



Instruction Sheets

# **CONTEST**

## **Contaminated Land**

## **Proficiency Testing Scheme**

[lgcstandards.com/AXIO](https://lgcstandards.com/AXIO)

Detailed information about samples, matrices, ranges, units, etc. can be found in the **CONTEST Scheme Description**

**Issue No: 32**

**Issued: 18/06/2025**

Sample ID	Protocol	Page
<a href="#">General Information</a>		3-4
PT-CN-1A	<a href="#">CN-MET-1</a>	5
PT-CN-1B	<a href="#">CN-MET-1</a>	5
PT-CN-1C	<a href="#">CN-MET-1</a>	5
PT-CN-02	<a href="#">CN-MET-2</a>	6
PT-CN-3A	<a href="#">CN-MET-3</a>	7
PT-CN-3B	<a href="#">CN-INO-1</a>	9
PT-CN-3C	<a href="#">CN-ORG-1</a>	11
PT-CN-05	<a href="#">CN-ORG-2</a>	12
PT-CN-06	<a href="#">CN-INO-2</a>	10
PT-CN-7A	<a href="#">CN-ORG-5</a>	15
PT-CN-7B	<a href="#">CN-ORG-6</a>	16
PT-CN-08	<a href="#">CN-INO-2</a>	10
PT-CN-10	<a href="#">CN-INO-2</a>	10
PT-CN-11	<a href="#">CN-ORG-2</a>	12
PT-CN-12	<a href="#">CN-INO-2</a>	10
PT-CN-13	<a href="#">CN-MET-4</a>	8
PT-CN-14A	<a href="#">CN-ORG-2</a>	12
PT-CN-14B	<a href="#">CN-ORG-3</a>	13
PT-CN-15	<a href="#">CN-ORG-4</a>	14
PT-CN-16	<a href="#">CN-INO-2</a>	10
PT-CN-17	<a href="#">CN-INO-2</a>	10
PT-CN-18	<a href="#">CN-LEA-1</a>	19
PT-CN-19	<a href="#">CN-ORG-4</a>	14
PT-CN-20	<a href="#">CN-ORG-7</a>	17
PT-CN-21	<a href="#">CN-WAC-1</a>	20
PT-CN-23	<a href="#">CN-ORG-10</a>	24
PT-CN-24	<a href="#">CN-WAC-2</a>	21
PT-CN-25	<a href="#">CN-ORG-9</a>	23
PT-CN-26	<a href="#">CN-ORG-8</a>	22
PT-CN-27	<a href="#">CN-LOI</a>	25
PT-CN-28	<a href="#">CN-ST</a>	26
PT-CN-29	<a href="#">CN-IBA</a>	27
PT-CN-30	<a href="#">CN-ORG-8</a>	22
PT-CN-32	<a href="#">CN-PFAS</a>	28

## GENERAL INFORMATION

### Storage and receipt

- On receipt of the test materials, record the date and store as appropriate.

Storage temperature	Samples			
<b>Refrigerated (2 to 8°C)</b>	PT-CN-1A	PT-CN-7B	PT-CN-16	PT-CN-28
	PT-CN-1B	PT-CN-8	PT-CN-17	PT-CN-29
	PT-CN-1C	PT-CN-10	PT-CN-20	PT-CN-32
	PT-CN-2	PT-CN-11	PT-CN-21	
	PT-CN-3C (spike)	PT-CN-12	PT-CN-23B (soil)	
	PT-CN-5	PT-CN-13	PT-CN-23C (soil)	
	PT-CN-6	PT-CN-14A	PT-CN-24	
	PT-CN-7A	PT-CN-14B	PT-CN-27	
<b>Room temp. (20±5°C) in a dry, insect free storage area</b>	PT-CN-3A	PT-CN-18	PT-CN-26B (soil)	
	PT-CN-3B	PT-CN-23	PT-CN-30B (soil)	
	PT-CN-3C (soil)	PT-CN-25B (soil)		
<b>Frozen (&lt;-20°C)</b>	PT-CN-15	PT-CN-25A (spike)		
	PT-CN-19	PT-CN-26A (spike)		
	PT-CN-23A (spike)	PT-CN-30A (spike)		

