PT Regression Equations

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1.0 Introduction

The acceptance limits for PTC PT are derived from the Standard Deviation for Proficiency Assessment (SDPA). Acceptable criteria for each reported result being the Assigned Value ± 2 x SDPA. The SDPA for each analyte is derived by one of three processes:

1. **Regression Equations**: Regression of inter-laboratory mean value against inter-laboratory standard deviation from historic PT rounds (1991 to 2012);
2. **Fixed Limits**:(i.e., ± ##%) adopted from external authorities (e.g., TNI) or based on accepted data-quality objectives.
3. **Consensus Standard Deviation**: PT round specific inter-laboratory standard deviation.

2.0 Regression Equations

For SDPAs based on regression equations a regression equation is established between sample concentration and inter-laboratory standard deviation for each analyte in the PT program. The steps involved in determining the regression equation for an analyte are as follows:

- compile the consensus means and inter-lab standard deviations used from all historic studies;
- remove data that is below the currently published concentration range;
- plot consensus mean against inter-lab standard deviation and remove any data pairs that are inconsistent with the data set as a whole;
- calculate the slope and intercept of consensus mean against inter-lab standard deviation;
- If the intercept is negative, force the line through zero to prevent unreasonably low standard deviations at lower concentrations.

SDPA = Assigned value x slope + intercept

3.0 Fixed Limits

Fixed limits are indicated as ± ##% and are derived after consultation with technical experts, regulators, accreditation bodies and other PT schemes. For these, the SDPA is one half the fixed limit percentage. For example, a fixed limit of ± 30% will have a SDPA of ½ x 0.3 = 0.15.

4.0 Consensus Standard Deviation

Consensus standard deviation is typically used for the SDPA for PT where there are insufficient data to estimate a regression equation and where accepted data-quality objectives are not available. The SDPA is the standard deviation from the PT round following Algorithm A from ISO 13528.

5.0 Regression Equations

Analyte	Conc. Range	Slope	Intercept
C01A Major Ions in Water			
Alkalinity to pH 4.5	20 – 250 mg/L	± 15%	
Calcium	2 – 200 mg/L	± 15%	
Chloride	5 – 400 mg/L	± 15%	
Conductivity at 25°C	20 – 2000 µS/cm	± 10%	
Fluoride	0.2 – 4.0 mg/L	± 15%	
Hardness as $CaCO_3$	20 – 800 mg/L	± 15%	
Inorganic Carbon	10 – 100 mg/L	± 20%	
Magnesium	1 – 40 mg/L	± 15%	
Nitrate	0.20 – 20.0 mg/L	± 15%	
Nitrate plus Nitrite	0.20 – 20.0 mg/L	± 15%	
Potassium	1 – 40 mg/L	± 15%	
Reactive Silica	0.5 – 15 mg/L	± 20%	
Sodium	10 – 150 mg/L	± 15%	
Sulphate	5 – 200 mg/L	± 15%	
C01B Simple Nutrients in Water			
Ammonia	0.5 – 20.0 mg/L	± 20%	
Bromide	1.0 – 10.0 mg/L	± 15%	
Nitrite	0.1 – 1.0 mg/L	± 15%	
Organic Carbon	2.0 – 20.0 mg/L	0.0385	0.226
Phosphate	0.1 – 3.0 mg/L	± 15%	
C02A Metals (Full Range) in Water			
Aluminium	0.001 – 1.60 mg/L	± 15%	
Antimony	0.001 – 0.10 mg/L	± 20 %	
Arsenic	0.001 – 0.10 mg/L	± 20 %	
Barium	0.001 – 1.60 mg/L	± 15%	
Beryllium	0.001 – 0.10 mg/L	± 15%	
Bismuth	0.005 – 0.5 mg/L	0	
Boron	0.001 – 1.60 mg/L	±15%	
Cadmium	0.001 – 0.10 mg/L	± 15%	
Chromium	0.001 – 1.60 mg/L	± 15%	
Cobalt	0.001 – 1.60 mg/L	± 15%	
Copper	0.001 – 1.60 mg/L	± 15%	
Iron	0.001 – 1.60 mg/L	± 15%	
Lead	0.001 – 1.60 mg/L	± 15%	
Lithium	0.005 – 0.5 mg/L	0	
Manganese	0.001 – 1.60 mg/L	± 15%	
Molybdenum	0.001 – 1.60 mg/L	± 15%	
Nickel	0.001 – 1.60 mg/L	± 15%	
Selenium	0.001 – 0.10 mg/L	± 20 %	
Silver	0.001 – 0.100 mg/L	± 15%	
Strontium	0.001 – 1.60 mg/L	± 15%	
Thallium	0.001 – 0.100 mg/L	± 20 %	
Tin	0.001 – 0.100 mg/L	± 20 %	
Titanium	0.001 – 1.60 mg/L	± 15%	
Uranium	0. 001 – 0.1 mg/L	± 15%	
Vanadium	0.001 – 1.60 mg/L	± 15%	
Zinc	0.001 – 1.60 mg/L	± 15%	
C02B Metals (High Range) in Water			
Aluminium	0.25 – 1.60 mg/L	± 15%	

