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Technical Memorandum

To:	Mary Beth Marks – On-Scene Coordinator	**From:**	Mark F. Pearson – Project Geologist
Company:	USDA Forest Service Gallatin National Forest	**Date:**	February 6, 2009
Re:	**Spatial Distribution of Metals in Groundwater of the New World Mining District - Implications for a Controlled Groundwater Area** New World Mining District Response and Restoration Project	**Project #:**	1157561506A.218

INTRODUCTION

This technical memorandum presents geochemical data and maps that illustrate the spatial extent of metal concentrations in groundwater that exceed regulatory standards and guidelines within the New World Mining District in Park County, Montana. This memorandum also provides a basis for consideration of the establishment of a controlled groundwater area as an appropriate administrative/regulatory solution to groundwater quality issues in the District.

Groundwater in the District is represented by samples collected from monitoring wells, seeps and springs (from both unconsolidated material and bedrock formations), and adit discharges. Metals concentrations evaluated include cadmium, copper, iron, lead, manganese, and zinc. Average metal concentrations are plotted by data point (or station).

Site Aspects and General Geology

The New World Mining District in Park County, Montana encompasses about 25,600 acres, most of which are National Forest System Lands within the Gallatin National Forest. Water users adjacent to the District include the community of Cooke City, Montana where springs have been developed and wells have been drilled for the community water supply system. In addition, outside of the town of Cooke City proper, a large number of residences rely on drilled residential water wells for their domestic water supply. Within the District, numerous seeps and springs have been documented, as well as a number of discharging adits. Numerous groundwater monitoring wells have been installed in the upper Daisy, Miller, and Fisher Creek drainages for evaluating groundwater conditions attendant to proposed mine facility developments and for subsequent District-wide response actions. The oldest monitoring wells and data collected date back to the late 1980's.

The New World Mining District is a major intrusive center of Eocene age (40 million years before present (ybp)). Surface and groundwater quality in the District is affected by the distribution of intrusive rocks, and spatially and temporally related alteration and mineralization. The intrusives are present as stocks, intrusive complexes, laccoliths, and numerous sills and dikes.

The highest elevation groundwater is hosted by a minimum of four mineralized intrusive porphyries and associated breccia zones. The District and intrusive center is located within the Beartooth block, a large uplift of Archean (600 million + ybp) granitic gneisses in south-central Montana and north-eastern Wyoming. Paleazoic sedimentary rocks also exist in the District and have an aggregate thickness of 1,200 feet. The Wolsey shale and Meagher formation (limestone and shale) in the vicinity of the intrusives have been mineralized. Brecciation, alteration, and mineralization associated with the intrusives resulted in sulfide mineral assemblages and economic gold-copper-silver deposits[1].

Hydrogeology

Groundwater in the District occurs in two hydrostratigraphic units. The first is in unconsolidated material such as regolith, talus, colluvium, alluvial valley fill and glacial deposits. The second is in consolidated rock formations, i.e. bedrock. Primary porosity and hydraulic conductivity within bedrock is low. Groundwater movement in bedrock is controlled by secondary permeability developed along faults, fractures, and joints. Flow paths are generally from mountain ridges to valley bottoms, although faults, fractures, and geologic contacts can locally influence the direction of flow paths[2] and result in zones of much higher transmissivity.

Recharge to groundwater occurs through infiltration of rain and snowmelt water initially into unconsolidated deposits and then into bedrock through fractures. Recharge can be rapid in fractured bedrock and unconsolidated deposits as evidenced by recharge rates in the McLaren Pit waste rock wells. Recharge into deeper bedrock is believed to be low as evidenced by low yields as sustained base flows from adits, low discharge from springs, and minor volumes of water encountered during historic drilling into bedrock units[2, 3].

Seeps and springs occur where the water table or potentiometric surface intersects the topographic surface and often are localized near the surface expression of fractures or geologic contacts. Discharge from seeps and springs are variable and seasonally dependent. Many of these seeps and springs flow only during the spring of the year, when snowmelt is occurring[3].

METHODS

Data Point Selection

Monitoring data from District monitoring wells and seeps, springs, and adit discharges was compiled. To this end 116 data points were created and their locations are plotted in Figure 1.

Monitoring Wells

Monitoring wells included in the data set were selected for their spatial extent and distribution, within the District, and if a choice was to be made between a well pair completed in unconsolidated deposits and underlying bedrock, the bedrock well was selected. The exception to this was in the McLaren Pit Area where two waste rock wells DCGW-104 and DCGW-105 were used instead of the previously drilled EPA bedrock wells. Review of monitoring results for the former EPA wells[3] indicated relatively high metal concentrations similar to monitoring results for waste rock wells DCGW-104 and DCGW -105.

Samples collected from wells for analysis of metals were typically filtered and, therefore, reported in dissolved concentrations. Wells make up 45 of the total of 116 data points. Well depths ranged between 5 feet in well MW-12 at approximately 8,300 feet above mean sea level

(AMSL) to 235 feet below ground surface in well DCGW-100 at approximately 9,900 feet AMSL.

Seeps, Springs, and Adits

Seeps, springs, and adit discharges included in the data set were selected for their metals analytical results and spatial distribution over the largest area possible. Adit discharge locations of the McLaren Adit (D-18) and Glengarry Adit (F-8A) were not included due to the relatively great length of these adits enabling atmospheric interactions with groundwater, and because of the occurrence of other nearby seeps, springs, and/or adit discharges. The Gold Dust Adit (F-28) was retained in the data set to maintain spatial distribution for this type of data point.

Samples collected for metal analysis from the seep, spring, and adit sites were typically not filtered and, therefore, reported in total recoverable concentrations. Seeps, springs, and adits make up 71 of the 116 data points. Range of flow values measured for adits were between 0.003 gallons per minute (gpm) at Sheep Mountain Adit (FCSI-99-1) and 33 gpm at the Gold Dust Adit (F-28).

Database and Map Construction Methodology

The New World database is in Microsoft Access. The database was queried for two categories of water data: 1) *Groundwater* (from monitoring wells), and 2) *Springs, Seeps & Adits*. Analytical results for cadmium, copper, iron, lead, manganese, and zinc in dissolved or total recoverable concentrations were extracted from the database for these two categories of water data. Two new tables were produced. These tables were reviewed for analytical results below the detection limit value then the detection limit value was halved and assumed to be the measured concentration.

The tables were then run in a “make-table query” that grouped the sample locations (or stations) and then averaged the results for all sets of analyses at each station, for each of the six metals. Another make-table query was created to include location coordinates with the average metal concentrations. The new tables that were used in the preparation of the metal concentration distribution maps are presented as Tables 1 and 2, in this document and groups 1) monitoring wells, and 2) springs, seeps, and adits.

The metal concentration maps produced from Tables 1 and 2 are presented in Figures 2 through 7. These maps were produced by ArcMap 9.3® software. The type of map produced is also known as a dot concentration map where there is a minimum and maximum dot size established. In the case of the six metals, the minimum dot size is 300 feet in diameter (map scale) and corresponds to applicable Montana Department of Environmental Quality (DEQ) WQB-7 numeric water quality human health standard or guidelines[5]. The maximum dot size of 1,200 feet in diameter corresponds to the maximum concentration of each of the six metals measured in the database. For example, in the cadmium concentration map, the minimum dot size corresponds to the human health standard of 0.005 milligrams per liter (mg/L) and the maximum dot size corresponds to the maximum concentration of cadmium in the database, 0.0283 mg/L. For concentrations between the minimum and the maximum values, the software creates an algebraic formula for linear scaling of the size of the dot between the minimum and the maximum size.

