Water Chemistry Data for Selected Springs, Geysers, and Streams in Yellowstone National Park, Wyoming, Beginning 2009 – Sample Information

By R. Blaine McCleskey, Randall B. Chiu, D. Kirk Nordstrom, Kate M. Campbell, David A. Roth, James W. Ball, and Terry I. Plowman

Both photographs are of Cistern Spring, Norris Geyser Basin, Yellowstone National Park. The photograph on the left is taken on 9/11/2009 and the photograph on the right is taken on 8/7/2013 about 1 week after Steamboat Geyser erupted causing Cistern Spring to completely drain.

Suggested citation:
McCleskey, R.B., Chiu, R.B., Nordstrom, D.K., Campbell, K.M., Roth, D.A., Ball, J.W., and Plowman, T.I., 2014, Water-Chemistry Data for Selected Springs, Geysers, and Streams in Yellowstone National Park, Wyoming, Beginning 2009: **doi:10.5066/F7M043FS**.

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Contents

Introduction 1

Sample Locations 2

Water Chemistry Data 28

Acknowledgments 104

References Cited 104

Appendix – Photographs 106

Figures

Figure 1. Locations of sampling areas in Yellowstone National Park, Wyoming. 4

Figure 2. Sample locations at Amphitheater Springs, Yellowstone National Park, Wyoming. 13

Figure 3. Sample locations near Nymph Lake, Yellowstone National Park, Wyoming. 14

Figure 4. Sample locations at West Nymph Creek Thermal Area, Yellowstone National Park, Wyoming. 15

Figure 5. Sample locations at Norris Geyser Basin, Yellowstone National Park, Wyoming. Red points are geothermal sample sites and the blue is a sample from a creek. 16

Figure 6. Sample locations at the Ragged Hills area, Yellowstone National Park, Wyoming. 17

Figure 7. Sample locations at the Geyser Springs Group, Yellowstone National Park, Wyoming. 18

Figure 8. Sample locations at Sylvan Springs, Yellowstone National Park, Wyoming. 19

Figure 9. Sample locations at Monument Geyser Basin, Yellowstone National Park, Wyoming. 20

Figure 10. Sample locations of thermal waters (red circles) and streams (blue circles) at Secret Valley Hot Springs, Yellowstone National Park, Wyoming. 21

Figure 11. Sample locations at Lower Geyser Basin, Yellowstone National Park, Wyoming. 22

Figure 12. Sample locations at Upper Geyser Basin, Yellowstone National Park, Wyoming. 23

Figure 13. Sample locations at Forest Springs, Yellowstone National Park, Wyoming 24

Figure 14. Sample locations at Crater Hills, Yellowstone National Park, Wyoming..... 25

Figure 15. Sample locations at the Mud Volcano area, Yellowstone National Park, Wyoming. 26

Figure 16. Sample locations of thermal water (red circle) and stream water (blue circles) near Snake Hot Springs, Yellowstone National Park, Wyoming..... 27

Tables

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references…….5

Table 2. Water analyses for samples collected from Yellowstone National Park……..29

Introduction

There are over 10,000 thermal features in Yellowstone National Park (YNP) (Whittlesey, 1988), where waters have pH values ranging from about 1 to 10 and surface temperatures up to about 95 °C (~93°C is boiling at YNP's altitude; some pools are superheated). Many geothermal waters have concentrations of silica, arsenic, boron, fluoride, hydrogen sulfide, lithium, sulfate, and alkalinity that are greater than most natural waters (McCleskey and others, 2010a). Active geothermal areas in YNP provide insight into geothermal processes occurring at depth, such as formation of mineral deposits, microbiological processes in extreme environments, biogeochemical oxidation-reduction (redox) reactions, and water-rock interactions. Investigations into the water chemistry of YNP hot springs, geysers, fumaroles, mud pots, streams, and rivers have been conducted by the U.S. Geological Survey (USGS) and other earth-science organizations and academic institutions since 1888 (Gooch and Whitfield, 1888). More recently, this group of USGS researchers have sampled features in YNP at least annually since 1994 (Ball and others, 2010; Ball and others, 2006; Ball and others, 2002; Ball and others, 1998a; Ball and others, 2001; McCleskey and others, 2005), with some earlier data back to 1974 (Ball and others, 1998b). Several interpretive papers have been published on many aspects of this project and of other collaborative research efforts (Deng and others, 2011; Gihring and others, 2001; Holloway and others, 2011; McCleskey and others, 2010a; McCleskey and others, 2010b; Nordstrom and others, 2005; Nordstrom and others, 2009).

In this survey, water samples were collected and analyzed for major and trace constituents from 19 thermal areas of YNP: the Amphitheater Springs area, Nymph Lake area, West Nymph Creek Thermal Area, Norris Geyser Basin, Chocolate Pots, Gibbon Geyser Basin (including Geyser Springs Group, Sylvan Spring area, Monument Geyser Basin, and Beryl Spring), Secret Valley Hot Springs, Lower Geyser Basin, Quagmire Group, Midway Geyser Basin, Upper Geyser Basin, Lone Star Geyser

area, Forest Springs area, Crater Hills area, Mud Volcano area, and Snake Hot Springs area. Because the water samples were collected from numerous thermal areas throughout YNP and encompass a wide range of chemistry, the data may be useful for interpreting the geochemical processes affecting the redox species of arsenic, iron, nitrogen, and sulfur; the occurrence and distribution of dissolved mercury; and the general hydrogeochemistry of hot springs. In addition, some streams and creeks were sampled to determine hydrothermal signatures in surface runoff. Many of the samples were collected in support of a collaborative study on the microbal ecology of acidophilic bacteria and archaea in YNP.

The purposes of this report are to: (1) provide water chemistry data from numerous sample sites in YNP, (2) provide sample location details, (3) describe methods used to collect and analyze the samples, (4) describe quality-assurance and quality-control procedures, and (5) supplement interpretive reports. The methods and quality-assurance and quality-control procedures can be found in a separate file (*http://water.usgs.gov/nrp/yellowstone-water-chemistry/Methods_QAQC.pdf*) and the water chemistry data is also available in a spreadsheet (*http://water.usgs.gov/nrp/yellowstone-water-chemistry/YNP_FinalData.xlsx*).

Sample Locations

Many geothermal features are within meters of each other; therefore, it is critical that sample sites be accurately located and described. Figure 1 is a map showing the locations of the 19 thermal areas in YNP where water samples were collected. Table 1 includes sample site names and descriptions, sample code numbers, collection dates, latitudes and longitudes, figure references to detailed maps, and photograph references (appendix). Maps with detailed sample locations are shown on the following figures: (2) Amphitheater Springs area, (3) Nymph Lake area, (4) West Nymph Creek Thermal Area, (5) Norris Geyser Basin, (6) Ragged Hills area of Norris Geyser Basin, (7) Geyser Springs Group, (8) Sylvan Spring area, (9) Monument Geyser Basin, (10) Secret Valley Hot Springs, (11) Lower Geyser

Basin, (12) Upper Geyser Basin, (13) Forest Springs area, (14) Crater Hills area, (15) Mud Volcano area, and (16) Snake Hot Springs area. Sample locations for Chocolate Pots, Beryl Spring, and Lone Star Geyser area are only shown on figure 1 because the sites are either well-known, named features (Beryl Spring and Lone Star Geyser) or easy to identify (Chocolate Pots).

Official names are taken from either the Geographic Names Information System (GNIS; http://geonames.usgs.gov/) or Whittlesey (1988). Several features that did not have official names were assigned codes or names by the authors for project purposes. Features named by the authors are in quotations marks to identify them as unofficial names.

In this report, “source” samples were collected at the origin of the spring, and “overflow” samples were collected at various distances downstream from the source. Series of transect samples were collected in the overflow drainage channels from Ojo Caliente Spring, the Quagmire group in Porcupine Hills, and a spring near the Snake River. Latitudes and longitudes were acquired using a portable global positioning system receiver (GPS; Garmin III+ or Garmin Rino 530/530HCx) with latitudes and longitudes referenced to NAD27 (North American Datum of 1927).

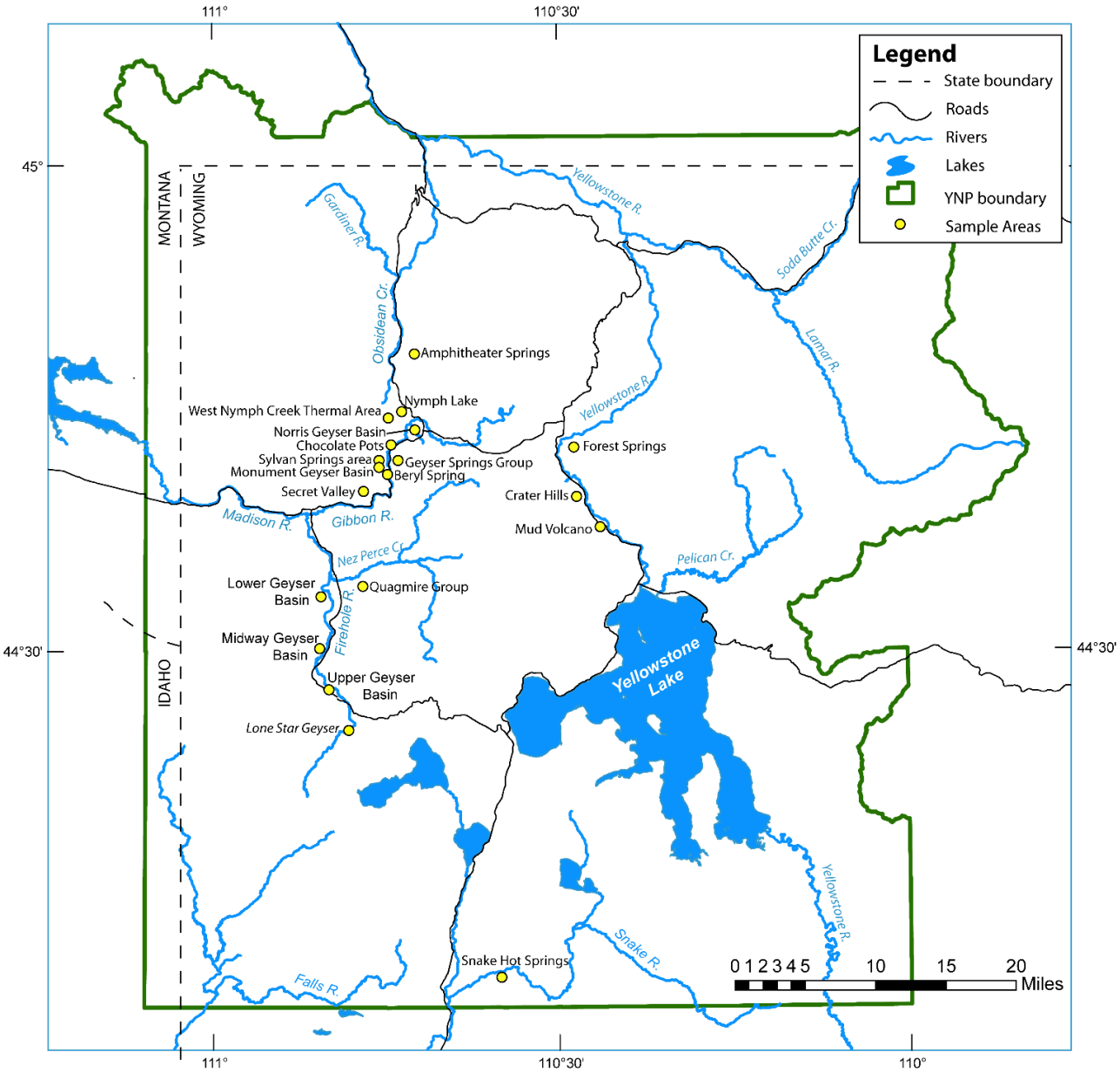


Figure 1. Locations of sampling areas in Yellowstone National Park, Wyoming.

Table 4. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references.

[m, meter; ---, not measured or photographed]

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Amphitheater Springs Area						
AMP01 - unnamed acid spring near Lemonade Creek	Y10G020	7/7/2010	44° 48' 4.4"	110° 43' 43.4"	2	---
AMP01 - unnamed acid spring near Lemonade Creek	10WA183	9/17/2010	44° 48' 4.4"	110° 43' 43.4"	2	1
AMP02 - unnamed acid spring on south-east hillside	10WA123	6/2/2010	44° 47' 50.1"	110° 43' 25.4"	2	2
AMP02 - unnamed acid spring on south-east hillside	Y10G019	7/7/2010	44° 47' 50.1"	110° 43' 25.4"	2	---
AMP02 - unnamed acid spring on south-east hillside	10WA184	9/18/2010	44° 47' 50.1"	110° 43' 25.4"	2	---
Nymph Lake Area						
Frying Pan Spring	10WA107	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	3
Frying Pan Spring	10WA107A	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	---
Frying Pan Spring	10WA107B	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	---
Frying Pan Spring	10WA107C	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	---
Frying Pan Spring	10WA107D	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	---
Frying Pan Spring	10WA107E	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	---
Unnamed stream feeding into Frying Pan Spring on SW side of the pool	10WA108	5/30/2010	44° 45' 7.7"	110° 43' 18.1"	3	4
NL01 - unnamed hillside spring	09WA117	9/10/2009	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	10WA130	6/5/2010	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	Y10G010	6/28/2010	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	Y10G018	7/7/2010	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	10WA173	9/16/2010	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	11WA136	9/7/2011	44° 45' 7.3"	110° 43' 40.3"	3	---
NL01 - unnamed hillside spring	12WA148	9/26/2012	44° 45' 7.3"	110° 43' 40.3"	3	5
NL01 - unnamed hillside spring	13WA135	9/20/2013	44° 45' 7.3"	110° 43' 40.3"	3	---
NL03 - unnamed hillside spring	09WA118	9/10/2009	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	10WA131	6/5/2010	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	Y10G004	6/16/2010	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	Y10G027	7/15/2010	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	10WA175	9/16/2010	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	11WA139	9/7/2011	44° 45' 7.9"	110° 43' 39.8"	3	---
NL03 - unnamed hillside spring	12WA150	9/26/2012	44° 45' 7.9"	110° 43' 39.8"	3	6
NL03 - unnamed hillside spring	13WA137	9/20/2013	44° 45' 7.9"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	10WA132	6/5/2010	44° 45' 7.4"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	Y10G003	6/16/2010	44° 45' 7.4"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	Y10G017	7/7/2010	44° 45' 7.4"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	10WA174	9/16/2010	44° 45' 7.4"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	11WA137	9/7/2011	44° 45' 7.4"	110° 43' 39.8"	3	---
NL10 - unnamed hillside spring	12WA149	9/26/2012	44° 45' 7.4"	110° 43' 39.8"	3	7
NL10 - unnamed hillside spring	13WA136	9/20/2013	44° 45' 7.4"	110° 43' 39.8"	3	---
NL13 - unnamed hillside spring	Y10G005	6/22/2010	44° 45' 7.5"	110° 43' 42.8"	3	---
NL13 - unnamed hillside spring	Y10G044	9/21/2010	44° 45' 7.5"	110° 43' 42.8"	3	---
NL13 - unnamed hillside spring	11WA138	9/7/2011	44° 45' 7.5"	110° 43' 42.8"	3	---
NL13 - unnamed hillside spring	12WA151	9/26/2012	44° 45' 7.5"	110° 43' 42.8"	3	8
NL13 - unnamed hillside spring	13WA138	9/20/2013	44° 45' 7.5"	110° 43' 42.8"	3	---
West Nymph Creek Thermal Area						
Unnamed - northernmost spring	09WA123	9/11/2009	44° 44' 44.6'	110° 44' 40.0"	4	---
Unnamed - northernmost spring	12WA131	9/22/2012	44° 44' 44.6'	110° 44' 40.0"	4	9
"Yellow Cinder Pool"	12WA132	9/22/2012	44° 44' 41.0"	110° 44' 32.4"	4	10
Norris Geyser Basin						
Branch Spring	09WA112	9/9/2009	44° 43' 30.1"	110° 42' 18.6"	5	11
Bathtub Spring	09WA109	9/8/2009	44° 43' 35.3"	110° 42' 12.5"	5	12

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Norris Geyser Basin						
Cinder Pool	09WA108	9/8/2009	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	10WA109	5/31/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	10WA109A	5/31/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	10WA109B	5/31/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	10WA109C	5/31/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	10WA155	7/27/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool (10 depth)	10WA156	7/27/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool (1m depth)	10WA194	9/20/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool (6 m depth)	10WA193	9/20/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool (14 m depth)	10WA192	9/20/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool (20 m depth)	10WA191	9/20/2010	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	11WA174	9/13/2011	44° 43' 56.9"	110° 42' 32.4"	5	13
Cinder Pool	11WA175	9/13/2011	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	11WA176	9/13/2011	44° 43' 56.9"	110° 42' 32.4"	5	---
Cinder Pool	12WA126	9/21/2012	44° 43' 56.9"	110° 42' 32.4"	5	---
Cistern Spring	09WA122	9/11/2009	44° 43' 23.3"	110° 42' 11.3"	5	14
Cistern Spring	10WA125	6/4/2010	44° 43' 23.3"	110° 42' 11.3"	5	---
Cistern Spring	11WA173	9/13/2011	44° 43' 23.4"	110° 42' 14.8"	5	---
Cistern Spring	12WA136	9/24/2012	44° 43' 23.4"	110° 42' 14.8"	5	---
Cistern Spring (nearly empty, sampled 1 week after Steamboat Geyser eruption)	13WA113	8/7/2013	44° 43' 23.4"	110° 42' 14.8"	5	15
Cistern Spring	13WA161	9/23/2013	44° 43' 23.4"	110° 42' 14.8"	5	---
Emerald Spring	09WA110	9/8/2009	44° 43' 32.9"	110° 42' 12.8"	5	16
Emerald Spring	10WA197	9/21/2010	44° 43' 32.9"	110° 42' 12.8"	5	---
Emerald Spring	11WA169	9/12/2011	44° 43' 32.9"	110° 42' 12.8"	5	---
Green Dragon Spring	09WA125	9/12/2009	44° 43' 12.4"	110° 42' 22.9"	5	17
Green Dragon Spring	10WA201	9/21/2010	44° 43' 12.4"	110° 42' 22.9"	5	---
Medusa Spring	10WA199	9/21/2010	44° 43' 8.2"	110° 42' 30.3"	5	18
Minute Geyser	09WA111	9/9/2009	44° 43' 30.5"	110° 42' 19.5"	5	19
Pearl Geyser	10WA198	9/21/2010	44° 43' 20.7"	110° 42' 23.9"	5	20
Perpetual spouter	10WA112	6/1/2010	44° 43' 35.7"	110° 42' 32.7"	5	---
Perpetual Spouter	10WA166	9/16/2010	44° 43' 35.7"	110° 42' 32.7"	5	---
Perpetual Spouter	11WA140	9/7/2011	44° 43' 35.7"	110° 42' 32.7"	5	---
Perpetual Spouter	11WA171	9/12/2011	44° 43' 35.7"	110° 42' 32.7"	5	---
Perpetual Spouter	12WA124	9/21/2012	44° 43' 35.7"	110° 42' 32.7"	5	---
Perpetual Spouter	13WA152	9/23/2013	44° 43' 35.7"	110° 42' 32.7"	5	21
Unnamed acid spring south of Perpetual Spouter	10WA115	6/1/2010	44° 43' 35.5"	110° 42' 32.7"	5	22
Unnamed acid spring south of Perpetual Spouter	Y10G026	7/15/2010	44° 43' 35.5"	110° 42' 32.7"	5	---
Unnamed acid spring south of Perpetual Spouter	10WA167	9/16/2010	44° 43' 35.5"	110° 42' 32.7"	5	---
Unnamed acid spring south of Perpetual Spouter	Y10G045	9/21/2010	44° 43' 35.5"	110° 42' 32.7"	5	---
Unnamed acid spring south of Perpetual Spouter	11WA141	9/7/2011	44° 43' 35.5"	110° 42' 32.7"	5	---
Unnamed acid spring south of Perpetual Spouter	12WA125	9/21/2012	44° 43' 35.5"	110° 42' 32.7"	5	---
Unnamed acid spring south of Perpetual Spouter	13WA153	9/23/2013	44° 43' 35.5"	110° 42' 32.7"	5	---
Recess Spring	10WA200	9/21/2010	44° 43' 22.7"	110° 42' 32.9"	5	23
Recess Spring	11WA170	9/12/2011	44° 43' 22.7"	110° 42' 32.9"	5	---
Rediscovered Geyser	11WA172	9/12/2011	44° 43' 38.1"	110° 42' 20.8"	5	24
Steamboat Geyser	09WA124	9/12/2009	44° 43' 25.0"	110° 42' 07.7"	5	25
"Arsenic Dust"	12WA127	9/21/2012	44° 44' 8.4"	110° 42' 22.5"	5	26
"Second Erupter"	09WA113	9/9/2009	44° 43' 20.3"	110° 42' 24.4"	5	27
Tantalus Creek @ weir	10WA141	6/8/2010	44° 44' 2.7"	110° 42' 54.6"	5	28
"Beowulf Spring"	11WA150	9/8/2011	44° 43' 53.5"	110° 42' 37.9"	5	29
"Outbreak Spring" - Unnamed spring near Bathtub Spring	09WA107	9/8/2009	44° 43' 37.7"	110° 42' 15.3"	5	30
"Outbreak Spring" - Unnamed spring near Bathtub Spring	10WA165	9/16/2010	44° 43' 37.8"	110° 42' 15.3"	5	---

