

APPENDIX D – NUTRIENT AND METALS WATER QUALITY DATA

This appendix contains recent water quality data used for impairment verification and discussed within this document for nutrients (**Table D-1**) and metals (**Table D-2**). Additionally, water quality data used to determine natural background concentrations for metals in Sullivan Creek are presented in **Table D-3** and metals-related data submitted by Pan American Silver Corporation for surface water and ground water samples collected at the Hog Heaven Mine site are presented in **Table D-4**.

Table D-1. Recent Surface Water Nutrient Data for the Thompson TMDL Project Area

Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	TN (mg/L)	TP (mg/L)	NO ₂ + ₃ (mg/L)	Chlorophyll- <i>a</i> (mg/m ²)	AFDM (g/m ²)	Macroinvertebrates (HBI)
Lazier Creek	C13LAZRC04	8/12/2012	DEQ	0.16	0.07	0.011	0.005	35.3	54.1	-
Lazier Creek	C13LAZRC04	9/21/2012	DEQ	0.12	0.08	0.007	0.005	-	-	-
Lazier Creek	C13LAZRC20	9/4/2004	DEQ	2.31	-	0.024	0.08	-	-	2.67
Lazier Creek	LZRC-254	8/21/2011	DEQ	0.32	0.08	0.009	0.005	68.6	30.9	-
Lazier Creek	C13LAZRC05	7/2/2012	DEQ	3.75	0.1	0.016	-	-	-	-
Lazier Creek	C13LAZRC05	8/12/2012	DEQ	2.2	0.025	0.012	0.02	< 50	-	-
Lazier Creek	C13LAZRC05	9/21/2012	DEQ	1.08	0.02	0.013	0.02	-	-	-
Lazier Creek	LZRC-253	8/22/2011	DEQ	3.93	0.08	0.0025	0.03	40	-	-
Lazier Creek	C13LAZRC02	8/12/2012	DEQ	0.21	0.07	0.01	0.005	21.7	36.2	-
Lazier Creek	C13LAZRC02	9/21/2012	DEQ	0.18	0.05	0.009	0.005	-	-	-
Lazier Creek	C13LAZRC03	8/12/2012	DEQ	0.21	0.07	0.009	0.005	19.7	17.83	-
Lazier Creek	C13LAZRC03	9/21/2012	DEQ	0.2	0.04	0.008	0.005	-	-	-
Lazier Creek	LZRC-256	8/21/2011	DEQ	0.21	0.06	0.012	0.01	40	-	-
Lazier Creek	LZRC-255	8/21/2011	DEQ	0.32	0.025	0.011	0.005	40	-	-
Lazier Creek	C13LAZRC01	8/23/2011	DEQ	-	-	-	-	-	-	5.37
Lazier Creek	C13LAZRC20	8/23/2011	DEQ	-	-	-	-	-	-	4.52
Little Bitterroot River	C12LTBTR02	7/5/2012	DEQ	42.65	0.52	0.033	0.13	-	-	-
Little Bitterroot River	C12LTBTR02	8/15/2012	DEQ	53.43	0.35	0.078	0.005	-	-	-
Little Bitterroot River	C12LTBTR02	9/22/2012	DEQ	46.61	0.38	0.028	0.01	-	-	-
Little Bitterroot River	C12LTBTR01	8/4/2004	DEQ	56.76	-	0.057	0.08	-	-	5.61
Little Bitterroot River	LBRR-299	8/25/2011	DEQ	53.4	0.63	0.067	0.05	-	-	-
Little Bitterroot River	LBRR-289	8/25/2011	DEQ	58.37	0.43	0.068	0.04	32	19.5	-
Little Bitterroot River	C12LTBTR04	7/5/2012	DEQ	58.68	0.39	0.042	0.08	-	-	-
Little Bitterroot River	C12LTBTR04	8/15/2012	DEQ	57.6	0.33	0.059	0.005	-	-	-
Little Bitterroot River	C12LTBTR04	9/22/2012	DEQ	57.79	0.34	0.027	0.03	-	-	-

