Table 9.1-19
Surface Water Data Summary for Naturally Occurring Constituents
Seeps in the North Fork Koktuli River Drainage

Analyte	Frequency of	Percent Detected	Range of Detects (Min-Max)	Range of Reporting Limits	Range of Detection Limits	Mean[b]	Median[b]	Standard Deviation[b]	Coefficient of
Field and Physical parameters (mg/L, except where noted)									
Total Dissolved Solids	71 / 74	96%	3.1 - 60	10 - 20	3.1 - 10	34	33.8	12.1	0.36
pH (Field, Standard Units)	75 / 75	100%	5.24 - 7.24	NA - NA	NA - NA	6.3	6.24	0.46	0.073
Dissolved Oxygen	75 / 75	100%	2.96 - 12.6	NA - NA	NA - NA	9.4	9.63	2.04	0.22
Water Temperature (ºC)	75 / 75	100%	0.62 - 6.37	NA - NA	NA - NA	2.6	2.57	1.28	0.49
Specific Conductivity (Field, uS/cm)	74 / 74	100%	10 - 350	NA - NA	NA - NA	43	38	37.8	0.89
Turbidity (NTU)	75 / 75	100%	0.060 - 0.95	NA - NA	NA - NA	0.17	0.14	0.13	0.76
Total Suspended Solids	26 / 68	38%	0.16 - 13.8	0.51 - 20	0.15 - 5.0	1.8	0.41	2.64	1.46
ORP (mv)	74 / 74	100%	16.1 - 334	NA - NA	NA - NA	193	202	65.3	0.34
Major Ions (mg/L)									
Calcium - dissolved	73 / 73	100%	1.12 - 6.5	0.050 - 1.0	0.015 - 0.20	4.6	4.59	0.94	0.21
Calcium - total	74 / 74	100%	1.08 - 6.0	0.050 - 1.0	0.015 - 0.20	4.4	4.28	0.88	0.20
Magnesium - dissolved	66 / 66	100%	0.431 - 1.62	0.020 - 1.0	0.0062 - 0.20	0.87	0.80	0.33	0.38
Magnesium - total	75 / 75	100%	0.133 - 1.54	0.020 - 1.0	0.0062 - 0.20	0.79	0.71	0.34	0.44
Sodium - dissolved	71 / 71	100%	0.571 - 3.55	0.10 - 2.0	0.031 - 0.30	2.41	2.5	0.67	0.28
Sodium - total	75 / 75	100%	0.583 - 3.65	0.10 - 2.0	0.031 - 0.30	2.31	2.44	0.66	0.29
Potassium - dissolved	60 / 65	92%	0.0815 - 0.80	0.050 - 2.0	0.015 - 0.30	0.32	0.31	0.17	0.54
Potassium - total	62 / 71	87%	0.0586 - 0.62	0.050 - 2.0	0.015 - 0.30	0.28	0.30	0.16	0.56
Alkalinity, Total	72 / 75	96%	3.1 - 35.7	10 - 20	2 - 3.1	17.9	16.1	7.43	0.41
Sulfate	74 / 75	99%	0.044 - 8.5	0.10 - 3.0	0.031 - 0.50	3.1	2.23	2.23	0.73
Chloride	71 / 72	99%	0.031 - 1.16	0.10 - 3.0	0.031 - 0.50	0.66	0.63	0.20	0.30
Fluoride	27 / 75	36%	0.031 - 0.10	0.10 - 0.50	0.031 - 0.10	0.056	0.038	0.030	0.53
Hardness as CaCO3	74 / 74	100%	3.24 - 23	0.80 - 7.0	0.80 - 1	14.4	13.8	3.63	0.25
Nutrients, (mg/L)									
Total Ammonia - N	13 / 72	18%	0.031 - 0.34	0.10 - 0.50	0.031 - 0.050	0.066	0.050	0.051	0.77
Nitrate-Nitrite	67 / 73	92%	0.020 - 0.94	0.020 - 0.10	0.0062 - 0.031	0.17	0.10	0.19	1.13
Total Phosphorous	69 / 75	92%	0.0040 - 0.068	0.010 - 0.050	0.0031 - 0.010	0.020	0.019	0.012	0.59
Total Orthophosphate (as P)	0 / 5	0%	0.031 - 0.10	0.10 - 0.10	0.031 - 0.031	0.072	0.10	0.038	0.52
Total Metals (mg/L)									
Aluminum - total	71 / 73	97%	0.0020 - 0.13	0.0020 - 0.010	0.00062 - 0.0020	0.013	0.0070	0.019	1.5
Arsenic - total	3 / 75	4%	0.00031 - 0.00070	0.00050 - 0.0010	0.00031 - 0.00050	0.00036	0.00031	0.000089	0.25
Barium - total	68 / 75	91%	0.000050 - 0.0043	0.000050 - 0.00050	0.000025 - 0.00010	0.0019	0.0022	0.0012	0.61
Cadmium - total	4 / 57	7%	0.000015 - 0.000037	0.000050 - 0.000050	0.000015 - 0.000037	0.000017	0.000015	0.0000059	0.35
Chromium - total	46 / 75	61%	0.00010 - 0.00090	0.00020 - 0.00050	0.00010 - 0.00010	0.00028	0.00024	0.00017	0.60
Copper - total	39 / 59	66%	0.000093 - 0.0014	0.00010 - 0.0030	0.000031 - 0.00050	0.00046	0.00050	0.00029	0.63
Iron - total	43 / 73	59%	0.0062 - 0.45	0.020 - 0.050	0.0062 - 0.020	0.039	0.016	0.073	1.87
Lead - total	11 / 69	16%	0.000031 - 0.00030	0.00010 - 0.00050	0.000031 - 0.00010	0.000061	0.000031	0.000053	0.87
Manganese - total	62 / 71	87%	0.000066 - 0.013	0.000050 - 0.0030	0.000015 - 0.00050	0.0010	0.00035	0.0023	2.27
Molybdenum - total	57 / 69	83%	0.000031 - 0.00050	0.000050 - 0.0030	0.000015 - 0.00050	0.00025	0.00018	0.00015	0.62
Nickel - total	32 / 69	46%	0.000070 - 0.00062	0.00020 - 0.0030	0.000062 - 0.00060	0.00038	0.00030	0.00021	0.55
Selenium - total	3 / 74	4%	0.00010 - 0.00050	0.00050 - 0.0010	0.00010 - 0.00031	0.00027	0.00031	0.000091	0.34
Silver - total	0 / 60	0%	0.0000062 - 0.00010	0.000020 - 0.00050	0.0000062 - 0.00010	0.0000092	0.0000062	0.000014	1.55
Zinc - total	29 / 70	41%	0.00031 - 0.0053	0.0010 - 0.010	0.00031 - 0.0020	0.0020	0.0020	0.0011	0.56

