



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 4, Aarhus University, Department of Environmental Science (Denmark)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.203	0.180	0.192	0.022	0.492	S
H2		0.428	0.429	0.442	0.04	-0.34	S
H3		0.324	0.315	0.327	0.026	-0.099	S
H4		0.201	0.219	0.228	0.025	-1.096	S
H1	Cd <i>µg/l</i>	0.028	0.032	0.033	0.009	-0.548	S
H2		0.024	0.023	0.027	0.007	-0.437	S
H3		0.023	0.025	0.026	0.006	-0.475	S
H4		0.026	0.029	0.03	0.009	-0.445	S
H1	Cr <i>µg/l</i>	0.303	0.280	0.294	0.037	0.248	S
H2		0.294	0.273	0.283	0.023	0.475	S
H3		0.249	0.228	0.228	0.043	0.492	S
H4		0.237	0.219	0.224	0.056	0.233	S
H1	Cu <i>µg/l</i>	< 0.360	0.220	0.237	0.085		B
H2		0.396	0.390	0.389	0.07	0.105	S
H3		0.403	0.420	0.420	0.056	-0.297	S
H4		< 0.360	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	0.375	0.36	0.366	0.161	0.055	S
H2		0.374	0.351	0.361	0.102	0.125	S
H3		0.234	0.21	0.228	0.113	0.054	S
H4		0.358	0.329	0.357	0.132	0.007	S
H1	Pb <i>µg/l</i>	0.744	0.800	0.789	0.182	-0.247	S
H2		0.548	0.585	0.601	0.164	-0.324	S
H3		0.638	0.665	0.667	0.123	-0.234	S
H4		0.871	0.913	0.875	0.158	-0.023	S
H1	Zn <i>µg/l</i>	3.916	3.88	4.019	0.906	-0.114	S
H2		2.677	2.73	2.934	1.013	-0.254	S
H3		3.929	3.85	4.417	1.977	-0.247	S
H4		3.667	3.65	3.781	0.92	-0.124	S

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Foretaksnr./Enterprise no. 941705561

If your laboratory reported values as less than the detection limit, and your detection limit equal or is lower than the expected value, $\frac{1}{2}$ DL is taken as the reported value in further calculations.

* Z score in unitless

⌘ EMEP quality norm; letters indicate:

S – Satisfactory: Your results deviates less than $\pm 25\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and less than $\pm 15\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

Q – Questionable: Your result deviates between $\pm 25-50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and between $\pm 15-30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect:
<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 5, Finnish Meteorological Institute, Atmospheric Composition, Air Quality (Finland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.182	0.180	0.192	0.022	-0.437	S
H2		0.439	0.429	0.442	0.04	-0.059	S
H3		0.326	0.315	0.327	0.026	-0.01	S
H4		0.23	0.219	0.228	0.025	0.074	S
H1	Cd <i>µg/l</i>	0.031	0.032	0.033	0.009	-0.188	S
H2		0.025	0.023	0.027	0.007	-0.248	S
H3		0.024	0.025	0.026	0.006	-0.369	S
H4		0.03	0.029	0.03	0.009	-0.044	S
H1	Cr <i>µg/l</i>	0.279	0.280	0.294	0.037	-0.398	S
H2		0.279	0.273	0.283	0.023	-0.18	S
H3		0.23	0.228	0.228	0.043	0.047	S
H4		0.218	0.219	0.224	0.056	-0.105	S
H1	Cu <i>µg/l</i>	0.237	0.220	0.237	0.085	0.008	S
H2		0.387	0.390	0.389	0.07	-0.018	S
H3		0.453	0.420	0.420	0.056	0.605	S
H4		0.3	0.292	0.278	0.072	0.307	S
H1	Ni <i>µg/l</i>	0.368	0.36	0.366	0.161	0.013	S
H2		0.358	0.351	0.361	0.102	-0.03	S
H3		0.214	0.21	0.228	0.113	-0.12	S
H4		0.345	0.329	0.357	0.132	-0.089	S
H1	Pb <i>µg/l</i>	0.818	0.800	0.789	0.182	0.162	S
H2		0.596	0.585	0.601	0.164	-0.028	S
H3		0.682	0.665	0.667	0.123	0.124	S
H4		0.929	0.913	0.875	0.158	0.347	S
H1	Zn <i>µg/l</i>	3.979	3.88	4.019	0.906	-0.044	S
H2		2.767	2.73	2.934	1.013	-0.165	S
H3		3.856	3.85	4.417	1.977	-0.283	S
H4		3.742	3.65	3.781	0.92	-0.042	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 6, SGS France - EHS (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.23	0.180	0.192	0.022	1.709	Q
H2		0.528	0.429	0.442	0.04	2.148	S
H3		0.42	0.315	0.327	0.026	3.547	Q
H4		0.28	0.219	0.228	0.025	2.104	Q
H1	Cd <i>µg/l</i>	< 0.050	0.032	0.033	0.009		B
H2		< 0.050	0.023	0.027	0.007		B
H3		< 0.050	0.025	0.026	0.006		B
H4		< 0.050	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 0.400	0.280	0.294	0.037		B
H2		< 0.400	0.273	0.283	0.023		B
H3		< 0.400	0.228	0.228	0.043		B
H4		< 0.400	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 0.300	0.220	0.237	0.085		B
H2		0.41	0.390	0.389	0.07	0.304	S
H3		0.45	0.420	0.420	0.056	0.548	S
H4		0.306	0.292	0.278	0.072	0.386	S
H1	Ni <i>µg/l</i>	0.38	0.36	0.366	0.161	0.087	S
H2		0.37	0.351	0.361	0.102	0.085	S
H3		< 0.300	0.21	0.228	0.113		B
H4		0.347	0.329	0.357	0.132	-0.076	S
H1	Pb <i>µg/l</i>	0.772	0.800	0.789	0.182	-0.093	S
H2		0.556	0.585	0.601	0.164	-0.275	S
H3		0.63	0.665	0.667	0.123	-0.299	S
H4		0.88	0.913	0.875	0.158	0.034	S
H1	Zn <i>µg/l</i>	< 20.000	3.88	4.019	0.906		B
H2		< 20.000	2.73	2.934	1.013		B
H3		< 20.000	3.85	4.417	1.977		B
H4		< 20.000	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 7, SGS Analytics Germany GmbH, Niederlassung Markkleeberg (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.182	0.180	0.192	0.022	-0.455	S
H2		0.412	0.429	0.442	0.04	-0.738	S
H3		0.323	0.315	0.327	0.026	-0.137	S
H4		0.222	0.219	0.228	0.025	-0.245	S
H1	Cd <i>µg/l</i>	0.027	0.032	0.033	0.009	-0.661	S
H2		0.028	0.023	0.027	0.007	0.099	S
H3		0.027	0.025	0.026	0.006	0.191	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.286	0.280	0.294	0.037	-0.216	S
H2		0.288	0.273	0.283	0.023	0.218	S
H3		0.243	0.228	0.228	0.043	0.352	S
H4		0.219	0.219	0.224	0.056	-0.089	S
H1	Cu <i>µg/l</i>	0.213	0.220	0.237	0.085	-0.278	S
H2		0.378	0.390	0.389	0.07	-0.152	S
H3		0.432	0.420	0.420	0.056	0.224	S
H4		0.298	0.292	0.278	0.072	0.275	S
H1	Ni <i>µg/l</i>	0.341	0.36	0.366	0.161	-0.156	S
H2		0.353	0.351	0.361	0.102	-0.082	S
H3		0.219	0.21	0.228	0.113	-0.079	S
H4		0.319	0.329	0.357	0.132	-0.289	S
H1	Pb <i>µg/l</i>	0.818	0.800	0.789	0.182	0.16	S
H2		0.587	0.585	0.601	0.164	-0.086	S
H3		0.678	0.665	0.667	0.123	0.092	S
H4		0.917	0.913	0.875	0.158	0.268	S
H1	Zn <i>µg/l</i>	4.173	3.88	4.019	0.906	0.17	S
H2		2.95	2.73	2.934	1.013	0.016	S
H3		4.172	3.85	4.417	1.977	-0.124	S
H4		4.031	3.65	3.781	0.92	0.272	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 8, Umweltbundesamt, Langen (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.192	0.180	0.192	0.022	-0.004	S
H2		0.439	0.429	0.442	0.04	-0.066	S
H3		0.329	0.315	0.327	0.026	0.091	S
H4		0.229	0.219	0.228	0.025	0.038	S
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.097	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.025	0.025	0.026	0.006	-0.142	S
H4		0.029	0.029	0.03	0.009	-0.109	S
H1	Cr <i>µg/l</i>	0.276	0.280	0.294	0.037	-0.49	S
H2		0.268	0.273	0.283	0.023	-0.641	S
H3		0.228	0.228	0.228	0.043	0.005	S
H4		0.213	0.219	0.224	0.056	-0.197	S
H1	Cu <i>µg/l</i>	0.215	0.220	0.237	0.085	-0.254	S
H2		0.389	0.390	0.389	0.07	0.005	S
H3		0.415	0.420	0.420	0.056	-0.081	S
H4		0.283	0.292	0.278	0.072	0.065	S
H1	Ni <i>µg/l</i>	0.352	0.36	0.366	0.161	-0.088	S
H2		0.349	0.351	0.361	0.102	-0.122	S
H3		0.221	0.21	0.228	0.113	-0.061	S
H4		0.328	0.329	0.357	0.132	-0.221	S
H1	Pb <i>µg/l</i>	0.806	0.800	0.789	0.182	0.094	S
H2		0.584	0.585	0.601	0.164	-0.104	S
H3		0.67	0.665	0.667	0.123	0.027	S
H4		0.913	0.913	0.875	0.158	0.243	S
H1	Zn <i>µg/l</i>	3.852	3.88	4.019	0.906	-0.184	S
H2		2.697	2.73	2.934	1.013	-0.234	S
H3		4.01	3.85	4.417	1.977	-0.206	S
H4		3.57	3.65	3.781	0.92	-0.229	S

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Foretaksnr./Enterprise no. 941705561

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* Z score in unitless

⌘ EMEP quality norm; letters indicate:

S – Satisfactory: Your results deviates less than $\pm 25\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and less than $\pm 15\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect:
<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 15, Norwegian Institute for Air Research NILU (Norway)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.174	0.180	0.192	0.022	-0.815	S
H2		0.409	0.429	0.442	0.04	-0.813	S
H3		0.295	0.315	0.327	0.026	-1.2	S
H4		0.21	0.219	0.228	0.025	-0.731	S
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.097	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.024	0.025	0.026	0.006	-0.309	S
H4		0.029	0.029	0.03	0.009	-0.109	S
H1	Cr <i>µg/l</i>	0.288	0.280	0.294	0.037	-0.162	S
H2		0.274	0.273	0.283	0.023	-0.383	S
H3		0.229	0.228	0.228	0.043	0.028	S
H4		0.222	0.219	0.224	0.056	-0.036	S
H1	Cu <i>µg/l</i>	0.226	0.220	0.237	0.085	-0.125	S
H2		0.392	0.390	0.389	0.07	0.047	S
H3		0.424	0.420	0.420	0.056	0.08	S
H4		0.29	0.292	0.278	0.072	0.163	S
H1	Ni <i>µg/l</i>	0.358	0.36	0.366	0.161	-0.05	S
H2		0.343	0.351	0.361	0.102	-0.181	S
H3		0.217	0.21	0.228	0.113	-0.096	S
H4		0.333	0.329	0.357	0.132	-0.183	S
H1	Pb <i>µg/l</i>	0.8	0.800	0.789	0.182	0.061	S
H2		0.58	0.585	0.601	0.164	-0.128	S
H3		0.662	0.665	0.667	0.123	-0.038	S
H4		0.897	0.913	0.875	0.158	0.142	S
H1	Zn <i>µg/l</i>	3.98	3.88	4.019	0.906	-0.043	S
H2		2.74	2.73	2.934	1.013	-0.191	S
H3		3.95	3.85	4.417	1.977	-0.236	S
H4		3.68	3.65	3.781	0.92	-0.11	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 16, Institute of Meteorology and Water Management, Warsaw (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.031	0.032	0.033	0.009	-0.21	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.024	0.025	0.026	0.006	-0.309	S
H4		0.029	0.029	0.03	0.009	-0.109	S
H1	Cr <i>µg/l</i>	0.262	0.280	0.294	0.037	-0.872	S
H2		0.254	0.273	0.283	0.023	-1.241	S
H3		0.212	0.228	0.228	0.043	-0.367	S
H4		0.203	0.219	0.224	0.056	-0.376	S
H1	Cu <i>µg/l</i>	0.189	0.220	0.237	0.085	-0.56	S
H2		0.357	0.390	0.389	0.07	-0.452	S
H3		0.365	0.420	0.420	0.056	-0.98	S
H4		0.235	0.292	0.278	0.072	-0.604	S
H1	Ni <i>µg/l</i>	0.315	0.36	0.366	0.161	-0.318	S
H2		0.299	0.351	0.361	0.102	-0.614	S
H3		0.214	0.21	0.228	0.113	-0.123	S
H4		0.281	0.329	0.357	0.132	-0.577	S
H1	Pb <i>µg/l</i>	0.77	0.800	0.789	0.182	-0.104	S
H2		0.54	0.585	0.601	0.164	-0.373	S
H3		0.635	0.665	0.667	0.123	-0.258	S
H4		0.845	0.913	0.875	0.158	-0.188	S
H1	Zn <i>µg/l</i>	3.58	3.88	4.019	0.906	-0.485	S
H2		2.65	2.73	2.934	1.013	-0.28	S
H3		3.71	3.85	4.417	1.977	-0.357	S
H4		3.7	3.65	3.781	0.92	-0.088	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 19, Centro Nacional de Sanidad Ambiental (Spain)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.185	0.180	0.192	0.022	-0.32	S
H2		0.435	0.429	0.442	0.04	-0.166	S
H3		0.315	0.315	0.327	0.026	-0.44	S
H4		0.219	0.219	0.228	0.025	-0.367	S
H1	Cd <i>µg/l</i>	0.054	0.032	0.033	0.009	2.384	U
H2		0.04	0.023	0.027	0.007	1.707	U
H3		0.03	0.025	0.026	0.006	0.691	S
H4		< 0.030	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	0.263	0.280	0.294	0.037	-0.845	S
H2		0.252	0.273	0.283	0.023	-1.327	S
H3		< 0.210	0.228	0.228	0.043	-2.849	U
H4		< 0.210	0.219	0.224	0.056	-2.133	U
H1	Cu <i>µg/l</i>	< 0.910	0.220	0.237	0.085		B
H2		< 0.910	0.390	0.389	0.07		B
H3		< 0.910	0.420	0.420	0.056		B
H4		< 0.910	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 1.030	0.36	0.366	0.161		B
H2		< 1.030	0.351	0.361	0.102		B
H3		< 1.030	0.21	0.228	0.113		B
H4		< 1.030	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	0.843	0.800	0.789	0.182	0.298	S
H2		0.599	0.585	0.601	0.164	-0.012	S
H3		0.69	0.665	0.667	0.123	0.19	S
H4		0.918	0.913	0.875	0.158	0.275	S
H1	Zn <i>µg/l</i>	4.766	3.88	4.019	0.906	0.824	S
H2		3.374	2.73	2.934	1.013	0.434	S
H3		4.935	3.85	4.417	1.977	0.262	Q
H4		4.6	3.65	3.781	0.92	0.89	Q

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 20, Swedish Environmental Research Institute IVL, Gothenburg (Sweden)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.217	0.180	0.192	0.022	1.123	S
H2		0.471	0.429	0.442	0.04	0.73	S
H3		0.351	0.315	0.327	0.026	0.927	S
H4		0.247	0.219	0.228	0.025	0.767	S
H1	Cd <i>µg/l</i>	0.036	0.032	0.033	0.009	0.388	S
H2		0.028	0.023	0.027	0.007	0.152	S
H3		0.027	0.025	0.026	0.006	0.174	S
H4		0.031	0.029	0.03	0.009	0.149	S
H1	Cr <i>µg/l</i>	0.285	0.280	0.294	0.037	-0.244	S
H2		0.274	0.273	0.283	0.023	-0.383	S
H3		0.228	0.228	0.228	0.043	0.005	S
H4		0.219	0.219	0.224	0.056	-0.089	S
H1	Cu <i>µg/l</i>	0.231	0.220	0.237	0.085	-0.066	S
H2		0.392	0.390	0.389	0.07	0.047	S
H3		0.42	0.420	0.420	0.056	0.008	S
H4		0.292	0.292	0.278	0.072	0.191	S
H1	Ni <i>µg/l</i>	0.358	0.36	0.366	0.161	-0.05	S
H2		0.345	0.351	0.361	0.102	-0.161	S
H3		0.215	0.21	0.228	0.113	-0.114	S
H4		0.326	0.329	0.357	0.132	-0.236	S
H1	Pb <i>µg/l</i>	0.848	0.800	0.789	0.182	0.326	S
H2		0.614	0.585	0.601	0.164	0.079	S
H3		0.693	0.665	0.667	0.123	0.214	S
H4		0.949	0.913	0.875	0.158	0.471	S
H1	Zn <i>µg/l</i>	4.45	3.88	4.019	0.906	0.475	S
H2		3.12	2.73	2.934	1.013	0.184	S
H3		4.56	3.85	4.417	1.977	0.073	S
H4		4.11	3.65	3.781	0.92	0.358	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 22, Institute of Global Climate and Ecology (Russian Federation)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.021	0.032	0.033	0.009	-1.337	Q
H2		0.012	0.023	0.027	0.007	-2.045	Q
H3		0.013	0.025	0.026	0.006	-2.141	Q
H4		0.015	0.029	0.03	0.009	-1.677	Q
H1	Cr <i>µg/l</i>	-999	0.280	0.294	0.037		B
H2		-999	0.273	0.283	0.023		B
H3		-999	0.228	0.228	0.043		B
H4		-999	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	0.43	0.220	0.237	0.085	2.278	U
H2		0.12	0.390	0.389	0.07	-3.831	U
H3		0.19	0.420	0.420	0.056	-4.127	U
H4		0.11	0.292	0.278	0.072	-2.348	U
H1	Ni <i>µg/l</i>	-999	0.36	0.366	0.161		B
H2		-999	0.351	0.361	0.102		B
H3		-999	0.21	0.228	0.113		B
H4		-999	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	0.52	0.800	0.789	0.182	-1.48	Q
H2		0.27	0.585	0.601	0.164	-2.023	U
H3		0.42	0.665	0.667	0.123	-2.009	Q
H4		0.81	0.913	0.875	0.158	-0.409	S
H1	Zn <i>µg/l</i>	-999	3.88	4.019	0.906		B
H2		-999	2.73	2.934	1.013		B
H3		-999	3.85	4.417	1.977		B
H4		-999	3.65	3.781	0.92		B