RESULTS

The dot metal concentration maps (Figures 2 through 7) present the range of metal concentrations as summarized in Table 3. Monitoring wells have a higher maximum value in each of the six metals except lead. Review of the dot concentration maps indicates the following:

- The maps do not establish contour gradients, boundaries, or geographic limits of metal impacts to groundwater. The maps accurately portray groundwater impacts in areas of the District where one or more data points/monitoring stations exist.

- Cadmium, copper, and lead exceed the DEQ WQB-7 human health standard in the same general areas of the District. These being the Black Warrior mine, McLaren pit, Como Basin, and upper Fisher Creek areas.

- Iron and manganese exceed the DEQ WQB-7 human health guideline over a greater area in the district compared with cadmium, copper, and lead.

Figures 2 through 7 also provide a basis in consideration of the establishment of a controlled groundwater area as an administrative control method with the following aspects:

- Metal impacts to groundwater, in many parts of the District, appear related to naturally occurring disseminated and massive sulfide mineral occurrences within the host rocks.

- The maps clearly demonstrate distinct localized/regional areas of metal impacts to groundwater exceeding human health standards and guidelines.

- The maps do not define boundaries or limits (either vertically or in plan view) of metal-impacted groundwater. Boundaries may be established on the basis of geologic formations, structure, or other geologic aspects. The completion of additional monitoring well installations or additional monitoring to define the lateral extents or boundaries of contaminated groundwater is unlikely.

- Private land holdings occur within the District that may want to develop groundwater resources in the future.

Endnotes:

1 Kirk, Allan R, 1995. Bedrock structure and hydrogeology New World Project, Park County, Montana. Report submitted Joe Gurrieri, hydrologist, Montana Dept. of State Lands. January 25.

2 Kirk, A.R. and T.W. Johnson, 1995. Geology and mineral deposits of the New World District, Park County, Montana. Montana Geological Society – Energy and Mineral Resources of Central Montana.

3 URS Operating Services, Inc., 1998. Site assessment summary and sampling activities report, New World Mine, Cooke City, Montana, TDD No. 9607-0024.

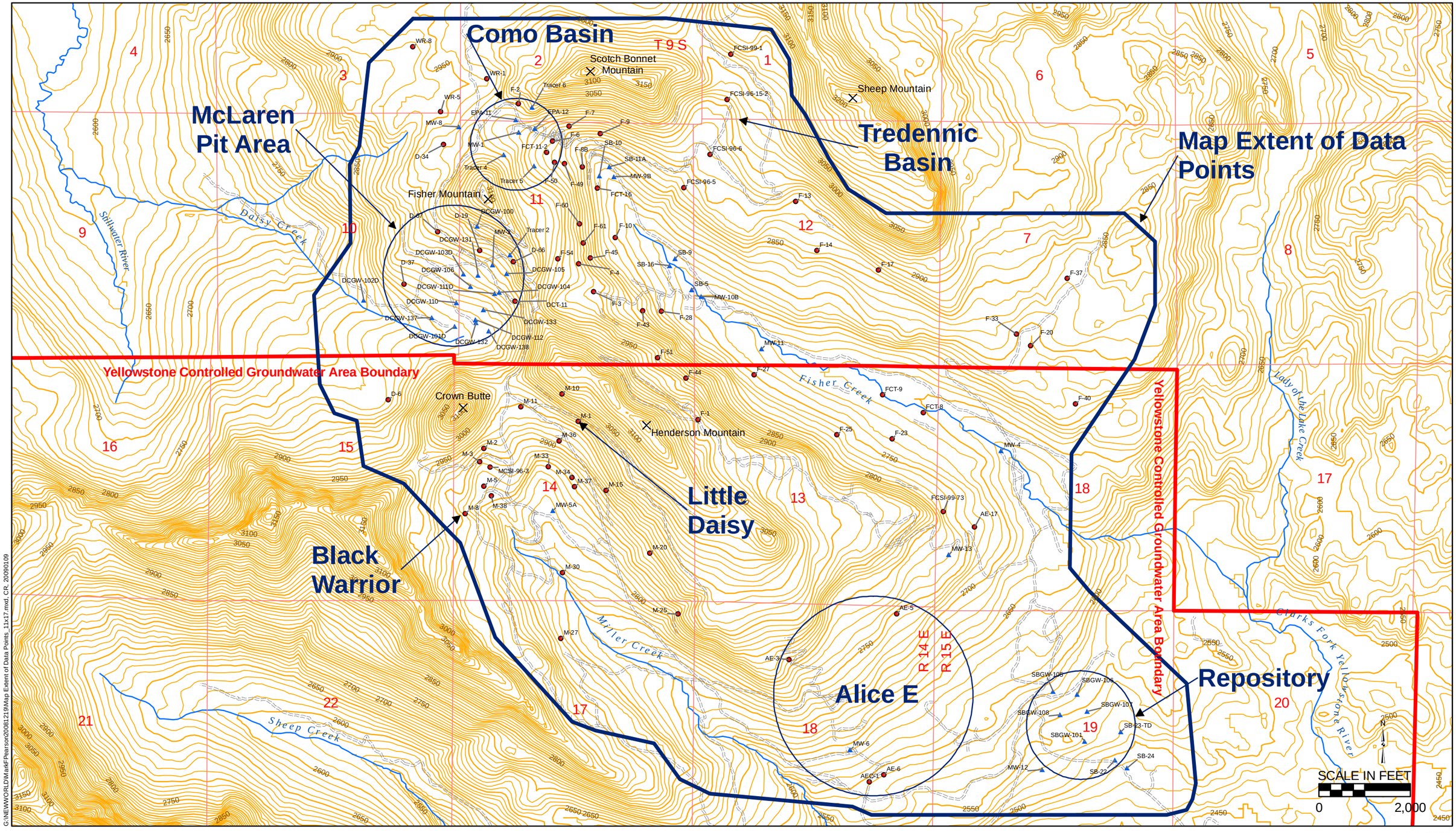
4 Tetra Tech, 2008. 2007 Surface Water and Groundwater Monitoring Report. Report submitted to the USDA Forest Service, Gallatin National Forest, Bozeman, Montana. March 28.

5 Montana DEQ, 2008. Circular DEQ-7, Montana Numeric Water Quality Standards. Planning, Prevention, and Assistance Division – Water Quality Standards Section. February.

ATTACHMENT A
FIGURES

Spatial Distribution of Metals in Groundwater of the New World Mining District - Implications for a Controlled Groundwater Area

New World Mining District Response and Restoration Project



G:\NEWWORLD\MarkPPearson\20081219\Map Extent of Data Points_11x17.mxd, CR, 20090109