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Dissolved Metals (mg/L)										
Aluminum - dissolved	58 / 69	84%	0.0015 - 0.012	0.002 - 0.005	0.00062 - 0.0010	0.0044	0.0041	0.0022	0.50
Arsenic - dissolved	5 / 75	7%	0.00031 - 0.00050	0.0005 - 0.001	0.00031 - 0.00050	0.00036	0.00031	0.000082	0.23
Barium - dissolved	40 / 45	89%	0.00025 - 0.0039	0.00005 - 0.0005	0.000025 - 0.00010	0.0021	0.0025	0.0011	0.51
Cadmium - dissolved	5 / 57	9%	0.000015 - 0.000037	0.00005 - 0.00005	0.000015 - 0.000037	0.000017	0.000015	0.0000062	0.36
Chromium - dissolved	47 / 73	64%	0.00010 - 0.00070	0.0002 - 0.0005	0.00010 - 0.00010	0.00031	0.00025	0.00016	0.53
Copper - dissolved	27 / 54	50%	0.000050 - 0.0011	0.0001 - 0.003	0.000031 - 0.00050	0.00051	0.00050	0.00019	0.38
Iron - dissolved	37 / 74	50%	0.0062 - 0.11	0.02 - 0.05	0.0062 - 0.020	0.018	0.015	0.017	0.96
Lead - dissolved	13 / 69	19%	0.000031 - 0.00010	0.0001 - 0.0005	0.000031 - 0.00010	0.000056	0.000031	0.000032	0.57
Manganese - dissolved	47 / 60	78%	0.000071 - 0.012	0.00005 - 0.003	0.000015 - 0.00050	0.00068	0.00033	0.0016	2.39
Molybdenum - dissolved	50 / 68	74%	0.000031 - 0.00050	0.00005 - 0.003	0.000015 - 0.00050	0.00028	0.00024	0.00017	0.59
Nickel - dissolved	29 / 64	45%	0.00015 - 0.0016	0.0002 - 0.003	0.000062 - 0.00060	0.00050	0.00060	0.00024	0.47
Selenium - dissolved	7 / 75	9%	0.00010 - 0.00050	0.0005 - 0.001	0.00010 - 0.00031	0.00027	0.00031	0.000089	0.32
Silver - dissolved	5 / 75	7%	0.0000062 - 0.00010	0.00002 - 0.0005	0.0000062 - 0.00010	0.000018	0.0000062	0.000021	1.16
Zinc - dissolved	23 / 54	43%	0.00049 - 0.0053	0.001 - 0.01	0.00031 - 0.0020	0.0024	0.0020	0.00084	0.36
Cyanides (mg/L)									
Cyanide, Total	4 / 73	5%	0.0015 - 0.0050	0.0050 - 0.030	0.0015 - 0.0050	0.0027	0.0015	0.0017	0.61
Cyanide, Weak Acid Dissociable	6 / 75	8%	0.0015 - 0.0050	0.0050 - 0.030	0.0015 - 0.0050	0.0029	0.0015	0.0017	0.58

Notes:

[a] Frequency of detection (FOD) = Number of detected samples / total number of samples in data set.

