0,0916

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

**Data appear Approximate Lognormal at 5% Significance Level**

**Lognormal Statistics**

Minimum of Logged Data	-4,135	Mean of logged Data	1,321
Maximum of Logged Data	4,167	SD of logged Data	1,428

**Assuming Lognormal Distribution**

95% H-UCL	15,50	90% Chebyshev (MVUE) UCL	16,25
95% Chebyshev (MVUE) UCL	19,01	97,5% Chebyshev (MVUE) UCL	22,84
99% Chebyshev (MVUE) UCL	30,35		

**Nonparametric Distribution Free UCL Statistics**

**Data appear to follow a Discernible Distribution at 5% Significance Level**

**Nonparametric Distribution Free UCLs**

95% CLT UCL	10,08	95% Jackknife UCL	10,10
95% Standard Bootstrap UCL	10,08	95% Bootstrap-t UCL	10,77
95% Hall's Bootstrap UCL	10,62	95% Percentile Bootstrap UCL	10,21
95% BCA Bootstrap UCL	10,34		
90% Chebyshev(Mean, Sd) UCL	11,73	95% Chebyshev(Mean, Sd) UCL	13,38
97,5% Chebyshev(Mean, Sd) UCL	15,67	99% Chebyshev(Mean, Sd) UCL	20,16

**Suggested UCL to Use**

95% H-UCL	15,50
-----------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**

**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**

**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**

**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:48:41  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,1Dichloroethylene

### General Statistics

Total Number of Observations	294,0	Number of Distinct Observations	129,0
		Number of Missing Observations	41,00
Minimum	0,00490	Mean	0,172
Maximum	7,770	Median	0,0383
SD	0,604	Std. Error of Mean	0,0352
Coefficient of Variation	3,506	Skewness	9,644

### Normal GOF Test

Shapiro Wilk Test Statistic	0,281
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,391
5% Lilliefors Critical Value	0,0521

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	0,230
---------------------	-------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,251
95% Modified-t UCL (Johnson-1978)	0,234

### Gamma GOF Test

A-D Test Statistic	16,44
5% A-D Critical Value	0,844
K-S Test Statistic	0,182
5% K-S Critical Value	0,0565

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	0,409	k star (bias corrected MLE)	0,407
Theta hat (MLE)	0,421	Theta star (bias corrected MLE)	0,423
nu hat (MLE)	240,4	nu star (bias corrected)	239,2
MLE Mean (bias corrected)	0,172	MLE Sd (bias corrected)	0,270
		Approximate Chi Square Value (0,0500)	204,4
Adjusted Level of Significance	0,0492	Adjusted Chi Square Value	204,3

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	0,201	95% Adjusted Gamma UCL (use when $n < 50$ )	0,202
---	-------	---	-------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,883
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,201
5% Lilliefors Critical Value	0,0521

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,319	Mean of logged Data	-3,364
Maximum of Logged Data	2,050	SD of logged Data	1,732

#### Assuming Lognormal Distribution

95% H-UCL	0,207	90% Chebyshev (MVUE) UCL	0,225
95% Chebyshev (MVUE) UCL	0,257	97,5% Chebyshev (MVUE) UCL	0,302
99% Chebyshev (MVUE) UCL	0,391		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,230	95% Jackknife UCL	0,230
95% Standard Bootstrap UCL	0,229	95% Bootstrap-t UCL	0,299
95% Hall's Bootstrap UCL	0,506	95% Percentile Bootstrap UCL	0,239
95% BCA Bootstrap UCL	0,262		
90% Chebyshev(Mean, Sd) UCL	0,278	95% Chebyshev(Mean, Sd) UCL	0,326
97,5% Chebyshev(Mean, Sd) UCL	0,392	99% Chebyshev(Mean, Sd) UCL	0,522

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,326
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:37:58  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,2dicloroetilene (cis+trans)

### General Statistics

Total Number of Observations	308,0	Number of Distinct Observations	100,0
		Number of Missing Observations	91,00
Minimum	0,00500	Mean	0,891
Maximum	6,680	Median	0,300
SD	1,408	Std. Error of Mean	0,0802
Coefficient of Variation	1,581	Skewness	2,238

### Normal GOF Test

Shapiro Wilk Test Statistic	0,614
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,284
5% Lilliefors Critical Value	0,0509

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	1,023
---------------------	-------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1,034
95% Modified-t UCL (Johnson-1978)	1,025

### Gamma GOF Test

A-D Test Statistic	6,767
5% A-D Critical Value	0,818
K-S Test Statistic	0,133
5% K-S Critical Value	0,0544

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	0,543	k star (bias corrected MLE)	0,540
Theta hat (MLE)	1,641	Theta star (bias corrected MLE)	1,651
nu hat (MLE)	334,3	nu star (bias corrected)	332,4
MLE Mean (bias corrected)	0,891	MLE Sd (bias corrected)	1,213
		Approximate Chi Square Value (0,0500)	291,1
Adjusted Level of Significance	0,0492	Adjusted Chi Square Value	291,0

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1,017	95% Adjusted Gamma UCL (use when n<50)	1,018
---	-------	--	-------

### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,949
5% Shapiro Wilk P Value	1,088E-11
Lilliefors Test Statistic	0,0751
5% Lilliefors Critical Value	0,0509

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	-1,271
Maximum of Logged Data	1,899	SD of logged Data	1,680

#### Assuming Lognormal Distribution

95% H-UCL	1,498	90% Chebyshev (MVUE) UCL	1,635
95% Chebyshev (MVUE) UCL	1,859	97,5% Chebyshev (MVUE) UCL	2,172
99% Chebyshev (MVUE) UCL	2,785		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	1,023	95% Jackknife UCL	1,023
95% Standard Bootstrap UCL	1,024	95% Bootstrap-t UCL	1,037
95% Hall's Bootstrap UCL	1,027	95% Percentile Bootstrap UCL	1,025
95% BCA Bootstrap UCL	1,042		
90% Chebyshev(Mean, Sd) UCL	1,131	95% Chebyshev(Mean, Sd) UCL	1,240
97,5% Chebyshev(Mean, Sd) UCL	1,392	99% Chebyshev(Mean, Sd) UCL	1,689

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	1,240
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation    ProUCL 5.109/10/2018 17:52:20  
 From File    WorkSheet.xls  
 Full Precision    OFF  
 Confidence Coefficient    95%  
 Number of Bootstrap Operations    2000

### 1,2Dicloropropano

#### General Statistics

Total Number of Observations	337,0	Number of Distinct Observations	59,00
		Number of Missing Observations	62,00
Minimum	0,00500	Mean	0,0430
Maximum	0,900	Median	0,0160
SD	0,0688	Std. Error of Mean	0,00375
Coefficient of Variation	1,601	Skewness	7,017

#### Normal GOF Test

Shapiro Wilk Test Statistic	0,516
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,290
5% Lilliefors Critical Value	0,0487

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL	0,0492
---------------------	--------

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0,0507
95% Modified-t UCL (Johnson-1978)	0,0494

#### Gamma GOF Test

A-D Test Statistic	22,71
5% A-D Critical Value	0,786
K-S Test Statistic	0,235
5% K-S Critical Value	0,0511

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,974	k star (bias corrected MLE)	0,967
Theta hat (MLE)	0,0442	Theta star (bias corrected MLE)	0,0445
nu hat (MLE)	656,1	nu star (bias corrected)	651,6
MLE Mean (bias corrected)	0,0430	MLE Sd (bias corrected)	0,0437
		Approximate Chi Square Value (0,0500)	593,4
Adjusted Level of Significance	0,0493	Adjusted Chi Square Value	593,2

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when $n \geq 50$ )	0,0472	95% Adjusted Gamma UCL (use when $n < 50$ )	0,0472
---	--------	---	--------

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0,853
5% Shapiro Wilk P Value	0
Lilliefors Test Statistic	0,227
5% Lilliefors Critical Value	0,0487

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	-3,742
Maximum of Logged Data	-0,105	SD of logged Data	1,015

#### Assuming Lognormal Distribution

95% H-UCL	0,0447	90% Chebyshev (MVUE) UCL	0,0476
95% Chebyshev (MVUE) UCL	0,0513	97,5% Chebyshev (MVUE) UCL	0,0563
99% Chebyshev (MVUE) UCL	0,0662		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,0492	95% Jackknife UCL	0,0492
95% Standard Bootstrap UCL	0,0490	95% Bootstrap-t UCL	0,0520
95% Hall's Bootstrap UCL	0,0539	95% Percentile Bootstrap UCL	0,0498
95% BCA Bootstrap UCL	0,0505		
90% Chebyshev(Mean, Sd) UCL	0,0542	95% Chebyshev(Mean, Sd) UCL	0,0593
97,5% Chebyshev(Mean, Sd) UCL	0,0664	99% Chebyshev(Mean, Sd) UCL	0,0803

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,0593
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:45:20  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### 1,1,2Tricloroetano

#### General Statistics

Total Number of Observations	400,0	Number of Distinct Observations	15,00
		Number of Missing Observations	71,00
Minimum	0,00500	Mean	0,0191
Maximum	0,480	Median	0,0200
SD	0,0309	Std. Error of Mean	0,00155
Coefficient of Variation	1,619	Skewness	13,09

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,174  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,461  
 5% Lilliefors Critical Value 0,0447

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 0,0217

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,0227  
 95% Modified-t UCL (Johnson-1978) 0,0218

#### Gamma GOF Test

A-D Test Statistic 2,500E+28  
 5% A-D Critical Value 0,760  
 K-S Test Statistic 0,365  
 5% K-S Critical Value 0,0455

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	2,983	k star (bias corrected MLE)	2,963
Theta hat (MLE)	0,00640	Theta star (bias corrected MLE)	0,00645
nu hat (MLE)	2387	nu star (bias corrected)	2370
MLE Mean (bias corrected)	0,0191	MLE Sd (bias corrected)	0,0111
		Approximate Chi Square Value (0,0500)	2258
Adjusted Level of Significance	0,0494	Adjusted Chi Square Value	2258

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,0201      95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,0201

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,708  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,292  
 5% Lilliefors Critical Value 0,0447

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-5,298	Mean of logged Data	-4,135
Maximum of Logged Data	-0,734	SD of logged Data	0,459

#### Assuming Lognormal Distribution

95% H-UCL	0,0185	90% Chebyshev (MVUE) UCL	0,0191
95% Chebyshev (MVUE) UCL	0,0197	97,5% Chebyshev (MVUE) UCL	0,0205
99% Chebyshev (MVUE) UCL	0,0221		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,0217	95% Jackknife UCL	0,0217
95% Standard Bootstrap UCL	0,0216	95% Bootstrap-t UCL	0,0296
95% Hall's Bootstrap UCL	0,0356	95% Percentile Bootstrap UCL	0,0219
95% BCA Bootstrap UCL	0,0232		
90% Chebyshev(Mean, Sd) UCL	0,0237	95% Chebyshev(Mean, Sd) UCL	0,0258
97,5% Chebyshev(Mean, Sd) UCL	0,0288	99% Chebyshev(Mean, Sd) UCL	0,0345

#### Suggested UCL to Use

95% Student's-t UCL	0,0217	or 95% Modified-t UCL	0,0218
---------------------	--------	-----------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:50:38  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### 1,2,3Tricloropropano

#### General Statistics

Total Number of Observations	255,0	Number of Distinct Observations	15,00
		Number of Missing Observations	46,00
Minimum	1,0000E-4	Mean	0,00385
Maximum	0,0248	Median	0,00100
SD	0,00691	Std. Error of Mean	4,3300E-4
Coefficient of Variation	1,798	Skewness	2,021

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,468  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,471  
 5% Lilliefors Critical Value 0,0559

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 0,00456

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,00462  
 95% Modified-t UCL (Johnson-1978) 0,00457

#### Gamma GOF Test

A-D Test Statistic 49,80  
 5% A-D Critical Value 0,814  
 K-S Test Statistic 0,456  
 5% K-S Critical Value 0,0603

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,577	k star (bias corrected MLE)	0,572
Theta hat (MLE)	0,00667	Theta star (bias corrected MLE)	0,00672
nu hat (MLE)	294,1	nu star (bias corrected)	291,9
MLE Mean (bias corrected)	0,00385	MLE Sd (bias corrected)	0,00508
		Approximate Chi Square Value (0,0500)	253,4
Adjusted Level of Significance	0,0491	Adjusted Chi Square Value	253,2

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,00443      95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,00444

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,686  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,391  
 5% Lilliefors Critical Value 0,0559

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-9,210	Mean of logged Data	-6,638
Maximum of Logged Data	-3,697	SD of logged Data	1,349

#### Assuming Lognormal Distribution

95% H-UCL	0,00400	90% Chebyshev (MVUE) UCL	0,00434
95% Chebyshev (MVUE) UCL	0,00485	97,5% Chebyshev (MVUE) UCL	0,00555
99% Chebyshev (MVUE) UCL	0,00692		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,00456	95% Jackknife UCL	0,00456
95% Standard Bootstrap UCL	0,00456	95% Bootstrap-t UCL	0,00465
95% Hall's Bootstrap UCL	0,00465	95% Percentile Bootstrap UCL	0,00457
95% BCA Bootstrap UCL	0,00459		
90% Chebyshev(Mean, Sd) UCL	0,00515	95% Chebyshev(Mean, Sd) UCL	0,00573
97,5% Chebyshev(Mean, Sd) UCL	0,00655	99% Chebyshev(Mean, Sd) UCL	0,00815