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Norris Geyser Basin						
Unnamed pool about 80 m from Green Dragon Spring	09WA126	9/12/2009	44° 43' 12.3"	110° 42' 22.3"	5	31
"Outhere Spring SE"	10WA158	7/28/2010	44° 43' 58.9"	110° 42' 26.2"	5	32
"Outhere Spring SE"	10WA196	9/21/2010	44° 43' 58.9"	110° 42' 26.2"	5	---
"Outhere Spring SE"	11WA151	9/8/2011	44° 43' 58.9"	110° 42' 26.2"	5	---
"Outhere Spring SE"	12WA128	9/21/2012	44° 43' 58.9"	110° 42' 26.2"	5	---
"Outhere Spring SE"	13WA154	9/23/2013	44° 43' 58.9"	110° 42' 26.2"	5	---
"Outhere Spring NW"	10WA157	7/28/2010	44° 43' 59.0"	110° 42' 26.3"	5	33
"Outhere Spring NW"	10WA195	9/20/2010	44° 43' 59.0"	110° 42' 26.3"	5	---
"Outhere Spring NW"	11WA152	9/8/2011	44° 43' 59.0"	110° 42' 26.3"	5	---
"Outhere Spring NW"	12WA129	9/21/2012	44° 43' 59.0"	110° 42' 26.3"	5	---
"Outhere Spring NW"	13WA155	9/23/2013	44° 43' 59.0"	110° 42' 26.3"	5	---
Unnamed spring	12WA130	9/21/2012	44° 43' 57.9"	110° 42' 32.2"	5	34
Norris Geyser Basin - Ragged Hills Area						
"Crystal Sister - East"	09WA105	9/7/2009	44° 43' 43.4"	110° 42' 40.0"	5, 6	35
"Crystal Sister - East"	10WA111	5/31/2010	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	Y10G022	7/15/2010	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	10WA160	7/28/2010	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	10WA169	9/16/2010	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	Y10G042	9/20/2010	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	11WA146	9/8/2011	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	11WA165	9/11/2011	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	12WA137	9/24/2012	44° 43' 43.4"	110° 42' 40.0"	5, 6	36
"Crystal Sister - East"	13WA112	8/6/2013	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - East"	13WA115	9/19/2013	44° 43' 43.4"	110° 42' 40.0"	5, 6	---
"Crystal Sister - West"	09WA106	9/7/2009	44° 43' 43.5"	110° 42' 40.2"	5, 6	35
"Crystal Sister - West"	10WA110	5/31/2010	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	Y10G021	7/15/2010	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	10WA159	7/28/2010	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	10WA168	9/16/2010	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	11WA145	9/8/2011	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	11WA166	9/11/2011	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	12WA138	9/24/2012	44° 43' 43.5"	110° 42' 40.2"	5, 6	37
"Crystal Sister - West"	13WA111	8/6/2013	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Crystal Sister - West"	13WA114	9/19/2013	44° 43' 43.5"	110° 42' 40.2"	5, 6	---
"Red Growler"	10WA122	6/2/2010	44° 43' 42.1"	110° 42' 44.2"	5, 6	38
"Kaolin Spring"	09WA115	9/9/2009	44° 43' 41.7"	110° 42' 44.6"	5, 6	---
"Kaolin Spring"	10WA121	6/2/2010	44° 43' 41.8"	110° 42' 44.7"	5, 6	---
"Kaolin Spring"	Y10G025	7/15/2010	44° 43' 41.8"	110° 42' 44.7"	5, 6	---
"Kaolin Spring"	10WA172	9/16/2010	44° 43' 41.8"	110° 42' 44.7"	5, 6	---
"Kaolin Spring"	11WA144	9/7/2011	44° 43' 41.8"	110° 42' 44.7"	5, 6	---
"Kaolin Spring"	12WA141	9/24/2012	44° 43' 41.8"	110° 42' 44.7"	5, 6	39
"Kaolin Spring"	13WA142	9/20/2013	44° 43' 41.8"	110° 42' 44.7"	5, 6	---
"Lifeboat Spring"	09WA102	9/7/2009	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	10WA118	6/2/2010	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	Y10G001	6/16/2010	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	10WA170	9/16/2010	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	11WA143	9/7/2011	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	12WA139	9/24/2012	44° 43' 39.8"	110° 42' 49.0"	5, 6	41
"Lifeboat Spring"	13WA117	9/19/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA118	9/19/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA119	9/19/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA121	9/19/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA116	9/19/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA168	9/24/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA169	9/24/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA170	9/24/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA171	9/24/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	---
"Lifeboat Spring"	13WA172	9/24/2013	44° 43' 39.8"	110° 42' 49.0"	5, 6	42

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Norris Geyser Basin - Ragged Hills Area						
"Persnickety Geyser"	09WA103	9/7/2009	44 °43' 40.5"	110° 42' 47.1"	5, 6	40
"Titanic Spring"	10WA120	6/2/2010	44 °43' 40.0"	110° 42' 48.5"	5, 6	40
NG06 - small appendage pool to "Lifeboat Spring"	09WA114	9/9/2009	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	10WA119	6/2/2010	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	Y10G002	6/16/2010	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	Y10G024	7/15/2010	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	10WA171	9/16/2010	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	11WA142	9/7/2011	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG06 - small appendage pool to "Lifeboat Spring"	12WA140	9/24/2012	44° 43' 39.6"	110° 42' 49.2"	5, 6	43
NG06 - small appendage pool to "Lifeboat Spring"	13WA120	9/19/2013	44° 43' 39.6"	110° 42' 49.2"	5, 6	---
NG08 - white pool (1.5 m diameter)	09WA116	9/9/2009	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG08 - white pool (1.5 m diameter)	10WA117	6/1/2010	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG08 - white pool (1.5 m diameter)	Y10G023	7/15/2010	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG08 - white pool (1.5 m diameter)	Y10G043	9/21/2010	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG08 - white pool (1.5 m diameter)	11WA147	9/8/2011	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG08 - white pool (1.5 m diameter)	12WA143	9/24/2012	44° 43' 44.5"	110° 42' 41.7"	5, 6	44, 45
NG08 - white pool (1.5 m diameter)	13WA139	9/20/2013	44° 43' 44.5"	110° 42' 41.7"	5, 6	---
NG10 - little white pool	11WA148	9/8/2011	44° 43' 44.4"	110° 42' 41.7"	5, 6	---
NG10 - little white pool	12WA144	9/24/2012	44° 43' 44.4"	110° 42' 41.7"	5, 6	45
NG10 - little white pool	13WA140	9/20/2013	44° 43' 44.4"	110° 42' 41.7"	5, 6	---
NG16 - unnamed small yellow feature	10WA116	6/1/2010	44° 43' 44.2"	110° 42' 42.0"	5, 6	---
NG16 - unnamed small yellow feature	Y10G040	9/16/2010	44° 43' 44.2"	110° 42' 42.0"	5, 6	---
NG16 - unnamed small yellow feature	11WA149	9/8/2011	44° 43' 44.2"	110° 42' 42.0"	5, 6	---
NG16 - unnamed small yellow feature	12WA142	9/24/2012	44° 43' 44.2"	110° 42' 42.0"	5, 6	46
NG16 - unnamed small yellow feature	13WA141	9/20/2013	44° 43' 44.2"	110° 42' 42.0"	5, 6	---
"Orpiment Puddle 2"	11WA167	9/11/2011	44° 43' 44.5"	110° 42' 41.7"	5, 6	45
Another "Orpiment Puddle"	11WA168	9/11/2011	---	---	5, 6	47
Chocolate Pots						
Chocolate Pots I - upstream site on east side of Gibbon River	09WA128	9/13/2009	44° 42' 36.4"	110° 44' 25.7"	1	48
Chocolate Pots II - major hot spring downstream of 09WA128 on west side of Gibbon River	09WA129	9/13/2009	44° 42' 36"	110° 44' 26"	1	49
Gibbon Geyser Basin - Geyser Springs Group						
GG01 - northernmost spring on the base of hill	Y10G006	6/24/2010	44° 41' 25.8"	110° 43' 43.6"	7	---
GG01 - northernmost spring on the base of hill	Y10G032	7/23/2010	44° 41' 25.8"	110° 43' 43.6"	7	---
GG01 - northernmost spring on the base of hill	10WA179	9/17/2010	44° 41' 25.8"	110° 43' 43.6"	7	---
GG01 - northernmost spring on the base of hill	11WA153	9/9/2011	44° 41' 25.8"	110° 43' 43.6"	7	---
GG01 - northernmost spring on the base of hill	12WA152	9/26/2012	44° 41' 25.8"	110° 43' 43.6"	7	50
GG01 - northernmost spring on the base of hill	13WA133	9/22/2013	44° 41' 25.8"	110° 43' 43.6"	7	---
GG06 - unnamed acid pool (1 m diameter)	Y10G007	6/24/2010	44° 41' 25.1"	110° 43' 41.9"	7	---
GG06 - unnamed acid pool (1 m diameter)	Y10G031	7/23/2010	44° 41' 25.1"	110° 43' 41.9"	7	---
GG06 - unnamed acid pool (1 m diameter)	10WA180	9/17/2010	44° 41' 25.1"	110° 43' 41.9"	7	---
GG06 - unnamed acid pool (1 m diameter)	11WA154	9/9/2011	44° 41' 25.1"	110° 43' 41.9"	7	51
GG06 - unnamed acid pool (1 m diameter)	13WA157	9/22/2013	44° 41' 25.1"	110° 43' 41.9"	7	---
GG08 - unnamed acid pool (0.5 m diameter)	Y10G008	6/24/2010	44° 41' 22.3"	110° 43' 40.7"	7	---
GG08 - unnamed acid pool (0.5 m diameter)	Y10G030	7/23/2010	44° 41' 22.3"	110° 43' 40.7"	7	---
GG08 - unnamed acid pool (0.5 m diameter)	10WA181	9/17/2010	44° 41' 22.3"	110° 43' 40.7"	7	---
GG08 - unnamed acid pool (0.5 m diameter)	11WA155	9/9/2011	44° 41' 22.3"	110° 43' 40.7"	7	52
GG08 - unnamed acid pool (0.5 m diameter)	12WA154	9/26/2012	44° 41' 22.3"	110° 43' 40.7"	7	---
GG08 - unnamed acid pool (0.5 m diameter)	13WA158	9/22/2013	44° 41' 22.3"	110° 43' 40.7"	7	---
GG09 - unnamed feature	Y10G009	6/24/2010	44° 41' 25.5"	110°43' 44.2"	7	---
GG10 - unnamed circumneutral spring near Geyser Creek	13WA156	9/22/2013	44° 41' 25.4"	110°43' 41.8"	7	51
GG11 - unnamed acid spring	12WA153	9/26/2012	44° 41' 25.2"	110° 43' 42.6"	7	53
GG11 - unnamed acid spring	13WA134	9/22/2013	44° 41' 25.2"	110° 43' 42.6"	7	---

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Gibbon Geyser Basin - Geyser Springs Group						
GG12 - unnamed small acid pool	12WA164	9/26/2012	44° 41' 22.5"	110° 43' 40.8"	7	54
GG12 - unnamed small acid pool	13WA159	9/22/2013	44° 41' 22.5"	110° 43' 40.8"	7	---
GG14 - unnamed acid spring	13WA160	9/22/2013	44° 41' 20.8"	110° 43' 41.1"	7	---
Gibbon - unnamed geyser east side of Geyser Creek on hillside	10WA182	9/17/2010	44° 41' 20.0"	110° 43' 37.2"	7	55
Gibbon Geyser Basin - Sylvan Spring Area						
Bridge Pool	12WA135	9/23/2012	44° 41' 43.2"	110° 46' 1.5"	8	56
Coffin Spring	11WA164	9/10/2011	44° 42' 1.0"	110° 45' 55.0"	8	57
Dante's Inferno	10WA203	9/22/2010	44° 41' 56.3"	110° 46' 3.3"	8	---
Dante's Inferno	11WA158	9/10/2011	44° 41' 56.3"	110° 46' 3.3"	8	58
Evening Primrose Spring	10WA135	6/6/2010	44° 41' 57.9"	110° 45' 59.1"	8	---
Evening Primrose Spring	Y10G035	7/23/2010	44° 41' 57.9"	110° 45' 59.1"	8	---
Evening Primrose Spring	10WA202	9/22/2010	44° 41' 57.9"	110° 45' 59.1"	8	---
Evening Primrose Spring	11WA157	9/10/2011	44° 41' 57.9"	110° 45' 59.1"	8	59
Evening Primrose Spring	12WA133	9/23/2012	44° 41' 57.9"	110° 45' 59.1"	8	---
Sylvan Spring	10WA138	6/6/2010	44° 41' 58.4"	110° 46' 2.8"	8	---
Sylvan Spring	Y10G034	7/23/2010	44° 41' 58.4"	110° 46' 2.8"	8	---
Sylvan Spring	11WA159	9/10/2011	44° 41' 58.4"	110° 46' 2.8"	8	---
Sylvan Spring	12WA167	9/27/2012	44° 41' 58.4"	110° 46' 2.8"	8	---
Sylvan Spring	13WA164	9/23/2013	44° 41' 58.4"	110° 46' 2.8"	8	60
SYL05 - unnamed pool near the top of drainage (2 m diameter)	10WA137	6/6/2010	44° 41' 57.7"	110° 46' 4.0"	8	61
SYL10 (2 m diameter)	11WA160	9/10/2011	44° 41' 58.3"	110° 46' 1.8"	8	62
SYL10 (2 m diameter)	13WA163	9/23/2013	44° 41' 58.3"	110° 46' 1.8"	8	---
SYL11 - unnamed hot spring on the north side of drainage (0.5 m diameter)	11WA161	9/10/2011	44° 41' 58.8"	110°46' 2.4"	8	---
SYL11 - unnamed hot spring on the north side of drainage (0.5 m diameter)	12WA165	9/27/2012	44° 41' 58.8"	110°46' 2.4"	8	63
SYL11 - unnamed hot spring on the north side of drainage (0.5 m diameter)	13WA162	9/23/2013	44° 41' 58.8"	110°46' 2.4"	8	---
SYL14 - unnamed pool, upper most spring in drainage	12WA166	9/27/2012	44° 41' 58.0"	110° 46' 4.1"	8	---
SYL14 - unnamed pool, upper most spring in drainage	13WA167	9/23/2013	44° 41' 58.0"	110° 46' 4.1"	8	64
SYL15 - Unnamed pool immediately east of Sylvan Spring	12WA168	9/27/2012	44° 41' 58.4"	110° 46' 2.6"	8	65
SYL15 - Unnamed pool immediately east of Sylvan Spring	13WA165	9/23/2013	44° 41' 58.4"	110° 46' 2.6"	8	---
SYL16 - unnamed pool	13WA166	9/23/2013	44°41'58.6"	110°46'2.7"	8	66
Unnamed caved in spring just north of Evening Primrose	10WA136	6/6/2010	44° 41' 58.3"	110° 45' 58.8"	8	67
Unnamed slightly turbid hot spring (6 m by 4 m)	11WA162	9/10/2011	44° 42' 2.2"	110° 45' 52.6"	8	68
Unnamed circular 2m pool	11WA163	9/10/2011	44° 42' 0.1"	110° 45' 52.5"	8	69
SYL01 - unnamed feature	Y10G033	7/23/2010	44° 41' 59.8"	110° 45' 55.3"	8	---
Unnamed spring south of Bridge Pool	12WA134	9/23/2012	44° 41' 41.7"	110° 46' 0.6"	8	70
Gibbon Geyser Basin - Monument Geyser Basin						
Unnamed acid spring - northernmost sampled in area (2 m by 4 m)	13WA147	9/22/2013	44° 41' 6.5"	110° 45' 11.8"	9	71
Unnamed acid spring (1.5 m diameter)	13WA148	9/22/2013	44° 41' 5.6"	110° 45' 11.3"	9	72
Unnamed acid spring	13WA149	9/22/2013	44° 41' 4.3"	110° 45' 10.8"	9	73
Unnamed acid spring - across from trail end on hillslope	13WA150	9/22/2013	44° 41' 3.9"	110° 45' 10.8"	9	74
Unnamed acid spring - southernmost spring sampled	13WA151	9/22/2013	44° 41' 3.2"	110° 45' 10.3"	9	---
Gibbon Canyon						
Beryl Spring	10WA204	9/22/2010	44° 40' 43.4"	110° 44' 44.7"	1	75

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Secret Valley Hot Springs						
Unnamed hillside seep	12WA116	9/20/2012	44° 40' 17.2"	110° 47' 9.2"	10	76, 77
Unnamed hillside seep	12WA117	9/20/2012	44° 40' 18.1"	110° 47' 7.6"	10	78, 80
Unnamed hillside seep	12WA118	9/20/2012	44° 40' 15.9"	110° 47' 5.6"	10	79, 80
Unnamed hillside seep	12WA119	9/20/2012	44° 40' 17.9"	110° 47' 0.3"	10	80
Secret Valley Creek above confluence with 12WA122	12WA121	9/20/2012	44° 39' 55.5"	110° 47' 5.8"	10	81
Secret Valley Creek at mouth	12WA123	9/20/2012	44° 39' 31.2"	110° 46' 9.9"	10	82
Tributary to Secret Valley Creek - upstream site	12WA120	9/20/2012	44° 40' 13.7"	110° 47' 0.1"	10	83
Tributary to Secret Valley Creek - downstream site	12WA122	9/20/2012	44° 39' 55.6"	110° 47' 5.8"	10	84
Lower Geyser Basin						
Azure Spring	10WA113	5/29/2010	44° 33' 39.5"	110° 49' 55.9"	11	85
Azure Spring - overflow (2 m from pool exit)	10WA114	5/29/2010	44° 33' 39.5"	110° 49' 55.9"	11	---
Clepsydra Geyser	10WA139	6/7/2010	44° 33' 4.1"	110° 48' 28.8"	11	86
Ojo Caliente - source (30 m depth)	09WA139	9/15/2009	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (15 m depth)	09WA140	9/15/2009	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (1 m depth)	09WA138	9/15/2009	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - pool exit (pool exit)	09WA141	9/15/2009	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - overflow (3.6 m from pool exit)	09WA142	9/15/2009	---	---	11	89
Ojo Caliente - overflow (8.1 m from pool exit)	09WA143	9/15/2009	---	---	11	---
Ojo Caliente - overflow (11.7 m from pool exit)	09WA144	9/15/2009	---	---	11	---
Ojo Caliente - overflow (15 m from pool exit)	09WA145	9/15/2009	---	---	11	---
Ojo Caliente - overflow (20 m from pool exit)	09WA146	9/15/2009	---	---	11	---
Ojo Caliente - overflow (26 m from pool exit)	09WA147	9/15/2009	---	---	11	90
Ojo Caliente - source (1 m depth)	10WA106	5/29/2010	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (30 m depth)	10WA176	9/17/2010	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (15 m depth)	10WA177	9/17/2010	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (1 m depth)	10WA178	9/17/2010	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (0.5 m depth)	11WA177	9/14/2011	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (30 m depth)	11WA178	9/14/2011	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (15 m depth)	11WA179	9/14/2011	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (1 m depth)	11WA180	9/14/2011	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - pool exit (pool exit)	11WA181	9/14/2011	44° 33' 46.1"	110° 50' 17.2"	11	88
Ojo Caliente - overflow (3.8 m from pool exit)	11WA182	9/14/2011	---	---	11	---
Ojo Caliente - overflow (6 m from pool exit)	11WA183	9/14/2011	---	---	11	---
Ojo Caliente - overflow (10 m from pool exit)	11WA184	9/14/2011	---	---	11	---
Ojo Caliente - overflow (15 m from pool exit)	11WA185	9/14/2011	---	---	11	---
Ojo Caliente - overflow (21 m from pool exit)	11WA186	9/14/2011	---	---	11	---
Ojo Caliente - overflow (32 m from pool exit)	11WA187	9/14/2011	---	---	11	---
Ojo Caliente - source (30 m depth)	12WA155	9/26/2012	44° 33' 46.1"	110° 50' 17.2"	11	87
Ojo Caliente - source (15 m depth)	12WA156	9/26/2012	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (0.05 m depth)	12WA157	9/26/2012	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - pool exit (pool exit)	12WA158	9/26/2012	---	---	11	---
Ojo Caliente - overflow (4.3 m from pool exit)	12WA159	9/26/2012	---	---	11	---
Ojo Caliente - overflow (9.8 m from pool exit)	12WA160	9/26/2012	---	---	11	---
Ojo Caliente - overflow (15 m from pool exit)	12WA161	9/26/2012	---	---	11	---
Ojo Caliente - overflow (20 m from pool exit)	12WA162	9/26/2012	---	---	11	---
Ojo Caliente - overflow (31 m from pool exit)	12WA163	9/26/2012	---	---	11	---
Ojo Caliente - source (70 m depth)	13WA122	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (50 m depth)	13WA123	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (35 m depth)	13WA124	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (18 m depth)	13WA125	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - source (0.3 m depth)	13WA126	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - pool exit (pool exit)	13WA126-1	9/20/2013	44° 33' 46.1"	110° 50' 17.2"	11	---
Ojo Caliente - overflow (3 m from pool exit)	13WA126-2	9/20/2013	---	---	11	---
Ojo Caliente - overflow (6 m from pool exit)	13WA126-3	9/20/2013	---	---	11	---
Ojo Caliente - overflow (10 m from pool exit)	13WA126-4	9/20/2013	---	---	11	---
Ojo Caliente - overflow (15 m from pool exit)	13WA126-5	9/20/2013	---	---	11	---
Ojo Caliente - overflow (20 m from pool exit)	13WA126-6	9/20/2013	---	---	11	---
Ojo Caliente - overflow (30 m from pool exit)	13WA126-7	9/20/2013	---	---	11	---