[b] When calculating the average, median, and standard deviation, non-detects with "U" or "UJ" qualifiers were included as the value of the RDL. Non-detect results of zero, without "U" or "UJ" qualifiers, were included as the value of the RDL.

Key:

NA = Not applicable.

°C = degrees Celsius.

MDL = method detection limit.

MRL = method reporting limit.

mg/L = milligram per liter.

uS/cm = microSiemens per centimeter.

mV = millivolt.

NTU = nephelometric turbidity units.

ORP = oxidation reduction potential.

Table 9.1-20
Comparison of Human Health and Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Freshwater Seeps, North Fork Koktuli River

Analyte	Number of Samples	Number of Samples Exceeding Criteria[a]	
		Chronic Aquatic Life Criteria	Drinking Water Standards
Field and Physical Parameters (mg/L, except where noted)			
Total Dissolved Solids	75	--	0
pH (Field)	75	51	20
Dissolved Oxygen (Field)	75	9	2
Major Ions (mg/L)			
Alkalinity	75	42	--
Chloride	75	0	0
Fluoride	75	--	0
Sulfate	75	--	0
Nutrients			
Ammonia	75	0	--
Nitrate + Nitrite	75	--	0
Total Phosphorus	75	0	0
Ortho-phosphate	5	0	0
Total Metals (mg/L)			
Aluminum	75	0	--
Arsenic	75	--	0
Barium	75	--	0
Cadmium	75	18	0
Chromium	75	0	0
Copper	75	4	0
Iron	75	0	1
Lead	75	7	0
Manganese	75	--	0
Mercury	75	0	0
Nickel	75	0	0
Selenium	75	0	0
Silver	75	0	--
Zinc	75	0	--
Dissolved Metals (mg/L)			
Aluminum	69	0	--
Arsenic	75	--	0
Barium	45	--	0
Cadmium	75	18	0
Chromium	73	0	0
Copper	62	0	0
Iron	75	0	0
Lead	72	3	0
Manganese	63	--	0
Nickel	69	0	--
Selenium	75	0	0
Silver	75	0	--
Zinc	60	0	--
Cyanides (mg/L)			
Cyanide WAD	75	0	0

Notes:
Bolded text identifies positive results exceeding impact criteria.
[a] Seep sample results were compared to criteria from ADEC (2008 and 2009). Drinking water standards were compared to total metals data. Chronic aquatic life criteria were compared to both total and dissolved metals data. Hardness-dependent criteria are based on preliminary estimates.
Key:
-- = Not applicable.
References:
Alaska Department of Environmental Conservation (ADEC). 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. As amended through December 12, 2008.
ADEC. 2009. 18 AAC 70. Water Quality Standards. Amended as of September 19, 2009.

Table 9.1-21
Surface Water Data Summary for Naturally Occurring Constitents
Seeps in the South Fork Koktuli River Drainage