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Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	TN (mg/L)	TP (mg/L)	NO ₂ + ₃ (mg/L)	Chlorophyll- <i>a</i> (mg/m ²)	AFDM (g/m ²)	Macroinvertebrates (HBI)
Little Bitterroot River	C12LTBTR02	8/22/2011	DEQ	-	-	-	-	-	-	5.18
Little Bitterroot River	C12LTBTR03	8/22/2011	DEQ	-	-	-	-	-	-	4.72
Little Bitterroot River	472934114194301	6/17/2008	USGS	18	-	-	-	-	-	-
Little Thompson River	LTLTR-250	8/23/2011	DEQ	1.96	0.14	0.011	0.005	18.4	16.5	-
Little Thompson River	LTLTR-244	8/22/2011	DEQ	14.57	0.12	0.009	0.005	6.4	4.5	-
Little Thompson River	C13LTTPR03	8/13/2012	DEQ	13.35	0.05	0.012	0.005	-	-	-
Little Thompson River	C13LTTPR03	9/21/2012	DEQ	7.87	0.02	0.011	0.005	-	-	-
Little Thompson River	LTLTR-NAN	8/23/2011	DEQ	0.87	0.26	0.019	0.02	8.9	10.1	-
Little Thompson River	LTLTR-246	8/22/2011	DEQ	11.36	0.09	0.006	0.005	25	-	-
Little Thompson River	C13LTTPR40	8/27/2004	DEQ	9.47	-	0.019	0.005	-	-	1.63
Little Thompson River	C13LTTPR40	8/10/2007	DEQ	-	0.005	0.011	0.0025	20.81	-	-
Little Thompson River	C13LTTPR40	8/13/2012	DEQ	17.21	0.07	0.013	0.005	-	-	-
Little Thompson River	C13LTTPR40	9/21/2012	DEQ	12.9	0.05	0.012	0.005	-	-	-
Little Thompson River	C13LTTPR30	8/27/2004	DEQ	13.83	-	0.016	0.005	-	-	3.02
Little Thompson River	LTLTR-240	8/22/2011	DEQ	23.78	0.12	0.011	0.005	14.4	6.04	-
Little Thompson River	C13LTTPR10	8/26/2004	DEQ	E 4.1	-	0.022	0.005	-	-	3.29
Little Thompson River	C13LTTPR20	8/26/2004	DEQ	E 12.8	-	0.016	0.005	-	-	3.94

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Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	TN (mg/L)	TP (mg/L)	NO ₂ + ₃ (mg/L)	Chlorophyll- <i>a</i> (mg/m ²)	AFDM (g/m ²)	Macroinvertebrates (HBI)
Little Thompson River	C13LTTPR02	8/13/2012	DEQ	8.15	0.025	0.009	0.005	21.9	20.4	-
Little Thompson River	C13LTTPR02	9/21/2012	DEQ	5.55	0.02	0.01	0.005	-	-	-
Little Thompson River	C13LTTPR05	8/13/2012	DEQ	1.53	0.12	0.013	0.005	-	-	-
Little Thompson River	C13LTTPR05	9/22/2012	DEQ	0.96	0.07	0.01	0.005	-	-	-
Little Thompson River	C13LTTPR04	8/13/2012	DEQ	0.71	0.18	0.022	0.005	-	-	-
Little Thompson River	C13LTTPR04	9/22/2012	DEQ	0.42	0.09	0.017	0.005	-	-	-
Little Thompson River	C13LTTPR05	8/14/2012	DEQ	-	-	-	-	5.4	45.4	-
Little Thompson River	C13LTTPR01	8/24/2011	DEQ	-	-	-	-	-	-	2.69
Little Thompson River	C13LTTPR02	8/24/2011	DEQ	-	-	-	-	-	-	3.11
Little Thompson River	PIBO_139	7/25/2009	DEQ	-	-	-	-	-	-	3.36
Little Thompson River	PIBO_139	7/29/2008	DEQ	-	-	-	-	-	-	4.03
Little Thompson River	PIBO_139	7/30/2007	DEQ	-	-	-	-	-	-	3.78
Little Thompson River	PIBO_139	7/25/2006	DEQ	-	-	-	-	-	-	4.08
Little Thompson River	PIBO_139	7/28/2004	DEQ	-	-	-	-	-	-	4.23
Little Thompson River	PIBO_139	7/1/2003	DEQ	-	-	-	-	-	-	3.45
Lynch Creek	C13LYNCC04	7/26/2011	DEQ	5.76	0.08	0.013	0.005	-	-	-
Lynch Creek	C13LYNCC07	7/26/2011	DEQ	0.37	0.27	0.016	0.005	-	-	-
Lynch Creek	C13LYNCC04	9/4/2011	DEQ	0.43	0.025	0.013	0.01	0.7	3.77	2.08
Lynch Creek	C13LYNCC07	9/5/2011	DEQ	0.07	0.025	0.016	0.03	2.15	4.01	2.03