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Lower Geyser Basin						
Unnamed Spring, Quagmire Group - source	09WA132	9/14/2009	---	---	11	---
Unnamed Spring, Quagmire Group - overflow (1.8 m from pool exit)	09WA133	9/14/2009	---	---	11	---
Unnamed Spring, Quagmire Group - overflow (5.6 m from pool exit)	09WA134	9/14/2009	---	---	11	---
Unnamed Spring, Quagmire Group - overflow (7.0 m from pool exit)	09WA135	9/14/2009	---	---	11	---
Unnamed Spring, Quagmire Group - overflow (16 m from pool exit)	09WA136	9/14/2009	---	---	11	---
Unnamed Spring, Quagmire Group - overflow (23 m from pool exit)	09WA137	9/14/2009	---	---	11	---
Upper Geyser Basin						
Beehive Geyser - outflow	09WA150A	9/16/2009	---	---	12	91
Beehive Geyser - outflow	09WA150B	9/16/2009	---	---	12	---
Giant Geyser - outflow	09WA157	9/16/2009	---	---	12	92
Grand Geyser - outflow	09WA148	9/16/2009	---	---	12	93
Grotto Geyser - main outflow	09WA151	9/16/2009	---	---	12	94
Grotto Geyser - main outflow	09WA152	9/16/2009	---	---	12	---
Grotto Geyser - main outflow	09WA153	9/16/2009	---	---	12	---
Grotto Geyser - main outflow	09WA155	9/16/2009	---	---	12	---
Grotto Geyser - west outflow	09WA154	9/16/2009	---	---	12	---
Grotto Geyser - west outflow	09WA156	9/16/2009	---	---	12	---
Lion Geyser - outflow	09WA149	9/16/2009	---	---	12	95
Old Faithful Geyser - outflow	09WA159	9/16/2009	---	---	12	96
Old Faithful Geyser - outflow	09WA160	9/16/2009	---	---	12	---
Sawmill Geyser - outflow	09WA158	9/16/2009	---	---	12	97
Lone Star Geyser Area						
Lone Star Geyser - outflow near Geyser	09WA131	9/14/2009	44° 25' 6.1"	110° 48' 19.9"	1	98
Lone Star Geyser - outflow near Firehole River	13WA175	9/24/2013	---	---	1	---
Firehole River above Lonestar Geyser	09WA130	9/14/2009	44° 25' 1.4"	110° 48' 25.6"	1	99
Firehole River above Lonestar Geyser	13WA174	9/24/2013	44° 25' 0.1"	110° 48' 27.3"	1	---
Forest Springs Area						
Unnamed spring near Clear Lake Trail	12WA113	9/18/2012	44° 42' 54.2"	110° 28' 24.6"	13	100
Unnamed mud pot near Clear Lake Trail	12WA114	9/18/2012	44° 42' 54.4"	110° 28' 26.5"	13	101
Unnamed spring	12WA115	9/18/2012	44° 42' 44.5"	110° 28' 25.6"	13	102
Crater Hills Area						
Sulphur Spring	09WA120	9/10/2009	44° 39' 17.2"	110° 28' 51.3"	14	103
Sulphur Spring	10WA126	6/4/2010	44° 39' 17.2"	110° 28' 51.3"	14	---
Sulphur Spring	Y10G015	6/30/2010	44° 39' 17.2"	110° 28' 51.3"	14	---
Sulphur Spring	Y10G038	7/26/2010	44° 39' 17.2"	110° 28' 51.3"	14	---
Sulphur Spring	10WA188	9/19/2010	44° 39' 17.2"	110° 28' 51.3"	14	---
Sulphur Spring	12WA147	9/25/2012	44° 39' 17.2"	110° 28' 51.3"	14	---
Sulphur Spring	13WA129	9/21/2013	44° 39' 17.2"	110° 28' 51.3"	14	---
CH08 - unnamed acid spring downhill from Sulphur Spring	Y10G014	6/30/2010	44° 39' 15.3"	110° 28' 58.9"	14	---
CH08 - unnamed acid spring downhill from Sulphur Spring	Y10G037	7/26/2010	44° 39' 15.3"	110° 28' 58.9"	14	---
CH08 - unnamed acid spring downhill from Sulphur Spring	10WA127	6/4/2010	44° 39' 15.3"	110° 28' 58.9"	14	---
CH08 - unnamed acid spring downhill from Sulphur Spring	10WA189	9/19/2010	44° 39' 15.3"	110° 28' 58.9"	14	---
CH08 - unnamed acid spring downhill from Sulphur Spring	13WA128	9/21/2013	44° 39' 15.3"	110° 28' 58.9"	14	104
CH09 - unnamed acid spring	09WA119	9/10/2009	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	10WA128	6/4/2010	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	Y10G013	6/30/2010	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	Y10G036	7/26/2010	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	10WA190	9/19/2010	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	12WA145	9/25/2012	44° 39' 12.0"	110° 29' 2.0"	14	105
CH09 - unnamed acid spring	13WA143	9/21/2013	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	13WA144	9/21/2013	44° 39' 12.0"	110° 29' 2.0"	14	---
CH09 - unnamed acid spring	13WA145	9/21/2013	44° 39' 12.0"	110° 29' 2.0"	14	---
CH13 - unnamed yellow acidic hot pool	09WA121	9/10/2009	44° 39' 14.0"	110° 28' 37.4"	14	106
CH13 - unnamed yellow acidic hot pool	10WA129	6/4/2010	44° 39' 14.0"	110° 28' 37.4"	14	---
CH13 - unnamed yellow acidic hot pool	Y10G016	6/30/2010	44° 39' 14.0"	110° 28' 37.4"	14	---
CH13 - unnamed yellow acidic hot pool	Y10G039	7/26/2010	44° 39' 14.0"	110° 28' 37.4"	14	---
CH13 - unnamed yellow acidic hot pool	10WA187	9/19/2010	44° 39' 14.0"	110° 28' 37.4"	14	---
CH13 - unnamed yellow acidic hot pool	13WA127	9/21/2013	44° 39' 14.0"	110° 28' 37.4"	14	---
CH19 - unnamed acid spring (10 cm by 5 cm) 10 m south of CH09	12WA146	9/25/2012	44° 39' 11.5"	110° 29' 2.0"	14	107
CH19 - unnamed acid spring (10 cm by 5 cm) 10 m south of CH09	13WA146	9/21/2013	44° 39' 11.5"	110° 29' 2.0"	14	---

Table 1. Sample site names, descriptions, code numbers, collection dates, locations, and map and photograph references–Continued.

Name and Description	Sample Code Number	Collection Date	Latitude	Longitude	Map (figure)	Photograph (appendix)
Mud Volcano Area						
Sulphur Caldron	10WA124	6/4/2010	44° 37' 41.5"	110° 25' 55.9"	15	108
Sulphur Caldron	Y10G011	6/30/2010	44° 37' 41.5"	110° 25' 55.9"	15	---
Sulphur Caldron	Y10G029	7/26/2010	44° 37' 41.5"	110° 25' 55.9"	15	---
Sulphur Caldron	10WA185	9/19/2010	44° 37' 41.5"	110° 25' 55.9"	15	---
Turbulent Pool	Y10G012	6/30/2010	44° 37' 42.4"	110° 25' 57.3"	15	---
Turbulent Pool	Y10G028	7/26/2010	44° 37' 42.4"	110° 25' 57.3"	15	---
Turbulent Pool	10WA186	9/19/2010	44° 37' 42.4"	110° 25' 57.3"	15	---
MV01 - unnamed acid pool (12 m by 20 m)	11WA156	9/9/2011	44° 37' 6.1"	110° 26' 4.5"	15	109
MV01 - unnamed acid pool (12 m by 20 m)	13WA130	9/21/2013	44° 37' 6.1"	110° 26' 4.5"	15	---
MV02 - unnamed small acid pool to the east of MV01	13WA131	9/21/2013	44° 37' 5.8"	110° 26' 5.6"	15	110
MV03 - unnamed small acid pool to the south of MV01	13WA132	9/21/2013	44° 37' 5.2"	110° 26' 4.8"	15	111
Snake Hot Springs Area						
Unnamed pool (5 m by 4 m) about 0.7 km west of Snake Hot Springs	10WA161	9/14/2010	44° 10' 4.6"	110° 35' 22.7"	16	112
45 meters downstream of 10WA161	10WA162	9/14/2010	44° 10' 5.3"	110° 35' 24.8"	16	113, 114
60 meters downstream of 10WA162	10WA163	9/14/2010	---	---	16	115
25 meters downstream of 10WA163	10WA164	9/14/2010	44° 10 '5.2"	110° 35' 29.7"	16	---

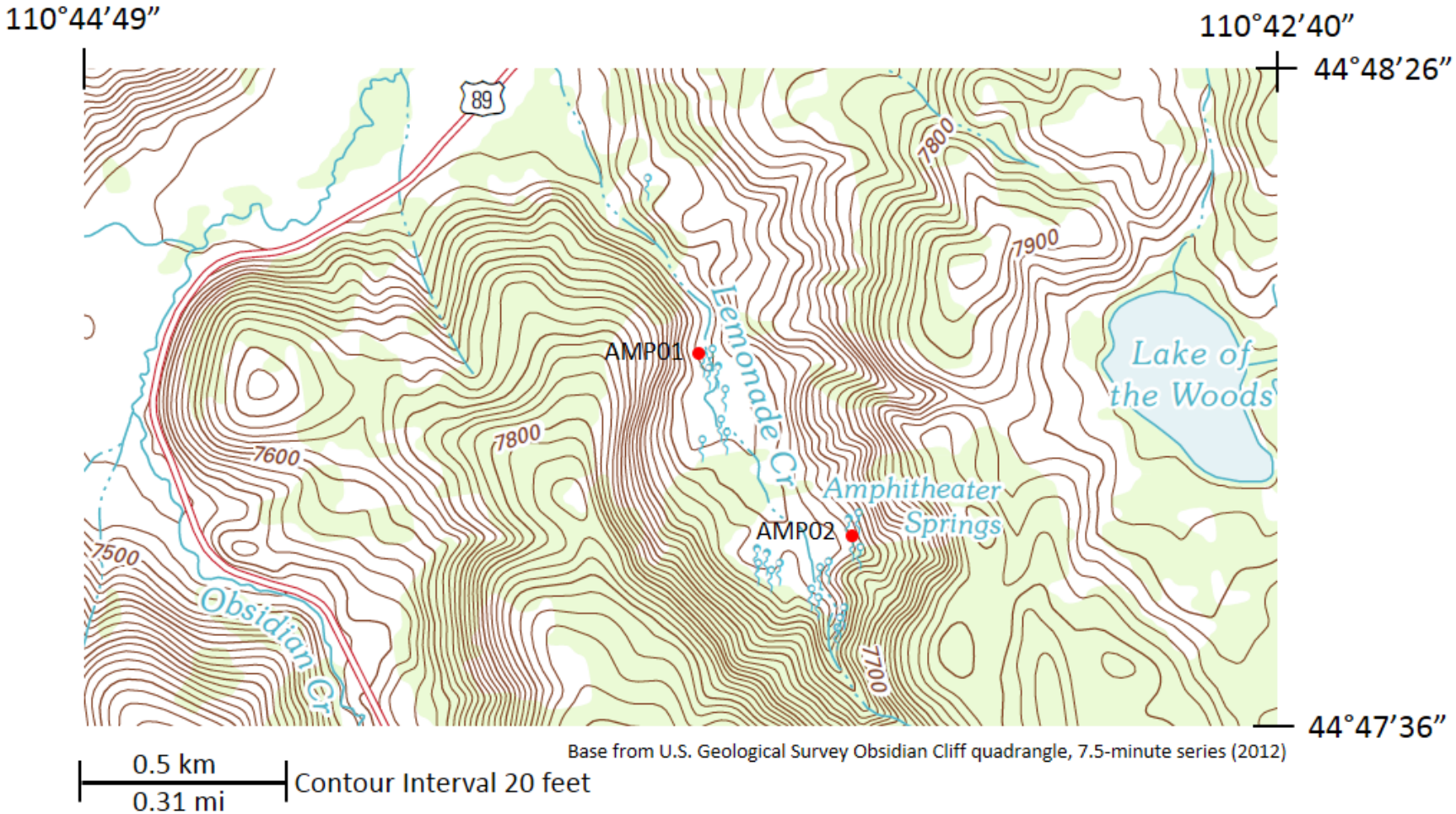


Figure 2. Sample locations at Amphitheater Springs, Yellowstone National Park, Wyoming.

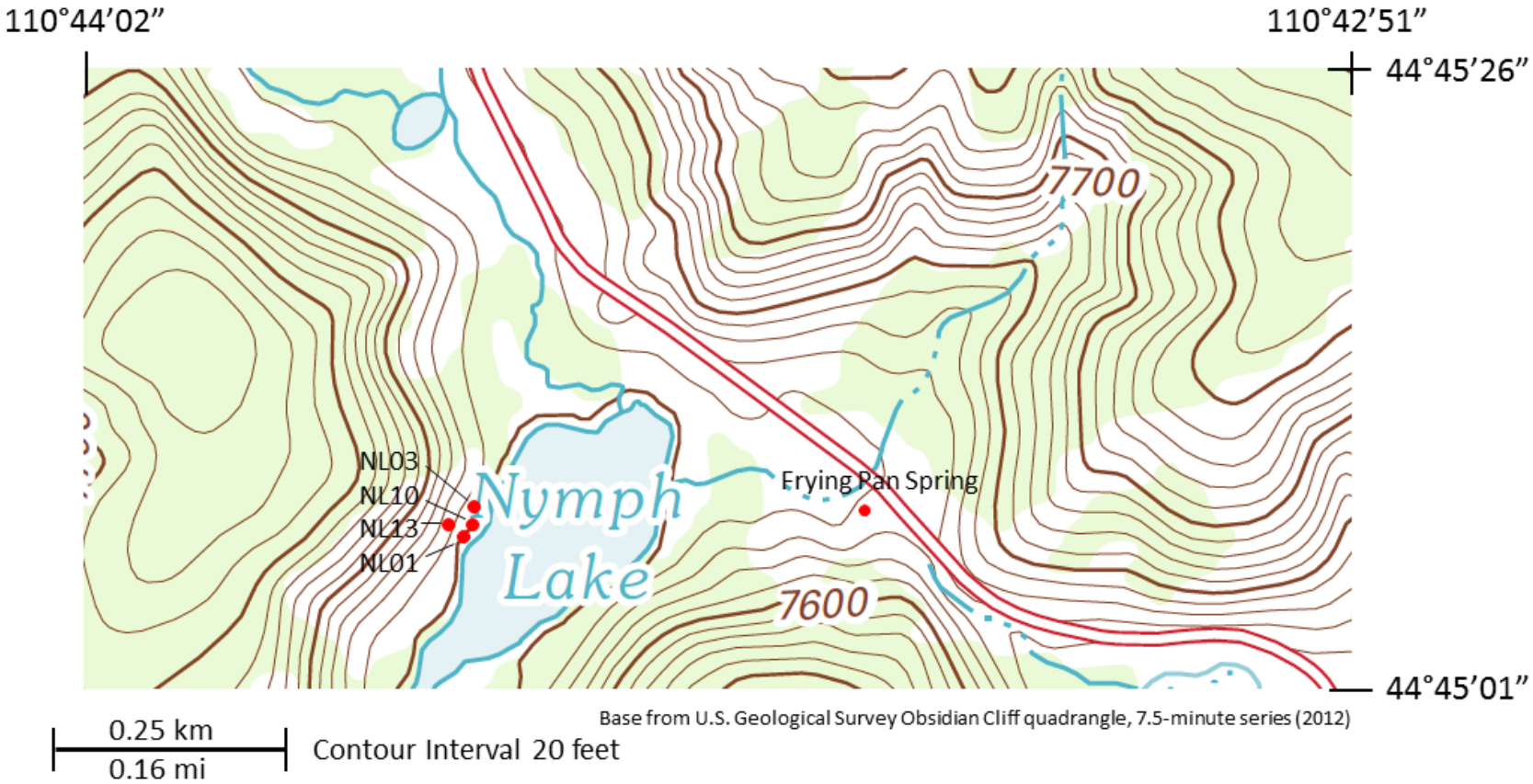


Figure 3. Sample locations near Nymph Lake, Yellowstone National Park, Wyoming.

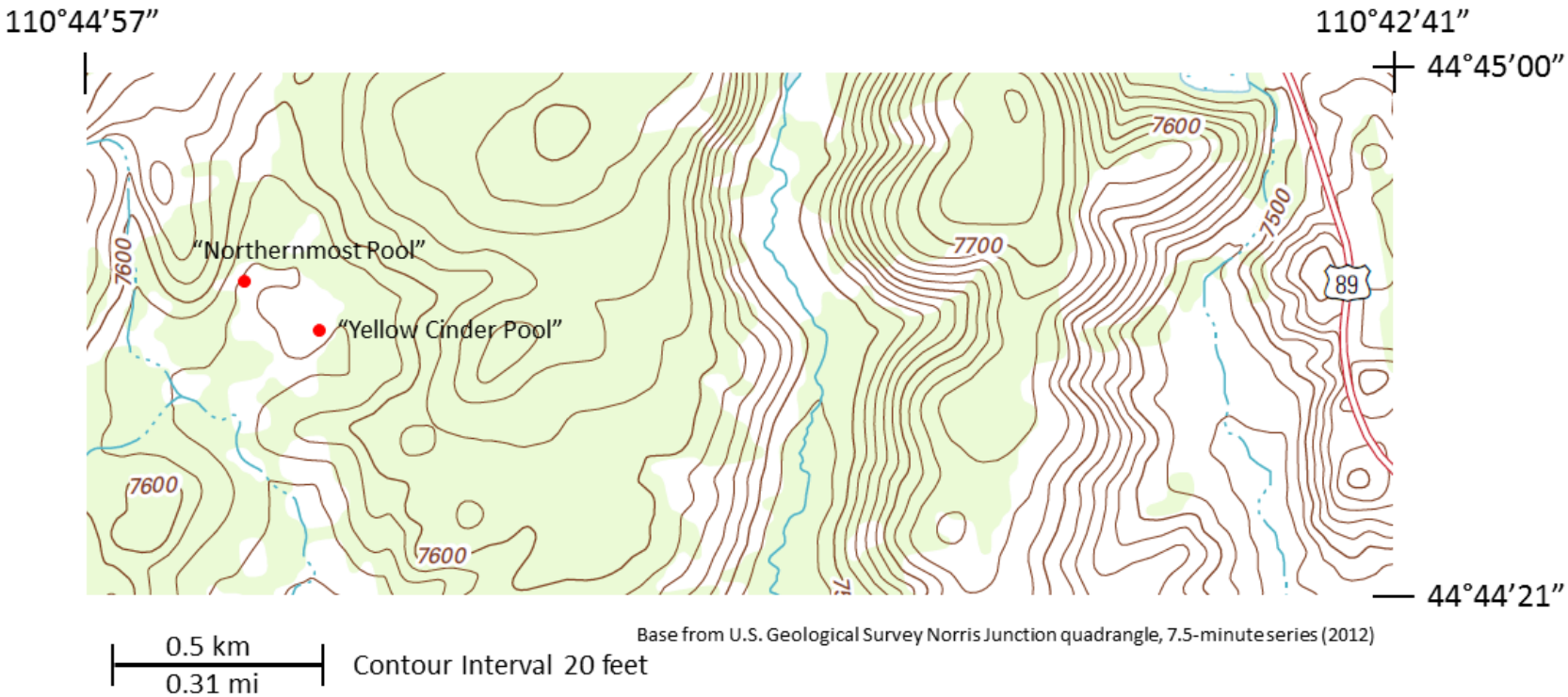


Figure 4. Sample locations at West Nymph Creek Thermal Area, Yellowstone National Park, Wyoming.

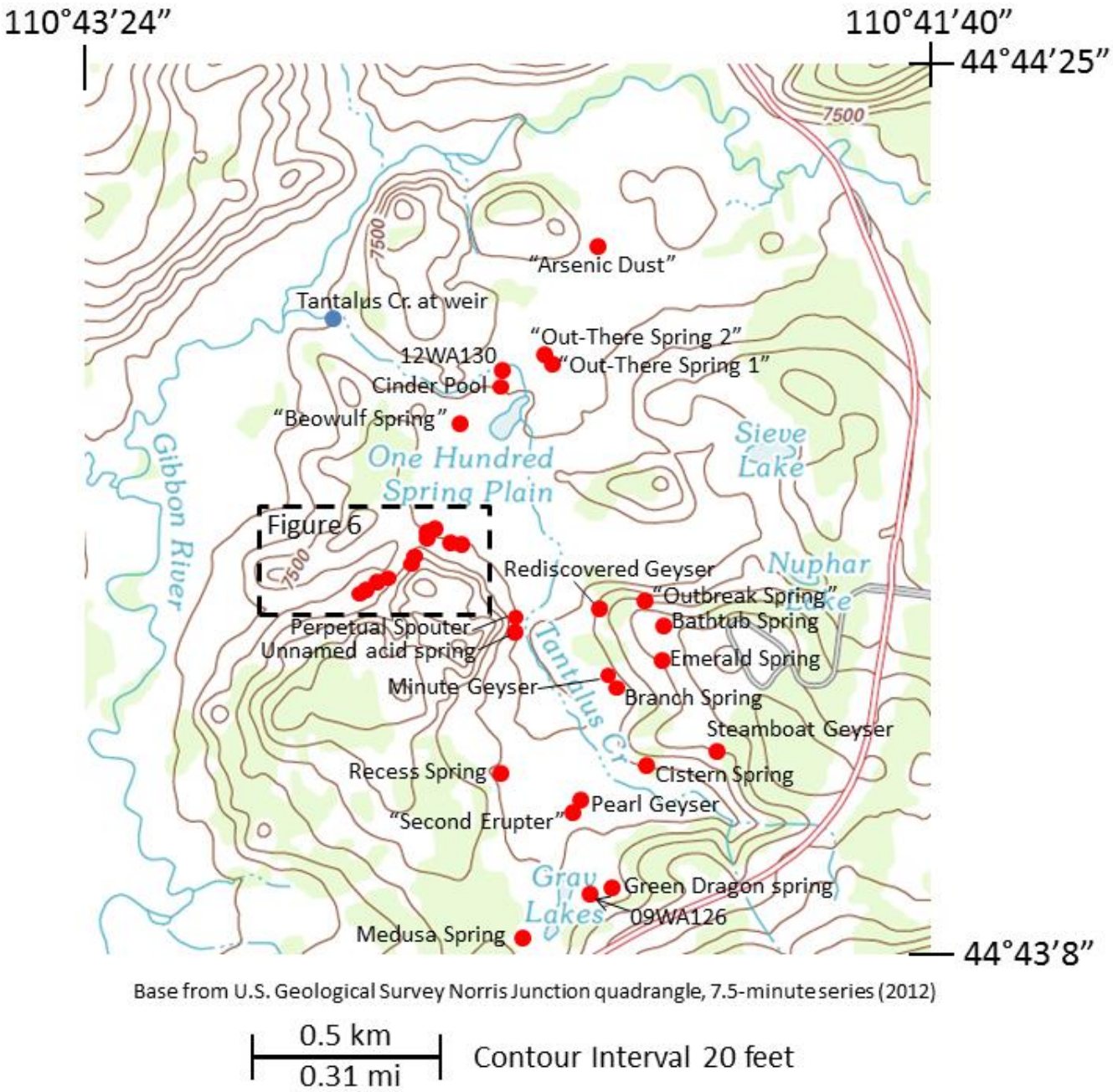


Figure 5. Sample locations at Norris Geyser Basin, Yellowstone National Park, Wyoming. Red points are geothermal sample sites and the blue is a sample from a creek.