Analyte	Frequency of Detection	Percent Detected	Range of Detects (Min-Max)	Range of Reporting Limits (MRL)	Range of Detection Limits (MDL)	Mean[b]	Median[b]	Standard Deviation[b]	Coefficient of Variation
Field and Physical parameters (mg/L, except where noted)									
Total Dissolved Solids	108 / 111	97%	5.0 - 146	10 - 20	3.1 - 10	42	32.5	32	0.77
pH (Field, Standard Units)	114 / 114	100%	3.72 - 7.68	NA - NA	NA - NA	5.9	5.96	1.1	0.19
Dissolved Oxygen	114 / 114	100%	2.45 - 12.7	NA - NA	NA - NA	10	10.2	1.75	0.18
Water Temperature (ºC)	114 / 114	100%	0.06 - 8.13	NA - NA	NA - NA	3.0	2.74	1.44	0.49
Specific Conductivity (Field, uS/cm)	114 / 114	100%	7.0 - 203	NA - NA	NA - NA	56	41	47	0.84
Turbidity (NTU)	113 / 113	100%	0.050 - 1.32	NA - NA	NA - NA	0.18	0.12	0.18	1.02
Total Suspended Solids	40 / 93	43%	0.15 - 44.9	0.15 - 5	0.5 - 20	2.3	0.42	5.2	2.29
ORP (mv)	110 / 110	100%	38.6 - 456	NA - NA	NA - NA	249	235	81	0.33
Major Ions (mg/L)									
Calcium - dissolved	104 / 105	99%	0.84 - 14.9	0.050 - 1	0.015 - 0.20	5.37	5.38	3.40	0.63
Calcium - total	109 / 109	100%	0.65 - 14.3	0.050 - 1.0	0.015 - 0.20	5.06	5.25	3.33	0.66
Magnesium - dissolved	96 / 99	97%	0.15 - 3.14	0.0050 - 1.0	0.0016 - 0.20	1.15	0.80	0.89	0.77
Magnesium - total	106 / 108	98%	0.12 - 3.0	0.0050 - 1.0	0.0016 - 0.20	1.03	0.63	0.87	0.84
Sodium - dissolved	111 / 111	100%	0.90 - 3.58	0.10 - 2.0	0.031 - 0.30	2.02	1.83	0.71	0.35
Sodium - total	111 / 111	100%	0.80 - 3.40	0.10 - 2.0	0.031 - 0.30	1.94	1.76	0.69	0.36
Potassium - dissolved	80 / 101	79%	0.065 - 3.060	0.050 - 2.0	0.015 - 0.30	0.57	0.22	0.76	1.34
Potassium - total	87 / 107	81%	0.050 - 3.0	0.050 - 2	0.015 - 0.30	0.52	0.19	0.72	1.39
Alkalinity, Total	72 / 111	65%	2.0 - 116	10 - 20	2 - 3.1	12.1	7	15	1.24
Sulfate	108 / 112	96%	0.031 - 69.3	0.10 - 3.0	0.031 - 0.50	14.1	4.87	19	1.34
Chloride	110 / 112	98%	0.031 - 1.5	0.10 - 3.0	0.031 - 0.50	0.70	0.65	0.22	0.32
Fluoride	46 / 112	41%	0.031 - 0.30	0.10 - 0.50	0.031 - 0.10	0.080	0.072	0.056	0.71
Hardness as CaCO3	106 / 111	96%	2.1 - 43	0.80 - 7.0	0.80 - 1.0	16.8	16.8	10.9	0.65
Nutrients, (mg/L)									
Total Ammonia - N	24 / 107	22%	0.031 - 0.47	0.10 - 3.0	0.031 - 0.30	0.070	0.050	0.075	1.07
Nitrate-Nitrite	101 / 111	91%	0.02 - 1.59	0.10 - 0.10	0.020 - 0.031	0.22	0.14	0.25	1.14
Total Phosphorous	69 / 110	63%	0.0031 - 0.052	0.010 - 0.050	0.0031 - 0.010	0.014	0.010	0.011	0.76
Total Orthophosphate (as P)	0 / 4	0%	0.031 - 0.10	0.10 - 0.10	0.031 - 0.031	0.066	0.066	0.040	0.61
Total Metals (mg/L)									
Aluminum - total	105 / 111	95%	0.0010 - 4.88	0.0020 - 0.050	0.00062 - 0.012	0.47	0.0092	1.17	2.51
Arsenic - total	18 / 112	16%	0.00031 - 0.010	0.00050 - 0.0013	0.00025 - 0.00063	0.0010	0.00031	0.0019	1.8
Barium - total	106 / 112	95%	0.000094 - 0.026	0.000050 - 0.00050	0.000025 - 0.00016	0.0060	0.0028	0.0073	1.21
Cadmium - total	32 / 86	37%	0.000015 - 0.00020	0.000050 - 0.00050	0.000015 - 0.00010	0.000048	0.000015	0.000054	1.13
Chromium - total	57 / 110	52%	0.00010 - 0.00080	0.00020 - 0.00050	0.000062 - 0.00016	0.00022	0.00020	0.00014	0.64
Copper - total	62 / 112	55%	0.000050 - 0.55	0.00010 - 0.0030	0.000031 - 0.00050	0.061	0.00050	0.13	2.11
Iron - total	48 / 109	44%	0.0062 - 2.35	0.020 - 0.050	0.0062 - 0.020	0.12	0.016	0.37	3.01
Lead - total	15 / 112	13%	0.000031 - 0.00014	0.000050 - 0.00050	0.000026 - 0.00010	0.000056	0.000031	0.000032	0.57
Manganese - total	88 / 111	79%	0.000046 - 0.11	0.000050 - 0.0030	0.000015 - 0.00050	0.016	0.00050	0.031	1.88
Molybdenum - total	59 / 103	57%	0.000015 - 0.0023	0.000020 - 0.0030	0.0000062 - 0.00050	0.00038	0.00031	0.00039	1.04
Nickel - total	55 / 110	50%	0.000062 - 0.013	0.00010 - 0.0030	0.000031 - 0.00060	0.0019	0.00060	0.0033	1.74
Selenium - total	17 / 108	16%	0.00010 - 0.00050	0.00050 - 0.0013	0.00010 - 0.00039	0.00028	0.00031	0.000083	0.30
Silver - total	10 / 89	11%	0.0000062 - 0.000071	0.000020 - 0.00030	0.0000062 - 0.000050	0.000011	0.0000062	0.000014	1.22
Zinc - total	50 / 111	45%	0.00031 - 0.028	0.00050 - 0.010	0.00026 - 0.0020	0.0067	0.0021	0.0085	1.27

