



EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.429	0.418	0.419	0.114	0.085	S
H2		0.296	0.315	0.306	0.04	-0.25	S
H3		0.419	0.365	0.36	0.038	1.546	S
H4		0.353	0.31	0.306	0.043	1.083	S
H1	Cd $\mu\text{g/l}$	0.059	0.048	0.053	0.021	0.27	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.05	0.045	0.048	0.01	0.203	S
H4		0.043	0.044	0.045	0.013	-0.121	S
H1	Cr $\mu\text{g/l}$	0.37	0.396	0.384	0.044	-0.311	S
H2		0.259	0.276	0.271	0.033	-0.364	S
H3		0.26	0.278	0.262	0.055	-0.03	S
H4		0.272	0.288	0.273	0.044	-0.023	S
H1	Cu $\mu\text{g/l}$	0.489	0.484	0.548	0.253	-0.235	S
H2		0.337	0.355	0.381	0.092	-0.475	S
H3		0.303	0.278	0.321	0.084	-0.219	S
H4		0.454	0.465	0.485	0.094	-0.327	S
H1	Ni $\mu\text{g/l}$	0.519	0.528	0.533	0.179	-0.076	S
H2		0.393	0.394	0.389	0.093	0.041	S
H3		0.384	0.383	0.403	0.149	-0.128	S
H4		0.367	0.381	0.362	0.092	0.051	S
H1	Pb $\mu\text{g/l}$	0.899	0.968	0.96	0.205	-0.297	S
H2		0.912	1.01	0.942	0.09	-0.331	S
H3		0.851	0.94	0.916	0.089	-0.729	S
H4		0.725	0.797	0.759	0.178	-0.19	S
H1	Zn $\mu\text{g/l}$	6.79	5.5	5.87	0.629	1.463	S
H2		5.04	4.53	4.743	0.696	0.427	S
H3		4.88	4.25	4.467	0.649	0.636	S
H4		4.77	4.21	4.419	0.744	0.472	S

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PO Box 100
NO-2027 KJELLER, Norway
Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
Bank: 5102.05.19030
Foretaksnr./Enterprise no. 941705561

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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; 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

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 2020

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 *
H1	As $\mu\text{g/l}$	0.398	0.418	0.419	0.114	-0.188	S
H2		0.31	0.315	0.306	0.04	0.102	S
H3		0.352	0.365	0.36	0.038	-0.206	S
H4		0.314	0.31	0.306	0.043	0.185	S
H1	Cd $\mu\text{g/l}$	0.047	0.048	0.053	0.021	-0.288	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.046	0.045	0.048	0.01	-0.192	S
H4		0.044	0.044	0.045	0.013	-0.043	S
H1	Cr $\mu\text{g/l}$	0.475	0.396	0.384	0.044	2.054	S
H2		0.34	0.276	0.271	0.033	2.088	S
H3		0.346	0.278	0.262	0.055	1.545	S
H4		0.35	0.288	0.273	0.044	1.749	S
H1	Cu $\mu\text{g/l}$	0.595	0.484	0.548	0.253	0.185	S
H2		0.497	0.355	0.381	0.092	1.266	Q
H3		0.431	0.278	0.321	0.084	1.304	U
H4		0.598	0.465	0.485	0.094	1.208	Q
H1	Ni $\mu\text{g/l}$	0.625	0.528	0.533	0.179	0.516	S
H2		0.522	0.394	0.389	0.093	1.43	Q
H3		0.441	0.383	0.403	0.149	0.255	S
H4		0.427	0.381	0.362	0.092	0.704	S
H1	Pb $\mu\text{g/l}$	0.939	0.968	0.96	0.205	-0.103	S
H2		0.962	1.01	0.942	0.09	0.225	S
H3		0.93	0.94	0.916	0.089	0.157	S
H4		0.763	0.797	0.759	0.178	0.024	S
H1	Zn $\mu\text{g/l}$	7.08	5.5	5.87	0.629	1.925	Q
H2		6.044	4.53	4.743	0.696	1.87	Q
H3		6.808	4.25	4.467	0.649	3.606	U
H4		5.602	4.21	4.419	0.744	1.589	Q

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 PO Box 100
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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.417	0.418	0.419	0.114	-0.023	S
H2		0.308	0.315	0.306	0.04	0.057	S
H3		0.363	0.365	0.36	0.038	0.093	S
H4		0.305	0.31	0.306	0.043	-0.026	S
H1	Cd µg/l	0.048	0.048	0.053	0.021	-0.242	S
H2		0.063	0.059	0.057	0.011	0.495	S
H3		0.047	0.045	0.048	0.01	-0.113	S
H4		0.045	0.044	0.045	0.013	0.068	S
H1	Cr µg/l	0.394	0.396	0.384	0.044	0.221	S
H2		0.277	0.276	0.271	0.033	0.191	S
H3		0.28	0.278	0.262	0.055	0.344	S
H4		0.282	0.288	0.273	0.044	0.201	S
H1	Cu µg/l	0.519	0.484	0.548	0.253	-0.116	S
H2		0.401	0.355	0.381	0.092	0.223	S
H3		0.297	0.278	0.321	0.084	-0.286	S
H4		0.482	0.465	0.485	0.094	-0.031	S
H1	Ni µg/l	0.522	0.528	0.533	0.179	-0.06	S
H2		0.382	0.394	0.389	0.093	-0.081	S
H3		0.859	0.383	0.403	0.149	3.063	U
H4		0.388	0.381	0.362	0.092	0.276	S
H1	Pb µg/l	0.971	0.968	0.96	0.205	0.053	S
H2		0.992	1.01	0.942	0.09	0.552	S
H3		0.939	0.94	0.916	0.089	0.253	S
H4		0.791	0.797	0.759	0.178	0.183	S
H1	Zn µg/l	5.632	5.5	5.87	0.629	-0.377	S
H2		4.683	4.53	4.743	0.696	-0.087	S
H3		4.438	4.25	4.467	0.649	-0.046	S
H4		4.311	4.21	4.419	0.744	-0.146	S

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Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
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Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
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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 2020

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 *
H1	As µg/l	0.47	0.418	0.419	0.114	0.446	S
H2		0.35	0.315	0.306	0.04	1.108	S
H3		0.4	0.365	0.36	0.038	1.049	S
H4		0.33	0.31	0.306	0.043	0.553	S
H1	Cd µg/l	0.053	0.048	0.053	0.021	-0.009	S
H2		0.065	0.059	0.057	0.011	0.701	S
H3		0.049	0.045	0.048	0.01	0.104	S
H4		0.049	0.044	0.045	0.013	0.351	S
H1	Cr µg/l	< 0.500	0.396	0.384	0.044		B
H2		< 0.500	0.276	0.271	0.033		B
H3		< 0.500	0.278	0.262	0.055		B
H4		< 0.500	0.288	0.273	0.044		B
H1	Cu µg/l	< 0.500	0.484	0.548	0.253		B
H2		< 0.500	0.355	0.381	0.092		B
H3		< 0.500	0.278	0.321	0.084		B
H4		< 0.500	0.465	0.485	0.094		B
H1	Ni µg/l	< 0.500	0.528	0.533	0.179	-1.579	U
H2		< 0.500	0.394	0.389	0.093		B
H3		< 0.500	0.383	0.403	0.149		B
H4		< 0.500	0.381	0.362	0.092		B
H1	Pb µg/l	0.82	0.968	0.96	0.205	-0.682	S
H2		0.83	1.01	0.942	0.09	-1.241	Q
H3		0.8	0.94	0.916	0.089	-1.302	S
H4		0.64	0.797	0.759	0.178	-0.668	S
H1	Zn µg/l	7.07	5.5	5.87	0.629	1.909	Q
H2		6.3	4.53	4.743	0.696	2.238	Q
H3		5.35	4.25	4.467	0.649	1.36	Q
H4		5.41	4.21	4.419	0.744	1.331	Q

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 PO Box 100
 NO-2027 KJELLER, Norway
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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
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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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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	< 0.500	0.418	0.419	0.114		B
H2		< 0.500	0.315	0.306	0.04		B
H3		< 0.500	0.365	0.36	0.038		B
H4		< 0.500	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	< 0.072	0.048	0.053	0.021		B
H2		< 0.072	0.059	0.057	0.011		B
H3		< 0.072	0.045	0.048	0.01		B
H4		< 0.072	0.044	0.045	0.013		B
H1	Cr $\mu\text{g/l}$	0.4	0.396	0.384	0.044	0.365	S
H2		0.3	0.276	0.271	0.033	0.877	S
H3		0.28	0.278	0.262	0.055	0.337	S
H4		0.3	0.288	0.273	0.044	0.613	S
H1	Cu $\mu\text{g/l}$	< 0.492	0.484	0.548	0.253		B
H2		< 0.492	0.355	0.381	0.092		B
H3		< 0.492	0.278	0.321	0.084		B
H4		< 0.492	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	< 0.870	0.528	0.533	0.179		B
H2		< 0.870	0.394	0.389	0.093		B
H3		< 0.870	0.383	0.403	0.149		B
H4		< 0.870	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	0.95	0.968	0.96	0.205	-0.049	S
H2		0.95	1.01	0.942	0.09	0.091	S
H3		0.91	0.94	0.916	0.089	-0.067	S
H4		0.79	0.797	0.759	0.178	0.176	S
H1	Zn $\mu\text{g/l}$	6.5	5.5	5.87	0.629	1.002	S
H2		5.17	4.53	4.743	0.696	0.613	S
H3		4.96	4.25	4.467	0.649	0.759	S
H4		4.9	4.21	4.419	0.744	0.646	S

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 Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
 Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
Internet: www.nilu.no
 Bank: 5102.05.19030
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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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<http://www.nilu.no/projects/ccc/intercomparison.html>



EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.401	0.418	0.419	0.114	-0.162	S
H2		0.293	0.315	0.306	0.04	-0.326	S
H3		0.338	0.365	0.36	0.038	-0.573	S
H4		0.289	0.31	0.306	0.043	-0.391	S
H1	Cd $\mu\text{g/l}$	0.048	0.048	0.053	0.021	-0.242	S
H2		0.058	0.059	0.057	0.011	0.049	S
H3		0.043	0.045	0.048	0.01	-0.489	S
H4		0.041	0.044	0.045	0.013	-0.279	S
H1	Cr $\mu\text{g/l}$	0.382	0.396	0.384	0.044	-0.041	S
H2		0.263	0.276	0.271	0.033	-0.243	S
H3		0.269	0.278	0.262	0.055	0.135	S
H4		0.273	0.288	0.273	0.044	0	S
H1	Cu $\mu\text{g/l}$	0.455	0.484	0.548	0.253	-0.369	S
H2		0.354	0.355	0.381	0.092	-0.29	S
H3		0.285	0.278	0.321	0.084	-0.433	S
H4		0.426	0.465	0.485	0.094	-0.625	S
H1	Ni $\mu\text{g/l}$	0.538	0.528	0.533	0.179	0.03	S
H2		0.385	0.394	0.389	0.093	-0.045	S
H3		0.367	0.383	0.403	0.149	-0.242	S
H4		0.361	0.381	0.362	0.092	-0.014	S
H1	Pb $\mu\text{g/l}$	0.938	0.968	0.96	0.205	-0.108	S
H2		0.96	1.01	0.942	0.09	0.202	S
H3		0.898	0.94	0.916	0.089	-0.202	S
H4		0.766	0.797	0.759	0.178	0.041	S
H1	Zn $\mu\text{g/l}$	5.764	5.5	5.87	0.629	-0.168	S
H2		4.549	4.53	4.743	0.696	-0.279	S
H3		4.524	4.25	4.467	0.649	0.087	S
H4		4.285	4.21	4.419	0.744	-0.18	S

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 PO Box 100
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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 10, Air Quality Reference Centre (Hungary)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
H1	As $\mu\text{g/l}$	0.541	0.418	0.419	0.114	1.072	Q
H2		< 0.500	0.315	0.306	0.04		B
H3		< 0.500	0.365	0.36	0.038		B
H4		< 0.500	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	0.066	0.048	0.053	0.021	0.596	Q
H2		< 0.050	0.059	0.057	0.011	-3.026	U
H3		0.061	0.045	0.048	0.01	1.291	Q
H4		0.076	0.044	0.045	0.013	2.474	U
H1	Cr $\mu\text{g/l}$	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	-999	0.484	0.548	0.253		B
H2		-999	0.355	0.381	0.092		B
H3		-999	0.278	0.321	0.084		B
H4		-999	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	0.786	0.528	0.533	0.179	1.415	Q
H2		< 0.700	0.394	0.389	0.093		B
H3		< 0.700	0.383	0.403	0.149		B
H4		< 0.700	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	0.84	0.968	0.96	0.205	-0.585	S
H2		0.773	1.01	0.942	0.09	-1.874	Q
H3		1.183	0.94	0.916	0.089	2.996	Q
H4		< 0.700	0.797	0.759	0.178	-2.299	U
H1	Zn $\mu\text{g/l}$	-999	5.5	5.87	0.629		B
H2		-999	4.53	4.743	0.696		B
H3		-999	4.25	4.467	0.649		B
H4		-999	4.21	4.419	0.744		B

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 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.39	0.418	0.419	0.114	-0.258	S
H2		0.29	0.315	0.306	0.04	-0.401	S
H3		0.34	0.365	0.36	0.038	-0.52	S
H4		0.3	0.31	0.306	0.043	-0.137	S
H1	Cd $\mu\text{g/l}$	0.048	0.048	0.053	0.021	-0.242	S
H2		0.058	0.059	0.057	0.011	0.049	S
H3		0.047	0.045	0.048	0.01	-0.093	S
H4		0.045	0.044	0.045	0.013	0.036	S
H1	Cr $\mu\text{g/l}$	0.4	0.396	0.384	0.044	0.365	S
H2		0.27	0.276	0.271	0.033	-0.031	S
H3		0.27	0.278	0.262	0.055	0.153	S
H4		0.3	0.288	0.273	0.044	0.613	S
H1	Cu $\mu\text{g/l}$	0.48	0.484	0.548	0.253	-0.27	S
H2		0.38	0.355	0.381	0.092	-0.008	S
H3		0.33	0.278	0.321	0.084	0.102	S
H4		0.5	0.465	0.485	0.094	0.164	S
H1	Ni $\mu\text{g/l}$	0.52	0.528	0.533	0.179	-0.071	S
H2		0.38	0.394	0.389	0.093	-0.099	S
H3		0.4	0.383	0.403	0.149	-0.021	S
H4		0.38	0.381	0.362	0.092	0.193	S
H1	Pb $\mu\text{g/l}$	0.97	0.968	0.96	0.205	0.048	S
H2		0.98	1.01	0.942	0.09	0.424	S
H3		0.92	0.94	0.916	0.089	0.045	S
H4		0.8	0.797	0.759	0.178	0.232	S
H1	Zn $\mu\text{g/l}$	5.5	5.5	5.87	0.629	-0.588	S
H2		4.6	4.53	4.743	0.696	-0.206	S
H3		4.4	4.25	4.467	0.649	-0.104	S
H4		4.4	4.21	4.419	0.744	-0.026	S

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 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	0.048	0.048	0.053	0.021	-0.242	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.044	0.045	0.048	0.01	-0.39	S
H4		0.043	0.044	0.045	0.013	-0.121	S
H1	Cr µg/l	0.368	0.396	0.384	0.044	-0.356	S
H2		0.262	0.276	0.271	0.033	-0.273	S
H3		0.254	0.278	0.262	0.055	-0.14	S
H4		0.252	0.288	0.273	0.044	-0.478	S
H1	Cu µg/l	0.539	0.484	0.548	0.253	-0.037	S
H2		0.427	0.355	0.381	0.092	0.504	S
H3		0.379	0.278	0.321	0.084	0.685	Q
H4		0.461	0.465	0.485	0.094	-0.252	S
H1	Ni µg/l	0.502	0.528	0.533	0.179	-0.171	S
H2		0.404	0.394	0.389	0.093	0.159	S
H3		0.391	0.383	0.403	0.149	-0.081	S
H4		0.385	0.381	0.362	0.092	0.247	S
H1	Pb µg/l	0.915	0.968	0.96	0.205	-0.22	S
H2		0.914	1.01	0.942	0.09	-0.308	S
H3		0.874	0.94	0.916	0.089	-0.471	S
H4		0.758	0.797	0.759	0.178	-0.004	S
H1	Zn µg/l	5.193	5.5	5.87	0.629	-1.076	S
H2		4.451	4.53	4.743	0.696	-0.42	S
H3		4.253	4.25	4.467	0.649	-0.33	S
H4		4.139	4.21	4.419	0.744	-0.376	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.426	0.418	0.419	0.114	0.059	S
H2		0.318	0.315	0.306	0.04	0.303	S
H3		0.364	0.365	0.36	0.038	0.107	S
H4		0.319	0.31	0.306	0.043	0.3	S
H1	Cd $\mu\text{g/l}$	0.052	0.048	0.053	0.021	-0.056	S
H2		0.057	0.059	0.057	0.011	-0.044	S
H3		0.044	0.045	0.048	0.01	-0.39	S
H4		0.043	0.044	0.045	0.013	-0.121	S
H1	Cr $\mu\text{g/l}$	0.421	0.396	0.384	0.044	0.838	S
H2		0.274	0.276	0.271	0.033	0.09	S
H3		0.275	0.278	0.262	0.055	0.245	S
H4		0.283	0.288	0.273	0.044	0.227	S
H1	Cu $\mu\text{g/l}$	< 0.910	0.484	0.548	0.253		B
H2		< 0.910	0.355	0.381	0.092		B
H3		< 0.910	0.278	0.321	0.084		B
H4		< 0.910	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	< 1.030	0.528	0.533	0.179		B
H2		< 1.030	0.394	0.389	0.093		B
H3		< 1.030	0.383	0.403	0.149		B
H4		< 1.030	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	0.861	0.968	0.96	0.205	-0.482	S
H2		0.857	1.01	0.942	0.09	-0.941	Q
H3		0.798	0.94	0.916	0.089	-1.324	S
H4		0.689	0.797	0.759	0.178	-0.392	S
H1	Zn $\mu\text{g/l}$	7.974	5.5	5.87	0.629	3.346	Q
H2		6.435	4.53	4.743	0.696	2.432	Q
H3		6.07	4.25	4.467	0.649	2.469	Q
H4		6.119	4.21	4.419	0.744	2.284	Q

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 PO Box 100
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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
Internet: www.nilu.no
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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 $> 2 \mu\text{g/l}$

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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 2020