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Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	TN (mg/L)	TP (mg/L)	NO ₂ + ₃ (mg/L)	Chlorophyll- <i>a</i> (mg/m ²)	AFDM (g/m ²)	Macroinvertebrates (HBI)
Lynch Creek	C13LYNCC07	7/3/2012	DEQ	0.4	0.08	0.016	0.005	-	-	-
Lynch Creek	C13LYNCC06	7/26/2011	DEQ	0.42	0.08	0.017	0.005	-	-	-
Lynch Creek	C13LYNCC06	9/4/2011	DEQ	0.07	0.025	0.016	0.005	-	-	-
Lynch Creek	C13LYNCC06	7/3/2012	DEQ	0.45	0.09	0.013	0.005	-	-	-
Lynch Creek	C13LYNCC03	7/26/2011	DEQ	5.14	0.34	0.015	0.005	-	-	-
Lynch Creek	C13LYNCC03	9/3/2011	DEQ	0.97	0.21	0.033	0.005	1.98	5.87	-
Lynch Creek	C13LYNCC01	8/11/2009	DEQ	-	0.34	0.033	0.04	53	-	-
Lynch Creek	C13LYNCC01	9/9/2009	DEQ	-	0.91	0.036	0.07	13.6	-	-
Lynch Creek	C13LYNCC01	7/26/2011	DEQ	5.53	0.25	0.03	0.08	-	-	-
Lynch Creek	C13LYNCC01	9/3/2011	DEQ	0.72	0.52	0.031	0.32	6.47	37.1	7.17
Lynch Creek	C13LYNCC08	7/27/2011	DEQ	0.29	0.025	0.015	0.005	-	-	-
Lynch Creek	C13LYNCC08	9/5/2011	DEQ	0.07	0.025	0.019	0.005	1.1	3.68	-
Lynch Creek	C13LYNCC05	7/26/2011	DEQ	0.76	0.025	0.021	0.01	-	-	-
Lynch Creek	C13LYNCC05	9/4/2011	DEQ	0.28	0.025	0.017	0.05	7.23	3.82	-
Lynch Creek	C13LYNCC05	7/3/2012	DEQ	0.68	0.07	0.028	0.08	-	-	-
Lynch Creek	C13LYNCC30	9/7/2004	DEQ	E 0.43	-	0.038	0.005	-	-	5.93
Lynch Creek	C13LYNCC20	9/7/2004	DEQ	E 3.8	-	0.022	0.005	-	-	3.58
Lynch Creek	C13LYNCC20	8/12/2009	DEQ	-	0.1	0.016	0.005	17	-	-
Lynch Creek	C13LYNCC20	9/10/2009	DEQ	-	0.07	0.019	0.02	16.6	-	-
Lynch Creek	C13LYNCC11	7/3/2012	DEQ	0.26	0.12	0.015	0.005	-	-	-
Lynch Creek	C13LYNCC10	8/11/2009	DEQ	-	0.28	0.024	0.01	10.5	-	-
Lynch Creek	C13LYNCC10	9/9/2009	DEQ	-	0.77	0.034	0.005	11.6	-	-
Lynch Creek	C13LYNCC05	8/25/2011	DEQ	-	-	-	-	-	-	2.99
Lynch Creek	C13LYNCC09	8/25/2011	DEQ	-	-	-	-	-	-	2.14
Sullivan Creek	C12SLVNC02	8/4/2004	DEQ	E 0.1	-	0.061	0.005	-	-	-
Sullivan Creek	C12SLVNC02	7/4/2012	DEQ	-	1.28	0.02	0.005	-	-	-
Sullivan Creek	C12SLVNC01	8/4/2004	DEQ	E 0.1	-	0.043	0.005	-	-	2.08
Sullivan Creek	C12SULLC02	7/4/2012	DEQ	0.03	0.11	0.014	0.005	19.3	5.85	6.46
Sullivan Creek	C12SULLC02	8/15/2012	DEQ	E 1.5	0.17	0.019	0.005	-	-	-
Sullivan Creek	C12SLVNC02	7/23/2011	DEQ	0.05	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	7/24/2011	DEQ	0.05	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	5/31/2012	DEQ	E 40	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	8/15/2012	DEQ	E 0	-	-	-	-	-	-

