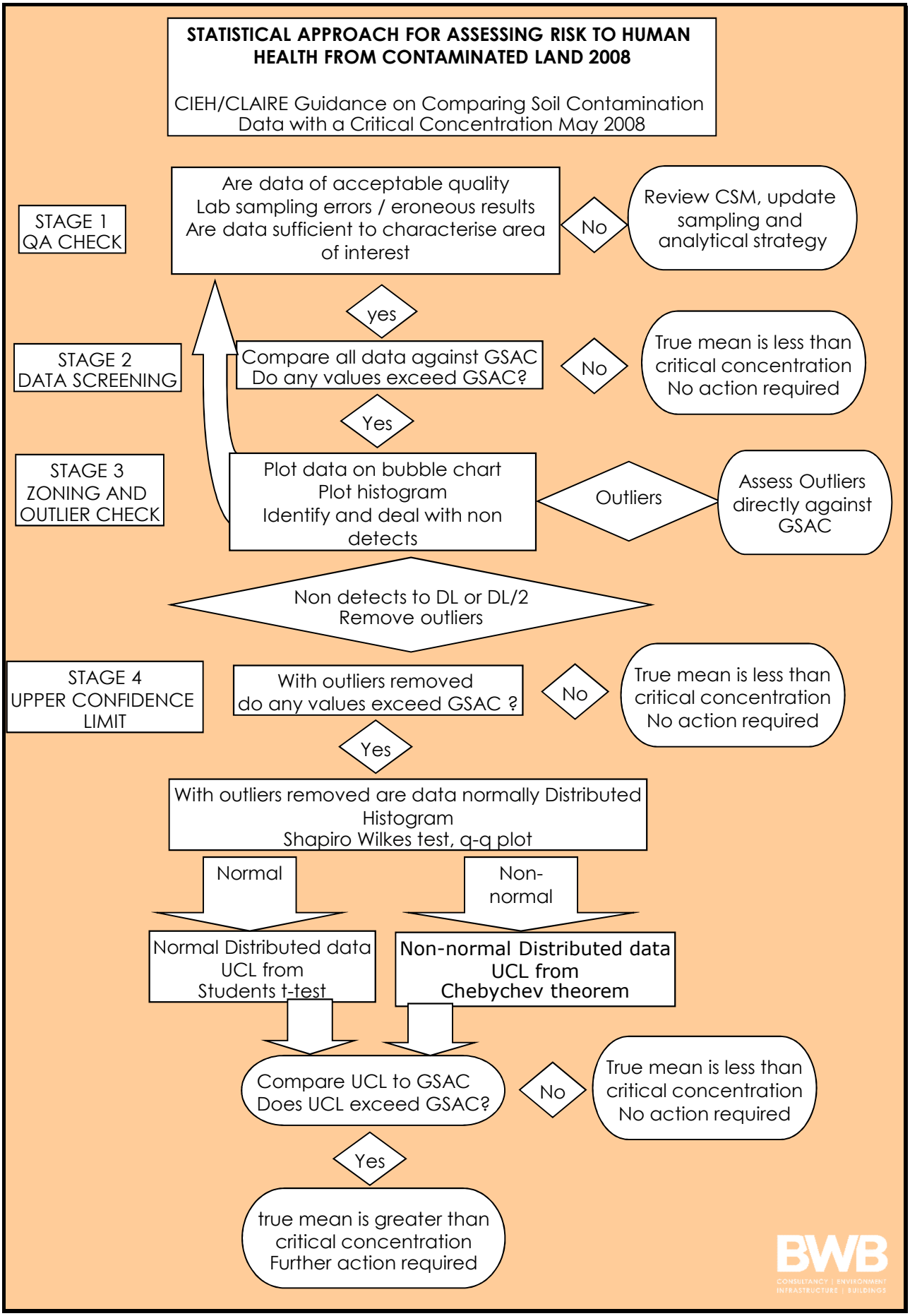

STATISTICAL APPROACH FOR ASSESSING RISK TO HUMAN HEALTH FROM CONTAMINATED LAND 2008
CIEH/CLAIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration May 2008
STAGE 1 QA CHECK
Are data of acceptable quality
Lab sampling errors / eroneous results
Are data sufficient to characterise area of interest
No
Review CSM, update sampling and analytical strategy
yes
STAGE 2 DATA SCREENING
Compare all data against GSAC
Do any values exceed GSAC?
No
True mean is less than critical concentration
No action required
Yes
STAGE 3 ZONING AND OUTLIER CHECK
Plot data on bubble chart
Plot histogram
Identify and deal with non detects
Outliers
Assess Outliers directly against GSAC
Non detects to DL or DL/2
Remove outliers
STAGE 4 UPPER CONFIDENCE LIMIT
With outliers removed
do any values exceed GSAC ?
No
True mean is less than critical concentration
No action required
Yes
With outliers removed are data normally Distributed
Histogram
Shapiro Wilkes test, q-q plot
Normal
Non-normal
Normal Distributed data
UCL from
Students t-test
Non-normal Distributed data
UCL from
Chebychev theorem
Compare UCL to GSAC
Does UCL exceed GSAC?
No
True mean is less than critical concentration
No action required
Yes
true mean is greater than critical concentration
Further action required
BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Human Health Generic QRA Worksheet

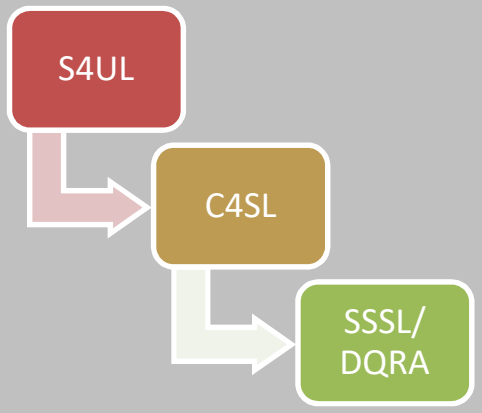
Trowbridge Rugby Club	LDQ2048
All Data	

Define CSM – Is site represented by a standard land use?

Residential with / without homegrown produce