Analyte	Conc. Range	Slope	Intercept
Barium	0.25 – 1.60 mg/L	± 15%	
Bismuth	0.05 – 0.5 mg/L	0	
Boron	0.25 – 1.60 mg/L	± 15%	
Chromium	0.25 – 1.60 mg/L	± 15%	
Cobalt	0.25 – 1.60 mg/L	± 15%	
Copper	0.25 – 1.60 mg/L	± 15%	
Iron	0.25 – 1.60 mg/L	± 15%	
Lead	0.25 – 1.60 mg/L	± 15%	
Lithium	0.05 – 0.5 mg/L	0	
Manganese	0.25 – 1.60 mg/L	± 15%	
Molybdenum	0.25 – 1.60 mg/L	± 15%	
Nickel	0.25 – 1.60 mg/L	± 15%	
Strontium	0.25 – 1.60 mg/L	± 15%	
Thallium	0.25 – 1.60 mg/L	± 20 %	
Titanium	0.25 – 1.60 mg/L	± 15%	
Vanadium	0.25 – 1.60 mg/L	± 15%	
Zinc	0.25 – 1.60 mg/L	± 15%	
C02C Metals (Total) in Water			
Aluminium	0.25 – 1.60 mg/L	± 15%	
Antimony	0.001 – 0.10 mg/L	± 20 %	
Arsenic	0.001 – 0.10 mg/L	± 20 %	
Barium	0.25 – 1.60 mg/L	± 15%	
Beryllium	0.001 – 0.10 mg/L	± 15%	
Bismuth	0.05 – 0.5 mg/L	0	
Boron	0.25 – 1.60 mg/L	±15%	
Cadmium	0.001 – 0.10 mg/L	± 15%	
Chromium	0.25 – 1.60 mg/L	± 15%	
Cobalt	0.25 – 1.60 mg/L	± 15%	
Copper	0.25 – 1.60 mg/L	± 15%	
Iron	0.25 – 1.60 mg/L	± 15%	
Lead	0.25 – 1.60 mg/L	± 15%	
Lithium	0.05 – 0.5 mg/L	0	
Manganese	0.25 – 1.60 mg/L	± 15%	
Molybdenum	0.25 – 1.60 mg/L	± 15%	
Nickel	0.25 – 1.60 mg/L	± 15%	
Selenium	0.001 – 0.10 mg/L	± 20 %	
Silver	0.001 – 0.100 mg/L	± 15%	
Strontium	0.25 – 1.60 mg/L	± 15%	
Thallium	0.25 – 1.60 mg/L	± 20 %	
Tin	0.001 – 0.10 mg/L	± 20 %	
Titanium	0.25 – 1.60 mg/L	± 15%	
Uranium	0. 001 – 0.1 mg/L	± 15%	
Vanadium	0.25 – 1.60 mg/L	± 15%	
Zinc	0.25 – 1.60 mg/L	± 15%	
C03 Complex Nutrients in Water			
Total Kjeldahl Nitrogen	2.0 – 20 mg/L	± 25%	
Total Phosphorus	0.10 – 4.0 mg/L	± 20%	
C04A Solids in Water			
Total Dissolved Solids	100 - 1000 mg/L	0	22.5
Total Suspended Solids	10 – 200 mg/L	± 20%	
Volatile Suspended Solids	5 – 150 mg/L	± 25%	
C04B BOD in Water			
BOD	25 – 200 mg/L	± 35%	