1/9/2009

Sample Locations

- Spring, Seep, or Adit
- Well

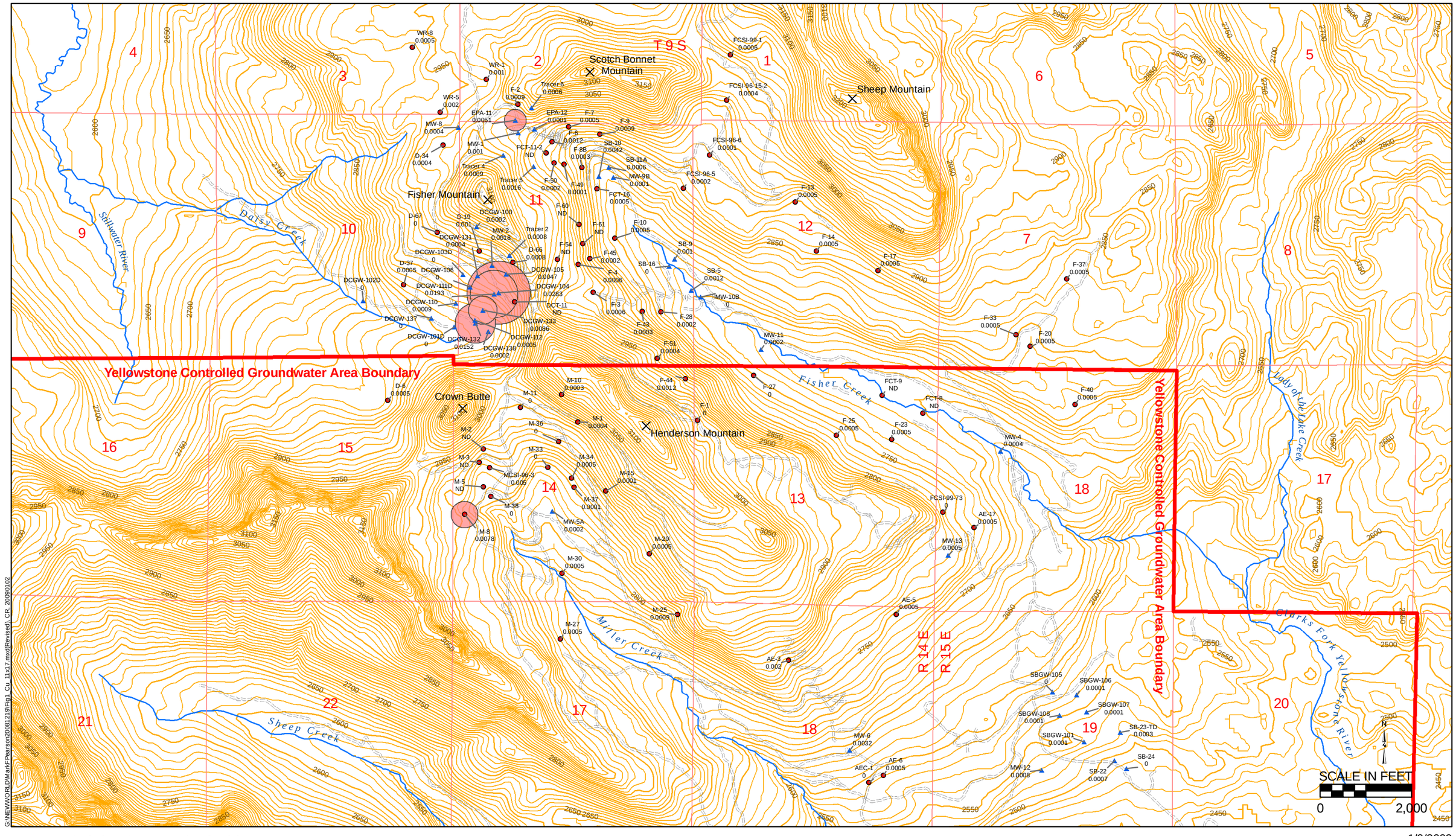
Sections
Roads
Streams

Elevation Contours (M)

Index
Intermediate

Figure 1

Sample Locations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana
New World Mining District, Response and Resoration Project



Cadmium Concentration (Mg/L)

0.005 — 0.0283

ND = No Data

Sample Locations
- Spring, Seep, or Adit
- Well

Sections
Roads
Streams

Elevation Contours (M)
- Index
- Intermediate

NOTES: Scaled dots displayed for Cadmium (Cd) values equal to or greater than 0.005 mg/L, Circular DEQ-7 Human Health Standard for Cadmium. The dots are scaled from a 150 feet radius which is equivalent to 0.005 mg/L to a 600 feet radius which is equivalent to 0.0283 mg/L.

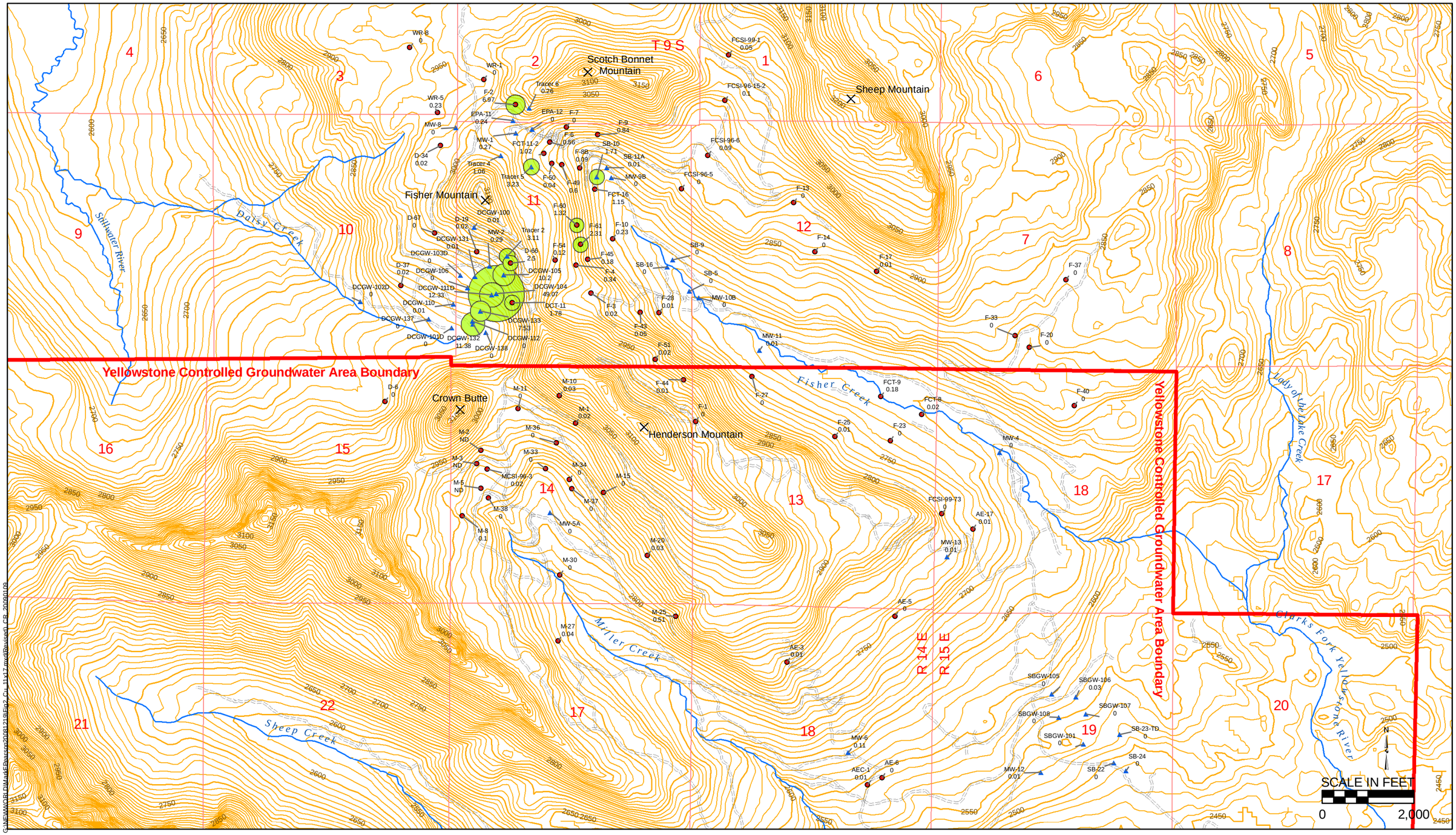
1/9/2009

Figure 2

Cadmium Concentrations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana

New World Mining District, Response and Resoration Project

G:\NEW\WORLD\Mark\Pearson\20081219\Fig1_Cu_11x17.mxd(Revised).CR_20090102



Copper Concentration (Mg/L)

1.3

43

ND = No Data

Sample Locations

- Spring, Seep, or Adit
- Well

Sections

Roads

Streams

Elevation Contours (M)

Index

Intermediate

NOTES: Scaled dots displayed for Copper (Cu) values equal to or greater than 1.3 mg/L, Circular DEQ-7 Human Health Standard for Copper. The dots are scaled from a 150 feet radius which is equivalent to 1.3 mg/L to a 600 feet radius which is equivalent to 49 mg/L.

