

S2 Table. Permissible limits (ppm) for heavy metals in food, water and soil according to international and local standards. International standards used are displayed in bold.

Matrices	Area of application	Arsenic (As)	Cadmium (Cd)	Mercury (Hg)	Lead (Pb)	Source
Food	International	0.1-0.2	0.05-2	0.5-1	0.01-3	[1]
	European Union	0.1-0.2	0.05-3	0.1-1	0.02-3	[2,3]
	USA	NA	NA	NA	NA	The U.S. Food and Drug Administration has not established regulatory limits for trace metals in finished food products other than bottled water.
	China	0.5	0.05	0.01	0.2	Retrieved from [4]
Drinking water	International	0.01	0.003	0.001	0.01	[1]
	European Union	0.01	0.005	0.01	0.001	[5]
	USA	0.01	0.005	0.002	0.015	[6]
	China	0.01	0.005	0.001	0.01	[7]
Irrigation water	International	0.1	0.01	NA	5	[8]
	USA	NA	0.005-0.01	NA	5	[9]
	China	0.05	NA	0.01	NA	Retrieved from [10]
Soil	International	20	0.9-3	0.03-2	30-50	[11,12]
	European Union	NA	NA	NA	NA	The European Union has not established limits for heavy metals in soils. There is

						however on-going policy to manage contamination, see [13] which states limit values in sludge for use in agriculture (Cd: 1-3 ppm; Hg:1-1.5 ppm; Pb:50-300 ppm)
	Finland	5-100	1-20	0.5-5	60-750	[14]. The Finnish standard values represent a good approximation of different national systems in Europe have been applied in an international context for agricultural soils as well.
	UK	32-640	10-230	1-3600	450-750	[15]
	USA	0.11	0.48	1	200	[16] [17] stated limit values in sludge for use in agriculture (As: 75 ppm; Cd: 85 ppm; Hg: 420 ppm; Pb: 840 ppm)
	China	20-40	0.3-0.6	0.3-1	80	[18]

1. Codex Alimentarius. Codex general standard for contaminants and toxins in food and feed - CODEX STAN 193-1995. Joint FAO/WHO; 2015 p. 59. Available: 10.13140/RG.2.1.4910.2560
2. Commission Regulation (EU) 2015/1006. Commission Regulation (EU) 2015/1006 of 25 June 2015 amending Regulation (EC) No 1881/2006 as regards maximum levels of inorganic arsenic in foodstuffs (OJ L161). EU; 2015 Jun. Report No.: OJ L161. Available: <http://data.europa.eu/eli/reg/2015/1006/oj/eng>

3. Commission Regulation (EC) No 1881/2006. Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (OJ L364). EU; 2006. Available: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02006R1881-20100701>
4. Li J, Xie ZM, Xu JM, Sun YF. Risk assessment for safety of soils and vegetables around a lead/zinc mine. *Environ Geochem Health*. 2006;28: 37–44. doi:10.1007/s10653-005-9009-x
5. European Commission. Proposal for a Directive of the European Parliament and of the Council on the quality of water intended for human consumption (COM/2017/0753). EU; 2019.
6. US EPA. Drinking water regulations (Safe Drinking Water Act). 2017. Available: <https://www.epa.gov/dwreginfo/drinking-water-regulations>
7. Ministry of Health, China. Standards for drinking water quality (GB 5749-2006). 2006.
8. Ayers RS, Westcot DW. Water quality for agriculture. Food and Agriculture Organization of the United Nations, Rome; 1994. Available: <http://www.fao.org/3/t0234e/T0234E06.htm#ch5.5>
9. US EPA. Aircraft industry waste water recycling (EPA-600/2-78-130). 1978.
10. Zhao X, Wang H, Tang Z, Zhao T, Qin N, Li H, et al. Amendment of water quality standards in China: viewpoint on strategic considerations. *Environ Sci Pollut Res*. 2018;25: 3078–3092. doi:10.1007/s11356-016-7357-y
11. de Vries W, Schütze G, Lots S, Meili M, Römken P, de Temmerman L, et al. Critical limits for cadmium, lead and mercury related to ecotoxicological effects on soil organisms, aquatic organisms, plants, animals and humans. In: Schütze G, Lorent U, Spranger T, editors. Proceedings of the expert meeting on critical limits for heavy metals and methods for their application, Berlin, 2–4 December 2002 Held under the UN/ECE Convention on Long- Range Transboundary Air Pollution UBA-Texte 47/03. Berlin: Umweltbundesamt; 2003. pp. 29–78.
12. WHO/FAO. Codex alimentarius commission. Food additives and contaminants. Food Standards Programme, ALINORM 10/12A. Joint FAO/WHO; 2001. Available: 10.13140/RG.2.1.4910.2560
13. Council Directive 86/278/EEC. Council Directive of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (OJ L181). EU; 1986.
14. Ministry of the Environment, Finland. Government Decree on the assessment of soil contamination and remediation needs (214/2007). 2007.
15. UK Environment Agency. Soil guideline values for arsenic, cadmium, mercury and lead in soil (SC050021). 2009.

16. US EPA. Supplemental guidance for developing soil screening levels for superfund sites. Office of Solid Waste and Emergency Response, Washington, D.C. 2002. Available: <http://www.epa.gov/superfund/health/conmedia/soil/index.htm>
17. US EPA. Clean Water Act (Sec. 503, vol. 58, no. 32). 1993. Available: <https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol32/xml/CFR-2019-title40-vol32-part503.xml>
18. Environmental Protection Ministry of China. Standards of soil environmental quality of agricultural land. Huangbanhang 69: Office of Environmental Protection Ministry of China, Beijing, China. 2015.