Effective Date: 24-Apr-14
Revision Number: 2

LINE 3 SCRUBBER THICKENER OVERFLOW WS003

Date	Time	Thickener Overflow			Recirc Tank Blowdown			Field Notes	Technician
		pH	S. C. uS/cm	Temp. °C	pH	S. C. uS/cm	Temp. °C		
1-6-16	08:50	9.41	3714	37.2	4.41	3731	41.8		PM
1-13-16	08:50	9.79	3713	38.1	6.51	3848	41.0		PM
1/19/16	1405	9.35	3390	33.0	2.90	3550	44.0		TAM
2/3/16	08:40	9.97	2802	27.0	5.73	4216	44.2		PM
2/10/16	08:30	11.68	6410	35.5	5.88	4740	43.1		PM
2/17/16	08:40	11.79	7190	36.1	3.55	5020	46.3		PM
2/24/16	08:30	10.70	4461	36.9	6.14	4850	44.4		PM
3/2/16	08:45	10.26	4830	35.0	3.38	5050	44.8		PM
3/9/16	08:35	10.25	4541	36.7	3.21	4670	45.8		PM
3/16/16	09:45	10.92	4990	31.7	4.60	4880	45.9		PM/RP
3/23/16	11:50	10.58	3860	33.7	3.25	3915	42.1		PM
3/30/16	08:50	10.18	4640	40.2	3.37	4522	44.7		PM
4/6/16	08:30	10.73	6270	40.5	2.90	4960	46.0		PM
4/13/16	08:20	10.59	4573	24.0	4.16	4910	46.2		PM
4/20/16	08:20	11.41	4871	22.5	4.35	4537	44.8		PM
4/27/16	08:35	10.14	3979	25.0	3.10	4387	45.3		PM
5/5/16	08:30	7.43	4650	38.8	5.48	4800	47.4		PM/RP
5/11/16	08:45	8.03	4426	25.5	8.28	2845	18.7		PM
5/18/16	08:45	9.68	4810	37.7	5.35	5350	44.6		PM
5/25/16	08:50	9.12	4820	40.6	4.80	4550	46.5		PM
6/1/16	08:40	4.43	4670	41.0	4.18	4760	48.2		PM
6/8/16	08:40	9.53	4720	38.1	5.85	4990	46.0		PM

Effective Date: 24-Apr-14
Revision Number: 2

LINE 3 SCRUBBER THICKENER OVERFLOW WS003

Date	Time	Thickener Overflow pH	Thickener Overflow S. C. uS/cm	Thickener Overflow Temp. °C	Recirc Tank Blowdown pH	Recirc Tank Blowdown S. C. uS/cm	Recirc Tank Blowdown Temp. °C	Field Notes	Technician
6/15/16	08:40	*Line	3 Do	wn *	8.18	2094	16.4	Clear water Line Down	PM
6/22/16	08:35	6.88	4580	45.1	4.40	4590	49.7	valve open - water running out	PM
6/29/16	08:45	9.26	4427	37.9	3.46	4590	48.0		PM
7/6/16	09:25	8.10	4720	34.8	4.97	4640	47.2		PM
7/13/16	08:30	9.11	4196	31.0	3.77	4169	46.5		PM
7/20/16	08:45	8.25	4660	43.4	3.98	4670	52.3		RP
7/26/16	08:40	9.00	4560	31.4	3.90	4820	48.0		PM
8/3/16	08:15	9.12	4104	32.9	7.68	2732	40.6		PM
8/10/16	08:40	9.47	4002	42.0	3.84	4840	51.3		PM/JB
8/17/16	08:30	9.77	1423	43.1	8.40	3320	37.9		JB
8/23/16	08:20	9.35	4269	27.1	2.63	4299	45.6		PM
8/31/16	08:35	9.42	3880	22.0	4.09	4220	46.3		PM
9/7/16	08:25	9.59	3969	37.7	6.06	4158	47.5		PM
9/14/16	08:40	9.58	4054	19.5	4.49	4830	43.7		PM
9/21/16	08:35	9.82	4430	26.0	7.47	4820	45.8		PM
9/28/16	08:30	9.33	4063	20.4	4.09	4740	51.1		PM/JB
10/6/16	09:55	8.97	4850	37.3	7.48	4930	45.7		PM
10/12/16	08:50	9.64	4594	19.9	7.25	3815	32.2		PM
10/19/16	08:45	9.01	3640	36.9	4.32	3662	44.3		PM
10/26/16	08:50	9.31	3780	22.2	2.84	3990	41.1		PM
11/2/16	08:45	9.38	4200	39.9	4.75	4225	47.2		JB/PM
11/9/16	08:40	8.71	4487	38.7	4.59	4640	41.4		PM