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,00573
------------------------------	---------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:40:45  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## 1,1,2,2Tetrachloroetano

### General Statistics

Total Number of Observations	303,0	Number of Distinct Observations	9,000
		Number of Missing Observations	62,00
Minimum	5,0000E-4	Mean	0,00673
Maximum	0,0500	Median	0,00500
SD	0,00554	Std. Error of Mean	3,1827E-4
Coefficient of Variation	0,823	Skewness	5,290

### Normal GOF Test

Shapiro Wilk Test Statistic 0,381  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,464  
 5% Lilliefors Critical Value 0,0513

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL 0,00726

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,00736  
 95% Modified-t UCL (Johnson-1978) 0,00727

### Gamma GOF Test

A-D Test Statistic 74,29  
 5% A-D Critical Value 0,759  
 K-S Test Statistic 0,487  
 5% K-S Critical Value 0,0522

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	3,772	k star (bias corrected MLE)	3,737
Theta hat (MLE)	0,00178	Theta star (bias corrected MLE)	0,00180
nu hat (MLE)	2286	nu star (bias corrected)	2265
MLE Mean (bias corrected)	0,00673	MLE Sd (bias corrected)	0,00348
		Approximate Chi Square Value (0,0500)	2155
Adjusted Level of Significance	0,0492	Adjusted Chi Square Value	2155

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,00708  
 95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,00708

### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,516  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,481  
 5% Lilliefors Critical Value 0,0513

### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-7,601	Mean of logged Data	-5,139
Maximum of Logged Data	-2,996	SD of logged Data	0,447

#### Assuming Lognormal Distribution

95% H-UCL	0,00678	90% Chebyshev (MVUE) UCL	0,00700
95% Chebyshev (MVUE) UCL	0,00723	97,5% Chebyshev (MVUE) UCL	0,00756
99% Chebyshev (MVUE) UCL	0,00821		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,00726	95% Jackknife UCL	0,00726
95% Standard Bootstrap UCL	0,00726	95% Bootstrap-t UCL	0,00741
95% Hall's Bootstrap UCL	0,00741	95% Percentile Bootstrap UCL	0,00725
95% BCA Bootstrap UCL	0,00743		
90% Chebyshev(Mean, Sd) UCL	0,00769	95% Chebyshev(Mean, Sd) UCL	0,00812
97,5% Chebyshev(Mean, Sd) UCL	0,00872	99% Chebyshev(Mean, Sd) UCL	0,00990

#### Suggested UCL to Use

95% Student's-t UCL	0,00726	or 95% Modified-t UCL	0,00727
---------------------	---------	-----------------------	---------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:55:20  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### Cloruro di Vinile

#### General Statistics

Total Number of Observations	403,0	Number of Distinct Observations	11,00
		Number of Missing Observations	66,00
Minimum	0,0100	Mean	0,0358
Maximum	0,430	Median	0,0220
SD	0,0369	Std. Error of Mean	0,00184
Coefficient of Variation	1,031	Skewness	5,241

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,554  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,307  
 5% Lilliefors Critical Value 0,0445

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 0,0388

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,0393  
 95% Modified-t UCL (Johnson-1978) 0,0389

#### Gamma GOF Test

A-D Test Statistic 28,54  
 5% A-D Critical Value 0,770  
 K-S Test Statistic 0,239  
 5% K-S Critical Value 0,0458

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	1,714	k star (bias corrected MLE)	1,703
Theta hat (MLE)	0,0209	Theta star (bias corrected MLE)	0,0210
nu hat (MLE)	1382	nu star (bias corrected)	1373
MLE Mean (bias corrected)	0,0358	MLE Sd (bias corrected)	0,0274
		Approximate Chi Square Value (0,0500)	1288
Adjusted Level of Significance	0,0494	Adjusted Chi Square Value	1287

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,0381      95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,0381

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,807  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,274  
 5% Lilliefors Critical Value 0,0445

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,605	Mean of logged Data	-3,650
Maximum of Logged Data	-0,844	SD of logged Data	0,787

#### Assuming Lognormal Distribution

95% H-UCL	0,0382	90% Chebyshev (MVUE) UCL	0,0401
95% Chebyshev (MVUE) UCL	0,0423	97,5% Chebyshev (MVUE) UCL	0,0452
99% Chebyshev (MVUE) UCL	0,0511		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,0388	95% Jackknife UCL	0,0388
95% Standard Bootstrap UCL	0,0388	95% Bootstrap-t UCL	0,0397
95% Hall's Bootstrap UCL	0,0396	95% Percentile Bootstrap UCL	0,0389
95% BCA Bootstrap UCL	0,0392		
90% Chebyshev(Mean, Sd) UCL	0,0413	95% Chebyshev(Mean, Sd) UCL	0,0438
97,5% Chebyshev(Mean, Sd) UCL	0,0472	99% Chebyshev(Mean, Sd) UCL	0,0540

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0,0438
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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



# UCL Statistics for Uncensored Full Data Sets

## User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:56:48  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

## Tetrachloroethylene

### General Statistics

Total Number of Observations	410,0	Number of Distinct Observations	272,0
		Number of Missing Observations	61,00
Minimum	0,0100	Mean	14,80
Maximum	850,0	Median	3,500
SD	56,41	Std. Error of Mean	2,786
Coefficient of Variation	3,810	Skewness	11,72

### Normal GOF Test

Shapiro Wilk Test Statistic 0,236  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,397  
 5% Lilliefors Critical Value 0,0441

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

### Data Not Normal at 5% Significance Level

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL 19,40

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 21,11  
 95% Modified-t UCL (Johnson-1978) 19,67

### Gamma GOF Test

A-D Test Statistic 23,88  
 5% A-D Critical Value 0,823  
 K-S Test Statistic 0,180  
 5% K-S Critical Value 0,0473

### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

### Data Not Gamma Distributed at 5% Significance Level

### Gamma Statistics

k hat (MLE)	0,502	k star (bias corrected MLE)	0,500
Theta hat (MLE)	29,47	Theta star (bias corrected MLE)	29,59
nu hat (MLE)	411,9	nu star (bias corrected)	410,3
MLE Mean (bias corrected)	14,80	MLE Sd (bias corrected)	20,93
		Approximate Chi Square Value (0,0500)	364,3
Adjusted Level of Significance	0,0494	Adjusted Chi Square Value	364,2

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 16,67  
 95% Adjusted Gamma UCL (use when  $n < 50$ ) 16,68

### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,982  
 5% Shapiro Wilk P Value 0,284  
 Lilliefors Test Statistic 0,0700  
 5% Lilliefors Critical Value 0,0441

### Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

**Data appear Approximate Lognormal at 5% Significance Level**

**Lognormal Statistics**

Minimum of Logged Data	-4,605	Mean of logged Data	1,431
Maximum of Logged Data	6,745	SD of logged Data	1,443

**Assuming Lognormal Distribution**

95% H-UCL	14,15	90% Chebyshev (MVUE) UCL	15,35
95% Chebyshev (MVUE) UCL	16,96	97,5% Chebyshev (MVUE) UCL	19,20
99% Chebyshev (MVUE) UCL	23,59		

**Nonparametric Distribution Free UCL Statistics**

**Data appear to follow a Discernible Distribution at 5% Significance Level**

**Nonparametric Distribution Free UCLs**

95% CLT UCL	19,39	95% Jackknife UCL	19,40
95% Standard Bootstrap UCL	19,39	95% Bootstrap-t UCL	26,23
95% Hall's Bootstrap UCL	42,16	95% Percentile Bootstrap UCL	19,97
95% BCA Bootstrap UCL	22,21		
90% Chebyshev(Mean, Sd) UCL	23,16	95% Chebyshev(Mean, Sd) UCL	26,95
97,5% Chebyshev(Mean, Sd) UCL	32,20	99% Chebyshev(Mean, Sd) UCL	42,52

**Suggested UCL to Use**

95% H-UCL	14,15
-----------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**

**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**

**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**

**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:58:24  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

### Tricloroetilene

#### General Statistics

Total Number of Observations	231,0	Number of Distinct Observations	103,0
		Number of Missing Observations	32,00
Minimum	0,0100	Mean	0,337
Maximum	1,800	Median	0,300
SD	0,240	Std. Error of Mean	0,0158
Coefficient of Variation	0,711	Skewness	1,765

#### Normal GOF Test

Shapiro Wilk Test Statistic 0,888  
 5% Shapiro Wilk P Value 0  
 Lilliefors Test Statistic 0,103  
 5% Lilliefors Critical Value 0,0587

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 0,363

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0,365  
 95% Modified-t UCL (Johnson-1978) 0,363

#### Gamma GOF Test

A-D Test Statistic 0,413  
 5% A-D Critical Value 0,766  
 K-S Test Statistic 0,0452  
 5% K-S Critical Value 0,0608

#### Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

#### Detected data appear Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	2,014	k star (bias corrected MLE)	1,991
Theta hat (MLE)	0,167	Theta star (bias corrected MLE)	0,169
nu hat (MLE)	930,6	nu star (bias corrected)	919,8
MLE Mean (bias corrected)	0,337	MLE Sd (bias corrected)	0,239
		Approximate Chi Square Value (0,0500)	850,4
Adjusted Level of Significance	0,0490	Adjusted Chi Square Value	850,0

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ ) 0,365  
 95% Adjusted Gamma UCL (use when  $n < 50$ ) 0,365

#### Lognormal GOF Test

Shapiro Wilk Test Statistic 0,958  
 5% Shapiro Wilk P Value 1,7730E-5  
 Lilliefors Test Statistic 0,0862  
 5% Lilliefors Critical Value 0,0587

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,605	Mean of logged Data	-1,356
Maximum of Logged Data	0,588	SD of logged Data	0,804

#### Assuming Lognormal Distribution

95% H-UCL	0,396	90% Chebyshev (MVUE) UCL	0,420
95% Chebyshev (MVUE) UCL	0,449	97,5% Chebyshev (MVUE) UCL	0,490
99% Chebyshev (MVUE) UCL	0,569		

#### Nonparametric Distribution Free UCL Statistics

#### Data appear to follow a Discernible Distribution at 5% Significance Level

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,363	95% Jackknife UCL	0,363
95% Standard Bootstrap UCL	0,363	95% Bootstrap-t UCL	0,365
95% Hall's Bootstrap UCL	0,364	95% Percentile Bootstrap UCL	0,363
95% BCA Bootstrap UCL	0,365		
90% Chebyshev(Mean, Sd) UCL	0,384	95% Chebyshev(Mean, Sd) UCL	0,406
97,5% Chebyshev(Mean, Sd) UCL	0,436	99% Chebyshev(Mean, Sd) UCL	0,494

#### Suggested UCL to Use

95% Approximate Gamma UCL	0,365
---------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation    ProUCL 5.109/10/2018 17:53:47  
 From File    WorkSheet.xls  
 Full Precision    OFF  
 Confidence Coefficient    95%  
 Number of Bootstrap Operations    2000

### Cloroformio

#### General Statistics

Total Number of Observations	336,0	Number of Distinct Observations	170,0
		Number of Missing Observations	63,00
Minimum	0,0100	Mean	0,908
Maximum	6,160	Median	0,600
SD	1,009	Std. Error of Mean	0,0551
Coefficient of Variation	1,111	Skewness	2,272

#### Normal GOF Test

Shapiro Wilk Test Statistic    0,741  
 5% Shapiro Wilk P Value    0  
 Lilliefors Test Statistic    0,207  
 5% Lilliefors Critical Value    0,0487

#### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

#### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

#### Data Not Normal at 5% Significance Level

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL    0,999

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)    1,006  
 95% Modified-t UCL (Johnson-1978)    1,000

#### Gamma GOF Test

A-D Test Statistic    2,336  
 5% A-D Critical Value    0,785  
 K-S Test Statistic    0,0743  
 5% K-S Critical Value    0,0511

#### Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

#### Data Not Gamma Distributed at 5% Significance Level

#### Gamma Statistics

k hat (MLE)	0,984	k star (bias corrected MLE)	0,978
Theta hat (MLE)	0,923	Theta star (bias corrected MLE)	0,929
nu hat (MLE)	661,6	nu star (bias corrected)	657,0
MLE Mean (bias corrected)	0,908	MLE Sd (bias corrected)	0,919
		Approximate Chi Square Value (0,0500)	598,5
Adjusted Level of Significance	0,0493	Adjusted Chi Square Value	598,3

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when  $n \geq 50$ )    0,997    95% Adjusted Gamma UCL (use when  $n < 50$ )    0,997

#### Lognormal GOF Test

Shapiro Wilk Test Statistic    0,918  
 5% Shapiro Wilk P Value    0  
 Lilliefors Test Statistic    0,0800  
 5% Lilliefors Critical Value    0,0487

#### Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

#### Lilliefors Lognormal GOF Test

Data Not Lognormal at 5% Significance Level

### Data Not Lognormal at 5% Significance Level

#### Lognormal Statistics

Minimum of Logged Data	-4,605	Mean of logged Data	-0,684
Maximum of Logged Data	1,818	SD of logged Data	1,253

#### Assuming Lognormal Distribution

95% H-UCL	1,299	90% Chebyshev (MVUE) UCL	1,401
95% Chebyshev (MVUE) UCL	1,536	97,5% Chebyshev (MVUE) UCL	1,724
99% Chebyshev (MVUE) UCL	2,092		

#### Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

#### Nonparametric Distribution Free UCLs

95% CLT UCL	0,999	95% Jackknife UCL	0,999
95% Standard Bootstrap UCL	1,000	95% Bootstrap-t UCL	1,005
95% Hall's Bootstrap UCL	1,013	95% Percentile Bootstrap UCL	0,998
95% BCA Bootstrap UCL	1,005		
90% Chebyshev(Mean, Sd) UCL	1,074	95% Chebyshev(Mean, Sd) UCL	1,148
97,5% Chebyshev(Mean, Sd) UCL	1,252	99% Chebyshev(Mean, Sd) UCL	1,456

#### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	1,148
------------------------------	-------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

---

**ALLEGATO 4 – ELABORAZIONE STATISTICA PER DEFINIZIONE VALORE RAPPRESENTATIVO DI  
SOGGIACENZA (PROUCL)**

---

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:13:41  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz1

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	39,00
		Number of Missing Observations	1,000
Minimum	-8,700	Mean	-6,304
Maximum	-3,490	Median	-6,115
SD	1,083	Std. Error of Mean	0,171
Coefficient of Variation	-0,172	Skewness	-0,0466

### Normal GOF Test

Shapiro Wilk Test Statistic	0,982
5% Shapiro Wilk Critical Value	0,940
Lilliefors Test Statistic	0,107
5% Lilliefors Critical Value	0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	-6,016
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	-6,024
95% Modified-t UCL (Johnson-1978)	-6,016

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-6,022	95% Jackknife UCL	-6,016
95% Standard Bootstrap UCL	-6,037	95% Bootstrap-t UCL	-6,023
95% Hall's Bootstrap UCL	-6,025	95% Percentile Bootstrap UCL	-6,040
95% BCA Bootstrap UCL	-6,024		
90% Chebyshev(Mean, Sd) UCL	-5,790	95% Chebyshev(Mean, Sd) UCL	-5,558
97,5% Chebyshev(Mean, Sd) UCL	-5,235	99% Chebyshev(Mean, Sd) UCL	-4,600

### Suggested UCL to Use

95% Student's-t UCL	-6,016
---------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:14:59  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz2

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	38,00
		Number of Missing Observations	1,000
Minimum	-10,87	Mean	-8,481
Maximum	-6,450	Median	-8,275
SD	1,111	Std. Error of Mean	0,176
Coefficient of Variation	-0,131	Skewness	-0,426

### Normal GOF Test

Shapiro Wilk Test Statistic 0,959  
 5% Shapiro Wilk Critical Value 0,940  
 Lilliefors Test Statistic 0,112  
 5% Lilliefors Critical Value 0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -8,184

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -8,204  
 95% Modified-t UCL (Johnson-1978) -8,186

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,191	95% Jackknife UCL	-8,184
95% Standard Bootstrap UCL	-8,200	95% Bootstrap-t UCL	-8,193
95% Hall's Bootstrap UCL	-8,195	95% Percentile Bootstrap UCL	-8,200
95% BCA Bootstrap UCL	-8,193		
90% Chebyshev(Mean, Sd) UCL	-7,953	95% Chebyshev(Mean, Sd) UCL	-7,715
97,5% Chebyshev(Mean, Sd) UCL	-7,383	99% Chebyshev(Mean, Sd) UCL	-6,732

### Suggested UCL to Use

95% Student's-t UCL -8,184

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:15:29  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz3

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	38,00
		Number of Missing Observations	1,000
Minimum	-10,23	Mean	-7,958
Maximum	-6,050	Median	-7,705
SD	1,060	Std. Error of Mean	0,168
Coefficient of Variation	-0,133	Skewness	-0,437

### Normal GOF Test

Shapiro Wilk Test Statistic 0,955  
 5% Shapiro Wilk Critical Value 0,940  
 Lilliefors Test Statistic 0,118  
 5% Lilliefors Critical Value 0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -7,675

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -7,694  
 95% Modified-t UCL (Johnson-1978) -7,677

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-7,682	95% Jackknife UCL	-7,675
95% Standard Bootstrap UCL	-7,679	95% Bootstrap-t UCL	-7,673
95% Hall's Bootstrap UCL	-7,696	95% Percentile Bootstrap UCL	-7,693
95% BCA Bootstrap UCL	-7,712		
90% Chebyshev(Mean, Sd) UCL	-7,455	95% Chebyshev(Mean, Sd) UCL	-7,227
97,5% Chebyshev(Mean, Sd) UCL	-6,911	99% Chebyshev(Mean, Sd) UCL	-6,290

### Suggested UCL to Use

95% Student's-t UCL -7,675

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:16:04  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

**Pz4**

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	35,00
		Number of Missing Observations	1,000
Minimum	-10,63	Mean	-7,506
Maximum	0	Median	-7,475
SD	2,130	Std. Error of Mean	0,337
Coefficient of Variation	-0,284	Skewness	2,072

### Normal GOF Test

Shapiro Wilk Test Statistic	0,787
5% Shapiro Wilk Critical Value	0,940
Lilliefors Test Statistic	0,222
5% Lilliefors Critical Value	0,139

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	-6,938
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	-6,834
95% Modified-t UCL (Johnson-1978)	-6,920

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution (0.05)**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-6,952	95% Jackknife UCL	-6,938
95% Standard Bootstrap UCL	-6,958	95% Bootstrap-t UCL	-6,736
95% Hall's Bootstrap UCL	-6,248	95% Percentile Bootstrap UCL	-6,906
95% BCA Bootstrap UCL	-6,817		
90% Chebyshev(Mean, Sd) UCL	-6,495	95% Chebyshev(Mean, Sd) UCL	-6,038
97,5% Chebyshev(Mean, Sd) UCL	-5,402	99% Chebyshev(Mean, Sd) UCL	-4,154

### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	-6,038
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:18:29  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz5

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	39,00
		Number of Missing Observations	1,000
Minimum	-10,15	Mean	-7,710
Maximum	-5,240	Median	-7,475
SD	1,160	Std. Error of Mean	0,183
Coefficient of Variation	-0,150	Skewness	-0,255

### Normal GOF Test

Shapiro Wilk Test Statistic 0,971  
 5% Shapiro Wilk Critical Value 0,940  
 Lilliefors Test Statistic 0,105  
 5% Lilliefors Critical Value 0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -7,401

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -7,416  
 95% Modified-t UCL (Johnson-1978) -7,402

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-7,408	95% Jackknife UCL	-7,401
95% Standard Bootstrap UCL	-7,412	95% Bootstrap-t UCL	-7,416
95% Hall's Bootstrap UCL	-7,401	95% Percentile Bootstrap UCL	-7,408
95% BCA Bootstrap UCL	-7,419		
90% Chebyshev(Mean, Sd) UCL	-7,160	95% Chebyshev(Mean, Sd) UCL	-6,911
97,5% Chebyshev(Mean, Sd) UCL	-6,565	99% Chebyshev(Mean, Sd) UCL	-5,885

### Suggested UCL to Use

95% Student's-t UCL -7,401

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:19:33  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz6

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	37,00
		Number of Missing Observations	1,000
Minimum	-9,500	Mean	-6,967
Maximum	-4,570	Median	-6,935
SD	1,245	Std. Error of Mean	0,197
Coefficient of Variation	-0,179	Skewness	-0,0654

### Normal GOF Test

Shapiro Wilk Test Statistic 0,970  
 5% Shapiro Wilk Critical Value 0,940  
 Lilliefors Test Statistic 0,0908  
 5% Lilliefors Critical Value 0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -6,635

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -6,645  
 95% Modified-t UCL (Johnson-1978) -6,636

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-6,643	95% Jackknife UCL	-6,635
95% Standard Bootstrap UCL	-6,650	95% Bootstrap-t UCL	-6,637
95% Hall's Bootstrap UCL	-6,623	95% Percentile Bootstrap UCL	-6,656
95% BCA Bootstrap UCL	-6,634		
90% Chebyshev(Mean, Sd) UCL	-6,376	95% Chebyshev(Mean, Sd) UCL	-6,109
97,5% Chebyshev(Mean, Sd) UCL	-5,738	99% Chebyshev(Mean, Sd) UCL	-5,008

### Suggested UCL to Use

95% Student's-t UCL -6,635

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation    ProUCL 5.131/08/2018 15:20:11  
 From File                      WorkSheet.xls  
 Full Precision                OFF  
 Confidence Coefficient      95%  
 Number of Bootstrap Operations    2000

**Pz7**

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	35,00
		Number of Missing Observations	1,000
Minimum	-11,04	Mean	-8,879
Maximum	-6,930	Median	-8,780
SD	0,838	Std. Error of Mean	0,133
Coefficient of Variation	-0,0944	Skewness	-0,243

### Normal GOF Test

Shapiro Wilk Test Statistic    0,986  
 5% Shapiro Wilk Critical Value    0,940  
 Lilliefors Test Statistic        0,0928  
 5% Lilliefors Critical Value    0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL    -8,656

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)    -8,667  
 95% Modified-t UCL (Johnson-1978)    -8,657

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,661	95% Jackknife UCL	-8,656
95% Standard Bootstrap UCL	-8,658	95% Bootstrap-t UCL	-8,660
95% Hall's Bootstrap UCL	-8,666	95% Percentile Bootstrap UCL	-8,669
95% BCA Bootstrap UCL	-8,662		
90% Chebyshev(Mean, Sd) UCL	-8,482	95% Chebyshev(Mean, Sd) UCL	-8,301
97,5% Chebyshev(Mean, Sd) UCL	-8,051	99% Chebyshev(Mean, Sd) UCL	-7,560

### Suggested UCL to Use

95% Student's-t UCL    -8,656

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:20:45  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz8

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	39,00
		Number of Missing Observations	1,000
Minimum	-10,77	Mean	-8,293
Maximum	-5,940	Median	-8,075
SD	1,015	Std. Error of Mean	0,160
Coefficient of Variation	-0,122	Skewness	-0,199

### Normal GOF Test

Shapiro Wilk Test Statistic	0,981
5% Shapiro Wilk Critical Value	0,940
Lilliefors Test Statistic	0,108
5% Lilliefors Critical Value	0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	-8,022
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	-8,034
95% Modified-t UCL (Johnson-1978)	-8,023

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,029	95% Jackknife UCL	-8,022
95% Standard Bootstrap UCL	-8,040	95% Bootstrap-t UCL	-8,026
95% Hall's Bootstrap UCL	-8,029	95% Percentile Bootstrap UCL	-8,034
95% BCA Bootstrap UCL	-8,041		
90% Chebyshev(Mean, Sd) UCL	-7,811	95% Chebyshev(Mean, Sd) UCL	-7,593
97,5% Chebyshev(Mean, Sd) UCL	-7,290	99% Chebyshev(Mean, Sd) UCL	-6,696

### Suggested UCL to Use

95% Student's-t UCL	-8,022
---------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:21:30  
 From File Worksheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz9

### General Statistics

Total Number of Observations	39,00	Number of Distinct Observations	38,00
		Number of Missing Observations	2,000
Minimum	-11,04	Mean	-8,283
Maximum	-6,050	Median	-8,130
SD	1,211	Std. Error of Mean	0,194
Coefficient of Variation	-0,146	Skewness	-0,347

### Normal GOF Test

Shapiro Wilk Test Statistic 0,968  
 5% Shapiro Wilk Critical Value 0,939  
 Lilliefors Test Statistic 0,140  
 5% Lilliefors Critical Value 0,140

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data appear Approximate Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -7,956

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -7,975

95% Modified-t UCL (Johnson-1978) -7,957

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-7,964	95% Jackknife UCL	-7,956
95% Standard Bootstrap UCL	-7,960	95% Bootstrap-t UCL	-7,969
95% Hall's Bootstrap UCL	-7,972	95% Percentile Bootstrap UCL	-7,969
95% BCA Bootstrap UCL	-7,958		
90% Chebyshev(Mean, Sd) UCL	-7,701	95% Chebyshev(Mean, Sd) UCL	-7,437
97,5% Chebyshev(Mean, Sd) UCL	-7,071	99% Chebyshev(Mean, Sd) UCL	-6,353

### Suggested UCL to Use

95% Student's-t UCL -7,956

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**



## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:22:24  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

**Pz10**

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	37,00
		Number of Missing Observations	1,000
Minimum	-11,89	Mean	-8,688
Maximum	-6,550	Median	-8,500
SD	1,307	Std. Error of Mean	0,207
Coefficient of Variation	-0,150	Skewness	-0,665

### Normal GOF Test

Shapiro Wilk Test Statistic	0,938
5% Shapiro Wilk Critical Value	0,940
Lilliefors Test Statistic	0,144
5% Lilliefors Critical Value	0,139