Commercial / Industrial
Public Open Space - Residential (S4UL/C4SL only)
Public Open Space - Park (S4UL/C4SL only)

GSAC Type (BWB, LQM S4UL, C4SL, Bespoke)	**LQM_CIEH_S4UL**
Key Receptor/CSM (Residential/Commercial/POS)	**S4UL Public open space (park)**
Organic Matter % (If unknown use 1%)	**1**

GSAC Hierarcy



Generic Assessment Criteria Trowbridge Rugby Club LDQ2048	S4UL Public open space (park)	Source
Arsenic	1.70E+02	LQM_CIEH_S4UL
Barium	1.35E+03	LQM_CIEH_S4UL
Beryllium	6.30E+01	LQM_CIEH_S4UL
Boron	4.60E+04	LQM_CIEH_S4UL
Cadmium	5.32E+02	LQM_CIEH_S4UL
Chromium VI	2.20E+02	LQM_CIEH_S4UL
Chromium III	3.30E+04	LQM_CIEH_S4UL
Copper	4.40E+04	LQM_CIEH_S4UL
Lead*	1.30E+03	DEFRA_C4SL
Inorganic Mercury	2.40E+02	LQM_CIEH_S4UL
Nickel	3.40E+03	LQM_CIEH_S4UL
Selenium	1.80E+03	LQM_CIEH_S4UL
Vanadium	5.00E+03	LQM_CIEH_S4UL
Zinc	1.70E+05	LQM_CIEH_S4UL
Cyanide (Free)	4.30E+01	BWB
Cyanide (Complex)	2.13E+02	BWB
Phenols (Total)	4.40E+02	LQM_CIEH_S4UL
Total TPH	5.00E+02	BWB
Naphthalene	1.20E+03	LQM_CIEH_S4UL
Acenaphthylene	2.90E+04	LQM_CIEH_S4UL
Acenaphthene	2.90E+04	LQM_CIEH_S4UL
Fluorene	2.00E+04	LQM_CIEH_S4UL
Phenanthrene	6.20E+03	LQM_CIEH_S4UL
Anthracene	1.50E+05	LQM_CIEH_S4UL
Fluoranthene	6.30E+03	LQM_CIEH_S4UL
Pyrene	1.50E+04	LQM_CIEH_S4UL
Benzo(a)anthracene	4.90E+01	LQM_CIEH_S4UL
Chrysene	9.30E+01	LQM_CIEH_S4UL
Benzo(b)fluoranthene	1.30E+01	LQM_CIEH_S4UL
Benzo(k)fluoranthene	3.70E+02	LQM_CIEH_S4UL
Benzo(a)pyrene	1.10E+01	LQM_CIEH_S4UL
Indeno(1,2,3-c,d)pyrene	1.50E+02	LQM_CIEH_S4UL
Dibenzo(a,h)anthracene	1.10E+00	LQM_CIEH_S4UL
Benzo(g,hi)perylene	1.40E+03	LQM_CIEH_S4UL