Effective Date: 24-Apr-14
Revision Number: 2

LINE 3 SCRUBBER THICKENER OVERFLOW WS003

Date	Time	Thickener Overflow			Recirc Tank Blowdown			Field Notes	Technician
		pH	S. C. uS/cm	Temp. °C	pH	S. C. uS/cm	Temp. °C		
11/16/16	08:35	9.63	4376	37.9	4.70	4418	45.4		PM
11/23/16	08:45	9.47	4072	37.7	7.03	4060	41.5		PM
11/30/16	09:20	9.93	4292	41.5	8.45	3991	30.0		PM
12/7/16	08:55	9.24	4323	35.2	8.38	2853	25.3		PM
12/14/16	08:40	9.20	4280	34.9	5.15	4560	44.0		PM
12/19/16	08:40	9.53	4007	40.2	3.05	4348	48.1		JB
12/28/16	09:00	—	—	—	—	—	—	Down - All valves open	PM

Effective Date: 12-Jun-14
Revision Number: 1

020 SEEP (West Perimeter Dike) SD001

Date	Time	Gage Height ft	Discharge cfs	pH	Temp. °C	S.C. uS/cm	Field Notes	Technicians
1-6-16	11:30	0.42	0.29	7.22	8.1	2528		PM
1-20-16	11:30	0.42	0.29	7.15	5.5	2511		PM
2-3-16	11:30	0.40	0.25	7.19	8.7	2785		PM
2-17-16	11:00	0.40	0.25	7.11	9.2	2834		PM
3-2-16	11:30	0.40	0.25	7.18	9.4	2823		PM
3-16-16	11:15	0.40	0.25	7.18	10.7	2809		PM/RP
4-6-16	11:30	0.40	0.25	7.17	10.1	2915		PM
4-20-16	11:30	0.38	0.22	7.18	11.1	2840		PM
5-5-16	10:45	0.40	0.25	7.09	11.1	2919		PM
5-18-16	11:00	0.40	0.25	6.99	11.2	2928		PM
6-1-16	11:00	0.38	0.22	7.24	11.1	2818	downstream beaver activity causing water to back up into the weir	PM
6-15-16	11:15	0.48	0.40	7.07	10.4	2700	Assume flow = that measured on 6/1/16	PM
7-6-16	11:20	0.66	0.88	7.17	10.1	2767	Backed up	PM
7-20-16	10:30	0.38	0.22	7.15	9.3	2752	WILDLIFE CONTROL REMOVED BEAVER DAM ON OR ABOUT 7/16.	RP
8-3-16	11:00	0.40	0.25	7.16	9.3	2267		PM
8/17/16	10:45	0.40	0.25	7.02	9.4	2720		JB
9/7/16	11:20	0.40	0.25	7.25	8.2	2719		PM
9/21/16	10:40	0.40	0.25	7.29	7.9	2790		PM
10/6/16	11:30	0.48	0.40	7.14	8.5	2695	water backup	PM
10/19/16	10:30	0.48	0.40	7.12	8.3	2638	WATER backup - beaver activity	PM
11/2/16	10:30	0.40	0.25	7.21	8.7	2508		JB/PM
11/16/16	10:45	0.38	0.22	7.12	9.0	2714		PM
12/7/16	11:10	0.40	0.25	7.21	8.7	2719		PM
12/19/16	09:45	0.40	0.25	7.16	8.3	2716		