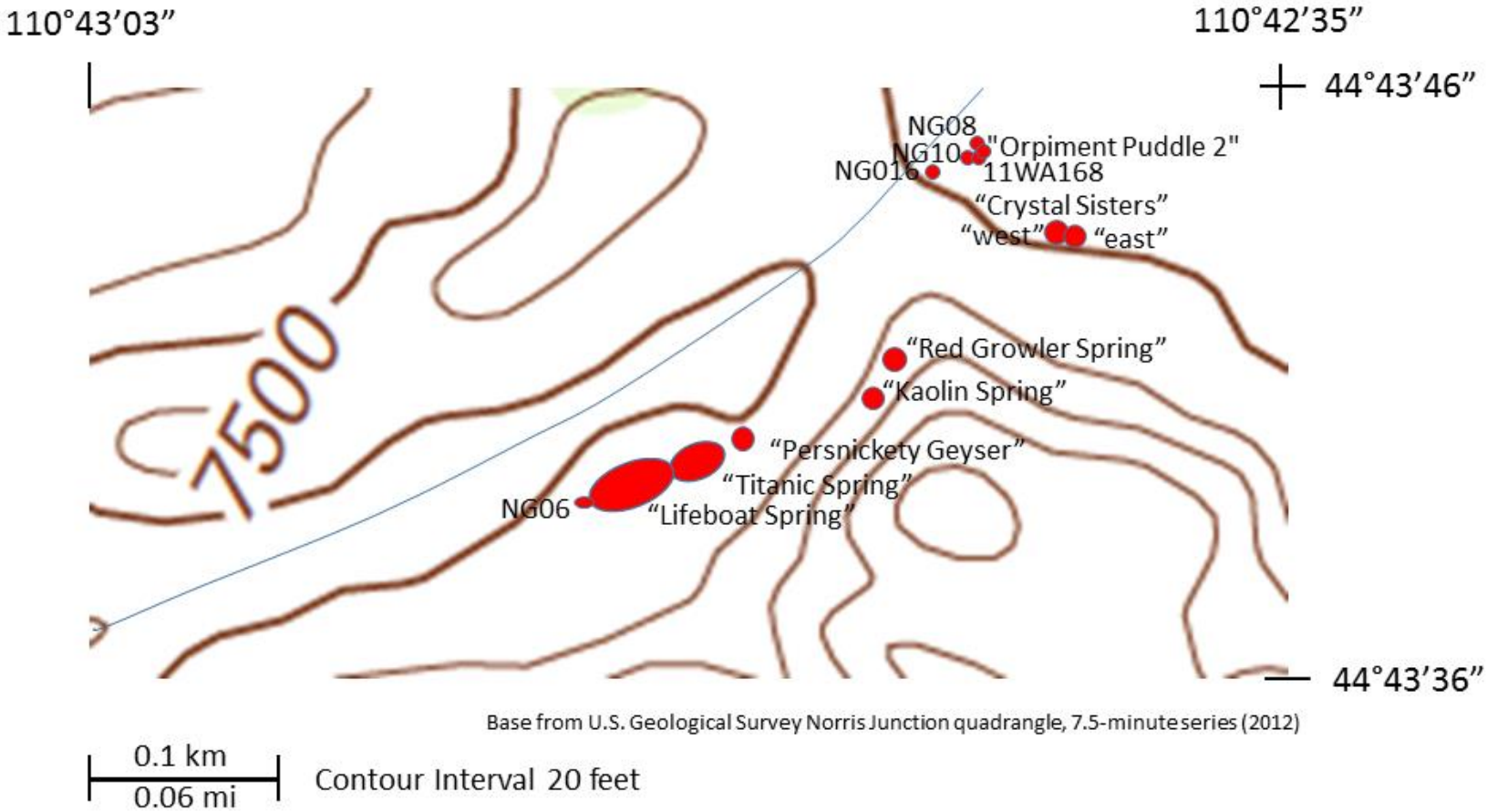


Figure 6. Sample locations at the Ragged Hills area, Yellowstone National Park, Wyoming.

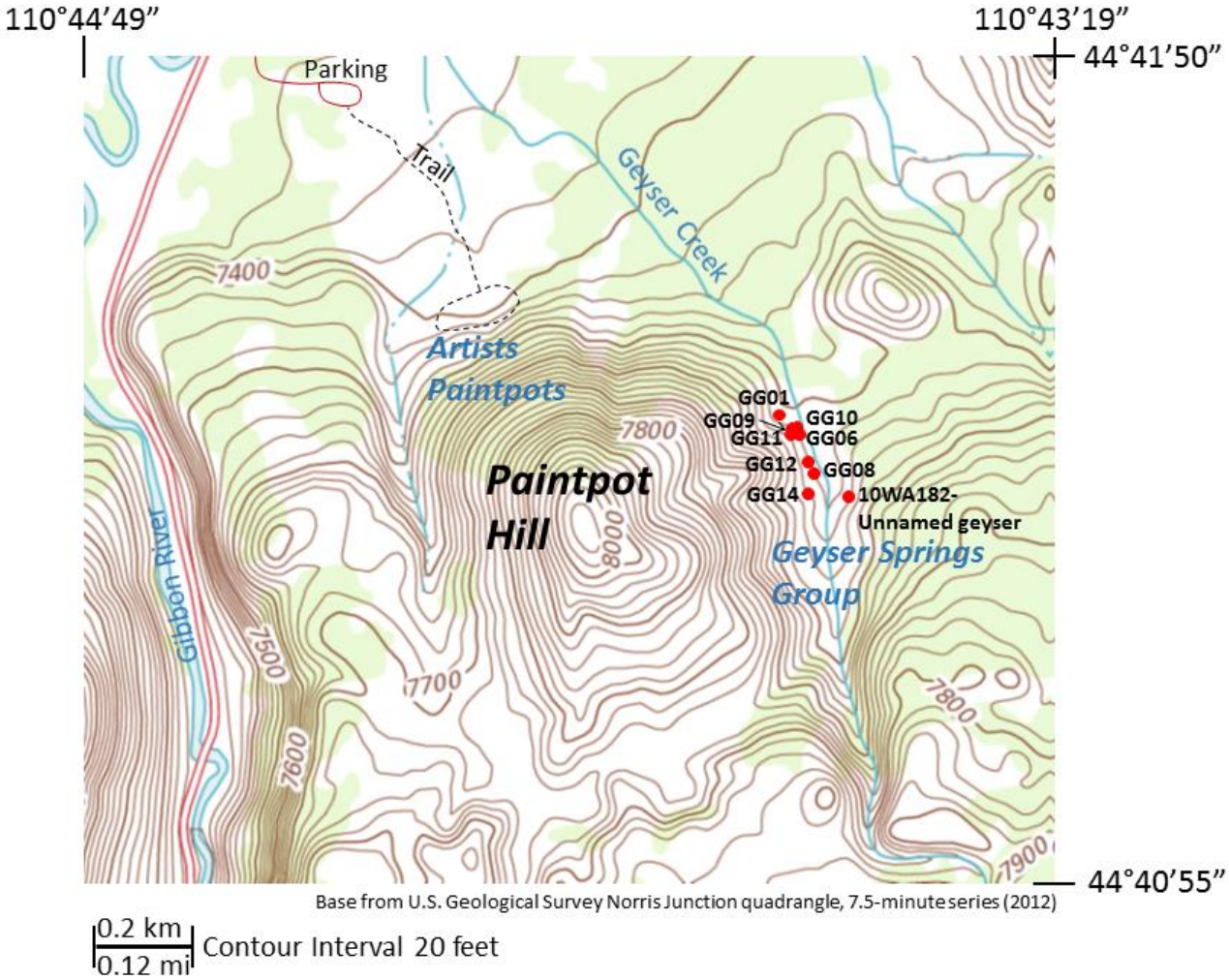


Figure 7. Sample locations at the Geyser Springs Group, Yellowstone National Park, Wyoming.

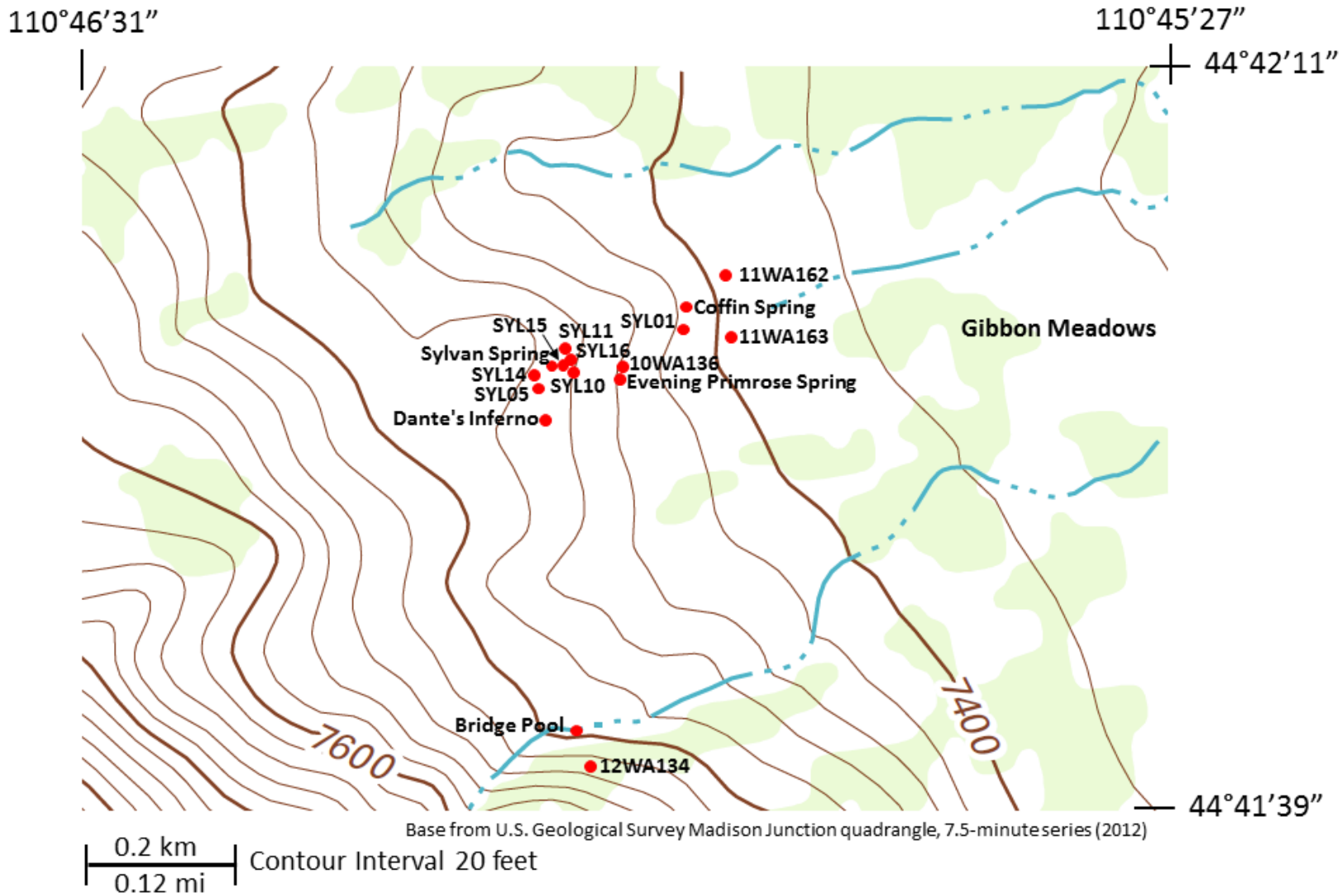


Figure 8. Sample locations at Sylvan Springs, Yellowstone National Park, Wyoming.

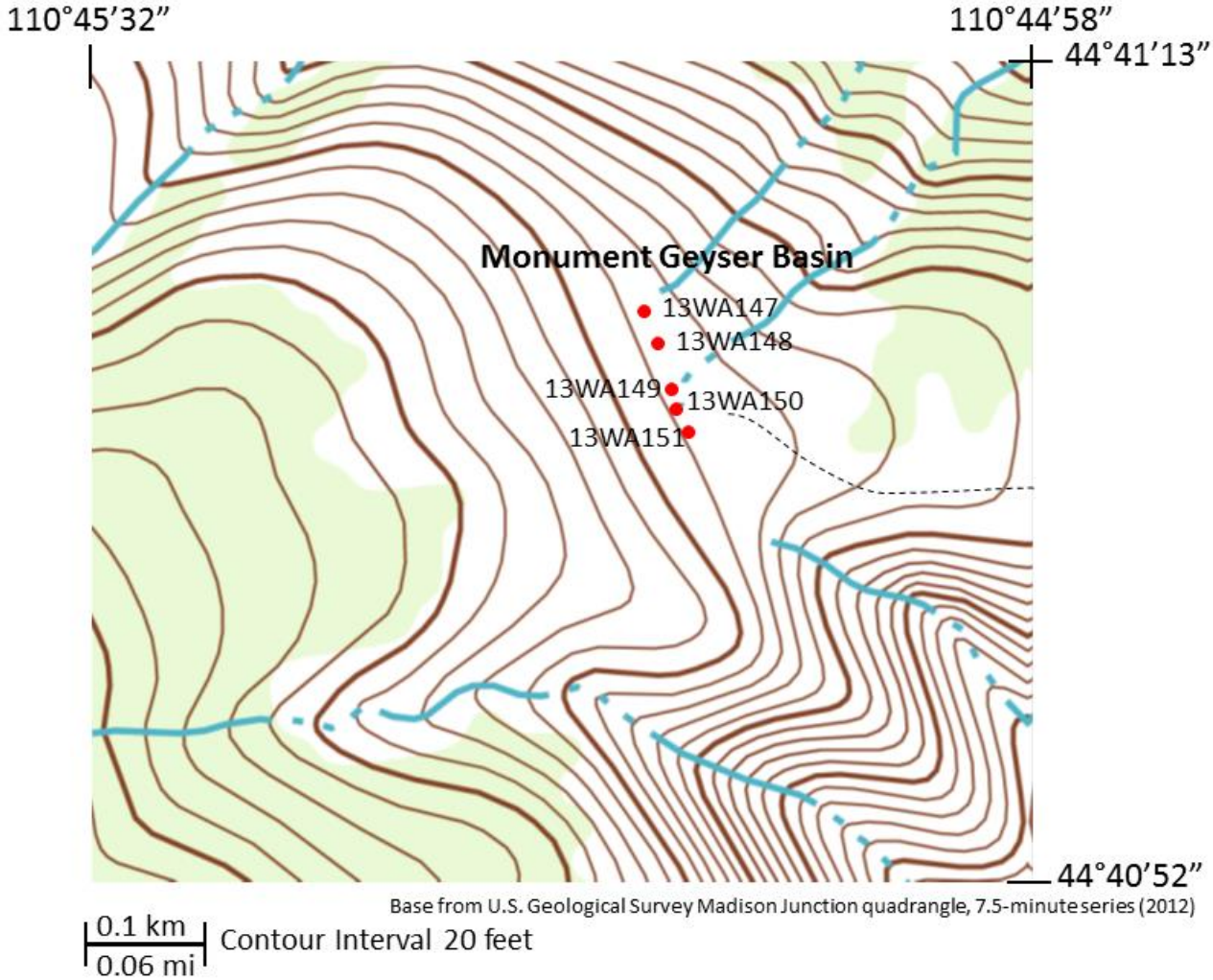


Figure 9. Sample locations at Monument Geyser Basin, Yellowstone National Park, Wyoming.

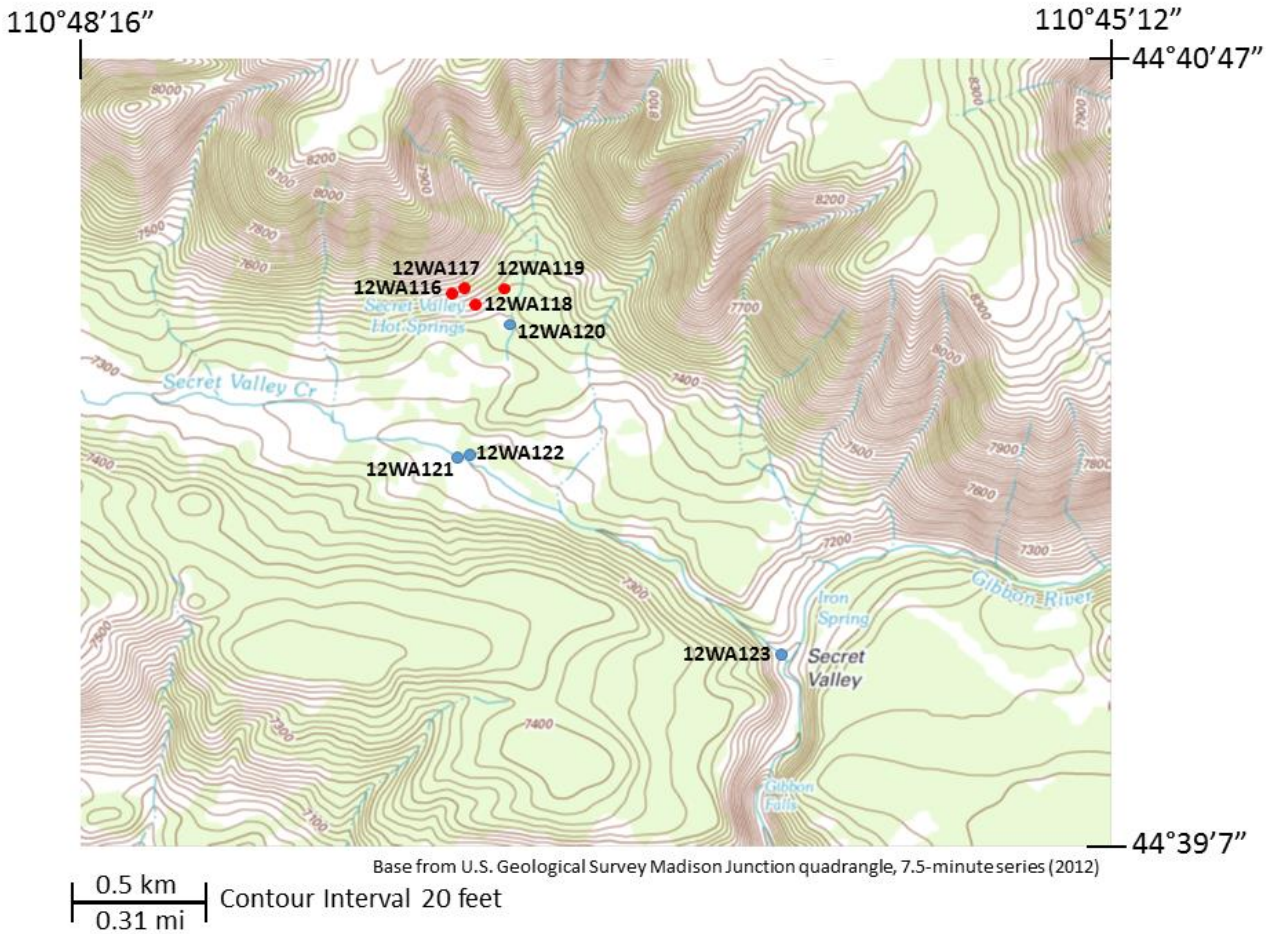


Figure 10. Sample locations of thermal waters (red circles) and streams (blue circles) at Secret Valley Hot Springs, Yellowstone National Park, Wyoming.

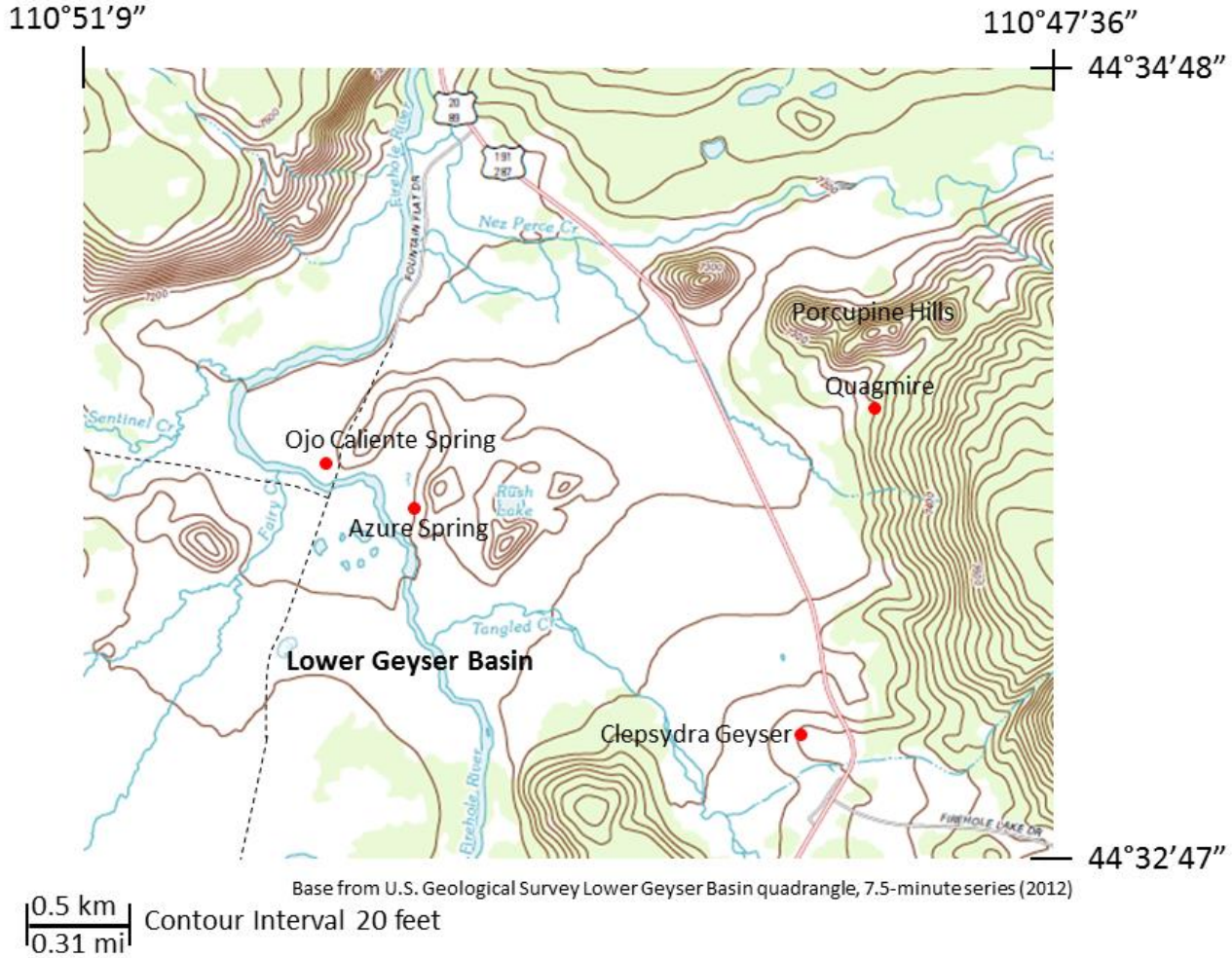


Figure 11. Sample locations at Lower Geyser Basin, Yellowstone National Park, Wyoming.

