



---

**Sustainable Leather Foundation  
Standard for Soil Contamination and Quality**

**Reference:** FSE12.1

**Authored by:** K Flowers

**Peer Reviewed by:** I. Král

**Accredited by:** XXX

**Original Creation Date:** 6 July 2021

**Last Reviewed Date:**

**Next Review Date:** August 2022

---

## **SOIL CONTAMINATION AND QUALITY STANDARD AND BENCHMARK**

**Summary:** The SLF soil quality standard provides the context, audit of soil quality, and provides the facility under audit the methodology to analyse and report their soil quality to an interested party ensuring the reporting of soil quality, and such that the environmental impact and comparisons of the facilities' use can be compared to global levels and to other facilities of similar size and type.



## 1. Scope

EEC (1986) helps to set benchmarks for the basic agricultural soil pollutants: metals, salinity, total phosphorous, total nitrogen, and pH –these have been incorporated as benchmarks in this Standard. The Scope of this Audit Standard will include farms through to commercial (industrial) land. Other soil pollutants have been identified as a serious threat to global soils these include: sulfide, pesticides (which includes fungicides/bactericides and chlorinated phenols), volatile organic compounds, absorbable organic halides (AOX), phenols, colourants, polycyclic aromatic hydrocarbons, alkyl-phenol (and ethoxylates), organotins, flame retardants, phthalate esters, perfluorocarbons, microplastics, nanoparticles, total petroleum hydrocarbons, and selected siloxanes – these are not currently added to this Standard. This Standard does acknowledge that there are other restricted substances that result in soil contamination, but the evidence for the proposed limits set by industry bodies is not clear. Future updates of this Standard will contain restricted substance benchmarks.

The Scope of this Audit Standard includes the soils beneath the facility under audit and any areas surrounding the facility that may have been contaminated by run-off or percolation, or by air plume from the facility under audit. The Scope of this audit Standard also includes any soils that may have been contaminated by air emissions or effluent irrigation that were a direct consequence of activities in the facility.

The method and definition of soil quality for all facilities in the leather value chain is included in this Standard. The facilities in the value chain include all facilities from the farm to the end-of-life of the leather.

The Standard on soil quality also includes the facilities (including their sub-contractors, and waste handling/treatment vendors) on their immediate properties and their surrounding environments. The soil quality in question is only related to the Scope of the SLF audit (or mapped certification) that is being audited. The Scope of the Soil Quality Standard does not include indirect soil impacts that are related to the preparation of inputs - that are then used on the site (included within the Scope of the audit).

## 2. Normative references

The following referenced documents are useful in the understanding of this document and are provided for further guidance. In the case of dispute these references form the core of the evidence in support of the Standard and Benchmarks used here:

Council Directive (EEC) 86/278 of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture. [Online]. [Accessed 6 July 2021]. Available from: <http://eur-lex.europa.eu/>

Pierzynski, G.M. and Sharpley, A.N. (2000) *Methods of phosphorous analysis for soils, sediments, residuals, and waters: introduction*. In: Methods of phosphorous analysis for soils, sediments, residuals, and waters. (Editor: Pierzynski, G.M.). Southern Co-operative Bulletin Series No. 396.

Zaman, M., Shahid, S.A., and Heng, L. (2018) Guideline for salinity assessment, mitigation and adaptation using nuclear and related techniques. Joint FAO/IAEA Programme, Springer Open, Switzerland.



### 3. Terms and definitions

**Facility** – the facility being audited against this Standard. If the facility pipes their water outputs to a third parties for treatment, then the benchmarks found in this Standard will be used to judge the final effluent quality of those third parties that is being released to the environment.

**Salinity** - From the point of view of defining saline soils, when the electrical conductivity of a soil extract from a saturated paste (EC<sub>e</sub>) equals, or exceeds 4 deci Siemens per meter (dS m<sup>-1</sup>) at 25°C, the soil is said to be saline (USSL Staff 1954), and this definition remains in the latest glossary of soil science in the USA [Quoted from Zaman *et al.* (2018)]

**Total Nitrogen** – total nitrogen (TN) includes all forms of nitrogen (N) that are present in the soil (including organic and inorganic sources of nitrogen). The test involves hot digesting the sample in concentrated acid and a catalyst to drive off any carbon and sulfur - leaving ammonium salts. The ammonium salts are converted to ammonia then condensed into an acid trap which is then titrated to determine N quantity.