USS MINNESOTA ORE OPERATIONS - MINNTAC

FIELD INSTRUMENT CALIBRATION RECORD

YSI MODEL 63 (pH/Specific Conductance/Temperature)

Effective Date: 15-Mar-11
Revision Number: 3

Calibration Date	pH				SPECIFIC CONDUCTANCE				Comments	Technician
	Offset Reading	Slope Readings		Replace Probe? (Yes/No)	Calibration Standard uS/cm	Temp. °C	Initial Reading uS/cm	Final Reading uS/cm		
	7.0 Buffer	4.0 Buffer	10.0 Buffer							
1-6-16	7.02	—	10.06	N	—	—	—	—	old instrument	PM
1-13-16	7.02	—	10.05	N	—	—	—	—	"	PM
1/19/16	7.02	—	10.06	N	—	—	—	—	"	TAM
1-20-16	7.02	—	10.06	N	—	—	—	—	"	PM
1-27-16	7.02	—	10.06	N	—	—	—	—	"	PM
2-3-16	7.02	—	10.06	N	—	—	—	—	(repaired) original instrument	PM
2-10-16	7.02	—	10.06	N	—	—	—	—		PM
2-17-16	7.02	—	10.05	N	—	—	—	—		PM
2-24-16	7.02	—	10.06	N	—	—	—	—		PM
3-2-16	7.02	—	10.06	N	—	—	—	—		PM
3/7/16	7.02	—	10.06	N	—	—	—	—	MDH here to Sample	TAM
3/9/16	7.02	—	10.05	N	—	—	—	—		PM
3/16/16	7.02	—	10.06	N	—	—	—	—		PM
3/23/16	7.02	—	10.06	N	—	—	—	—		PM
3/24/16	7.02	4.00	10.07	YES	—	—	—	—	METER ACTING UP. WOULD NOT CALIBRATE. REPLACED SENSOR. OK	TAM
3/30/16	7.02	—	10.06	N	—	—	—	—		PM
4/1/16	7.02	—	10.06	N	—	—	—	—		TAM
4-6-16	7.02	—	10.07	N	—	—	—	—		PM

USS MINNESOTA ORE OPERATIONS - MINNTAC

FIELD INSTRUMENT CALIBRATION RECORD

YSI MODEL 63 (pH/Specific Conductance/Temperature)

Effective Date: 15-Mar-11
Revision Number: 3

Calibration Date	pH				SPECIFIC CONDUCTANCE				Comments	Technician
	Offset Reading	Slope Readings		Replace Probe? (Yes/No)	Calibration Standard uS/cm	Temp. °C	Initial Reading uS/cm	Final Reading uS/cm		
	7.0 Buffer	4.0 Buffer	10.0 Buffer							
4/13/16	7.02	—	10.06	No	—	—	—	—		PM
4/15/16	7.02	—	10.05	No	—	—	—	—		TAM
4/19/16	7.02	—	10.06	No	—	—	—	—	SD003 Samples & Flow Gauging	TAM
4/20/16	7.03	—	10.07	No	—	—	—	—		PM
4/21/16	7.02	—	10.05	No	—	—	—	—	Potable H_2O sampling/ monitoring for MWH	TAM
4/27/16	7.02	—	10.07	No	—	—	—	—		PM
4/28/16	7.02	—	10.07	No	—	—	—	—		TAM
4/29/16	7.02	—	10.06	No	—	—	—	—		TAM
5/4/16	7.02	4.00	10.05	No	—	—	—	—		PM
5/5/16	7.01	—	10.04	No	—	—	—	—		PM
5/11/16	7.02	—	10.07	No	—	—	—	—		PM
5/18/16	7.02	—	10.06	No	—	—	—	—		PM
5/19/16	7.02	—	10.06	No	—	—	—	—	Seep Sys for West-side SCRS Design	TAM
5/25/16	7.02	—	10.06	No	—	—	—	—		PM
5/26/16	7.02	—	10.05	No	—	—	—	—	Twin Lakes Sys	TAM
6/1/16	7.02	—	10.06	No	—	—	—	—		PM
6/8/16	7.02	—	10.06	No	—	—	—	—		PM
6/9/16	7.02	—	10.06	No	—	—	—	—	Mine Pit Seeps	TAM