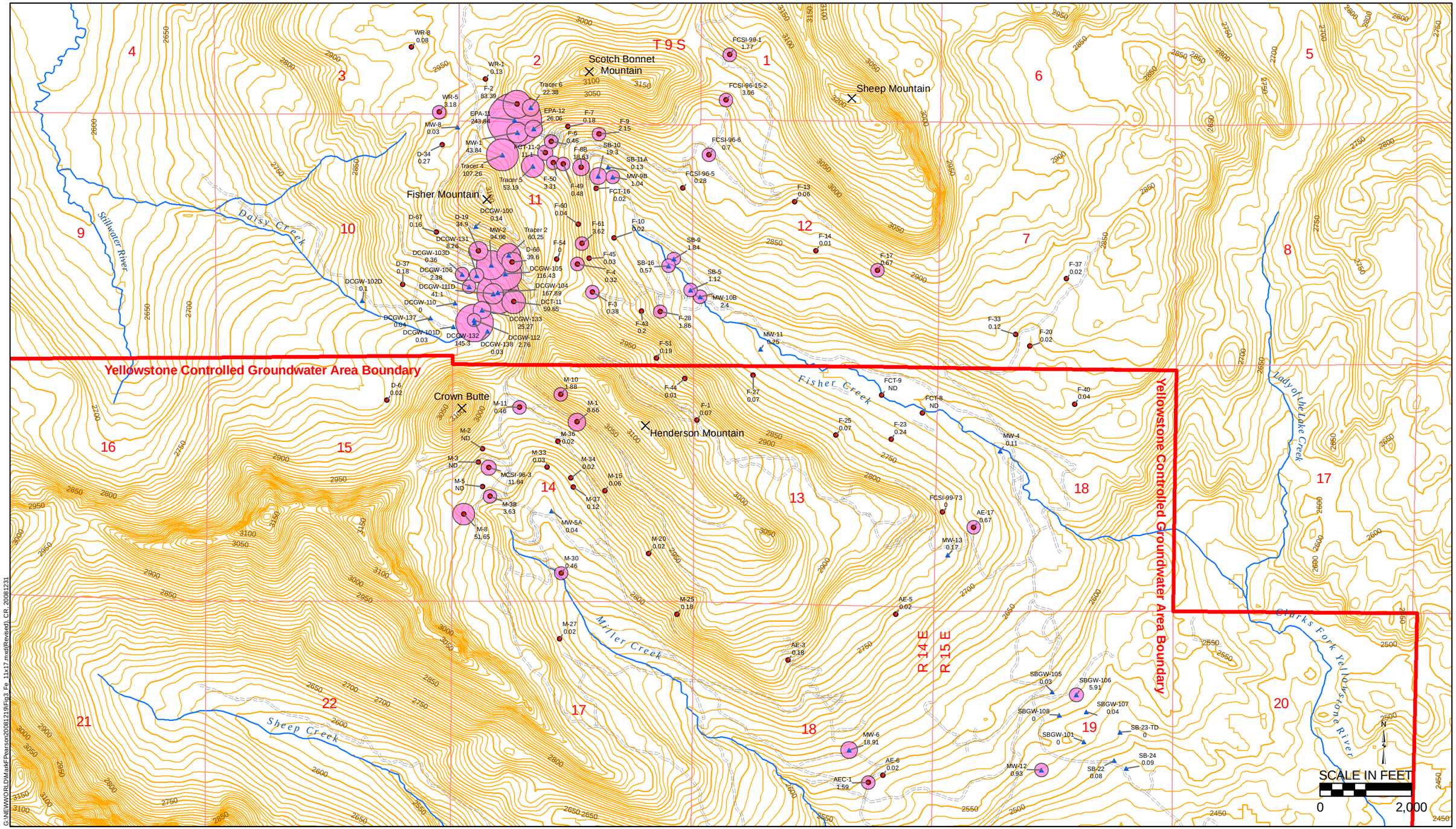
1/9/2008

Figure 3

Copper Concentrations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana

New World Mining District, Response and Resoration Project

G:\NEW\WORLD\Mxd\Pearson\20081215\Fig2_Cu_11x17.mxd(Revised) CB 20090109



Iron Concentration (Mg/L)

0.3

243

ND = No Data

Sample Locations

- Spring, Seep, or Adit
- Well

Sections

Roads

Streams

Elevation Contours (M)

Index

Intermediate

NOTES: Scaled dots displayed for Iron (Fe) values equal to or greater than 0.3 mg/L, Circular DEQ-7 Human Health Guideline for Iron. The dots are scaled from a 150 feet radius which is equivalent to 0.3 mg/L to a 600 feet radius which is equivalent to 243 mg/L.