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 $\mu\text{g/l}$	0.425	0.418	0.419	0.114	0.05	S
H2		0.313	0.315	0.306	0.04	0.177	S
H3		0.368	0.365	0.36	0.038	0.212	S
H4		0.31	0.31	0.306	0.043	0.093	S
H1	Cd $\mu\text{g/l}$	0.049	0.048	0.053	0.021	-0.195	S
H2		0.06	0.059	0.057	0.011	0.235	S
H3		0.046	0.045	0.048	0.01	-0.192	S
H4		0.045	0.044	0.045	0.013	0.036	S
H1	Cr $\mu\text{g/l}$	0.388	0.396	0.384	0.044	0.094	S
H2		0.266	0.276	0.271	0.033	-0.152	S
H3		0.27	0.278	0.262	0.055	0.153	S
H4		0.282	0.288	0.273	0.044	0.204	S
H1	Cu $\mu\text{g/l}$	0.49	0.484	0.548	0.253	-0.231	S
H2		0.35	0.355	0.381	0.092	-0.334	S
H3		0.299	0.278	0.321	0.084	-0.266	S
H4		0.482	0.465	0.485	0.094	-0.028	S
H1	Ni $\mu\text{g/l}$	0.504	0.528	0.533	0.179	-0.16	S
H2		0.375	0.394	0.389	0.093	-0.153	S
H3		0.36	0.383	0.403	0.149	-0.289	S
H4		0.376	0.381	0.362	0.092	0.149	S
H1	Pb $\mu\text{g/l}$	0.972	0.968	0.96	0.205	0.058	S
H2		0.993	1.01	0.942	0.09	0.569	S
H3		0.959	0.94	0.916	0.089	0.483	S
H4		0.796	0.797	0.759	0.178	0.209	S
H1	Zn $\mu\text{g/l}$	5.87	5.5	5.87	0.629	0.001	S
H2		4.91	4.53	4.743	0.696	0.24	S
H3		4.91	4.25	4.467	0.649	0.682	S
H4		4.7	4.21	4.419	0.744	0.377	S

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NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	0.056	0.048	0.053	0.021	0.131	S
H2		0.067	0.059	0.057	0.011	0.887	S
H3		0.06	0.045	0.048	0.01	1.192	Q
H4		0.048	0.044	0.045	0.013	0.272	S
H1	Cr µg/l	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu µg/l	0.32	0.484	0.548	0.253	-0.903	Q
H2		0.15	0.355	0.381	0.092	-2.51	U
H3		0.15	0.278	0.321	0.084	-2.039	Q
H4		0.44	0.465	0.485	0.094	-0.476	S
H1	Ni µg/l	-999	0.528	0.533	0.179		B
H2		-999	0.394	0.389	0.093		B
H3		-999	0.383	0.403	0.149		B
H4		-999	0.381	0.362	0.092		B
H1	Pb µg/l	0.75	0.968	0.96	0.205	-1.023	S
H2		0.81	1.01	0.942	0.09	-1.463	Q
H3		0.73	0.94	0.916	0.089	-2.087	S
H4		0.7	0.797	0.759	0.178	-0.331	S
H1	Zn µg/l	-999	5.5	5.87	0.629		B
H2		-999	4.53	4.743	0.696		B
H3		-999	4.25	4.467	0.649		B
H4		-999	4.21	4.419	0.744		B

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NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.162	0.418	0.419	0.114	-2.267	U
H2		0.138	0.315	0.306	0.04	-4.223	U
H3		0.508	0.365	0.36	0.038	3.874	Q
H4		0.142	0.31	0.306	0.043	-3.776	U
H1	Cd $\mu\text{g/l}$	0.096	0.048	0.053	0.021	1.993	U
H2		0.077	0.059	0.057	0.011	1.819	Q
H3		0.079	0.045	0.048	0.01	3.071	U
H4		0.089	0.044	0.045	0.013	3.496	U
H1	Cr $\mu\text{g/l}$	0.331	0.396	0.384	0.044	-1.189	S
H2		0.353	0.276	0.271	0.033	2.482	Q
H3		2.99	0.278	0.262	0.055	49.971	U
H4		0.161	0.288	0.273	0.044	-2.545	Q
H1	Cu $\mu\text{g/l}$	0.8	0.484	0.548	0.253	0.996	U
H2		0.415	0.355	0.381	0.092	0.373	S
H3		0.495	0.278	0.321	0.084	2.065	U
H4		0.467	0.465	0.485	0.094	-0.188	S
H1	Ni $\mu\text{g/l}$	0.296	0.528	0.533	0.179	-1.322	Q
H2		0.394	0.394	0.389	0.093	0.052	S
H3		0.375	0.383	0.403	0.149	-0.189	S
H4		0.196	0.381	0.362	0.092	-1.81	Q
H1	Pb $\mu\text{g/l}$	0.881	0.968	0.96	0.205	-0.385	S
H2		0.721	1.01	0.942	0.09	-2.452	Q
H3		1.068	0.94	0.916	0.089	1.706	S
H4		0.272	0.797	0.759	0.178	-2.737	U
H1	Zn $\mu\text{g/l}$	3.537	5.5	5.87	0.629	-3.709	Q
H2		2.934	4.53	4.743	0.696	-2.601	Q
H3		3.317	4.25	4.467	0.649	-1.772	S
H4		2.359	4.21	4.419	0.744	-2.768	Q

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 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 32, Center for Physical Sciences and Technology (Lithuania)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
H1	As $\mu\text{g/l}$	0.895	0.418	0.419	0.114	4.19	U
H2		0.484	0.315	0.306	0.04	4.477	U
H3		0.495	0.365	0.36	0.038	3.534	Q
H4		0.396	0.31	0.306	0.043	2.073	Q
H1	Cd $\mu\text{g/l}$	0.069	0.048	0.053	0.021	0.722	Q
H2		0.068	0.059	0.057	0.011	1.018	S
H3		0.05	0.045	0.048	0.01	0.233	S
H4		0.05	0.044	0.045	0.013	0.421	S
H1	Cr $\mu\text{g/l}$	0.435	0.396	0.384	0.044	1.164	S
H2		0.294	0.276	0.271	0.033	0.702	S
H3		0.292	0.278	0.262	0.055	0.556	S
H4		0.301	0.288	0.273	0.044	0.643	S
H1	Cu $\mu\text{g/l}$	0.536	0.484	0.548	0.253	-0.05	S
H2		0.391	0.355	0.381	0.092	0.112	S
H3		0.326	0.278	0.321	0.084	0.052	S
H4		0.502	0.465	0.485	0.094	0.186	S
H1	Ni $\mu\text{g/l}$	0.575	0.528	0.533	0.179	0.237	S
H2		0.401	0.394	0.389	0.093	0.128	S
H3		0.411	0.383	0.403	0.149	0.053	S
H4		0.472	0.381	0.362	0.092	1.19	S
H1	Pb $\mu\text{g/l}$	0.948	0.968	0.96	0.205	-0.059	S
H2		0.97	1.01	0.942	0.09	0.316	S
H3		0.916	0.94	0.916	0.089	0.005	S
H4		0.778	0.797	0.759	0.178	0.106	S
H1	Zn $\mu\text{g/l}$	6.938	5.5	5.87	0.629	1.699	Q
H2		5.393	4.53	4.743	0.696	0.934	S
H3		5.11	4.25	4.467	0.649	0.99	S
H4		5.107	4.21	4.419	0.744	0.924	S

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NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
Bank: 5102.05.19030
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 $> 2 \mu\text{g/l}$

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 2020

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 *
H1	As $\mu\text{g/l}$	0.25	0.418	0.419	0.114	-1.492	Q
H2		0.23	0.315	0.306	0.04	-1.91	Q
H3		0.33	0.365	0.36	0.038	-0.782	S
H4		0.21	0.31	0.306	0.043	-2.21	Q
H1	Cd $\mu\text{g/l}$	0.056	0.048	0.053	0.021	0.131	S
H2		0.064	0.059	0.057	0.011	0.608	S
H3		0.05	0.045	0.048	0.01	0.203	S
H4		0.051	0.044	0.045	0.013	0.508	S
H1	Cr $\mu\text{g/l}$	0.3	0.396	0.384	0.044	-1.888	S
H2		< 0.200	0.276	0.271	0.033	-5.177	U
H3		< 0.200	0.278	0.262	0.055	-2.96	U
H4		< 0.200	0.288	0.273	0.044	-3.931	U
H1	Cu $\mu\text{g/l}$	0.4	0.484	0.548	0.253	-0.587	S
H2		0.38	0.355	0.381	0.092	-0.008	S
H3		0.32	0.278	0.321	0.084	-0.017	S
H4		0.59	0.465	0.485	0.094	1.123	Q
H1	Ni $\mu\text{g/l}$	< 0.900	0.528	0.533	0.179		B
H2		< 0.900	0.394	0.389	0.093		B
H3		< 0.900	0.383	0.403	0.149		B
H4		< 0.900	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	1.4	0.968	0.96	0.205	2.142	Q
H2		1.5	1.01	0.942	0.09	6.199	U
H3		1.4	0.94	0.916	0.089	5.432	Q
H4		1.3	0.797	0.759	0.178	3.043	U
H1	Zn $\mu\text{g/l}$	4.8	5.5	5.87	0.629	-1.701	S
H2		4	4.53	4.743	0.696	-1.068	S
H3		3.8	4.25	4.467	0.649	-1.028	S
H4		4.1	4.21	4.419	0.744	-0.429	S

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NILU – Norsk institutt for luftforskning
 PO Box 100
 NO-2027 KJELLER, Norway
 Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
 Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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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 2020

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 *
H1	As µg/l	0.472	0.418	0.419	0.114	0.464	S
H2		0.356	0.315	0.306	0.04	1.258	S
H3		0.411	0.365	0.36	0.038	1.337	S
H4		0.369	0.31	0.306	0.043	1.451	S
H1	Cd µg/l	0.05	0.048	0.053	0.021	-0.149	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.054	0.045	0.048	0.01	0.599	S
H4		0.045	0.044	0.045	0.013	0.036	S
H1	Cr µg/l	0.354	0.396	0.384	0.044	-0.671	S
H2		0.186	0.276	0.271	0.033	-2.574	Q
H3		0.191	0.278	0.262	0.055	-1.293	Q
H4		0.223	0.288	0.273	0.044	-1.137	S
H1	Cu µg/l	0.01	0.484	0.548	0.253	-2.13	U
H2		< 0.010	0.355	0.381	0.092	-4.088	U
H3		< 0.010	0.278	0.321	0.084	-3.763	U
H4		< 0.010	0.465	0.485	0.094	-5.114	U
H1	Ni µg/l	< 0.010	0.528	0.533	0.179	-2.948	U
H2		< 0.010	0.394	0.389	0.093	-4.138	U
H3		< 0.010	0.383	0.403	0.149	-2.674	U
H4		< 0.010	0.381	0.362	0.092	-3.89	U
H1	Pb µg/l	0.843	0.968	0.96	0.205	-0.57	S
H2		0.846	1.01	0.942	0.09	-1.064	Q
H3		0.793	0.94	0.916	0.089	-1.38	S
H4		0.689	0.797	0.759	0.178	-0.392	S
H1	Zn µg/l	2.813	5.5	5.87	0.629	-4.86	Q
H2		1.72	4.53	4.743	0.696	-4.346	U
H3		1.5	4.25	4.467	0.649	-4.572	U
H4		1.468	4.21	4.419	0.744	-3.965	U

