

EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 3, Czech Hydrometeorological Institute, Praha (Czech Republic)

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 µg/l	0.126	0.1	0.105	0.025	0.832	Q
H2		0.188	0.15	0.159	0.028	1.055	Q
H3		0.245	0.2	0.199	0.05	0.936	S
H4		0.329	0.3	0.304	0.059	0.42	S
H1	Cd µg/l	0.041	0.035	0.035	0.005	1.171	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.065	0.06	0.059	0.007	0.852	S
H4		0.081	0.07	0.071	0.009	1.072	S
H1	Cr µg/l	0.091	0.1	0.107	0.026	-0.605	S
H2		0.137	0.15	0.157	0.023	-0.859	S
H3		0.277	0.3	0.296	0.036	-0.518	S
H4		0.374	0.4	0.405	0.028	-1.098	S
H1	Cu µg/l	0.672	0.7	0.694	0.056	-0.389	S
H2		0.85	0.9	0.883	0.1	-0.327	S
H3		1.021	1.1	1.103	0.106	-0.769	S
H4		1.169	1.2	1.164	0.26	0.019	S
H1	Ni µg/l	0.417	0.4	0.383	0.064	0.535	S
H2		0.504	0.5	0.485	0.049	0.391	S
H3		0.703	0.7	0.687	0.074	0.22	S
H4		0.813	0.8	0.807	0.059	0.108	S
H1	Pb µg/l	0.421	0.45	0.425	0.082	-0.043	S
H2		0.526	0.55	0.519	0.09	0.083	S
H3		0.771	0.8	0.792	0.09	-0.232	S
H4		0.859	0.9	0.869	0.118	-0.083	S
H1	Zn µg/l	7.978	6	6.029	0.759	2.567	Q
H2		9.248	7	7.121	0.852	2.498	Q
H3		10.43	8	8.333	1.015	2.065	Q
H4		11.81	9	9.25	0.981	2.609	Q

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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; the letters in the column indicates:

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 2019

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 µg/l	0.1	0.1	0.105	0.025	-0.194	S
H2		0.148	0.15	0.159	0.028	-0.38	S
H3		0.197	0.2	0.199	0.05	-0.034	S
H4		0.275	0.3	0.304	0.059	-0.5	S
H1	Cd µg/l	< 0.040	0.035	0.035	0.005		B
H2		0.044	0.045	0.045	0.006	-0.094	S
H3		0.058	0.06	0.059	0.007	-0.155	S
H4		0.067	0.07	0.071	0.009	-0.5	S
H1	Cr µg/l	0.129	0.1	0.107	0.026	0.834	Q
H2		0.182	0.15	0.157	0.023	1.121	S
H3		0.34	0.3	0.296	0.036	1.211	S
H4		0.442	0.4	0.405	0.028	1.31	S
H1	Cu µg/l	0.83	0.7	0.694	0.056	2.411	S
H2		1.04	0.9	0.883	0.1	1.571	S
H3		1.275	1.1	1.103	0.106	1.619	S
H4		1.38	1.2	1.164	0.26	0.83	S
H1	Ni µg/l	0.361	0.4	0.383	0.064	-0.345	S
H2		0.45	0.5	0.485	0.049	-0.707	S
H3		0.592	0.7	0.687	0.074	-1.285	S
H4		0.678	0.8	0.807	0.059	-2.168	S
H1	Pb µg/l	0.41	0.45	0.425	0.082	-0.178	S
H2		0.505	0.55	0.519	0.09	-0.15	S
H3		0.725	0.8	0.792	0.09	-0.742	S
H4		0.82	0.9	0.869	0.118	-0.413	S
H1	Zn µg/l	5.82	6	6.029	0.759	-0.275	S
H2		8.465	7	7.121	0.852	1.578	S
H3		9.8	8	8.333	1.015	1.445	S
H4		11.075	9	9.25	0.981	1.86	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 2019

Laboratory 5, Finnish Meteorological Institute. Air Quality Department (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 µg/l	0.101	0.1	0.105	0.025	-0.166	S
H2		0.154	0.15	0.159	0.028	-0.175	S
H3		0.196	0.2	0.199	0.05	-0.064	S
H4		0.313	0.3	0.304	0.059	0.148	S
H1	Cd µg/l	0.035	0.035	0.035	0.005	0.109	S
H2		0.044	0.045	0.045	0.006	-0.141	S
H3		0.062	0.06	0.059	0.007	0.449	S
H4		0.074	0.07	0.071	0.009	0.297	S
H1	Cr µg/l	0.1	0.1	0.107	0.026	-0.279	S
H2		0.148	0.15	0.157	0.023	-0.393	S
H3		0.304	0.3	0.296	0.036	0.22	S
H4		0.407	0.4	0.405	0.028	0.088	S
H1	Cu µg/l	0.713	0.7	0.694	0.056	0.332	S
H2		0.903	0.9	0.883	0.1	0.201	S
H3		1.105	1.1	1.103	0.106	0.023	S
H4		1.21	1.2	1.164	0.26	0.175	S
H1	Ni µg/l	0.403	0.4	0.383	0.064	0.317	S
H2		0.517	0.5	0.485	0.049	0.651	S
H3		0.71	0.7	0.687	0.074	0.31	S
H4		0.832	0.8	0.807	0.059	0.432	S
H1	Pb µg/l	0.463	0.45	0.425	0.082	0.468	S
H2		0.559	0.55	0.519	0.09	0.446	S
H3		0.814	0.8	0.792	0.09	0.249	S
H4		0.91	0.9	0.869	0.118	0.35	S
H1	Zn µg/l	6.269	6	6.029	0.759	0.317	S
H2		7.317	7	7.121	0.852	0.231	S
H3		8.333	8	8.333	1.015	0	S
H4		10.873	9	9.25	0.981	1.654	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 $> 2 \mu\text{g/l}$

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 6, SGS Multilab (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 $\mu\text{g/l}$	< 0.200	0.1	0.105	0.025		B
H2		< 0.200	0.15	0.159	0.028		B
H3		0.24	0.2	0.199	0.05	0.835	S
H4		0.37	0.3	0.304	0.059	1.119	S
H1	Cd $\mu\text{g/l}$	0.04	0.035	0.035	0.005	0.978	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.07	0.06	0.059	0.007	1.571	S
H4		0.09	0.07	0.071	0.009	2.083	Q
H1	Cr $\mu\text{g/l}$	< 0.400	0.1	0.107	0.026		B
H2		< 0.400	0.15	0.157	0.023		B
H3		< 0.400	0.3	0.296	0.036		B
H4		0.41	0.4	0.405	0.028	0.177	S
H1	Cu $\mu\text{g/l}$	0.72	0.7	0.694	0.056	0.462	S
H2		0.93	0.9	0.883	0.1	0.472	S
H3		1.17	1.1	1.103	0.106	0.631	S
H4		2.06	1.2	1.164	0.26	3.445	U
H1	Ni $\mu\text{g/l}$	< 0.400	0.4	0.383	0.064	-2.874	Q
H2		0.46	0.5	0.485	0.049	-0.503	S
H3		0.7	0.7	0.687	0.074	0.179	S
H4		0.88	0.8	0.807	0.059	1.237	S
H1	Pb $\mu\text{g/l}$	0.36	0.45	0.425	0.082	-0.787	S
H2		0.46	0.55	0.519	0.09	-0.651	S
H3		0.71	0.8	0.792	0.09	-0.909	S
H4		0.83	0.9	0.869	0.118	-0.328	S
H1	Zn $\mu\text{g/l}$	7.73	6	6.029	0.759	2.24	Q
H2		8.94	7	7.121	0.852	2.136	Q
H3		11.42	8	8.333	1.015	3.04	Q
H4		13.87	9	9.25	0.981	4.709	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 7, synlab Umweltinstitut GmbH, Niederlassung Leipzig (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 µg/l	< 0.700	0.1	0.105	0.025		B
H2		< 0.700	0.15	0.159	0.028		B
H3		< 0.700	0.2	0.199	0.05		B
H4		< 0.700	0.3	0.304	0.059		B
H1	Cd µg/l	< 0.042	0.035	0.035	0.005		B
H2		< 0.042	0.045	0.045	0.006	-3.65	U
H3		0.045	0.06	0.059	0.007	-2.025	S
H4		0.053	0.07	0.071	0.009	-2.072	S
H1	Cr µg/l	< 0.470	0.1	0.107	0.026		B
H2		< 0.470	0.15	0.157	0.023		B
H3		< 0.470	0.3	0.296	0.036		B
H4		< 0.470	0.4	0.405	0.028		B
H1	Cu µg/l	< 0.530	0.7	0.694	0.056	-7.601	U
H2		0.68	0.9	0.883	0.1	-2.025	S
H3		0.89	1.1	1.103	0.106	-2.001	S
H4		0.93	1.2	1.164	0.26	-0.901	S
H1	Ni µg/l	< 0.890	0.4	0.383	0.064		B
H2		< 0.890	0.5	0.485	0.049		B
H3		< 0.890	0.7	0.687	0.074		B
H4		< 0.890	0.8	0.807	0.059		B
H1	Pb µg/l	< 0.780	0.45	0.425	0.082		B
H2		< 0.780	0.55	0.519	0.09		B
H3		< 0.780	0.8	0.792	0.09	-4.456	U
H4		< 0.780	0.9	0.869	0.118	-4.049	U
H1	Zn µg/l	5.91	6	6.029	0.759	-0.156	S
H2		6.65	7	7.121	0.852	-0.553	S
H3		7.89	8	8.333	1.015	-0.436	S
H4		8.49	9	9.25	0.981	-0.774	S

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* Z score in unitless

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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 $> 2 \mu\text{g/l}$

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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 2019