1/9/2008

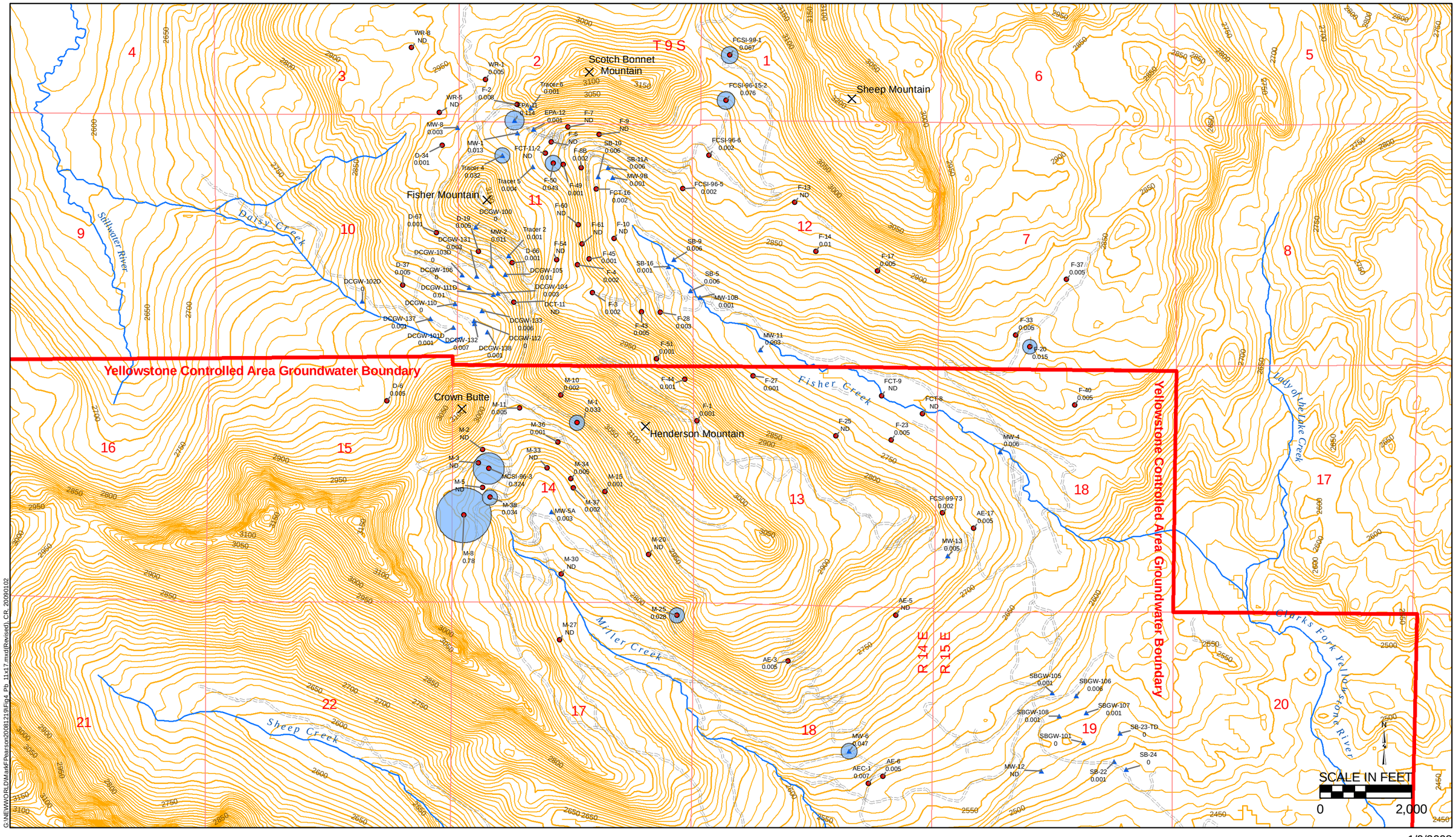
Figure 4

Iron Concentrations in Groundwater, Seeps, Springs, and Adit Discharges

Cooke City, Montana

New World Mining District, Response and Resoration Project

G:\NEWWORLD\MarkFPearson20081219\Fig3_Fe_11x17.mxd(Revised)_CR_20081231



Lead Concentration (Mg/L)

0.015 — 0.78

ND = No Data

Sample Locations

- Spring, Seep, or Adit
- Well

Sections
Roads
Streams

Elevation Contours (M)

Index
Intermediate

NOTES: Scaled dots displayed for Lead (Pb) values equal to or greater than 0.015 mg/L, Circular DEQ-7 Human Health Standard for Lead. The dots are scaled from a 150 feet radius which is equivalent to 0.015 mg/L to a 600 feet radius which is equivalent to 0.78 mg/L.

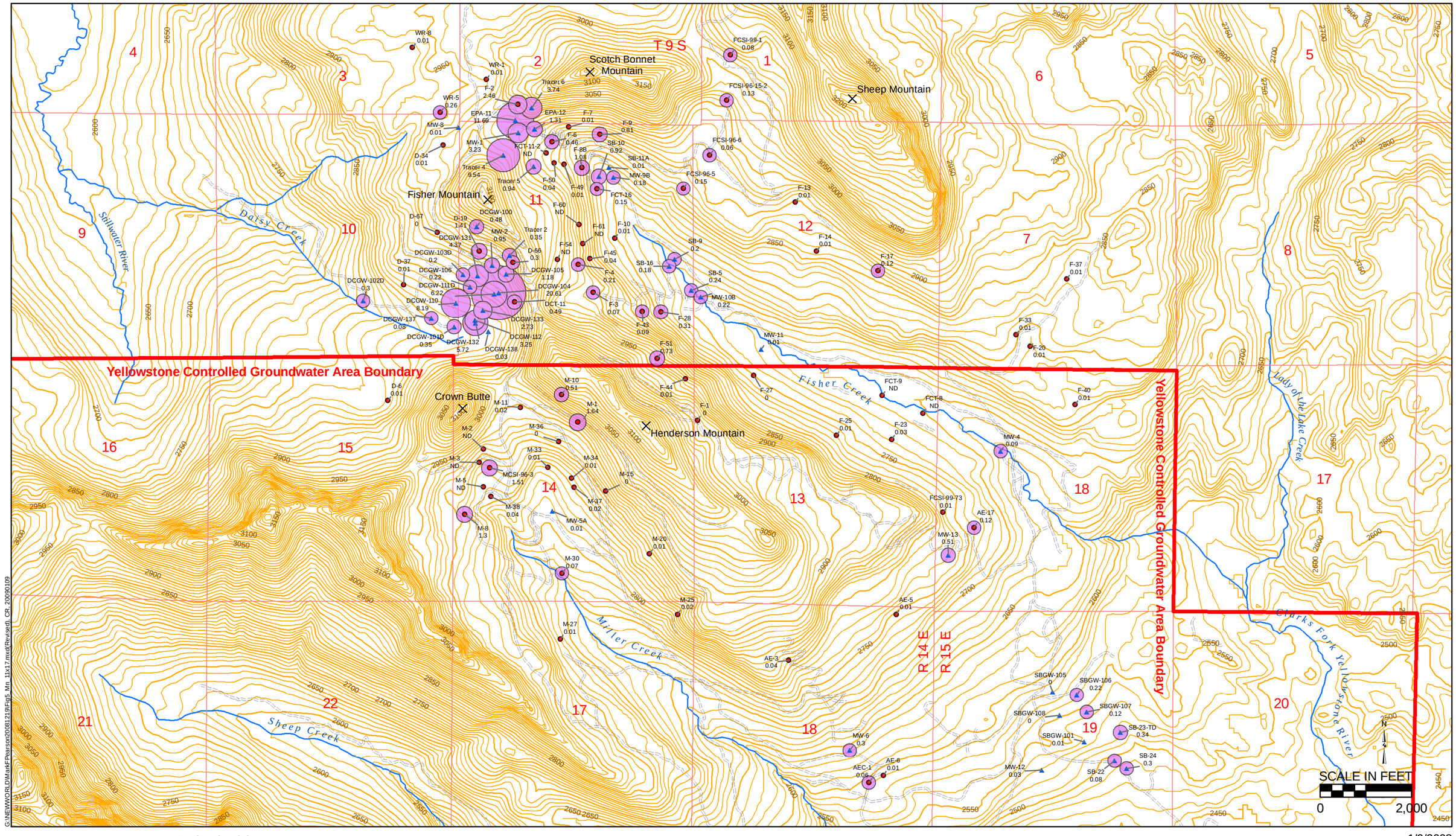
G:\NEW\ORLD\Mat\KPearson\20081219\Fig4_Pb_11x17.mxd(Revised), CR, 20090102

1/9/2008

Figure 5

Lead Concentrations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana

New World Mining District, Response and Resoration Project



Manganese Concentration (Mg/L)

0.05

20.61

ND = No Data

Sample Locations

- Spring, Seep, or Adit
- Well

Sections

Roads

Streams

Elevation Contours (M)

Index

Intermediate

NOTES: Scaled dots displayed for Manganese (Mn) values equal to or greater than 0.05 mg/L, Circular DEQ-7 Human Health Standard for Manganese. The dots are scaled from a 150 feet radius which is equivalent to 0.05 mg/L to a 600 feet radius which is equivalent to 20.61 mg/L.