Analyte	Conc. Range	Slope	Intercept
CBOD	25 – 200 mg/L	± 35%	
C04C Turbidity in Water			
Turbidity	0.5 – 50 NTU	0.0887	0
C04D COD in Water			
COD	30 – 500 mg/L	0.0308	3.15
C05A Microbiology in Water			
Escherichia coli (*E. coli*)	200 – 1000 CFU/mL	0.16	1.45
Faecal (Thermotolerant) Coliforms	200 – 1000 CFU/mL	0.252	0.219
Heterotrophic Plate Count	200 – 1000 CFU/mL	0.14	7.62
Total Coliforms	200 – 1000 CFU/mL	0.144	2.24
C06A OC Pesticides in Water			
a – Chlordane	0.05 – 5.0 µg/L	0.1899	0
alpha-BHC	0.05 – 3.0 µg/L	0.246	0.0056
Aldrin	0.05 – 5.0 µg/L	0.2222	0.0286
Dieldrin	0.05 – 5.0 µg/L	0.203	0.0151
Endosulfan I	0.05 – 3.0 µg/L	0.2416	0.0155
Endosulfan II	0.05 – 3.0 µg/L	0.2028	0.0457
Endrin	0.05 – 3.0 µg/L	0.216	0.0354
g – Chlordane	0.05 – 5.0 µg/L	0.1713	0.0022
Heptachlor	0.05 – 5.0 µg/L	0.329	0
Heptachlor Epoxide	0.05 – 3.0 µg/L	0.164	0.0471
Lindane (gamma-BHC)	0.05 – 3.0 µg/L	0.234	0
Mirex	0.05 – 3.0 µg/L	0.2447	0.0294
o,p' – DDT	0.05 – 3.0 µg/L	0.2043	0.031
p,p' – DDT	0.05 – 3.0 µg/L	0.243	0.0216
p,p' Methoxychlor	0.05 – 3.0 µg/L	0.2084	0.0499
C06B PCBs in Water			
Aroclor 1242	1.0 – 20.0 µg/L	0.2863	0.0336
Aroclor 1248	1.0 – 20.0 µg/L	0.2863	0.0336
Aroclor 1254	1.0 – 20.0 µg/L	0.2863	0.0336
Aroclor 1260	1.0 – 20.0 µg/L	0.2863	0.0336
Total PCB	1.0 – 20.0 µg/L	0.2863	0.0336
C07 Polycyclic Aromatic Hydrocarbons in Water			
Acenaphthene	0.4 - 12 µg/L	0.1445	0.0613
Acenaphthylene	0.4 - 12 µg/L	0.167	0.0323
Anthracene	0.4 - 12 µg/L	0.179	0.0714
Benzo(a)anthracene	0.4 - 12 µg/L	0.218	0.0402
Benzo(a)pyrene	0.4 - 12 µg/L	0.2336	0.069
Benzo(b)fluoranthene	0.4 - 12 µg/L	0.237	0.0382
Benzo(b+j)fluoranthene	0.4 - 12 µg/L	Consensus	
Benzo(g,h,i)perylene	0.4 - 12 µg/L	0.247	0.065
Benzo(k)fluoranthene	0.4 - 12 µg/L	0.239	0.0204
Chrysene	0.4 - 12 µg/L	0.1974	0.0417
Dibenzo(a,h)anthracene	0.4 - 12 µg/L	0.238	0.1203
Fluoranthene	0.4 - 12 µg/L	0.164	0.051
Fluorene	0.4 - 12 µg/L	0.158	0.0472
Indeno(1,2,3-cd)pyrene	0.4 - 12 µg/L	0.257	0.0523
Naphthalene	0.4 - 12 µg/L	0.177	0.0326
Phenanthrene	0.4 - 12 µg/L	0.1757	0.0368
Pyrene	0.4 - 12 µg/L	0.159	0.0655
C08 PCBs in Oil			
Aroclor 1242	5.0 – 150.0 µg/g	0.177	0.653
Aroclor 1248	5.0 – 150.0 µg/g	0.177	0.653

Analyte	Conc. Range	Slope	Intercept
Aroclor 1254	5.0 – 150.0 µg/g	0.177	0.653
Aroclor 1260	5.0 – 150.0 µg/g	0.177	0.653
Total PCB	5.0 – 150.0 µg/g	0.177	0.653
C09 Metals on Filters			
Cadmium	4.0 – 30 µg/HVF	0.0777	0.425
Copper	4.0 – 60 µg/HVF	0.101	0.21
Lead	4.0 – 80 µg/HVF	0.108	0.137
Zinc	4.0 – 60 µg/HVF	0.153	0.138
C10A Enterococci & Faecal Streptococci in Water			
Enterococci	20-100 CFU/100mL (200-1000 CFU/mL)	0	0
Faecal Streptococci	20-100 CFU/100mL (200-1000 CFU/mL)	0	0
C11/C12/C13 Toxicology			
Trout 96 Hour LC50	2 – 10 mL/L	0.117	0.04
Daphnia 48 Hour LC50	20 - 100 mL/L	0.141	0
Microtox™ 15 Minute IC50	4 – 10 mL/L	0.2	0
C14 Cyanide in Water			
Cyanide – Strong Acid Dissociable	0.2 – 5.0 mg/L	± 30%	
C15 pH in Water			
pH	3 – 10 pH units	0	0.1
C16 VOCs in Water			
1,1,1-Trichloroethane	6.0 – 200 µg/L	± 30%	
1,1,2,2-Tetrachloroethane	6.0 – 200 µg/L	± 35%	
1,1,2-Trichloroethane	6.0 – 200 µg/L	± 30%	
1,1-Dichloroethane	6.0 – 200 µg/L	± 30%	
1,1-Dichloroethylene	6.0 – 200 µg/L	± 40%	
1,2-Dichlorobenzene	6.0 – 200 µg/L	± 30%	
1,2-Ddichloroethane	6.0 – 200 µg/L	± 30%	
1,2-Dichloropropane	6.0 – 200 µg/L	± 30%	
1,3-Dichlorobenzene	6.0 – 200 µg/L	± 30%	
1,4-Dichlorobenzene	6.0 – 200 µg/L	± 30%	
Acetone (2-Propanone)	6.0 – 200 µg/L	0.233	2.05
Benzene	2.0 – 200 µg/L	± 30%	
Bromodichloromethane	20 – 200 µg/L	± 30%	
Bromoform	20 – 200 µg/L	± 30%	
Carbon Tetrachloride	6.0 – 200 µg/L	± 30%	
Chlorobenzene	6.0 – 200 µg/L	± 30%	
Chlorodibromomethane	20 – 200 µg/L	± 30%	
Chloroform	20 – 200 µg/L	± 30%	
cis-1,2-Dichloroethylene	6.0 – 200 µg/L	± 30%	
cis-1,3-Dichloropropene	6.0 – 200 µg/L	± 30%	
Dichloromethane	6.0 – 200 µg/L	± 35%	
Ethylbenzene	2.0 – 200 µg/L	± 30%	
Ethylene Dibromide	6.0 – 200 µg/L	± 30%	
m/p-xylene	6.0 – 200 µg/L	± 30%	
Methyl Ethyl Ketone	6.0 – 200 µg/L	± 45%	
Methyl isobutyl Ketone (MIBK)	6.0 – 200 µg/L	± 30%	
Methyl t-butyl ether (MTBE)	6.0 – 200 µg/L	± 40%	
o-xylene	6.0 – 200 µg/L	± 30%	
Styrene	6.0 – 200 µg/L	± 30%	
Tetrachloroethylene	6.0 – 200 µg/L	± 30%	