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 $\mu\text{g/l}$	0.094	0.1	0.105	0.025	-0.43	S
H2		0.14	0.15	0.159	0.028	-0.667	S
H3		0.192	0.2	0.199	0.05	-0.135	S
H4		0.285	0.3	0.304	0.059	-0.33	S
H1	Cd $\mu\text{g/l}$	0.033	0.035	0.035	0.005	-0.374	S
H2		0.041	0.045	0.045	0.006	-0.558	S
H3		0.058	0.06	0.059	0.007	-0.155	S
H4		0.063	0.07	0.071	0.009	-0.949	S
H1	Cr $\mu\text{g/l}$	0.084	0.1	0.107	0.026	-0.87	S
H2		0.135	0.15	0.157	0.023	-0.947	S
H3		0.276	0.3	0.296	0.036	-0.545	S
H4		0.387	0.4	0.405	0.028	-0.638	S
H1	Cu $\mu\text{g/l}$	0.667	0.7	0.694	0.056	-0.478	S
H2		0.844	0.9	0.883	0.1	-0.387	S
H3		1.047	1.1	1.103	0.106	-0.525	S
H4		1.162	1.2	1.164	0.26	-0.008	S
H1	Ni $\mu\text{g/l}$	0.389	0.4	0.383	0.064	0.095	S
H2		0.472	0.5	0.485	0.049	-0.26	S
H3		0.65	0.7	0.687	0.074	-0.498	S
H4		0.749	0.8	0.807	0.059	-0.971	S
H1	Pb $\mu\text{g/l}$	0.447	0.45	0.425	0.082	0.273	S
H2		0.533	0.55	0.519	0.09	0.161	S
H3		0.763	0.8	0.792	0.09	-0.321	S
H4		0.872	0.9	0.869	0.118	0.027	S
H1	Zn $\mu\text{g/l}$	6.038	6	6.029	0.759	0.012	S
H2		6.803	7	7.121	0.852	-0.373	S
H3		7.782	8	8.333	1.015	-0.542	S
H4		8.993	9	9.25	0.981	-0.261	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 10, Institute for Atmospheric Physics (Hungary)

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 $\mu\text{g/l}$	0.814	0.1	0.105	0.025	27.969	U
H2		< 0.650	0.15	0.159	0.028		B
H3		0.683	0.2	0.199	0.05	9.783	U
H4		1.248	0.3	0.304	0.059	16.083	U
H1	Cd $\mu\text{g/l}$	< 0.020	0.035	0.035	0.005	-4.815	U
H2		< 0.020	0.045	0.045	0.006	-5.35	U
H3		0.029	0.06	0.059	0.007	-4.327	U
H4		0.04	0.07	0.071	0.009	-3.532	Q
H1	Cr $\mu\text{g/l}$	0.511	0.1	0.107	0.026	15.3	U
H2		0.588	0.15	0.157	0.023	18.985	U
H3		0.713	0.3	0.296	0.036	11.449	U
H4		0.837	0.4	0.405	0.028	15.294	U
H1	Cu $\mu\text{g/l}$	0.623	0.7	0.694	0.056	-1.257	S
H2		0.88	0.9	0.883	0.1	-0.027	S
H3		1.279	1.1	1.103	0.106	1.656	S
H4		1.19	1.2	1.164	0.26	0.099	S
H1	Ni $\mu\text{g/l}$	0.53	0.4	0.383	0.064	2.311	Q
H2		0.434	0.5	0.485	0.049	-1.032	S
H3		0.95	0.7	0.687	0.074	3.568	Q
H4		0.957	0.8	0.807	0.059	2.536	S
H1	Pb $\mu\text{g/l}$	1.35	0.45	0.425	0.082	11.276	U
H2		1.366	0.55	0.519	0.09	9.425	U
H3		1.321	0.8	0.792	0.09	5.864	U
H4		1.811	0.9	0.869	0.118	7.967	U
H1	Zn $\mu\text{g/l}$	5.287	6	6.029	0.759	-0.977	S
H2		6.535	7	7.121	0.852	-0.688	S
H3		8.458	8	8.333	1.015	0.123	S
H4		9.337	9	9.25	0.981	0.089	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 µg/l	0.099	0.1	0.105	0.025	-0.233	S
H2		0.146	0.15	0.159	0.028	-0.452	S
H3		0.21	0.2	0.199	0.05	0.229	S
H4		0.31	0.3	0.304	0.059	0.096	S
H1	Cd µg/l	0.035	0.035	0.035	0.005	0.012	S
H2		0.045	0.045	0.045	0.006	0.06	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.073	0.07	0.071	0.009	0.174	S
H1	Cr µg/l	0.101	0.1	0.107	0.026	-0.226	S
H2		0.14	0.15	0.157	0.023	-0.727	S
H3		0.29	0.3	0.296	0.036	-0.161	S
H4		0.393	0.4	0.405	0.028	-0.425	S
H1	Cu µg/l	0.703	0.7	0.694	0.056	0.16	S
H2		0.88	0.9	0.883	0.1	-0.027	S
H3		1.13	1.1	1.103	0.106	0.255	S
H4		1.2	1.2	1.164	0.26	0.138	S
H1	Ni µg/l	0.39	0.4	0.383	0.064	0.111	S
H2		0.48	0.5	0.485	0.049	-0.097	S
H3		0.67	0.7	0.687	0.074	-0.227	S
H4		0.78	0.8	0.807	0.059	-0.449	S
H1	Pb µg/l	0.447	0.45	0.425	0.082	0.273	S
H2		0.552	0.55	0.519	0.09	0.372	S
H3		0.82	0.8	0.792	0.09	0.311	S
H4		0.92	0.9	0.869	0.118	0.433	S
H1	Zn µg/l	6.2	6	6.029	0.759	0.225	S
H2		7.13	7	7.121	0.852	0.011	S
H3		8.2	8	8.333	1.015	-0.131	S
H4		9.2	9	9.25	0.981	-0.051	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 $\mu\text{g/l}$	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd $\mu\text{g/l}$	0.034	0.035	0.035	0.005	-0.181	S
H2		0.045	0.045	0.045	0.006	0.06	S
H3		0.058	0.06	0.059	0.007	-0.155	S
H4		0.071	0.07	0.071	0.009	-0.051	S
H1	Cr $\mu\text{g/l}$	0.097	0.1	0.107	0.026	-0.378	S
H2		0.148	0.15	0.157	0.023	-0.375	S
H3		0.296	0.3	0.296	0.036	0.004	S
H4		0.395	0.4	0.405	0.028	-0.354	S
H1	Cu $\mu\text{g/l}$	0.649	0.7	0.694	0.056	-0.797	S
H2		0.861	0.9	0.883	0.1	-0.217	S
H3		1.088	1.1	1.103	0.106	-0.139	S
H4		1.289	1.2	1.164	0.26	0.48	S
H1	Ni $\mu\text{g/l}$	0.369	0.4	0.383	0.064	-0.219	S
H2		0.469	0.5	0.485	0.049	-0.321	S
H3		0.665	0.7	0.687	0.074	-0.295	S
H4		0.776	0.8	0.807	0.059	-0.516	S
H1	Pb $\mu\text{g/l}$	0.443	0.45	0.425	0.082	0.225	S
H2		0.538	0.55	0.519	0.09	0.217	S
H3		0.784	0.8	0.792	0.09	-0.088	S
H4		0.889	0.9	0.869	0.118	0.171	S
H1	Zn $\mu\text{g/l}$	5.985	6	6.029	0.759	-0.058	S
H2		6.782	7	7.121	0.852	-0.398	S
H3		7.844	8	8.333	1.015	-0.481	S
H4		8.984	9	9.25	0.981	-0.271	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 *
H1	As µg/l	0.098	0.1	0.105	0.025	-0.284	S
H2		0.148	0.15	0.159	0.028	-0.38	S
H3		0.199	0.2	0.199	0.05	0.007	S
H4		0.293	0.3	0.304	0.059	-0.193	S
H1	Cd µg/l	0.033	0.035	0.035	0.005	-0.374	S
H2		0.042	0.045	0.045	0.006	-0.372	S
H3		0.057	0.06	0.059	0.007	-0.342	S
H4		0.067	0.07	0.071	0.009	-0.556	S
H1	Cr µg/l	0.102	0.1	0.107	0.026	-0.188	S
H2		0.153	0.15	0.157	0.023	-0.155	S
H3		0.31	0.3	0.296	0.036	0.388	S
H4		0.408	0.4	0.405	0.028	0.106	S
H1	Cu µg/l	0.723	0.7	0.694	0.056	0.515	S
H2		0.92	0.9	0.883	0.1	0.373	S
H3		1.14	1.1	1.103	0.106	0.349	S
H4		1.23	1.2	1.164	0.26	0.253	S
H1	Ni µg/l	0.423	0.4	0.383	0.064	0.63	S
H2		0.513	0.5	0.485	0.049	0.573	S
H3		0.721	0.7	0.687	0.074	0.464	S
H4		0.823	0.8	0.807	0.059	0.276	S
H1	Pb µg/l	0.436	0.45	0.425	0.082	0.139	S
H2		0.529	0.55	0.519	0.09	0.116	S
H3		0.777	0.8	0.792	0.09	-0.166	S
H4		0.873	0.9	0.869	0.118	0.036	S
H1	Zn µg/l	5.82	6	6.029	0.759	-0.275	S
H2		6.97	7	7.121	0.852	-0.177	S
H3		8.04	8	8.333	1.015	-0.288	S
H4		8.75	9	9.25	0.981	-0.509	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 2019