Table D-1. Recent Surface Water Nutrient Data for the Thompson TMDL Project Area

Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	TN (mg/L)	TP (mg/L)	NO ₂ + ₃ (mg/L)	Chlorophyll- <i>a</i> (mg/m ²)	AFDM (g/m ²)	Macroinvertebrates (HBI)
Sullivan Creek	C12SLVNC02	9/22/2012	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	C12SLVNC03	7/23/2011	DEQ	0.03	-	-	-	-	-	-
Sullivan Creek	C12SLVNC03	7/24/2011	DEQ	0.02	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	7/23/2011	DEQ	0.04	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	7/24/2011	DEQ	0.03	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	5/31/2012	DEQ	0.17	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	9/22/2012	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	SLVNC-01	8/25/2011	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	SLVNC-02	8/25/2011	DEQ	E 0	-	-	-	-	-	-
Swamp Creek	C13SWPCR20	8/9/2007	DEQ	-	0.005	0.009	0.01	70.948	-	-
Swamp Creek	C13SWPCR20	8/16/2009	DEQ	-	0.11	0.01	0.005	14.4	-	-
Swamp Creek	C13SWPCR20	9/15/2009	DEQ	-	0.08	0.009	0.005	7.3	-	-
Swamp Creek	C13SWPCR20	7/28/2011	DEQ	16.3	0.06	0.027	0.005	-	-	-
Swamp Creek	C13SWPCR20	8/26/2011	DEQ	4.91	0.09	0.006	0.005	-	-	-
Swamp Creek	C13SWPCR10	9/8/2004	DEQ	E 1.92	-	0.01	0.005	-	-	-
Swamp Creek	C13SWPCR10	8/17/2009	DEQ	-	0.11	0.009	0.01	15.7	-	-
Swamp Creek	C13SWPCR10	9/15/2009	DEQ	-	0.09	0.008	0.005	14.5	-	-
Swamp Creek	C13SWPCR10	7/28/2011	DEQ	14.94	0.025	0.008	0.005	-	-	-
Swamp Creek	C13SWPCR10	8/27/2011	DEQ	5.47	0.1	0.005	0.005	7.13	4.65	-
Swamp Creek	C13SWMPC02	8/16/2009	DEQ	-	0.11	0.012	0.005	35	-	-
Swamp Creek	C13SWMPC02	9/15/2009	DEQ	-	0.08	0.011	0.005	10.5	-	-
Swamp Creek	C13SWMPC02	7/28/2011	DEQ	14.28	0.025	0.008	0.005	-	-	-
Swamp Creek	C13SWMPC02	8/27/2011	DEQ	5.15	0.08	0.0025	0.005	15.44	46.7	4.58
Swamp Creek	C13SWMPC01	8/17/2009	DEQ	-	-	-	-	6.28	-	-
Swamp Creek	C13SWMPC01	9/15/2009	DEQ	-	-	-	-	2.33	-	-
Swamp Creek	C13SWMPC01	8/28/2011	DEQ	1.53	-	-	-	19.11	16.7	-
Swamp Creek	C13SWMPC03	9/12/2011	DEQ	-	-	-	-	-	-	3.39
Swamp Creek	C13SWMPC02	8/25/2011	DEQ	-	-	-	-	-	-	6.05
Swamp Creek	C13SWPCR20	9/8/2004	DEQ	E 1.9	-	-	-	-	-	4.91
Swamp Creek	C13SWMPC01	7/28/2011	DEQ	11.6	-	-	-	-	-	-
Swamp Creek	C13SWMPC10	9/21/2004	DEQ	36.75	-	-	-	-	-	-