Analyte	Conc. Range	Slope	Intercept
Toluene	6.0 – 200 µg/L	± 30%	
trans-1,2-Dichloroethylene	6.0 – 200 µg/L	± 30%	
trans-1,3-Dichloropropene	6.0 – 200 µg/L	± 30%	
Trichloroethylene	6.0 – 200 µg/L	± 35%	
Trichlorofluoromethane	6.0 – 200 µg/L	± 40%	
Vinyl Chloride	6.0 – 200 µg/L	± 45%	
C17 Metals in Soil			
Aluminium	1000 – 100000 µg/g	0.131	400
Antimony	0.4 – 4.0 µg/g	0.573	0
Arsenic	5.0 – 35 µg/g	0.111	0.62
Barium	50 – 500 µg/g	0.0692	2.09
Beryllium	1.0 – 3.0 µg/g	0.132	0.045
Boron	20 – 200 µg/g	0.105	0.807
Cadmium	0.2 – 6.0 µg/g	0.0866	0.153
Chromium	50 – 150 µg/g	0.0761	1.53
Cobalt	10 – 20 µg/g	0.0978	0
Copper	30 – 600 µg/g	0.0836	0
Iron	1000 – 50000 µg/g	0.0913	0
Lead	5 – 400 µg/g	0.0746	1.68
Manganese	100 – 2000 µg/g	0.0733	0
Mercury	50 – 2000 ng/g	0.255	0
Nickel	25 – 1000 µg/g	0.103	0
Strontium	100 – 500 µg/g	0.0871	0.459
Tin	10 – 100 µg/g	0.24	0.613
Titanium	500 – 5000 µg/g	0.253	14.2
Uranium	1 – 5 µg/g	0.0872	0.0649
Vanadium	25 – 200 µg/g	0.141	0.155
Zinc	40 – 1600 µg/g	0.08	0.283
Thallium	0.2-7 ug/g	0	0
C18 Polycyclic Aromatic Hydrocarbons in Soil			
Acenaphthene	0.2 - 50 µg/g	0.209	0.0161
Acenaphthylene	0.2 - 50 µg/g	0.445	0
Anthracene	0.2 - 50 µg/g	0.321	0
Benzo(a)anthracene	0.2 - 50 µg/g	0.241	0
Benzo(a)pyrene	0.2 - 50 µg/g	0.232	0.0058
Benzo(b)fluoranthene	0.2 - 50 µg/g	0.28	0.0836
Benzo(b+j)fluoranthene	0.2 - 50 µg/g	Consensus	
Benzo(g,h,i)perylene	0.2 - 50 µg/g	0.243	0.039
Benzo(k)fluoranthene	0.2 - 50 µg/g	0.372	0
Chrysene	0.2 - 50 µg/g	0.221	0.056
Dibenzo(a,h)anthracene	0.2 - 50 µg/g	0.303	0.0102
Fluoranthene	0.2 - 50 µg/g	0.206	0.0165
Fluorene	0.2 - 50 µg/g	0.25	0.112
Indeno(1,2,3-cd)pyrene	0.2 - 50 µg/g	0.223	0.107
Naphthalene	0.2 - 50 µg/g	0.373	0
Phenanthrene	0.2 - 50 µg/g	0.209	0
Pyrene	0.2 - 50 µg/g	0.2	0.0423
C19 Mercury in Water			
Mercury	0.1 – 5.0 µg/L	± 30%	
C22 Organophosphorus Pesticides in Water			
Atrazine	2 – 5 µg/L	0.204	0
Azinphos-methyl	10 – 40 µg/L	0.250	0.356
Bendiocarb	1 – 40 µg/L	0.223	0.598