### Shapiro Wilk GOF Test

Data Not Normal at 5% Significance Level

### Lilliefors GOF Test

Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	-8,339
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	-8,371
95% Modified-t UCL (Johnson-1978)	-8,343

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data do not follow a Discernible Distribution (0.05)**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,348	95% Jackknife UCL	-8,339
95% Standard Bootstrap UCL	-8,352	95% Bootstrap-t UCL	-8,353
95% Hall's Bootstrap UCL	-8,380	95% Percentile Bootstrap UCL	-8,361
95% BCA Bootstrap UCL	-8,369		
90% Chebyshev(Mean, Sd) UCL	-8,068	95% Chebyshev(Mean, Sd) UCL	-7,787
97,5% Chebyshev(Mean, Sd) UCL	-7,397	99% Chebyshev(Mean, Sd) UCL	-6,631

### Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	-7,787
------------------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:22:56  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz11

### General Statistics

Total Number of Observations	40,00	Number of Distinct Observations	37,00
		Number of Missing Observations	1,000
Minimum	-10,60	Mean	-8,432
Maximum	-6,560	Median	-8,245
SD	1,001	Std. Error of Mean	0,158
Coefficient of Variation	-0,119	Skewness	-0,370

### Normal GOF Test

Shapiro Wilk Test Statistic	0,961
5% Shapiro Wilk Critical Value	0,940
Lilliefors Test Statistic	0,107
5% Lilliefors Critical Value	0,139

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL	-8,166
---------------------	--------

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	-8,182
95% Modified-t UCL (Johnson-1978)	-8,167

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,172	95% Jackknife UCL	-8,166
95% Standard Bootstrap UCL	-8,170	95% Bootstrap-t UCL	-8,180
95% Hall's Bootstrap UCL	-8,182	95% Percentile Bootstrap UCL	-8,170
95% BCA Bootstrap UCL	-8,186		
90% Chebyshev(Mean, Sd) UCL	-7,957	95% Chebyshev(Mean, Sd) UCL	-7,742
97,5% Chebyshev(Mean, Sd) UCL	-7,444	99% Chebyshev(Mean, Sd) UCL	-6,857

### Suggested UCL to Use

95% Student's-t UCL	-8,166
---------------------	--------

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:23:42  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

**Pz12**

### General Statistics

Total Number of Observations	35,00	Number of Distinct Observations	35,00
		Number of Missing Observations	6,000
Minimum	-9,630	Mean	-7,015
Maximum	-4,280	Median	-7,090
SD	1,200	Std. Error of Mean	0,203
Coefficient of Variation	-0,171	Skewness	0,280

### Normal GOF Test

Shapiro Wilk Test Statistic 0,980  
 5% Shapiro Wilk Critical Value 0,934  
 Lilliefors Test Statistic 0,107  
 5% Lilliefors Critical Value 0,148

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -6,673

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -6,672  
 95% Modified-t UCL (Johnson-1978) -6,671

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-6,682	95% Jackknife UCL	-6,673
95% Standard Bootstrap UCL	-6,686	95% Bootstrap-t UCL	-6,673
95% Hall's Bootstrap UCL	-6,667	95% Percentile Bootstrap UCL	-6,675
95% BCA Bootstrap UCL	-6,677		
90% Chebyshev(Mean, Sd) UCL	-6,407	95% Chebyshev(Mean, Sd) UCL	-6,132
97,5% Chebyshev(Mean, Sd) UCL	-5,749	99% Chebyshev(Mean, Sd) UCL	-4,998

### Suggested UCL to Use

95% Student's-t UCL -6,673

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.109/10/2018 17:39:03  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

**Pz13**

### General Statistics

Total Number of Observations	24,00	Number of Distinct Observations	23,00
		Number of Missing Observations	0
Minimum	-10,12	Mean	-7,748
Maximum	-5,800	Median	-7,565
SD	0,967	Std. Error of Mean	0,197
Coefficient of Variation	-0,125	Skewness	-0,455

### Normal GOF Test

Shapiro Wilk Test Statistic 0,965  
 5% Shapiro Wilk Critical Value 0,916  
 Lilliefors Test Statistic 0,133  
 5% Lilliefors Critical Value 0,177

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -7,410

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -7,443  
 95% Modified-t UCL (Johnson-1978) -7,413

Gamma Statistics Not Available

Lognormal Statistics Not Available

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-7,424	95% Jackknife UCL	-7,410
95% Standard Bootstrap UCL	-7,428	95% Bootstrap-t UCL	-7,424
95% Hall's Bootstrap UCL	-7,434	95% Percentile Bootstrap UCL	-7,430
95% BCA Bootstrap UCL	-7,444		
90% Chebyshev(Mean, Sd) UCL	-7,156	95% Chebyshev(Mean, Sd) UCL	-6,888
97,5% Chebyshev(Mean, Sd) UCL	-6,516	99% Chebyshev(Mean, Sd) UCL	-5,785

### Suggested UCL to Use

95% Student's-t UCL -7,410

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

## UCL Statistics for Uncensored Full Data Sets

### User Selected Options

Date/Time of Computation ProUCL 5.131/08/2018 15:26:34  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

Pz14

### General Statistics

Total Number of Observations	17,00	Number of Distinct Observations	17,00
		Number of Missing Observations	24,00
Minimum	-10,52	Mean	-8,524
Maximum	-7,470	Median	-8,260
SD	0,921	Std. Error of Mean	0,223
Coefficient of Variation	-0,108	Skewness	-0,743

### Normal GOF Test

Shapiro Wilk Test Statistic 0,912  
 5% Shapiro Wilk Critical Value 0,892  
 Lilliefors Test Statistic 0,184  
 5% Lilliefors Critical Value 0,207

### Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

### Lilliefors GOF Test

Data appear Normal at 5% Significance Level

**Data appear Normal at 5% Significance Level**

### Assuming Normal Distribution

#### 95% Normal UCL

95% Student's-t UCL -8,134

#### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) -8,199  
 95% Modified-t UCL (Johnson-1978) -8,140

**Gamma Statistics Not Available**

**Lognormal Statistics Not Available**

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	-8,156	95% Jackknife UCL	-8,134
95% Standard Bootstrap UCL	-8,166	95% Bootstrap-t UCL	-8,193
95% Hall's Bootstrap UCL	-8,193	95% Percentile Bootstrap UCL	-8,178
95% BCA Bootstrap UCL	-8,209		
90% Chebyshev(Mean, Sd) UCL	-7,854	95% Chebyshev(Mean, Sd) UCL	-7,550
97,5% Chebyshev(Mean, Sd) UCL	-7,129	99% Chebyshev(Mean, Sd) UCL	-6,302

### Suggested UCL to Use

95% Student's-t UCL -8,134

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.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

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.**

---

**ALLEGATO 5 – GRAFICI BOX-PLOT CON INDIVIDUAZIONE OUTLIER**

---

## Grafici box-plot con individuazione outlier

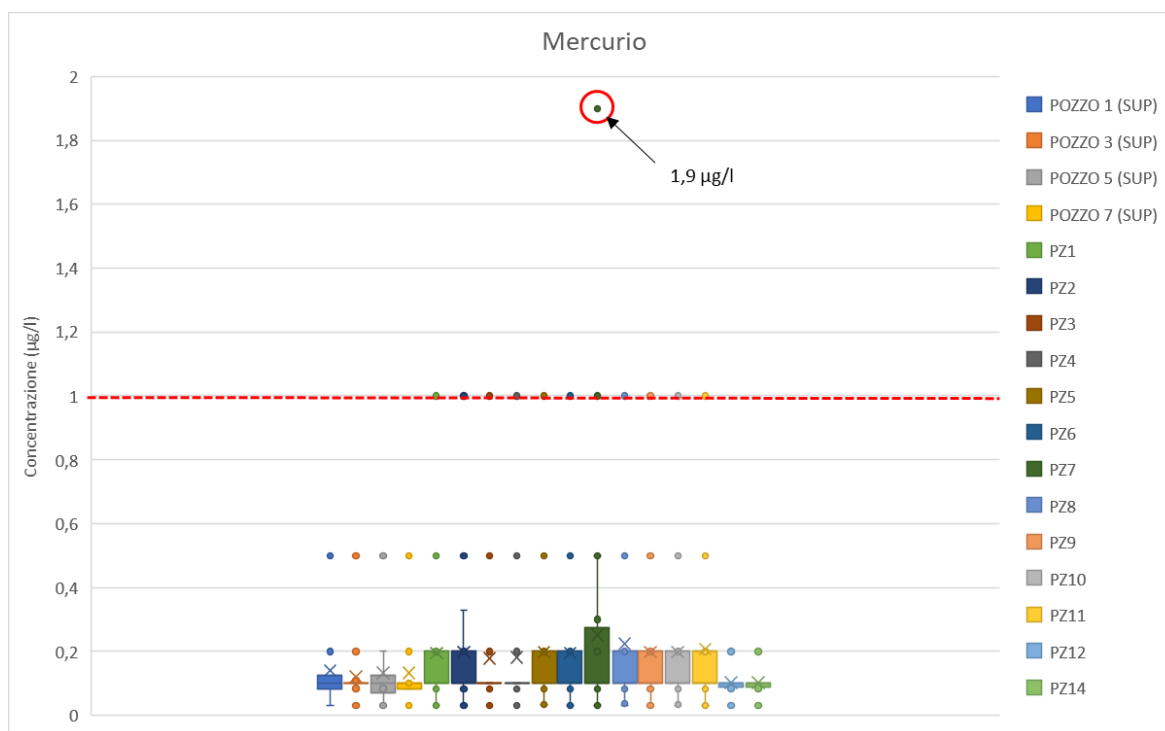


Figura 1 - Serie di dati relative al Mercurio. Il cerchio indica l'outlier individuato (1,9 µg/l). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

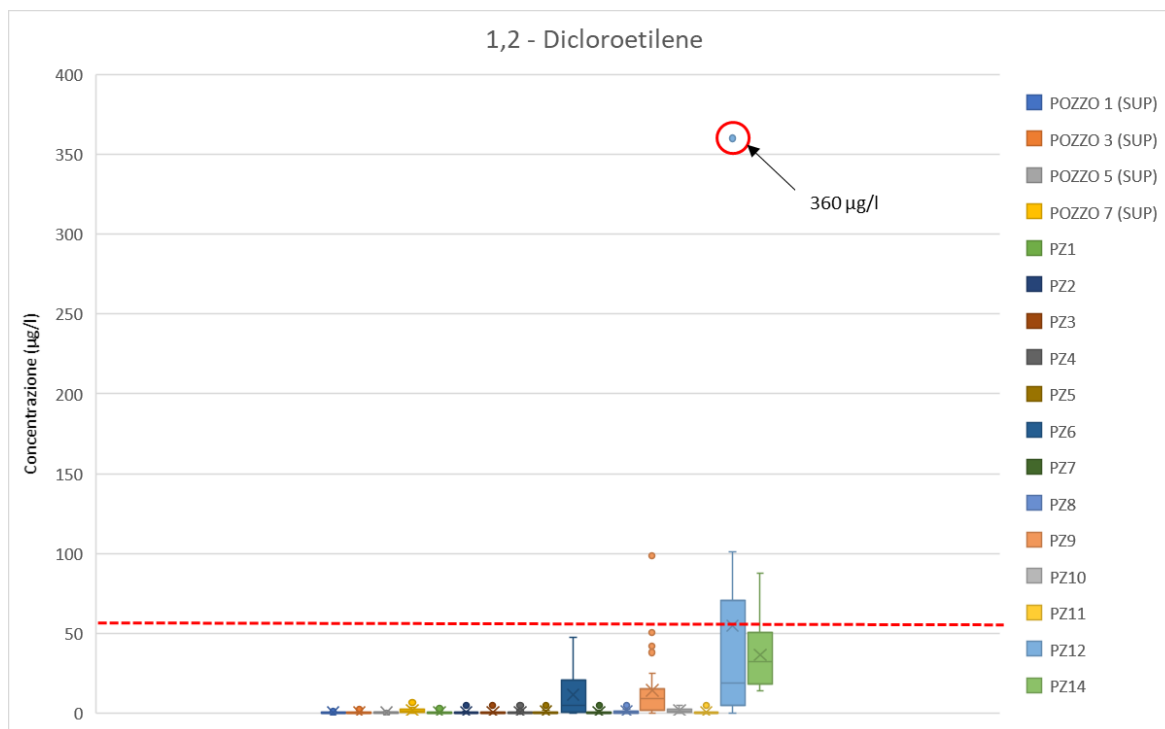


Figura 2 - Serie di dati relative al 1,2-Dicloroetilene (cis+trans). Il cerchio indica l'outlier individuato (360 µg/l). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