Table D-2. Recent Surface Water Metals Data for the Thompson TMDL Project Area

Waterbody Segment	Site ID	Sample Date	Organization	Flow (cfs)	Hardness (mg/L)	pH	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
Sullivan Creek	C12SULLC02	5/31/2012	DEQ	0.17	-	4.89	-	-	-	-
Sullivan Creek	C12SULLC02	5/31/2012	DEQ	-	298	-	1,750	7.81	7	16,800
Sullivan Creek	C12SLVNC02	5/31/2012	DEQ	E 0.08912	-	5.57	-	-	-	-
Sullivan Creek	C12SLVNC02	5/31/2012	DEQ	-	193	-	1,850	13.5	40	6,960
Sullivan Creek	C12SULLC02	7/4/2012	DEQ	0.03	-	5.3	-	-	-	-
Sullivan Creek	C12SULLC02	7/4/2012	DEQ	-	305	-	1,290	6.02	5	16,300
Sullivan Creek	C12SLVNC02	7/4/2012	DEQ	-	-	4.8	-	-	-	-
Sullivan Creek	C12SLVNC02	7/4/2012	DEQ	-	269	-	10,600	26.5	32	12,100
Sullivan Creek	C12SLVNC02	8/4/2004	DEQ	E 0.1	-	5.1	-	-	-	-
Sullivan Creek	C12SLVNC02	8/4/2004	DEQ	-	283	-	800	7.8	13	7,540
Sullivan Creek	C12SLVNC01	8/4/2004	DEQ	E 0.1	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	7/23/2011	DEQ	0.04	-	-	-	-	-	-
Sullivan Creek	C12SLVNC03	7/23/2011	DEQ	0.03	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	7/23/2011	DEQ	0.05	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	7/24/2011	DEQ	0.03	-	-	-	-	-	-
Sullivan Creek	C12SLVNC03	7/24/2011	DEQ	0.02	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	7/24/2011	DEQ	0.05	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	8/15/2012	DEQ	E 0.003342	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	8/15/2012	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	C12SLVNC02	9/22/2012	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	C12SULLC02	9/22/2012	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	SLVNC-01	8/25/2011	DEQ	E 0	-	-	-	-	-	-
Sullivan Creek	SLVNC-02	8/25/2011	DEQ	E 0	-	-	-	-	-	-

Table D-3. Natural Background Surface Water Metals Data for the Thompson TMDL Project Area

Waterbody Segment	Site ID	Sample Date	Organization	Hardness (mg/L)	Flow (cfs)	pH	Al (ug/L) D	Cd (ug/L) TR	Cu (ug/L) TR	Zn (ug/L) TR
Little Bitterroot River	C12LTBTR01	8/4/04	MDEQ		56.79	8.05				
Little Bitterroot River	C12LTBTR01	8/4/04	MDEQ	49			100	< .1	1	< 10
McGinnis Creek	C13MCGNC10	8/25/04	MDEQ		E 1.6	5.68				
McGinnis Creek	C13MCGNC20	8/25/04	MDEQ		E 8.2	6.43				
McGinnis Creek	C13MCGNC10	8/25/04	MDEQ	9			200	< .1	< 1	< 10