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 24, Serbian Environmental Protection Agency (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.18	0.180	0.192	0.022	-0.545	S
H2		0.529	0.429	0.442	0.04	2.173	S
H3		0.366	0.315	0.327	0.026	1.496	S
H4		0.265	0.219	0.228	0.025	1.496	S
H1	Cd <i>µg/l</i>	0.044	0.032	0.033	0.009	1.256	Q
H2		0.034	0.023	0.027	0.007	0.903	Q
H3		0.027	0.025	0.026	0.006	0.191	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	< 0.600	0.280	0.294	0.037		B
H2		< 0.600	0.273	0.283	0.023		B
H3		< 0.600	0.228	0.228	0.043		B
H4		< 0.600	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	-999	0.220	0.237	0.085		B
H2		-999	0.390	0.389	0.07		B
H3		-999	0.420	0.420	0.056		B
H4		-999	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 1.000	0.36	0.366	0.161		B
H2		< 1.000	0.351	0.361	0.102		B
H3		< 1.000	0.21	0.228	0.113		B
H4		< 1.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 1.000	0.800	0.789	0.182		B
H2		< 1.000	0.585	0.601	0.164		B
H3		< 1.000	0.665	0.667	0.123		B
H4		< 1.000	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	-999	3.88	4.019	0.906		B
H2		-999	2.73	2.934	1.013		B
H3		-999	3.85	4.417	1.977		B
H4		-999	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 31, Slovak Hydrometeorological Institute (Slovakia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.236	0.180	0.192	0.022	1.98	Q
H2		0.409	0.429	0.442	0.04	-0.813	S
H3		0.408	0.315	0.327	0.026	3.091	Q
H4		0.301	0.219	0.228	0.025	2.954	Q
H1	Cd <i>µg/l</i>	0.036	0.032	0.033	0.009	0.354	S
H2		0.039	0.023	0.027	0.007	1.573	U
H3		0.039	0.025	0.026	0.006	2.19	U
H4		0.056	0.029	0.03	0.009	2.916	U
H1	Cr <i>µg/l</i>	0.424	0.280	0.294	0.037	3.556	U
H2		0.338	0.273	0.283	0.023	2.363	S
H3		0.273	0.228	0.228	0.043	1.048	S
H4		0.432	0.219	0.224	0.056	3.729	U
H1	Cu <i>µg/l</i>	0.482	0.220	0.237	0.085	2.891	U
H2		0.557	0.390	0.389	0.07	2.4	Q
H3		0.416	0.420	0.420	0.056	-0.064	S
H4		0.332	0.292	0.278	0.072	0.749	S
H1	Ni <i>µg/l</i>	0.985	0.36	0.366	0.161	3.853	U
H2		0.348	0.351	0.361	0.102	-0.131	S
H3		0.559	0.21	0.228	0.113	2.935	U
H4		0.58	0.329	0.357	0.132	1.692	U
H1	Pb <i>µg/l</i>	0.362	0.800	0.789	0.182	-2.35	U
H2		1.175	0.585	0.601	0.164	3.507	U
H3		0.7	0.665	0.667	0.123	0.271	S
H4		0.377	0.913	0.875	0.158	-3.15	U
H1	Zn <i>µg/l</i>	11.444	3.88	4.019	0.906	8.192	U
H2		10.896	2.73	2.934	1.013	7.86	U
H3		27.051	3.85	4.417	1.977	11.451	U
H4		12.554	3.65	3.781	0.92	9.536	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 33, Latvian Environment, Geology and Meteorology Centre (Latvia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.168	0.180	0.192	0.022	-1.086	S
H2		0.382	0.429	0.442	0.04	-1.484	S
H3		0.277	0.315	0.327	0.026	-1.883	S
H4		0.19	0.219	0.228	0.025	-1.541	S
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.097	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.026	0.025	0.026	0.006	0.025	S
H4		0.027	0.029	0.03	0.009	-0.333	S
H1	Cr <i>µg/l</i>	0.229	0.280	0.294	0.037	-1.774	S
H2		0.222	0.273	0.283	0.023	-2.615	S
H3		0.18	0.228	0.228	0.043	-1.109	S
H4		0.17	0.219	0.224	0.056	-0.968	S
H1	Cu <i>µg/l</i>	0.133	0.220	0.237	0.085	-1.22	Q
H2		0.246	0.390	0.389	0.07	-2.035	Q
H3		0.359	0.420	0.420	0.056	-1.088	S
H4		0.179	0.292	0.278	0.072	-1.385	Q
H1	Ni <i>µg/l</i>	0.216	0.36	0.366	0.161	-0.934	Q
H2		0.205	0.351	0.361	0.102	-1.54	Q
H3		0.117	0.21	0.228	0.113	-0.983	Q
H4		0.196	0.329	0.357	0.132	-1.223	Q
H1	Pb <i>µg/l</i>	0.571	0.800	0.789	0.182	-1.2	Q
H2		0.408	0.585	0.601	0.164	-1.179	Q
H3		0.457	0.665	0.667	0.123	-1.708	Q
H4		0.611	0.913	0.875	0.158	-1.669	Q
H1	Zn <i>µg/l</i>	3.673	3.88	4.019	0.906	-0.382	S
H2		2.493	2.73	2.934	1.013	-0.435	S
H3		3.59	3.85	4.417	1.977	-0.418	S
H4		3.283	3.65	3.781	0.92	-0.541	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 34, Ministry of Environment and Urbanisation (Turkey)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.212	0.180	0.192	0.022	0.898	S
H2		0.49	0.429	0.442	0.04	1.203	S
H3		0.357	0.315	0.327	0.026	1.154	S
H4		0.249	0.219	0.228	0.025	0.848	S
H1	Cd <i>µg/l</i>	0.041	0.032	0.033	0.009	0.918	Q
H2		0.043	0.023	0.027	0.007	2.109	U
H3		0.035	0.025	0.026	0.006	1.524	Q
H4		0.042	0.029	0.03	0.009	1.348	Q
H1	Cr <i>µg/l</i>	0.35	0.280	0.294	0.037	1.533	S
H2		0.336	0.273	0.283	0.023	2.277	S
H3		0.289	0.228	0.228	0.043	1.42	Q
H4		0.273	0.219	0.224	0.056	0.879	S
H1	Cu <i>µg/l</i>	0.192	0.220	0.237	0.085	-0.525	S
H2		0.425	0.390	0.389	0.07	0.518	S
H3		0.474	0.420	0.420	0.056	0.979	S
H4		0.28	0.292	0.278	0.072	0.024	S
H1	Ni <i>µg/l</i>	0.443	0.36	0.366	0.161	0.479	S
H2		0.432	0.351	0.361	0.102	0.696	S
H3		0.254	0.21	0.228	0.113	0.232	S
H4		0.413	0.329	0.357	0.132	0.425	Q
H1	Pb <i>µg/l</i>	1.122	0.800	0.789	0.182	1.834	Q
H2		0.967	0.585	0.601	0.164	2.236	U
H3		0.922	0.665	0.667	0.123	2.079	Q
H4		1.283	0.913	0.875	0.158	2.585	Q
H1	Zn <i>µg/l</i>	3.641	3.88	4.019	0.906	-0.417	S
H2		2.173	2.73	2.934	1.013	-0.751	S
H3		3.262	3.85	4.417	1.977	-0.584	S
H4		3.097	3.65	3.781	0.92	-0.744	S

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* Z score in unitless

✕ EMEP quality norm; letters indicate:

S – Satisfactory: Your results deviates less than $\pm 25\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and less than $\pm 15\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

Q – Questionable: Your result deviates between $\pm 25-50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and between $\pm 15-30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

U – Unsatisfactory: Your result deviates more than $\pm 50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and more than $\pm 30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

B – Blank: You reported either no value or the detection limit

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 35, Meteorological and Hydrological Service of Croatia (Croatia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.196	0.180	0.192	0.022	0.176	S
H2		0.465	0.429	0.442	0.04	0.581	S
H3		0.347	0.315	0.327	0.026	0.775	S
H4		0.241	0.219	0.228	0.025	0.524	S
H1	Cd <i>µg/l</i>	0.034	0.032	0.033	0.009	0.129	S
H2		0.027	0.023	0.027	0.007	-0.035	S
H3		0.026	0.025	0.026	0.006	0.025	S
H4		0.032	0.029	0.03	0.009	0.227	S
H1	Cr <i>µg/l</i>	-999	0.280	0.294	0.037		B
H2		-999	0.273	0.283	0.023		B
H3		-999	0.228	0.228	0.043		B
H4		-999	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	-999	0.220	0.237	0.085		B
H2		-999	0.390	0.389	0.07		B
H3		-999	0.420	0.420	0.056		B
H4		-999	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	0.362	0.36	0.366	0.161	-0.026	S
H2		0.358	0.351	0.361	0.102	-0.033	S
H3		0.217	0.21	0.228	0.113	-0.096	S
H4		0.341	0.329	0.357	0.132	-0.122	S
H1	Pb <i>µg/l</i>	0.796	0.800	0.789	0.182	0.039	S
H2		0.587	0.585	0.601	0.164	-0.086	S
H3		0.675	0.665	0.667	0.123	0.068	S
H4		0.915	0.913	0.875	0.158	0.256	S
H1	Zn <i>µg/l</i>	-999	3.88	4.019	0.906		B
H2		-999	2.73	2.934	1.013		B
H3		-999	3.85	4.417	1.977		B
H4		-999	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 36, Slovenian Environment Agency (Slovenia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.181	0.180	0.192	0.022	-0.5	S
H2		0.426	0.429	0.442	0.04	-0.39	S
H3		0.317	0.315	0.327	0.026	-0.364	S
H4		0.222	0.219	0.228	0.025	-0.245	S
H1	Cd <i>µg/l</i>	0.034	0.032	0.033	0.009	0.129	S
H2		0.027	0.023	0.027	0.007	-0.035	S
H3		0.026	0.025	0.026	0.006	0.025	S
H4		0.031	0.029	0.03	0.009	0.115	S
H1	Cr <i>µg/l</i>	< 0.300	0.280	0.294	0.037		B
H2		< 0.300	0.273	0.283	0.023		B
H3		< 0.300	0.228	0.228	0.043		B
H4		< 0.300	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 0.300	0.220	0.237	0.085		B
H2		0.382	0.390	0.389	0.07	-0.095	S
H3		0.418	0.420	0.420	0.056	-0.028	S
H4		< 0.300	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	0.416	0.36	0.366	0.161	0.311	S
H2		0.393	0.351	0.361	0.102	0.312	S
H3		< 0.300	0.21	0.228	0.113		B
H4		0.354	0.329	0.357	0.132	-0.023	S
H1	Pb <i>µg/l</i>	0.794	0.800	0.789	0.182	0.028	S
H2		0.58	0.585	0.601	0.164	-0.128	S
H3		0.658	0.665	0.667	0.123	-0.071	S
H4		0.908	0.913	0.875	0.158	0.211	S
H1	Zn <i>µg/l</i>	3.9	3.88	4.019	0.906	-0.131	S
H2		2.76	2.73	2.934	1.013	-0.172	S
H3		3.86	3.85	4.417	1.977	-0.282	S
H4		3.63	3.65	3.781	0.92	-0.164	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 38, Estonian Environmental Research Centre, Tallinn (Estonia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.14	0.180	0.192	0.022	-2.348	S
H2		0.39	0.429	0.442	0.04	-1.285	S
H3		0.29	0.315	0.327	0.026	-1.39	S
H4		0.19	0.219	0.228	0.025	-1.541	S
H1	Cd <i>µg/l</i>	< 0.020	0.032	0.033	0.009	-2.578	U
H2		< 0.020	0.023	0.027	0.007	-2.313	U
H3		< 0.020	0.025	0.026	0.006	-2.641	U
H4		< 0.020	0.029	0.03	0.009	-2.238	U
H1	Cr <i>µg/l</i>	< 0.500	0.280	0.294	0.037		B
H2		< 0.500	0.273	0.283	0.023		B
H3		< 0.500	0.228	0.228	0.043		B
H4		< 0.500	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	-999	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	0.2	0.36	0.366	0.161	-1.034	Q
H2		0.18	0.351	0.361	0.102	-1.786	Q
H3		< 0.100	0.21	0.228	0.113	-1.577	U
H4		0.17	0.329	0.357	0.132	-1.42	Q
H1	Pb <i>µg/l</i>	0.74	0.800	0.789	0.182	-0.269	S
H2		0.53	0.585	0.601	0.164	-0.434	S
H3		0.61	0.665	0.667	0.123	-0.462	S
H4		0.85	0.913	0.875	0.158	-0.156	S
H1	Zn <i>µg/l</i>	3.4	3.88	4.019	0.906	-0.683	S
H2		2	2.73	2.934	1.013	-0.922	Q
H3		3.3	3.85	4.417	1.977	-0.565	S
H4		3.1	3.65	3.781	0.92	-0.74	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 39, Central Environmental Analysis Laboratory - CentLab (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.2	0.180	0.192	0.022	0.357	S
H2		0.5	0.429	0.442	0.04	1.452	S
H3		0.35	0.315	0.327	0.026	0.889	S
H4		0.25	0.219	0.228	0.025	0.889	S
H1	Cd <i>µg/l</i>	0.031	0.032	0.033	0.009	-0.21	S
H2		0.023	0.023	0.027	0.007	-0.571	S
H3		0.026	0.025	0.026	0.006	0.025	S
H4		0.027	0.029	0.03	0.009	-0.333	S
H1	Cr <i>µg/l</i>	0.29	0.280	0.294	0.037	-0.107	S
H2		0.28	0.273	0.283	0.023	-0.126	S
H3		0.24	0.228	0.228	0.043	0.283	S
H4		0.23	0.219	0.224	0.056	0.108	S
H1	Cu <i>µg/l</i>	0.15	0.220	0.237	0.085	-1.02	Q
H2		0.4	0.390	0.389	0.07	0.162	S
H3		0.45	0.420	0.420	0.056	0.548	S
H4		0.25	0.292	0.278	0.072	-0.395	S
H1	Ni <i>µg/l</i>	0.3	0.36	0.366	0.161	-0.412	S
H2		0.4	0.351	0.361	0.102	0.381	S
H3		0.15	0.21	0.228	0.113	-0.69	Q
H4		0.35	0.329	0.357	0.132	-0.054	S
H1	Pb <i>µg/l</i>	0.69	0.800	0.789	0.182	-0.544	S
H2		0.43	0.585	0.601	0.164	-1.045	Q
H3		0.53	0.665	0.667	0.123	-1.113	S
H4		0.86	0.913	0.875	0.158	-0.093	S
H1	Zn <i>µg/l</i>	-999	3.88	4.019	0.906		B
H2		-999	2.73	2.934	1.013		B
H3		-999	3.85	4.417	1.977		B
H4		-999	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 41, Micro Pollutants Technology (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.166	0.180	0.192	0.022	-1.176	S
H2		0.426	0.429	0.442	0.04	-0.39	S
H3		0.318	0.315	0.327	0.026	-0.326	S
H4		0.216	0.219	0.228	0.025	-0.488	S
H1	Cd <i>µg/l</i>	0.039	0.032	0.033	0.009	0.692	S
H2		0.022	0.023	0.027	0.007	-0.705	S
H3		0.033	0.025	0.026	0.006	1.191	Q
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.286	0.280	0.294	0.037	-0.216	S
H2		0.29	0.273	0.283	0.023	0.303	S
H3		0.232	0.228	0.228	0.043	0.097	S
H4		0.235	0.219	0.224	0.056	0.197	S
H1	Cu <i>µg/l</i>	0.199	0.220	0.237	0.085	-0.443	S
H2		0.365	0.390	0.389	0.07	-0.338	S
H3		0.408	0.420	0.420	0.056	-0.207	S
H4		0.284	0.292	0.278	0.072	0.079	S
H1	Ni <i>µg/l</i>	0.352	0.36	0.366	0.161	-0.088	S
H2		0.343	0.351	0.361	0.102	-0.181	S
H3		0.219	0.21	0.228	0.113	-0.079	S
H4		0.331	0.329	0.357	0.132	-0.198	S
H1	Pb <i>µg/l</i>	0.832	0.800	0.789	0.182	0.238	S
H2		0.596	0.585	0.601	0.164	-0.031	S
H3		0.681	0.665	0.667	0.123	0.116	S
H4		0.925	0.913	0.875	0.158	0.319	S
H1	Zn <i>µg/l</i>	3.95	3.88	4.019	0.906	-0.076	S
H2		2.88	2.73	2.934	1.013	-0.053	S
H3		4.15	3.85	4.417	1.977	-0.135	S
H4		3.69	3.65	3.781	0.92	-0.099	S