Dissolved Metals (mg/L)									
Aluminum - dissolved	92 / 108	85%	0.0014 - 5.2	0.0020 - 0.050	0.00062 - 0.012	0.47	0.0090	1.21	2.57
Arsenic - dissolved	21 / 112	19%	0.00031 - 0.0076	0.00050 - 0.0010	0.00025 - 0.00050	0.00099	0.00031	0.0017	1.69
Barium - dissolved	82 / 84	98%	0.00025 - 0.026	0.000050 - 0.00050	0.000025 - 0.00010	0.0078	0.0045	0.0080	1.02
Cadmium - dissolved	34 / 86	40%	0.000015 - 0.00020	0.000050 - 0.00050	0.000015 - 0.00010	0.000046	0.000015	0.000051	1.11
Chromium - dissolved	48 / 104	46%	0.00010 - 0.00070	0.00020 - 0.00050	0.000062 - 0.00010	0.00027	0.00021	0.00014	0.54
Copper - dissolved	51 / 78	65%	0.000091 - 0.58	0.00010 - 0.0030	0.000031 - 0.00050	0.084	0.00050	0.14	1.71
Iron - dissolved	54 / 98	55%	0.0062 - 1.28	0.020 - 0.050	0.0062 - 0.020	0.074	0.011	0.21	2.76
Lead - dissolved	30 / 105	29%	0.000031 - 0.00013	0.000050 - 0.00050	0.000026 - 0.00010	0.000068	0.000068	0.000033	0.49
Manganese - dissolved	71 / 90	79%	0.000035 - 0.12	0.000050 - 0.0030	0.000015 - 0.00050	0.021	0.00081	0.034	1.63
Molybdenum - dissolved	58 / 100	58%	0.000015 - 0.0011	0.000020 - 0.0030	0.0000062 - 0.00050	0.00038	0.00036	0.00033	0.89
Nickel - dissolved	56 / 101	55%	0.00012 - 0.014	0.00010 - 0.0030	0.000031 - 0.00060	0.0021	0.00062	0.0034	1.6
Selenium - dissolved	15 / 112	13%	0.00010 - 0.00050	0.00050 - 0.0010	0.00010 - 0.00031	0.00028	0.00031	0.000088	0.31
Silver - dissolved	13 / 112	12%	0.0000062 - 0.00050	0.000020 - 0.0030	0.0000062 - 0.00050	0.000022	0.0000062	0.000049	2.21
Zinc - dissolved	55 / 96	57%	0.00099 - 0.031	0.00050 - 0.010	0.00026 - 0.0020	0.0076	0.0030	0.0093	1.23
Cyanides (mg/L)									
Cyanide, Total	3 / 110	3%	0.0015 - 0.057	0.0050 - 0.030	0.0015 - 0.0050	0.0037	0.0015	0.0060	1.62
Cyanide, Weak Acid Dissociable	3 / 107	3%	0.0015 - 0.0050	0.0050 - 0.030	0.0015 - 0.0050	0.0026	0.0015	0.0016	0.62

Notes:

[a] Frequency of detection (FOD) = Number of detected samples / total number of samples in data set.

[b] When calculating the average, median, and standard deviation, non-detects with "U" or "UJ" qualifiers were included as the value of the RDL. Non-detect results of zero, without "U" or "UJ" qualifiers, were included as the value of the RDL.

Key:
NA = Not applicable.
°C = degrees Celsius.
MDL = method detection limit.
MRL = method reporting limit.
mg/L = milligram per liter.
uS/cm = microSiemens per centimeter.
mV = millivolt.
NTU = nephelometric turbidity units.
ORP = oxidation reduction potential.