**Extractable phosphorus** – extractable P has been used by soil testing laboratories to describe the amount of P in soil available for crop uptake and to determine the probability of crop response to added P, and thereby fertilizer P requirements.

**Total phosphorous** – the total amount in dissolved and particulate phases of soils determined through acid digestion and measurement using inductively coupled plasma spectroscopy.

### 4. Principle

The soil parameter tested, must be linked to a Soil Quality Risk Assessment or a manufacturer restricted substance list (MRSL) that identifies that there is (or is not) a need for soil pollution measurement.

The facility soil parameters (or their contracted third-party facility) are monitored, and the levels obtained will result in the output being classified as A, B, C, or D. The principle of soil quality assessment is to measure the soil pollutants that are released by the facility (by mostly site measurement, e.g., random sampling) and to provide the facility with data that helps minimise the contribution that the facility makes to those levels. The due diligence of the facility being audited is to do estimates (through calculations) and confirm them with measurements that show that the facility is not responsible for the pollutant discharge into the environment. It is the requirement of this standard that the facility shows continuous improvement in the soil quality of the facility and that a strategy is in place to improve low environmental performance, with pollutant levels falling in C and D bands.

The facility soil quality benchmark levels laid out in this Standard appear in four bands A, B, C, and D. The B-Banding correspond (in part) onto the EEC (1986) and includes an additional three SLF bands, see Table 1. The limit given in the B-band column, see Table 1, is the maximum level that the soil can have to be awarded a B-band.

A-Banding is a level considered above the levels given in EEC (1986) that demonstrate outstanding effort (possibly non-detectable levels). A-Banding is automatically awarded to facilities that do not have any processes that generate the parameters listed or whose MRSL and risk assessments can show that the soil parameter listed is not directly produced by the facility. The limit given in the A-band column, see Table 1, is the maximum concentration that the soil can have to be awarded an A-band.

C-Banding shows a level below the levels given in EEC (1986) which indicates, transparently, that the facility is below the EEC (1986) levels and that work is underway to improve this. If a stricter level than those given in C-Banding is required by law (then the regulatory limit will supersede the C-Banding limit). The limit given in the C-band column, see Table 1, is the maximum concentration that the soil can have to be awarded a C-band.

D-Banding shows that the soil parameter has not been measured at the time of the audit or is exempt from monitoring.

The frequency of measuring soil parameters is an important decision, with the optimum laying somewhere between too frequent and not frequent enough.

Minimisation and mitigation to lower/remove pollutants before they can enter the environment and continuous improvement of the soil parameters at the facility is considered minimum standard practice and the decision-making and monitoring of the facility must demonstrate this practice.

## 5. Procedure and benchmark

- 5.1 A record of soil contamination and the facility history must commence with the preparation for the first audit, to meet the Standard the facility must continuously monitor soil quality. Note any activities that neighbours are performing that may influence the facility soil quality.
- 5.2 If using third party lands to irrigate land with effluent originating from the generating facility, then those soils must have the same records as seen in Clause 5.1. The same is true for any sub-contractor (for processing, waste handling/or disposal).
- 5.3 Effluent parameters associated with the facility must be identified from Table 1 using the MRSL, the Water Output Risk Assessment, and will be marked off on the report sheet, see Annex A. Exclusions should be fully explained.

Table 1. Soil quality benchmarks for facilities (adapted from EEC, 1986).