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 $\mu\text{g/l}$	0.109	0.1	0.105	0.025	0.161	S
H2		0.157	0.15	0.159	0.028	-0.057	S
H3		0.216	0.2	0.199	0.05	0.35	S
H4		0.319	0.3	0.304	0.059	0.25	S
H1	Cd $\mu\text{g/l}$	0.034	0.035	0.035	0.005	-0.181	S
H2		0.044	0.045	0.045	0.006	-0.094	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.07	0.07	0.071	0.009	-0.163	S
H1	Cr $\mu\text{g/l}$	0.102	0.1	0.107	0.026	-0.188	S
H2		0.148	0.15	0.157	0.023	-0.375	S
H3		0.299	0.3	0.296	0.036	0.086	S
H4		0.401	0.4	0.405	0.028	-0.142	S
H1	Cu $\mu\text{g/l}$	0.716	0.7	0.694	0.056	0.391	S
H2		0.897	0.9	0.883	0.1	0.143	S
H3		1.151	1.1	1.103	0.106	0.453	S
H4		1.205	1.2	1.164	0.26	0.157	S
H1	Ni $\mu\text{g/l}$	0.402	0.4	0.383	0.064	0.3	S
H2		0.493	0.5	0.485	0.049	0.167	S
H3		0.7	0.7	0.687	0.074	0.179	S
H4		0.805	0.8	0.807	0.059	-0.027	S
H1	Pb $\mu\text{g/l}$	0.454	0.45	0.425	0.082	0.359	S
H2		0.555	0.55	0.519	0.09	0.406	S
H3		0.84	0.8	0.792	0.09	0.532	S
H4		0.913	0.9	0.869	0.118	0.374	S
H1	Zn $\mu\text{g/l}$	5.972	6	6.029	0.759	-0.075	S
H2		6.688	7	7.121	0.852	-0.508	S
H3		8.131	8	8.333	1.015	-0.199	S
H4		8.829	9	9.25	0.981	-0.429	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 32, Atmospheric Pollution Research Laboratory, Institute of Physics, Vilnius (Lithuania)

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 $\mu\text{g/l}$	0.014	0.1	0.105	0.025	-3.586	U
H2		0.015	0.15	0.159	0.028	-5.151	U
H3		0.02	0.2	0.199	0.05	-3.609	U
H4		0.027	0.3	0.304	0.059	-4.727	U
H1	Cd $\mu\text{g/l}$	0.039	0.035	0.035	0.005	0.785	S
H2		0.052	0.045	0.045	0.006	1.143	S
H3		0.067	0.06	0.059	0.007	1.139	S
H4		0.079	0.07	0.071	0.009	0.847	S
H1	Cr $\mu\text{g/l}$	0.102	0.1	0.107	0.026	-0.188	S
H2		0.156	0.15	0.157	0.023	-0.023	S
H3		0.319	0.3	0.296	0.036	0.635	S
H4		0.409	0.4	0.405	0.028	0.141	S
H1	Cu $\mu\text{g/l}$	0.793	0.7	0.694	0.056	1.755	S
H2		1.002	0.9	0.883	0.1	1.192	S
H3		1.257	1.1	1.103	0.106	1.449	S
H4		1.348	1.2	1.164	0.26	0.707	S
H1	Ni $\mu\text{g/l}$	0.958	0.4	0.383	0.064	9.035	U
H2		1.061	0.5	0.485	0.049	11.708	U
H3		1.285	0.7	0.687	0.074	8.109	U
H4		1.412	0.8	0.807	0.059	10.207	U
H1	Pb $\mu\text{g/l}$	0.466	0.45	0.425	0.082	0.505	S
H2		0.578	0.55	0.519	0.09	0.661	S
H3		0.824	0.8	0.792	0.09	0.355	S
H4		0.93	0.9	0.869	0.118	0.518	S
H1	Zn $\mu\text{g/l}$	0.763	6	6.029	0.759	-6.934	U
H2		0.912	7	7.121	0.852	-7.291	U
H3		1.054	8	8.333	1.015	-7.168	U
H4		1.117	9	9.25	0.981	-8.288	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 33, Environmental Pollution Observ. 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 µg/l	< 0.200	0.1	0.105	0.025		B
H2		< 0.200	0.15	0.159	0.028		B
H3		< 0.200	0.2	0.199	0.05	-1.993	Q
H4		0.35	0.3	0.304	0.059	0.778	S
H1	Cd µg/l	0.041	0.035	0.035	0.005	1.171	S
H2		0.048	0.045	0.045	0.006	0.524	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.08	0.07	0.071	0.009	0.96	S
H1	Cr µg/l	0.13	0.1	0.107	0.026	0.872	Q
H2		0.17	0.15	0.157	0.023	0.593	S
H3		0.3	0.3	0.296	0.036	0.113	S
H4		0.4	0.4	0.405	0.028	-0.177	S
H1	Cu µg/l	0.7	0.7	0.694	0.056	0.107	S
H2		1	0.9	0.883	0.1	1.172	S
H3		0.9	1.1	1.103	0.106	-1.907	S
H4		1.1	1.2	1.164	0.26	-0.247	S
H1	Ni µg/l	< 0.900	0.4	0.383	0.064		B
H2		< 0.900	0.5	0.485	0.049		B
H3		< 0.900	0.7	0.687	0.074		B
H4		< 0.900	0.8	0.807	0.059		B
H1	Pb µg/l	0.5	0.45	0.425	0.082	0.919	S
H2		0.55	0.55	0.519	0.09	0.35	S
H3		1	0.8	0.792	0.09	2.306	S
H4		1.1	0.9	0.869	0.118	1.955	S
H1	Zn µg/l	-999	6	6.029	0.759		B
H2		-999	7	7.121	0.852		B
H3		-999	8	8.333	1.015		B
H4		-999	9	9.25	0.981		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 36, Hydrometeorological Institute of Slovenia (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 $\mu\text{g/l}$	0.103	0.1	0.105	0.025	-0.075	S
H2		0.15	0.15	0.159	0.028	-0.308	S
H3		0.198	0.2	0.199	0.05	-0.014	S
H4		0.294	0.3	0.304	0.059	-0.176	S
H1	Cd $\mu\text{g/l}$	0.04	0.035	0.035	0.005	0.978	S
H2		0.047	0.045	0.045	0.006	0.37	S
H3		0.058	0.06	0.059	0.007	-0.155	S
H4		0.069	0.07	0.071	0.009	-0.276	S
H1	Cr $\mu\text{g/l}$	< 0.300	0.1	0.107	0.026		B
H2		< 0.300	0.15	0.157	0.023		B
H3		< 0.300	0.3	0.296	0.036	-4.004	Q
H4		0.389	0.4	0.405	0.028	-0.567	S
H1	Cu $\mu\text{g/l}$	0.686	0.7	0.694	0.056	-0.141	S
H2		0.877	0.9	0.883	0.1	-0.057	S
H3		1.07	1.1	1.103	0.106	-0.309	S
H4		1.18	1.2	1.164	0.26	0.061	S
H1	Ni $\mu\text{g/l}$	0.383	0.4	0.383	0.064	0.001	S
H2		0.48	0.5	0.485	0.049	-0.097	S
H3		0.677	0.7	0.687	0.074	-0.132	S
H4		0.779	0.8	0.807	0.059	-0.465	S
H1	Pb $\mu\text{g/l}$	0.447	0.45	0.425	0.082	0.273	S
H2		0.546	0.55	0.519	0.09	0.306	S
H3		0.802	0.8	0.792	0.09	0.111	S
H4		0.901	0.9	0.869	0.118	0.272	S
H1	Zn $\mu\text{g/l}$	5.31	6	6.029	0.759	-0.947	S
H2		6.26	7	7.121	0.852	-1.011	S
H3		7.23	8	8.333	1.015	-1.086	S
H4		8.21	9	9.25	0.981	-1.059	S

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* Z score in unitless

✎ EMEP quality norm; the letters in the column indicates:

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 2019

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 µg/l	0.095	0.1	0.105	0.025	-0.391	S
H2		0.138	0.15	0.159	0.028	-0.738	S
H3		0.186	0.2	0.199	0.05	-0.256	S
H4		0.278	0.3	0.304	0.059	-0.449	S
H1	Cd µg/l	0.026	0.035	0.035	0.005	-1.726	Q
H2		0.036	0.045	0.045	0.006	-1.331	S
H3		0.052	0.06	0.059	0.007	-1.018	S
H4		0.06	0.07	0.071	0.009	-1.286	S
H1	Cr µg/l	< 0.500	0.1	0.107	0.026		B
H2		< 0.500	0.15	0.157	0.023		B
H3		< 0.500	0.3	0.296	0.036		B
H4		< 0.500	0.4	0.405	0.028		B
H1	Cu µg/l	< 1.000	0.7	0.694	0.056		B
H2		< 1.000	0.9	0.883	0.1		B
H3		< 1.000	1.1	1.103	0.106	-5.667	U
H4		< 1.000	1.2	1.164	0.26	-2.554	U
H1	Ni µg/l	0.236	0.4	0.383	0.064	-2.308	Q
H2		0.346	0.5	0.485	0.049	-2.82	Q
H3		0.502	0.7	0.687	0.074	-2.505	Q
H4		0.542	0.8	0.807	0.059	-4.461	Q
H1	Pb µg/l	0.346	0.45	0.425	0.082	-0.957	S
H2		0.451	0.55	0.519	0.09	-0.751	S
H3		0.64	0.8	0.792	0.09	-1.685	S
H4		0.736	0.9	0.869	0.118	-1.123	S
H1	Zn µg/l	5.58	6	6.029	0.759	-0.591	S
H2		6.39	7	7.121	0.852	-0.858	S
H3		7.36	8	8.333	1.015	-0.958	S
H4		8.3	9	9.25	0.981	-0.968	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 39, Environmental Monitoring Laboratory, Institute of Environmental Protection (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 µg/l	< 0.200	0.1	0.105	0.025		B
H2		< 0.200	0.15	0.159	0.028		B
H3		0.2	0.2	0.199	0.05	0.027	S
H4		0.3	0.3	0.304	0.059	-0.074	S
H1	Cd µg/l	0.04	0.035	0.035	0.005	0.978	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.07	0.06	0.059	0.007	1.571	S
H4		0.08	0.07	0.071	0.009	0.96	S
H1	Cr µg/l	0.1	0.1	0.107	0.026	-0.264	S
H2		0.2	0.15	0.157	0.023	1.913	Q
H3		0.3	0.3	0.296	0.036	0.113	S
H4		0.4	0.4	0.405	0.028	-0.177	S
H1	Cu µg/l	0.7	0.7	0.694	0.056	0.107	S
H2		0.9	0.9	0.883	0.1	0.173	S
H3		1.1	1.1	1.103	0.106	-0.027	S
H4		1.2	1.2	1.164	0.26	0.138	S
H1	Ni µg/l	0.4	0.4	0.383	0.064	0.268	S
H2		0.6	0.5	0.485	0.049	2.341	S
H3		0.7	0.7	0.687	0.074	0.179	S
H4		0.9	0.8	0.807	0.059	1.575	S
H1	Pb µg/l	0.5	0.45	0.425	0.082	0.919	S
H2		0.6	0.55	0.519	0.09	0.906	S
H3		0.7	0.8	0.792	0.09	-1.02	S
H4		1	0.9	0.869	0.118	1.11	S
H1	Zn µg/l	6	6	6.029	0.759	-0.038	S
H2		7	7	7.121	0.852	-0.142	S
H3		8	8	8.333	1.015	-0.328	S
H4		9	9	9.25	0.981	-0.254	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 µg/l	0.143	0.1	0.105	0.025	1.502	Q
H2		0.186	0.15	0.159	0.028	0.983	S
H3		0.229	0.2	0.199	0.05	0.613	S
H4		0.342	0.3	0.304	0.059	0.642	S
H1	Cd µg/l	< 0.100	0.035	0.035	0.005		B
H2		< 0.100	0.045	0.045	0.006		B
H3		< 0.100	0.06	0.059	0.007		B
H4		< 0.100	0.07	0.071	0.009		B
H1	Cr µg/l	< 0.500	0.1	0.107	0.026		B
H2		< 0.500	0.15	0.157	0.023		B
H3		< 0.500	0.3	0.296	0.036		B
H4		< 0.500	0.4	0.405	0.028		B
H1	Cu µg/l	0.705	0.7	0.694	0.056	0.196	S
H2		0.917	0.9	0.883	0.1	0.343	S
H3		1.14	1.1	1.103	0.106	0.349	S
H4		1.22	1.2	1.164	0.26	0.215	S
H1	Ni µg/l	< 0.500	0.4	0.383	0.064		B
H2		< 0.500	0.5	0.485	0.049	-4.77	Q
H3		0.676	0.7	0.687	0.074	-0.146	S
H4		0.772	0.8	0.807	0.059	-0.583	S
H1	Pb µg/l	0.441	0.45	0.425	0.082	0.2	S
H2		0.548	0.55	0.519	0.09	0.328	S
H3		1.04	0.8	0.792	0.09	2.75	Q
H4		0.876	0.9	0.869	0.118	0.061	S
H1	Zn µg/l	4.57	6	6.029	0.759	-1.921	S
H2		6.27	7	7.121	0.852	-0.999	S
H3		13.4	8	8.333	1.015	4.99	U
H4		8.15	9	9.25	0.981	-1.121	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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>	0.108	0.1	0.105	0.025	0.122	S
H2		0.153	0.15	0.159	0.028	-0.2	S
H3		0.212	0.2	0.199	0.05	0.269	S
H4		0.285	0.3	0.304	0.059	-0.33	S
H1	Cd <i>µg/l</i>	0.032	0.035	0.035	0.005	-0.567	S
H2		0.045	0.045	0.045	0.006	0.06	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.071	0.07	0.071	0.009	-0.051	S
H1	Cr <i>µg/l</i>	0.102	0.1	0.107	0.026	-0.188	S
H2		0.141	0.15	0.157	0.023	-0.683	S
H3		0.266	0.3	0.296	0.036	-0.82	S
H4		0.363	0.4	0.405	0.028	-1.487	S
H1	Cu <i>µg/l</i>	0.632	0.7	0.694	0.056	-1.098	S
H2		0.865	0.9	0.883	0.1	-0.177	S
H3		0.998	1.1	1.103	0.106	-0.985	S
H4		1.046	1.2	1.164	0.26	-0.454	S
H1	Ni <i>µg/l</i>	0.369	0.4	0.383	0.064	-0.219	S
H2		0.498	0.5	0.485	0.049	0.269	S
H3		0.612	0.7	0.687	0.074	-1.013	S
H4		0.715	0.8	0.807	0.059	-1.544	S
H1	Pb <i>µg/l</i>	0.446	0.45	0.425	0.082	0.261	S
H2		0.553	0.55	0.519	0.09	0.383	S
H3		0.781	0.8	0.792	0.09	-0.122	S
H4		0.884	0.9	0.869	0.118	0.129	S
H1	Zn <i>µg/l</i>	6.441	6	6.029	0.759	0.543	S
H2		7.621	7	7.121	0.852	0.587	S
H3		8.146	8	8.333	1.015	-0.184	S
H4		9.533	9	9.25	0.981	0.289	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 $\mu\text{g/l}$	< 0.200	0.1	0.105	0.025		B
H2		0.224	0.15	0.159	0.028	2.346	Q
H3		0.28	0.2	0.199	0.05	1.643	Q
H4		0.382	0.3	0.304	0.059	1.324	Q
H1	Cd $\mu\text{g/l}$	< 0.200	0.035	0.035	0.005		B
H2		< 0.200	0.045	0.045	0.006		B
H3		< 0.200	0.06	0.059	0.007		B
H4		< 0.200	0.07	0.071	0.009		B
H1	Cr $\mu\text{g/l}$	< 0.500	0.1	0.107	0.026		B
H2		< 0.500	0.15	0.157	0.023		B
H3		< 0.500	0.3	0.296	0.036		B
H4		< 0.500	0.4	0.405	0.028		B
H1	Cu $\mu\text{g/l}$	0.734	0.7	0.694	0.056	0.71	S
H2		0.916	0.9	0.883	0.1	0.333	S
H3		1.153	1.1	1.103	0.106	0.472	S
H4		1.232	1.2	1.164	0.26	0.261	S
H1	Ni $\mu\text{g/l}$	< 0.500	0.4	0.383	0.064		B
H2		0.539	0.5	0.485	0.049	1.102	S
H3		0.751	0.7	0.687	0.074	0.871	S
H4		0.839	0.8	0.807	0.059	0.546	S
H1	Pb $\mu\text{g/l}$	0.452	0.45	0.425	0.082	0.334	S
H2		0.552	0.55	0.519	0.09	0.372	S
H3		0.789	0.8	0.792	0.09	-0.033	S
H4		0.91	0.9	0.869	0.118	0.348	S
H1	Zn $\mu\text{g/l}$	6.401	6	6.029	0.759	0.49	S
H2		7.287	7	7.121	0.852	0.195	S
H3		8.065	8	8.333	1.015	-0.264	S
H4		8.904	9	9.25	0.981	-0.352	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 $> 2 \mu\text{g/l}$

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

EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 52, Voivodship Inspectorate of Environmental Protection (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 µg/l	0.108	0.1	0.105	0.025	0.122	S
H2		0.155	0.15	0.159	0.028	-0.129	S
H3		0.205	0.2	0.199	0.05	0.128	S
H4		0.304	0.3	0.304	0.059	-0.006	S
H1	Cd µg/l	0.031	0.035	0.035	0.005	-0.76	S
H2		0.04	0.045	0.045	0.006	-0.713	S
H3		0.053	0.06	0.059	0.007	-0.875	S
H4		0.063	0.07	0.071	0.009	-0.949	S
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	0.35	0.4	0.383	0.064	-0.517	S
H2		0.44	0.5	0.485	0.049	-0.91	S
H3		0.61	0.7	0.687	0.074	-1.041	S
H4		0.82	0.8	0.807	0.059	0.226	S
H1	Pb µg/l	0.46	0.45	0.425	0.082	0.432	S
H2		0.56	0.55	0.519	0.09	0.461	S
H3		0.82	0.8	0.792	0.09	0.311	S
H4		0.95	0.9	0.869	0.118	0.687	S
H1	Zn µg/l	-999	6	6.029	0.759		B
H2		-999	7	7.121	0.852		B
H3		-999	8	8.333	1.015		B
H4		-999	9	9.25	0.981		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 53, ARPA UMBRIA multisite laboratory