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 PO Box 100
 NO-2027 KJELLER, Norway
 Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
 Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.402	0.418	0.419	0.114	-0.153	S
H2		0.298	0.315	0.306	0.04	-0.2	S
H3		0.345	0.365	0.36	0.038	-0.389	S
H4		0.293	0.31	0.306	0.043	-0.299	S
H1	Cd $\mu\text{g/l}$	0.046	0.048	0.053	0.021	-0.335	S
H2		0.056	0.059	0.057	0.011	-0.138	S
H3		0.042	0.045	0.048	0.01	-0.588	S
H4		0.041	0.044	0.045	0.013	-0.279	S
H1	Cr $\mu\text{g/l}$	0.388	0.396	0.384	0.044	0.094	S
H2		< 0.300	0.276	0.271	0.033		B
H3		< 0.300	0.278	0.262	0.055		B
H4		< 0.300	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	0.461	0.484	0.548	0.253	-0.345	S
H2		0.326	0.355	0.381	0.092	-0.595	S
H3		< 0.300	0.278	0.321	0.084		B
H4		0.44	0.465	0.485	0.094	-0.476	S
H1	Ni $\mu\text{g/l}$	0.518	0.528	0.533	0.179	-0.082	S
H2		0.382	0.394	0.389	0.093	-0.078	S
H3		0.386	0.383	0.403	0.149	-0.115	S
H4		0.369	0.381	0.362	0.092	0.073	S
H1	Pb $\mu\text{g/l}$	0.942	0.968	0.96	0.205	-0.088	S
H2		0.961	1.01	0.942	0.09	0.213	S
H3		0.905	0.94	0.916	0.089	-0.123	S
H4		0.761	0.797	0.759	0.178	0.012	S
H1	Zn $\mu\text{g/l}$	5.37	5.5	5.87	0.629	-0.794	S
H2		4.36	4.53	4.743	0.696	-0.551	S
H3		4.16	4.25	4.467	0.649	-0.473	S
H4		4.02	4.21	4.419	0.744	-0.536	S

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 PO Box 100
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 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.388	0.418	0.419	0.114	-0.276	S
H2		0.288	0.315	0.306	0.04	-0.451	S
H3		0.341	0.365	0.36	0.038	-0.494	S
H4		0.285	0.31	0.306	0.043	-0.483	S
H1	Cd $\mu\text{g/l}$	0.023	0.048	0.053	0.021	-1.405	U
H2		0.042	0.059	0.057	0.011	-1.442	Q
H3		0.026	0.045	0.048	0.01	-2.17	Q
H4		0.02	0.044	0.045	0.013	-1.93	U
H1	Cr $\mu\text{g/l}$	< 0.500	0.396	0.384	0.044		B
H2		< 0.500	0.276	0.271	0.033		B
H3		< 0.500	0.278	0.262	0.055		B
H4		< 0.500	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	< 1.000	0.484	0.548	0.253		B
H2		< 1.000	0.355	0.381	0.092		B
H3		< 1.000	0.278	0.321	0.084		B
H4		< 1.000	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	0.505	0.528	0.533	0.179	-0.155	S
H2		0.383	0.394	0.389	0.093	-0.067	S
H3		0.376	0.383	0.403	0.149	-0.182	S
H4		0.36	0.381	0.362	0.092	-0.025	S
H1	Pb $\mu\text{g/l}$	0.768	0.968	0.96	0.205	-0.935	S
H2		0.794	1.01	0.942	0.09	-1.641	Q
H3		0.733	0.94	0.916	0.089	-2.053	S
H4		0.59	0.797	0.759	0.178	-0.949	Q
H1	Zn $\mu\text{g/l}$	5.46	5.5	5.87	0.629	-0.651	S
H2		4.66	4.53	4.743	0.696	-0.12	S
H3		4.5	4.25	4.467	0.649	0.05	S
H4		4.24	4.21	4.419	0.744	-0.241	S

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.35	0.418	0.419	0.114	-0.611	S
H2		0.25	0.315	0.306	0.04	-1.407	S
H3		0.3	0.365	0.36	0.038	-1.566	S
H4		0.22	0.31	0.306	0.043	-1.98	Q
H1	Cd µg/l	0.047	0.048	0.053	0.021	-0.288	S
H2		0.057	0.059	0.057	0.011	-0.044	S
H3		0.045	0.045	0.048	0.01	-0.291	S
H4		0.044	0.044	0.045	0.013	-0.043	S
H1	Cr µg/l	0.38	0.396	0.384	0.044	-0.086	S
H2		0.25	0.276	0.271	0.033	-0.636	S
H3		0.24	0.278	0.262	0.055	-0.396	S
H4		0.26	0.288	0.273	0.044	-0.296	S
H1	Cu µg/l	0.6	0.484	0.548	0.253	0.205	S
H2		0.45	0.355	0.381	0.092	0.754	Q
H3		0.35	0.278	0.321	0.084	0.34	Q
H4		0.5	0.465	0.485	0.094	0.164	S
H1	Ni µg/l	0.5	0.528	0.533	0.179	-0.183	S
H2		0.35	0.394	0.389	0.093	-0.422	S
H3		0.4	0.383	0.403	0.149	-0.021	S
H4		0.3	0.381	0.362	0.092	-0.678	S
H1	Pb µg/l	1	0.968	0.96	0.205	0.194	S
H2		1	1.01	0.942	0.09	0.647	S
H3		0.9	0.94	0.916	0.089	-0.179	S
H4		0.8	0.797	0.759	0.178	0.232	S
H1	Zn µg/l	5.5	5.5	5.87	0.629	-0.588	S
H2		4.5	4.53	4.743	0.696	-0.35	S
H3		3.8	4.25	4.467	0.649	-1.028	S
H4		4	4.21	4.419	0.744	-0.563	S

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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
Internet: www.nilu.no
 Bank: 5102.05.19030
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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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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.449	0.418	0.419	0.114	0.261	S
H2		0.338	0.315	0.306	0.04	0.806	S
H3		0.386	0.365	0.36	0.038	0.683	S
H4		0.342	0.31	0.306	0.043	0.83	S
H1	Cd µg/l	< 0.100	0.048	0.053	0.021		B
H2		< 0.100	0.059	0.057	0.011		B
H3		< 0.100	0.045	0.048	0.01		B
H4		< 0.100	0.044	0.045	0.013		B
H1	Cr µg/l	< 0.500	0.396	0.384	0.044		B
H2		< 0.500	0.276	0.271	0.033		B
H3		< 0.500	0.278	0.262	0.055		B
H4		< 0.500	0.288	0.273	0.044		B
H1	Cu µg/l	< 0.500	0.484	0.548	0.253		B
H2		< 0.500	0.355	0.381	0.092		B
H3		< 0.500	0.278	0.321	0.084		B
H4		< 0.500	0.465	0.485	0.094		B
H1	Ni µg/l	0.52	0.528	0.533	0.179	-0.071	S
H2		< 0.500	0.394	0.389	0.093		B
H3		< 0.500	0.383	0.403	0.149		B
H4		< 0.500	0.381	0.362	0.092		B
H1	Pb µg/l	0.883	0.968	0.96	0.205	-0.375	S
H2		0.905	1.01	0.942	0.09	-0.408	S
H3		0.846	0.94	0.916	0.089	-0.785	S
H4		0.736	0.797	0.759	0.178	-0.128	S
H1	Zn µg/l	6.94	5.5	5.87	0.629	1.702	Q
H2		5.49	4.53	4.743	0.696	1.073	S
H3		5.03	4.25	4.467	0.649	0.867	S
H4		5.31	4.21	4.419	0.744	1.197	Q

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NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
Bank: 5102.05.19030
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 47, Jelenia Gora (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
H1	As $\mu\text{g/l}$	0.346	0.418	0.419	0.114	-0.646	S
H2		0.227	0.315	0.306	0.04	-1.985	Q
H3		0.309	0.365	0.36	0.038	-1.331	S
H4		0.286	0.31	0.306	0.043	-0.46	S
H1	Cd $\mu\text{g/l}$	0.023	0.048	0.053	0.021	-1.405	U
H2		0.057	0.059	0.057	0.011	-0.044	S
H3		0.05	0.045	0.048	0.01	0.203	S
H4		0.045	0.044	0.045	0.013	0.036	S
H1	Cr $\mu\text{g/l}$	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	-999	0.484	0.548	0.253		B
H2		-999	0.355	0.381	0.092		B
H3		-999	0.278	0.321	0.084		B
H4		-999	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	0.495	0.528	0.533	0.179	-0.211	S
H2		3.414	0.394	0.389	0.093	32.575	U
H3		2.264	0.383	0.403	0.149	12.502	U
H4		7.855	0.381	0.362	0.092	81.569	U
H1	Pb $\mu\text{g/l}$	1.545	0.968	0.96	0.205	2.847	U
H2		1.937	1.01	0.942	0.09	11.052	U
H3		1.766	0.94	0.916	0.089	9.539	U
H4		2.32	0.797	0.759	0.178	8.779	U
H1	Zn $\mu\text{g/l}$	-999	5.5	5.87	0.629		B
H2		-999	4.53	4.743	0.696		B
H3		-999	4.25	4.467	0.649		B
H4		-999	4.21	4.419	0.744		B