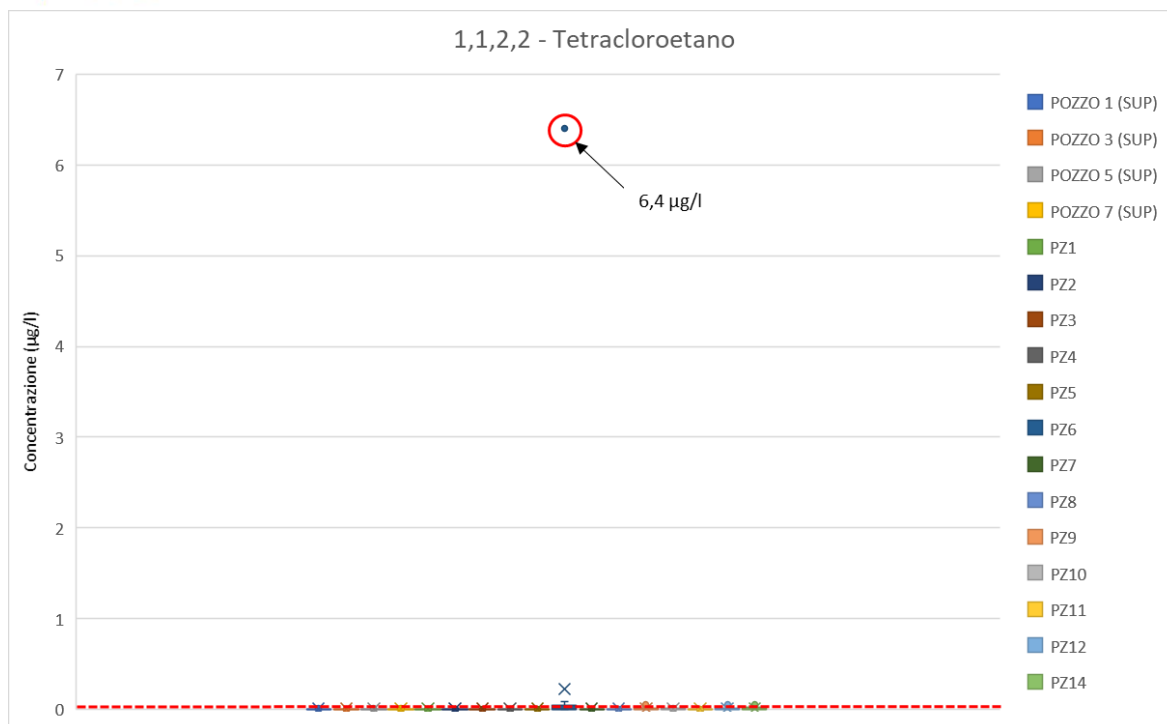


Figura 3 - Serie di dati relative al 1,1,2,2-Tetracloroetano. Il cerchio indica l'outlier individuato (6,4 µg/l). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

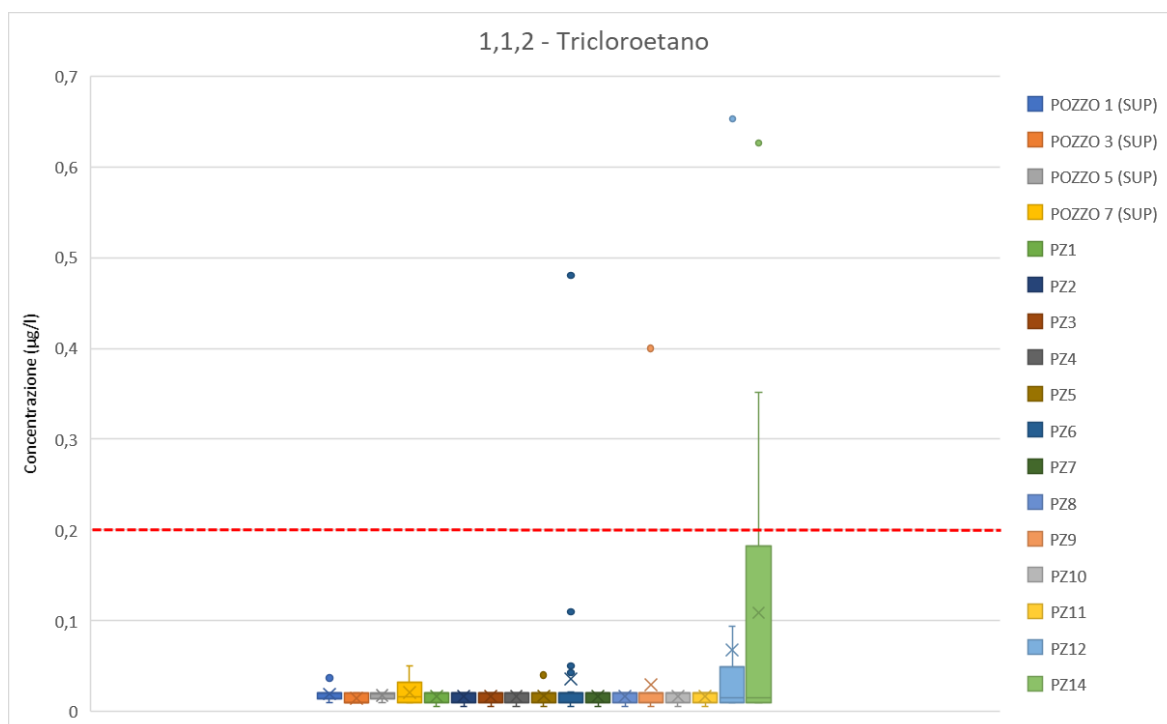


Figura 4 - Serie di dati relative al 1,1,2-Tricloroetano. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.



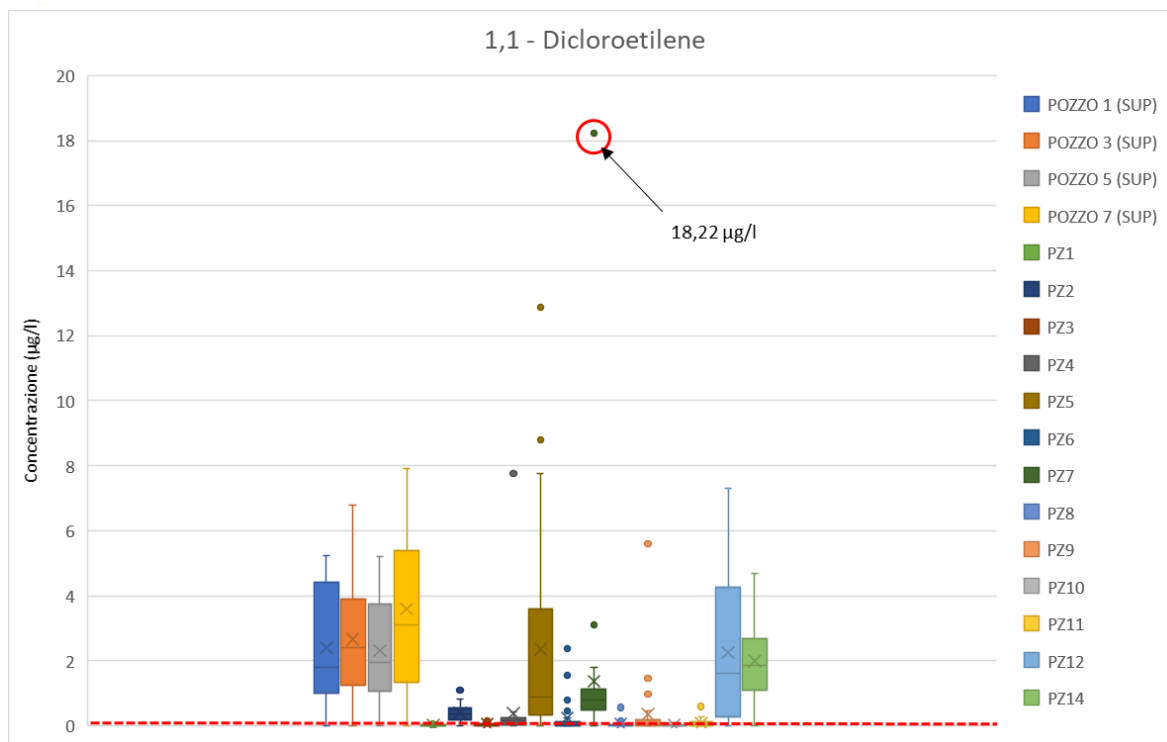


Figura 5 - Serie di dati relative al 1,1-Dicloroetilene. Il cerchio indica l'outlier individuato (18,22 µg/l). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

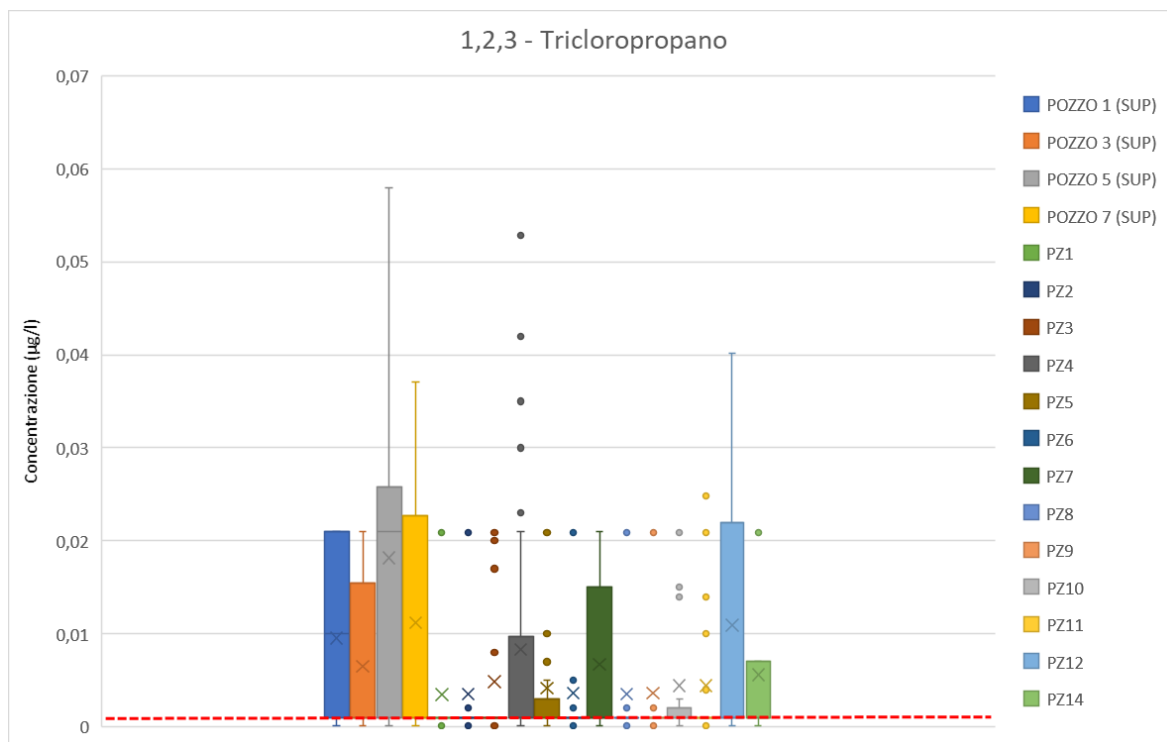


Figura 6 - Serie di dati relative al 1,2,3-Tricloropropano. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

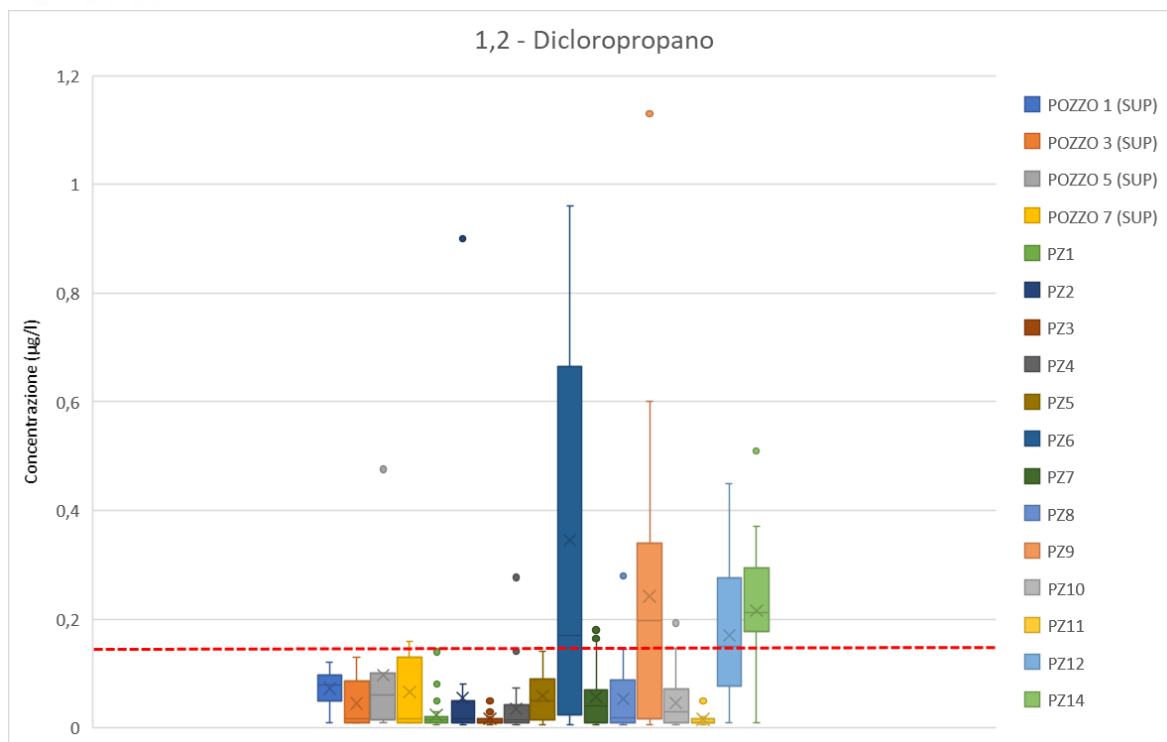


Figura 7 - Serie di dati relative al 1,2-Dicloropropano. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