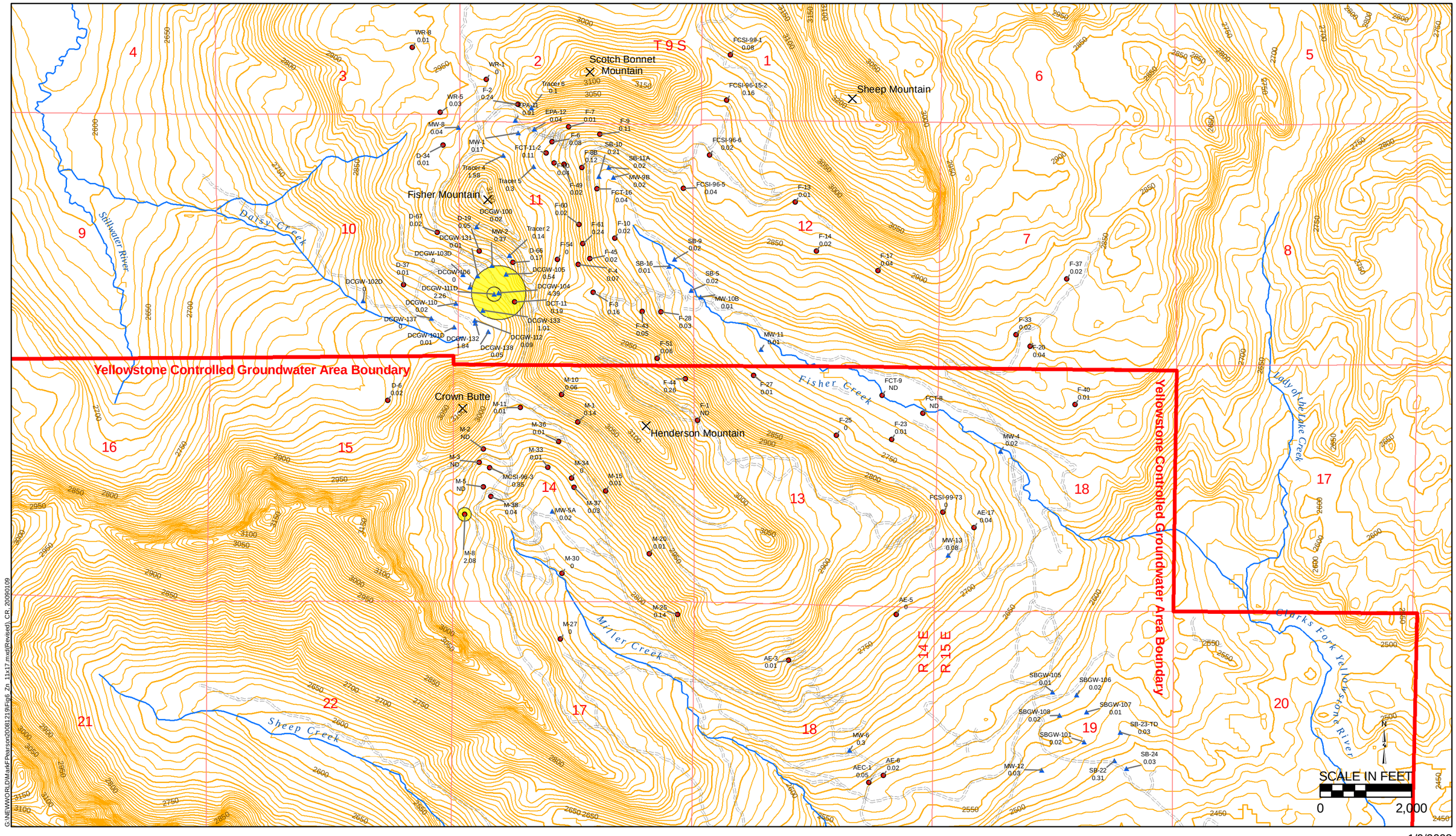
G:\NEW\WORLD\Mark\Pearson\20081219\Fig5_Mn_11x17.mxd(Revised), CR, 20090109

1/9/2008

Figure 6

Manganese Concentrations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana

New World Mining District, Response and Resoration Project



G:\NEW\WORLD\Mark\Pearson\20081219\Fig6_Zn_11x17.mxd(Revised), CR, 20090109

Zinc Concentration (Mg/L)

2.0

4.3

ND = No Data

Sample Locations

- Spring, Seep, or Adit
- Well

Sections

Roads

Streams

Elevation Contours (M)

Index

Intermediate

NOTES: Scaled dots displayed for Zinc (Zn) values equal to or greater than 2 mg/L, Circular DEQ-7 Human Health Standard for Zinc. The dots are scaled from a 150 feet radius which is equivalent to 2 mg/L to a 600 feet radius which is equivalent to 4.39 mg/L.

1/9/2008

Figure 7

Zinc Concentrations in Groundwater, Seeps, Springs, and Adit Discharges
Cooke City, Montana

New World Mining District, Response and Resoration Project

ATTACHMENT B
TABLES

Spatial Distribution of Metals in Groundwater of the New World Mining District - Implications for a Controlled Groundwater Area

New World Mining District Response and Restoration Project

TABLE 1
MONITORING WELLS - AVERAGE METAL CONCENTRATIONS
New World Mining District Response and Restoration Project