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 $\mu\text{g/l}$	0.1	0.1	0.105	0.025	-0.194	S
H2		0.16	0.15	0.159	0.028	0.051	S
H3		0.2	0.2	0.199	0.05	0.027	S
H4		0.32	0.3	0.304	0.059	0.267	S
H1	Cd $\mu\text{g/l}$	0.04	0.035	0.035	0.005	0.978	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.07	0.07	0.071	0.009	-0.163	S
H1	Cr $\mu\text{g/l}$	0.1	0.1	0.107	0.026	-0.264	S
H2		0.15	0.15	0.157	0.023	-0.287	S
H3		0.29	0.3	0.296	0.036	-0.161	S
H4		0.39	0.4	0.405	0.028	-0.531	S
H1	Cu $\mu\text{g/l}$	0.71	0.7	0.694	0.056	0.284	S
H2		0.96	0.9	0.883	0.1	0.772	S
H3		1.17	1.1	1.103	0.106	0.631	S
H4		1.28	1.2	1.164	0.26	0.445	S
H1	Ni $\mu\text{g/l}$	0.28	0.4	0.383	0.064	-1.617	Q
H2		0.41	0.5	0.485	0.049	-1.519	S
H3		0.6	0.7	0.687	0.074	-1.176	S
H4		0.71	0.8	0.807	0.059	-1.629	S
H1	Pb $\mu\text{g/l}$	< 0.500	0.45	0.425	0.082		B
H2		< 0.500	0.55	0.519	0.09	-2.986	U
H3		0.73	0.8	0.792	0.09	-0.687	S
H4		0.83	0.9	0.869	0.118	-0.328	S
H1	Zn $\mu\text{g/l}$	6.8	6	6.029	0.759	1.015	S
H2		8.2	7	7.121	0.852	1.267	S
H3		9.5	8	8.333	1.015	1.15	S
H4		10.8	9	9.25	0.981	1.58	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 110, Thüringer Landesanstalt für Landwirtschaft TTL, Jena (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 µg/l	0.11	0.1	0.105	0.025	0.201	S
H2		0.16	0.15	0.159	0.028	0.051	S
H3		0.2	0.2	0.199	0.05	0.027	S
H4		0.33	0.3	0.304	0.059	0.437	S
H1	Cd µg/l	0.035	0.035	0.035	0.005	0.012	S
H2		0.06	0.045	0.045	0.006	2.379	Q
H3		0.061	0.06	0.059	0.007	0.276	S
H4		0.09	0.07	0.071	0.009	2.083	Q
H1	Cr µg/l	0.1	0.1	0.107	0.026	-0.264	S
H2		0.16	0.15	0.157	0.023	0.153	S
H3		0.33	0.3	0.296	0.036	0.937	S
H4		0.45	0.4	0.405	0.028	1.593	S
H1	Cu µg/l	0.75	0.7	0.694	0.056	0.993	S
H2		2.45	0.9	0.883	0.1	15.655	U
H3		1.4	1.1	1.103	0.106	2.794	Q
H4		3.6	1.2	1.164	0.26	9.367	U
H1	Ni µg/l	0.43	0.4	0.383	0.064	0.739	S
H2		0.54	0.5	0.485	0.049	1.122	S
H3		0.75	0.7	0.687	0.074	0.857	S
H4		0.9	0.8	0.807	0.059	1.575	S
H1	Pb µg/l	0.48	0.45	0.425	0.082	0.675	S
H2		1.5	0.55	0.519	0.09	10.915	U
H3		0.92	0.8	0.792	0.09	1.419	S
H4		2.18	0.9	0.869	0.118	11.087	U
H1	Zn µg/l	5.9	6	6.029	0.759	-0.17	S
H2		7.5	7	7.121	0.852	0.445	S
H3		8.05	8	8.333	1.015	-0.278	S
H4		9.7	9	9.25	0.981	0.459	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 µg/l	< 1.000	0.1	0.105	0.025		B
H2		< 1.000	0.15	0.159	0.028		B
H3		< 1.000	0.2	0.199	0.05		B
H4		< 1.000	0.3	0.304	0.059		B
H1	Cd µg/l	< 0.100	0.035	0.035	0.005		B
H2		< 0.100	0.045	0.045	0.006		B
H3		< 0.100	0.06	0.059	0.007		B
H4		< 0.100	0.07	0.071	0.009		B
H1	Cr µg/l	0.1	0.1	0.107	0.026	-0.264	S
H2		0.2	0.15	0.157	0.023	1.913	Q
H3		0.3	0.3	0.296	0.036	0.113	S
H4		0.5	0.4	0.405	0.028	3.363	S
H1	Cu µg/l	1	0.7	0.694	0.056	5.424	Q
H2		1.1	0.9	0.883	0.1	2.171	S
H3		1.2	1.1	1.103	0.106	0.914	S
H4		1.2	1.2	1.164	0.26	0.138	S
H1	Ni µg/l	0.4	0.4	0.383	0.064	0.268	S
H2		0.5	0.5	0.485	0.049	0.309	S
H3		0.7	0.7	0.687	0.074	0.179	S
H4		0.8	0.8	0.807	0.059	-0.111	S
H1	Pb µg/l	< 0.300	0.45	0.425	0.082	-3.345	U
H2		< 0.300	0.55	0.519	0.09	-4.099	U
H3		0.7	0.8	0.792	0.09	-1.02	S
H4		0.9	0.9	0.869	0.118	0.264	S
H1	Zn µg/l	6.1	6	6.029	0.759	0.094	S
H2		6.9	7	7.121	0.852	-0.259	S
H3		7.8	8	8.333	1.015	-0.525	S
H4		8.8	9	9.25	0.981	-0.458	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 $\pm 25\text{-}50\%$ 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 $\pm 15\text{-}30\%$ 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 2019

Laboratory 115, Bayerische Landesanstalt f. 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 µg/l	0.122	0.1	0.105	0.025	0.674	S
H2		0.185	0.15	0.159	0.028	0.947	S
H3		0.228	0.2	0.199	0.05	0.592	S
H4		0.325	0.3	0.304	0.059	0.352	S
H1	Cd µg/l	0.036	0.035	0.035	0.005	0.205	S
H2		0.046	0.045	0.045	0.006	0.215	S
H3		0.065	0.06	0.059	0.007	0.852	S
H4		0.072	0.07	0.071	0.009	0.061	S
H1	Cr µg/l	0.102	0.1	0.107	0.026	-0.188	S
H2		0.151	0.15	0.157	0.023	-0.243	S
H3		0.302	0.3	0.296	0.036	0.168	S
H4		0.405	0.4	0.405	0.028	0	S
H1	Cu µg/l	0.715	0.7	0.694	0.056	0.373	S
H2		0.917	0.9	0.883	0.1	0.343	S
H3		1.116	1.1	1.103	0.106	0.124	S
H4		1.22	1.2	1.164	0.26	0.215	S
H1	Ni µg/l	0.416	0.4	0.383	0.064	0.52	S
H2		0.5	0.5	0.485	0.049	0.309	S
H3		0.7	0.7	0.687	0.074	0.179	S
H4		0.809	0.8	0.807	0.059	0.04	S
H1	Pb µg/l	0.431	0.45	0.425	0.082	0.078	S
H2		0.53	0.55	0.519	0.09	0.128	S
H3		0.77	0.8	0.792	0.09	-0.244	S
H4		0.859	0.9	0.869	0.118	-0.083	S
H1	Zn µg/l	6.28	6	6.029	0.759	0.331	S
H2		7.18	7	7.121	0.852	0.069	S
H3		8.32	8	8.333	1.015	-0.013	S
H4		9.42	9	9.25	0.981	0.174	S

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* Z score in unitless

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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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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 117, Standortserkundung/Bodenmonitoring Forsten, Graupa (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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	0.03	0.035	0.035	0.005	-0.953	S
H2		0.04	0.045	0.045	0.006	-0.713	S
H3		0.054	0.06	0.059	0.007	-0.731	S
H4		0.07	0.07	0.071	0.009	-0.163	S
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	0.58	0.7	0.694	0.056	-2.019	S
H2		0.79	0.9	0.883	0.1	-0.926	S
H3		0.93	1.1	1.103	0.106	-1.625	S
H4		1.04	1.2	1.164	0.26	-0.478	S
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	0.35	0.45	0.425	0.082	-0.909	S
H2		0.45	0.55	0.519	0.09	-0.762	S
H3		0.68	0.8	0.792	0.09	-1.241	S
H4		0.8	0.9	0.869	0.118	-0.582	S
H1	Zn µg/l	8.5	6	6.029	0.759	3.254	Q
H2		8.5	7	7.121	0.852	1.619	S
H3		10.75	8	8.333	1.015	2.381	Q
H4		10.75	9	9.25	0.981	1.529	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	0.015	0.035	0.035	0.005	-3.85	U
H2		0.025	0.045	0.045	0.006	-3.031	Q
H3		0.038	0.06	0.059	0.007	-3.032	Q
H4		0.05	0.07	0.071	0.009	-2.409	Q
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	0.51	0.45	0.425	0.082	1.041	S
H2		0.55	0.55	0.519	0.09	0.35	S
H3		0.82	0.8	0.792	0.09	0.311	S
H4		0.9	0.9	0.869	0.118	0.264	S
H1	Zn µg/l	6	6	6.029	0.759	-0.038	S
H2		6	7	7.121	0.852	-1.316	S
H3		8	8	8.333	1.015	-0.328	S
H4		8	9	9.25	0.981	-1.273	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 $\mu\text{g/l}$	0.117	0.1	0.105	0.025	0.477	S
H2		0.148	0.15	0.159	0.028	-0.38	S
H3		0.195	0.2	0.199	0.05	-0.074	S
H4		0.311	0.3	0.304	0.059	0.114	S
H1	Cd $\mu\text{g/l}$	0.041	0.035	0.035	0.005	1.171	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.061	0.06	0.059	0.007	0.276	S
H4		0.069	0.07	0.071	0.009	-0.276	S
H1	Cr $\mu\text{g/l}$	0.122	0.1	0.107	0.026	0.569	S
H2		0.175	0.15	0.157	0.023	0.813	S
H3		0.35	0.3	0.296	0.036	1.486	S
H4		0.454	0.4	0.405	0.028	1.734	S
H1	Cu $\mu\text{g/l}$	0.714	0.7	0.694	0.056	0.355	S
H2		0.928	0.9	0.883	0.1	0.452	S
H3		1.13	1.1	1.103	0.106	0.255	S
H4		1.23	1.2	1.164	0.26	0.253	S
H1	Ni $\mu\text{g/l}$	0.427	0.4	0.383	0.064	0.692	S
H2		0.527	0.5	0.485	0.049	0.858	S
H3		0.705	0.7	0.687	0.074	0.247	S
H4		0.824	0.8	0.807	0.059	0.293	S
H1	Pb $\mu\text{g/l}$	0.447	0.45	0.425	0.082	0.273	S
H2		0.547	0.55	0.519	0.09	0.317	S
H3		0.806	0.8	0.792	0.09	0.156	S
H4		0.88	0.9	0.869	0.118	0.095	S
H1	Zn $\mu\text{g/l}$	6.11	6	6.029	0.759	0.107	S
H2		7.01	7	7.121	0.852	-0.13	S
H3		8.21	8	8.333	1.015	-0.121	S
H4		9.19	9	9.25	0.981	-0.061	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 121, Landeslabor Schleswig-Holsteinmwelt (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 $\mu\text{g/l}$	< 0.200	0.1	0.105	0.025		B
H2		< 0.200	0.15	0.159	0.028		B
H3		< 0.200	0.2	0.199	0.05	-1.993	Q
H4		0.289	0.3	0.304	0.059	-0.261	S
H1	Cd $\mu\text{g/l}$	< 0.050	0.035	0.035	0.005		B
H2		< 0.050	0.045	0.045	0.006		B
H3		0.059	0.06	0.059	0.007	-0.012	S
H4		0.068	0.07	0.071	0.009	-0.388	S
H1	Cr $\mu\text{g/l}$	< 0.250	0.1	0.107	0.026		B
H2		< 0.250	0.15	0.157	0.023		B
H3		0.287	0.3	0.296	0.036	-0.243	S
H4		0.389	0.4	0.405	0.028	-0.567	S
H1	Cu $\mu\text{g/l}$	0.557	0.7	0.694	0.056	-2.427	S
H2		0.754	0.9	0.883	0.1	-1.286	S
H3		0.949	1.1	1.103	0.106	-1.446	S
H4		1.11	1.2	1.164	0.26	-0.208	S
H1	Ni $\mu\text{g/l}$	0.318	0.4	0.383	0.064	-1.02	S
H2		0.387	0.5	0.485	0.049	-1.987	S
H3		0.594	0.7	0.687	0.074	-1.257	S
H4		0.709	0.8	0.807	0.059	-1.646	S
H1	Pb $\mu\text{g/l}$	0.448	0.45	0.425	0.082	0.285	S
H2		0.541	0.55	0.519	0.09	0.25	S
H3		0.794	0.8	0.792	0.09	0.023	S
H4		0.904	0.9	0.869	0.118	0.298	S
H1	Zn $\mu\text{g/l}$	5.81	6	6.029	0.759	-0.288	S
H2		6.63	7	7.121	0.852	-0.577	S
H3		7.76	8	8.333	1.015	-0.564	S
H4		8.87	9	9.25	0.981	-0.387	S