USS MINNESOTA ORE OPERATIONS - MINNTAC

FIELD INSTRUMENT CALIBRATION RECORD

YSI MODEL 63 (pH/Specific Conductance/Temperature)

Effective Date: 15-Mar-11
Revision Number: 3

Calibration Date	pH				SPECIFIC CONDUCTANCE				Comments	Technician
	Offset Reading	Slope Readings		Replace Probe? (Yes/No)	Calibration Standard uS/cm	Temp. °C	Initial Reading uS/cm	Final Reading uS/cm		
	7.0 Buffer	4.0 Buffer	10.0 Buffer							
6-15-16	7.02	—	10.06	N	—	—	—	—		PM
6/22/16	7.02	—	10.06	N	—	—	—	—		PM
6/29/16	7.02	—	10.06	N	—	—	—	—		PM
7/6/16	7.02	4.00	10.05	Y					sensor = 16B replaced probe	PM
7/12/16	7.02	4.00	10.06	N	—	—	—	—		PM
7/13/16	7.02	—		N	—	—	—	—		PM
7/14/16	7.01	4.00	10.03	N	—	—	—	—		PM
7/20/16	7.01	—	10.01	N	—	—	—	—		TAM
7/25/16	7.02	—	10.05	N	—	—	—	—	ACUTE TOX SAMPLES	TAM
7/27/16	7.02	—	10.06	N	—	—	—	—		PM
7/28/16	7.02	—	10.06	N	—	—	—	—		PM
8/3/16	7.02	—	10.07	N	—	—	—	—		PM
8/10/16	7.02	—	10.06	N	—	—	—	—		PM
8/17/16	7.02	—	10.06	N	—	—	—	—		JB
8/23/16	7.02	—	10.07	N	—	—	—	—		PM
8/25/16	7.02	—	10.06	N	—	—	—	—	TWIN LAKES Monitoring	TAM
8/30/16	7.02	—	10.07	N	—	—	—	—	WPDT MW 5X	TAM
8/31/16	7.03	—	10.07	N	—	—	—	—		PM

USS MINNESOTA ORE OPERATIONS - MINNTAC

FIELD INSTRUMENT CALIBRATION RECORD

YSI MODEL 63 (pH/Specific Conductance/Temperature)