StationName	Type	TD	Bedrock	NorthingSP	EastingSP	Avg Cadmium	Avg Copper	Avg Iron	Avg Lead	Avg Manganese	Avg Zinc
DEQ WQB-7 Human Health Standard or Guideline						0.005	1.3	0.3	0.015	0.05	2
DCGW-100	Well	235	Meagher Limestone	90597.00	563801.00	0.0002	0.008	0.14	0.0005	0.48	0.02
DCGW-101D	Well	25	Lulu Pass Rhyodacite	89929.75	563650.43	0.0001	0.001	0.03	0.0008	0.35	0.01
DCGW-102D	Well	55	Lulu Pass Rhyodacite	90104.24	563043.22	0.0001	0.001	0.10	0.0005	0.30	0.01
DCGW-103D	Well	50	Lulu Pass Rhyodacite	90277.44	563709.04	0.0001	0.001	0.36	0.0005	0.21	0.01
DCGW-104	Well	22	Waste	90157.85	563947.44	0.0283	49.073	167.89	0.0027	20.61	4.39
DCGW-105	Well	27	Waste	90281.40	563997.40	0.0047	10.197	116.43	0.0104	1.18	0.54
DCGW-106	Well	42	Glacial Dep/Colluvium	90194.09	563754.79	0.0001	0.001	2.38	0.0005	0.22	0.01
DCGW-110	Well	9	Glacial Dep/Colluvium	90087.28	563661.53	0.0009	0.010	0.01	0.0005	8.19	0.02
DCGW-111D	Well	40	Lulu Pass Rhyodacite	90149.12	563915.38	0.0193	12.333	41.10	0.0100	6.22	2.26
DCGW-112	Well	35	Lulu Pass Rhyodacite	89974.00	563788.00	0.0005	0.002	2.76	0.0005	3.25	0.09
DCGW-131	Well	20	Glacial Dep/Colluvium	90270.18	563806.96	0.0004	0.012	8.26	0.0028	4.37	0.01
DCGW-132	Well	10	Glacial Dep/Colluvium	89955.13	563791.49	0.0152	11.376	145.30	0.0067	5.72	1.84
DCGW-133	Well	9	Glacial Dep/Colluvium	90041.05	563842.48	0.0086	7.531	25.27	0.0064	2.73	1.01
DCGW-137	Well	16	Glacial Dep/Colluvium	89986.12	563499.15	0.0001	0.001	0.04	0.0007	0.08	0.01
DCGW-138	Well	20	Glacial Dep/Colluvium	89898.73	563878.81	0.0002	0.003	0.03	0.0010	0.03	0.05
EPA-11	Well	152	Fisher Mtn Complex	91305.84	564057.00	0.0051	0.244	243.84	0.1136	11.69	0.91
EPA-12	Well	153	Scotch Bonnet Diorite	91247.40	564186.00	0.0001	0.001	26.06	0.0007	1.31	0.04
MW-1	Well	105	Wolsey Shale	91223.44	564076.50	0.0010	0.272	43.84	0.0125	3.23	0.17
MW-10B	Well	28	PC Granitic Rocks	90128.16	565294.50	0.0001	0.003	2.40	0.0007	0.22	0.01
MW-11	Well	18	PC Granitic Rocks	89778.51	565695.20	0.0002	0.006	0.25	0.0031	0.01	0.01
MW-12	Well	5	PC Granitic Rocks	86974.23	567566.10	0.0008	0.006	0.93	--	0.03	0.03
MW-13	Well	8	Henderson Mtn Complex	88407.57	566942.10	0.0005	0.006	0.17	0.0050	0.51	0.08
MW-2	Well	60	Wolsey Shale	90338.30	563901.80	0.0018	0.290	94.07	0.0110	0.95	0.37
MW-4	Well	25	PC Granitic Rocks	89100.85	567292.10	0.0004	0.004	0.11	0.0058	0.09	0.02
MW-5A	Well	30	Henderson Mtn Complex	88701.01	564304.40	0.0002	0.002	0.04	0.0031	0.01	0.02
MW-6	Well	42	Henderson Mtn Complex	87107.70	566286.80	0.0032	0.112	18.91	0.0471	0.30	0.30
MW-8	Well	39	Lulu Pass Rhyodacite	91259.93	563677.00	0.0004	0.002	0.03	0.0031	0.01	0.04
MW-9B	Well	58	Fisher Mtn Complex	90926.40	564713.20	0.0001	0.001	1.04	0.0007	0.18	0.02
SB-10	Well	21	Fisher Mtn Complex	90933.23	564615.30	0.0043	1.708	19.30	0.0055	0.92	0.21
SB-11A	Well	17	PC Granitic Rocks	90992.00	564682.40	0.0006	0.007	0.13	0.0064	0.01	0.02
SB-16	Well	50	PC Granitic Rocks	90334.22	565082.30	0.0001	0.004	0.57	0.0006	0.18	0.01
SB-22	Well	70	PC Granitic Rocks	87040.32	568049.50	0.0007	0.003	0.09	0.0013	0.08	0.31
SB-23-TD	Well	39	PC Granitic Rocks	87228.64	568090.49	0.0003	0.001	0.01	0.0005	0.34	0.03
SB-24	Well	70	PC Granitic Rocks	86986.77	568131.19	0.0001	0.003	0.09	0.0005	0.30	0.03
SB-5	Well	25	PC Granitic Rocks	90171.88	565230.30	0.0013	0.004	1.12	0.0055	0.25	0.02
SB-9	Well	20	PC Granitic Rocks	90381.57	565118.30	0.0010	0.004	1.84	0.0055	0.20	0.02
SBGW-101	Well	102	PC Granitic Rocks	87164.79	567849.18	0.0001	0.001	0.01	0.0005	0.01	0.02
SBGW-105	Well	34	PC Granitic Rocks	87495.20	567637.30	0.0001	0.001	0.03	0.0006	0.003	0.01
SBGW-106	Well		PC Granitic Rocks	87476.13	567798.32	0.0001	0.030	5.91	0.0060	0.22	0.02
SBGW-107	Well	30	PC Granitic Rocks	87363.38	567864.47	0.0001	0.002	0.04	0.0006	0.12	0.01
SBGW-108	Well	31	PC Granitic Rocks	87339.98	567685.03	0.0001	0.001	0.01	0.0005	0.002	0.02
Tracer 2	Well	135	Fisher Mtn Complex	90406.14	564019.20	0.0008	3.111	60.25	0.0007	0.35	0.14
Tracer 4	Well	200	Scotch Bonnet Diorite	91074.20	563978.70	0.0009	1.056	107.26	0.0321	9.54	1.58
Tracer 5	Well	205	Fisher Mtn Complex	90999.40	564180.30	0.0016	3.226	53.19	0.0043	0.94	0.30
Tracer 6	Well	175	Fisher Mtn Complex	91390.87	564164.70	0.0006	0.258	22.38	0.0010	3.74	0.10
					n	45	45	45	44	45	45
					min	0.0001	0.001	0.01	0.0005	0.002	0.01
					mean	0.0023	2.243	26.98	0.0073	1.99	0.34
					max	0.0283	49.073	243.84	0.1136	20.61	4.39

Notes:
Concentrations in milligrams per liter
Analytical results for wells reported in in dissolved concentrations
Avg: Average PC: PreCambrian -- : No result
Shading indicates exceedence of DEQ WQB-7 Human Health Standard or Guideline

TABLE 2
SPRINGS, SEEPS, & ADITS - AVERAGE METAL CONCENTRATIONS
New World Mining District Response and Restoration Project