Analyte	Conc. Range	Slope	Intercept
Carbaryl	0.2 – 90 µg/L	0.301	0.073
Carbofuran	0.2 – 90 µg/L	0.309	0
Chlorpyriphos (ethyl)	2 – 10 µg/L	0.188	0.147
Cyanazine	2 – 10 µg/L	0.275	0.164
Diazinon	0.5 – 20 µg/L	0.254	0
Dimethoate	2 – 20 µg/L	0.302	0.227
Diuron	20 – 50 µg/L	0.238	0.583
Malathion	2 – 10 µg/L	0.197	0.26
Metolachlor	2 – 10 µg/L	0.179	0.191
Metribuzin	2 – 10 µg/L	0.216	0.263
Parathion (ethyl)	0.5 – 20 µg/L	0.2347	0.0776
Phorate	0.5 – 5 µg/L	0.274	0
Simazine	1 – 10 µg/L	0.25	0.0079
Terbufos	0.5 – 5 µg/L	0.279	0.0389
Trifluralin	1 – 10 µg/L	0.26	0.0121
C24 Aryloxy Acid Pesticides in Water			
2,4,5-Trichlorophenoxyacetic Acid	0.1 – 10 µg/L	0.244	0.0761
2,4-Dichlorophenoxyacetic Acid	0.1 – 10 µg/L	0.264	0.0979
Bromoxynil	1 – 5 µg/L	0.23	0.0704
Dicamba	1 – 10 µg/L	0.29	0.0108
Diclofop-methyl (as free acid)	0.5 – 5 µg/L	0.363	0
Dinoseb	1 – 10 µg/L	0.339	0.0979
Picloram	0.1 – 10 µg/L	0.482	0.0957
C25 Chlorophenols in Water			
2,3,4,6-Tetrachlorophenol	2 – 20 µg/L	0.207	0.387
2,4,6-Trichlorophenol	2 – 20 µg/L	0.24	0
2,4-Dichlorophenol	2 – 20 µg/L	0.237	0.278
Pentachlorophenol	2 – 20 µg/L	0.206	0.406
C27 Glyphosate in Water			
Glyphosate	25 – 80 µg/L	0.138	1.85
C29 Aldicarb in Water			
Aldicarb	1 – 9 µg/L	0.174	0.326
C31A Petroleum Hydrocarbons in Soil			
Benzene	0.1 - 10 mg/kg	± 35%	
Ethylbenzene	10 – 200 mg/kg	± 35%	
F1: (C6-C10)	30 – 3500 mg/kg	0.213	38.9
m/p- Xylene	100 – 500 mg/kg	± 40%	
o-Xylene	100 – 500 mg/kg	± 35%	
Toluene	10 – 200 mg/kg	± 35%	
VH (C6-C10)	30 – 3500 mg/kg	0.213	38.9
C31B Petroleum Hydrocarbons in Soil			
F2: C10-C16	150 – 6500 mg/kg	0.220	40.3
F3: C16-C34	250 – 12500 mg/kg	0.227	26
F4: C34-C50	1000 – 12500 mg/kg	0.3	35
F4: Gravimetric	1000 – 12500 mg/kg	0.187	570
C32 Chlorine in Water			
Free Chlorine	0.5 – 3.0 mg/L	0.0661	0.00248
Total Chlorine	0.5 – 3.0 mg/L	0.0576	0.0193
C33 Phenolics in Water			
Total Phenolics	0.005 – 0.5 mg/L	0.0678	0.0035
C34 Oil and Grease in Water			
Mineral (non-polar) Oil and Grease	10 – 500 mg/L	0.185	7.15
Total Oil and Grease	10 – 500 mg/L	0.185	7.15