- If a preservative is routinely added to the type of sample provided as part of your laboratory procedures, a suitable aliquot should be preserved as soon as possible in the normal way.
- Any dilutions that result from addition of preservatives should be corrected for before submission of results.**

Please note:

- Conditions for storage after receipt of the sample may differ from the conditions under which the PT sample was transported

The test material(s) should be analysed in accordance with the deadlines shown on the website: <https://portal.lgcstandards.com>

## Sample Preparation

- Samples should be prepared in accordance with the specific instructions for the group.
- The dilutions specified should be conducted in such a way as to ensure that any errors introduced by this dilution are much smaller than the overall analytical error involved in your method. As a general rule it is suggested that the error from dilution should be less than 1%.
- Example dilutions are given for illustration to help clarify the meaning of the instructions. These procedures should be followed exactly to ensure comparability of results.

**Any dilutions detailed as part of these procedures should not be used in the calculation of results. These dilutions simply provide a final sample for analysis within the expected concentration ranges.**

## Sample Analysis

- Samples should be analysed by the normal methods used for those analytes by your laboratory.
- CONTEST samples should be treated like any other samples and all normal quality control procedures should be adopted.
- Results should only be corrected for recovery and blank, if appropriate, **and** if this is the normal practice in the laboratory. **If the sample is diluted as part of the analytical process (this is apart from the dilutions in the sample preparation instructions), such dilutions should be corrected for.**

## Soil Matrix

The classification for the soil matrix (soil type), for each round, will be provided in the main report for Samples 3A, 3B, 3C and 18.

## General Safety

Some of the CONTEST samples contain acids or alkalis and are corrosive. Others will contain low levels of carcinogens and toxic or flammable chemicals.


## Reporting Results



- All results should be submitted using PORTAL
- Please go to <https://portal.lgcstandards.com>
- Login using your Lab ID, username, and password.
- A PORTAL user guide can be downloaded from the help section.

If you need any help at all, please do not hesitate to contact our support team using the details below or your local LGC representative.

**Tel:** +44(0)161 762 2500

**Email:** [axiopt@lgcgroup.com](mailto:axiopt@lgcgroup.com)


<b>Protocol</b>  <b>CN-MET-1</b>	Sample codes:		Description:	
	PT-CN-1A PT-CN-1C	PT-CN-1B	Approximately 8mL standard solution –the bottle label recalls the appropriate testing <ul style="list-style-type: none"> <li>• 1A and 1B: in 0.2M nitric acid</li> <li>• 1C in 2% HCl acid</li> </ul>	

All analytes			
<b>Step 1</b> Dilute <ul style="list-style-type: none"> <li>• an aliquot (1A) or</li> <li>• the full sample supplied (1B, 1C) by a factor of 10 (e.g. 1mL made up to 10mL) using <b>deionised</b> water or <b>acid</b> to achieve your normal final acid strength</li> </ul>		<b>Step 2</b> Analyse by your chosen instrumental technique	

**Note:** Do not correct results for these dilutions


**Note:** in PT-CN-1C, Mercury may be present in both organic and inorganic forms



[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-MET-2</b></p>	<p>Sample codes:</p> <p>PT-CN-02</p>	<p>Description:</p> <p>Approximately 60ml extract of soil (prepared following ISO 11466 for the extraction of metals, acid strength 21% HCl and 7% HNO<sub>3</sub>)</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-MET-3</b></p>	<p>Sample codes:</p> <p>PT-CN-3A</p>	<p>Description:</p> <p>Approximately 30g prepared soil, ground to pass through a 200µm sieve</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	