Table 9.1-22
Comparison of Human Health and Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Freshwater Seeps, South Fork Koktuli River

Analyte	Number of Samples	Number of Samples Exceeding Criteria[a]	
		Chronic Aquatic Life Criteria	Drinking Water Standards
Field and Physical Parameters (mg/L, except where noted)			
Total Dissolved Solids	112	--	0
pH (Field)	114	72	59
Dissolved Oxygen (Field)	114	7	2
Major Ions (mg/L)			
Alkalinity	112	93	--
Chloride	112	0	0
Fluoride	112	--	0
Sulfate	112	--	0
Nutrients			
Ammonia	112	0	--
Nitrate + Nitrite	112	--	0
Total Metals (mg/L)			
Aluminum	112	35	--
Arsenic	112	--	0
Barium	112	--	0
Cadmium	112	62	0
Chromium	112	0	0
Copper	112	80	0
Iron	112	5	10
Lead	112	48	0
Manganese	112	--	20
Mercury	112	0	0
Nickel	112	26	0
Selenium	112	0	0
Silver	112	38	--
Zinc	112	29	--
Dissolved Metals (mg/L)			
Aluminum	109	25	--
Arsenic	112	--	0
Barium	84	--	0
Cadmium	112	62	0
Chromium	104	0	0
Copper	100	85	0
Iron	112	2	8
Lead	107	62	0
Manganese	93	- -	0
Nickel	106	25	--
Selenium	112	0	0
Silver	112	39	--
Zinc	102	32	--
Cyanides (mg/L)			
Cyanide WAD	111	4	0

Notes:
Bolded text identifies positive results exceeding impact criteria.
[a] Seep sample results were compared to criteria from ADEC (2008 and 2009). Drinking water standards were compared to total metals data. Chronic aquatic life criteria were compared to both total and dissolved metals data. Hardness-dependent criteria are based on preliminary estimates.
Key:
-- = Not applicable.
References:
Alaska Department of Environmental Conservation (ADEC). 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. As amended through December 12, 2008.
ADEC. 2009. 18 AAC 70. Water Quality Standards. Amended as of September 19, 2009.

Table 9.1-23
Surface Water Data Summary for Naturally Occurring Constituents
Seeps in the Upper Talarik Creek Drainage