Analyte	Conc. Range	Slope	Intercept
C35 PCBs in Soil			
Aroclor 1242	5 - 500 µg/g	0.339	0
Aroclor 1248	5 - 500 µg/g	0.339	0
Aroclor 1254	5 - 500 µg/g	0.339	0
Aroclor 1260	5 - 500 µg/g	0.339	0
Total PCB	5 - 500 µg/g	0.339	0
C36 VOCs in Soil			
1,1,1-Trichloroethane	6 – 200 µg/g	± 45%	
1,1,2,2-Tetrachloroethane	6 – 200 µg/g	± 35%	
1,1,2-Trichloroethane	6 – 200 µg/g	± 35%	
1,1-Dichloroethane	6 – 200 µg/g	± 40%	
1,1-Dichloroethylene	6 – 200 µg/g	± 40%	
1,2-Dichlorobenzene	6 – 200 µg/g	± 35%	
1,2-Dichloroethane	6 – 200 µg/g	± 35%	
1,2-Dichloropropane	6 – 200 µg/g	± 35%	
1,3-Dichlorobenzene	6 – 200 µg/g	± 35%	
1,4-Dichlorobenzene	6 – 200 µg/g	± 35%	
Acetone (2-Propanone)	6 – 200 µg/g	0.204	1.21
Benzene	2- 200 µg/g	± 35%	
Bromodichloromethane	20 – 500 µg/g	± 35%	
Bromoform	20 – 500 µg/g	± 35%	
Carbon Tetrachloride	6 – 200 µg/g	± 35%	
Chlorobenzene	6 – 200 µg/g	± 35%	
Chlorodibromomethane	20 – 200 µg/g	± 35%	
Chloroform	20 – 200 µg/g	± 35%	
cis-1,2-Dichloroethylene	6 – 200 µg/g	± 35%	
cis-1,3-Dichloropropene	6 – 200 µg/g	± 35%	
Dichloromethane	6 – 200 µg/g	± 40%	
Ethylbenzene	2 – 200 µg/g	± 35%	
Ethylene Dibromide	6 – 200 µg/g	± 35%	
m/p-xylene	6 – 200 µg/g	± 40%	
Methyl Ethyl Ketone	6 – 200 µg/g	± 55%	
Methyl isobutyl Ketone (MIBK)	6 – 200 µg/g	± 45%	
Methyl t-butyl ether (MTBE)	6 – 200 µg/g	± 40%	
o-xylene	6 – 200 µg/g	± 35%	
Styrene	6 – 200 µg/g	± 35%	
Tetrachloroethylene	6 – 200 µg/g	± 45%	
Toluene	6 – 200 µg/g	± 35%	
trans-1,2-Dichloroethylene	6 – 200 µg/g	± 35%	
trans-1,3-Dichloropropene	6 – 200 µg/g	± 35%	
Trichloroethylene	6 – 200 µg/g	± 40%	
Trichlorofluoromethane	6 – 200 µg/g	± 50%	
C37 Colour in Water			
True Colour	2 – 50 TCU	0.081	0.933
C38 VOCs by TCLP			
1,2-Dichlorobenzene	0.025 – 5 mg/L	Consensus	
1,2-Dichloroethane	0.025 – 5 mg/L	Consensus	
1,4-Dichlorobenzene	0.025 – 5 mg/L	Consensus	
Benzene	0.025 – 5 mg/L	Consensus	
Carbon tetrachloride	0.025 – 5 mg/L	Consensus	
Chlorobenzene	0.025 – 5 mg/L	Consensus	
Chloroform	0.025 – 5 mg/L	Consensus	
Dichloromethane	0.025 – 5 mg/L	Consensus	

Analyte	Conc. Range	Slope	Intercept
Methyl Ethyl Ketone	1.0 – 5 mg/L	Consensus	
Tetrachloroethylene	0.025 – 5 mg/L	Consensus	
Trichloroethylene	0.025 – 5 mg/L	Consensus	
C39 Inorganics by TCLP			
Arsenic	0.10 – 5.0 mg/L	Consensus	
Barium	0.10 – 2.0 mg/L	Consensus	
Boron	0.50 – 10.0 mg/L	Consensus	
Cadmium	0.0010 – 0.050 mg/L	Consensus	
Chromium	0.010 – 0.50 mg/L	Consensus	
Cyanide (Weak Acid Dissociable)	0.1 – 5 mg/L	Consensus	
Fluoride	10 – 100 mg/L	Consensus	
Lead	0.010 – 0.50 mg/L	Consensus	
Mercury	0.0001 – 0.050 mg/L	Consensus	
Nitrate-N	2 – 50 mg/L	Consensus	
Nitrate and Nitrite as N	2 – 70 mg/L	Consensus	
Selenium	0.050 – 1.0 mg/L	Consensus	
Silver	0.0010 – 0.050 mg/L	Consensus	
Uranium	0.050 – 1.0 mg/L	Consensus	
C40A Petroleum Hydrocarbons in Water			
Benzene	1 - 100 µg/L	± 30%	
Ethylbenzene	1 – 200 µg/L	± 30%	
F1: C6-C10	20 - 1000 µg/L	± 30%	
m/p-Xylene	1 - 200 µg/L	± 30%	
o-Xylene	1 - 200 µg/L	± 30%	
Toluene	1 - 200 µg/L	± 30%	
VH (C6-C10)	20 - 1000 µg/L	± 30%	
C40B Petroleum Hydrocarbons in Water			
F2: C10-C16	200 – 50000 µg/L	± 30%	
F3: C16-C34	200 - 50000 µg/L	± 30%	
F4: C34-C50	200 - 50000 µg/L	± 30%	
C41 Hexavalent Chromium in Water			
Hexavalent Chromium	50 - 500 µg/L	± 20%	
C42 Sulphide in Water			
Sulphide	1 – 10 mg/L	0.121	0.282
C43 Solids in Soil			
Fixed Solids	80 – 100%	Consensus	
Percent Moisture	1 – 30%	Consensus	
Total Solids	70 – 100%	Consensus	
Volatile Solids	1 – 20%	Consensus	
C44 Nutrients in Soil			
Ammonia - N	300 - 3000 µg/g	Consensus	
Kjeldahl Nitrogen	400 – 4000 µg/g	Consensus	
Organic Carbon	1000 – 15000 µg/g	Consensus	
Phosphorus	300 – 3000 µg/g	Consensus	
C45 Anions in Soil			
Bromide	10 - 100 µg/g	Consensus	
Chloride	200 - 1000 µg/g	Consensus	
Fluoride	25 - 500 µg/g	Consensus	
Nitrate-N	25 - 500 µg/g	Consensus	
% Saturation		Consensus	
Phosphate-P	25 – 500 µg/g	Consensus	
Sulphate	25 – 2000 µg/g	Consensus	
C46 Acidity in Water			