Substance	Limit			
	6-7 for mineral soils; 5-5.5 for organic soils			
pH	A	B	C	D
Cadmium, Cd (ppm)	<1	≤1 to ≤100	100< to ≤410	410<; NM
Copper, Cu (ppm)	<5	≤5 to ≤200	200< to ≤400	400<; NM
Nickel, Ni (ppm)	<30	≤30 to ≤110	110< to ≤200	200<; NM
Lead, Pb (ppm)	<55	≤55 to ≤300	300< to ≤2300	2300<; NM
Zinc, Zn (ppm)	<100	≤100 to ≤200	200< to ≤450	450<; NM
Mercury, Hg (ppm)	<0.5	≤0.5 to ≤1	1< to ≤26	26<; NM
Chromium, Cr (ppm)	<100	≤100 to ≤400	400< to ≤5000	5000<; NM
- Cr VI	<21	≤21 to ≤30	30< to ≤49	49<; NM
Salinity (EC <sub>e</sub> dS m <sup>-1</sup> )	<0.5	≤0.5 to ≤2	2< to ≤4	2<; NM
Total Nitrogen (ppm)	<1500	≤1500 to ≤2000	2000< to ≤3000	3000<; NM
Total Phosphorous (ppm)	<60	≤60 to ≤200	200< to ≤1300	1300<; NM

NM = not measured yet

- 5.4 The number of times the soil parameters are measured must be decided (recorded in a decision log) and reviewed (yearly).
- 5.5 Soil parameters must be monitored at least annually, and the auditor will need a thorough explanation why the facility frequency of measurement was decided.



- 5.6 The facility will monitor (at the frequency decided in Clause 5.4 and 5.5), at the predetermined points - these will be recorded on Annex A.
- 5.7 Soil sampling:
  - 5.7.1 A record and site map of historical sampling must be kept by the facility (to monitor progress and locations of previous sampling)
  - 5.7.2 The facility must have a standard procedure to ensure the same method of soil sampling is performed (if a third-party test facility is used their sampling procedure must be known and a record of how it is performed kept by the facility)
- 5.8 The levels for each soil parameter are diagnosed according to the scheme outlined below (and Table 1).
- 5.9 The banding should be recorded on the SLF Standard Soil Quality Annual Report (given in Annex B).
- 5.10 The facility will monitor and track (including visibly) the annual performance of the soils on the production site and any contractor third party sites where activities, that may affect the soils, is taking place.
- 5.11 A mitigation plan to help protect soils that from the activities that may reduce the quality of those soils must be in place.
- 5.12 The continuous improvement in improving soil parameters will be monitored by annual review and necessary improvements planned for.

## 6. Calculation of soil parameters

- 6.1 Soil parameters associated with the facility, that are marked off as laid out in Clause 5.3, must be compared, and rated using Table 1.
- 6.2 Soil parameters that are recorded (at a frequency decided by management) using Annex A and the levels transferred to Annex B to show yearly performance.
- 6.3 A test result that exceeds the maximum level permitted in the C-Banding constitutes an incident and should be recorded, as such, in Annex A.
- 6.4 A report explaining the incidents and their root cause should be generated for each incident, which should be reviewed by management, and decisions needed to prevent future incidents should be logged against each incident.
- 6.5 The Standard expects that the decisions to mitigate incidents should result in progress.

## 7. Diagnostic parameters

- 7.1 Soil parameter levels determined by Clause 6, that a facility is required to monitor in whole or in part, in the manner specified by the Principle/Procedure (outlined above), will be published by their banding and measured annual average. The banding will be determined through determination of highest value of overall soil parameter level listing (encompassing each sampling site tested), i.e., if a Cr level from sampling site 1 was 110 ppm and sampling site 2 was 410 ppm, the banding for Cr at the facility will be Band C.
- 7.2 The publication will allow full transparency and focussed environmental objectives that can drive continuous improvement.
- 7.3 Soil parameters associated with the facility (or their contracted third parties) that have been excluded from Annex A must be fully justified.
- 7.4 The number of incidents calculated from Clause 6.3 must be recorded on Annex B for each.
- 7.5 The mitigation decision making outlined in Clause 6.5 should show tangible continuous improvement, specifically that the frequency of incidents is declining, not increasing.
- 7.6 The site map, records and monitoring of levels over time is critical to knowing about the contamination of the site. A non-conformance to this Standard and Benchmark must be recorded if the facility does not have:
  - 7.6.1 Site map showing previous sampling locations of soil (exempt for first soil test)
  - 7.6.2 Records of previous soil tests (at the known locations), showing graphs or tables of previous levels identified by sampling location.
  - 7.6.3 A procedure that documents how to consistently take soil samples at the specified locations.