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* Z score in unitless

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B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 43, Air, Water and Soil Analyses Laboratory, LEPL National Environmental Agency (Georgia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.23	0.180	0.192	0.022	1.709	Q
H2		0.39	0.429	0.442	0.04	-1.285	S
H3		0.33	0.315	0.327	0.026	0.129	S
H4		0.26	0.219	0.228	0.025	1.294	S
H1	Cd <i>µg/l</i>	0.06	0.032	0.033	0.009	3.061	U
H2		0.05	0.023	0.027	0.007	3.047	U
H3		0.04	0.025	0.026	0.006	2.357	U
H4		0.05	0.029	0.03	0.009	2.244	U
H1	Cr <i>µg/l</i>	0.64	0.280	0.294	0.037	9.459	U
H2		0.65	0.273	0.283	0.023	15.752	U
H3		0.91	0.228	0.228	0.043	15.825	U
H4		0.82	0.219	0.224	0.056	10.686	U
H1	Cu <i>µg/l</i>	1.64	0.220	0.237	0.085	16.531	U
H2		1.34	0.390	0.389	0.07	13.566	U
H3		1.39	0.420	0.420	0.056	17.447	U
H4		2.08	0.292	0.278	0.072	25.131	U
H1	Ni <i>µg/l</i>	0.79	0.36	0.366	0.161	2.639	U
H2		0.53	0.351	0.361	0.102	1.661	U
H3		0.42	0.21	0.228	0.113	1.703	U
H4		0.87	0.329	0.357	0.132	3.894	U
H1	Pb <i>µg/l</i>	0.61	0.800	0.789	0.182	-0.985	S
H2		0.42	0.585	0.601	0.164	-1.106	Q
H3		0.48	0.665	0.667	0.123	-1.521	Q
H4		0.64	0.913	0.875	0.158	-1.485	Q
H1	Zn <i>µg/l</i>	7.09	3.88	4.019	0.906	3.388	U
H2		6.45	2.73	2.934	1.013	3.471	U
H3		13.1	3.85	4.417	1.977	4.393	U
H4		6.75	3.65	3.781	0.92	3.227	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 48, Afdeling Rapportering Water Labovestiging Gent, VMM (Belgium)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.19	0.180	0.192	0.022	-0.094	S
H2		0.445	0.429	0.442	0.04	0.083	S
H3		0.326	0.315	0.327	0.026	-0.023	S
H4		0.225	0.219	0.228	0.025	-0.124	S
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.097	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.025	0.025	0.026	0.006	-0.142	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.31	0.280	0.294	0.037	0.44	S
H2		0.287	0.273	0.283	0.023	0.175	S
H3		0.232	0.228	0.228	0.043	0.097	S
H4		0.229	0.219	0.224	0.056	0.09	S
H1	Cu <i>µg/l</i>	0.238	0.220	0.237	0.085	0.017	S
H2		0.39	0.390	0.389	0.07	0.019	S
H3		0.426	0.420	0.420	0.056	0.116	S
H4		0.287	0.292	0.278	0.072	0.121	S
H1	Ni <i>µg/l</i>	0.38	0.36	0.366	0.161	0.087	S
H2		0.361	0.351	0.361	0.102	-0.003	S
H3		0.207	0.21	0.228	0.113	-0.185	S
H4		0.346	0.329	0.357	0.132	-0.084	S
H1	Pb <i>µg/l</i>	0.854	0.800	0.789	0.182	0.359	S
H2		0.61	0.585	0.601	0.164	0.055	S
H3		0.705	0.665	0.667	0.123	0.312	S
H4		0.965	0.913	0.875	0.158	0.572	S
H1	Zn <i>µg/l</i>	4.725	3.88	4.019	0.906	0.779	S
H2		3.274	2.73	2.934	1.013	0.336	S
H3		4.467	3.85	4.417	1.977	0.026	S
H4		4.341	3.65	3.781	0.92	0.609	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 49, The Cyprus Institute (Cyl) (Cyprus)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.216	0.180	0.192	0.022	1.078	S
H2		0.49	0.429	0.442	0.04	1.203	S
H3		0.381	0.315	0.327	0.026	2.066	S
H4		0.258	0.219	0.228	0.025	1.213	S
H1	Cd <i>µg/l</i>	0.033	0.032	0.033	0.009	0.016	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.027	0.025	0.026	0.006	0.191	S
H4		0.032	0.029	0.03	0.009	0.227	S
H1	Cr <i>µg/l</i>	0.289	0.280	0.294	0.037	-0.134	S
H2		0.285	0.273	0.283	0.023	0.089	S
H3		0.233	0.228	0.228	0.043	0.121	S
H4		0.224	0.219	0.224	0.056	0	S
H1	Cu <i>µg/l</i>	0.245	0.220	0.237	0.085	0.099	S
H2		0.425	0.390	0.389	0.07	0.518	S
H3		0.469	0.420	0.420	0.056	0.889	S
H4		0.316	0.292	0.278	0.072	0.526	S
H1	Ni <i>µg/l</i>	0.379	0.36	0.366	0.161	0.08	S
H2		0.374	0.351	0.361	0.102	0.125	S
H3		0.225	0.21	0.228	0.113	-0.026	S
H4		0.356	0.329	0.357	0.132	-0.008	S
H1	Pb <i>µg/l</i>	0.789	0.800	0.789	0.182	0.001	S
H2		0.553	0.585	0.601	0.164	-0.293	S
H3		0.636	0.665	0.667	0.123	-0.25	S
H4		0.892	0.913	0.875	0.158	0.11	S
H1	Zn <i>µg/l</i>	5.324	3.88	4.019	0.906	1.44	Q
H2		4.08	2.73	2.934	1.013	1.131	Q
H3		5.283	3.85	4.417	1.977	0.438	Q
H4		4.953	3.65	3.781	0.92	1.274	Q

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 51, TERA Environnement (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.191	0.180	0.192	0.022	-0.049	S
H2		0.456	0.429	0.442	0.04	0.357	S
H3		0.332	0.315	0.327	0.026	0.205	S
H4		0.228	0.219	0.228	0.025	-0.002	S
H1	Cd <i>µg/l</i>	0.033	0.032	0.033	0.009	0.016	S
H2		0.03	0.023	0.027	0.007	0.367	Q
H3		0.027	0.025	0.026	0.006	0.191	S
H4		0.032	0.029	0.03	0.009	0.227	S
H1	Cr <i>µg/l</i>	0.294	0.280	0.294	0.037	0.002	S
H2		0.288	0.273	0.283	0.023	0.218	S
H3		0.229	0.228	0.228	0.043	0.028	S
H4		0.221	0.219	0.224	0.056	-0.054	S
H1	Cu <i>µg/l</i>	0.228	0.220	0.237	0.085	-0.101	S
H2		0.405	0.390	0.389	0.07	0.233	S
H3		0.429	0.420	0.420	0.056	0.17	S
H4		0.303	0.292	0.278	0.072	0.344	S
H1	Ni <i>µg/l</i>	0.375	0.36	0.366	0.161	0.055	S
H2		0.356	0.351	0.361	0.102	-0.053	S
H3		0.216	0.21	0.228	0.113	-0.105	S
H4		0.345	0.329	0.357	0.132	-0.092	S
H1	Pb <i>µg/l</i>	0.833	0.800	0.789	0.182	0.243	S
H2		0.616	0.585	0.601	0.164	0.092	S
H3		0.699	0.665	0.667	0.123	0.263	S
H4		0.943	0.913	0.875	0.158	0.433	S
H1	Zn <i>µg/l</i>	4.167	3.88	4.019	0.906	0.163	S
H2		2.976	2.73	2.934	1.013	0.042	S
H3		4.142	3.85	4.417	1.977	-0.139	S
H4		3.867	3.65	3.781	0.92	0.093	S

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S – Satisfactory: Your results deviates less than $\pm 25\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and less than $\pm 15\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

Q – Questionable: Your result deviates between $\pm 25-50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and between $\pm 15-30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