Analyte	Conc. Range	Slope	Intercept
Acidity	50 – 2000 mg/L	± 10%	
C47 Haloacetic Acids in Water			
Bromochloroacetic acid	5 - 50 µg /L	± 40%	
Dibromoacetic acid	5 - 50 µg /L	± 40%	
Dichloroacetic acid	5 - 50 µg /L	± 40%	
Monobromoacetic acid	5 - 50 µg /L	± 40%	
Monochloroacetic acid	5 - 50 µg /L	± 40%	
Trichloroacetic acid	5 - 50 µg /L	± 40%	
C48 Diquat & Paraquat in Water			
Diquat	1 - 50 µg/L	0	
Paraquat	1 – 10 µg/L	0	
C49 PCB Congeners in Water			
PCB Congeners (209 analytes)	0.2-5 ug/L	0	
C50 PFAS in Water			
PFAS (EPA 1633 – 40 Analytes)	10-200 ng/L	0	
C51 Glyphosate in Soil			
Glyphosate	0.5 – 5.0 mg/kg	0	
C53 PCB Congeners in Soil			
PCB Congeners (209 analytes)	2 - 500 ng/g	0	
C54 PFAS in Soil			
PFAS (EPA 1633 – 40 Analytes)	10 – 200 ng/g	0	
C55 Alcohols in Soil			
Ethanol	5 – 200 ug/g	0	
Isobutanol	5 – 200 ug/g	0	
Isopropyl Alcohol	5 – 200 ug/g	0	
Methanol	5 – 200 ug/g	0	
n-Butanol	5 – 200 ug/g	0	
Pentanol	5 – 200 ug/g	0	
sec-Butanol	5 – 200 ug/g	0	
C70 Potency in Cannabis			
Cannabidiol (CBD)	0.1 – 25%	Consensus	
Cannabidiolic Acid (CBDA)	0.1 – 25%	Consensus	
Tetrahydrocannabinol (THC)	0.1 – 25%	Consensus	
Tetrahydrocannabinolic Acid (THCA)	0.1 – 25%	Consensus	
C71 Pesticides in Cannabis			
Acephate	0.1 – 1 µg/g	Consensus	
Aldicarb	5.0 – 20 µg/g	Consensus	
Azoxystrobin	0.1 – 1 µg/g	Consensus	
Bifenazate	0.1 – 1 µg/g	Consensus	
Boscalid	0.1 – 1 µg/g	Consensus	
Carbaryl	0.25 – 5 µg/g	Consensus	
Carbofuran	0.1 – 1 µg/g	Consensus	
Diazinon	0.1 – 1 µg/g	Consensus	
Dichlorvos (DDVP)	0.5 – 10 µg/g	Consensus	
Dimethoate	0.1 – 1 µg/g	Consensus	
Ethoprophos	0.1 – 1 µg/g	Consensus	
Etoxazole	0.1 – 1 µg/g	Consensus	
Fipronil	0.3 – 1.2 µg/g	Consensus	
Fludioxonil	0.1 – 1 µg/g	Consensus	
Imidacloprid	0.1 – 1 µg/g	Consensus	
Malathion	0.1 – 1 µg/g	Consensus	
Metalaxyl	0.1 – 1 µg/g	Consensus	
Methiocarb	0.1 – 1 µg/g	Consensus	