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Waterbody Segment	Site ID	Sample Date	Organization	Hardness (mg/L)	Flow (cfs)	pH	Al (ug/L) D	Cd (ug/L) TR	Cu (ug/L) TR	Zn (ug/L) TR
McGinnis Creek	C13MCGNC20	8/25/04	MDEQ	7			< 100	< .1	< 1	< 10
Little Thompson River	C13LTTPR10	8/26/04	MDEQ		E 4.1	6.71				
Little Thompson River	C13LTTPR20	8/26/04	MDEQ		E 12.8	6.82				
Little Thompson River	C13LTTPR10	8/26/04	MDEQ	14			< 100	< .1	< 1	< 10
Little Thompson River	C13LTTPR20	8/26/04	MDEQ	10			< 100	< .1	< 1	< 10
Little Thompson River	C13LTTPR30	8/27/04	MDEQ		13.83	6.63				
Little Thompson River	C13LTTPR40	8/27/04	MDEQ		9.47	7.46				
Little Thompson River	C13LTTPR30	8/27/04	MDEQ	9			< 100	< .1	< 1	< 10
Little Thompson River	C13LTTPR40	8/27/04	MDEQ	39			< 100	< .1	< 1	< 10
Fishtrap Creek	C13FISTC20	8/28/04	MDEQ		27.96	7.52				
Fishtrap Creek	C13FISTC30	8/28/04	MDEQ		32.21	7.37				
Fishtrap Creek	C13FISTC20	8/28/04	MDEQ	106			< 100	< .1	< 1	< 10
Fishtrap Creek	C13FISTC20	8/28/04	MDEQ	105			< 100	< .1	3	< 10
Fishtrap Creek	C13FISTC30	8/28/04	MDEQ	103			< 100	< .1	< 1	< 10
Fishtrap Creek	C13FTWFC10	8/29/04	MDEQ		E 8.3	6.83				
Fishtrap Creek	C13FTWFC20	8/29/04	MDEQ		E 9.6	6.59				
Fishtrap Creek	C13FTWFC10	8/29/04	MDEQ	48			< 100	< .1	< 1	< 10
Fishtrap Creek	C13FTWFC20	8/29/04	MDEQ	55			< 100	< .1	< 1	< 10
McGregor Creek	C13MCGRC20	9/3/04	MDEQ		E 1.4	6.3				
McGregor Creek	C13MCGRC10	9/3/04	MDEQ	21			< 100	< .1	< 1	< 10
McGregor Creek	C13MCGRC20	9/3/04	MDEQ	32			< 100	< .1	< 1	< 10
Lazier Creek	C13LAZRC20	9/4/04	MDEQ		E 2.31	7.51				
Lazier Creek	C13LAZRC20	9/4/04	MDEQ	128			< 100	< .1	1	< 10
Thompson River	C13TPRWF10	9/5/04	MDEQ		16.53	6.95				
Thompson River	C13TPRWF20	9/5/04	MDEQ		25.33	7.12				
Thompson River	C13TPRWF10	9/5/04	MDEQ	30			< 100	< .1	< 1	< 10
Thompson River	C13TPRWF20	9/5/04	MDEQ	47			< 100	< .1	< 1	< 10
Henry Creek	C13HNRYC10	9/6/04	MDEQ	51			< 100	< .1	< 1	< 10
Lynch Creek	C13LYNCC30	9/7/04	MDEQ		E 0.43	7.41				
Lynch Creek	C13LYNCC30	9/7/04	MDEQ	40			< 100	< .1	2	< 10
Lynch Creek	C13LYNCC20	9/7/04	MDEQ	28			< 100	< .1	< 1	< 10
Swamp Creek	C13SWPCR20	9/8/04	MDEQ		E 1.9	6.81				

Table D-3. Natural Background Surface Water Metals Data for the Thompson TMDL Project Area

Waterbody Segment	Site ID	Sample Date	Organization	Hardness (mg/L)	Flow (cfs)	pH	Al (ug/L) D	Cd (ug/L) TR	Cu (ug/L) TR	Zn (ug/L) TR
Swamp Creek	C13SWPCR10	9/8/04	MDEQ	27			< 100	< .1	< 1	< 10
Clark Fork River	CFRPO-27	1/19/05	TSWQC			7.89				
Clark Fork River	CFRPO-27	1/19/05	TSWQC	C 103				< .1	< 1	2.2
Clark Fork River	CFRPO-27	2/16/05	TSWQC			8.42				
Clark Fork River	CFRPO-27	2/16/05	TSWQC	C 87.9				< .1	1	< .5
Clark Fork River	CFRPO-27	3/16/05	TSWQC			8.27				
Clark Fork River	CFRPO-27	3/16/05	TSWQC	C 86.7				< .1	< 1	< .5
Clark Fork River	CFRPO-27	7/20/05	TSWQC			8.66				
Clark Fork River	CFRPO-27	7/20/05	TSWQC	C 94.7				< .08	1	< .5
Clark Fork River	CFRPO-27	8/17/05	TSWQC			9.14				
Clark Fork River	CFRPO-27	8/17/05	TSWQC	C 97.9				< .08	1	0.9
Clark Fork River	CFRPO-27	9/14/05	TSWQC			8.43				
Clark Fork River	CFRPO-27	9/14/05	TSWQC	C 102				< .08	1	0.9
Clark Fork River	CFRPO-27	10/19/05	TSWQC			9				
Clark Fork River	CFRPO-27	10/19/05	TSWQC	C 102				< .08	< 1	< .5
Clark Fork River	CFRPO-27	11/16/05	TSWQC	C 91				< .08	< 1	< .5
Clark Fork River	CFRPO-27	12/14/05	TSWQC	C 101				< .08	< 1	< .5
Henry Creek	C13HNRYC01	7/6/12	MDEQ		0.44	7.1				
Henry Creek	C13HNRYC01	7/6/12	MDEQ	C < 1			< 30	0.09	< 1	70
Clark Fork River	C13CKFKR05	7/18/12	MDEQ			8.6				
Clark Fork River	C13CKFKR05	7/18/12	MDEQ	C 81			< 30	< .08	< 1	< 10
Clark Fork River	C13CKFKR05	8/9/12	MDEQ	C 85			< 30	< .08	1	< 10
Clark Fork River	C13CKFKR05	8/9/12	MDEQ			8.76				