StationName	Type	NorthingSP	EastingSP	Avg Cadmium	Avg Copper	Avg Iron	Avg Lead	Avg Manganese	Avg Zinc
DEQ WQB-7 Human Health Standard or Guideline				0.005	1.3	0.3	0.015	0.05	2
AE-17	Springs, Seeps, & Adits	88591.42	567115.10	0.0005	0.010	0.67	0.0050	0.12	0.04
AE-3	Springs, Seeps, & Adits	87707.61	565878.60	0.0020	0.008	0.18	0.0050	0.04	0.01
AE-5	Springs, Seeps, & Adits	88012.35	566595.90	0.0005	0.005	0.02	--	0.01	0.01
AE-6	Springs, Seeps, & Adits	86940.50	566509.40	0.0005	0.005	0.02	0.0050	0.01	0.02
AEC-1	Springs, Seeps, & Adits	86893.26	566412.10	0.0001	0.013	1.59	0.0070	0.06	0.05
D-19	Springs, Seeps, & Adits	90432.45	563816.10	0.0010	0.020	34.90	0.0050	1.41	0.05
D-34	Springs, Seeps, & Adits	91139.27	563575.60	0.0004	0.018	0.27	0.0010	0.01	0.01
D-37	Springs, Seeps, & Adits	90208.77	563311.90	0.0005	0.020	0.18	0.0050	0.01	0.01
D-6	Springs, Seeps, & Adits	89438.35	563208.20	0.0005	0.005	0.02	0.0050	0.01	0.02
D-66	Springs, Seeps, & Adits	90357.70	564041.10	0.0008	2.500	39.60	0.0010	0.30	0.17
D-67	Springs, Seeps, & Adits	90557.72	563537.20	0.0001	0.002	0.16	0.0010	0.01	0.02
DCT-11	Springs, Seeps, & Adits	90095.35	564053.40	--	1.785	59.65	--	0.49	0.19
F-1	Springs, Seeps, & Adits	89306.73	565270.30	0.0001	0.001	0.07	0.0010	0.01	--
F-10	Springs, Seeps, & Adits	90518.59	564719.60	0.0005	0.230	0.02	--	0.01	0.02
F-13	Springs, Seeps, & Adits	90760.69	565923.50	0.0005	0.005	0.06	--	0.01	0.01
F-14	Springs, Seeps, & Adits	90433.44	566062.90	0.0005	0.005	0.01	0.0100	0.01	0.02
F-17	Springs, Seeps, & Adits	90302.70	566473.40	0.0005	0.010	0.67	0.0050	0.12	0.04
F-2	Springs, Seeps, & Adits	91412.55	564075.00	0.0009	6.970	83.39	0.0085	2.47	0.24
F-20	Springs, Seeps, & Adits	89799.52	567487.60	0.0005	0.005	0.02	0.0150	0.01	0.04
F-23	Springs, Seeps, & Adits	89179.47	566565.40	0.0005	0.005	0.24	0.0050	0.03	0.01
F-25	Springs, Seeps, & Adits	89204.85	566197.60	0.0005	0.008	0.07	--	0.01	0.01
F-27	Springs, Seeps, & Adits	89604.35	565645.80	0.0001	0.001	0.07	0.0010	0.01	0.01
F-28	Springs, Seeps, & Adits	90029.12	565026.60	0.0002	0.008	1.86	0.0029	0.31	0.03
F-3	Springs, Seeps, & Adits	90158.60	564576.40	0.0006	0.016	0.38	0.0023	0.07	0.16
F-33	Springs, Seeps, & Adits	89876.29	567394.90	0.0005	0.005	0.12	0.0050	0.01	0.02
F-37	Springs, Seeps, & Adits	90246.66	567732.10	0.0005	0.005	0.02	0.0050	0.01	0.02
F-4	Springs, Seeps, & Adits	90344.57	564475.50	0.0006	0.339	0.32	0.0021	0.21	0.07
F-40	Springs, Seeps, & Adits	89411.25	567786.70	0.0005	0.005	0.04	0.0050	0.01	0.01
F-43	Springs, Seeps, & Adits	90030.45	564902.30	0.0003	0.049	0.20	0.0050	0.09	0.05
F-44	Springs, Seeps, & Adits	89582.32	565192.30	0.0012	0.009	0.01	0.0010	0.01	0.26
F-45	Springs, Seeps, & Adits	90383.13	564554.10	0.0002	0.184	0.03	0.0010	0.04	0.02
F-49	Springs, Seeps, & Adits	91013.12	564382.90	0.0001	0.595	0.48	0.0010	0.01	0.02
F-50	Springs, Seeps, & Adits	91020.88	564315.60	0.0002	0.040	3.31	0.0430	0.04	0.05
F-51	Springs, Seeps, & Adits	89718.94	565002.30	0.0004	0.015	0.19	0.0010	0.73	0.06
F-54	Springs, Seeps, & Adits	90379.15	564338.60	--	0.120	0.01	--	--	0.01
F-6	Springs, Seeps, & Adits	91162.71	564301.30	0.0013	0.560	0.46	--	0.46	0.08
F-60	Springs, Seeps, & Adits	90610.55	564483.10	--	1.320	0.04	--	--	0.02
F-61	Springs, Seeps, & Adits	90483.07	564505.90	--	2.310	3.62	--	--	0.24
F-7	Springs, Seeps, & Adits	91261.66	564412.90	0.0005	0.005	0.18	--	0.01	0.01
F-8B	Springs, Seeps, & Adits	90990.40	564500.60	0.0003	0.092	18.63	0.0018	1.08	0.12
F-9	Springs, Seeps, & Adits	91211.25	564620.90	0.0009	0.841	2.16	0.0000	0.81	0.11
FCSI-96-15-2	Springs, Seeps, & Adits	91438.70	565465.50	0.0004	0.100	3.06	0.0760	0.13	0.16
FCSI-96-5	Springs, Seeps, & Adits	90851.30	565177.80	0.0002	0.004	0.28	0.0018	0.15	0.04
FCSI-96-6	Springs, Seeps, & Adits	91074.50	565353.10	0.0002	0.088	0.70	0.0023	0.06	0.03
FCSI-99-1	Springs, Seeps, & Adits	91742.20	565491.50	0.0006	0.055	1.77	0.0670	0.08	0.08
FCSI-99-73	Springs, Seeps, & Adits	88692.50	566905.60	0.0001	0.001	0.01	0.0015	0.01	0.01
FCT-11-2	Springs, Seeps, & Adits	91087.37	564264.10	--	1.020	11.10	--	--	0.11
FCT-16	Springs, Seeps, & Adits	90848.98	564599.90	0.0005	1.147	0.02	0.0023	0.15	0.04
FCT-8	Springs, Seeps, & Adits	89353.66	566773.00	--	0.020	--	--	--	--
FCT-9	Springs, Seeps, & Adits	89471.31	566500.60	--	0.182	--	--	--	--
M-1	Springs, Seeps, & Adits	89294.63	564473.00	0.00044	0.01745	8.66	0.0334	1.64	0.14
M-11	Springs, Seeps, & Adits	89390.81	564091.50	0.00005	0.0023	0.46	0.0055	0.02	0.01
M-2	Springs, Seeps, & Adits	89115.78	563845.50	--	--	--	--	--	--
M-3	Springs, Seeps, & Adits	89026.26	563818.00	--	--	--	--	--	--
M-5	Springs, Seeps, & Adits	88863.67	563845.10	--	--	--	--	--	--
M-10	Springs, Seeps, & Adits	89477.23	564365.70	0.0003	0.033	1.88	0.0024	0.51	0.06
M-15	Springs, Seeps, & Adits	88835.95	564658.40	0.0001	0.001	0.06	0.0010	0.01	0.01
M-20	Springs, Seeps, & Adits	88416.78	564951.30	0.0005	0.030	0.02	--	0.01	0.01
M-25	Springs, Seeps, & Adits	88012.09	565138.40	0.0009	0.510	0.18	0.0280	0.02	0.14
M-27	Springs, Seeps, & Adits	87848.63	564356.80	0.0005	0.040	0.02	--	0.01	0.01
M-30	Springs, Seeps, & Adits	88287.09	564369.40	0.0005	0.005	0.46	--	0.07	0.01
M-33	Springs, Seeps, & Adits	88991.72	564273.50	0.0001	0.005	0.03	0.0000	0.01	0.01
M-34	Springs, Seeps, & Adits	88919.72	564432.30	0.0005	0.005	0.02	0.0050	0.01	0.01
M-36	Springs, Seeps, & Adits	89165.45	564345.50	0.0001	0.001	0.02	0.0010	0.01	0.01
M-37	Springs, Seeps, & Adits	88858.36	564449.90	0.0001	0.001	0.12	0.0017	0.02	0.03
M-38	Springs, Seeps, & Adits	88798.24	563893.30	0.0001	0.002	3.63	0.0340	0.04	0.04
M-8	Springs, Seeps, & Adits	88680.41	563720.60	0.0079	0.101	51.65	0.7800	1.30	2.09
MCSI-96-3	Springs, Seeps, & Adits	88991.10	563886.80	0.0048	0.020	11.84	0.3238	1.51	0.85
WR-1	Springs, Seeps, & Adits	91577.59	563863.20	0.0010	0.005	0.13	0.0050	0.01	0.01
WR-5	Springs, Seeps, & Adits	91359.22	563557.40	0.0020	0.230	3.18	--	0.26	0.03
WR-8	Springs, Seeps, & Adits	91790.38	563371.80	0.0005	0.005	0.08	--	0.01	0.01
			n	61	68	66	50	62	65
			min	0.0001	0.001	0.01	0.0000	0.01	0.01
			mean	0.0007	0.320	5.35	0.0307	0.24	0.10
			max	0.0079	6.970	83.39	0.7800	2.47	2.09

Notes:
Concentrations in milligrams per liter
Analytical results for Springs, Seeps, & Adits reported in in total recoverable concentrations
Avg: Average -- : No result
Shading indicates exceedence of DEQ WQB-7 Human Health Standard or Guideline

TABLE 3
RANGE OF GROUNDWATER METAL CONCENTRATIONS
New World Mining District Response and Restoration Project

	Avg Cadmium	Avg Copper	Avg Iron	Avg Lead	Avg Manganese	Avg Zinc
	(0.0001)	(0.001)	(0.01)	(0.001)	(0.003)	(0.01)
Wells						
min	0.00005	0.0005	0.005	0.0005	0.002	0.005
mean	0.0023	2.24	27	0.007	1.99	0.34
max	**0.0283**	**49.07**	**244**	**0.114**	**20.61**	**4.39**
Springs, Seeps, & Adits						
min	0.00005	0.0005	0.005	0.0	0.005	0.005
mean	0.0007	0.32	5	0.031	0.24	0.10
max	**0.0079**	**6.97**	**83**	**0.780**	**2.47**	**2.09**

Notes: Concentrations in milligrams per liter
Analytical reporting limits shown in parenthesis
Analytical results for wells reported in dissolved concentrations
Analytical results for Springs, Seeps, & Adits reported in total recoverable concentrations