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 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.411	0.418	0.419	0.114	-0.074	S
H2		0.308	0.315	0.306	0.04	0.051	S
H3		0.358	0.365	0.36	0.038	-0.049	S
H4		0.3	0.31	0.306	0.043	-0.137	S
H1	Cd µg/l	0.048	0.048	0.053	0.021	-0.242	S
H2		0.058	0.059	0.057	0.011	0.049	S
H3		0.047	0.045	0.048	0.01	-0.093	S
H4		0.044	0.044	0.045	0.013	-0.043	S
H1	Cr µg/l	0.392	0.396	0.384	0.044	0.185	S
H2		0.267	0.276	0.271	0.033	-0.122	S
H3		0.277	0.278	0.262	0.055	0.282	S
H4		0.288	0.288	0.273	0.044	0.34	S
H1	Cu µg/l	0.539	0.484	0.548	0.253	-0.037	S
H2		0.443	0.355	0.381	0.092	0.678	S
H3		0.32	0.278	0.321	0.084	-0.017	S
H4		0.512	0.465	0.485	0.094	0.292	S
H1	Ni µg/l	0.545	0.528	0.533	0.179	0.069	S
H2		0.414	0.394	0.389	0.093	0.267	S
H3		0.369	0.383	0.403	0.149	-0.229	S
H4		0.379	0.381	0.362	0.092	0.182	S
H1	Pb µg/l	0.995	0.968	0.96	0.205	0.17	S
H2		1.002	1.01	0.942	0.09	0.669	S
H3		0.966	0.94	0.916	0.089	0.561	S
H4		0.926	0.797	0.759	0.178	0.94	S
H1	Zn µg/l	5.943	5.5	5.87	0.629	0.117	S
H2		4.603	4.53	4.743	0.696	-0.202	S
H3		4.432	4.25	4.467	0.649	-0.054	S
H4		4.363	4.21	4.419	0.744	-0.075	S

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Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.424	0.418	0.419	0.114	0.041	S
H2		0.306	0.315	0.306	0.04	0.001	S
H3		0.35	0.365	0.36	0.038	-0.259	S
H4		0.306	0.31	0.306	0.043	0.001	S
H1	Cd µg/l	0.049	0.048	0.053	0.021	-0.195	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.041	0.045	0.048	0.01	-0.687	S
H4		0.04	0.044	0.045	0.013	-0.357	S
H1	Cr µg/l	< 0.500	0.396	0.384	0.044		B
H2		< 0.500	0.276	0.271	0.033		B
H3		< 0.500	0.278	0.262	0.055		B
H4		< 0.500	0.288	0.273	0.044		B
H1	Cu µg/l	0.53	0.484	0.548	0.253	-0.072	S
H2		< 0.500	0.355	0.381	0.092		B
H3		< 0.500	0.278	0.321	0.084		B
H4		< 0.500	0.465	0.485	0.094		B
H1	Ni µg/l	0.556	0.528	0.533	0.179	0.13	S
H2		0.405	0.394	0.389	0.093	0.17	S
H3		0.423	0.383	0.403	0.149	0.134	S
H4		0.39	0.381	0.362	0.092	0.302	S
H1	Pb µg/l	1.007	0.968	0.96	0.205	0.228	S
H2		1.015	1.01	0.942	0.09	0.813	S
H3		0.952	0.94	0.916	0.089	0.404	S
H4		0.827	0.797	0.759	0.178	0.384	S
H1	Zn µg/l	5.7	5.5	5.87	0.629	-0.27	S
H2		4.5	4.53	4.743	0.696	-0.35	S
H3		4.2	4.25	4.467	0.649	-0.412	S
H4		4.4	4.21	4.419	0.744	-0.026	S

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 NO-2027 KJELLER, Norway
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 Framsenteret / The Fram Centre
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 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
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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

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



EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.397	0.418	0.419	0.114	-0.197	S
H2		0.308	0.315	0.306	0.04	0.051	S
H3		0.354	0.365	0.36	0.038	-0.154	S
H4		0.308	0.31	0.306	0.043	0.047	S
H1	Cd $\mu\text{g/l}$	0.047	0.048	0.053	0.021	-0.288	S
H2		0.059	0.059	0.057	0.011	0.142	S
H3		0.047	0.045	0.048	0.01	-0.093	S
H4		0.045	0.044	0.045	0.013	0.036	S
H1	Cr $\mu\text{g/l}$	0.358	0.396	0.384	0.044	-0.581	S
H2		0.256	0.276	0.271	0.033	-0.455	S
H3		0.25	0.278	0.262	0.055	-0.213	S
H4		0.246	0.288	0.273	0.044	-0.614	S
H1	Cu $\mu\text{g/l}$	0.369	0.484	0.548	0.253	-0.709	S
H2		0.254	0.355	0.381	0.092	-1.379	Q
H3		0.195	0.278	0.321	0.084	-1.503	Q
H4		0.359	0.465	0.485	0.094	-1.34	S
H1	Ni $\mu\text{g/l}$	0.445	0.528	0.533	0.179	-0.49	S
H2		0.296	0.394	0.389	0.093	-1.004	S
H3		0.288	0.383	0.403	0.149	-0.773	S
H4		0.295	0.381	0.362	0.092	-0.733	S
H1	Pb $\mu\text{g/l}$	1.048	0.968	0.96	0.205	0.428	S
H2		1.003	1.01	0.942	0.09	0.68	S
H3		0.989	0.94	0.916	0.089	0.819	S
H4		0.753	0.797	0.759	0.178	-0.033	S
H1	Zn $\mu\text{g/l}$	6.214	5.5	5.87	0.629	0.548	S
H2		4.943	4.53	4.743	0.696	0.287	S
H3		4.683	4.25	4.467	0.649	0.332	S
H4		4.798	4.21	4.419	0.744	0.509	S

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NILU – Norsk institutt for luftforskning
PO Box 100
NO-2027 KJELLER, Norway
Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
Bank: 5102.05.19030
Foretaksnr./Enterprise no. 941705561

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 110, Thüringer Landesanstalt für Landwirtschaft und Ländlichen Raum, Jena (Germany)

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	0.407	0.418	0.419	0.114	-0.109	S
H2		0.281	0.315	0.306	0.04	-0.628	S
H3		0.369	0.365	0.36	0.038	0.238	S
H4		0.27	0.31	0.306	0.043	-0.828	S
H1	Cd µg/l	0.047	0.048	0.053	0.021	-0.288	S
H2		0.053	0.059	0.057	0.011	-0.417	S
H3		0.043	0.045	0.048	0.01	-0.489	S
H4		0.04	0.044	0.045	0.013	-0.357	S
H1	Cr µg/l	0.336	0.396	0.384	0.044	-1.077	S
H2		0.26	0.276	0.271	0.033	-0.334	S
H3		0.224	0.278	0.262	0.055	-0.689	S
H4		0.238	0.288	0.273	0.044	-0.796	S
H1	Cu µg/l	0.462	0.484	0.548	0.253	-0.341	S
H2		0.348	0.355	0.381	0.092	-0.356	S
H3		0.278	0.278	0.321	0.084	-0.516	S
H4		0.573	0.465	0.485	0.094	0.942	S
H1	Ni µg/l	0.486	0.528	0.533	0.179	-0.261	S
H2		0.38	0.394	0.389	0.093	-0.099	S
H3		0.344	0.383	0.403	0.149	-0.397	S
H4		0.354	0.381	0.362	0.092	-0.09	S
H1	Pb µg/l	0.925	0.968	0.96	0.205	-0.171	S
H2		0.938	1.01	0.942	0.09	-0.042	S
H3		0.899	0.94	0.916	0.089	-0.191	S
H4		0.746	0.797	0.759	0.178	-0.072	S
H1	Zn µg/l	5.77	5.5	5.87	0.629	-0.158	S
H2		4.46	4.53	4.743	0.696	-0.407	S
H3		4.11	4.25	4.467	0.649	-0.55	S
H4		4.16	4.21	4.419	0.744	-0.348	S

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 PO Box 100
 NO-2027 KJELLER, Norway
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 Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
Internet: www.nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	0.051	0.048	0.053	0.021	-0.097	S
H2		0.063	0.059	0.057	0.011	0.496	S
H3		0.049	0.045	0.048	0.01	0.114	S
H4		0.048	0.044	0.045	0.013	0.24	S
H1	Cr µg/l	0.391	0.396	0.384	0.044	0.16	S
H2		0.266	0.276	0.271	0.033	-0.164	S
H3		0.27	0.278	0.262	0.055	0.15	S
H4		0.281	0.288	0.273	0.044	0.179	S
H1	Cu µg/l	0.506	0.484	0.548	0.253	-0.167	S
H2		0.411	0.355	0.381	0.092	0.33	S
H3		0.303	0.278	0.321	0.084	-0.223	S
H4		0.48	0.465	0.485	0.094	-0.05	S
H1	Ni µg/l	0.508	0.528	0.533	0.179	-0.137	S
H2		0.379	0.394	0.389	0.093	-0.115	S
H3		0.376	0.383	0.403	0.149	-0.181	S
H4		0.364	0.381	0.362	0.092	0.023	S
H1	Pb µg/l	0.976	0.968	0.96	0.205	0.075	S
H2		0.996	1.01	0.942	0.09	0.601	S
H3		0.931	0.94	0.916	0.089	0.165	S
H4		0.802	0.797	0.759	0.178	0.243	S
H1	Zn µg/l	6.545	5.5	5.87	0.629	1.074	S
H2		5.302	4.53	4.743	0.696	0.803	S
H3		5.022	4.25	4.467	0.649	0.855	S
H4		4.976	4.21	4.419	0.744	0.748	S