TSWQC = Tri-State Water Quality Council

MDEQ = Montana Department of Environmental Quality

Table D-4. Metals and pH data for the Hog Heaven Mine (Source: Pan American Silver Corporation 2013)

Date	Parameter	HSW-15	Office Shop Well	WFW	HSW-1	HSW-2
4/22/02	pH	5.9	4.6	5.6	3.9	5.1
9/23/02	pH	3.3	3.6	5	3.1	4.9
4/14/03	pH	4.5	4	5.4	3.7	4.6
10/27/03	pH	3.6	3.9	5.5		5.6
4/27/04	pH	3.6	5.4	5.3	3.6	5.1
10/10/04	pH	4	4.1	5.6	3.5	6
5/14/05	pH	4.1	4.2	5.6	3.8	5.2
9/18/05	pH		4.2	5.5	3.6	5.6
5/14/06	pH		6.5	6.3	3.7	4.6
9/11/06	pH		4.1	5.6	3.5	5.4
4/28/07	pH		4.1	5.6	3.7	4.7
10/28/07	pH		4	5.5	3.5	5.6
5/12/08	pH		4	5.6	3.6	5
10/18/08	pH		4.2	5.7	3.7	5.8
5/14/09	pH		5	5.6	4.1	4.9
10/24/09	pH		4.5	5.6	3.6	5.3
7/8/10	pH		4.2	5.6	3.4	5.2
9/11/10	pH		4.2	5.9	3.4	5.9
5/28/12	pH		4.5	5.4	3.5	4.7
6/10/13	pH		4.4	5.8	3.6	4.8
4/22/02	Al (µg/L)	3,400	2,500		9,100	1,400
9/23/02	Al (µg/L)	9,000	3,200		19,800	800
4/14/03	Al (µg/L)	1,600	3,000		11,300	2,200
10/27/03	Al (µg/L)	31,600	3,500			600
4/27/04	Al (µg/L)	21,800	3,800	187,000	15,100	1,500
10/10/04	Al (µg/L)	41,000	1,800	181,000	28,400	2,900
5/14/05	Al (µg/L)	9,600	3,800	174,000	20,200	1,400
9/18/05	Al (µg/L)		3,400	184,000	24,600	600
5/14/06	Al (µg/L)		1,100	186,000	13,100	1,800
9/11/06	Al (µg/L)		3,300	174,000	26,500	800
4/28/07	Al (µg/L)		3,600	167,000	13,000	1,600
10/28/07	Al (µg/L)		4,100	172,000	39,500	1,000
5/12/08	Al (µg/L)		5,400	171,000	15,800	1,800
10/18/08	Al (µg/L)		5,000	171,000	24,000	900
5/14/09	Al (µg/L)		3,100	181,000	12,700	2,300
10/24/09	Al (µg/L)		2,900	171,000	37,900	600
7/8/10	Al (µg/L)		4,800	178,000	22,400	1,200
9/11/10	Al (µg/L)		5,200	179,000	18,600	1,500
5/28/12	Al (µg/L)		6,310	165,000	23,500	1,890
6/10/13	Al (µg/L)		6,400	175,000	21,500	1,600
4/22/02	Cd (µg/L)	8	6.8	0.3	28.6	12.3
9/23/02	Cd (µg/L)	7.2	7.5	0.1	6.9	3.4
4/14/03	Cd (µg/L)	8.8	9.4		27.7	11.8
10/27/03	Cd (µg/L)	327	9.5			2
4/27/04	Cd (µg/L)	86.3	9.6		22	6.2
10/10/04	Cd (µg/L)	269	12.6		6.9	2.1
5/14/05	Cd (µg/L)	67.4	11		21.5	5.1