U – Unsatisfactory: Your result deviates more than $\pm 50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and more than $\pm 30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect:
<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 53, ARPA UMBRIA multisite laboratory (Italy)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.19	0.180	0.192	0.022	-0.094	S
H2		0.44	0.429	0.442	0.04	-0.041	S
H3		0.35	0.315	0.327	0.026	0.889	S
H4		0.24	0.219	0.228	0.025	0.484	S
H1	Cd <i>µg/l</i>	0.03	0.032	0.033	0.009	-0.323	S
H2		0.03	0.023	0.027	0.007	0.367	Q
H3		0.03	0.025	0.026	0.006	0.691	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.26	0.280	0.294	0.037	-0.927	S
H2		0.28	0.273	0.283	0.023	-0.126	S
H3		0.26	0.228	0.228	0.043	0.747	S
H4		0.23	0.219	0.224	0.056	0.108	S
H1	Cu <i>µg/l</i>	0.25	0.220	0.237	0.085	0.158	S
H2		0.36	0.390	0.389	0.07	-0.409	S
H3		0.41	0.420	0.420	0.056	-0.171	S
H4		0.28	0.292	0.278	0.072	0.024	S
H1	Ni <i>µg/l</i>	0.33	0.36	0.366	0.161	-0.225	S
H2		0.34	0.351	0.361	0.102	-0.21	S
H3		0.21	0.21	0.228	0.113	-0.158	S
H4		0.32	0.329	0.357	0.132	-0.281	S
H1	Pb <i>µg/l</i>	0.8	0.800	0.789	0.182	0.061	S
H2		0.57	0.585	0.601	0.164	-0.19	S
H3		0.68	0.665	0.667	0.123	0.108	S
H4		0.93	0.913	0.875	0.158	0.351	S
H1	Zn <i>µg/l</i>	3.86	3.88	4.019	0.906	-0.176	S
H2		2.69	2.73	2.934	1.013	-0.241	S
H3		4.08	3.85	4.417	1.977	-0.17	S
H4		3.92	3.65	3.781	0.92	0.151	S

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B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 54, Central Research Laboratory; Division in Lublin (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 1.000	0.180	0.192	0.022		B
H2		< 1.000	0.429	0.442	0.04		B
H3		< 1.000	0.315	0.327	0.026		B
H4		< 1.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.026	0.032	0.033	0.009	-0.774	S
H2		0.02	0.023	0.027	0.007	-0.973	S
H3		0.021	0.025	0.026	0.006	-0.808	S
H4		0.025	0.029	0.03	0.009	-0.557	S
H1	Cr <i>µg/l</i>	0.276	0.280	0.294	0.037	-0.49	S
H2		0.26	0.273	0.283	0.023	-0.984	S
H3		0.21	0.228	0.228	0.043	-0.413	S
H4		0.2	0.219	0.224	0.056	-0.43	S
H1	Cu <i>µg/l</i>	< 1.000	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 1.000	0.36	0.366	0.161		B
H2		< 1.000	0.351	0.361	0.102		B
H3		< 1.000	0.21	0.228	0.113		B
H4		< 1.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	0.944	0.800	0.789	0.182	0.854	S
H2		0.645	0.585	0.601	0.164	0.269	S
H3		0.723	0.665	0.667	0.123	0.458	S
H4		0.968	0.913	0.875	0.158	0.591	S
H1	Zn <i>µg/l</i>	3.45	3.88	4.019	0.906	-0.628	S
H2		2.23	2.73	2.934	1.013	-0.695	S
H3		3.4	3.85	4.417	1.977	-0.514	S
H4		3.17	3.65	3.781	0.92	-0.664	S

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 110, Thüringer Landesamt für Landwirtschaft und ländlichen Raum (TLLLR) (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.18	0.180	0.192	0.022	-0.545	S
H2		0.4	0.429	0.442	0.04	-1.036	S
H3		0.29	0.315	0.327	0.026	-1.39	S
H4		0.21	0.219	0.228	0.025	-0.731	S
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.097	S
H2		0.024	0.023	0.027	0.007	-0.437	S
H3		0.024	0.025	0.026	0.006	-0.309	S
H4		0.028	0.029	0.03	0.009	-0.221	S
H1	Cr <i>µg/l</i>	0.3	0.280	0.294	0.037	0.166	S
H2		0.29	0.273	0.283	0.023	0.303	S
H3		0.25	0.228	0.228	0.043	0.515	S
H4		0.23	0.219	0.224	0.056	0.108	S
H1	Cu <i>µg/l</i>	0.22	0.220	0.237	0.085	-0.195	S
H2		0.37	0.390	0.389	0.07	-0.266	S
H3		0.38	0.420	0.420	0.056	-0.711	S
H4		0.26	0.292	0.278	0.072	-0.255	S
H1	Ni <i>µg/l</i>	0.37	0.36	0.366	0.161	0.024	S
H2		0.36	0.351	0.361	0.102	-0.013	S
H3		0.22	0.21	0.228	0.113	-0.07	S
H4		0.33	0.329	0.357	0.132	-0.205	S
H1	Pb <i>µg/l</i>	0.86	0.800	0.789	0.182	0.392	S
H2		0.62	0.585	0.601	0.164	0.116	S
H3		0.72	0.665	0.667	0.123	0.434	S
H4		0.97	0.913	0.875	0.158	0.604	S
H1	Zn <i>µg/l</i>	4.03	3.88	4.019	0.906	0.012	S
H2		2.46	2.73	2.934	1.013	-0.468	S
H3		3.56	3.85	4.417	1.977	-0.433	S
H4		3.09	3.65	3.781	0.92	-0.751	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 112, Nordwestdeutsche Forstliche Versuchsanstalt (NFV) (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.209	0.180	0.192	0.022	0.763	S
H2		0.485	0.429	0.442	0.04	1.078	S
H3		0.348	0.315	0.327	0.026	0.813	S
H4		0.242	0.219	0.228	0.025	0.565	S
H1	Cd <i>µg/l</i>	0.035	0.032	0.033	0.009	0.298	S
H2		0.028	0.023	0.027	0.007	0.099	S
H3		0.027	0.025	0.026	0.006	0.191	S
H4		0.031	0.029	0.03	0.009	0.115	S
H1	Cr <i>µg/l</i>	0.292	0.280	0.294	0.037	-0.052	S
H2		0.285	0.273	0.283	0.023	0.089	S
H3		0.237	0.228	0.228	0.043	0.213	S
H4		0.228	0.219	0.224	0.056	0.063	S
H1	Cu <i>µg/l</i>	0.237	0.220	0.237	0.085	0.005	S
H2		0.404	0.390	0.389	0.07	0.211	S
H3		0.439	0.420	0.420	0.056	0.35	S
H4		0.299	0.292	0.278	0.072	0.289	S
H1	Ni <i>µg/l</i>	0.374	0.36	0.366	0.161	0.049	S
H2		0.365	0.351	0.361	0.102	0.036	S
H3		0.216	0.21	0.228	0.113	-0.105	S
H4		0.347	0.329	0.357	0.132	-0.076	S
H1	Pb <i>µg/l</i>	0.835	0.800	0.789	0.182	0.251	S
H2		0.613	0.585	0.601	0.164	0.073	S
H3		0.701	0.665	0.667	0.123	0.275	S
H4		0.951	0.913	0.875	0.158	0.483	S
H1	Zn <i>µg/l</i>	4.61	3.88	4.019	0.906	0.652	S
H2		3.28	2.73	2.934	1.013	0.342	S
H3		4.57	3.85	4.417	1.977	0.078	S
H4		4.33	3.65	3.781	0.92	0.597	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 114, C.N.R. Institute of Water Research (Italy)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 4.000	0.180	0.192	0.022		B
H2		< 4.000	0.429	0.442	0.04		B
H3		< 4.000	0.315	0.327	0.026		B
H4		< 4.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.1	0.032	0.033	0.009	7.572	U
H2		0.1	0.023	0.027	0.007	9.747	U
H3		< 0.100	0.025	0.026	0.006		B
H4		< 0.100	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 0.200	0.280	0.294	0.037	-5.3	U
H2		< 0.200	0.273	0.283	0.023	-7.85	U
H3		< 0.200	0.228	0.228	0.043	-2.965	U
H4		< 0.200	0.219	0.224	0.056	-2.223	U
H1	Cu <i>µg/l</i>	< 1.000	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	0	0.36	0.366	0.161	-2.279	U
H2		0.8	0.351	0.361	0.102	4.32	U
H3		0.6	0.21	0.228	0.113	3.298	U
H4		0.7	0.329	0.357	0.132	2.603	U
H1	Pb <i>µg/l</i>	< 0.700	0.800	0.789	0.182	-2.416	U
H2		< 0.700	0.585	0.601	0.164		B
H3		< 0.700	0.665	0.667	0.123		B
H4		< 0.700	0.913	0.875	0.158	-3.321	U
H1	Zn <i>µg/l</i>	4.1	3.88	4.019	0.906	0.089	S
H2		3	2.73	2.934	1.013	0.065	S
H3		3.9	3.85	4.417	1.977	-0.261	S
H4		3.7	3.65	3.781	0.92	-0.088	S