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Besøk/visit: Instituttveien 18, 2007 Kjeller

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NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	< 4.000	0.418	0.419	0.114		B
H2		< 4.000	0.315	0.306	0.04		B
H3		< 4.000	0.365	0.36	0.038		B
H4		< 4.000	0.31	0.306	0.043		B
H1	Cd µg/l	0.15	0.048	0.053	0.021	4.506	U
H2		0.2	0.059	0.057	0.011	13.282	U
H3		0.2	0.045	0.048	0.01	15.036	U
H4		0.15	0.044	0.045	0.013	8.293	U
H1	Cr µg/l	0.5	0.396	0.384	0.044	2.617	Q
H2		0.6	0.276	0.271	0.033	9.959	U
H3		0.4	0.278	0.262	0.055	2.534	Q
H4		0.4	0.288	0.273	0.044	2.885	Q
H1	Cu µg/l	1.5	0.484	0.548	0.253	3.765	U
H2		1	0.355	0.381	0.092	6.739	U
H3		0.8	0.278	0.321	0.084	5.693	U
H4		0.7	0.465	0.485	0.094	2.296	U
H1	Ni µg/l	1	0.528	0.533	0.179	2.61	U
H2		0.6	0.394	0.389	0.093	2.27	U
H3		0.8	0.383	0.403	0.149	2.667	U
H4		0.4	0.381	0.362	0.092	0.41	S
H1	Pb µg/l	< 0.700	0.968	0.96	0.205	-2.97	U
H2		< 0.700	1.01	0.942	0.09	-6.571	U
H3		< 0.700	0.94	0.916	0.089	-6.351	U
H4		< 0.700	0.797	0.759	0.178	-2.299	U
H1	Zn µg/l	5.6	5.5	5.87	0.629	-0.429	S
H2		4.4	4.53	4.743	0.696	-0.493	S
H3		4.2	4.25	4.467	0.649	-0.412	S
H4		4.15	4.21	4.419	0.744	-0.361	S

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 NO-2027 KJELLER, Norway
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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.452	0.418	0.419	0.114	0.288	S
H2		0.331	0.315	0.306	0.04	0.63	S
H3		0.347	0.365	0.36	0.038	-0.337	S
H4		0.276	0.31	0.306	0.043	-0.69	S
H1	Cd µg/l	0.052	0.048	0.053	0.021	-0.056	S
H2		0.06	0.059	0.057	0.011	0.235	S
H3		0.048	0.045	0.048	0.01	0.006	S
H4		0.046	0.044	0.045	0.013	0.115	S
H1	Cr µg/l	0.387	0.396	0.384	0.044	0.072	S
H2		0.27	0.276	0.271	0.033	-0.031	S
H3		0.269	0.278	0.262	0.055	0.135	S
H4		0.27	0.288	0.273	0.044	-0.069	S
H1	Cu µg/l	0.511	0.484	0.548	0.253	-0.148	S
H2		0.384	0.355	0.381	0.092	0.036	S
H3		0.296	0.278	0.321	0.084	-0.302	S
H4		0.481	0.465	0.485	0.094	-0.039	S
H1	Ni µg/l	0.538	0.528	0.533	0.179	0.03	S
H2		0.389	0.394	0.389	0.093	-0.002	S
H3		0.376	0.383	0.403	0.149	-0.182	S
H4		0.366	0.381	0.362	0.092	0.04	S
H1	Pb µg/l	0.929	0.968	0.96	0.205	-0.151	S
H2		0.947	1.01	0.942	0.09	0.058	S
H3		0.894	0.94	0.916	0.089	-0.247	S
H4		0.741	0.797	0.759	0.178	-0.1	S
H1	Zn µg/l	5.63	5.5	5.87	0.629	-0.381	S
H2		4.88	4.53	4.743	0.696	0.197	S
H3		4.57	4.25	4.467	0.649	0.158	S
H4		4.26	4.21	4.419	0.744	-0.214	S

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 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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



EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	< 0.050	0.048	0.053	0.021		B
H2		< 0.050	0.059	0.057	0.011	-3.026	U
H3		< 0.050	0.045	0.048	0.01		B
H4		< 0.050	0.044	0.045	0.013		B
H1	Cr µg/l	< 0.400	0.396	0.384	0.044		B
H2		< 0.400	0.276	0.271	0.033		B
H3		< 0.400	0.278	0.262	0.055		B
H4		< 0.400	0.288	0.273	0.044		B
H1	Cu µg/l	0.49	0.484	0.548	0.253	-0.231	S
H2		0.33	0.355	0.381	0.092	-0.552	S
H3		0.3	0.278	0.321	0.084	-0.254	S
H4		0.46	0.465	0.485	0.094	-0.263	S
H1	Ni µg/l	< 0.700	0.528	0.533	0.179		B
H2		< 0.700	0.394	0.389	0.093		B
H3		< 0.700	0.383	0.403	0.149		B
H4		< 0.700	0.381	0.362	0.092		B
H1	Pb µg/l	1.05	0.968	0.96	0.205	0.438	S
H2		1.11	1.01	0.942	0.09	1.868	S
H3		1.05	0.94	0.916	0.089	1.504	S
H4		0.87	0.797	0.759	0.178	0.625	S
H1	Zn µg/l	6.5	5.5	5.87	0.629	1.002	S
H2		7	4.53	4.743	0.696	3.244	U
H3		5.8	4.25	4.467	0.649	2.053	Q
H4		5.3	4.21	4.419	0.744	1.184	Q

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 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.395	0.418	0.419	0.114	-0.214	S
H2		0.276	0.315	0.306	0.04	-0.753	S
H3		0.321	0.365	0.36	0.038	-1.017	S
H4		0.317	0.31	0.306	0.043	0.254	S
H1	Cd µg/l	0.046	0.048	0.053	0.021	-0.312	S
H2		0.058	0.059	0.057	0.011	0.002	S
H3		0.045	0.045	0.048	0.01	-0.291	S
H4		0.043	0.044	0.045	0.013	-0.161	S
H1	Cr µg/l	0.387	0.396	0.384	0.044	0.072	S
H2		0.264	0.276	0.271	0.033	-0.212	S
H3		0.264	0.278	0.262	0.055	0.044	S
H4		0.277	0.288	0.273	0.044	0.09	S
H1	Cu µg/l	0.469	0.484	0.548	0.253	-0.314	S
H2		0.35	0.355	0.381	0.092	-0.334	S
H3		0.296	0.278	0.321	0.084	-0.302	S
H4		0.456	0.465	0.485	0.094	-0.306	S
H1	Ni µg/l	0.504	0.528	0.533	0.179	-0.16	S
H2		0.368	0.394	0.389	0.093	-0.228	S
H3		0.433	0.383	0.403	0.149	0.201	S
H4		0.358	0.381	0.362	0.092	-0.047	S
H1	Pb µg/l	0.941	0.968	0.96	0.205	-0.093	S
H2		0.957	1.01	0.942	0.09	0.169	S
H3		0.9	0.94	0.916	0.089	-0.179	S
H4		0.768	0.797	0.759	0.178	0.052	S
H1	Zn µg/l	5.33	5.5	5.87	0.629	-0.858	S
H2		4.42	4.53	4.743	0.696	-0.465	S
H3		4.2	4.25	4.467	0.649	-0.412	S
H4		4.07	4.21	4.419	0.744	-0.469	S

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 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	0.446	0.418	0.419	0.114	0.232	S
H2		0.414	0.315	0.306	0.04	2.73	Q
H3		0.427	0.365	0.36	0.038	1.747	S
H4		0.351	0.31	0.306	0.043	1.044	S
H1	Cd µg/l	0.052	0.048	0.053	0.021	-0.056	S
H2		0.059	0.059	0.057	0.011	0.095	S
H3		0.047	0.045	0.048	0.01	-0.133	S
H4		0.045	0.044	0.045	0.013	0.075	S
H1	Cr µg/l	0.398	0.396	0.384	0.044	0.324	S
H2		0.283	0.276	0.271	0.033	0.372	S
H3		0.292	0.278	0.262	0.055	0.551	S
H4		0.299	0.288	0.273	0.044	0.586	S
H1	Cu µg/l	0.528	0.484	0.548	0.253	-0.08	S
H2		0.388	0.355	0.381	0.092	0.076	S
H3		0.319	0.278	0.321	0.084	-0.024	S
H4		0.528	0.465	0.485	0.094	0.466	S
H1	Ni µg/l	1	0.528	0.533	0.179	2.61	U
H2		0.406	0.394	0.389	0.093	0.177	S
H3		0.434	0.383	0.403	0.149	0.21	S
H4		0.407	0.381	0.362	0.092	0.484	S
H1	Pb µg/l	1.04	0.968	0.96	0.205	0.389	S
H2		1.028	1.01	0.942	0.09	0.954	S
H3		0.971	0.94	0.916	0.089	0.619	S
H4		0.831	0.797	0.759	0.178	0.408	S
H1	Zn µg/l	5.777	5.5	5.87	0.629	-0.147	S
H2		4.575	4.53	4.743	0.696	-0.242	S
H3		4.353	4.25	4.467	0.649	-0.177	S
H4		4.294	4.21	4.419	0.744	-0.168	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	3.657	0.418	0.419	0.114	28.518	U
H2		0.495	0.315	0.306	0.04	4.754	U
H3		0.467	0.365	0.36	0.038	2.801	Q
H4		0.385	0.31	0.306	0.043	1.82	S
H1	Cd $\mu\text{g/l}$	6.061	0.048	0.053	0.021	279.648	U
H2		0.061	0.059	0.057	0.011	0.328	S
H3		0.061	0.045	0.048	0.01	1.291	Q
H4		0.018	0.044	0.045	0.013	-2.087	U
H1	Cr $\mu\text{g/l}$	5.488	0.396	0.384	0.044	114.972	U
H2		0.289	0.276	0.271	0.033	0.544	S
H3		0.238	0.278	0.262	0.055	-0.433	S
H4		0.185	0.288	0.273	0.044	-2	Q
H1	Cu $\mu\text{g/l}$	5.634	0.484	0.548	0.253	20.12	U
H2		0.275	0.355	0.381	0.092	-1.15	S
H3		0.183	0.278	0.321	0.084	-1.646	Q
H4		0.166	0.465	0.485	0.094	-3.397	U
H1	Ni $\mu\text{g/l}$	5.147	0.528	0.533	0.179	25.775	U
H2		0.398	0.394	0.389	0.093	0.095	S
H3		0.221	0.383	0.403	0.149	-1.223	Q
H4		0.345	0.381	0.362	0.092	-0.188	S
H1	Pb $\mu\text{g/l}$	5.887	0.968	0.96	0.205	23.985	U
H2		0.811	1.01	0.942	0.09	-1.452	Q
H3		0.871	0.94	0.916	0.089	-0.505	S
H4		0.778	0.797	0.759	0.178	0.108	S
H1	Zn $\mu\text{g/l}$	5.558	5.5	5.87	0.629	-0.495	S
H2		3.48	4.53	4.743	0.696	-1.816	S
H3		2.62	4.25	4.467	0.649	-2.846	Q
H4		2.454	4.21	4.419	0.744	-2.64	Q