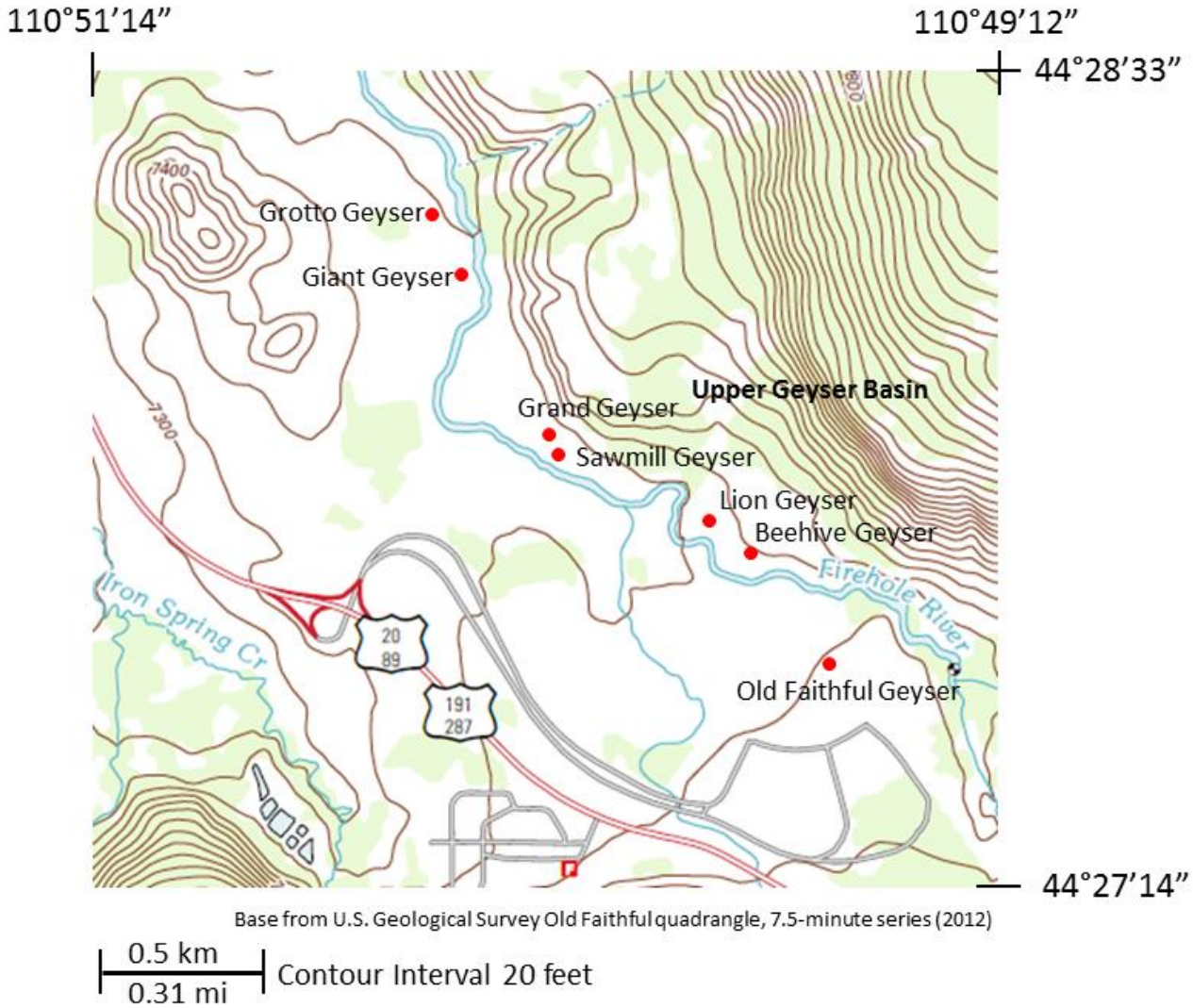


Figure 12. Sample locations at Upper Geyser Basin, Yellowstone National Park, Wyoming.

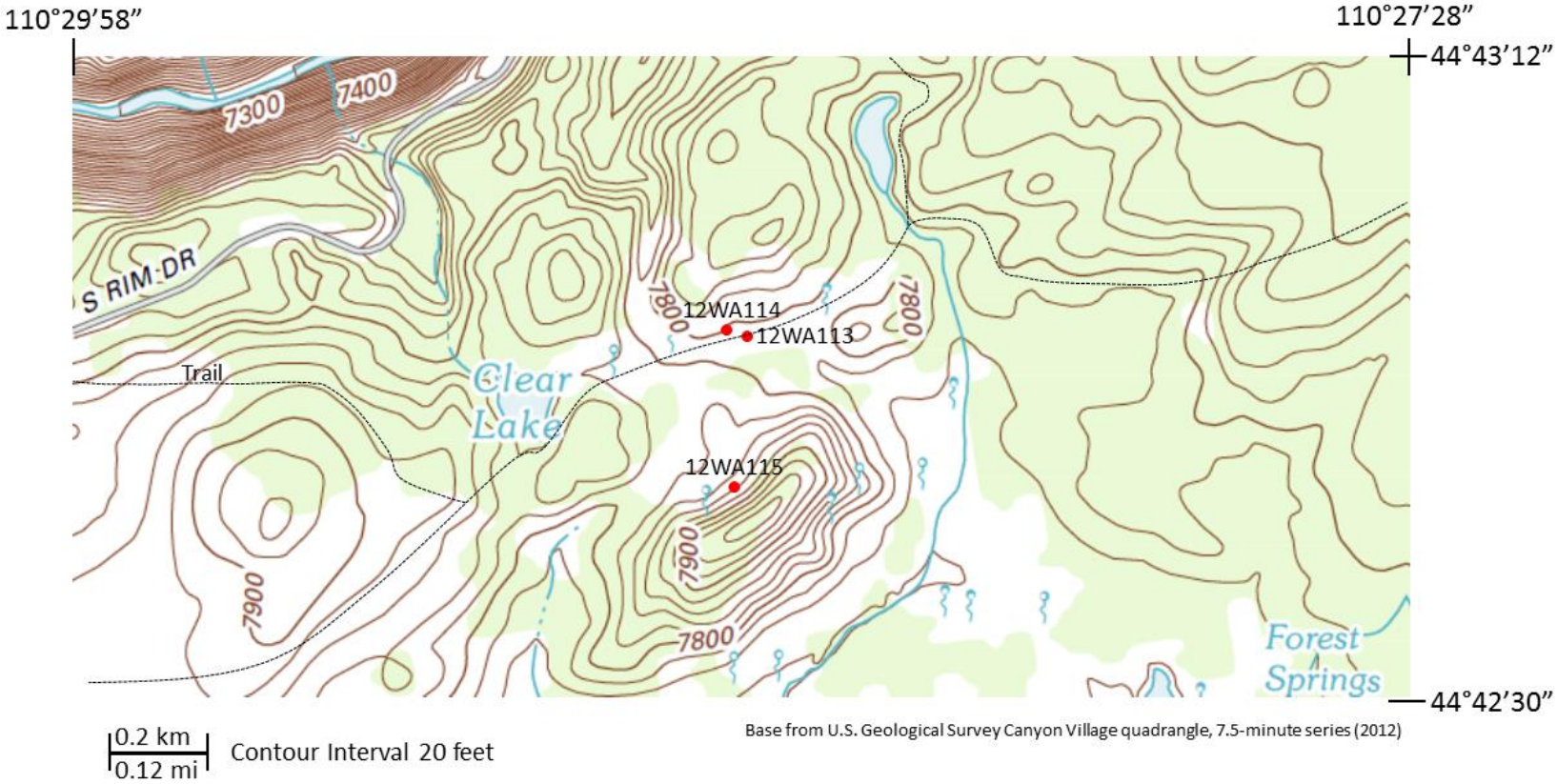


Figure 13. Sample locations at Forest Springs, Yellowstone National Park, Wyoming

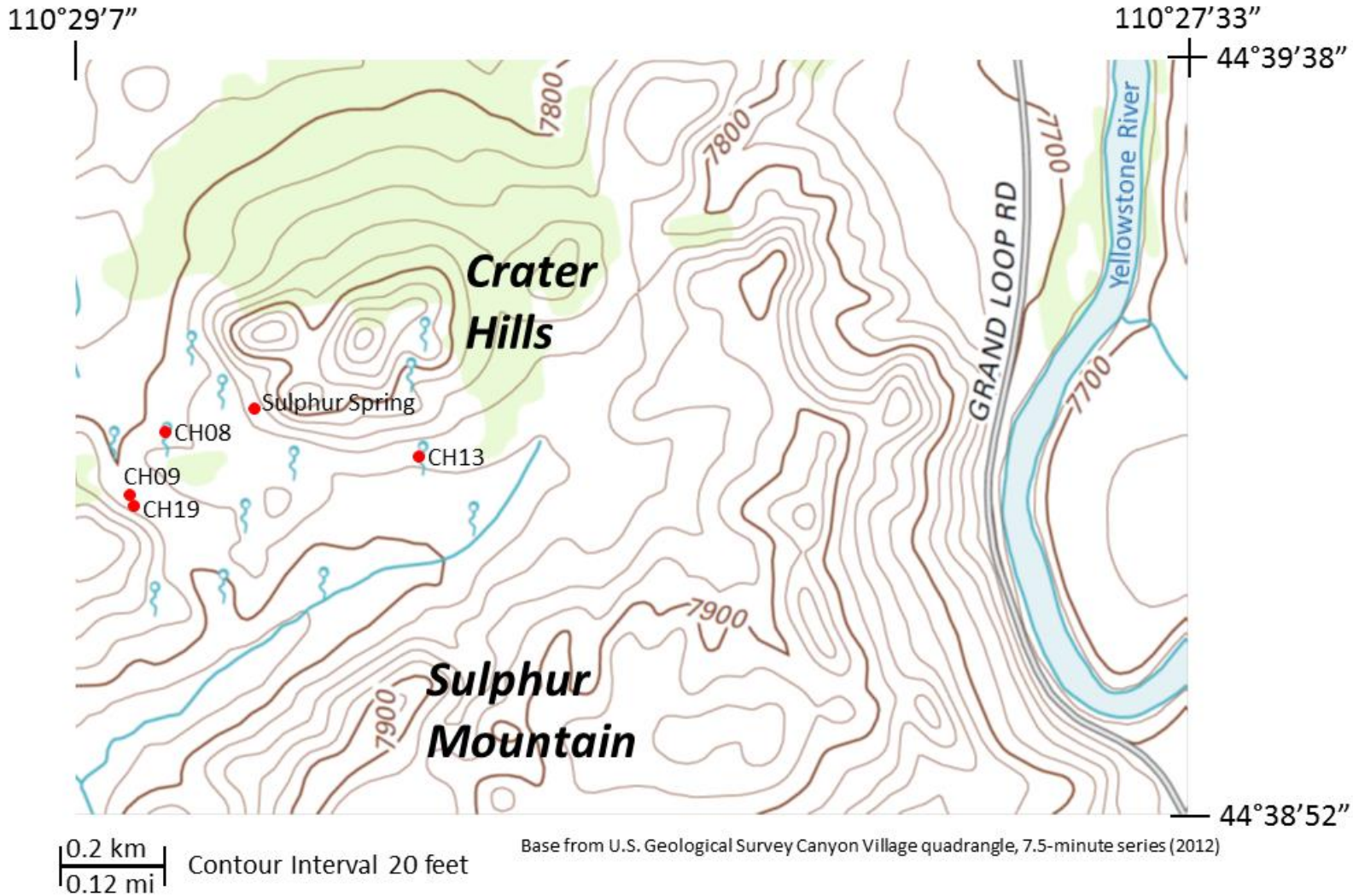


Figure 14. Sample locations at Crater Hills, Yellowstone National Park, Wyoming.

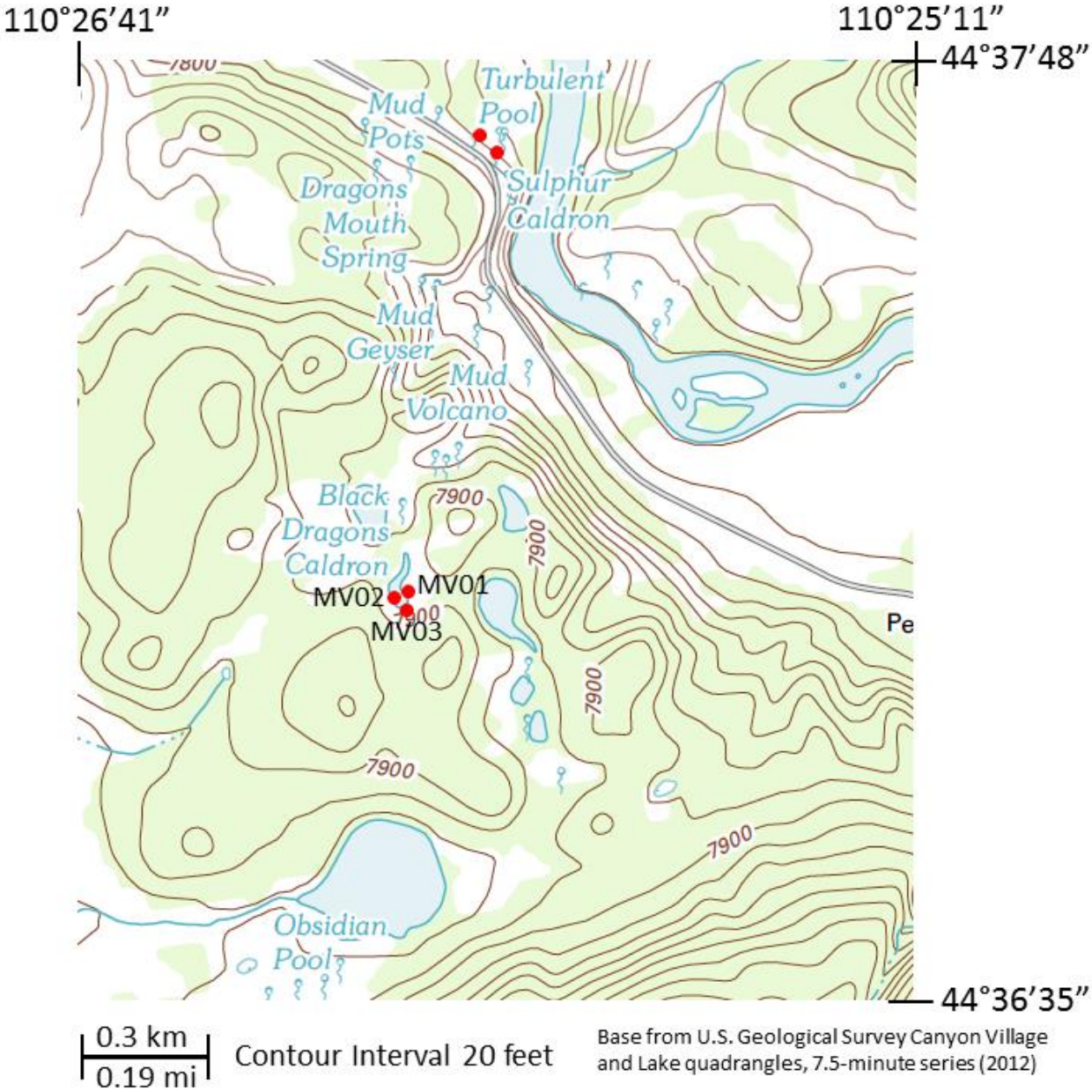


Figure 15. Sample locations at the Mud Volcano area, Yellowstone National Park, Wyoming.

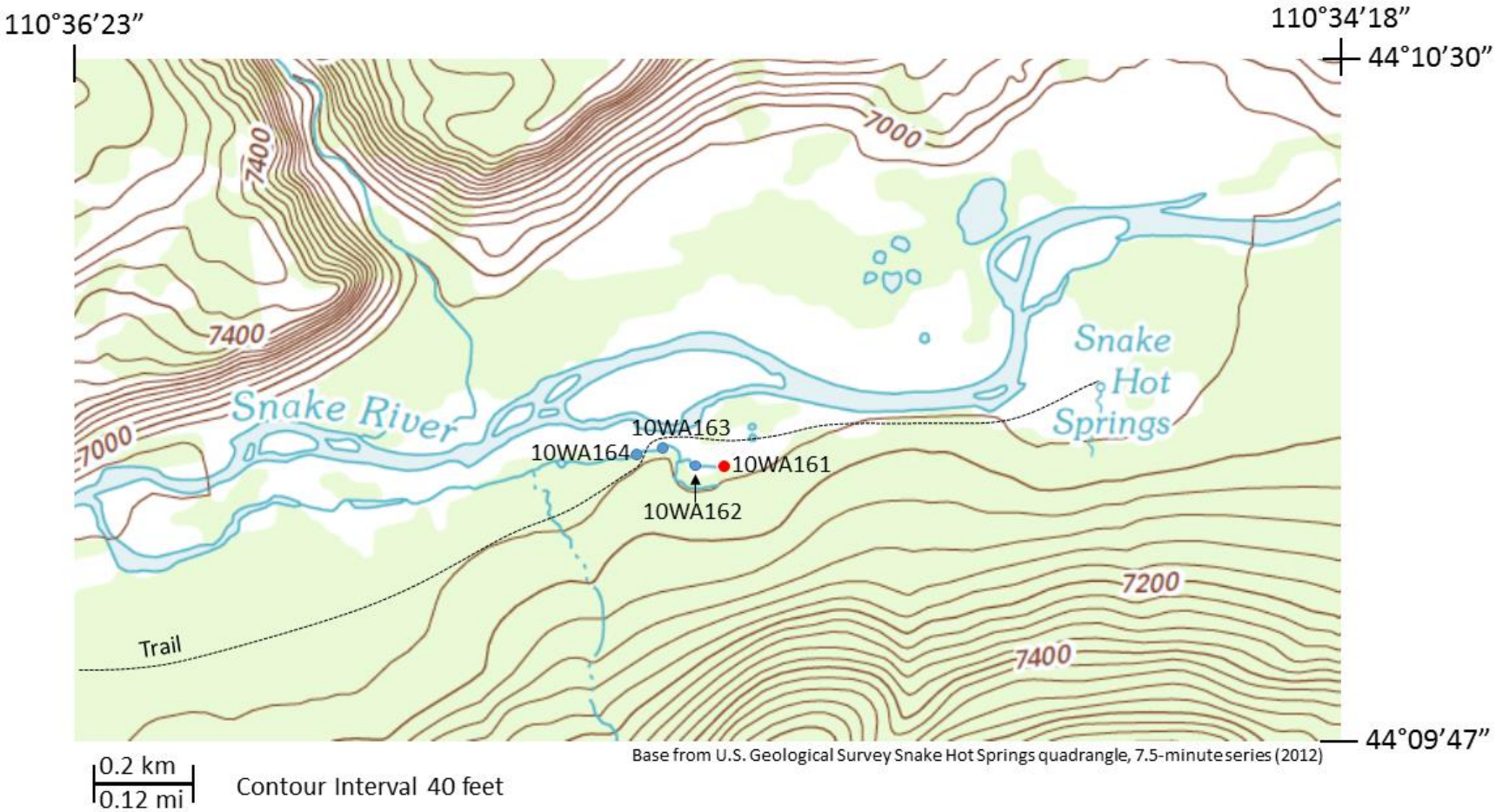


Figure 16. Sample locations of thermal water (red circle) and stream water (blue circles) near Snake Hot Springs, Yellowstone National Park, Wyoming.

Water Chemistry Data

Selected water chemistry data for YNP thermal features, their overflow drainages, and surface waters are presented in table 4. The EXCEL spreadsheet associated with this report (*http://water.usgs.gov/nrp/yellowstone-water-chemistry/YNP_FinalData.xlsx*) contains all the water chemistry data. Table 4 contains site information, collection date and time, field measurements (temperature, pH, specific conductance, Eh, and dissolved oxygen), charge imbalance, specific conductance balance, and concentrations of major cations (Ca, Mg, Na, K), anions (Cl, SO_4, alkalinity, F, Br), SiO_2, nutrients (NH_4, NO_3, P), redox species (As, Fe, S), selected trace metals (Al, B, Hg, Li, Mn, Ba, Sr, and Rb), acidity, dissolved organic carbon, and water isotopes. Samples in table 4 and the EXCEL spreadsheet are in the same order as table 1.

Table 2. Water analyses for samples collected from Yellowstone National Park.