[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-MET-4</b></p>	<p>Sample codes:</p> <p>PT-CN-13</p>	<p>Description:</p> <p>Approximately 60mL standard solution (containing potassium dichromate and another chromium salt)</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	

[Back to sample list](#)




<b>Protocol</b>  <b>CN-INO-1</b>	<b>Sample codes:</b>  PT-CN-3B	<b>Description:</b>  Approximately 150g prepared soil, ground to pass through a 200µm sieve	



**All analytes**




**Step 1**  
Analyse by your chosen instrumental technique



[Back to sample list](#)

<b>Protocol</b>  <b>CN-INO-2</b>	<b>Sample codes:</b>		<b>Description:</b>  Approximately 60ml standard solution –the bottle label recalls the appropriate testing <b>Note:</b> <ul style="list-style-type: none"><li>Solution is preserved in 0.1M sodium hydroxide for PT-CN-06</li><li>Solution is preserved with zinc acetate for PT-CN-12</li></ul>	
	PT-CN-06 PT-CN-10 PT-CN-16	PT-CN-08 PT-CN-12 PT-CN-17		

Total cyanide		Total sulfate	
<b>Step 1</b> Analyse by your chosen instrumental technique		<b>Step 1</b> Analyse by your chosen instrumental technique	


Water soluble boron		Easily liberated sulfide	
<b>Step 1</b> Analyse by your chosen instrumental technique		<b>Step 1</b> Shake the sample well	
		<b>Step 2</b> take a 5mL sub-sample and analyse by your chosen instrumental technique	

Thiocyanate		Total fluoride	
<b>Step 1</b> Analyse by your chosen instrumental technique		<b>Step 1</b> Analyse by your chosen instrumental technique	

**Note:** PT-CN-12: Results should be reported as mg/L as the concentration of the solution

**Note:** PT-CN-16: Results should be reported as SCN

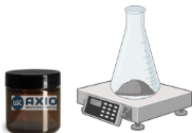


[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-ORG-1</b></p>	<p>Sample codes:</p> <p>PT-CN-3C</p>	<p>Description:</p> <ul style="list-style-type: none"> <li>- Approximately 70g prepared soil, ground to pass through a 200µm sieve</li> <li>- 1ml phenol spike solution</li> </ul>	
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**All analytes except Phenols, Cresols, Xylois and Distillable phenolic substances**


<p><b>Step 1</b> Analyse by your chosen instrumental technique</p> 	
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**Phenols, Cresols, Xylois and Distillable phenolic substances**

<p><b>Step 1</b> Weigh 10g of the soil supplied</p>		<p><b>Step 2</b> Accurately transfer 0.5mL of the phenol solution to 10g of soil</p>	
<p><b>Step 3</b> Perform an extraction of the entire sub-sample and analyse by your chosen instrumental technique</p>			

**Note:** Report each analyte result in mg/kg of the prepared soil sample  
Do not correct the results for these dilutions

[Back to sample list](#)


<p><b>Protocol</b></p> <p><b>CN-ORG-2</b></p>	<p>Sample codes:</p> <p>PT-CN-05      PT-CN-11</p> <p>PT-CN-14A</p>	<p>Description:</p> <p>Approximately 2ml standard solution –the bottle label recalls the appropriate testing</p> <ul style="list-style-type: none"> <li>• Hexane for PT-CN-05 and PT-CN-14A</li> <li>• Isooctane for PT-CN-11</li> </ul>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	

**Note:** PT-CN-14A must be stored at 4(±2)°C

**Note:** The weight of the sample plus the vial on preparation is given on all the vials. Please reweigh before analysis and if the weight difference is greater than 40mg please contact [contest@lgcgroup.com](mailto:contest@lgcgroup.com)

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-ORG-3</b></p>	<p>Sample codes:</p> <p>PT-CN-14B</p>	<p>Description:</p> <p>Approximately 2ml standard solution in methanol</p>	
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All analytes			
<p><b>Step 1</b></p> <p>Dilute the sample supplied by a factor of 100 (e.g. 0.1mL made up to 10mL) using deionised water</p>		<p><b>Step 2</b></p> <p>Analyse the resulting solution plus a blank by your chosen instrumental technique</p>	