Location	Sample depth	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium VI	Chromium III	Copper	Lead	Inorganic Mercury	Nickel	Selenium	Vanadium	Zinc	Cyanide (Free)	Cyanide (Complex)	Phenols (Total)
Detection Limit		1	1	0.06	0.2	0.2	4	1	1	1	0.3	1	1	1	1	1	1	1
GSAC		1.70E+02	1.35E+03	6.30E+01	4.60E+04	5.32E+02	2.20E+02	3.30E+04	4.40E+04	1.30E+03	2.40E+02	3.40E+03	1.80E+03	5.00E+03	1.70E+05	4.30E+01	2.13E+02	4.40E+02
DS01	0.20-0.30	18	64	0.73	1.5	0.2	4	21	15	16	0.3	16	1	53	100	1	1	1
DS02	0.03-0.12	24	370	2.4	1.5	0.2	4	18	77	20	0.3	46	1	65	1100	1	1	1
DS02	1.00-1.10	11	19	0.51	0.7	0.2	4	11	6.3	4.3	0.3	10	1	34	25	1	1	1
DS03	0.20-0.30	25	120	1	2.7	0.6	4	31	28	32	0.3	24	1	74	130	1	1	1
DS04	0.40-0.50	19	36	0.55	1.2	0.2	4	18	11	10	0.3	16	1	58	48	1	1	1
DS04	2.90-3.00	4.4	20	0.8	7.8	0.2	4	17	12	8.8	0.3	17	1	19	35	1	1	1
DS05	0.20-0.30	28	110	1.2	1.7	0.5	4	37	22	20	0.3	30	1	90	120	1	1	1
DS05	1.10-1.20	4.4	12	0.43	0.5	0.2	4	8.8	6.3	3.7	0.3	8.1	1	23	16	1	1	1
DS06	0.50-0.60	22	73	0.96	1.7	0.2	4	32	20	14	0.3	24	1	70	97	1	1	1
DS07	0.30-0.40	24	98	1.2	2.9	0.2	4	33	22	36	0.3	26	1	80	120	1	1	1
DS08	0.50-0.60	9.6	22	0.47	1	0.2	4	12	9.3	9.7	0.3	10	2.6	34	34	1	1	1