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* Z score in unitless

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Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect:
<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 115, Bayerische Landesanstalt für Wald- und Forstwirtschaft (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.202	0.180	0.192	0.022	0.447	S
H2		0.486	0.429	0.442	0.04	1.103	S
H3		0.351	0.315	0.327	0.026	0.927	S
H4		0.241	0.219	0.228	0.025	0.524	S
H1	Cd <i>µg/l</i>	0.037	0.032	0.033	0.009	0.467	S
H2		0.027	0.023	0.027	0.007	-0.035	S
H3		0.028	0.025	0.026	0.006	0.358	S
H4		0.032	0.029	0.03	0.009	0.227	S
H1	Cr <i>µg/l</i>	0.284	0.280	0.294	0.037	-0.271	S
H2		0.283	0.273	0.283	0.023	0.003	S
H3		0.229	0.228	0.228	0.043	0.028	S
H4		0.221	0.219	0.224	0.056	-0.054	S
H1	Cu <i>µg/l</i>	0.214	0.220	0.237	0.085	-0.266	S
H2		0.382	0.390	0.389	0.07	-0.095	S
H3		0.422	0.420	0.420	0.056	0.044	S
H4		0.286	0.292	0.278	0.072	0.107	S
H1	Ni <i>µg/l</i>	0.314	0.36	0.366	0.161	-0.324	S
H2		0.307	0.351	0.361	0.102	-0.535	S
H3		0.164	0.21	0.228	0.113	-0.566	S
H4		0.279	0.329	0.357	0.132	-0.593	S
H1	Pb <i>µg/l</i>	0.766	0.800	0.789	0.182	-0.126	S
H2		0.556	0.585	0.601	0.164	-0.275	S
H3		0.639	0.665	0.667	0.123	-0.226	S
H4		0.874	0.913	0.875	0.158	-0.004	S
H1	Zn <i>µg/l</i>	4.17	3.88	4.019	0.906	0.166	S
H2		2.92	2.73	2.934	1.013	-0.014	S
H3		4.09	3.85	4.417	1.977	-0.165	S
H4		3.85	3.65	3.781	0.92	0.075	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 117, SBS Standortserkundung/Bodenmonitoring (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.050	0.032	0.033	0.009		B
H2		< 0.050	0.023	0.027	0.007		B
H3		< 0.050	0.025	0.026	0.006		B
H4		< 0.050	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 0.700	0.280	0.294	0.037		B
H2		< 0.000	0.273	0.283	0.023	-12.141	U
H3		< 0.700	0.228	0.228	0.043		B
H4		< 0.700	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	0.18	0.220	0.237	0.085	-0.666	S
H2		0.3	0.390	0.389	0.07	-1.264	S
H3		0.31	0.420	0.420	0.056	-1.969	Q
H4		0.25	0.292	0.278	0.072	-0.395	S
H1	Ni <i>µg/l</i>	< 1.000	0.36	0.366	0.161		B
H2		< 1.400	0.351	0.361	0.102		B
H3		< 1.400	0.21	0.228	0.113		B
H4		< 1.400	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	0.94	0.800	0.789	0.182	0.832	S
H2		0.68	0.585	0.601	0.164	0.483	S
H3		0.72	0.665	0.667	0.123	0.434	S
H4		0.99	0.913	0.875	0.158	0.73	S
H1	Zn <i>µg/l</i>	< 10.000	3.88	4.019	0.906		B
H2		< 10.000	2.73	2.934	1.013		B
H3		< 10.000	3.85	4.417	1.977		B
H4		< 10.000	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 118, Forstliche Versuchs-und Forschungsanstalt (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.085	0.032	0.033	0.009	5.88	U
H2		0.085	0.023	0.027	0.007	7.737	U
H3		0.075	0.025	0.026	0.006	8.187	U
H4		0.09	0.029	0.03	0.009	6.725	U
H1	Cr <i>µg/l</i>	-999	0.280	0.294	0.037		B
H2		-999	0.273	0.283	0.023		B
H3		-999	0.228	0.228	0.043		B
H4		-999	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	-999	0.220	0.237	0.085		B
H2		-999	0.390	0.389	0.07		B
H3		-999	0.420	0.420	0.056		B
H4		-999	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	-999	0.36	0.366	0.161		B
H2		-999	0.351	0.361	0.102		B
H3		-999	0.21	0.228	0.113		B
H4		-999	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	3.6	0.800	0.789	0.182	15.478	U
H2		1.95	0.585	0.601	0.164	8.243	U
H3		2.1	0.665	0.667	0.123	11.673	U
H4		2.45	0.913	0.875	0.158	9.973	U
H1	Zn <i>µg/l</i>	9.6	3.88	4.019	0.906	6.158	U
H2		6.1	2.73	2.934	1.013	3.125	U
H3		6.75	3.85	4.417	1.977	1.181	U
H4		6.1	3.65	3.781	0.92	2.521	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 120, Landwirtschaftliche Untersuchungs- und Forschungsanstalt LUFA (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.196	0.180	0.192	0.022	0.176	S
H2		0.476	0.429	0.442	0.04	0.854	S
H3		0.338	0.315	0.327	0.026	0.433	S
H4		0.23	0.219	0.228	0.025	0.079	S
H1	Cd <i>µg/l</i>	0.03	0.032	0.033	0.009	-0.323	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.021	0.025	0.026	0.006	-0.808	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.299	0.280	0.294	0.037	0.139	S
H2		0.268	0.273	0.283	0.023	-0.641	S
H3		0.215	0.228	0.228	0.043	-0.297	S
H4		0.186	0.219	0.224	0.056	-0.681	S
H1	Cu <i>µg/l</i>	0.222	0.220	0.237	0.085	-0.172	S
H2		0.499	0.390	0.389	0.07	1.573	Q
H3		0.436	0.420	0.420	0.056	0.296	S
H4		0.287	0.292	0.278	0.072	0.121	S
H1	Ni <i>µg/l</i>	0.36	0.36	0.366	0.161	-0.038	S
H2		0.369	0.351	0.361	0.102	0.075	S
H3		0.21	0.21	0.228	0.113	-0.158	S
H4		0.35	0.329	0.357	0.132	-0.054	S
H1	Pb <i>µg/l</i>	0.805	0.800	0.789	0.182	0.089	S
H2		0.592	0.585	0.601	0.164	-0.055	S
H3		0.66	0.665	0.667	0.123	-0.055	S
H4		0.904	0.913	0.875	0.158	0.186	S
H1	Zn <i>µg/l</i>	4.23	3.88	4.019	0.906	0.233	S
H2		2.97	2.73	2.934	1.013	0.036	S
H3		4.31	3.85	4.417	1.977	-0.054	S
H4		4.03	3.65	3.781	0.92	0.271	S

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Q – Questionable: Your result deviates between $\pm 25-50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and between $\pm 15-30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

U – Unsatisfactory: Your result deviates more than $\pm 50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and more than $\pm 30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 121, Landeslabor Schleswig-Holstein (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 0.200	0.180	0.192	0.022		B
H2		0.434	0.429	0.442	0.04	-0.191	S
H3		0.321	0.315	0.327	0.026	-0.213	S
H4		0.229	0.219	0.228	0.025	0.038	S
H1	Cd <i>µg/l</i>	< 0.050	0.032	0.033	0.009		B
H2		< 0.050	0.023	0.027	0.007		B
H3		< 0.050	0.025	0.026	0.006		B
H4		< 0.050	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	0.299	0.280	0.294	0.037	0.139	S
H2		0.283	0.273	0.283	0.023	0.003	S
H3		< 0.250	0.228	0.228	0.043		B
H4		< 0.250	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	0.277	0.220	0.237	0.085	0.476	Q
H2		0.462	0.390	0.389	0.07	1.046	S
H3		0.486	0.420	0.420	0.056	1.195	S
H4		0.342	0.292	0.278	0.072	0.888	S
H1	Ni <i>µg/l</i>	0.378	0.36	0.366	0.161	0.074	S
H2		0.365	0.351	0.361	0.102	0.036	S
H3		0.218	0.21	0.228	0.113	-0.088	S
H4		0.358	0.329	0.357	0.132	0.007	S
H1	Pb <i>µg/l</i>	0.692	0.800	0.789	0.182	-0.533	S
H2		0.486	0.585	0.601	0.164	-0.703	S
H3		0.561	0.665	0.667	0.123	-0.861	S
H4		0.776	0.913	0.875	0.158	-0.624	S
H1	Zn <i>µg/l</i>	3.36	3.88	4.019	0.906	-0.727	S
H2		1.99	2.73	2.934	1.013	-0.932	Q
H3		3.28	3.85	4.417	1.977	-0.575	S
H4		3.01	3.65	3.781	0.92	-0.838	S

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 125, Bayerisches Landesamt für Umweltschutz, Augsburg (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.21	0.180	0.192	0.022	0.808	S
H2		0.454	0.429	0.442	0.04	0.307	S
H3		0.368	0.315	0.327	0.026	1.572	S
H4		0.279	0.219	0.228	0.025	2.063	Q
H1	Cd <i>µg/l</i>	0.032	0.032	0.033	0.009	-0.063	S
H2		0.027	0.023	0.027	0.007	-0.022	S
H3		0.025	0.025	0.026	0.006	-0.175	S
H4		0.032	0.029	0.03	0.009	0.216	S
H1	Cr <i>µg/l</i>	0.28	0.280	0.294	0.037	-0.38	S
H2		0.278	0.273	0.283	0.023	-0.212	S
H3		< 0.250	0.228	0.228	0.043		B
H4		< 0.250	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	0.231	0.220	0.237	0.085	-0.066	S
H2		0.407	0.390	0.389	0.07	0.261	S
H3		0.433	0.420	0.420	0.056	0.242	S
H4		0.3	0.292	0.278	0.072	0.303	S
H1	Ni <i>µg/l</i>	0.363	0.36	0.366	0.161	-0.019	S
H2		0.364	0.351	0.361	0.102	0.026	S
H3		0.216	0.21	0.228	0.113	-0.105	S
H4		0.326	0.329	0.357	0.132	-0.236	S
H1	Pb <i>µg/l</i>	0.785	0.800	0.789	0.182	-0.021	S
H2		0.601	0.585	0.601	0.164	0	S
H3		0.679	0.665	0.667	0.123	0.1	S
H4		0.945	0.913	0.875	0.158	0.445	S
H1	Zn <i>µg/l</i>	4.17	3.88	4.019	0.906	0.166	S
H2		3.15	2.73	2.934	1.013	0.213	S
H3		4.19	3.85	4.417	1.977	-0.115	S
H4		3.85	3.65	3.781	0.92	0.075	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 129, Ecole Nationale d'Ingenieurs de Sfax (Tunisia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.1	0.180	0.192	0.022	-4.152	Q
H2		0.58	0.429	0.442	0.04	3.442	Q
H3		0.413	0.315	0.327	0.026	3.281	Q
H4		0.225	0.219	0.228	0.025	-0.124	S
H1	Cd <i>µg/l</i>	0.027	0.032	0.033	0.009	-0.661	S
H2		0.027	0.023	0.027	0.007	-0.035	S
H3		0.021	0.025	0.026	0.006	-0.808	S
H4		0.007	0.029	0.03	0.009	-2.574	U
H1	Cr <i>µg/l</i>	0.364	0.280	0.294	0.037	1.916	Q
H2		0.277	0.273	0.283	0.023	-0.254	S
H3		0.202	0.228	0.228	0.043	-0.599	S
H4		0.228	0.219	0.224	0.056	0.072	S
H1	Cu <i>µg/l</i>	< 0.005	0.220	0.237	0.085	-2.757	U
H2		< 0.005	0.390	0.389	0.07	-5.507	U
H3		< 0.005	0.420	0.420	0.056	-7.498	U
H4		< 0.005	0.292	0.278	0.072	-3.847	U
H1	Ni <i>µg/l</i>	0.081	0.36	0.366	0.161	-1.775	U
H2		0.15	0.351	0.361	0.102	-2.081	U
H3		< 0.007	0.21	0.228	0.113	-1.989	U
H4		0.12	0.329	0.357	0.132	-1.8	U
H1	Pb <i>µg/l</i>	0.694	0.800	0.789	0.182	-0.522	S
H2		0.441	0.585	0.601	0.164	-0.978	S
H3		0.553	0.665	0.667	0.123	-0.926	S
H4		0.763	0.913	0.875	0.158	-0.707	S
H1	Zn <i>µg/l</i>	1.68	3.88	4.019	0.906	-2.581	U
H2		0.6	2.73	2.934	1.013	-2.304	U
H3		2.691	3.85	4.417	1.977	-0.873	Q
H4		1.788	3.65	3.781	0.92	-2.166	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 145, Estonian Environmental Research Centre, Tartu laboratory (Estonia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.172	0.180	0.192	0.022	-0.906	S
H2		0.422	0.429	0.442	0.04	-0.489	S
H3		0.297	0.315	0.327	0.026	-1.124	S
H4		0.211	0.219	0.228	0.025	-0.691	S
H1	Cd <i>µg/l</i>	0.033	0.032	0.033	0.009	-0.041	S
H2		0.026	0.023	0.027	0.007	-0.142	S
H3		0.024	0.025	0.026	0.006	-0.309	S
H4		0.028	0.029	0.03	0.009	-0.243	S
H1	Cr <i>µg/l</i>	0.275	0.280	0.294	0.037	-0.517	S
H2		0.278	0.273	0.283	0.023	-0.212	S
H3		0.227	0.228	0.228	0.043	-0.019	S
H4		0.215	0.219	0.224	0.056	-0.161	S
H1	Cu <i>µg/l</i>	0.219	0.220	0.237	0.085	-0.207	S
H2		0.376	0.390	0.389	0.07	-0.181	S
H3		0.429	0.420	0.420	0.056	0.17	S
H4		0.288	0.292	0.278	0.072	0.135	S
H1	Ni <i>µg/l</i>	0.363	0.36	0.366	0.161	-0.019	S
H2		0.355	0.351	0.361	0.102	-0.063	S
H3		0.225	0.21	0.228	0.113	-0.026	S
H4		0.338	0.329	0.357	0.132	-0.145	S
H1	Pb <i>µg/l</i>	0.814	0.800	0.789	0.182	0.138	S
H2		0.599	0.585	0.601	0.164	-0.012	S
H3		0.649	0.665	0.667	0.123	-0.144	S
H4		0.915	0.913	0.875	0.158	0.256	S
H1	Zn <i>µg/l</i>	3.81	3.88	4.019	0.906	-0.231	S
H2		2.75	2.73	2.934	1.013	-0.182	S
H3		3.79	3.85	4.417	1.977	-0.317	S
H4		3.56	3.65	3.781	0.92	-0.24	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 146, Luxembourg Institute of Science and Technology (LIST) (Luxembourg)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		0.402	0.429	0.442	0.04	-0.987	S
H3		0.304	0.315	0.327	0.026	-0.858	S
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	0.04	0.032	0.033	0.009	0.805	S
H2		0.03	0.023	0.027	0.007	0.367	Q
H3		0.035	0.025	0.026	0.006	1.524	Q
H4		0.039	0.029	0.03	0.009	1.011	Q
H1	Cr <i>µg/l</i>	0.275	0.280	0.294	0.037	-0.517	S
H2		0.262	0.273	0.283	0.023	-0.898	S
H3		0.205	0.228	0.228	0.043	-0.529	S
H4		0.197	0.219	0.224	0.056	-0.484	S
H1	Cu <i>µg/l</i>	0.246	0.220	0.237	0.085	0.111	S
H2		0.401	0.390	0.389	0.07	0.176	S
H3		0.445	0.420	0.420	0.056	0.458	S
H4		0.3	0.292	0.278	0.072	0.303	S
H1	Ni <i>µg/l</i>	0.372	0.36	0.366	0.161	0.037	S
H2		0.361	0.351	0.361	0.102	-0.003	S
H3		0.211	0.21	0.228	0.113	-0.15	S
H4		0.33	0.329	0.357	0.132	-0.205	S
H1	Pb <i>µg/l</i>	0.842	0.800	0.789	0.182	0.293	S
H2		0.616	0.585	0.601	0.164	0.092	S
H3		0.667	0.665	0.667	0.123	0.002	S
H4		0.899	0.913	0.875	0.158	0.154	S
H1	Zn <i>µg/l</i>	4.417	3.88	4.019	0.906	0.439	S
H2		2.968	2.73	2.934	1.013	0.034	S
H3		4.013	3.85	4.417	1.977	-0.204	S
H4		3.805	3.65	3.781	0.92	0.026	S