**Note:** PT-CN-14B must be stored at 4(±2)°C

**Note:** Do not correct the results for these dilutions

**Note:** The weight of the sample plus the vial on preparation is given on all the vials. Please reweigh before analysis and if the weight difference is greater than 40mg please contact [contest@lgcgroup.com](mailto:contest@lgcgroup.com)

[Back to sample list](#)

<b>Protocol</b>  <b>CN-ORG-4</b>	Sample codes:	Description:	
	PT-CN-15      PT-CN-19	Approximately 2ml standard solution in methanol –the bottle label recalls the appropriate testing	


All analytes			
<b>Step 1</b> Dilute the sample supplied by a factor of 10,000 (e.g. 0.1mL made up to 1L) using deionised water		<b>Step 2</b> Analyse the resulting solution plus a blank by your chosen instrumental technique	

**Note:** PT-CN-15 and PT-CN-19 must be stored at -20°C or below

**Note:** Do not correct the results for these dilutions


**Note:** The weight of the sample plus the vial on preparation is given on all the vials. Please reweigh before analysis and if the weight difference is greater than 40mg please contact [contest@lgcgroup.com](mailto:contest@lgcgroup.com)



[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-ORG-5</b></p>	<p>Sample codes:</p> <p>PT-CN-7A</p>	<p>Description:</p> <p>Approximately 60mL standard solution in sodium hydroxide (for analysis by distillation and subsequent colorimetric analysis)</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	


[Back to sample list](#)


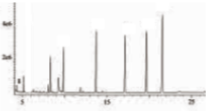
<p><b>Protocol</b></p> <p><b>CN-ORG-6</b></p>	<p>Sample codes:</p> <p>PT-CN-7B</p>	<p>Description:</p> <p>2 x approximately 2mL standard solution in methanol/water</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	

[Back to sample list](#)



<b>Protocol</b>  <b>CN-ORG-7</b>	<b>Sample codes:</b>  PT-CN-20	<b>Description:</b> <ul style="list-style-type: none"> <li>1 x 10mL solution of 6 organic compounds at a level of approximately 0.5mg/L in dichloromethane</li> <li>1 x blank</li> </ul>	
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All analytes			
<b>Step 1</b> Analyse the sample as received, or dilute if necessary, to bring into the working range of your instrument		<b>Step 2</b> Identify the six unknowns present in the test sample and select the appropriate compound from the drop down list on the result entry page of the reporting system	

**Note:** A blank is supplied to eliminate adventitious contaminants. The unknowns should be present in the solution only and not present (or present at trace levels) in the blank


**Possible chemicals found in this sample can be found on the following page**

*Continued on next page...*

Chemical	CAS number
1,2,4,5-Tetrachlorobenzene	95-94-3
1,2,4-Trichlorobenzene	120-82-1
1,3-Dinitrobenzene	99-65-0
2,3,4,6-Tetrachlorophenol	58-90-2
2,4,5-Trichlorophenol	95-95-4
2,4,6-Trichlorophenol	88-06-2
2,4-Dichlorophenol	120-83-2
2,4-Dinitrotoluene	131-14-2
2,6-Dinitrotoluene	606-20-2
2-Acetylaminofluorene	53-96-3
2-Chloronaphthalene	91-58-7
2-Chlorophenol	95-57-8
2-Methylnaphthalene	91-57-6
2-Nitroaniline	88-74-4
3-Methylcholanthrene	56-49-5
4-Bromophenyl phenyl ether	101-55-3
4-Chloro-3-methylphenol	59-50-7
4-Chlorophenyl phenyl ether	7005-72-3
4-Nitrophenol	100-02-7
5-Nitro-o-toluidine	99-55-8
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Acetophenone	98-86-2
Anthracene	120-12-7
Benz(a)anthracene	56-55-3
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Benzo(g,h,i)perylene	191-24-2
Benzo(k)fluoranthene	207-08-9
Benzyl alcohol	100-51-6
Bis(2-chloroethoxy)methane	111-91-1
Bis(2-chloroethyl)ether	111-44-4
Bis(2-chloroisopropyl)ether	108-60-1
Bis(2-ethylhexyl)phthalate	117-81-7
Butyl benzyl phthalate	85-68-7
Carbazole	86-74-8

