

Musselshell Watershed Coalition

Salinity Meter End of Season Assessment: November 2016

Summary prepared by Travis Wilson and Adam Sigler 11/14/2016

On November 9th 2016, all 5 meters were assessed at the same time for reading agreement. This was conducted at the USDA NRCS Field Office in Winnett, MT by Travis Wilson. All five meters were placed in the same tub of water and readings were recorded simultaneously while slugs of salt water were added to assess agreement among the meters over the range of salinities observed during the monitoring season. The full results are in the table below. In comparing all of the meters, there was never a relative percent difference (RPD) of more than 4% among meters, and the maximum difference was approximately half of that if meters were allowed to equilibrate for 5 minutes in the salt water solution. RPD was calculated as the percent difference of each meter from the mean of all the meters. At no point did the RPD for any meter exceed 3% after the meters had been given 2 minutes to equilibrate with the saline solution.

Time	LMCD 1		LMCD 2		LMCD 3		LMCD 4		ProPlus		Avg.	Notes
	SC	RPD	SC	RPD	SC	RPD	SC	RPD	SC	RPD		
15:13	1632	-1.35%	1662	0.46%	1597	-3.47%	1704	3.00%	1677	1.37%	1654.4	Placed probes in tub of Winnett NRCS field office tap water.
15:15	1631	-1.32%	1654	0.07%	1596	-3.44%	1697	2.67%	1686	2.01%	1652.8	
15:17	1632	-2.16%	1655	-0.78%	1658	-0.60%	1700	1.92%	1695	1.62%	1668.0	
15:19	1632	-2.16%	1655	-0.78%	1659	-0.54%	1699	1.86%	1695	1.62%	1668.0	
15:21	1633	-2.13%	1656	-0.76%	1660	-0.52%	1699	1.82%	1695	1.58%	1668.6	
15:23	1633	-2.27%	1667	-0.24%	1660	-0.66%	1700	1.74%	1695	1.44%	1671.0	
15:24	1850	-0.33%	1849	-0.39%	1848	-0.44%	1870	0.74%	1864	0.42%	1856.2	Added salt water to the tub of tap water/probes, mixed in the salt water.
15:26	1850	-0.34%	1849	-0.40%	1848	-0.45%	1871	0.79%	1864	0.41%	1856.4	
15:28	1849	-0.39%	1849	-0.39%	1848	-0.44%	1871	0.80%	1864	0.42%	1856.2	
15:29	1990	-0.54%	1993	-0.39%	1990	-0.54%	2017	0.81%	2014	0.66%	2000.8	Added salt water to the tub of tap water/probes, mixed in the salt water.
15:31	1990	-0.55%	1994	-0.35%	1990	-0.55%	2018	0.85%	2013	0.60%	2001.0	
15:33	1990	-0.56%	1994	-0.36%	1991	-0.51%	2018	0.84%	2013	0.59%	2001.2	
15:34	2181	-0.28%	2179	-0.37%	2177	-0.47%	2202	0.68%	2197	0.45%	2187.2	Added salt water to the tub of tap water/probes, mixed in the salt water.
15:36	2182	-0.27%	2180	-0.36%	2176	-0.54%	2203	0.69%	2198	0.47%	2187.8	
15:38	2181	-0.32%	2181	-0.32%	2177	-0.50%	2203	0.69%	2198	0.46%	2188.0	
15:40	2181	-0.32%	2181	-0.32%	2177	-0.50%	2203	0.69%	2198	0.46%	2188.0	

Travis Wilson subsequently recorded meter readings in 1413 solution before and after cleaning the meter electrodes. The RPD between pre and post cleaning was not greater than 3% for any of the meters. All meters read within 1% of the 1413 solution post cleaning.

		LMCD 1			LMCD 2			LMCD 3			LMCD 4			ProPlus		
		Time	SC	Temp	Time	SC	Temp	Time	SC	Temp	Time	SC	Temp	Time	SC	Temp
2016	Pre-cleaning	15:49	1412	19.9	16:56	1423	21.2	16:25	1423	20.6	16:25	1426	21	15:48	1408	21
		15:51	1418	19.9	16:58	1430	21.1	16:27	1434	20.4	16:27	1438	20.8	15:50	1417	20.9
		15:53	1419	20	17:00	1433	21.1	16:29	1437	20.4	16:29	1442	20.8	15:52	1417	20.9
		15:55	1419	20.1	17:02	1434	21.1	16:31	1437	20.5	16:31	1443	20.9	15:54	1417	20.9
					17:04	1435	21.2	16:33	1437	20.6	16:33	1444	20.9			
	Post-cleaning	16:08	1420	22.1	17:09	1404	22.1	16:41	1410	22	16:41	1405	22.4	16:08	1418	21.5
		16:10	1414	22.3	17:11	1401	22.4	16:43	1409	22.3	16:43	1407	22.6	16:10	1420	21.5
		16:12	1410	22.3	17:13	1400	22.5	16:45	1407	22.4	16:45	1404	22.6	16:12	1420	21.5
		16:14	1408	22.4	17:15	1401	22.5	16:47	1406	22.4	16:47	1403	22.6	16:14	1421	21.5
		16:16	1407	22.4	17:17	1401	22.4	16:49	1406	22.4	16:49	1404	22.6	16:16	1421	21.4
		RPD (pre vs post clean)		0.8%			2.3%			2.2%			2.7%			-0.3%
		RPD (post clean reading vs 1413 solution)		-0.4%			-0.8%			-0.5%			-0.6%			0.6%

In summary, the difference among meters at the end of the season was less than 3% across salinity levels given proper equilibration time and the difference from calibration solution was less than 1%. This verified high level of accuracy without calibration during the season indicates that the current procedure of calibrating only once at the beginning of the season and checking again at the end produces accurate results while dramatically reducing strain on volunteers.