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* Z score in unitless

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Q – Questionable: Your result deviates between $\pm 25\text{-}50\%$ 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 $\pm 15\text{-}30\%$ 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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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 2019

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 µg/l	0.094	0.1	0.105	0.025	-0.434	S
H2		0.157	0.15	0.159	0.028	-0.057	S
H3		0.203	0.2	0.199	0.05	0.087	S
H4		0.309	0.3	0.304	0.059	0.079	S
H1	Cd µg/l	0.035	0.035	0.035	0.005	0.012	S
H2		0.044	0.045	0.045	0.006	-0.017	S
H3		0.059	0.06	0.059	0.007	-0.012	S
H4		0.07	0.07	0.071	0.009	-0.219	S
H1	Cr µg/l	< 0.250	0.1	0.107	0.026		B
H2		< 0.250	0.15	0.157	0.023		B
H3		0.308	0.3	0.296	0.036	0.333	S
H4		0.417	0.4	0.405	0.028	0.425	S
H1	Cu µg/l	0.703	0.7	0.694	0.056	0.16	S
H2		0.88	0.9	0.883	0.1	-0.027	S
H3		1.09	1.1	1.103	0.106	-0.121	S
H4		1.29	1.2	1.164	0.26	0.484	S
H1	Ni µg/l	0.461	0.4	0.383	0.064	1.227	S
H2		0.544	0.5	0.485	0.049	1.203	S
H3		0.743	0.7	0.687	0.074	0.762	S
H4		0.849	0.8	0.807	0.059	0.715	S
H1	Pb µg/l	0.44	0.45	0.425	0.082	0.188	S
H2		0.53	0.55	0.519	0.09	0.128	S
H3		0.783	0.8	0.792	0.09	-0.099	S
H4		0.877	0.9	0.869	0.118	0.069	S
H1	Zn µg/l	7.38	6	6.029	0.759	1.779	S
H2		8.14	7	7.121	0.852	1.197	S
H3		9.23	8	8.333	1.015	0.884	S
H4		10.3	9	9.25	0.981	1.07	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 141, Marine Division, Global Environment and Marine Department, Japan Meteorological Agency, Tokyo (Japan)

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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	0.027	0.035	0.035	0.005	-1.532	S
H2		0.034	0.045	0.045	0.006	-1.64	S
H3		0.051	0.06	0.059	0.007	-1.162	S
H4		0.061	0.07	0.071	0.009	-1.174	S
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	-999	0.45	0.425	0.082		B
H2		-999	0.55	0.519	0.09		B
H3		-999	0.8	0.792	0.09		B
H4		-999	0.9	0.869	0.118		B
H1	Zn µg/l	-999	6	6.029	0.759		B
H2		-999	7	7.121	0.852		B
H3		-999	8	8.333	1.015		B
H4		-999	9	9.25	0.981		B

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 $\mu\text{g/l}$	0.115	0.1	0.105	0.025	0.398	S
H2		0.146	0.15	0.159	0.028	-0.452	S
H3		0.2	0.2	0.199	0.05	0.027	S
H4		0.319	0.3	0.304	0.059	0.25	S
H1	Cd $\mu\text{g/l}$	0.036	0.035	0.035	0.005	0.167	S
H2		0.049	0.045	0.045	0.006	0.617	S
H3		0.061	0.06	0.059	0.007	0.219	S
H4		0.071	0.07	0.071	0.009	-0.04	S
H1	Cr $\mu\text{g/l}$	< 0.500	0.1	0.107	0.026		B
H2		< 0.500	0.15	0.157	0.023		B
H3		< 0.500	0.3	0.296	0.036		B
H4		< 0.500	0.4	0.405	0.028		B
H1	Cu $\mu\text{g/l}$	< 1.000	0.7	0.694	0.056		B
H2		< 1.000	0.9	0.883	0.1		B
H3		1.12	1.1	1.103	0.106	0.161	S
H4		1.23	1.2	1.164	0.26	0.253	S
H1	Ni $\mu\text{g/l}$	0.408	0.4	0.383	0.064	0.394	S
H2		0.511	0.5	0.485	0.049	0.533	S
H3		0.718	0.7	0.687	0.074	0.423	S
H4		0.828	0.8	0.807	0.059	0.361	S
H1	Pb $\mu\text{g/l}$	0.412	0.45	0.425	0.082	-0.153	S
H2		0.521	0.55	0.519	0.09	0.028	S
H3		0.777	0.8	0.792	0.09	-0.166	S
H4		0.867	0.9	0.869	0.118	-0.015	S
H1	Zn $\mu\text{g/l}$	5.71	6	6.029	0.759	-0.42	S
H2		6.68	7	7.121	0.852	-0.518	S
H3		7.84	8	8.333	1.015	-0.485	S
H4		8.63	9	9.25	0.981	-0.631	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 $\mu\text{g/l}$	< 0.250	0.1	0.105	0.025		B
H2		< 0.250	0.15	0.159	0.028		B
H3		< 0.250	0.2	0.199	0.05		B
H4		0.29	0.3	0.304	0.059	-0.244	S
H1	Cd $\mu\text{g/l}$	0.028	0.035	0.035	0.005	-1.339	S
H2		0.041	0.045	0.045	0.006	-0.558	S
H3		0.052	0.06	0.059	0.007	-1.018	S
H4		0.063	0.07	0.071	0.009	-0.949	S
H1	Cr $\mu\text{g/l}$	< 0.100	0.1	0.107	0.026	-2.158	Q
H2		0.137	0.15	0.157	0.023	-0.859	S
H3		0.287	0.3	0.296	0.036	-0.243	S
H4		0.393	0.4	0.405	0.028	-0.425	S
H1	Cu $\mu\text{g/l}$	0.688	0.7	0.694	0.056	-0.105	S
H2		0.877	0.9	0.883	0.1	-0.057	S
H3		1.075	1.1	1.103	0.106	-0.262	S
H4		1.226	1.2	1.164	0.26	0.238	S
H1	Ni $\mu\text{g/l}$	0.394	0.4	0.383	0.064	0.174	S
H2		0.48	0.5	0.485	0.049	-0.097	S
H3		0.683	0.7	0.687	0.074	-0.051	S
H4		0.792	0.8	0.807	0.059	-0.246	S
H1	Pb $\mu\text{g/l}$	0.45	0.45	0.425	0.082	0.31	S
H2		0.546	0.55	0.519	0.09	0.306	S
H3		0.792	0.8	0.792	0.09	0	S
H4		0.884	0.9	0.869	0.118	0.129	S
H1	Zn $\mu\text{g/l}$	6.129	6	6.029	0.759	0.132	S
H2		12.28	7	7.121	0.852	6.058	U
H3		8.091	8	8.333	1.015	-0.238	S
H4		9.134	9	9.25	0.981	-0.118	S

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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 2019

Laboratory 166, Forest Research Institute, Laboratory of Forest 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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	0.042	0.035	0.035	0.005	1.364	S
H2		0.036	0.045	0.045	0.006	-1.331	S
H3		0.074	0.06	0.059	0.007	2.146	S
H4		0.086	0.07	0.071	0.009	1.633	S
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	0.768	0.7	0.694	0.056	1.312	S
H2		0.935	0.9	0.883	0.1	0.522	S
H3		1.425	1.1	1.103	0.106	3.029	Q
H4		1.138	1.2	1.164	0.26	-0.101	S
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	0.257	0.45	0.425	0.082	-2.042	Q
H2		0.533	0.55	0.519	0.09	0.161	S
H3		0.562	0.8	0.792	0.09	-2.549	Q
H4		0.592	0.9	0.869	0.118	-2.34	Q
H1	Zn µg/l	6.019	6	6.029	0.759	-0.013	S
H2		7.07	7	7.121	0.852	-0.06	S
H3		8.049	8	8.333	1.015	-0.279	S
H4		9.314	9	9.25	0.981	0.066	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 2019