Sample Code Number	Y10G020	10WA183	10WA123	Y10G019	10WA184
Area	Amphitheater Springs	Amphitheater Springs	Amphitheater Springs	Amphitheater Springs	Amphitheater Springs
Name and Description	AMP01 - unnamed acid spring near Lemonade Creek	AMP01 - unnamed acid spring near Lemonade Creek	AMP02 - unnamed acid spring on south-east hillside	AMP02 - unnamed acid spring on south-east hillside	AMP02 - unnamed acid spring on south-east hillside
Collection Date	7/7/2010	9/17/2010	6/2/2010	7/7/2010	9/18/2010
Collection Time	---	9:15	18:00	---	10:20
Latitude	44° 48' 4.4"	44° 48' 4.4"	44° 47' 50.1"	44° 47' 50.1"	44° 47' 50.1"
Longitude	110° 43' 43.4"	110° 43' 43.4"	110° 43' 25.4"	110° 43' 25.4"	110° 43' 25.4"
Map (figure)	2	2	2	2	2
Photograph (appendix)	---	1	2	---	---
pH	2.21	2.22	1.95	2.02	2.11
Specific Conductance (µS/cm)	3190	3092	5199	4465	4765
Temperature (°C)	75.1	75.5	88.6	86.1	88.9
Temperature (Flow Cell, °C)	---	67.7	62.2	---	77.8
Eh (V)	0.190	0.075	0.319	0.260	0.213
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9992	0.9991	---	0.9991
Constituent (mg/L)[1]					
Ca	6.33	6.64	1.08	0.94	0.60
Mg	1.95	1.91	0.46	0.423	0.24
Na	41.2	43.0	19.0	21.3	16.3
K	25.7	27.0	10.6	9.97	7.69
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	11.0	17.8	---	16.8
Cl	6.0	10.2	4.2	1.1	3.4
F	0.36	0.95	0.45	0.52	1.26
Br	<0.1	<0.1	<0.1	<0.1	<0.1
SO_4	678	670	983	823	903
S_2O_3	---	<0.1	<0.1	---	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	1.88	1.42	0.061	0.309	0.001
NO_3	<0.1	<0.1	<0.1	<0.1	<0.1
NH_4	2.4	3.2	9.4	8.1	13.9
SiO_2	294	316	167	159	131
B	0.34	0.42	0.083	0.19	0.20
Al	15.0	14.3	14.4	13.3	6.99
Fe(T)	3.31	3.18	1.63	1.23	0.661
Fe(II)	---	3.17	1.63	1.21	0.661
Mn	0.114	0.116	0.040	0.039	0.025
Sr	0.022	0.023	0.007	0.006	0.0032
Ba	0.017	0.018	0.031	0.032	0.031
Li	0.045	0.066	0.021	0.028	0.016
Rb	---	0.152	0.041	---	0.029
P	---	<0.06	<0.06	---	<0.06
As(T)	0.034	0.044	<0.002	0.0020	0.0021
As(III)	---	0.043	---	0.001	0.002
Hg (ng/L)	---	56.8	136	---	46.1
DOC	---	0.8	1.3	---	1.4
δD (‰)	-141.70	-140.84	-127.97	-124.30	-120.58
$\delta^{18}O$ (‰)	-17.00	-17.09	-12.07	-11.70	-10.76
Charge Imbalance (%)	-7.0	-7.7	-4.7	-2.0	-8.4
Specific Conductance Balance (%)	0.0	1.9	1.5	1.0	1.1
Sum Cations (meq/L)	10.7	10.6	15.1	13.1	10.8
Sum Anions (meq/L)	11.4	11.5	15.8	13.4	11.8

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA107	10WA107A	10WA107B	10WA107C	10WA107D
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	Frying Pan Spring	Frying Pan Spring	Frying Pan Spring	Frying Pan Spring	Frying Pan Spring
Collection Date	5/30/2010	5/30/2010	5/30/2010	5/30/2010	5/30/2010
Collection Time	10:45	11:01	11:24	11:50	13:21
Latitude	44° 45' 7.7"	44° 45' 7.7"	44° 45' 7.7"	44° 45' 7.7"	44° 45' 7.7"
Longitude	110° 43' 18.1"	110° 43' 18.1"	110° 43' 18.1"	110° 43' 18.1"	110° 43' 18.1"
Map (figure)	3	3	3	3	3
Photograph (appendix)	3	---	---	---	---
pH	2.38	---	---	2.37	2.32
Specific Conductance (µS/cm)	2373	---	---	2398	2559
Temperature (°C)	75.0	---	---	69.6	58.9
Temperature (Flow Cell, °C)	62.9	---	---	61.9	46.1
Eh (V)	0.171	---	---	0.247	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9989	---	---	---	---
Constituent (mg/L)[1]					
Ca	2.52	---	---	---	---
Mg	0.64	---	---	---	---
Na	28.4	---	---	---	---
K	11.2	---	---	---	---
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	---	---	---
Cl	5.8	---	---	---	---
F	1.6	---	---	---	---
Br	<0.1	---	---	---	---
SO_4	507	---	---	---	---
S_2O_3	0.3	---	---	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.086	---	---	---	---
NO_3	<0.1	---	---	---	---
NH_4	1.1	---	---	---	---
SiO_2	155	---	---	---	---
B	0.28	---	---	---	---
Al	14.5	---	---	---	---
Fe(T)	1.37	---	---	---	---
Fe(II)	1.37	---	---	---	---
Mn	0.030	---	---	---	---
Sr	0.022	---	---	---	---
Ba	0.048	---	---	---	---
Li	0.188	---	---	---	---
Rb	0.043	---	---	---	---
P	<0.06	---	---	---	---
As(T)	0.150	---	---	---	---
As(III)	---	---	---	---	---
Hg (ng/L)	63.5	---	---	---	---
DOC	2.0	---	---	---	---
δD (‰)	-128.95	---	---	---	---
$\delta^{18}O$ (‰)	-14.16	---	---	---	---
Charge Imbalance (%)	-3.5	---	---	---	---
Specific Conductance Balance (%)	3.0	---	---	---	---
Sum Cations (meq/L)	7.14	---	---	---	---
Sum Anions (meq/L)	7.39	---	---	---	---

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA107E	10WA108	09WA117	10WA130	Y10G010
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	Frying Pan Spring	Unnamed stream feeding into Frying Pan Spring	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring
Collection Date	5/30/2010	5/30/2010	9/10/2009	6/5/2010	6/28/2010
Collection Time	14:44	15:10	10:30	11:00	---
Latitude	44° 45' 7.7"	44° 45' 7.7"	44° 45' 7.3"	44° 45' 7.3"	44° 45' 7.3"
Longitude	110° 43' 18.1"	110° 43' 18.1"	110° 43' 40.3"	110° 43' 40.3"	110° 43' 40.3"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	4	---	---	---
pH	2.28	2.25	3.70	6.70	6.03
Specific Conductance (µS/cm)	2623	2618	985	213	308
Temperature (°C)	58.8	32.2	89.6	89.5	90.1
Temperature (Flow Cell, °C)	44.5	28.0	74.8	65.5	---
Eh (V)	---	0.678	-0.003	0.026	0.130
DO (mg/L)	---	---	2.4	---	---
Density (g/mL at 20°C)	---	0.9988	0.9986	0.9984	---
Constituent (mg/L)[1]					
Ca	---	2.63	11.4	1.88	3.39
Mg	---	0.85	1.14	0.19	0.330
Na	---	7.20	101	33.5	47.1
K	---	7.45	12.8	5.30	8.11
Alkalinity (as HCO_3)	---	---	---	10.4	---
Acidity (mN)	---	---	1.20	---	---
Cl	---	0.7	114	34.6	27.3
F	---	0.82	4.23	2.52	2.5
Br	---	<0.1	0.59	0.08	0.11
SO_4	---	508	162	31.0	74.1
S_2O_3	---	<0.1	<0.1	1.8	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	0.205	0.255	0.367	---
NO_3	---	<0.1	0.09	0.09	<0.1
NH_4	---	0.8	2.6	0.2	1.4
SiO_2	---	157	134	84.0	103
B	---	<0.04	1.82	0.31	0.67
Al	---	19.2	3.97	0.102	0.620
Fe(T)	---	1.50	0.468	0.005	0.168
Fe(II)	---	0.250	0.421	<0.002	0.168
Mn	---	0.023	1.23	0.129	0.255
Sr	---	0.023	0.032	0.0052	0.01
Ba	---	0.041	0.045	0.011	0.017
Li	---	0.022	0.570	0.180	0.267
Rb	---	0.033	0.066	0.0311	---
P	---	<0.06	<0.06	0.004	---
As(T)	---	0.017	0.340	0.240	0.307
As(III)	---	---	0.107	---	0.292
Hg (ng/L)	---	28.2	740	321	---
DOC	---	1.6	1.5	3.1	---
δD (‰)	---	-137.24	-126.22	-137.09	-131.40
$\delta^{18}O$ (‰)	---	-17.39	-14.07	-17.21	-15.70
Charge Imbalance (%)	---	0.0	-6.1	-9.7	5.0
Specific Conductance Balance (%)	---	4.1	-2.8	6.6	1.0
Sum Cations (meq/L)	---	7.98	5.96	1.73	2.54
Sum Anions (meq/L)	---	7.98	6.34	1.91	2.41

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G018	10WA173	11WA136	12WA148	13WA135
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring	NL01 - unnamed hillside spring
Collection Date	7/7/2010	9/16/2010	9/7/2011	9/26/2012	9/20/2013
Collection Time	---	17:00	10:40	10:10	10:15
Latitude	44° 45' 7.3"	44° 45' 7.3"	44° 45' 7.3"	44° 45' 7.3"	44° 45' 7.3"
Longitude	110° 43' 40.3"	110° 43' 40.3"	110° 43' 40.3"	110° 43' 40.3"	110° 43' 40.3"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	---	---	5	---
pH	5.08	3.30	3.11	2.94	3.27
Specific Conductance (µS/cm)	383	937	873	1282	1055
Temperature (°C)	91.3	90.2	87.9	86.6	76.5
Temperature (Flow Cell, °C)	---	75.2	75.4	71.2	75.5
Eh (V)	0.290	-0.035	0.228	0.213	0.443
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9987	0.9986	0.9991	0.9987
Constituent (mg/L)[1]					
Ca	4.49	11.4	8.90	13.1	11.7
Mg	0.441	1.11	0.916	1.35	1.17
Na	52.2	113	87.2	131	147
K	7.88	13.3	11.8	13.9	13.1
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	1.05	1.67	3.52	1.48
Cl	36.9	137	94.1	140	145
F	2.4	2.61	3.3	3.2	4.08
Br	0.15	0.43	0.50	0.44	0.45
SO_4	81.5	175	157	251	196
S_2O_3	---	<0.1	<0.1	<0.1	<0.05
S_nO_6 (µM / n)	---	---	---	---	<0.4 / ---
H_2S	0.080	0.067	0.023	0.109	0.135
NO_3	<0.1	<0.1	0.20	<0.05	<0.05
NH_4	1.5	3.2	2.7	3.2	3.5
SiO_2	105	120	111	106	131
B	0.85	2.05	1.53	2.33	2.22
Al	1.08	2.54	2.75	4.52	2.69
Fe(T)	0.230	0.466	0.728	1.67	0.874
Fe(II)	0.230	0.458	0.705	1.66	0.855
Mn	0.315	1.34	1.15	1.74	1.63
Sr	0.013	0.032	0.026	0.036	0.032
Ba	0.021	0.042	0.037	0.059	0.056
Li	0.285	0.658	0.365	0.649	0.712
Rb	---	0.062	0.062	0.090	0.093
P	---	<0.06	0.008	0.008	<0.04
As(T)	0.295	0.242	0.267	0.355	0.406
As(III)	0.290	0.101	0.102	0.193	0.232
Hg (ng/L)	---	44.8	76.1	97.1	65.7
DOC	---	1.2	1.9	1.7	2.0
δD (‰)	-129.90	-127.23	-130.10	-127.30	-124.80
$\delta^{18}O$ (‰)	-15.40	-14.49	-14.29	-13.80	-13.86
Charge Imbalance (%)	4.0	-3.2	7.1	5.2	6.9
Specific Conductance Balance (%)	-8.0	5.5	5.8	6.5	6.8
Sum Cations (meq/L)	2.85	6.80	5.79	8.54	8.31
Sum Anions (meq/L)	2.74	7.02	5.39	8.11	7.76

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA118	10WA131	Y10G004	Y10G027	10WA175
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring
Collection Date	9/10/2009	6/5/2010	6/16/2010	7/15/2010	9/16/2010
Collection Time	12:20	11:50	---	---	18:05
Latitude	44° 45' 7.9"	44° 45' 7.9"	44° 45' 7.9"	44° 45' 7.9"	44° 45' 7.9"
Longitude	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	---	---	---	---
pH	2.33	3.13	2.60	2.39	2.46
Specific Conductance (µS/cm)	3121	1018	1968	2787	2546
Temperature (°C)	82.4	84.0	84.6	84.2	84.3
Temperature (Flow Cell, °C)	76.2	77.3	---	---	74.2
Eh (V)	0.354	0.159	0.220	0.430	0.013
DO (mg/L)	1.0	---	---	---	---
Density (g/mL at 20°C)	0.9990	0.9987	---	---	0.9991
Constituent (mg/L)[1]					
Ca	9.53	5.63	7.24	8.93	8.23
Mg	0.97	0.71	0.777	0.890	0.86
Na	142	105	137	158	148
K	24.2	14.5	19.0	23.1	24.1
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	6.94	1.73	---	---	6.99
Cl	212	138	173	215	231
F	4.19	3.09	2.6	2.8	2.09
Br	0.82	0.47	0.62	0.72	0.73
SO_4	460	163	285	420	435
S_2O_3	<0.1	0.2	---	---	0.2
S_nO_6 (µM / n)	---	---	---	---	1.8 / 4
H_2S	0.251	0.703	---	0.203	0.482
NO_3	<0.05	0.15	<0.1	<0.1	<0.1
NH_4	8.5	2.2	3.5	5.8	7.8
SiO_2	241	144	191	233	226
B	3.41	2.15	3.17	3.89	3.56
Al	9.27	4.29	5.31	7.29	8.37
Fe(T)	2.62	2.09	2.64	2.61	2.49
Fe(II)	2.37	2.08	2.62	2.32	2.44
Mn	0.937	0.876	0.819	0.962	0.955
Sr	0.044	0.028	0.033	0.040	0.037
Ba	0.084	0.044	0.069	0.080	0.078
Li	1.16	0.872	1.04	1.24	1.28
Rb	0.135	0.068	---	---	0.118
P	<0.06	<0.06	---	---	<0.06
As(T)	0.374	0.220	0.359	0.513	0.454
As(III)	0.125	≥0.153	0.184	0.243	0.206
Hg (ng/L)	460	167	---	---	179
DOC	1.8	2.9	---	---	1.2
δD (‰)	-114.82	-128.05	-118.30	-115.10	-115.33
$\delta^{18}O$ (‰)	-9.64	-13.83	-10.40	-9.30	-9.56
Charge Imbalance (%)	9.5	-2.6	1.0	-1.0	-2.8
Specific Conductance Balance (%)	-4.1	2.2	1.0	2.0	10
Sum Cations (meq/L)	13.8	6.62	10.3	13.4	12.5
Sum Anions (meq/L)	12.6	6.80	10.2	13.6	12.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA139	12WA150	13WA137	10WA132	Y10G003
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring	NL03 - unnamed hillside spring	NL10 - unnamed hillside spring	NL10 - unnamed hillside spring
Collection Date	9/7/2011	9/26/2012	9/20/2013	6/5/2010	6/16/2010
Collection Time	12:15	11:50	11:40	12:25	---
Latitude	44° 45' 7.9"	44° 45' 7.9"	44° 45' 7.9"	44° 45' 7.4"	44° 45' 7.4"
Longitude	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	6	---	---	---
pH	2.44	2.35	2.45	3.85	2.67
Specific Conductance (µS/cm)	2712	3038	2830	439	1576
Temperature (°C)	85.7	84.5	83.3	77.9	80.0
Temperature (Flow Cell, °C)	74.1	72.8	70.8	63.2	---
Eh (V)	0.381	0.257	0.547	0.148	0.250
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9994	0.9991	0.9985	---
Constituent (mg/L)[1]					
Ca	7.89	9.70	9.24	2.66	4.76
Mg	0.763	1.08	1.12	0.28	0.578
Na	165	140	150	55.9	94.9
K	25.0	24.9	24.7	8.06	13.8
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	6.86	9.29	7.07	0.529	---
Cl	236	193	209	60.2	98.8
F	3.7	2.6	3.47	3.3	3.8
Br	1.20	0.66	0.65	0.21	0.35
SO_4	389	567	435	72.8	256
S_2O_3	<0.1	<0.1	<0.05	0.3	---
S_nO_6 (µM / n)	---	---	1.3 / 4	---	---
H_2S	0.014	0.096	0.171	1.18	---
NO_3	<0.05	<0.05	<0.05	<0.1	<0.1
NH_4	8.1	7.8	7.6	0.6	2.2
SiO_2	218	201	228	97.0	161
B	4.08	3.02	2.92	1.01	2.13
Al	7.33	12.5	9.69	1.42	5.40
Fe(T)	2.16	4.22	7.96	1.41	5.32
Fe(II)	1.99	3.65	7.69	1.40	5.32
Mn	0.846	0.946	1.10	0.297	0.693
Sr	0.038	0.043	0.042	0.0088	0.017
Ba	0.092	0.089	0.099	0.033	0.066
Li	1.09	1.22	1.28	0.375	0.620
Rb	0.152	0.179	0.175	0.032	---
P	0.012	0.008	<0.04	0.011	---
As(T)	0.901	0.675	0.540	0.179	0.282
As(III)	0.343	0.245	0.322	0.124	0.230
Hg (ng/L)	354	11.9	140	211	---
DOC	2.1	1.9	3.2	7.7	---
δD (‰)	-117.69	-120.90	-118.90	-132.85	-123.90
$\delta^{18}O$ (‰)	-9.78	-11.20	-10.97	-16.18	-12.60
Charge Imbalance (%)	8.6	2.6	5.7	-1.6	2.0
Specific Conductance Balance (%)	5.1	8.5	-3.3	-1.9	-1.0
Sum Cations (meq/L)	13.4	13.6	13.0	3.12	7.76
Sum Anions (meq/L)	12.3	13.3	12.3	3.17	7.63