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* Z score in unitless

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Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect:
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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 166, Forest Research Institute, Laboratory of Natural Environment Chemistry (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.500	0.032	0.033	0.009		B
H2		< 0.500	0.023	0.027	0.007		B
H3		< 0.500	0.025	0.026	0.006		B
H4		< 0.500	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	-999	0.280	0.294	0.037		B
H2		-999	0.273	0.283	0.023		B
H3		-999	0.228	0.228	0.043		B
H4		-999	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 9.000	0.220	0.237	0.085		B
H2		< 9.000	0.390	0.389	0.07		B
H3		< 9.000	0.420	0.420	0.056		B
H4		< 9.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	-999	0.36	0.366	0.161		B
H2		-999	0.351	0.361	0.102		B
H3		-999	0.21	0.228	0.113		B
H4		-999	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 10.000	0.800	0.789	0.182		B
H2		< 10.000	0.585	0.601	0.164		B
H3		< 10.000	0.665	0.667	0.123		B
H4		< 10.000	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	4.112	3.88	4.019	0.906	0.102	S
H2		3.189	2.73	2.934	1.013	0.252	S
H3		4.201	3.85	4.417	1.977	-0.109	S
H4		3.931	3.65	3.781	0.92	0.163	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 169, Lancaster Environment Centre, Centre for Ecology and Hydrology (United Kingdom)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.157	0.180	0.192	0.022	-1.582	S
H2		0.444	0.429	0.442	0.04	0.058	S
H3		0.303	0.315	0.327	0.026	-0.896	S
H4		0.192	0.219	0.228	0.025	-1.46	S
H1	Cd <i>µg/l</i>	0.03	0.032	0.033	0.009	-0.323	S
H2		0.025	0.023	0.027	0.007	-0.303	S
H3		0.024	0.025	0.026	0.006	-0.309	S
H4		0.03	0.029	0.03	0.009	0.003	S
H1	Cr <i>µg/l</i>	0.322	0.280	0.294	0.037	0.768	S
H2		0.315	0.273	0.283	0.023	1.376	S
H3		0.287	0.228	0.228	0.043	1.373	Q
H4		0.285	0.219	0.224	0.056	1.094	Q
H1	Cu <i>µg/l</i>	0.232	0.220	0.237	0.085	-0.054	S
H2		0.404	0.390	0.389	0.07	0.219	S
H3		0.432	0.420	0.420	0.056	0.224	S
H4		0.282	0.292	0.278	0.072	0.052	S
H1	Ni <i>µg/l</i>	0.35	0.36	0.366	0.161	-0.1	S
H2		0.37	0.351	0.361	0.102	0.085	S
H3		0.199	0.21	0.228	0.113	-0.256	S
H4		0.339	0.329	0.357	0.132	-0.137	S
H1	Pb <i>µg/l</i>	0.811	0.800	0.789	0.182	0.122	S
H2		0.603	0.585	0.601	0.164	0.012	S
H3		0.68	0.665	0.667	0.123	0.108	S
H4		0.931	0.913	0.875	0.158	0.357	S
H1	Zn <i>µg/l</i>	4.07	3.88	4.019	0.906	0.056	S
H2		2.89	2.73	2.934	1.013	-0.043	S
H3		4.1	3.85	4.417	1.977	-0.16	S
H4		3.7	3.65	3.781	0.92	-0.088	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 171, IMT Nord Europe (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.16	0.180	0.192	0.022	-1.429	S
H2		0.387	0.429	0.442	0.04	-1.357	S
H3		0.286	0.315	0.327	0.026	-1.549	S
H4		0.202	0.219	0.228	0.025	-1.059	S
H1	Cd <i>µg/l</i>	0.031	0.032	0.033	0.009	-0.176	S
H2		0.025	0.023	0.027	0.007	-0.33	S
H3		0.024	0.025	0.026	0.006	-0.392	S
H4		0.029	0.029	0.03	0.009	-0.053	S
H1	Cr <i>µg/l</i>	0.271	0.280	0.294	0.037	-0.629	S
H2		0.276	0.273	0.283	0.023	-0.293	S
H3		0.218	0.228	0.228	0.043	-0.22	S
H4		0.21	0.219	0.224	0.056	-0.249	S
H1	Cu <i>µg/l</i>	0.222	0.220	0.237	0.085	-0.169	S
H2		0.381	0.390	0.389	0.07	-0.107	S
H3		0.414	0.420	0.420	0.056	-0.092	S
H4		0.317	0.292	0.278	0.072	0.54	S
H1	Ni <i>µg/l</i>	0.347	0.36	0.366	0.161	-0.117	S
H2		0.338	0.351	0.361	0.102	-0.233	S
H3		0.203	0.21	0.228	0.113	-0.217	S
H4		0.351	0.329	0.357	0.132	-0.047	S
H1	Pb <i>µg/l</i>	0.773	0.800	0.789	0.182	-0.088	S
H2		0.57	0.585	0.601	0.164	-0.188	S
H3		0.653	0.665	0.667	0.123	-0.108	S
H4		0.894	0.913	0.875	0.158	0.124	S
H1	Zn <i>µg/l</i>	3.529	3.88	4.019	0.906	-0.541	S
H2		2.494	2.73	2.934	1.013	-0.434	S
H3		3.516	3.85	4.417	1.977	-0.456	S
H4		3.542	3.65	3.781	0.92	-0.26	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 179, Environmental Pollution Monitoring Center (Russian Federation)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.200	0.032	0.033	0.009		B
H2		< 0.200	0.023	0.027	0.007		B
H3		< 0.200	0.025	0.026	0.006		B
H4		< 0.200	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 1.000	0.280	0.294	0.037		B
H2		< 1.000	0.273	0.283	0.023		B
H3		< 1.000	0.228	0.228	0.043		B
H4		< 1.000	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 1.000	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 5.000	0.36	0.366	0.161		B
H2		< 5.000	0.351	0.361	0.102		B
H3		< 5.000	0.21	0.228	0.113		B
H4		< 5.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 2.000	0.800	0.789	0.182		B
H2		< 2.000	0.585	0.601	0.164		B
H3		< 2.000	0.665	0.667	0.123		B
H4		< 2.000	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	10.82	3.88	4.019	0.906	7.504	U
H2		8.87	2.73	2.934	1.013	5.86	U
H3		10.68	3.85	4.417	1.977	3.169	U
H4		8.99	3.65	3.781	0.92	5.662	U

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Q – Questionable: Your result deviates between $\pm 25-50\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $< 1 \mu\text{g/l}$, Cd $< 0,5 \mu\text{g/l}$, Zn $< 10 \mu\text{g/l}$ and Cu $< 2 \mu\text{g/l}$ and between $\pm 15-30\%$ of the expected value for theoretical values of Pb, Ni, Cr and As $> 1 \mu\text{g/l}$, Cd $> 0,5 \mu\text{g/l}$, Zn $> 10 \mu\text{g/l}$ and Cu $> 2 \mu\text{g/l}$