Analyte	Frequency of	Percent Detected	Range of Detects (Min-Max)	Range of Reporting Limits	Range of Detection Limits	Mean[b]	Median[b]	Standard Deviation[b]	Coefficient of Variation
Field and Physical parameters (mg/L, except where noted)									
Total Dissolved Solids	160 / 160	100%	7.5 - 133	10 - 20	3.1 - 10	55.3	50	26.4	0.48
pH (Field, Standard Units)	164 / 164	100%	5.13 - 8.67	NA - NA	NA - NA	6.93	6.79	0.82	0.12
Dissolved Oxygen	162 / 162	100%	5.79 - 13.4	NA - NA	NA - NA	9.63	9.64	1.37	0.14
Water Temperature (ºC)	162 / 162	100%	0.13 - 9.66	NA - NA	NA - NA	2.98	2.88	1.29	0.43
Specific Conductivity (Field, uS/cm)	164 / 164	100%	21 - 227	NA - NA	NA - NA	75.4	69	40.9	0.54
Turbidity (NTU)	164 / 164	100%	0.040 - 1.65	NA - NA	NA - NA	0.22	0.15	0.25	1.13
Total Suspended Solids	65 / 145	45%	0.15 - 38.9	0.50 - 20	0.15 - 5	2.25	0.43	4.43	1.97
ORP (mv)	163 / 163	100%	-170 - 299	NA - NA	NA - NA	184	201	74.7	0.41
Major Ions (mg/L)									
Calcium - dissolved	159 / 159	100%	3.34 - 26.8	0.050 - 5	0.015 - 1	10.2	9.54	4.99	0.49
Calcium - total	159 / 159	100%	3.34 - 26.5	0.050 - 1	0.015 - 0.20	10.1	9.55	4.97	0.49
Magnesium - dissolved	154 / 154	100%	0.36 - 11.5	0.0050 - 5	0.0016 - 1	2.19	1.24	2.63	1.2
Magnesium - total	158 / 158	100%	0.3 - 11.2	0.0050 - 1	0.0016 - 0.20	2.11	1.23	2.59	1.23
Sodium - dissolved	158 / 158	100%	1.16 - 4.81	0.10 - 8	0.031 - 2.00	2.71	2.31	1.01	0.37
Sodium - total	159 / 159	100%	1.11 - 4.9	0.10 - 2	0.031 - 0.30	2.65	2.29	1.00	0.38
Potassium - dissolved	143 / 151	95%	0.13 - 1.3	0.050 - 2	0.015 - 0.30	0.43	0.37	0.22	0.52
Potassium - total	142 / 148	96%	0.11 - 1.9	0.050 - 2	0.015 - 0.30	0.42	0.36	0.25	0.59
Alkalinity, Total	159 / 160	99%	7.98 - 116	10 - 20	2 - 3.10	33.1	28.6	23.9	0.72
Sulfate	160 / 160	100%	0.49 - 36.1	0.10 - 3	0.031 - 0.50	6.47	2.32	8.67	1.34
Chloride	159 / 159	100%	0.42 - 1.2	0.10 - 3	0.031 - 0.50	0.73	0.68	0.15	0.21
Fluoride	99 / 160	62%	0.031 - 0.17	0.10 - 0.50	0.031 - 0.10	0.062	0.053	0.029	0.46
Hardness as CaCO3	160 / 160	100%	9.76 - 114	0.80 - 7.0	0.80 - 1	34	30	22.4	0.66
Nutrients, (mg/L)									
Total Ammonia - N	21 / 157	13%	0.031 - 0.50	0.10 - 5	0.031 - 0.50	0.072	0.050	0.075	1.04
Nitrate-Nitrite	149 / 158	94%	0.020 - 1.11	0.020 - 0.10	0.0062 - 0.031	0.38	0.31	0.27	0.71
Total Phosphorous	127 / 156	81%	0.0031 - 0.066	0.010 - 0.050	0.0031 - 0.010	0.017	0.015	0.011	0.62
Total Orthophosphate (as P)	0 / 8	0%	0.031 - 0.10	0.10 - 0.10	0.031 - 0.031	0.066	0.066	0.037	0.56
Total Metals (mg/L)									
Aluminum - total	134 / 154	87%	0.0010 - 0.79	0.0020 - 0.030	0.00062 - 0.0050	0.023	0.0084	0.074	3.16
Arsenic - total	97 / 159	61%	0.00031 - 0.0086	0.00050 - 0.0010	0.00025 - 0.00050	0.0023	0.00071	0.0025	1.11
Barium - total	159 / 159	100%	0.00052 - 0.019	0.000050 - 0.00050	0.000025 - 0.00010	0.0047	0.0031	0.0048	1.02
Cadmium - total	4 / 125	3%	0.000015 - 0.000058	0.000050 - 0.00005	0.000015 - 0.000037	0.000017	0.000015	0.0000062	0.37
Chromium - total	132 / 157	84%	0.00010 - 0.0011	0.00020 - 0.00050	0.000062 - 0.00010	0.00041	0.00037	0.00024	0.59
Copper - total	79 / 146	54%	0.000050 - 0.0034	0.00010 - 0.0030	0.000031 - 0.00050	0.00044	0.00050	0.00039	0.89
Iron - total	101 / 156	65%	0.0062 - 0.43	0.020 - 0.050	0.0062 - 0.020	0.037	0.020	0.052	1.4
Lead - total	23 / 151	15%	0.000031 - 0.000367	0.000050 - 0.00050	0.000026 - 0.00010	0.000057	0.000031	0.000050	0.87
Manganese - total	126 / 156	81%	0.000050 - 0.039	0.000050 - 0.0030	0.000015 - 0.00050	0.0016	0.00050	0.0046	2.84
Molybdenum - total	123 / 150	82%	0.000015 - 0.0026	0.000020 - 0.0030	0.0000062 - 0.00050	0.00055	0.00042	0.00065	1.18
Nickel - total	89 / 157	57%	0.000062 - 0.0020	0.00010 - 0.0030	0.000031 - 0.00060	0.00053	0.00057	0.00041	0.78
Selenium - total	14 / 156	9%	0.00010 - 0.00046	0.00050 - 0.0010	0.00010 - 0.00031	0.00028	0.00031	0.000082	0.30
Silver - total	6 / 130	5%	0.0000062 - 0.00010	0.000020 - 0.00050	0.0000062 - 0.00010	0.000009	0.0000062	0.000011	1.28
Zinc - total	64 / 153	42%	0.00031 - 0.012	0.00050 - 0.010	0.00026 - 0.0020	0.0023	0.0020	0.0018	0.78