Location	Sample depth	Total TPH	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,hi)perylene
Detection Limit		10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
GSAC		5.00E+02	1.20E+03	2.90E+04	2.90E+04	2.00E+04	6.20E+03	1.50E+05	6.30E+03	1.50E+04	4.90E+01	9.30E+01	1.30E+01	3.70E+02	1.10E+01	1.50E+02	1.10E+00	1.40E+03
DS01	0.20-0.30	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS02	0.03-0.12	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS02	1.00-1.10	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS03	0.20-0.30	10	0.05	0.05	0.05	0.05	0.05	0.05	0.28	0.22	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS04	0.40-0.50	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS04	2.90-3.00	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS05	0.20-0.30	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS05	1.10-1.20	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS06	0.50-0.60	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DS07	0.30-0.40	10	0.05	0.05	0.05	0.05	0.28	0.05	0.61	0.52	0.39	0.43	0.47	0.22	0.42	0.23	0.05	0.23
DS08	0.50-0.60	10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Determinand	Number of tests	Range (mg/kg)	S4UL Public open space (park) GSAC (mg/kg)	Detection Limit (mg/kg)	Min	Max	No. of Exceedances	No. Non detects	< or not
Arsenic	11	4.4 to 28	1.70E+02	1	4.4	28	0	0	
Barium	11	12 to 370	1.35E+03	1	12	370	0	0	
Beryllium	11	0.43 to 2.4	6.30E+01	0.06	0.43	2.4	0	0	
Boron	11	0.5 to 7.8	4.60E+04	0.2	0.5	7.8	0	0	
Cadmium	11	<0.2 to 0.6	5.32E+02	0.2	0.2	0.6	0	9	<
Chromium VI	11	<4 to 4	2.20E+02	4	4	4	0	11	<
Chromium III	11	8.8 to 37	3.30E+04	1	8.8	37	0	0	
Copper	11	6.3 to 77	4.40E+04	1	6.3	77	0	0	
Lead*	11	3.7 to 36	1.30E+03	1	3.7	36	0	0	
Inorganic Mercury	11	<0.3 to 0.3	2.40E+02	0.3	0.3	0.3	0	11	<
Nickel	11	8.1 to 46	3.40E+03	1	8.1	46	0	0	
Selenium	11	<1 to 2.6	1.80E+03	1	1	2.6	0	10	<
Vanadium	11	19 to 90	5.00E+03	1	19	90	0	0	
Zinc	11	16 to 1100	1.70E+05	1	16	1100	0	0	
Cyanide (Free)	11	<1 to 1	4.30E+01	1	1	1	0	11	<
Cyanide (Complex)	11	<1 to 1	2.13E+02	1	1	1	0	11	<
Phenols (Total)	11	<1 to 1	4.40E+02	1	1	1	0	11	<
Total TPH	11	<10 to 10	5.00E+02	10	10	10	0	11	<
Naphthalene	11	<0.05 to 0.05	1.20E+03	0.05	0.05	0.05	0	11	<
Acenaphthylene	11	<0.05 to 0.05	2.90E+04	0.05	0.05	0.05	0	11	<
Acenaphthene	11	<0.05 to 0.05	2.90E+04	0.05	0.05	0.05	0	11	<
Fluorene	11	<0.05 to 0.05	2.00E+04	0.05	0.05	0.05	0	11	<
Phenanthrene	11	<0.05 to 0.28	6.20E+03	0.05	0.05	0.28	0	10	<
Anthracene	11	<0.05 to 0.05	1.50E+05	0.05	0.05	0.05	0	11	<
Fluoranthene	11	<0.05 to 0.61	6.30E+03	0.05	0.05	0.61	0	9	<
Pyrene	11	<0.05 to 0.52	1.50E+04	0.05	0.05	0.52	0	9	<
Benzo(a)anthracene	11	<0.05 to 0.39	4.90E+01	0.05	0.05	0.39	0	10	<
Chrysene	11	<0.05 to 0.43	9.30E+01	0.05	0.05	0.43	0	10	<
Benzo(b)fluoranthene	11	<0.05 to 0.47	1.30E+01	0.05	0.05	0.47	0	10	<
Benzo(k)fluoranthene	11	<0.05 to 0.22	3.70E+02	0.05	0.05	0.22	0	10	<
Benzo(a)pyrene	11	<0.05 to 0.42	1.10E+01	0.05	0.05	0.42	0	10	<
Indeno(1,2,3-c,d)pyrene	11	<0.05 to 0.23	1.50E+02	0.05	0.05	0.23	0	10	<
Dibenzo(a,h)anthracene	11	<0.05 to 0.05	1.10E+00	0.05	0.05	0.05	0	11	<
Benzo(g,hi)perylene	11	<0.05 to 0.23	1.40E+03	0.05	0.05	0.23	0	10	<