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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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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 141, Japan Meteorological Agency, Atmospheric Environment and Marine Division (Japan)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
H1	As $\mu\text{g/l}$	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	0.025	0.048	0.053	0.021	-1.312	Q
H2		0.036	0.059	0.057	0.011	-2.001	Q
H3		0.019	0.045	0.048	0.01	-2.862	U
H4		0.018	0.044	0.045	0.013	-2.087	U
H1	Cr $\mu\text{g/l}$	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	-999	0.484	0.548	0.253		B
H2		-999	0.355	0.381	0.092		B
H3		-999	0.278	0.321	0.084		B
H4		-999	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	-999	0.528	0.533	0.179		B
H2		-999	0.394	0.389	0.093		B
H3		-999	0.383	0.403	0.149		B
H4		-999	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	-999	0.968	0.96	0.205		B
H2		-999	1.01	0.942	0.09		B
H3		-999	0.94	0.916	0.089		B
H4		-999	0.797	0.759	0.178		B
H1	Zn $\mu\text{g/l}$	-999	5.5	5.87	0.629		B
H2		-999	4.53	4.743	0.696		B
H3		-999	4.25	4.467	0.649		B
H4		-999	4.21	4.419	0.744		B

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 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
Internet: www.nilu.no
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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.372	0.418	0.419	0.114	-0.417	S
H2		0.364	0.315	0.306	0.04	1.46	S
H3		0.354	0.365	0.36	0.038	-0.154	S
H4		0.307	0.31	0.306	0.043	0.024	S
H1	Cd $\mu\text{g/l}$	0.048	0.048	0.053	0.021	-0.256	S
H2		0.062	0.059	0.057	0.011	0.422	S
H3		0.046	0.045	0.048	0.01	-0.212	S
H4		0.045	0.044	0.045	0.013	0.012	S
H1	Cr $\mu\text{g/l}$	0.351	0.396	0.384	0.044	-0.739	S
H2		0.263	0.276	0.271	0.033	-0.243	S
H3		0.26	0.278	0.262	0.055	-0.03	S
H4		0.274	0.288	0.273	0.044	0.022	S
H1	Cu $\mu\text{g/l}$	0.464	0.484	0.548	0.253	-0.334	S
H2		0.369	0.355	0.381	0.092	-0.127	S
H3		0.283	0.278	0.321	0.084	-0.457	S
H4		0.462	0.465	0.485	0.094	-0.242	S
H1	Ni $\mu\text{g/l}$	0.494	0.528	0.533	0.179	-0.216	S
H2		0.396	0.394	0.389	0.093	0.073	S
H3		0.377	0.383	0.403	0.149	-0.175	S
H4		0.391	0.381	0.362	0.092	0.312	S
H1	Pb $\mu\text{g/l}$	0.852	0.968	0.96	0.205	-0.526	S
H2		0.973	1.01	0.942	0.09	0.347	S
H3		0.908	0.94	0.916	0.089	-0.09	S
H4		0.759	0.797	0.759	0.178	0.001	S
H1	Zn $\mu\text{g/l}$	4.61	5.5	5.87	0.629	-2.003	S
H2		4.29	4.53	4.743	0.696	-0.651	S
H3		3.81	4.25	4.467	0.649	-1.013	S
H4		3.98	4.21	4.419	0.744	-0.59	S

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 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

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* Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	0.413	0.418	0.419	0.114	-0.056	S
H2		0.284	0.315	0.306	0.04	-0.552	S
H3		0.336	0.365	0.36	0.038	-0.625	S
H4		0.295	0.31	0.306	0.043	-0.253	S
H1	Cd $\mu\text{g/l}$	0.046	0.048	0.053	0.021	-0.335	S
H2		0.056	0.059	0.057	0.011	-0.138	S
H3		0.044	0.045	0.048	0.01	-0.39	S
H4		0.044	0.044	0.045	0.013	-0.043	S
H1	Cr $\mu\text{g/l}$	0.386	0.396	0.384	0.044	0.049	S
H2		0.273	0.276	0.271	0.033	0.06	S
H3		0.264	0.278	0.262	0.055	0.044	S
H4		0.263	0.288	0.273	0.044	-0.228	S
H1	Cu $\mu\text{g/l}$	0.478	0.484	0.548	0.253	-0.278	S
H2		0.353	0.355	0.381	0.092	-0.301	S
H3		0.327	0.278	0.321	0.084	0.067	S
H4		0.469	0.465	0.485	0.094	-0.167	S
H1	Ni $\mu\text{g/l}$	0.538	0.528	0.533	0.179	0.03	S
H2		0.427	0.394	0.389	0.093	0.407	S
H3		0.403	0.383	0.403	0.149	0	S
H4		0.374	0.381	0.362	0.092	0.127	S
H1	Pb $\mu\text{g/l}$	0.94	0.968	0.96	0.205	-0.098	S
H2		0.958	1.01	0.942	0.09	0.18	S
H3		0.902	0.94	0.916	0.089	-0.157	S
H4		0.762	0.797	0.759	0.178	0.018	S
H1	Zn $\mu\text{g/l}$	5.756	5.5	5.87	0.629	-0.181	S
H2		4.49	4.53	4.743	0.696	-0.364	S
H3		4.431	4.25	4.467	0.649	-0.056	S
H4		4.178	4.21	4.419	0.744	-0.324	S

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 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	< 0.500	0.048	0.053	0.021		B
H2		< 0.500	0.059	0.057	0.011		B
H3		< 0.500	0.045	0.048	0.01		B
H4		< 0.500	0.044	0.045	0.013		B
H1	Cr µg/l	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu µg/l	< 9.000	0.484	0.548	0.253		B
H2		< 9.000	0.355	0.381	0.092		B
H3		< 9.000	0.278	0.321	0.084		B
H4		< 9.000	0.465	0.485	0.094		B
H1	Ni µg/l	-999	0.528	0.533	0.179		B
H2		-999	0.394	0.389	0.093		B
H3		-999	0.383	0.403	0.149		B
H4		-999	0.381	0.362	0.092		B
H1	Pb µg/l	1.593	0.968	0.96	0.205	3.081	U
H2		1.709	1.01	0.942	0.09	8.52	U
H3		0.939	0.94	0.916	0.089	0.258	S
H4		1.086	0.797	0.759	0.178	1.84	Q
H1	Zn µg/l	5.487	5.5	5.87	0.629	-0.608	S
H2		4.437	4.53	4.743	0.696	-0.44	S
H3		4.192	4.25	4.467	0.649	-0.424	S
H4		4.261	4.21	4.419	0.744	-0.212	S

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Framsenteret / The Fram Centre
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Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

Laboratory 171, IMT Lille Douai (France)

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	0.414	0.418	0.419	0.114	-0.051	S
H2		0.307	0.315	0.306	0.04	0.029	S
H3		0.358	0.365	0.36	0.038	-0.052	S
H4		0.301	0.31	0.306	0.043	-0.117	S
H1	Cd µg/l	0.05	0.048	0.053	0.021	-0.167	S
H2		0.058	0.059	0.057	0.011	0.021	S
H3		0.045	0.045	0.048	0.01	-0.242	S
H4		0.043	0.044	0.045	0.013	-0.098	S
H1	Cr µg/l	0.394	0.396	0.384	0.044	0.239	S
H2		0.271	0.276	0.271	0.033	-0.001	S
H3		0.279	0.278	0.262	0.055	0.316	S
H4		0.286	0.288	0.273	0.044	0.288	S
H1	Cu µg/l	0.491	0.484	0.548	0.253	-0.227	S
H2		0.356	0.355	0.381	0.092	-0.271	S
H3		0.321	0.278	0.321	0.084	-0.006	S
H4		0.477	0.465	0.485	0.094	-0.076	S
H1	Ni µg/l	0.539	0.528	0.533	0.179	0.036	S
H2		0.395	0.394	0.389	0.093	0.059	S
H3		0.387	0.383	0.403	0.149	-0.111	S
H4		0.386	0.381	0.362	0.092	0.257	S
H1	Pb µg/l	1.003	0.968	0.96	0.205	0.21	S
H2		1.023	1.01	0.942	0.09	0.902	S
H3		0.975	0.94	0.916	0.089	0.659	S
H4		0.822	0.797	0.759	0.178	0.354	S
H1	Zn µg/l	5.958	5.5	5.87	0.629	0.141	S
H2		4.581	4.53	4.743	0.696	-0.233	S
H3		4.377	4.25	4.467	0.649	-0.14	S
H4		4.261	4.21	4.419	0.744	-0.212	S