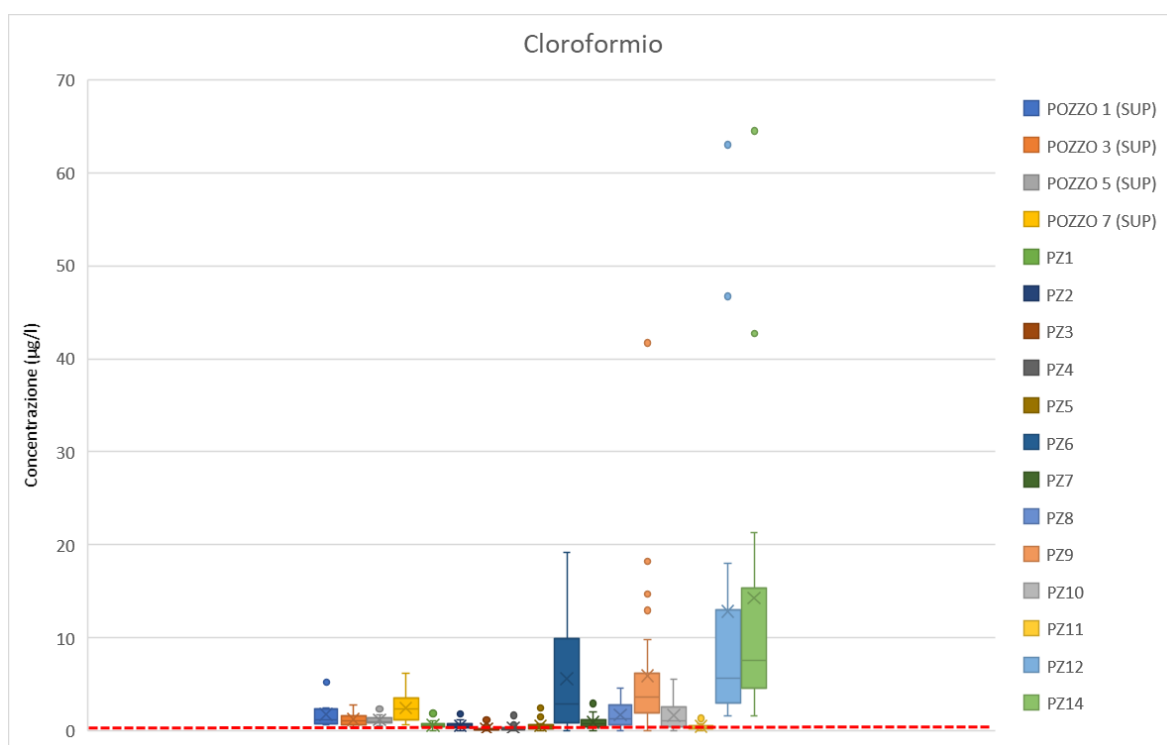


Figura 8 - Serie di dati relative al Cloroformio. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

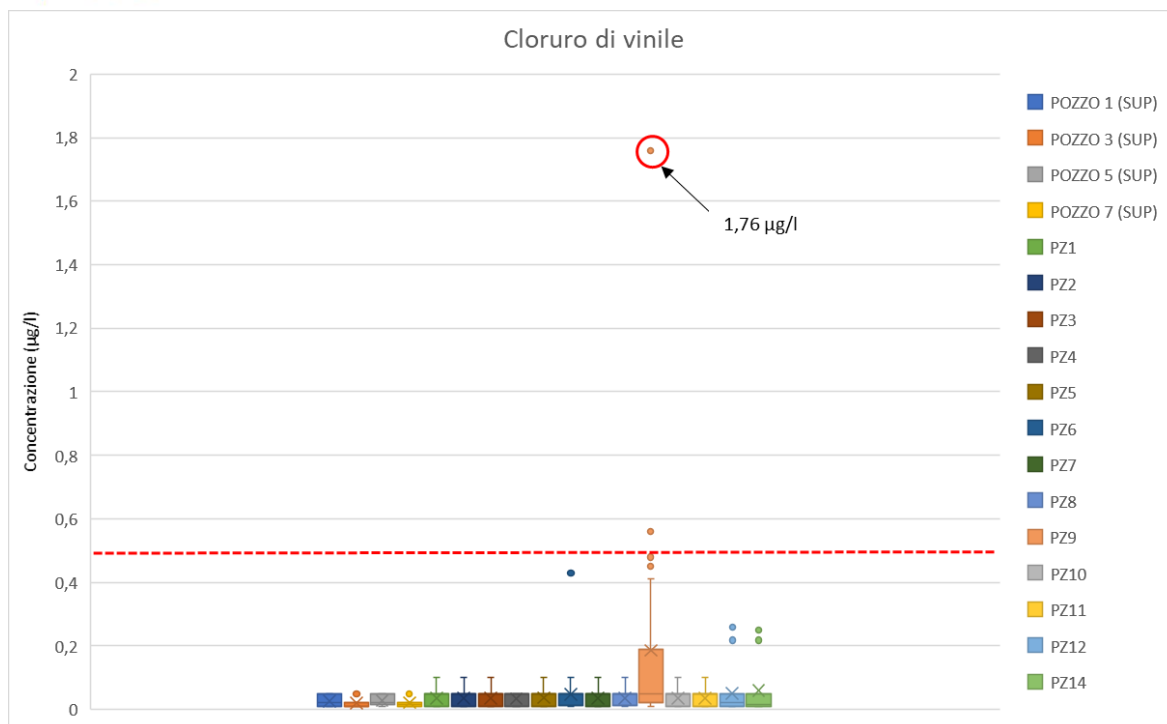


Figura 9 - Serie di dati relative al Cloruro di Vinile. Il cerchio indica l'outlier individuato (1,76 µg/l). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

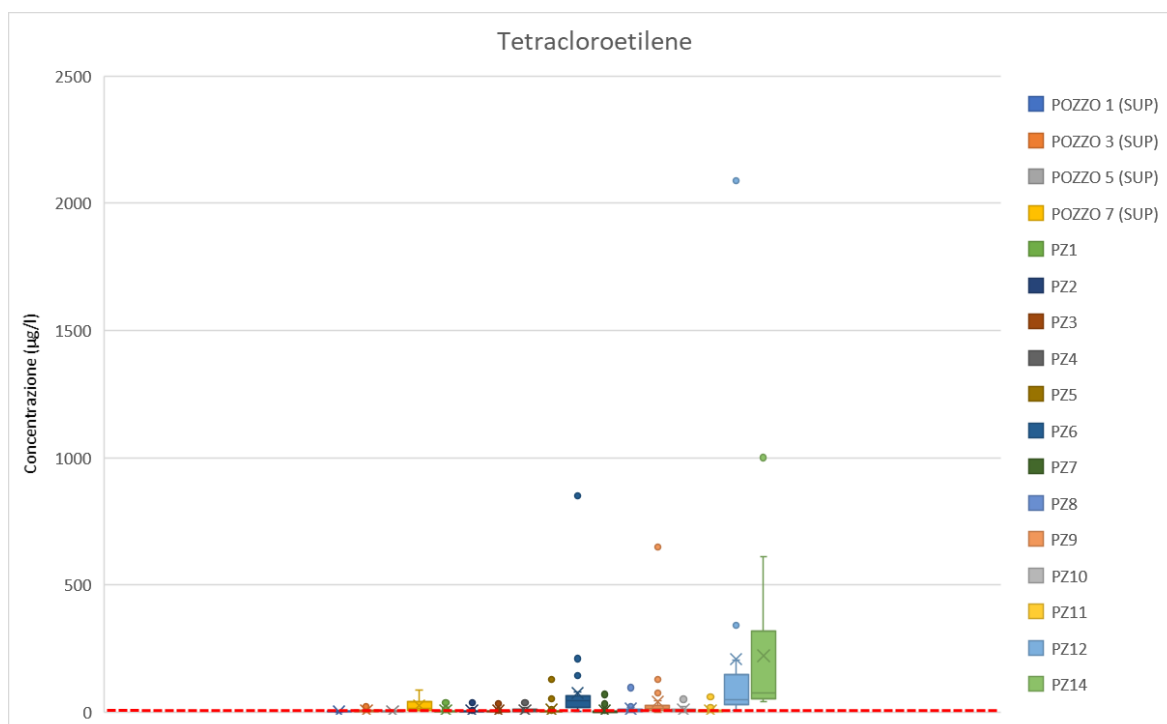


Figura 10 - Serie di dati relative al Tetracloroetilene. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

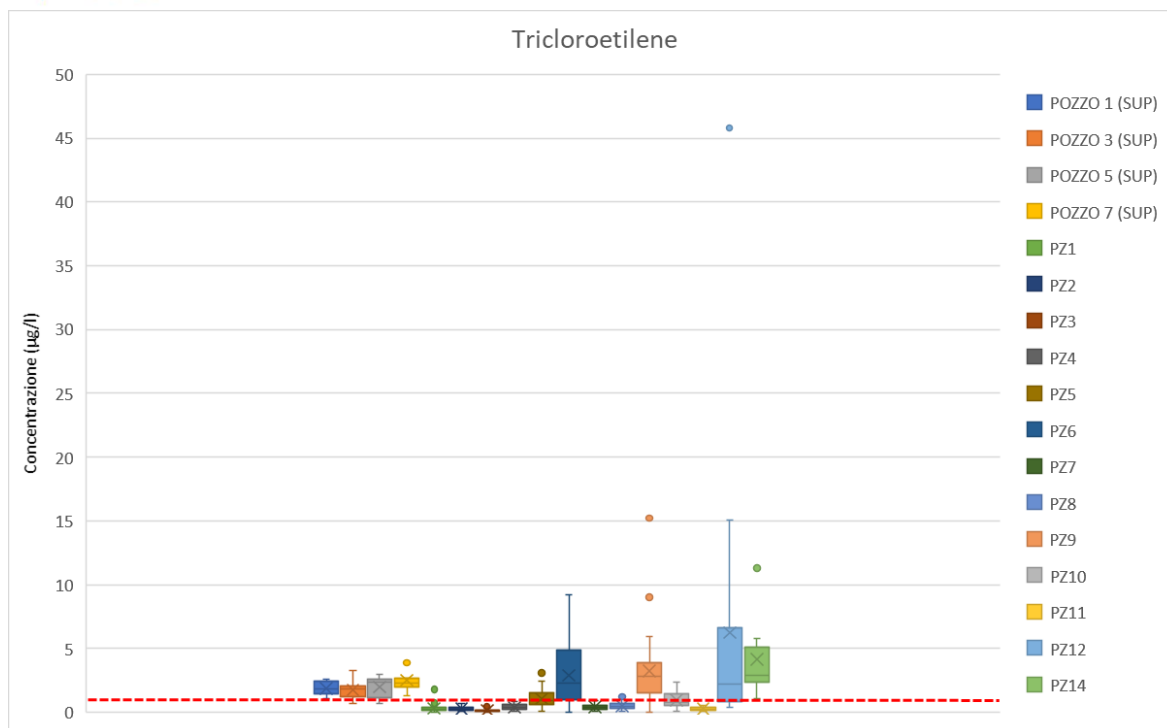


Figura 11 - Serie di dati relative al Tricloroetilene. Non sono stati individuati outlier. La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