Effective Date: 15-Mar-11
Revision Number: 3

Calibration Date	pH: Offset Reading 7.0 Buffer	pH: Slope Readings 4.0 Buffer	pH: Slope Readings 10.0 Buffer	Replace Probe? (Yes/No)	SPECIFIC CONDUCTANCE: Calibration Standard uS/cm	Temp. °C	Initial Reading uS/cm	Final Reading uS/cm	Comments	Technician
9/2/16	7.03	—	10.07	N	—	—	—	—	KEETAC MEMBRANE PILOT SAMPLING	TAM
9/7/16	7.03	—	10.07	N	—	—	—	—		PM
9/14/16	7.03	—	10.08	N	—	—	—	—		PM
9/21/16	7.02	—	10.07	N	—	—	—	—		PM
9/28/16	7.02	—	10.07	N	—	—	—	—		PM
10/3/16	7.02	—	10.06	N	—	—	—	—	RANDY'S POND	TAM
10/4/16	7.02	4.00	10.06	N	—	—	—	—	WELL MONITORING	TAM
10/5/16	7.02	4.00	10.06	N	—	—	—	—		PM
10/6/16	7.02	—	10.07	N	—	—	—	—		PM
10/12/16	7.02	—	10.06	N	—	—	—	—		PM
10/19/16	7.02	—	10.07	N	—	—	—	—		PM
10/25/16	7.02	—	10.07	N	—	—	—	—	MDH potable H_2O Sx. Pb-Cu Rule.	TAM
10/26/16	7.03	—	10.07	N	—	—	—	—		PM
11/2/16	7.03	—	10.07	N	—	—	—	—		PM
11/3/16	7.02	—	10.07	N	—	—	—	—	RANDY'S POND SXS	TAM
11/9/16	7.01	—	10.02	N	—	—	—	—		PM
11/16/16	7.02	—	10.07	N	—	—	—	—		PM
11/21/16	7.02	—	10.06	N	—	—	—	—	2nd Rnd Acute Tox	TAM/JB
11/23/16	7.03	—	10.07	N	—	—	—	—		PM

USS MINNESOTA ORE OPERATIONS - MINNTAC

FIELD INSTRUMENT CALIBRATION RECORD

YSI MODEL 63 (pH/Specific Conductance/Temperature)

Effective Date: 15-Mar-11
Revision Number: 3

Calibration Date	pH				SPECIFIC CONDUCTANCE				Comments	Technician
	Offset Reading	Slope Readings		Replace Probe? (Yes/No)	Calibration Standard uS/cm	Temp. °C	Initial Reading uS/cm	Final Reading uS/cm		
	7.0 Buffer	4.0 Buffer	10.0 Buffer							
11-30-16	~~7.3~~ 7.03	—	10.08	N	—	—	—	—		PM
12-07-16	~~7.2~~ 7.02	—	10.07	N	—	—	—	—		PM
12-14-16	~~7.2~~ 7.02	—	10.06	N	—	—	—	—		PM
12-19-16	7.02	—	10.06	N	—	—	—	—		JB
12-28-16	7.02	—	10.07	N	—	—	—	—		PM

90° V-notch Weir Flow Correlation Chart

Water Height on Weir (ft)	Water Height on Weir (in)	Flow Rate (cfs)	Flow Rate (gpm)
0.20	2.40	0.04	18
0.22	2.64	0.06	27
0.24	2.88	0.07	31
0.26	3.12	0.09	40
0.28	3.36	0.10	45
0.30	3.60	0.12	54
0.32	3.84	0.14	63
0.34	4.08	0.17	76
0.36	4.32	0.19	85
0.38	4.56	0.22	99
0.40	4.80	0.25	112
0.42	5.04	0.29	130
0.44	5.28	0.32	144
0.46	5.52	0.36	162
0.48	5.76	0.40	180
0.50	6.00	0.44	197
0.52	6.24	0.49	220
0.54	6.48	0.54	242
0.56	6.72	0.59	265
0.58	6.96	0.64	287
0.60	7.20	0.70	314
0.62	7.44	0.76	341
0.64	7.68	0.82	368
0.66	7.92	0.88	395
0.68	8.16	0.95	426
0.70	8.40	1.02	458
0.72	8.64	1.10	494
0.74	8.88	1.18	530
0.76	9.12	1.26	565
0.78	9.36	1.34	601
0.80	9.60	1.43	642
0.82	9.84	1.52	682
0.84	10.08	1.62	727
0.86	10.32	1.71	767
0.88	10.56	1.82	818
0.90	10.80	1.92	862
0.92	11.04	2.03	911
0.94	11.28	2.14	960
0.96	11.52	2.26	1014
0.98	11.76	2.38	1068
1.00	12.00	2.50	1122