Chemical	CAS number
Chrysene	218-01-9
Dibenz(a,h)anthracene	53-70-3
Dibenzofuran	132-64-9
Diethyl phthalate	84-66-2
Dimethyl phthalate	131-11-3
Dimethylaminoazobenzene	60-11-7
Di-n-butyl phthalate	84-74-2
Ethyl methanesulfonate	62-50-0
Fluoranthene	206-44-0
Fluorene	86-73-7
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachloroethane	67-72-1
Hexachloropropene	1888-71-7
Indeno(1,2,3-cd)pyrene	193-39-5
Isophorone	78-59-1
Isosafrole	120-58-1
m-Cresol	108-39-4
Naphthalene	91-20-3
Nitrobenzene	98-95-3
N-Nitrosodiethylamine	55-18-5
N-Nitrosodi-n-butylamine	924-16-3
N-Nitrosodi-n-propylamine	621-64-7
N-Nitrosomethylethylamine	10595-95-6
N-Nitrosomorpholine	59-89-2
N-Nitrosopiperidine	100-75-4
N-Nitrosopyrrolidine	930-55-2
o-Cresol	95-48-7
p-Cresol	106-44-5
Pentachlorobenzene	608-93-5
Pentachloronitrobenzene	82-68-8
Phenacetin	62-44-2
Phenanthrene	85-01-8
Phenol	108-95-2
Pyrene	129-00-0
Safrole	94-59-7

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-LEA-1</b></p>	<p>Sample codes:</p> <p>PT-CN-18</p>	<p>Description:</p> <p>Approximately 200g prepared soil, ground to pass through a 200µm sieve</p>	
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All analytes			
<p><b>Step 1</b></p> <p>Using a 'dry' sample (as received), extract the sample using a 10:1 leachate: soil ratio</p>		<p><b>Step 2</b></p> <p>Analyse by your chosen instrumental technique</p>	





**Note:** Results should be reported as mg/L

**Note:** Due to the very low levels of some analytes found in the leachate, many are not at a sufficient concentration for z scores to be calculated. The soil for leaching has therefore been spiked with a number of different parameters to raise the concentration of these to measurable levels

**Note:** Total organic carbon and dissolved organic carbon are regarded as the same determinand in the leachate sample due to the filtration carried out as part of the analytical procedure

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-WAC-1</b></p>	<p>Sample codes:</p> <p>PT-CN-21</p>	<p>Description:</p> <p>Approximately 200g Waste Acceptance Criteria material</p>	
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All analytes			
<p><b>Step 1</b></p> <p>Determine the moisture content (at 105°C) of the material provided PRIOR to determining the concentration of any other analyte</p>		<p><b>Step 2</b></p> <p>Calculate the Dry Matter Content Ratio using the following calculation</p>	<p><math>DR = 100 \times M_o/M_w</math></p> <p>where:</p> <p><b>DR</b> is the dry matter content ratio</p> <p><b>M<sub>o</sub></b> is the mass of the dried test portion (kg)</p> <p><b>M<sub>w</sub></b> is the mass of undried test portion (kg)</p> <p>Report this value in </p>
<p><b>Step 3</b></p> <p>Calculate the required test portion using the following calculations</p>	<p>The amount of sample should be equivalent to 0.09kg of dry mass.</p> <p><b>Required weight (kg) = 100 x 0.09/DR</b></p>	<p><b>Step 4</b></p> <p>Calculate the Moisture Content Ratio using the following calculation</p>	<p><b>Moisture Content (MC) = 100 x (M<sub>w</sub> - M<sub>o</sub>)/M<sub>o</sub></b></p>
<p><b>Step 5</b></p> <p>Calculate the required amount of leachant using the following calculations</p>	<p><math>L = (10 - MC/100) \times 0.09</math></p> <p>where</p> <p><b>L</b> is the volume of leachant used (in l)</p> <p><b>MC</b> is the moisture content ratio (in %)</p> <p><i>This should establish a 10:1 liquid to solid ratio</i></p>	<p><b>Step 6</b></p> <p>Leach the sample according to EN 12457-2</p>	
<p><b>Step 7</b></p> <p>Analyse the sample by your chosen instrumental technique</p>		<p><b>Note: The test material is a natural WAC sample; it may need to be dried and ground to pass through a 4mm sieve PRIOR to carrying out the analysis further</b></p>	