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G017	10WA174	11WA137	12WA149	13WA136
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	NL10 - unnamed hillside spring	NL10 - unnamed hillside spring	NL10 - unnamed hillside spring	NL10 - unnamed hillside spring	NL10 - unnamed hillside spring
Collection Date	7/7/2010	9/16/2010	9/7/2011	9/26/2012	9/20/2013
Collection Time	---	17:35	11:25	11:05	11:07
Latitude	44° 45' 7.4"	44° 45' 7.4"	44° 45' 7.4"	44° 45' 7.4"	44° 45' 7.4"
Longitude	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"	110° 43' 39.8"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	---	---	7	---
pH	2.29	2.37	2.28	2.43	2.42
Specific Conductance (µS/cm)	3003	2886	3567	2772	2665
Temperature (°C)	82.1	82.6	83.3	85.1	80.2
Temperature (Flow Cell, °C)	---	70.1	72.4	78.5	73.0
Eh (V)	0.320	0.008	0.372	0.199	0.340
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9992	0.9992	0.9995	0.9991
Constituent (mg/L)[1]					
Ca	5.60	7.34	6.54	11.8	10.9
Mg	0.698	0.87	0.843	1.41	1.30
Na	103	126	108	134	139
K	18.8	22.2	22.9	25.3	23.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	9.27	11.1	10.8	9.09
Cl	103	163	126	169	153
F	2.5	2.34	3.3	1.8	3.37
Br	0.38	0.51	0.80	0.52	0.43
SO_4	540	561	632	656	581
S_2O_3	---	0.4	<0.1	<0.1	<0.05
S_nO_6 (µM / n)	---	2.7 / 4	---	---	1.7 / 5
H_2S	0.555	0.560	0.002	0.089	0.098
NO_3	<0.1	<0.1	<0.05	<0.05	<0.05
NH_4	3.7	5.4	5.8	5.0	6.0
SiO_2	202	211	233	182	215
B	2.36	2.75	2.34	2.74	2.41
Al	12.3	11.7	16.8	20.6	15.6
Fe(T)	7.00	7.87	11.4	12.1	11.5
Fe(II)	7.00	7.85	11.1	11.9	11.4
Mn	0.973	1.22	1.18	1.98	1.99
Sr	0.021	0.028	0.025	0.040	0.035
Ba	0.069	0.082	0.078	0.090	0.091
Li	0.663	0.848	0.552	0.885	0.885
Rb	---	0.105	0.128	0.179	0.181
P	---	<0.06	0.061	0.047	<0.04
As(T)	0.270	0.275	0.341	0.327	0.240
As(III)	0.155	0.169	0.174	0.200	≥0.190
Hg (ng/L)	---	372	412	17.6	113
DOC	---	1.8	2.6	3.1	2.9
δD (‰)	-120.30	-119.59	-120.80	-122.40	-120.10
$\delta^{18}O$ (‰)	-11.20	-10.71	-10.81	-11.90	-11.38
Charge Imbalance (%)	0.0	-0.1	9.3	-5.2	3.3
Specific Conductance Balance (%)	0.0	6.7	0.1	4.2	9.1
Sum Cations (meq/L)	12.1	12.5	13.1	13.0	13.1
Sum Anions (meq/L)	12.2	12.5	12.0	13.7	12.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G005	Y10G044	11WA138	12WA151	13WA138
Area	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake	Nymph Lake
Name and Description	NL13 - unnamed hillside spring	NL13 - unnamed hillside spring	NL13 - unnamed hillside spring	NL13 - unnamed hillside spring	NL13 - unnamed hillside spring
Collection Date	6/22/2010	9/21/2010	9/7/2011	9/26/2012	9/20/2013
Collection Time	---	---	11:50	12:20	12:10
Latitude	44° 45' 7.5"	44° 45' 7.5"	44° 45' 7.5"	44° 45' 7.5"	44° 45' 7.5"
Longitude	110° 43' 42.8"	110° 43' 42.8"	110° 43' 42.8"	110° 43' 42.8"	110° 43' 42.8"
Map (figure)	3	3	3	3	3
Photograph (appendix)	---	---	---	8	---
pH	2.49	2.33	2.44	2.35	2.39
Specific Conductance (µS/cm)	2338	3009	2729	3033	2867
Temperature (°C)	74.4	78.3	82.8	87.4	85.2
Temperature (Flow Cell, °C)	---	---	73.4	76.2	71.0
Eh (V)	0.400	0.470	0.416	0.264	0.369
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	---	0.9991	0.9992	0.9991
Constituent (mg/L)[1]					
Ca	7.79	9.09	7.86	9.56	9.10
Mg	0.801	0.918	0.761	1.06	1.10
Na	145	149	162	140	148
K	21.2	23.7	25.0	24.6	23.8
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	7.22	9.56	7.14
Cl	185	210	233	194	206
F	2.4	1.3	3.7	2.5	3.38
Br	0.64	0.70	1.10	0.64	0.64
SO_4	344	465	411	576	447
S_2O_3	---	---	<0.1	<0.1	<0.05
S_nO_6 (µM / n)	---	---	---	---	<0.4 / ---
H_2S	---	0.140	0.095	0.104	0.251
NO_3	<0.1	<0.1	<0.05	<0.05	<0.05
NH_4	4.6	6.4	8.4	8.2	7.9
SiO_2	203	229	230	204	223
B	3.34	3.75	4.08	2.99	2.93
Al	5.85	8.91	7.53	12.7	9.89
Fe(T)	2.57	2.63	2.33	4.24	7.51
Fe(II)	2.49	2.19	1.74	3.67	7.20
Mn	0.858	0.957	0.831	0.942	1.06
Sr	0.035	0.039	0.038	0.043	0.041
Ba	0.073	0.080	0.093	0.089	0.099
Li	1.08	1.23	1.06	1.23	1.26
Rb	---	---	0.152	0.177	0.173
P	---	---	0.009	0.013	<0.04
As(T)	0.393	0.436	0.869	0.679	0.571
As(III)	0.160	0.196	0.210	0.240	0.325
Hg (ng/L)	---	---	293	194	144
DOC	---	---	1.8	2.2	3.3
δD (‰)	-117.60	-115.90	-117.60	-120.10	-118.50
$\delta^{18}O$ (‰)	-9.90	-10.00	-9.56	-11.40	-10.72
Charge Imbalance (%)	1.0	-1.0	5.1	2.4	-1.9
Specific Conductance Balance (%)	1.0	3.0	4.5	9.2	-1.1
Sum Cations (meq/L)	11.6	13.8	13.2	13.7	13.5
Sum Anions (meq/L)	11.5	14.0	12.6	13.3	13.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA123	12WA131	12WA132	09WA112
Area	West Nymph Creek Thermal Area	West Nymph Creek Thermal Area	West Nymph Creek Thermal Area	Norris Geyser Basin
Name and Description	Unnamed - northernmost spring	Unnamed - northernmost spring	"Yellow Cinder Pool"	Branch Spring
Collection Date	9/11/2009	9/22/2012	9/22/2012	9/9/2009
Collection Time	14:30	11:15	14:15	12:10
Latitude	44° 44' 44.6'	44° 44' 44.6'	44° 44' 41.0"	44° 43' 30.1"
Longitude	110° 44' 40.0"	110° 44' 40.0"	110° 44' 32.4"	110° 42' 18.6"
Map (figure)	4	4	4	5
Photograph (appendix)	---	9	10	11
pH	5.57	5.74	2.42	4.18
Specific Conductance (µS/cm)	363	377	2579	1551
Temperature (°C)	61.9	57.8	80.3	78.5
Temperature (Flow Cell, °C)	57.0	52.6	64.5	74.4
Eh (V)	-0.045	0.022	0.115	-0.033
DO (mg/L)	---	---	---	0.05
Density (g/mL at 20°C)	0.9985	0.9986	0.9991	0.9990
Constituent (mg/L)[1]				
Ca	6.87	6.51	11.1	4.90
Mg	0.42	0.375	4.22	0.27
Na	60.8	63.5	44.3	249
K	5.60	5.19	25.4	38.1
Alkalinity (as HCO_3)	93.1	78.3	---	---
Acidity (mN)	---	---	7.43	0.224
Cl	9.9	9.1	0.6	404
F	5.97	5.1	0.6	4.17
Br	<0.05	<0.05	<0.05	1.33
SO_4	42.2	60.0	551	84.7
S_2O_3	17.0	24.3	<0.1	8.1
S_nO_6 (µM / n)	---	---	---	---
H_2S	0.057	0.084	0.748	0.656
NO_3	0.11	<0.05	<0.05	0.14
NH_4	0.5	0.4	15.0	2.6
SiO_2	107	94.0	240	322
B	0.27	0.21	0.56	5.97
Al	0.234	0.184	5.77	0.401
Fe(T)	0.014	0.012	0.962	0.025
Fe(II)	0.014	0.012	0.962	0.025
Mn	0.141	0.142	0.865	0.068
Sr	0.013	0.012	0.031	0.013
Ba	0.016	0.015	0.111	0.028
Li	0.282	0.281	0.067	2.91
Rb	0.028	0.030	0.137	0.267
P	<0.06	<0.2	0.004	<0.06
As(T)	0.0010	0.0018	0.0023	1.59
As(III)	0.001	0.001	0.002	1.36
Hg (ng/L)	159	82.8	438	233
DOC	1.1	1.5	3.4	1.2
δD (‰)	-140.83	-138.50	-108.50	-132.16
$\delta^{18}O$ (‰)	-17.05	-16.40	-5.70	-12.33
Charge Imbalance (%)	9.0	8.1	6.4	-4.5
Specific Conductance Balance (%)	-9.4	-11	1.1	1.5
Sum Cations (meq/L)	3.21	3.28	8.56	12.7
Sum Anions (meq/L)	2.94	3.03	8.04	13.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA109	09WA108	10WA109	10WA109A	10WA109B
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Bathtub Spring	Cinder Pool	Cinder Pool	Cinder Pool	Cinder Pool
Collection Date	9/8/2009	9/8/2009	5/31/2010	5/31/2010	5/31/2010
Collection Time	15:20	13:00	11:00	12:20	12:30
Latitude	44° 43' 35.3"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"
Longitude	110° 42' 12.5"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"
Map (figure)	5	5	5	5	5
Photograph (appendix)	12	---	---	---	---
pH	4.18	4.23	4.05	---	3.52
Specific Conductance (µS/cm)	2033	2388	2283	---	---
Temperature (°C)	89.7	90.6	85.5	---	---
Temperature (Flow Cell, °C)	77.1	77.1	68.6	---	---
Eh (V)	-0.011	-0.056	0.346	0.262	0.262
DO (mg/L)	<0.05	---	---	---	---
Density (g/mL at 20°C)	0.9992	0.9993	0.9994	---	---
Constituent (mg/L)[1]					
Ca	1.69	5.99	5.18	---	---
Mg	0.09	0.03	0.02	---	---
Na	331	373	346	---	---
K	25.6	57.7	53.7	---	---
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	0.410	0.374	0.466	---	---
Cl	512	643	593	---	---
F	7.49	8.04	6.75	---	---
Br	1.70	2.02	1.89	---	---
SO_4	109	81.3	80.9	---	---
S_2O_3	0.6	6.4	14.5	---	---
S_nO_6 (µM / n)	---	---	5.0 / 5	---	---
H_2S	0.031	1.09	0.170	---	---
NO_3	0.17	0.07	<0.1	---	---
NH_4	15.4	8.4	8.2	---	---
SiO_2	483	414	392	---	---
B	9.96	9.45	8.80	---	---
Al	1.98	1.26	1.32	---	---
Fe(T)	0.132	0.023	0.019	---	---
Fe(II)	0.132	0.023	<0.002	---	---
Mn	0.023	0.0046	0.0045	---	---
Sr	0.0066	0.020	0.017	---	---
Ba	0.030	0.030	0.019	---	---
Li	3.93	4.40	4.15	---	---
Rb	0.204	0.503	0.464	---	---
P	<0.06	<0.06	<0.06	---	---
As(T)	1.88	2.85	2.58	---	---
As(III)	1.65	≥1.94	---	---	---
Hg (ng/L)	369	57.1	22.6	---	---
DOC	1.3	0.9	0.9	---	---
δD (‰)	-122.00	-125.65	-125.60	---	---
$\delta^{18}O$ (‰)	-10.00	-10.79	-9.93	---	---
Charge Imbalance (%)	-0.8	-4.3	-3.6	---	---
Specific Conductance Balance (%)	-1.7	-2.4	-4.5	---	---
Sum Cations (meq/L)	16.6	19.2	17.8	---	---
Sum Anions (meq/L)	16.8	20.0	18.5	---	---

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA109C	10WA155	10WA156	10WA194	10WA193
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Cinder Pool	Cinder Pool	Cinder Pool (10 depth)	Cinder Pool (1m depth)	Cinder Pool (6 m depth)
Collection Date	5/31/2010	7/27/2010	7/27/2010	9/20/2010	9/20/2010
Collection Time	13:25	12:00	15:30	14:00	13:15
Latitude	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"
Longitude	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	---	---	---
pH	3.97	4.27	4.26	4.18	4.18
Specific Conductance (µS/cm)	---	2220	---	2415	2242
Temperature (°C)	---	89.6	---	89.1	---
Temperature (Flow Cell, °C)	---	63.5	68.0	47.0	48.9
Eh (V)	0.262	---	---	0.138	0.119
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9994	0.9994	0.9994	0.9994
Constituent (mg/L)[1]					
Ca	---	5.30	5.32	5.17	5.28
Mg	---	0.02	0.03	0.03	0.03
Na	---	374	366	368	368
K	---	59.0	57.5	56.9	58.9
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	---	---	---
Cl	---	643	638	649	645
F	---	5.7	5.7	5.7	5.6
Br	---	2.02	2.03	1.98	2.00
SO_4	---	78.8	79.5	80.9	79.9
S_2O_3	---	10.4	10.4	10.0	9.8
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	---	0.976	1.09
NO_3	---	<0.1	<0.1	<0.1	<0.1
NH_4	---	---	---	8.4	8.7
SiO_2	---	360	353	352	353
B	---	9.36	9.41	9.38	9.37
Al	---	1.04	1.04	0.938	0.966
Fe(T)	---	0.040	0.045	0.023	0.016
Fe(II)	---	0.039	0.043	0.023	0.016
Mn	---	0.0052	0.0049	0.0052	0.0053
Sr	---	0.017	0.017	0.017	0.017
Ba	---	0.020	0.020	0.019	0.020
Li	---	4.48	4.41	4.39	4.36
Rb	---	0.492	0.489	0.491	0.490
P	---	<0.06	<0.06	<0.06	<0.06
As(T)	---	2.56	2.45	2.57	2.51
As(III)	---	2.56	≥1.73	≥1.31	≥0.970
Hg (ng/L)	---	23.6	36.5	14.0	13.3
DOC	---	---	---	0.7	0.7
δD (‰)	---	-126.57	-126.91	-126.57	-125.79
$\delta^{18}O$ (‰)	---	-10.62	-10.53	-10.76	-10.53
Charge Imbalance (%)	---	-6.1	-7.7	-6.4	-5.5
Specific Conductance Balance (%)	---	3.6	-3.7	-3.5	3.3
Sum Cations (meq/L)	---	18.7	18.4	18.9	19.0
Sum Anions (meq/L)	---	19.9	19.8	20.1	20.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA192	10WA191	11WA174	11WA175	11WA176
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Cinder Pool (14 m depth)	Cinder Pool (20 m depth)	Cinder Pool	Cinder Pool	Cinder Pool
Collection Date	9/20/2010	9/20/2010	9/13/2011	9/13/2011	9/13/2011
Collection Time	12:20	11:15	10:30	13:20	15:15
Latitude	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"	44° 43' 56.9"
Longitude	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"	110° 42' 32.4"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	13	---	---
pH	4.13	4.16	4.38	4.37	4.27
Specific Conductance (µS/cm)	2237	2262	2365	2352	2342
Temperature (°C)	---	---	90.6	---	---
Temperature (Flow Cell, °C)	50.9	55.9	55.0	67.6	58.4
Eh (V)	0.116	0.111	0.111	0.062	0.080
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9994	0.9994	0.9994	0.9993
Constituent (mg/L)[1]					
Ca	5.35	5.11	5.42	5.40	5.40
Mg	0.03	0.03	0.023	0.023	0.024
Na	365	369	373	363	368
K	55.9	56.9	51.4	55.1	50.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	---	---	---
Cl	653	649	598	603	598
F	5.6	5.6	5.4	5.4	5.4
Br	1.99	2.04	2.50	1.70	2.30
SO_4	83.0	80.5	54.4	53.0	57.1
S_2O_3	9.9	9.7	18.0	18.8	18.0
S_nO_6 (µM / n)	---	---	11.4 / 4	9.0 / 4	14.9 / 4
H_2S	1.14	1.17	1.72	---	2.48
NO_3	<0.1	<0.1	<0.05	<0.05	<0.05
NH_4	9.4	9.0	5.9	5.6	5.6
SiO_2	364	362	349	333	342
B	9.30	9.37	9.23	9.06	9.21
Al	0.973	0.930	0.712	0.709	0.711
Fe(T)	0.028	0.026	0.014	0.008	0.013
Fe(II)	0.027	0.025	0.014	0.008	0.013
Mn	0.0052	0.0052	0.0046	0.0045	0.0047
Sr	0.018	0.017	0.018	0.018	0.018
Ba	0.020	0.020	0.020	0.020	0.020
Li	4.36	4.41	3.20	3.94	4.03
Rb	0.489	0.491	0.438	0.435	0.449
P	<0.06	<0.06	0.009	0.010	0.007
As(T)	2.68	2.65	2.51	2.49	2.52
As(III)	≥0.897	≥0.890	≥1.86	≥1.31	≥1.62
Hg (ng/L)	14.7	20.9	21.9	22.4	13.2
DOC	1.0	0.8	0.9	1.1	0.8
δD (‰)	-126.05	-126.19	-131.04	-130.49	-132.36
$\delta^{18}O$ (‰)	-10.55	-10.48	-11.16	-12.36	-12.71
Charge Imbalance (%)	-7.7	-6.1	2.5	0.5	1.4
Specific Conductance Balance (%)	4.2	2.9	-7.7	-8.3	-8.0
Sum Cations (meq/L)	18.8	19.0	18.7	18.4	18.5
Sum Anions (meq/L)	20.3	20.2	18.2	18.3	18.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA126	09WA122	10WA125	11WA173	12WA136
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Cinder Pool	Cistern Spring	Cistern Spring	Cistern Spring	Cistern Spring
Collection Date	9/21/2012	9/11/2009	6/4/2010	9/13/2011	9/24/2012
Collection Time	13:00	11:20	13:00	7:40	6:50
Latitude	44° 43' 56.9"	44° 43' 23.3"	44° 43' 23.3"	44° 43' 23.4"	44° 43' 23.4"
Longitude	110° 42' 32.4"	110° 42' 11.3"	110° 42' 11.3"	110° 42' 14.8"	110° 42' 14.8"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	14	---	---	---
pH	4.08	4.80	4.99	4.33	4.70
Specific Conductance (µS/cm)	2351	2023	---	2056	1854
Temperature (°C)	---	83.1	---	80.5	82.0
Temperature (Flow Cell, °C)	72.8	75.1	44.1	72.2	73.6
Eh (V)	0.032	-0.012	---	0.033	0.039
DO (mg/L)	---	<0.05	---	---	---
Density (g/mL at 20°C)	0.9994	0.9995	0.9992	0.9993	0.9993
Constituent (mg/L)[1]					
Ca	5.45	2.12	1.78	2.21	1.69
Mg	0.022	0.08	0.09	0.109	0.040
Na	370	317	289	321	307
K	53.9	54.2	49.0	50.7	37.5
Alkalinity (as HCO_3)	---	3.2	4.3	---	<1
Acidity (mN)	---	---	---	---	---
Cl	615	536	452	502	475
F	4.95	5.6	4.9	5.5	4.96
Br	2.02	1.60	1.63	1.60	1.46
SO_4	86.5	76.9	90.4	77.0	89.5
S_2O_3	5.9	18.9	14.0	9.6	18.7
S_nO_6 (µM / n)	---	---	---	6.9 / 4	---
H_2S	0.575	0.299	0.197	1.04	0.442
NO_3	<0.05	0.09	<0.1	0.20	<0.05
NH_4	8.9	4.2	3.2	3.6	8.8
SiO_2	343	558	427	529	371
B	9.01	8.39	7.18	8.26	8.34
Al	1.19	0.102	0.089	0.078	0.127
Fe(T)	0.026	<0.002	<0.002	<0.002	0.012
Fe(II)	0.026	<0.002	<0.002	<0.002	0.003
Mn	0.0053	0.057	0.058	0.062	0.027
Sr	0.017	0.0072	0.0080	0.0083	0.0060
Ba	0.025	0.016	0.014	0.017	0.013
Li	4.50	4.05	3.43	3.62	3.79
Rb	0.465	0.397	0.356	0.379	0.303
P	<0.2	<0.06	<0.06	0.011	<0.2
As(T)	2.26	1.80	1.38	1.61	1.60
As(III)	2.26	1.65	---	1.61	1.47
Hg (ng/L)	200	102	61.8	128	278
DOC	1.5	1.6	0.6	1.0	0.9
δD (‰)	-125.30	-123.81	-125.07	-124.59	-121.30
$\delta^{18}O$ (‰)	-10.20	-10.03	-11.53	-9.76	-8.27
Charge Imbalance (%)	-1.4	-5.6	-2.4	0.9	-0.3
Specific Conductance Balance (%)	-3.3	-2.3	1.8	-6.8	-0.8
Sum Cations (meq/L)	19.0	16.1	14.6	16.1	15.4
Sum Anions (meq/L)	19.2	17.0	14.9	16.0	15.5