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B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 183, Public health institute Uzice (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	-999	0.180	0.192	0.022		B
H2		-999	0.429	0.442	0.04		B
H3		-999	0.315	0.327	0.026		B
H4		-999	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	-999	0.032	0.033	0.009		B
H2		-999	0.023	0.027	0.007		B
H3		-999	0.025	0.026	0.006		B
H4		-999	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	0.344	0.280	0.294	0.037	1.369	S
H2		0.312	0.273	0.283	0.023	1.247	S
H3		0.262	0.228	0.228	0.043	0.793	S
H4		0.27	0.219	0.224	0.056	0.825	S
H1	Cu <i>µg/l</i>	0.248	0.220	0.237	0.085	0.135	S
H2		0.416	0.390	0.389	0.07	0.39	S
H3		0.428	0.420	0.420	0.056	0.152	S
H4		0.278	0.292	0.278	0.072	-0.004	S
H1	Ni <i>µg/l</i>	0.4	0.36	0.366	0.161	0.211	S
H2		0.371	0.351	0.361	0.102	0.095	S
H3		0.228	0.21	0.228	0.113	0.001	S
H4		0.363	0.329	0.357	0.132	0.045	S
H1	Pb <i>µg/l</i>	-999	0.800	0.789	0.182		B
H2		-999	0.585	0.601	0.164		B
H3		-999	0.665	0.667	0.123		B
H4		-999	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	4.7	3.88	4.019	0.906	0.751	S
H2		3.03	2.73	2.934	1.013	0.095	S
H3		4.17	3.85	4.417	1.977	-0.125	S
H4		3.98	3.65	3.781	0.92	0.216	S

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* Z score in unitless

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B – Blank: You reported either no value or the detection limit

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 185, Public Health Centre - Cacak, Department for Sanitary Chemistry and Ecotoxicology (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 2.000	0.180	0.192	0.022		B
H2		< 2.000	0.429	0.442	0.04		B
H3		< 2.000	0.315	0.327	0.026		B
H4		< 2.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.100	0.032	0.033	0.009		B
H2		< 0.100	0.023	0.027	0.007		B
H3		< 0.100	0.025	0.026	0.006		B
H4		< 0.100	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	-999	0.280	0.294	0.037		B
H2		-999	0.273	0.283	0.023		B
H3		-999	0.228	0.228	0.043		B
H4		-999	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	-999	0.220	0.237	0.085		B
H2		-999	0.390	0.389	0.07		B
H3		-999	0.420	0.420	0.056		B
H4		-999	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 4.000	0.36	0.366	0.161		B
H2		< 4.000	0.351	0.361	0.102		B
H3		< 4.000	0.21	0.228	0.113		B
H4		< 4.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 3.000	0.800	0.789	0.182		B
H2		< 3.000	0.585	0.601	0.164		B
H3		< 3.000	0.665	0.667	0.123		B
H4		< 3.000	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	-999	3.88	4.019	0.906		B
H2		-999	2.73	2.934	1.013		B
H3		-999	3.85	4.417	1.977		B
H4		-999	3.65	3.781	0.92		B

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 187, Public Health Institute - Nis, Department for Sanitary Chemistry (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.189	0.180	0.192	0.022	-0.139	S
H2		0.379	0.429	0.442	0.04	-1.559	S
H3		0.3	0.315	0.327	0.026	-1.01	S
H4		0.189	0.219	0.228	0.025	-1.581	S
H1	Cd <i>µg/l</i>	0.015	0.032	0.033	0.009	-2.014	U
H2		0.07	0.023	0.027	0.007	5.727	U
H3		0.018	0.025	0.026	0.006	-1.308	Q
H4		0.069	0.029	0.03	0.009	4.372	U
H1	Cr <i>µg/l</i>	0.256	0.280	0.294	0.037	-1.036	S
H2		0.315	0.273	0.283	0.023	1.376	S
H3		0.3	0.228	0.228	0.043	1.675	Q
H4		0.27	0.219	0.224	0.056	0.825	S
H1	Cu <i>µg/l</i>	0.356	0.220	0.237	0.085	1.407	U
H2		0.415	0.390	0.389	0.07	0.375	S
H3		0.51	0.420	0.420	0.056	1.626	S
H4		0.388	0.292	0.278	0.072	1.53	Q
H1	Ni <i>µg/l</i>	1.91	0.36	0.366	0.161	9.611	U
H2		1.998	0.351	0.361	0.102	16.117	U
H3		1.43	0.21	0.228	0.113	10.656	U
H4		1.898	0.329	0.357	0.132	11.698	U
H1	Pb <i>µg/l</i>	0.823	0.800	0.789	0.182	0.188	S
H2		0.6	0.585	0.601	0.164	-0.006	S
H3		0.699	0.665	0.667	0.123	0.263	S
H4		0.952	0.913	0.875	0.158	0.49	S
H1	Zn <i>µg/l</i>	4.293	3.88	4.019	0.906	0.302	S
H2		2.879	2.73	2.934	1.013	-0.054	S
H3		4.498	3.85	4.417	1.977	0.041	S
H4		3.578	3.65	3.781	0.92	-0.221	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 193, Institute of Public Health of Vojvodina (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	0.21	0.180	0.192	0.022	0.808	S
H2		0.448	0.429	0.442	0.04	0.158	S
H3		0.341	0.315	0.327	0.026	0.547	S
H4		0.204	0.219	0.228	0.025	-0.974	S
H1	Cd <i>µg/l</i>	< 0.040	0.032	0.033	0.009		B
H2		< 0.040	0.023	0.027	0.007		B
H3		< 0.040	0.025	0.026	0.006		B
H4		< 0.040	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 0.400	0.280	0.294	0.037		B
H2		< 0.400	0.273	0.283	0.023		B
H3		< 0.400	0.228	0.228	0.043		B
H4		< 0.400	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	0.369	0.220	0.237	0.085	1.56	U
H2		0.433	0.390	0.389	0.07	0.632	S
H3		0.469	0.420	0.420	0.056	0.889	S
H4		0.401	0.292	0.278	0.072	1.711	Q
H1	Ni <i>µg/l</i>	-999	0.36	0.366	0.161		B
H2		-999	0.351	0.361	0.102		B
H3		-999	0.21	0.228	0.113		B
H4		-999	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 1.000	0.800	0.789	0.182		B
H2		< 1.000	0.585	0.601	0.164		B
H3		< 1.000	0.665	0.667	0.123		B
H4		1	0.913	0.875	0.158	0.794	S
H1	Zn <i>µg/l</i>	4.283	3.88	4.019	0.906	0.291	S
H2		3.652	2.73	2.934	1.013	0.709	Q
H3		4.514	3.85	4.417	1.977	0.049	S
H4		3.902	3.65	3.781	0.92	0.132	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 203, The Public Health Institute Vranje (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 1.000	0.180	0.192	0.022		B
H2		< 1.000	0.429	0.442	0.04		B
H3		< 1.000	0.315	0.327	0.026		B
H4		< 1.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.100	0.032	0.033	0.009		B
H2		< 0.100	0.023	0.027	0.007		B
H3		< 0.100	0.025	0.026	0.006		B
H4		< 0.100	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 1.000	0.280	0.294	0.037		B
H2		< 1.000	0.273	0.283	0.023		B
H3		< 1.000	0.228	0.228	0.043		B
H4		< 1.000	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 1.000	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 2.000	0.36	0.366	0.161		B
H2		< 2.000	0.351	0.361	0.102		B
H3		< 2.000	0.21	0.228	0.113		B
H4		< 2.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 1.000	0.800	0.789	0.182		B
H2		< 1.000	0.585	0.601	0.164		B
H3		< 1.000	0.665	0.667	0.123		B
H4		< 1.000	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	< 10.000	3.88	4.019	0.906		B
H2		< 10.000	2.73	2.934	1.013		B
H3		< 10.000	3.85	4.417	1.977		B
H4		< 10.000	3.65	3.781	0.92		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 207, IRMB - Institute of Mining and Metallurgy Bor (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 1.000	0.180	0.192	0.022		B
H2		< 1.000	0.429	0.442	0.04		B
H3		< 1.000	0.315	0.327	0.026		B
H4		< 1.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.100	0.032	0.033	0.009		B
H2		< 0.100	0.023	0.027	0.007		B
H3		< 0.100	0.025	0.026	0.006		B
H4		< 0.100	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 1.000	0.280	0.294	0.037		B
H2		< 1.000	0.273	0.283	0.023		B
H3		< 1.000	0.228	0.228	0.043		B
H4		< 1.000	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 1.000	0.220	0.237	0.085		B
H2		< 1.000	0.390	0.389	0.07		B
H3		< 1.000	0.420	0.420	0.056		B
H4		< 1.000	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 1.000	0.36	0.366	0.161		B
H2		< 1.000	0.351	0.361	0.102		B
H3		< 1.000	0.21	0.228	0.113		B
H4		< 1.000	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 5.000	0.800	0.789	0.182		B
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H2		< 5.000	2.73	2.934	1.013		B
H3		< 5.000	3.85	4.417	1.977		B
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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 208, VINCA - Vinca Institute of Nuclear Sciences (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 2.500	0.180	0.192	0.022		B
H2		< 2.500	0.429	0.442	0.04		B
H3		< 2.500	0.315	0.327	0.026		B
H4		< 2.500	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.500	0.032	0.033	0.009		B
H2		< 0.500	0.023	0.027	0.007		B
H3		< 0.500	0.025	0.026	0.006		B
H4		< 0.500	0.029	0.03	0.009		B
H1	Cr <i>µg/l</i>	< 1.500	0.280	0.294	0.037		B
H2		< 1.500	0.273	0.283	0.023		B
H3		< 1.500	0.228	0.228	0.043		B
H4		< 1.500	0.219	0.224	0.056		B
H1	Cu <i>µg/l</i>	< 1.500	0.220	0.237	0.085		B
H2		< 1.500	0.390	0.389	0.07		B
H3		< 1.500	0.420	0.420	0.056		B
H4		< 1.500	0.292	0.278	0.072		B
H1	Ni <i>µg/l</i>	< 0.600	0.36	0.366	0.161		B
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H3		< 0.600	0.21	0.228	0.113		B
H4		< 0.600	0.329	0.357	0.132		B
H1	Pb <i>µg/l</i>	< 5.100	0.800	0.789	0.182		B
H2		< 5.100	0.585	0.601	0.164		B
H3		< 5.100	0.665	0.667	0.123		B
H4		< 5.100	0.913	0.875	0.158		B
H1	Zn <i>µg/l</i>	< 2.500	3.88	4.019	0.906	-3.055	U
H2		< 2.500	2.73	2.934	1.013	-1.662	U
H3		< 2.500	3.85	4.417	1.977	-1.602	U
H4		< 2.500	3.65	3.781	0.92	-2.751	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2022

Laboratory 209, PHIB - Public Health Institute of Belgrade (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ^x
H1	As <i>µg/l</i>	< 1.000	0.180	0.192	0.022		B
H2		< 1.000	0.429	0.442	0.04		B
H3		< 1.000	0.315	0.327	0.026		B
H4		< 1.000	0.219	0.228	0.025		B
H1	Cd <i>µg/l</i>	< 0.100	0.032	0.033	0.009		B
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H1	Cr <i>µg/l</i>	< 1.000	0.280	0.294	0.037		B
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H4		< 1.000	0.329	0.357	0.132		B
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H2		1.1	0.585	0.601	0.164	3.049	U
H3		1.2	0.665	0.667	0.123	4.343	U
H4		1.7	0.913	0.875	0.158	5.225	U
H1	Zn <i>µg/l</i>	< 5.000	3.88	4.019	0.906		B
H2		< 5.000	2.73	2.934	1.013		B
H3		< 5.000	3.85	4.417	1.977		B
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