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PO Box 100
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Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
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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 2020

Laboratory 178, Laboratory of Hydrochemistry and Atmospheric Chemistry an EANET Monitoring Laboratory (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	0.42	0.418	0.419	0.114	0.006	S
H2		0.31	0.315	0.306	0.04	0.102	S
H3		0.31	0.365	0.36	0.038	-1.305	S
H4		0.23	0.31	0.306	0.043	-1.749	Q
H1	Cd µg/l	0.043	0.048	0.053	0.021	-0.474	S
H2		0.063	0.059	0.057	0.011	0.515	S
H3		0.049	0.045	0.048	0.01	0.104	S
H4		0.044	0.044	0.045	0.013	-0.043	S
H1	Cr µg/l	0.28	0.396	0.384	0.044	-2.338	Q
H2		0.2	0.276	0.271	0.033	-2.15	Q
H3		0.15	0.278	0.262	0.055	-2.044	Q
H4		0.11	0.288	0.273	0.044	-3.704	U
H1	Cu µg/l	0.77	0.484	0.548	0.253	0.877	U
H2		0.68	0.355	0.381	0.092	3.257	U
H3		0.53	0.278	0.321	0.084	2.481	U
H4		0.62	0.465	0.485	0.094	1.443	Q
H1	Ni µg/l	0.52	0.528	0.533	0.179	-0.071	S
H2		0.41	0.394	0.389	0.093	0.224	S
H3		0.39	0.383	0.403	0.149	-0.088	S
H4		0.39	0.381	0.362	0.092	0.302	S
H1	Pb µg/l	0.87	0.968	0.96	0.205	-0.439	S
H2		1.08	1.01	0.942	0.09	1.535	S
H3		0.93	0.94	0.916	0.089	0.157	S
H4		0.79	0.797	0.759	0.178	0.176	S
H1	Zn µg/l	5.89	5.5	5.87	0.629	0.032	S
H2		5.41	4.53	4.743	0.696	0.958	S
H3		4.42	4.25	4.467	0.649	-0.073	S
H4		3.67	4.21	4.419	0.744	-1.006	S

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PO Box 100
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Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	< 0.100	0.048	0.053	0.021		B
H2		< 0.100	0.059	0.057	0.011		B
H3		< 0.100	0.045	0.048	0.01		B
H4		< 0.100	0.044	0.045	0.013		B
H1	Cr $\mu\text{g/l}$	< 1.000	0.396	0.384	0.044		B
H2		< 1.000	0.276	0.271	0.033		B
H3		< 1.000	0.278	0.262	0.055		B
H4		< 1.000	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	< 1.000	0.484	0.548	0.253		B
H2		< 1.000	0.355	0.381	0.092		B
H3		< 1.000	0.278	0.321	0.084		B
H4		< 1.000	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	< 5.000	0.528	0.533	0.179		B
H2		< 5.000	0.394	0.389	0.093		B
H3		< 5.000	0.383	0.403	0.149		B
H4		< 5.000	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	< 2.000	0.968	0.96	0.205		B
H2		< 2.000	1.01	0.942	0.09		B
H3		< 2.000	0.94	0.916	0.089		B
H4		< 2.000	0.797	0.759	0.178		B
H1	Zn $\mu\text{g/l}$	5.12	5.5	5.87	0.629	-1.192	S
H2		4.18	4.53	4.743	0.696	-0.81	S
H3		< 4.000	4.25	4.467	0.649	-3.801	U
H4		< 4.000	4.21	4.419	0.744	-3.25	U

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NILU – Norsk institutt for luftforskning
 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
 Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
 Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
 nilu-tromso@nilu.no
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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	0.071	0.048	0.053	0.021	0.829	Q
H2		0.073	0.059	0.057	0.011	1.447	S
H3		0.066	0.045	0.048	0.01	1.785	Q
H4		0.17	0.044	0.045	0.013	9.866	U
H1	Cr $\mu\text{g/l}$	0.4	0.396	0.384	0.044	0.365	S
H2		0.29	0.276	0.271	0.033	0.575	S
H3		0.3	0.278	0.262	0.055	0.703	S
H4		0.38	0.288	0.273	0.044	2.431	Q
H1	Cu $\mu\text{g/l}$	1.1	0.484	0.548	0.253	2.183	U
H2		0.48	0.355	0.381	0.092	1.081	Q
H3		0.44	0.278	0.321	0.084	1.411	U
H4		1.09	0.465	0.485	0.094	6.454	U
H1	Ni $\mu\text{g/l}$	0.66	0.528	0.533	0.179	0.711	S
H2		0.48	0.394	0.389	0.093	0.978	S
H3		0.51	0.383	0.403	0.149	0.718	Q
H4		0.56	0.381	0.362	0.092	2.152	Q
H1	Pb $\mu\text{g/l}$	0.97	0.968	0.96	0.205	0.048	S
H2		1.05	1.01	0.942	0.09	1.202	S
H3		1.03	0.94	0.916	0.089	1.279	S
H4		0.97	0.797	0.759	0.178	1.188	S
H1	Zn $\mu\text{g/l}$	5.9	5.5	5.87	0.629	0.048	S
H2		4.8	4.53	4.743	0.696	0.082	S
H3		4.5	4.25	4.467	0.649	0.05	S
H4		4.9	4.21	4.419	0.744	0.646	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
H1	As $\mu\text{g/l}$	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd $\mu\text{g/l}$	< 0.400	0.048	0.053	0.021		B
H2		< 0.400	0.059	0.057	0.011		B
H3		< 0.400	0.045	0.048	0.01		B
H4		< 0.400	0.044	0.045	0.013		B
H1	Cr $\mu\text{g/l}$	< 2.000	0.396	0.384	0.044		B
H2		< 2.000	0.276	0.271	0.033		B
H3		< 2.000	0.278	0.262	0.055		B
H4		< 2.000	0.288	0.273	0.044		B
H1	Cu $\mu\text{g/l}$	-999	0.484	0.548	0.253		B
H2		-999	0.355	0.381	0.092		B
H3		-999	0.278	0.321	0.084		B
H4		-999	0.465	0.485	0.094		B
H1	Ni $\mu\text{g/l}$	< 2.000	0.528	0.533	0.179		B
H2		< 2.000	0.394	0.389	0.093		B
H3		< 2.000	0.383	0.403	0.149		B
H4		< 2.000	0.381	0.362	0.092		B
H1	Pb $\mu\text{g/l}$	< 5.000	0.968	0.96	0.205		B
H2		< 5.000	1.01	0.942	0.09		B
H3		< 5.000	0.94	0.916	0.089		B
H4		< 5.000	0.797	0.759	0.178		B
H1	Zn $\mu\text{g/l}$	< 10.000	5.5	5.87	0.629		B
H2		< 10.000	4.53	4.743	0.696		B
H3		< 10.000	4.25	4.467	0.649		B
H4		< 10.000	4.21	4.419	0.744		B

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 PO Box 100
 NO-2027 KJELLER, Norway
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 Framsenteret / The Fram Centre
 NO-9296 TROMSØ, Norway
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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 2020

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 *
H1	As µg/l	-999	0.418	0.419	0.114		B
H2		-999	0.315	0.306	0.04		B
H3		-999	0.365	0.36	0.038		B
H4		-999	0.31	0.306	0.043		B
H1	Cd µg/l	-999	0.048	0.053	0.021		B
H2		-999	0.059	0.057	0.011		B
H3		-999	0.045	0.048	0.01		B
H4		-999	0.044	0.045	0.013		B
H1	Cr µg/l	-999	0.396	0.384	0.044		B
H2		-999	0.276	0.271	0.033		B
H3		-999	0.278	0.262	0.055		B
H4		-999	0.288	0.273	0.044		B
H1	Cu µg/l	-999	0.484	0.548	0.253		B
H2		-999	0.355	0.381	0.092		B
H3		-999	0.278	0.321	0.084		B
H4		-999	0.465	0.485	0.094		B
H1	Ni µg/l	-999	0.528	0.533	0.179		B
H2		-999	0.394	0.389	0.093		B
H3		-999	0.383	0.403	0.149		B
H4		-999	0.381	0.362	0.092		B
H1	Pb µg/l	-999	0.968	0.96	0.205		B
H2		-999	1.01	0.942	0.09		B
H3		-999	0.94	0.916	0.089		B
H4		-999	0.797	0.759	0.178		B
H1	Zn µg/l	< 11.000	5.5	5.87	0.629		B
H2		< 11.000	4.53	4.743	0.696		B
H3		< 11.000	4.25	4.467	0.649		B
H4		< 11.000	4.21	4.419	0.744		B

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NILU – Norsk institutt for luftforskning
PO Box 100
NO-2027 KJELLER, Norway
Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
Besøk/visit: Instituttveien 18, 2007 Kjeller

NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
nilu-tromso@nilu.no
Internet: www.nilu.no
Bank: 5102.05.19030
Foretaksnr./Enterprise no. 941705561

Vennligst adresser post til NILU, ikke til enkeltpersoner/Please reply to the institute.

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:

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EMEP – Analytical intercomparison of heavy metals in precipitation 2020

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 *
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PO Box 100
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Phone: +47 63 89 80 00/Fax: +47 63 89 80 50
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NILU – Norsk institutt for luftforskning
Framsenteret / The Fram Centre
NO-9296 TROMSØ, Norway
Phone: +47 77 75 03 75/Fax: +47 77 75 03 76
Besøk/visit: Hjalmar Johansens gt. 14, 9007 Tromsø

e-mail: nilu@nilu.no
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