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 *
H1	As µg/l	0.162	0.1	0.105	0.025	2.252	U
H2		0.217	0.15	0.159	0.028	2.095	Q
H3		0.276	0.2	0.199	0.05	1.562	Q
H4		0.383	0.3	0.304	0.059	1.341	Q
H1	Cd µg/l	0.036	0.035	0.035	0.005	0.205	S
H2		0.044	0.045	0.045	0.006	-0.094	S
H3		0.062	0.06	0.059	0.007	0.42	S
H4		0.072	0.07	0.071	0.009	0.061	S
H1	Cr µg/l	0.161	0.1	0.107	0.026	2.046	U
H2		0.202	0.15	0.157	0.023	2.001	Q
H3		0.334	0.3	0.296	0.036	1.047	S
H4		0.399	0.4	0.405	0.028	-0.213	S
H1	Cu µg/l	0.702	0.7	0.694	0.056	0.143	S
H2		0.894	0.9	0.883	0.1	0.113	S
H3		1.11	1.1	1.103	0.106	0.067	S
H4		1.207	1.2	1.164	0.26	0.165	S
H1	Ni µg/l	0.391	0.4	0.383	0.064	0.127	S
H2		0.485	0.5	0.485	0.049	0.004	S
H3		0.676	0.7	0.687	0.074	-0.146	S
H4		0.806	0.8	0.807	0.059	-0.01	S
H1	Pb µg/l	0.444	0.45	0.425	0.082	0.237	S
H2		0.54	0.55	0.519	0.09	0.239	S
H3		0.792	0.8	0.792	0.09	0	S
H4		0.903	0.9	0.869	0.118	0.289	S
H1	Zn µg/l	6.6	6	6.029	0.759	0.752	S
H2		7.557	7	7.121	0.852	0.512	S
H3		8.717	8	8.333	1.015	0.378	S
H4		9.85	9	9.25	0.981	0.612	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 171, Mines Douai, Departement Sciences de l'Atmosphere et Genie de l'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 µg/l	0.108	0.1	0.105	0.025	0.142	S
H2		0.162	0.15	0.159	0.028	0.122	S
H3		0.218	0.2	0.199	0.05	0.386	S
H4		0.324	0.3	0.304	0.059	0.327	S
H1	Cd µg/l	0.037	0.035	0.035	0.005	0.398	S
H2		0.048	0.045	0.045	0.006	0.478	S
H3		0.064	0.06	0.059	0.007	0.679	S
H4		0.073	0.07	0.071	0.009	0.23	S
H1	Cr µg/l	0.097	0.1	0.107	0.026	-0.381	S
H2		0.144	0.15	0.157	0.023	-0.555	S
H3		0.291	0.3	0.296	0.036	-0.139	S
H4		0.384	0.4	0.405	0.028	-0.754	S
H1	Cu µg/l	0.656	0.7	0.694	0.056	-0.678	S
H2		0.841	0.9	0.883	0.1	-0.415	S
H3		1.035	1.1	1.103	0.106	-0.641	S
H4		1.123	1.2	1.164	0.26	-0.159	S
H1	Ni µg/l	0.395	0.4	0.383	0.064	0.188	S
H2		0.493	0.5	0.485	0.049	0.159	S
H3		0.693	0.7	0.687	0.074	0.085	S
H4		0.791	0.8	0.807	0.059	-0.263	S
H1	Pb µg/l	0.449	0.45	0.425	0.082	0.296	S
H2		0.548	0.55	0.519	0.09	0.326	S
H3		0.799	0.8	0.792	0.09	0.083	S
H4		0.897	0.9	0.869	0.118	0.24	S
H1	Zn µg/l	6.43	6	6.029	0.759	0.529	S
H2		7.477	7	7.121	0.852	0.418	S
H3		8.743	8	8.333	1.015	0.404	S
H4		9.781	9	9.25	0.981	0.542	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 174, Background Monitoring Department, Institute of Global Climate and Ecology (IGCE), Moscow (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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	0.021	0.035	0.035	0.005	-2.691	Q
H2		0.019	0.045	0.045	0.006	-3.959	U
H3		0.027	0.06	0.059	0.007	-4.615	U
H4		0.041	0.07	0.071	0.009	-3.42	Q
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	0.61	0.7	0.694	0.056	-1.488	S
H2		0.52	0.9	0.883	0.1	-3.623	Q
H3		0.62	1.1	1.103	0.106	-4.539	Q
H4		0.66	1.2	1.164	0.26	-1.939	Q
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	< 0.400	0.45	0.425	0.082	-2.736	U
H2		0.46	0.55	0.519	0.09	-0.651	S
H3		0.47	0.8	0.792	0.09	-3.569	Q
H4		0.72	0.9	0.869	0.118	-1.258	S
H1	Zn µg/l	-999	6	6.029	0.759		B
H2		-999	7	7.121	0.852		B
H3		-999	8	8.333	1.015		B
H4		-999	9	9.25	0.981		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 178, Environmental Chemistry and EANET Monitoring Laboratory, Limnological Institute
RAS/SB, Irkutsk (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 µg/l	0.09	0.1	0.105	0.025	-0.588	S
H2		0.16	0.15	0.159	0.028	0.051	S
H3		0.21	0.2	0.199	0.05	0.229	S
H4		0.29	0.3	0.304	0.059	-0.244	S
H1	Cd µg/l	0.03	0.035	0.035	0.005	-0.953	S
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.05	0.06	0.059	0.007	-1.306	S
H4		0.08	0.07	0.071	0.009	0.96	S
H1	Cr µg/l	0.183	0.1	0.107	0.026	2.879	U
H2		0.117	0.15	0.157	0.023	-1.739	S
H3		0.287	0.3	0.296	0.036	-0.243	S
H4		0.374	0.4	0.405	0.028	-1.098	S
H1	Cu µg/l	0.75	0.7	0.694	0.056	0.993	S
H2		0.89	0.9	0.883	0.1	0.073	S
H3		1.06	1.1	1.103	0.106	-0.403	S
H4		1.36	1.2	1.164	0.26	0.753	S
H1	Ni µg/l	0.34	0.4	0.383	0.064	-0.674	S
H2		0.5	0.5	0.485	0.049	0.309	S
H3		0.67	0.7	0.687	0.074	-0.227	S
H4		0.82	0.8	0.807	0.059	0.226	S
H1	Pb µg/l	0.43	0.45	0.425	0.082	0.066	S
H2		0.56	0.55	0.519	0.09	0.461	S
H3		0.87	0.8	0.792	0.09	0.865	S
H4		0.97	0.9	0.869	0.118	0.856	S
H1	Zn µg/l	4.8	6	6.029	0.759	-1.618	S
H2		6.8	7	7.121	0.852	-0.377	S
H3		7.9	8	8.333	1.015	-0.426	S
H4		9.2	9	9.25	0.981	-0.051	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 $> 2 \mu\text{g/l}$

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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 2019

Laboratory 179, Murmansk Environmental Monitoring Center, Murmansk (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 $\mu\text{g/l}$	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd $\mu\text{g/l}$	< 0.100	0.035	0.035	0.005		B
H2		< 0.100	0.045	0.045	0.006		B
H3		0.09	0.06	0.059	0.007	4.448	Q
H4		0.1	0.07	0.071	0.009	3.205	Q
H1	Cr $\mu\text{g/l}$	< 1.000	0.1	0.107	0.026		B
H2		< 1.000	0.15	0.157	0.023		B
H3		< 1.000	0.3	0.296	0.036		B
H4		< 1.000	0.4	0.405	0.028		B
H1	Cu $\mu\text{g/l}$	< 1.000	0.7	0.694	0.056		B
H2		< 1.000	0.9	0.883	0.1		B
H3		1.12	1.1	1.103	0.106	0.161	S
H4		1.21	1.2	1.164	0.26	0.176	S
H1	Ni $\mu\text{g/l}$	< 5.000	0.4	0.383	0.064		B
H2		< 5.000	0.5	0.485	0.049		B
H3		< 5.000	0.7	0.687	0.074		B
H4		< 5.000	0.8	0.807	0.059		B
H1	Pb $\mu\text{g/l}$	< 2.000	0.45	0.425	0.082		B
H2		< 2.000	0.55	0.519	0.09		B
H3		< 2.000	0.8	0.792	0.09		B
H4		< 2.000	0.9	0.869	0.118		B
H1	Zn $\mu\text{g/l}$	4.89	6	6.029	0.759	-1.5	S
H2		5.94	7	7.121	0.852	-1.387	S
H3		6.99	8	8.333	1.015	-1.322	S
H4		7.95	9	9.25	0.981	-1.324	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 181, TNO innovation for life (The Netherlands)

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 µg/l	< 0.150	0.1	0.105	0.025		B
H2		< 0.150	0.15	0.159	0.028	-2.998	Q
H3		0.201	0.2	0.199	0.05	0.047	S
H4		0.293	0.3	0.304	0.059	-0.193	S
H1	Cd µg/l	< 0.030	0.035	0.035	0.005	-3.85	U
H2		0.036	0.045	0.045	0.006	-1.331	S
H3		0.06	0.06	0.059	0.007	-0.132	S
H4		0.071	0.07	0.071	0.009	-0.051	S
H1	Cr µg/l	< 0.400	0.1	0.107	0.026		B
H2		< 0.400	0.15	0.157	0.023		B
H3		< 0.400	0.3	0.296	0.036		B
H4		< 0.400	0.4	0.405	0.028	-7.258	Q
H1	Cu µg/l	0.66	0.7	0.694	0.056	-0.602	S
H2		0.85	0.9	0.883	0.1	-0.327	S
H3		1.05	1.1	1.103	0.106	-0.497	S
H4		0.37	1.2	1.164	0.26	-3.054	U
H1	Ni µg/l	0.41	0.4	0.383	0.064	0.425	S
H2		0.47	0.5	0.485	0.049	-0.3	S
H3		0.75	0.7	0.687	0.074	0.857	S
H4		0.82	0.8	0.807	0.059	0.226	S
H1	Pb µg/l	0.44	0.45	0.425	0.082	0.188	S
H2		0.53	0.55	0.519	0.09	0.128	S
H3		0.79	0.8	0.792	0.09	-0.022	S
H4		0.9	0.9	0.869	0.118	0.264	S
H1	Zn µg/l	5.8	6	6.029	0.759	-0.301	S
H2		6.6	7	7.121	0.852	-0.612	S
H3		7.8	8	8.333	1.015	-0.525	S
H4		9.1	9	9.25	0.981	-0.152	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