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Dissolved Metals (mg/L)									
Aluminum - dissolved	111 / 149	75%	0.0012 - 0.020	0.0020 - 0.0050	0.00062 - 0.0010	0.0047	0.0040	0.0034	0.72
Arsenic - dissolved	94 / 157	60%	0.00031 - 0.0079	0.00050 - 0.0010	0.00025 - 0.00050	0.0022	0.00070	0.0025	1.14
Barium - dissolved	136 / 136	100%	0.00045 - 0.021	0.000050 - 0.0010	0.000025 - 0.00020	0.0053	0.0034	0.0051	0.97
Cadmium - dissolved	12 / 124	10%	0.000015 - 0.000043	0.000050 - 0.000050	0.000015 - 0.000037	0.000017	0.000015	0.0000056	0.33
Chromium - dissolved	118 / 150	79%	0.00010 - 0.0011	0.00020 - 0.00050	0.000062 - 0.00010	0.00043	0.00041	0.00022	0.51
Copper - dissolved	55 / 95	58%	0.00010 - 0.0014	0.00010 - 0.0030	0.000031 - 0.00050	0.00048	0.00050	0.00026	0.54
Iron - dissolved	77 / 154	50%	0.0062 - 0.19	0.020 - 0.10	0.0062 - 0.040	0.024	0.020	0.022	0.92
Lead - dissolved	32 / 135	24%	0.000031 - 0.00024	0.000050 - 0.00050	0.000026 - 0.00010	0.000056	0.000031	0.000037	0.65
Manganese - dissolved	98 / 131	75%	0.000015 - 0.0040	0.000050 - 0.0030	0.000015 - 0.00050	0.00042	0.00024	0.00060	1.42
Molybdenum - dissolved	110 / 142	78%	0.000015 - 0.0026	0.000020 - 0.0030	0.0000062 - 0.00050	0.00058	0.00046	0.00067	1.15
Nickel - dissolved	62 / 120	52%	0.00011 - 0.0024	0.00020 - 0.0030	0.000062 - 0.00060	0.00064	0.00060	0.00044	0.68
Selenium - dissolved	12 / 160	8%	0.00010 - 0.00050	0.00050 - 0.0010	0.00010 - 0.00031	0.00028	0.00031	0.000087	0.31
Silver - dissolved	9 / 160	6%	0.0000062 - 0.00010	0.000020 - 0.00050	0.0000062 - 0.00010	0.000017	0.0000062	0.000020	1.2
Zinc - dissolved	61 / 124	49%	0.00031 - 0.010	0.00050 - 0.010	0.00026 - 0.0020	0.0024	0.0020	0.0016	0.66
Cyanides (mg/L)									
Cyanide, Total	5 / 150	3%	0.0015 - 0.011	0.0050 - 0.030	0.0015 - 0.0050	0.0025	0.0015	0.0017	0.66
Cyanide, Weak Acid Dissociable	10 / 150	7%	0.0015 - 0.064	0.0050 - 0.030	0.0015 - 0.0050	0.0031	0.0015	0.0053	1.71

Notes:

[a] Frequency of detection (FOD) = Number of detected samples / total number of samples in data set.

[b] When calculating the average, median, and standard deviation, non-detects with "U" or "UJ" qualifiers were included as the value of the RDL. Non-detect results of zero, without "U" or "UJ" qualifiers, were included as the value of the RDL.

Key:

NA = Not applicable.

°C = degrees Celsius.

MDL = method detection limit.

MRL = method reporting limit.

mg/L = milligram per liter.

uS/cm = microSiemens per centimeter.

mV = millivolt.

Table 9.1-24
Comparison of Human Health and Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Freshwater Seeps, Upper Talarik Creek

Analyte	Number of Samples	Number of Samples Exceeding Criteria[a]	
		Chronic Aquatic Life Criteria	Drinking Water Standards
Field and Physical Parameters (mg/L, except where noted)			
Total Dissolved Solids	160	--	0
pH (Field)	164	63	26
Dissolved Oxygen (Field)	162	10	0
Major Ions			
Alkalinity	160	31	--
Chloride	160	--	0
Fluoride	160	0	0
Sulfate	160	--	0
Nutrients			
Ammonia	160	0	0
Nitrate + Nitrite	160	0	0
Total Metals (mg/L)			
Aluminum	160	12	--
Arsenic	160	--	0
Barium	160	--	0
Cadmium	160	35	0
Chromium	160	0	0
Copper	160	3	0
Iron	160	0	5
Lead	160	4	0
Manganese	160	--	0
Mercury	148	0	0
Nickel	160	0	0
Selenium	160	0	0
Silver	160	1	--
Zinc	160	1	--
Dissolved Metals (mg/L)			
Aluminum	155	0	--
Arsenic	136	--	0
Barium	160	--	0
Cadmium	159	0	0
Chromium	156	0	0
Copper	160	0	0
Iron	153	5	0
Lead	155	0	0
Manganese	160	--	0
Nickel	158	0	--
Selenium	160	0	0
Silver	160	0	--
Zinc	134	0	--
Cyanides (mg/L)			
Cyanide WAD	158	4	0

Notes:
Bolded text identifies positive results exceeding impact criteria.
[a] Seep sample results were compared to criteria from ADEC (2008 and 2009). Drinking water standards were compared to total metals data. Chronic aquatic life criteria were compared to both total and dissolved metals data. Hardness-dependent

Key:
-- = Not applicable.
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