Analyte	Conc. Range	Slope	Intercept
Methomyl	0.25 – 1 µg/g	Consensus	
Myclobutanil	0.1 – 1 µg/g	Consensus	
Oxamyl	15 – 60 µg/g	Consensus	
Paclobutrazol	0.1 – 1 µg/g	Consensus	
Propoxur (Baygon)	0.1 – 1 µg/g	Consensus	
Spiromesifen	15 – 60 µg/g	Consensus	
Spirotetramat	0.1 – 1 µg/g	Consensus	
Thiamethoxam	0.1 – 1 µg/g	Consensus	
Trifloxystrobin	0.1 – 1 µg/g	Consensus	
C72 Metals in Hemp			
Arsenic	0.1 - 10 µg/g	Consensus	
Cadmium	0.1 - 50 µg/g	Consensus	
Chromium	0.1 - 10 µg/g	Consensus	
Mercury	0.05 - 2 µg/g	Consensus	
Lead	0.1 - 10 µg/g	Consensus	
C73 Residual Solvents in Hemp Seed Oil			
1-Butanol (n-Butanol)	500 - 7000 µg/g	Consensus	
1-Pentanol	500 - 7000 µg/g	Consensus	
1-Propanol (Propanol)	500 - 7000 µg/g	Consensus	
2-Butanol	500 - 7000 µg/g	Consensus	
2-Butanone (Methyl ethyl ketone, MEK)	500 - 7000 µg/g	Consensus	
2-Propanol (Isopropyl alcohol)	500 - 7000 µg/g	Consensus	
3-Methyl-1-butanol	500 - 7000 µg/g	Consensus	
Acetone (2-Propanone)	500 - 7000 µg/g	Consensus	
Anisole	500 - 7000 µg/g	Consensus	
Butane	500 - 7000 µg/g	Consensus	
Butyl acetate	500 - 7000 µg/g	Consensus	
Dimethyl sulfoxide	500 - 7000 µg/g	Consensus	
Ethanol	500 - 7000 µg/g	Consensus	
Ethyl acetate	500 - 7000 µg/g	Consensus	
Ethyl ether	500 - 7000 µg/g	Consensus	
Heptane	500 - 7000 µg/g	Consensus	
Isobutanol (2-Methyl-1-propanol)	500 - 7000 µg/g	Consensus	
Isobutyl acetate	500 - 7000 µg/g	Consensus	
Isopropyl acetate	500 - 7000 µg/g	Consensus	
Methyl acetate	500 - 7000 µg/g	Consensus	
Pentane	500 - 7000 µg/g	Consensus	
Propane	500 - 7000 µg/g	Consensus	
Propyl acetate	500 - 7000 µg/g	Consensus	
Triethylamine	500 - 7000 µg/g	Consensus	
C74 Hexavalent Chromium in Soil			
Hexavalent Chromium	40 – 300 µg/g	0.1547	8.546
C75 Particle Size in Soil			
Percent Sand		Consensus	
Percent Silt		Consensus	
Percent Clay		Consensus	
C76 Oil and Grease in Soil			
Total Oil and Grease	300 - 3000 µg/g	0.1567	88.04
C77 Pesticides in Soil			
p,p'-DDT	50 - 500 µg/g	0.2243	2.65
Aldrin	50 - 500 µg/g	0.2024	1.85
Alpha-BHC	50 - 500 µg/g	0.2004	3.18
Alpha-Chlordane	50 - 500 µg/g	0.1876	0.6823

Analyte	Conc. Range	Slope	Intercept
Beta-BHC	50 - 500 µg/g	0.1788	9.406
Dieldrin	50 - 500 µg/g	0.1672	4.0365
Endosulfan I	50 - 500 µg/g	0.1824	5.0749
Endosulfan II	50 - 500 µg/g	0.2026	3.2251
Endrin	50 - 500 µg/g	0.1435	7.1706
Lindane	50 - 500 µg/g	0.1955	6.0037
Gamma-Chlordane	50 - 500 µg/g	0.1666	2.0584
Heptachlor	50 - 500 µg/g	0.1911	2.5619
Heptachlor Epoxide	50 - 500 µg/g	0.1786	2.4451
Methoxychlor	50 - 500 µg/g	0.2696	6.089
C78 Water Activity/% Moisture in Hemp			
Percent Moisture	1 - 60 %	Consensus	
Water Activity	0.1 - 10 wa	Consensus	

6.0 History of Changes

Date	Rev. No.	Sections	Changes
12/18/2019	1.0		Initial publication
01/13/2021	1.1	General 4.0	Added clarification of SDPA and fixed limits. Added section for Consensus standard deviation.
01/04/2023	1.2	4.0	C02B Removed duplicate Aluminum C40A Removed "New"
03/06/2023	1.3		Updated concentration ranges, slopes and Intercept to match the contract and F07 Data Examination rev 1.2.
03/12/2026	1.4	5.0	Added Thallium to C17 Added Bismuth and Lithium to C02A, B and C Added C10A, C48, C49, C50, C51, C52, C53, C54 and C55
05/19/2026	1.5	5.0	Updated concentration range for C01A
05/25/2026	1.6	5.0	Changed units in C02 for 3 analytes from ug/L to mg/L