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 µg/l	< 2.000	0.1	0.105	0.025		B
H2		< 2.000	0.15	0.159	0.028		B
H3		< 2.000	0.2	0.199	0.05		B
H4		< 2.000	0.3	0.304	0.059		B
H1	Cd µg/l	< 0.100	0.035	0.035	0.005		B
H2		< 0.100	0.045	0.045	0.006		B
H3		< 0.100	0.06	0.059	0.007		B
H4		< 0.100	0.07	0.071	0.009		B
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	< 3.000	0.4	0.383	0.064		B
H2		< 3.000	0.5	0.485	0.049		B
H3		< 3.000	0.7	0.687	0.074		B
H4		< 3.000	0.8	0.807	0.059		B
H1	Pb µg/l	< 2.000	0.45	0.425	0.082		B
H2		< 2.000	0.55	0.519	0.09		B
H3		< 2.000	0.8	0.792	0.09		B
H4		< 2.000	0.9	0.869	0.118		B
H1	Zn µg/l	-999	6	6.029	0.759		B
H2		-999	7	7.121	0.852		B
H3		-999	8	8.333	1.015		B
H4		-999	9	9.25	0.981		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 189, Institute of Public Health - Kikinda (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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	-999	0.035	0.035	0.005		B
H2		-999	0.045	0.045	0.006		B
H3		-999	0.06	0.059	0.007		B
H4		-999	0.07	0.071	0.009		B
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	< 2.000	0.4	0.383	0.064		B
H2		< 2.000	0.5	0.485	0.049		B
H3		< 2.000	0.7	0.687	0.074		B
H4		< 2.000	0.8	0.807	0.059		B
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H4		-999	0.9	0.869	0.118		B
H1	Zn µg/l	< 10.000	6	6.029	0.759		B
H2		< 10.000	7	7.121	0.852		B
H3		< 10.000	8	8.333	1.015		B
H4		< 10.000	9	9.25	0.981		B

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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 $\mu\text{g/l}$	0.1	0.1	0.105	0.025	-0.194	S
H2		0.15	0.15	0.159	0.028	-0.308	S
H3		0.2	0.2	0.199	0.05	0.027	S
H4		0.3	0.3	0.304	0.059	-0.074	S
H1	Cd $\mu\text{g/l}$	0.055	0.035	0.035	0.005	3.874	U
H2		0.05	0.045	0.045	0.006	0.833	S
H3		0.06	0.06	0.059	0.007	0.132	S
H4		0.08	0.07	0.071	0.009	0.96	S
H1	Cr $\mu\text{g/l}$	< 0.400	0.1	0.107	0.026		B
H2		< 0.400	0.15	0.157	0.023		B
H3		< 0.400	0.3	0.296	0.036		B
H4		0.4	0.4	0.405	0.028	-0.177	S
H1	Cu $\mu\text{g/l}$	0.65	0.7	0.694	0.056	-0.779	S
H2		0.8	0.9	0.883	0.1	-0.826	S
H3		1	1.1	1.103	0.106	-0.967	S
H4		1.1	1.2	1.164	0.26	-0.247	S
H1	Ni $\mu\text{g/l}$	< 2.000	0.4	0.383	0.064		B
H2		< 2.000	0.5	0.485	0.049		B
H3		< 2.000	0.7	0.687	0.074		B
H4		< 2.000	0.8	0.807	0.059		B
H1	Pb $\mu\text{g/l}$	< 1.000	0.45	0.425	0.082		B
H2		< 1.000	0.55	0.519	0.09		B
H3		< 1.000	0.8	0.792	0.09		B
H4		< 1.000	0.9	0.869	0.118		B
H1	Zn $\mu\text{g/l}$	6.1	6	6.029	0.759	0.094	S
H2		7	7	7.121	0.852	-0.142	S
H3		8.1	8	8.333	1.015	-0.229	S
H4		8.9	9	9.25	0.981	-0.356	S

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* Z score in unitless

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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 $> 2 \mu\text{g/l}$

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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 2019

Laboratory 198, Institute for public health - Sremska Mitrovica (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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	-999	0.035	0.035	0.005		B
H2		-999	0.045	0.045	0.006		B
H3		-999	0.06	0.059	0.007		B
H4		-999	0.07	0.071	0.009		B
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	-999	0.45	0.425	0.082		B
H2		-999	0.55	0.519	0.09		B
H3		-999	0.8	0.792	0.09		B
H4		-999	0.9	0.869	0.118		B
H1	Zn µg/l	< 11.000	6	6.029	0.759		B
H2		< 11.000	7	7.121	0.852		B
H3		< 11.000	8	8.333	1.015		B
H4		< 11.000	9	9.25	0.981		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 201, Public Health Institute "Timok" (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 µg/l	-999	0.1	0.105	0.025		B
H2		-999	0.15	0.159	0.028		B
H3		-999	0.2	0.199	0.05		B
H4		-999	0.3	0.304	0.059		B
H1	Cd µg/l	< 3.000	0.035	0.035	0.005		B
H2		< 3.000	0.045	0.045	0.006		B
H3		< 3.000	0.06	0.059	0.007		B
H4		< 3.000	0.07	0.071	0.009		B
H1	Cr µg/l	-999	0.1	0.107	0.026		B
H2		-999	0.15	0.157	0.023		B
H3		-999	0.3	0.296	0.036		B
H4		-999	0.4	0.405	0.028		B
H1	Cu µg/l	-999	0.7	0.694	0.056		B
H2		-999	0.9	0.883	0.1		B
H3		-999	1.1	1.103	0.106		B
H4		-999	1.2	1.164	0.26		B
H1	Ni µg/l	-999	0.4	0.383	0.064		B
H2		-999	0.5	0.485	0.049		B
H3		-999	0.7	0.687	0.074		B
H4		-999	0.8	0.807	0.059		B
H1	Pb µg/l	< 10.000	0.45	0.425	0.082		B
H2		< 10.000	0.55	0.519	0.09		B
H3		< 10.000	0.8	0.792	0.09		B
H4		< 10.000	0.9	0.869	0.118		B
H1	Zn µg/l	4.238	6	6.029	0.759	-2.358	Q
H2		5.124	7	7.121	0.852	-2.345	Q
H3		6.179	8	8.333	1.015	-2.121	S
H4		6.938	9	9.25	0.981	-2.356	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 $> 2 \mu\text{g/l}$

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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 2019

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 $\mu\text{g/l}$	< 0.500	0.1	0.105	0.025		B
H2		< 0.500	0.15	0.159	0.028		B
H3		< 0.500	0.2	0.199	0.05		B
H4		< 0.500	0.3	0.304	0.059		B
H1	Cd $\mu\text{g/l}$	< 0.250	0.035	0.035	0.005		B
H2		< 0.250	0.045	0.045	0.006		B
H3		< 0.250	0.06	0.059	0.007		B
H4		< 0.250	0.07	0.071	0.009		B
H1	Cr $\mu\text{g/l}$	< 1.000	0.1	0.107	0.026		B
H2		< 1.000	0.15	0.157	0.023		B
H3		< 1.000	0.3	0.296	0.036		B
H4		< 1.000	0.4	0.405	0.028		B
H1	Cu $\mu\text{g/l}$	< 1.500	0.7	0.694	0.056		B
H2		< 1.500	0.9	0.883	0.1		B
H3		< 1.500	1.1	1.103	0.106		B
H4		< 1.500	1.2	1.164	0.26		B
H1	Ni $\mu\text{g/l}$	< 1.500	0.4	0.383	0.064		B
H2		< 1.500	0.5	0.485	0.049		B
H3		< 1.500	0.7	0.687	0.074		B
H4		< 1.500	0.8	0.807	0.059		B
H1	Pb $\mu\text{g/l}$	< 1.500	0.45	0.425	0.082		B
H2		< 1.500	0.55	0.519	0.09		B
H3		< 1.500	0.8	0.792	0.09		B
H4		< 1.500	0.9	0.869	0.118		B
H1	Zn $\mu\text{g/l}$	< 20.000	6	6.029	0.759		B
H2		< 20.000	7	7.121	0.852		B
H3		< 20.000	8	8.333	1.015		B
H4		< 20.000	9	9.25	0.981		B

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* Z score in unitless

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Q – Questionable: Your result deviates between $\pm 25\text{-}50\%$ 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 $\pm 15\text{-}30\%$ 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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EMEP – Analytical intercomparison of heavy metals in precipitation 2019

Laboratory 205, Department of Gossiences and Natural Resource Management, University of
Copenhagen (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 µg/l	0.102	0.1	0.105	0.025	-0.115	S
H2		0.158	0.15	0.159	0.028	-0.021	S
H3		0.205	0.2	0.199	0.05	0.128	S
H4		0.296	0.3	0.304	0.059	-0.142	S
H1	Cd µg/l	0.04	0.035	0.035	0.005	0.939	S
H2		0.046	0.045	0.045	0.006	0.277	S
H3		0.065	0.06	0.059	0.007	0.78	S
H4		0.074	0.07	0.071	0.009	0.308	S
H1	Cr µg/l	0.099	0.1	0.107	0.026	-0.306	S
H2		0.15	0.15	0.157	0.023	-0.287	S
H3		0.304	0.3	0.296	0.036	0.223	S
H4		0.402	0.4	0.405	0.028	-0.106	S
H1	Cu µg/l	0.722	0.7	0.694	0.056	0.497	S
H2		0.914	0.9	0.883	0.1	0.313	S
H3		1.13	1.1	1.103	0.106	0.255	S
H4		1.23	1.2	1.164	0.26	0.253	S
H1	Ni µg/l	0.413	0.4	0.383	0.064	0.472	S
H2		0.502	0.5	0.485	0.049	0.35	S
H3		0.719	0.7	0.687	0.074	0.437	S
H4		0.822	0.8	0.807	0.059	0.26	S
H1	Pb µg/l	0.583	0.45	0.425	0.082	1.93	Q
H2		0.668	0.55	0.519	0.09	1.662	S
H3		0.933	0.8	0.792	0.09	1.563	S
H4		1.03	0.9	0.869	0.118	1.363	S
H1	Zn µg/l	6.63	6	6.029	0.759	0.792	S
H2		7.69	7	7.121	0.852	0.668	S
H3		8.82	8	8.333	1.015	0.48	S
H4		9.92	9	9.25	0.981	0.683	S

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* Z score in unitless

☒ EMEP quality norm; the letters in the column indicates:

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>