---

**ALLEGATO 6 – GRAFICI BOX-PLOT DISTRIBUZIONI DI DATI**

---

## Grafici box-plot distribuzioni di dati

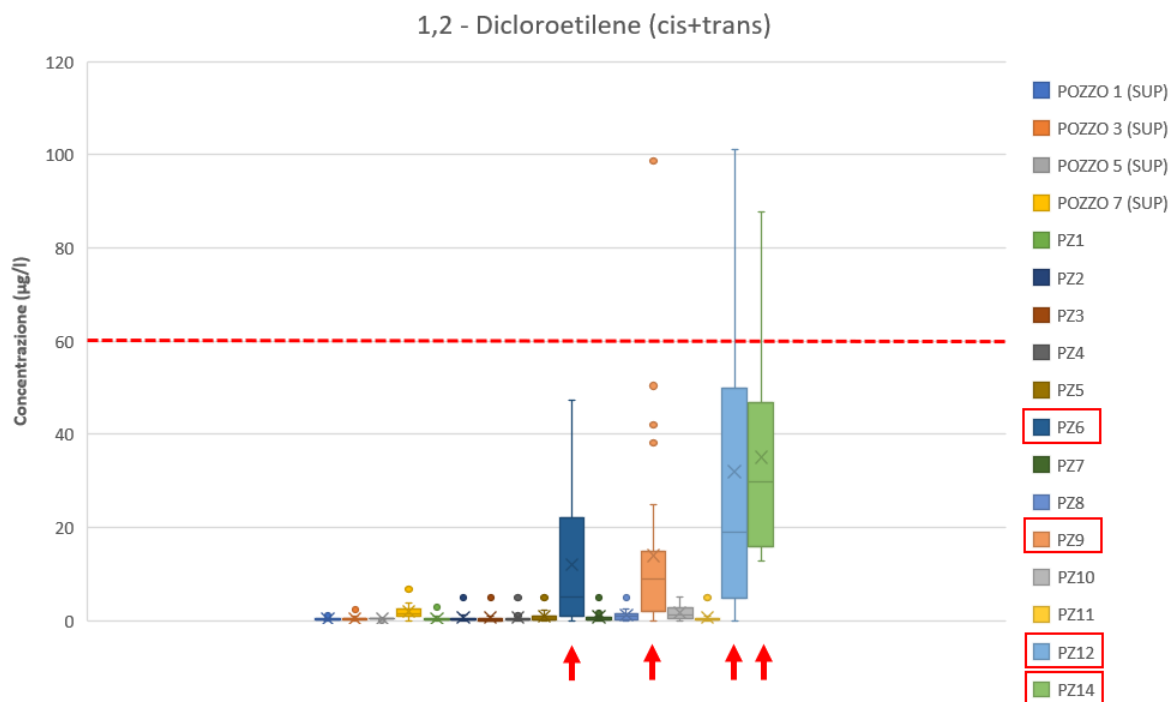


Figura 1 – Serie di dati relative al 1,2-Dicloroetilene (cis+trans). Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

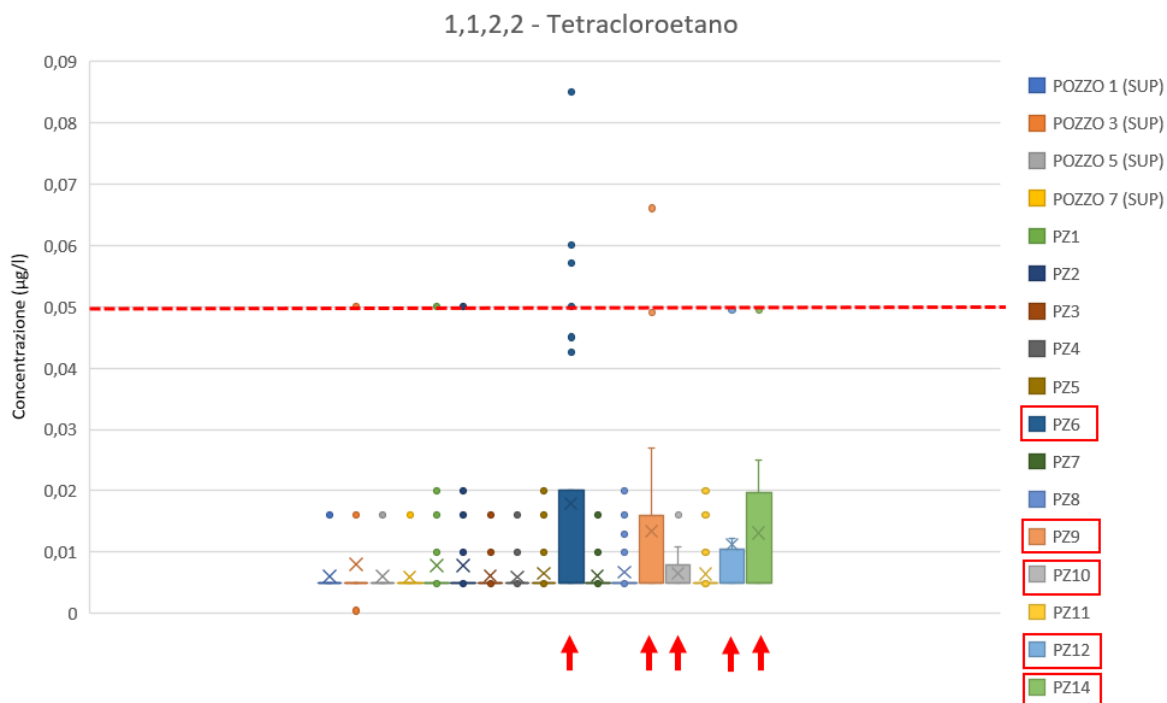


Figura 2 – Serie di dati relative al 1,1,2,2-Tetracloroetano. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

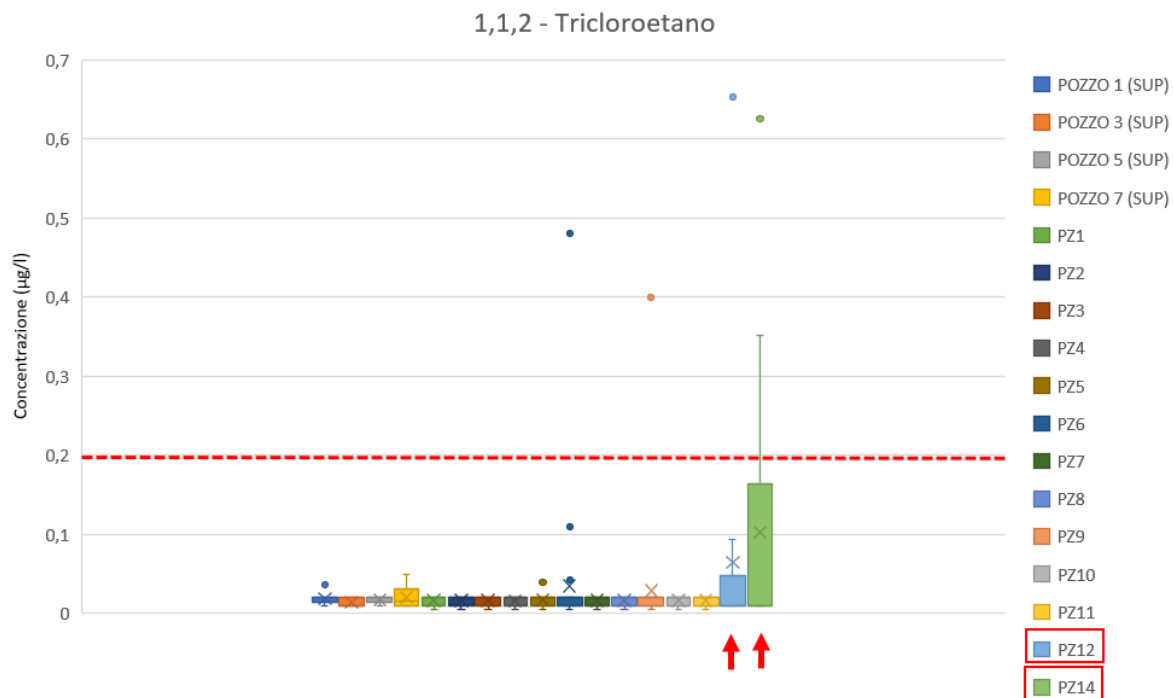


Figura 3 – Serie di dati relative al 1,1,2-Tricloroetano. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

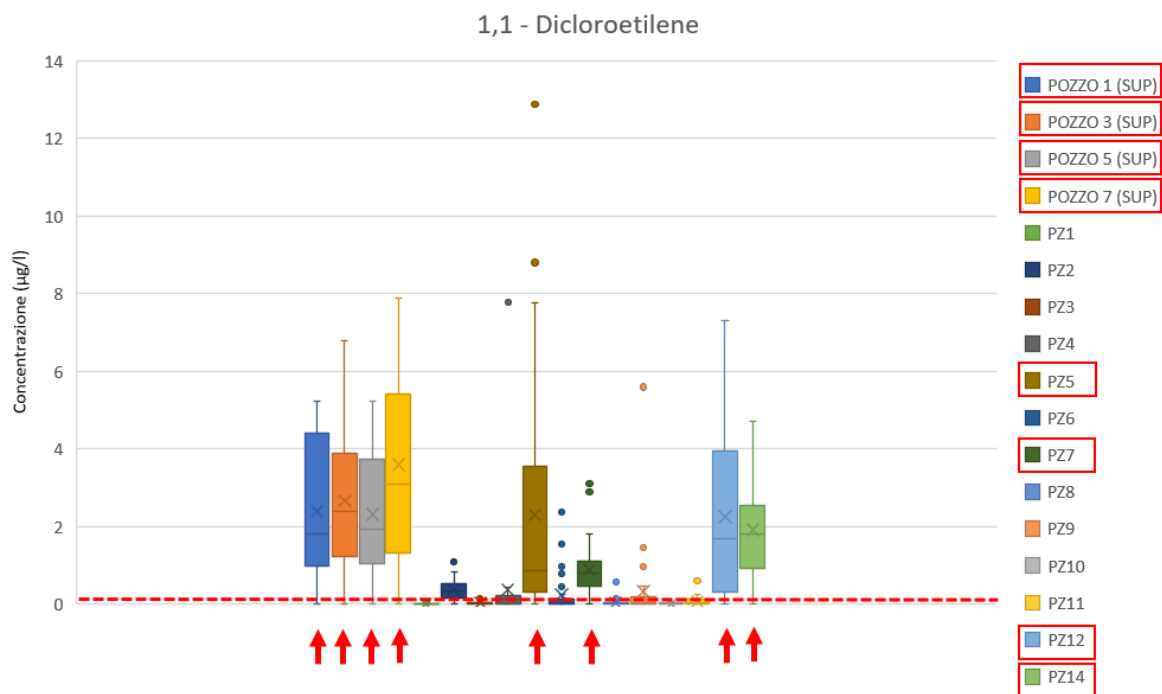


Figura 4 – Serie di dati relative al 1,1-Dicloroetilene. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

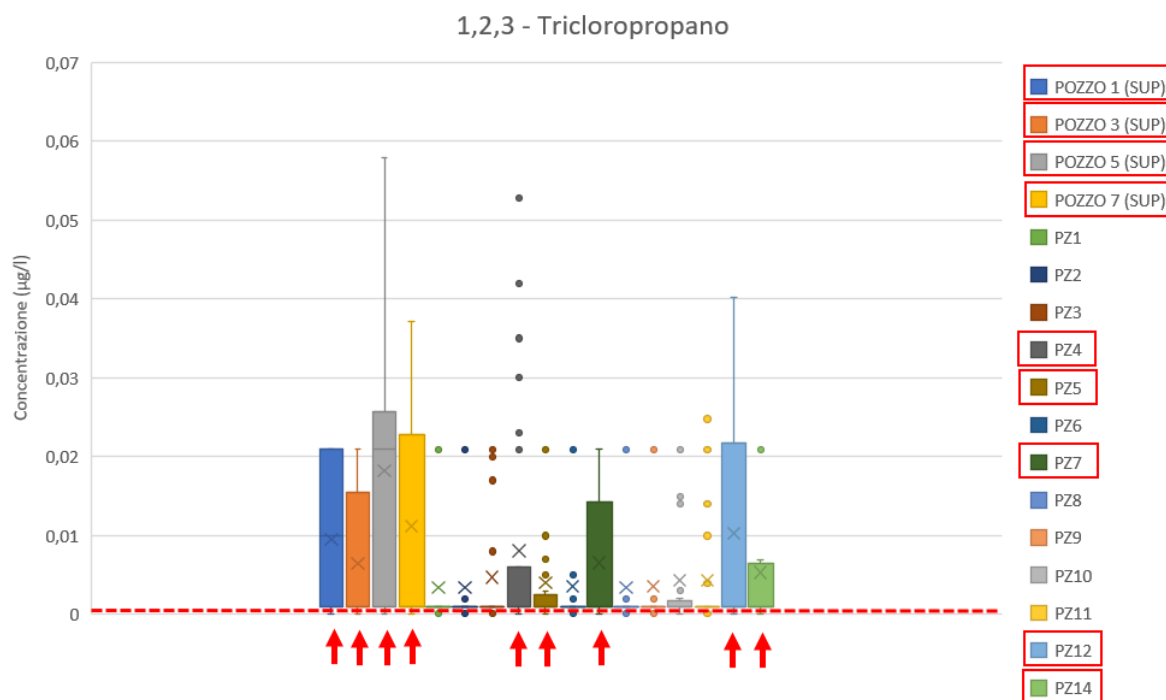


Figura 5 – Serie di dati relative al 1,2,3-Tricloropropano. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