**Note:** Results obtained by the leaching test will be expressed in mg/L, however the results obtained from the eluate should be expressed as the amount of constituent leached relative to the total mass of the sample, in mg/kg of dry matter. Participants must use the following calculation to convert their results:

$$A = C \times ((L/0.09) + (MC/100))$$

where


**A** is the concentration of the analyte in mg/kg dry matter (this must be reported as the result)

**C** is the concentration of the analyte in the eluate (in mg/l)

**L** is the volume of leachant used (in l)

**MC** is the moisture content ratio

[Back to sample list](#)


<p><b>Protocol</b></p> <p><b>CN-WAC-2</b></p>	<p>Sample codes:</p> <p>PT-CN-24</p>	<p>Description:</p> <p>Approximately 1L leachate solution</p>	
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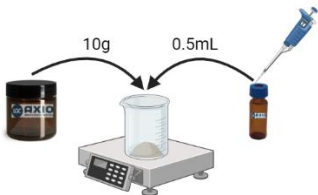

**All analytes**

<p><b>Step 1</b></p> <p>Analyse the sample by your chosen instrumental technique</p>	 
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**Note:** Results should be reported in mg/L

[Back to sample list](#)

<b>Protocol</b>  <b>CN-ORG-8</b>	Sample codes:	Description:	
	PT-CN-26      PT-CN-30	<ul style="list-style-type: none"> <li>Approximately 1mL standard solution in methanol</li> <li>Approximately 30g soil material</li> </ul>	


All analytes			
<b>Step 1</b> Accurately transfer 0.5mL of the standard solution to 10g of the soil supplied		<b>Step 2</b> Perform an extraction of the entire sub sample and analyse by your chosen instrumental technique	

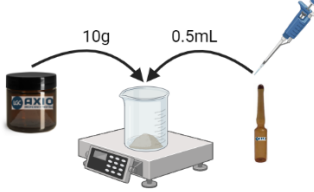

**Note:** The solutions must be stored at -20°C or below

**Note:** Do not correct the results for these dilutions

**Note:** Report each analyte result in mg/kg of the prepared soil sample

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-ORG-9</b></p>	<p>Sample codes:</p> <p>PT-CN-25</p>	<p>Description:</p> <ul style="list-style-type: none"> <li>Approximately 1mL standard solution in methanol</li> <li>Approximately 30g soil material</li> </ul>	
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All analytes			
<p><b>Step 1</b></p> <p>Accurately transfer 0.5mL of the standard solution to 10g of the soil supplied</p>		<p><b>Step 2</b></p> <p>Perform an extraction of the entire sub sample and analyse by your chosen instrumental technique</p>	