Table D-4. Metals and pH data for the Hog Heaven Mine (Source: Pan American Silver Corporation 2013)

Date	Parameter	HSW-15	Office Shop Well	WFW	HSW-1	HSW-2
9/18/05	Cd (µg/L)		12.9		7.8	1.7
5/14/06	Cd (µg/L)		4		23.2	14
9/11/06	Cd (µg/L)		12.1		2.5	1.7
4/28/07	Cd (µg/L)		11.4		21.2	9.4
10/28/07	Cd (µg/L)		13.5	0.5	11.6	2
5/12/08	Cd (µg/L)		13.4	0.6	19.2	7.1
10/18/08	Cd (µg/L)		15.4		9.3	2.3
5/14/09	Cd (µg/L)		9.9		16.6	12.9
10/24/09	Cd (µg/L)		12.7	0.9	12.8	3.3
7/8/10	Cd (µg/L)		18		8	5
9/11/10	Cd (µg/L)		20		7	2
5/28/12	Cd (µg/L)		10		20	8
6/10/13	Cd (µg/L)		21		13.5	6.8
4/22/02	Cu (µg/L)	9	157	14	142	10
9/23/02	Cu (µg/L)	8	146		73	7
4/14/03	Cu (µg/L)	4	173		128	9
10/27/03	Cu (µg/L)	50	218			3
4/27/04	Cu (µg/L)	36	205	2	175	6
10/10/04	Cu (µg/L)	49	261		77	13
5/14/05	Cu (µg/L)	22	252		178	6
9/18/05	Cu (µg/L)		276		67	5
5/14/06	Cu (µg/L)		72		123	12
9/11/06	Cu (µg/L)		224		15	3
4/28/07	Cu (µg/L)		224	3	118	7
10/28/07	Cu (µg/L)		283	23	139	5
5/12/08	Cu (µg/L)		264	25	103	3
10/18/08	Cu (µg/L)		324		89	5
5/14/09	Cu (µg/L)		196		111	8
10/24/09	Cu (µg/L)		211		129	3
7/8/10	Cu (µg/L)		310		130	
9/11/10	Cu (µg/L)		320		50	
5/28/12	Cu (µg/L)		179		207	9
6/10/13	Cu (µg/L)		342	1	150	10
4/22/02	Zn (µg/L)	1,580	5,820	4,420	8,960	22,000
9/23/02	Zn (µg/L)	4,860	6,470	4,390	10,500	9,060
4/14/03	Zn (µg/L)	2,930	8,610	4,630	10,700	23,100
10/27/03	Zn (µg/L)	121,000	7,440	4,300		6,430
4/27/04	Zn (µg/L)	34,200	8,700	5,070	11,700	17,200
10/10/04	Zn (µg/L)	180,000	9,480	5,100	10,900	5,800
5/14/05	Zn (µg/L)	21,000	9,720	4,900	11,400	16,600
9/18/05	Zn (µg/L)		11,900	5,350	11,700	8,530
5/14/06	Zn (µg/L)		2,980	4,430	13,100	26,700
9/11/06	Zn (µg/L)		9,130	5,320	11,300	6,180
4/28/07	Zn (µg/L)		10,200	4,330	10,500	21,500
10/28/07	Zn (µg/L)		10,800	4,860	15,400	7,720
5/12/08	Zn (µg/L)		12,400	5,230	12,900	22,600
10/18/08	Zn (µg/L)		13,000	5,280	10,600	6,820

Table D-4. Metals and pH data for the Hog Heaven Mine (Source: Pan American Silver Corporation 2013)

Date	Parameter	HSW-15	Office Shop Well	WFW	HSW-1	HSW-2
5/14/09	Zn (µg/L)		7,870	4,680	10,900	25,500
10/24/09	Zn (µg/L)		9,800	4,860	13,700	5,960
7/8/10	Zn (µg/L)		13,600	4,590	11,600	13,700
9/11/10	Zn (µg/L)		12,900	4,740	10,600	8,440
5/28/12	Zn (µg/L)		7,500	4,660	15,500	17,400
6/10/13	Zn (µg/L)		11,700	4,570	12,800	15,000