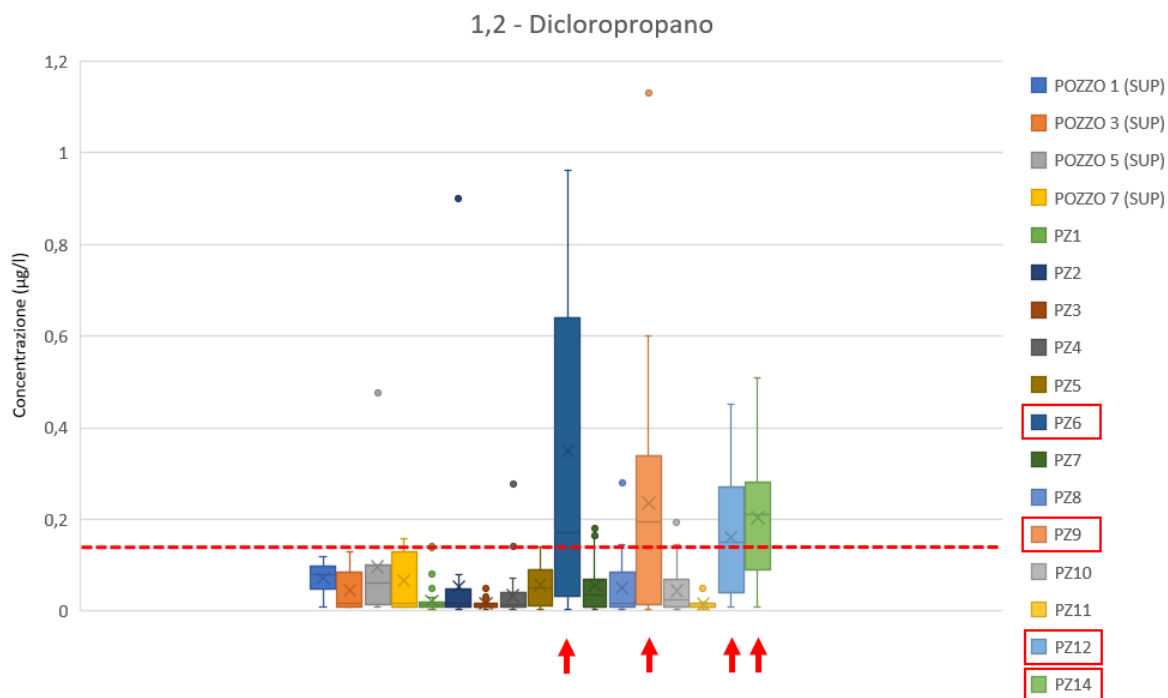


Figura 6 – Serie di dati relative al 1,2-Dicloropropano. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.



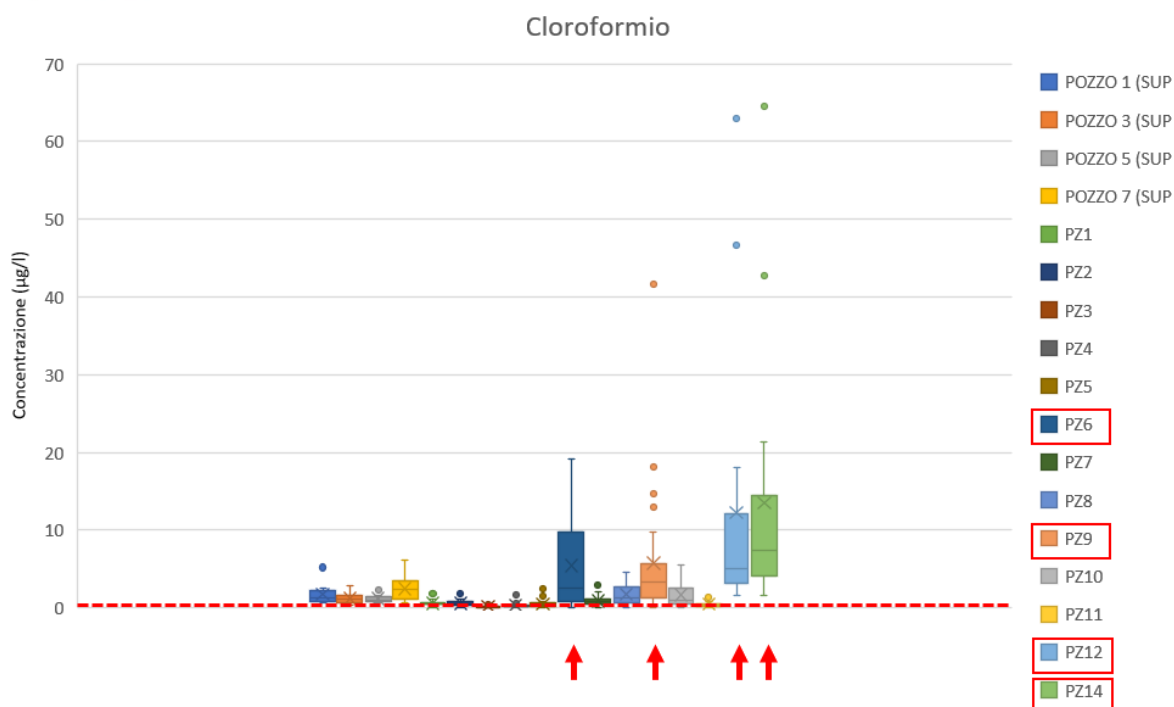


Figura 7 – Serie di dati relative al Cloroformio. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

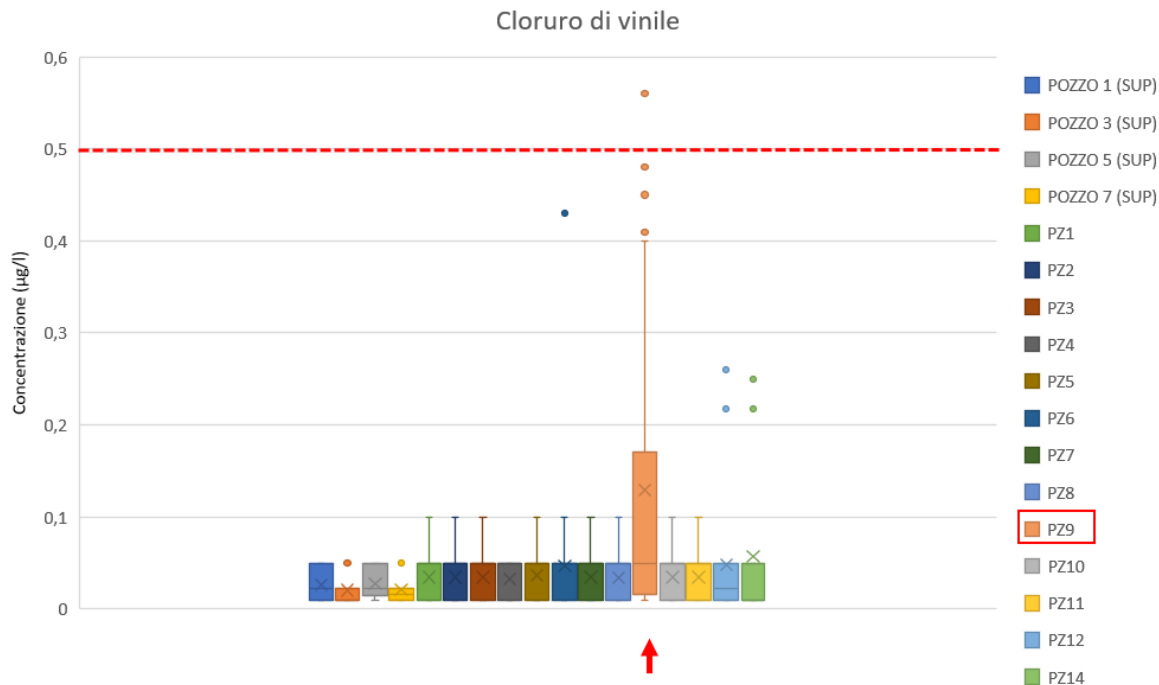


Figura 8 – Serie di dati relative al Cloruro di vinile. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

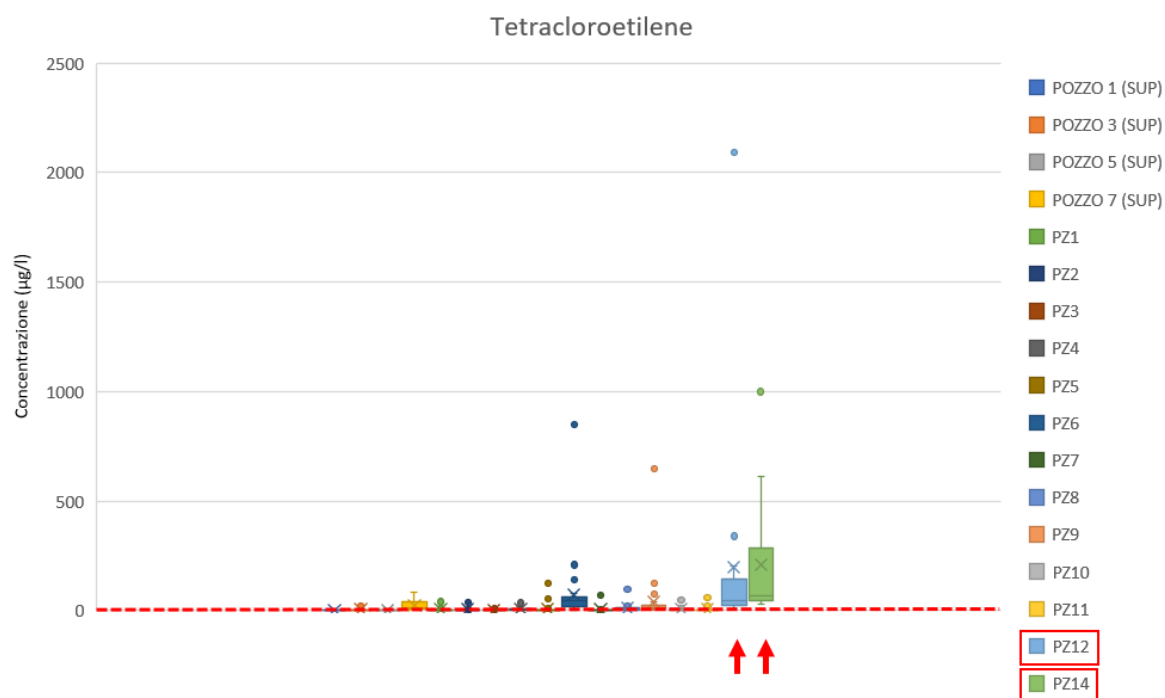


Figura 9 – Serie di dati relative al Tetracloroetilene. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.

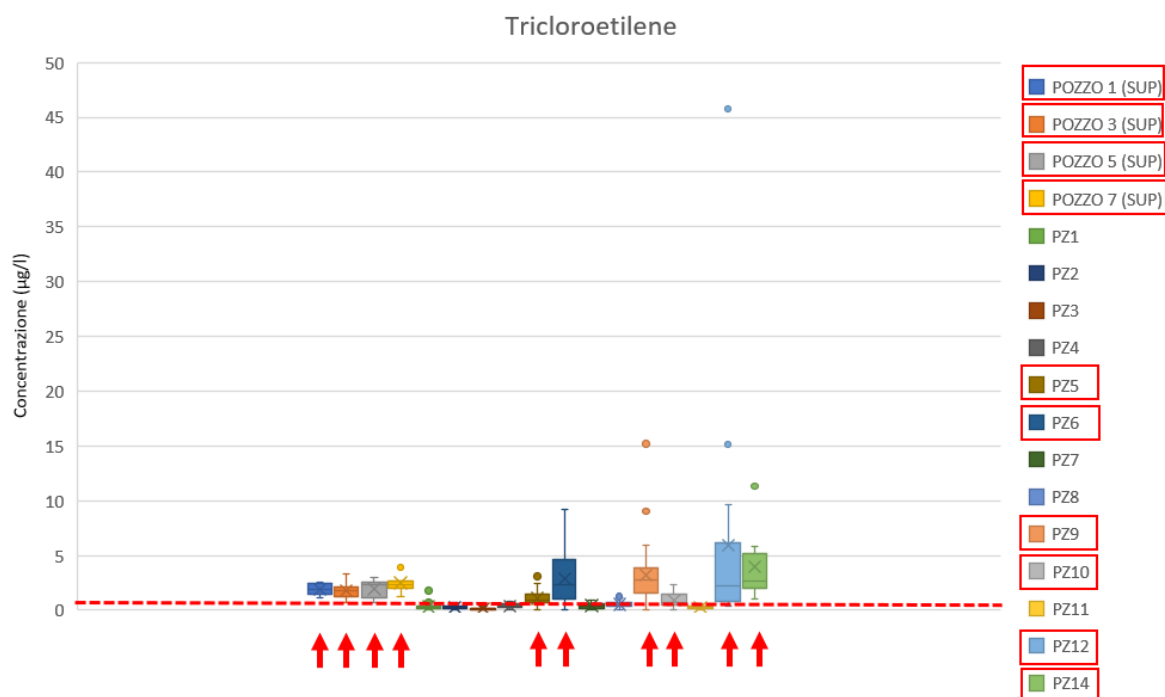


Figura 10 – Serie di dati relative al Tricloroetilene. Le frecce indicano le serie considerate nella distribuzione n.1, rappresentative dell'area maggiormente impattata dal transito del pennacchio). La linea orizzontale indica la CSC di Tab.2 D.Lgs.152/06.



arexpo

in collaborazione con:



lendlease

in collaborazione con:

**AECOM**

**LAND**

LANDSCAPE ARCHITECTURE NATURE DEVELOPMENT

 **Systematica**