**Note:** The solutions must be stored at -20°C or below

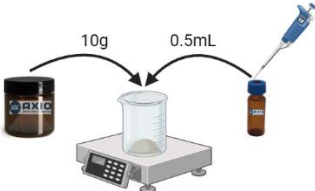

**Note:** Do not correct the results for these dilutions

**Note:** Report each analyte result in mg/kg of the prepared soil sample

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-ORG-10</b></p>	<p>Sample codes:</p> <p>PT-CN-23</p>	<p>Description:</p> <ul style="list-style-type: none"> <li>Approximately 1mL standard solution in methanol</li> <li>Approximately 2x50g soil material</li> </ul>	
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Dry matter			
<p><b>Step 1</b></p> <p>Mix the jar intended for dry matter and test it using your routine method</p>		<p><b>Step 2</b></p> <p>Follow your routine method (e.g. ISO 16558-1:2015) to calculate the dry matter content. The value (that may be reported in PORTAL) must be considered in the final results</p>	

All analytes			
<p><b>Step 1</b></p> <p>Accurately transfer 0.5mL of the standard solution to 10g of the soil supplied</p>		<p><b>Step 2</b></p> <p>Perform an extraction of the entire sub sample and analyse by your chosen instrumental technique</p>	


**Note:** The solution must be stored at -20°C or below

**Note:** Do not correct the results for these dilutions

**Note:** Report each analyte result in mg/kg of the prepared soil sample, taking the dry matter content in account


[Back to sample list](#)

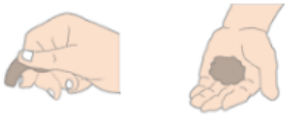


<p><b>Protocol</b></p> <p><b>CN-LOI</b></p>	<p>Sample codes:</p> <p>PT-CN-27</p>	<p>Description:</p> <p>Approximately 1kg soil</p>	
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All analytes			
<p><b>Step 1</b></p> <p>Air dry the sample, cone and quarter to produce a sub-sample</p>		<p><b>Step 2</b></p> <p>Sieve the sub-sample and then grind to &lt;2mm</p>	
<p><b>Step 3</b></p> <p>A minimum of 20g is then required to carry out the LOI test (in accordance to the HMRC LOI testing regime)</p>			


[Back to sample list](#)







<p><b>Protocol</b></p> <p><b>CN-ST</b></p>	<p>Sample codes:</p> <p>PT-CN-28</p>	<p>Description:</p> <p>Approximately 500g soil</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Determine the soil texture by using the <b>Feel or Ribbon Method</b></p>	

**Note:** The structure of this sample is to be confirmed and details will be circulated to participants closer to round

[Back to sample list](#)


<p><b>Protocol</b></p> <p><b>CN-IBA</b></p>	<p>Sample codes:</p> <p>PT-CN-29</p>	<p>Description:</p> <p>Approximately 500g or 1000g IBA material</p>	
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All analytes			
<p><b>Step 1</b></p> <p>Sieve to 5mm</p>		<p><b>Step 2</b></p> <p>Record the fraction that remains on the sieve and list out the material that has been retained. i.e. glass/metal</p>	
<p><b>Step 3</b></p> <p>Recombine and carry out a moisture content determination at 105°C</p>		<p><b>Step 4</b></p> <p>Dry the entire sample at 30°C</p>	
<p><b>Step 5</b></p> <p>Grind the sample in the shatter box</p>		<p><b>Step 6</b></p> <p>Submit for testing. Dry matter correct the results</p>	

**Note:** Analyse sample via a **single shot IBA**

**Note:** The structure of this sample is to be confirmed and details will be circulated to participants closer to round

[Back to sample list](#)

<p><b>Protocol</b></p> <p><b>CN-PFAS</b></p>	<p>Sample codes:</p> <p>PT-CN-32</p>	<p>Description:</p> <p>Approximately 50g prepared soil, sieved through 212 µm</p>	
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All analytes	
<p><b>Step 1</b></p> <p>Analyse by your chosen instrumental technique</p> 	

**Note:** The test material provided is a natural (non artificially spiked) soil. Therefore, some analytes may not always be present.

[Back to sample list](#)