## 8. Report

The annual test report for Soil Quality is the latest digital or printed report that shows the soil quality parameters calculated (see Clause 6). The report, Annex B, should include:

1. A reference to this Sustainable Leather Foundation Standard (i.e., FSE12.1: 2021)
2. Soil parameters identified from Table 1, which were identified as relevant for the facility will be marked off on Annex A with justification for any exclusions being recorded in a decision log.
3. The levels of each soil quality parameters that has been recorded (using Annex A) and averaged for the whole of the year, see Annex B.
4. The Soil Quality and how they compare to the SLF benchmark should appear on the webpage dashboard and the digital device application content.
5. The auditor must confirm that they have had sight of the sample location record (site map and references); the history of previous soil sampling (with levels) and the procedure that explains how consistent sampling is performed.



**Annex A**

**Facility name:**

**Date:**

**Sample location\*:** (identifier)

Relevant? (Tick if Y)	Soil Parameter	Measured Levels	Incident (Y/N)?
<input type="checkbox"/>	pH		
<input type="checkbox"/>	Cadmium, Cd (ppm)		
<input type="checkbox"/>	Copper, Cu (ppm)		
<input type="checkbox"/>	Nickel, Ni (ppm)		
<input type="checkbox"/>	Lead, Pb (ppm)		
<input type="checkbox"/>	- Zinc, Zn (ppm)		
<input type="checkbox"/>	Mercury, Hg (ppm)		
<input type="checkbox"/>	Chromium, Cr (ppm)		
<input type="checkbox"/>	- Cr VI		
<input type="checkbox"/>	Salinity (EC <sub>e</sub> dS m <sup>-1</sup> )		
<input type="checkbox"/>	Total Nitrogen (ppm)		
<input type="checkbox"/>	Total Phosphorous (ppm)		

\* Use this form for each location if necessary



**Annex B – Sustainable Leather Foundation Soil Quality Annual Report (FSE12.1)**

**Facility name:**

**Year:**

Relevant? (Tick if Y)	Soil Parameter – aggregate of all sample locations (worst levels used)	Annual level (Banding)	Number of incidents
<input type="checkbox"/>	pH		
<input type="checkbox"/>	Cadmium, Cd (ppm)		
<input type="checkbox"/>	Copper, Cu (ppm)		
<input type="checkbox"/>	Nickel, Ni (ppm)		
<input type="checkbox"/>	Lead, Pb (ppm)		
<input type="checkbox"/>	- Zinc, Zn (ppm)		
<input type="checkbox"/>	Mercury, Hg (ppm)		
<input type="checkbox"/>	Chromium, Cr (ppm)		
<input type="checkbox"/>	- Cr VI		
<input type="checkbox"/>	Salinity (EC <sub>e</sub> dS m <sup>-1</sup> )		
<input type="checkbox"/>	Total Nitrogen (ppm)		
<input type="checkbox"/>	Total Phosphorous (ppm)		
Was the treatment of the solid waste contracted to a third party?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Were any third parties contracted to do work that could contaminate soil?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Were the exclusions of parameters in Annex A justified?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Was a decision log (or similar) seen that justifies testing frequency of all soil quality parameters?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Was the soil parameter testing frequency adequate?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Were incidents fully explained through reports?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Were there any signs, visually, that soil contamination on any of the sites within the Scope		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Was there a mitigation plan that will protect soils from contamination?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Was there any indication that continuous improvement of soil quality was taking place in the facility?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
Can the SLF element be earned or not?		<input type="checkbox"/> YES	<input type="checkbox"/> NO

**Sustainable Leather Foundation**  
**Standard for Soil Contamination and Quality**  
**Reference:** FSE12.1  
**Authored by:** K Flowers  
**Peer Reviewed by:** I. Král  
**Accredited by:** XXX