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA113	13WA161	09WA110	10WA197	11WA169
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Cistern Spring (nearly empty, sampled 1 week after Steamboat Geyser eruption)	Cistern Spring	Emerald Spring	Emerald Spring	Emerald Spring
Collection Date	8/7/2013	9/23/2013	9/8/2009	9/21/2010	9/12/2011
Collection Time	9:00	17:45	16:30	11:30	7:40
Latitude	44° 43' 23.4"	44° 43' 23.4"	44° 43' 32.9"	44° 43' 32.9"	44° 43' 32.9"
Longitude	110° 42' 14.8"	110° 42' 14.8"	110° 42' 12.8"	110° 42' 12.8"	110° 42' 12.8"
Map (figure)	5	5	5	5	5
Photograph (appendix)	15	---	16	---	---
pH	4.03	5.49	4.31	3.77	4.74
Specific Conductance (µS/cm)	1615	2031	2251	2074	2244
Temperature (°C)	---	83.1	83.8	83.9	85.5
Temperature (Flow Cell, °C)	53.2	64.0	78.1	75.9	70.8
Eh (V)	---	0.071	-0.038	0.130	0.057
DO (mg/L)	---	---	<0.05	---	---
Density (g/mL at 20°C)	0.9992	0.9992	0.9994	0.9994	0.9995
Constituent (mg/L)[1]					
Ca	2.19	2.29	2.13	2.12	1.87
Mg	0.247	0.091	0.07	0.11	0.056
Na	282	342	358	336	365
K	35.0	55.2	61.2	55.8	61.5
Alkalinity (as HCO_3)	---	10.0	---	---	<2
Acidity (mN)	0.270	---	0.299	---	---
Cl	388	542	596	553	599
F	3.43	5.66	6.6	4.8	6.4
Br	1.21	1.69	1.92	1.69	2.10
SO_4	122	60.4	73.7	126	58.3
S_2O_3	---	18.3	6.2	3.2	10.1
S_nO_6 (µM / n)	---	<0.4 / ---	---	---	2.7 / 4
H_2S	<0.001	1.60	0.768	0.333	0.557
NO_3	<0.05	0.14	0.06	0.08	<0.05
NH_4	8.8	2.9	3.1	7.0	2.9
SiO_2	357	504	578	470	702
B	6.64	8.01	8.99	8.43	9.00
Al	0.390	0.066	0.269	0.575	0.100
Fe(T)	0.084	0.046	0.026	0.064	0.019
Fe(II)	0.076	0.045	0.026	0.064	0.019
Mn	0.187	0.056	0.023	0.033	0.017
Sr	0.0078	0.0091	0.0078	0.0096	0.0076
Ba	0.019	0.020	0.0070	0.011	0.0064
Li	3.05	4.39	4.79	4.29	3.74
Rb	0.325	0.467	0.481	0.441	0.496
P	<0.04	<0.04	0.034	<0.06	0.011
As(T)	1.20	1.67	2.24	1.96	2.23
As(III)	1.20	1.67	1.96	1.90	2.23
Hg (ng/L)	322	10.2	198	159	185
DOC	3.1	1.1	0.9	0.8	0.8
δD (‰)	-126.50	-124.00	-130.07	-122.48	-136.40
$\delta^{18}O$ (‰)	-11.03	-11.28	-11.19	-9.26	-13.14
Charge Imbalance (%)	5.5	1.3	-2.5	-5.2	-0.9
Specific Conductance Balance (%)	3.3	-0.8	-2.9	4.2	-3.2
Sum Cations (meq/L)	14.3	17.2	18.2	17.3	18.3
Sum Anions (meq/L)	13.5	17.0	18.6	18.3	18.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA125	10WA201	10WA199	09WA111	10WA198
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Green Dragon Spring	Green Dragon Spring	Medusa Spring	Minute Geyser	Pearl Geyser
Collection Date	9/12/2009	9/21/2010	9/21/2010	9/9/2009	9/21/2010
Collection Time	14:20	17:00	14:30	11:00	13:35
Latitude	44° 43' 12.4"	44° 43' 12.4"	44° 43' 8.2"	44° 43' 30.5"	44° 43' 20.7"
Longitude	110° 42' 22.9"	110° 42' 22.9"	110° 42' 30.3"	110° 42' 19.5"	110° 42' 23.9"
Map (figure)	5	5	5	5	5
Photograph (appendix)	17	---	18	19	20
pH	2.87	2.90	5.61	7.26	8.02
Specific Conductance (µS/cm)	2346	1684	1507	2065	2496
Temperature (°C)	90.2	90.6	81.5	92.3	88.8
Temperature (Flow Cell, °C)	77.6	68.8	65.5	78.1	72.6
Eh (V)	0.010	0.196	0.050	-0.102	-0.016
DO (mg/L)	---	---	---	0.2	---
Density (g/mL at 20°C)	0.9993	0.9991	0.9991	0.9992	0.9997
Constituent (mg/L)[1]					
Ca	4.01	3.38	2.40	5.18	4.50
Mg	0.26	0.35	0.08	0.06	0.01
Na	269	183	261	344	414
K	67.5	53.4	34.8	42.6	95.5
Alkalinity (as HCO_3)	---	---	7.0	27.2	55.0
Acidity (mN)	2.61	2.67	---	---	---
Cl	488	273	434	592	747
F	6.04	4.32	5.17	6.72	8.5
Br	1.38	0.84	1.34	1.79	2.33
SO_4	202	256	49.9	29.6	28.6
S_2O_3	<0.1	0.2	0.7	0.4	0.3
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.419	0.308	0.354	0.540	0.179
NO_3	0.07	0.03	0.03	0.15	0.05
NH_4	3.9	8.4	2.5	1.2	0.9
SiO_2	551	379	318	483	729
B	6.99	4.64	6.90	8.49	10.4
Al	3.68	3.77	0.029	0.128	0.055
Fe(T)	0.820	1.23	0.010	<0.002	<0.002
Fe(II)	0.820	1.23	0.010	<0.002	<0.002
Mn	0.122	0.190	0.322	0.018	0.020
Sr	0.014	0.012	0.01	0.013	0.016
Ba	0.033	0.043	0.034	0.013	0.0095
Li	3.78	2.17	3.43	4.31	6.61
Rb	0.475	0.366	0.277	0.356	0.755
P	<0.06	<0.06	<0.06	<0.06	<0.06
As(T)	1.77	1.07	1.40	2.03	2.87
As(III)	1.56	1.07	1.32	1.93	2.86
Hg (ng/L)	197	145	53.1	60.4	34.7
DOC	1.3	1.7	0.5	1.6	0.5
δD (‰)	-126.73	-120.89	-130.05	-135.63	-141.74
$\delta^{18}O$ (‰)	-10.51	-9.89	-11.49	-14.38	-15.18
Charge Imbalance (%)	-7.3	-1.5	-5.3	-6.5	-7.2
Specific Conductance Balance (%)	3.1	9.8	5.9	0.0	3.3
Sum Cations (meq/L)	16.1	11.9	13.0	17.0	21.7
Sum Anions (meq/L)	17.3	12.1	13.7	18.1	23.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA112	10WA166	11WA140	11WA171	12WA124
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Perpetual spouter	Perpetual Spouter	Perpetual Spouter	Perpetual Spouter	Perpetual Spouter
Collection Date	6/1/2010	9/16/2010	9/7/2011	9/12/2011	9/21/2012
Collection Time	11:00	10:55	14:00	10:00	11:10
Latitude	44° 43' 35.7"	44° 43' 35.7"	44° 43' 35.7"	44° 43' 35.7"	44° 43' 35.7"
Longitude	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	---	---	---
pH	7.35	7.29	7.43	7.35	7.55
Specific Conductance (µS/cm)	2760	2589	2678	2561	2653
Temperature (°C)	91.5	87.5	90.4	88.7	89.6
Temperature (Flow Cell, °C)	75.2	68.9	79.6	---	84.9
Eh (V)	0.019	-0.120	0.395	---	-0.081
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9995	0.9995	0.9995	0.9994	0.9995
Constituent (mg/L)[1]					
Ca	9.33	9.00	8.78	---	9.03
Mg	0.06	0.06	0.063	---	0.062
Na	439	439	449	---	447
K	51.0	51.3	47.6	---	47.6
Alkalinity (as HCO_3)	15.5	13.0	17.1	---	15.8
Acidity (mN)	---	---	---	---	---
Cl	792	772	720	---	732
F	7.2	7.2	7.1	---	7.03
Br	2.45	2.54	2.30	---	2.39
SO_4	37.1	46.9	36.6	---	40.3
S_2O_3	<0.1	0.2	<0.1	---	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	<0.001	0.068	0.010	---	0.037
NO_3	<0.1	0.08	0.20	---	<0.05
NH_4	0.8	1.6	1.2	---	0.1
SiO_2	290	286	276	---	268
B	11.4	11.0	11.6	---	11.3
Al	0.066	0.122	0.064	---	0.062
Fe(T)	0.028	0.188	0.008	---	0.010
Fe(II)	0.014	0.064	<0.002	---	0.008
Mn	0.034	0.035	0.032	---	0.030
Sr	0.033	0.032	0.031	---	0.031
Ba	0.011	0.014	0.011	---	0.011
Li	5.80	5.80	4.26	---	5.93
Rb	0.451	0.449	0.413	---	0.429
P	<0.06	<0.06	0.026	---	0.029
As(T)	3.19	2.87	3.19	---	3.15
As(III)	0.930	1.81	1.44	---	1.32
Hg (ng/L)	22.0	48.6	30.6	---	20.8
DOC	0.5	0.5	0.8	---	0.8
δD (‰)	-141.41	-140.28	-140.33	---	-139.80
$\delta^{18}O$ (‰)	-14.87	-14.91	-14.20	---	-14.50
Charge Imbalance (%)	-9.2	-7.2	0.3	---	-0.9
Specific Conductance Balance (%)	-3.7	1.7	-5.5	---	-3.6
Sum Cations (meq/L)	21.7	21.8	21.9	---	22.0
Sum Anions (meq/L)	23.8	23.4	21.8	---	22.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA152	10WA115	Y10G026	10WA167	Y10G045
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter
Collection Date	9/23/2013	6/1/2010	7/15/2010	9/16/2010	9/21/2010
Collection Time	10:50	11:20	---	11:30	---
Latitude	44° 43' 35.7"	44° 43' 35.5"	44° 43' 35.5"	44° 43' 35.5"	44° 43' 35.5"
Longitude	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"
Map (figure)	5	5	5	5	5
Photograph (appendix)	21	22	---	---	---
pH	7.41	2.78	2.90	3.03	2.92
Specific Conductance (µS/cm)	2642	1791	1752	1657	1742
Temperature (°C)	89.7	89.0	87.3	88.2	87.8
Temperature (Flow Cell, °C)	79.9	75.2	---	78.6	---
Eh (V)	0.036	0.425	0.470	0.034	0.520
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9991	---	0.9992	---
Constituent (mg/L)[1]					
Ca	9.08	4.00	4.24	3.99	4.31
Mg	0.059	0.49	0.537	0.49	0.550
Na	492	181	185	183	190
K	48.2	69.9	66.0	69.1	66.9
Alkalinity (as HCO_3)	15.5	---	---	---	---
Acidity (mN)	---	2.20	---	---	---
Cl	779	288	284	284	283
F	7.4	0.61	0.37	0.54	0.44
Br	2.42	0.88	0.92	0.92	0.55
SO_4	36.8	227	216	212	218
S_2O_3	<0.05	<0.1	---	<0.1	---
S_nO_6 (µM / n)	<0.4 / ---	---	---	---	---
H_2S	0.370	<0.001	0.017	0.067	0.021
NO_3	<0.05	<0.1	<0.1	0.43	<0.1
NH_4	0.2	2.9	2.3	2.8	2.1
SiO_2	279	454	416	395	415
B	11.4	4.10	4.31	4.21	4.49
Al	0.054	0.590	0.570	0.575	0.590
Fe(T)	0.009	6.77	7.30	7.24	7.17
Fe(II)	<0.002	5.13	7.20	7.21	7.09
Mn	0.032	0.152	0.160	0.156	0.161
Sr	0.031	0.022	0.022	0.022	0.022
Ba	0.011	0.123	0.117	0.123	0.115
Li	5.88	1.33	1.24	1.36	1.28
Rb	0.464	0.312	---	0.315	---
P	<0.04	<0.06	---	<0.06	---
As(T)	3.06	1.06	1.15	1.09	1.07
As(III)	1.52	0.530	0.804	0.750	0.509
Hg (ng/L)	55.3	16.9	---	---	---
DOC	1.2	0.7	---	0.5	---
δD (‰)	-139.80	-137.64	-138.90	-138.37	-136.80
$\delta^{18}O$ (‰)	-14.54	-15.41	-15.50	-15.76	-15.60
Charge Imbalance (%)	2.4	3.0	1.0	-2.3	2.0
Specific Conductance Balance (%)	3.2	5.9	6.0	2.8	6.0
Sum Cations (meq/L)	24.0	12.3	11.9	11.5	12.0
Sum Anions (meq/L)	23.4	11.9	11.7	11.8	11.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA141	12WA125	13WA153	10WA200	11WA170
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Unnamed acid spring south of Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter	Unnamed acid spring south of Perpetual Spouter	Recess Spring	Recess Spring
Collection Date	9/7/2011	9/21/2012	9/23/2013	9/21/2010	9/12/2011
Collection Time	14:40	11:30	11:30	15:45	9:00
Latitude	44° 43' 35.5"	44° 43' 35.5"	44° 43' 35.5"	44° 43' 22.7"	44° 43' 22.7"
Longitude	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.7"	110° 42' 32.9"	110° 42' 32.9"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	---	23	---
pH	2.98	3.00	3.01	3.83	3.60
Specific Conductance (µS/cm)	1734	1749	1821	2296	2358
Temperature (°C)	87.7	88.9	88.4	84.8	89.3
Temperature (Flow Cell, °C)	76.5	84.5	77.5	78.5	76.4
Eh (V)	0.347	0.102	0.474	0.096	0.109
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9992	0.9991	0.9995	0.9995
Constituent (mg/L)[1]					
Ca	3.92	4.15	4.31	6.39	6.43
Mg	0.505	0.548	0.563	0.07	0.069
Na	188	193	216	385	380
K	61.3	59.8	62.0	42.8	41.4
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	2.13	2.60	2.18	---	---
Cl	272	285	337	657	621
F	0.5	0.5	0.66	5.85	8
Br	1.10	0.98	1.00	2.08	2.40
SO_4	205	209	207	98.2	80.7
S_2O_3	<0.1	<0.1	<0.05	2.0	0.8
S_nO_6 (µM / n)	---	---	<0.4 / ---	---	0.9 / 4
H_2S	0.003	0.018	0.572	0.070	0.698
NO_3	<0.05	<0.05	0.26	0.03	<0.05
NH_4	2.9	2.5	3.4	7.3	6.0
SiO_2	363	369	380	404	431
B	4.30	4.22	5.46	9.75	9.36
Al	0.546	0.575	0.575	1.16	1.39
Fe(T)	6.91	7.38	7.67	0.041	0.055
Fe(II)	6.77	7.38	7.41	0.041	0.055
Mn	0.141	0.143	0.150	0.023	0.020
Sr	0.021	0.021	0.022	0.016	0.017
Ba	0.115	0.125	0.130	0.023	0.025
Li	1.01	1.26	1.29	5.31	3.84
Rb	0.283	0.293	0.347	0.395	0.373
P	0.020	<0.2	<0.04	<0.06	0.009
As(T)	1.12	1.14	1.24	2.25	2.51
As(III)	0.543	0.787	0.728	2.25	2.51
Hg (ng/L)	20.8	19.4	45.5	156	147
DOC	0.9	0.6	1.1	0.6	0.7
δD (‰)	-135.98	-137.90	-139.60	-128.15	-131.26
$\delta^{18}O$ (‰)	-14.33	-15.30	-15.44	-10.63	-11.80
Charge Imbalance (%)	2.9	0.5	-2.3	-5.6	-0.4
Specific Conductance Balance (%)	-1.6	-1.4	3.0	4.7	-1.4
Sum Cations (meq/L)	11.6	11.8	12.9	19.5	19.1
Sum Anions (meq/L)	11.3	11.7	13.2	20.6	19.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA172	09WA124	12WA127	09WA113	10WA141
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	Rediscovered Geyser	Steamboat Geyser	"Arsenic Dust"	"Second Erupter"	Tantalus Creek @ weir
Collection Date	9/12/2011	9/12/2009	9/21/2012	9/9/2009	6/8/2010
Collection Time	10:45	12:30	14:40	13:25	11:35
Latitude	44° 43' 38.1"	44° 43' 25.0"	44° 44' 8.4"	44° 43' 20.3"	44° 44' 2.7"
Longitude	110° 42' 20.8"	110° 42' 07.7"	110° 42' 22.5"	110° 42' 24.4"	110° 42' 54.6"
Map (figure)	5	5	5	5	5
Photograph (appendix)	24	25	26	27	28
pH	6.35	6.27	4.03	8.03	2.90
Specific Conductance (µS/cm)	1977	2047	2093	2474	1873
Temperature (°C)	91.3	82.0	88.6	91.2	29.6
Temperature (Flow Cell, °C)	80.7	64.8	82.5	81.7	---
Eh (V)	-0.026	-0.096	0.071	-0.153	---
DO (mg/L)	---	---	---	0.3	---
Density (g/mL at 20°C)	---	0.9993	0.9993	0.9995	---
Constituent (mg/L)[1]					
Ca	2.35	2.80	3.85	4.01	---
Mg	0.0073	0.18	0.254	<0.01	---
Na	347	327	336	366	---
K	24.5	64.3	43.6	88.1	---
Alkalinity (as HCO_3)	9.2	26.4	---	58.9	---
Acidity (mN)	---	---	---	---	---
Cl	546	571	569	665	368
F	6.6	5.72	5.6	6.31	6.6
Br	1.70	1.55	1.83	2.10	1.13
SO_4	28.0	70.3	67.4	22.2	160
S_2O_3	1.5	0.7	<0.1	0.4	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.273	0.297	0.024	0.333	---
NO_3	0.20	0.11	<0.05	0.10	<0.05
NH_4	1.7	1.6	1.6	0.7	---
SiO_2	445	584	224	778	---
B	8.79	8.36	8.29	9.79	---
Al	0.055	0.316	1.36	0.011	---
Fe(T)	<0.002	0.003	1.99	<0.002	---
Fe(II)	<0.002	0.003	1.94	<0.002	---
Mn	0.011	0.057	0.020	0.0080	---
Sr	0.0067	0.011	0.020	0.014	---
Ba	0.0026	0.027	0.214	0.0075	---
Li	3.28	4.18	2.43	5.89	---
Rb	0.287	0.463	0.330	0.703	---
P	0.007	<0.06	<0.2	<0.06	---
As(T)	2.15	1.88	5.39	2.63	---
As(III)	2.15	1.69	3.45	2.42	---
Hg (ng/L)	76.9	153	35.1	30.3	---
DOC	0.7	0.8	0.6	1.0	---
δD (‰)	-138.20	-129.61	-140.80	-143.58	---
$\delta^{18}O$ (‰)	-14.74	-13.90	-14.80	-15.64	---
Charge Imbalance (%)	-0.7	-9.2	-5.9	-7.9	---
Specific Conductance Balance (%)	-2.0	1.3	-2.0	-6.9	---
Sum Cations (meq/L)	16.4	16.7	16.6	19.3	---
Sum Anions (meq/L)	16.5	18.3	17.6	20.9	---

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA150	09WA107	10WA165	09WA126	10WA158
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	"Beowulf Spring"	"Outbreak Spring" - Unnamed spring near Bathtub Spring	"Outbreak Spring" - Unnamed spring near Bathtub Spring	Unnamed pool about 80 m from Green Dragon Spring	"Outhere Spring SE"
Collection Date	9/8/2011	9/8/2009	9/16/2010	9/12/2009	7/28/2010
Collection Time	14:05	10:15	10:00	15:10	12:00
Latitude	44° 43' 53.5"	44° 43' 37.7"	44° 43' 37.8"	44° 43' 12.3"	44° 43' 58.9"
Longitude	110° 42' 37.9"	110° 42' 15.3"	110° 42' 15.3"	110° 42' 22.3"	110° 42' 26.2"
Map (figure)	5	5	5	5	5
Photograph (appendix)	29	30	---	31	32
pH	2.93	6.57	5.64	2.72	5.85
Specific Conductance (µS/cm)	2050	2105	2136	2702	1958
Temperature (°C)	74.5	89.2	94.3	77.6	94.0
Temperature (Flow Cell, °C)	67.6	79.4	74.2	70.1	77.5
Eh (V)	0.213	-0.113	-0.117	0.022	---
DO (mg/L)	---	---	---	0.8	---
Density (g/mL at 20°C)	0.9992	0.9992	0.9994	0.9993	0.9993
Constituent (mg/L)[1]					
Ca	3.70	0.96	1.23	3.82	2.58
Mg	0.163	<0.01	0.01	0.18	0.08
Na	247	348	369	281	313
K	42.0	37.7	38.0	69.0	75.5
Alkalinity (as HCO_3)	---	22.0	1.0	---	4.0
Acidity (mN)	---	---	---	2.65	---
Cl	384	547	615	503	572
F	2.8	6.3	7.5	5.84	5
Br	1.50	1.80	2.01	2.37	1.80
SO_4	149	23.6	62.2	193	56.9
S_2O_3	<0.1	1.8	<0.1	<0.1	0.3
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.911	0.253	0.070	0.248	---
NO_3	<0.05	<0.05	0.08	0.05	<0.1
NH_4	1.8	1.4	5.4	2.6	0.5
SiO_2	301	546	453	555	463
B	6.02	9.06	9.78	7.36	7.96
Al	3.06	0.042	0.085	2.67	0.782
Fe(T)	1.67	<0.002	0.037	0.596	0.226
Fe(II)	---	<0.002	0.036	0.593	0.223
Mn	0.025	0.0019	0.0095	0.098	0.017
Sr	0.014	0.0038	0.0064	0.013	0.014
Ba	0.113	0.019	0.011	0.023	0.092
Li	2.51	4.30	4.66	4.08	4.79
Rb	0.352	0.312	0.318	0.506	0.571
P	0.013	<0.06	<0.06	<0.06	<0.06
As(T)	2.20	2.20	2.34	1.82	2.13
As(III)	1.91	2.12	1.91	1.07	2.06
Hg (ng/L)	73.0	90.9	48.8	134	22.7
DOC	1.0	0.8	0.8	1.2	---
δD (‰)	-140.49	-137.59	-127.42	-129.04	-144.14
$\delta^{18}O$ (‰)	-15.42	-14.54	-13.50	-10.77	-15.88
Charge Imbalance (%)	3.8	1.3	-5.5	-2.5	-7.2
Specific Conductance Balance (%)	-1.9	-6.7	2.7	-1.3	3.8
Sum Cations (meq/L)	14.0	16.9	18.1	17.2	16.4
Sum Anions (meq/L)	13.5	16.7	19.1	17.6	17.6

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA196	11WA151	12WA128	13WA154	10WA157
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	"Outhere Spring SE"	"Outhere Spring SE"	"Outhere Spring SE"	"Outhere Spring SE"	"Outhere Spring NW"
Collection Date	9/21/2010	9/8/2011	9/21/2012	9/23/2013	7/28/2010
Collection Time	10:30	14:45	15:40	13:40	11:00
Latitude	44° 43' 58.9"	44° 43' 58.9"	44° 43' 58.9"	44° 43' 58.9"	44° 43' 59.0"
Longitude	110° 42' 26.2"	110° 42' 26.2"	110° 42' 26.2"	110° 42' 26.2"	110° 42' 26.3"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	---	---	33
pH	3.80	5.54	6.75	5.26	7.30
Specific Conductance (µS/cm)	1876	2155	2188	2118	2103
Temperature (°C)	90.7	86.3	88.0	80.5	82.5
Temperature (Flow Cell, °C)	75.6	78.4	78.5	66.9	75.0
Eh (V)	0.172	0.075	-0.069	0.125	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9992	0.9993	0.9995	0.9993	0.9994
Constituent (mg/L)[1]					
Ca	3.21	2.88	2.43	2.71	2.44
Mg	0.18	0.101	0.031	0.090	0.04
Na	296	327	345	347	337
K	66.5	72.7	79.1	73.7	80.5
Alkalinity (as HCO_3)	---	6.1	25.5	1.0	21.0
Acidity (mN)	---	---	---	---	---
Cl	523	545	620	575	623
F	2.8	5	5.72	4.48	5.6
Br	1.59	2.60	1.98	1.75	1.95
SO_4	93.0	54.0	36.0	61.0	39.5
S_2O_3	0.1	<0.1	0.8	0.4	0.2
S_nO_6 (µM / n)	---	---	---	<0.4 / ---	---
H_2S	0.139	0.191	0.139	0.734	---
NO_3	2.05	<0.05	<0.05	<0.05	<0.1
NH_4	1.4	1.3	0.3	0.6	---
SiO_2	331	521	554	471	547
B	7.12	8.37	8.52	8.31	8.71
Al	2.29	1.25	0.209	1.08	0.380
Fe(T)	1.07	0.512	0.012	0.269	0.076
Fe(II)	1.07	---	0.009	0.266	0.058
Mn	0.036	0.018	0.0082	0.018	0.011
Sr	0.021	0.017	0.013	0.015	0.013
Ba	0.178	0.101	0.092	0.110	0.076
Li	4.10	3.73	5.62	5.03	5.37
Rb	0.488	0.547	0.635	0.630	0.643
P	<0.06	0.011	0.006	<0.04	<0.06
As(T)	1.59	2.41	2.59	2.29	2.34
As(III)	1.56	2.23	2.45	2.29	1.46
Hg (ng/L)	---	43.7	36.6	21.7	30.0
DOC	1.2	0.8	0.6	1.1	---
δD (‰)	-137.78	-140.48	-144.10	-140.20	-143.78
$\delta^{18}O$ (‰)	-14.91	-15.05	-15.40	-14.97	-15.60
Charge Imbalance (%)	-5.8	0.5	-5.4	1.5	-7.9
Specific Conductance Balance (%)	5.4	-7.3	-0.3	-0.8	3.1
Sum Cations (meq/L)	15.7	16.9	18.0	17.9	17.6
Sum Anions (meq/L)	16.7	16.8	19.0	17.7	19.1

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA195	11WA152	12WA129	13WA155	12WA130
Area	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin	Norris Geyser Basin
Name and Description	"Outhere Spring NW"	"Outhere Spring NW"	"Outhere Spring NW"	"Outhere Spring NW"	Unnamed spring
Collection Date	9/20/2010	9/8/2011	9/21/2012	9/23/2013	9/21/2012
Collection Time	16:45	15:15	15:55	14:25	16:30
Latitude	44° 43' 59.0"	44° 43' 59.0"	44° 43' 59.0"	44° 43' 59.0"	44° 43' 57.9"
Longitude	110° 42' 26.3"	110° 42' 26.3"	110° 42' 26.3"	110° 42' 26.3"	110° 42' 32.2"
Map (figure)	5	5	5	5	5
Photograph (appendix)	---	---	---	---	34
pH	3.73	7.25	7.82	6.83	3.29
Specific Conductance (µS/cm)	2056	2259	2250	2220	1920
Temperature (°C)	73.8	78.1	81.3	69.9	88.8
Temperature (Flow Cell, °C)	65.4	71.6	72.5	60.9	81.1
Eh (V)	0.000	0.044	-0.078	0.102	0.045
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	0.9995	0.9995	0.9994	0.9993
Constituent (mg/L)[1]					
Ca	3.21	2.59	2.37	2.55	3.15
Mg	0.17	0.061	0.017	0.059	0.198
Na	304	343	342	354	275
K	68.7	78.5	83.6	77.1	56.1
Alkalinity (as HCO_3)	---	20.9	34.4	13.3	---
Acidity (mN)	---	---	---	---	1.57
Cl	537	574	637	594	455
F	4.58	5.5	5.86	5.55	2.9
Br	1.70	1.80	2.00	1.92	1.44
SO_4	90.7	39.4	29.0	46.8	124
S_2O_3	0.1	<0.1	0.6	0.2	<0.1
S_nO_6 (µM / n)	---	---	---	<0.4 / ---	---
H_2S	0.195	0.001	0.136	0.729	1.14
NO_3	<0.1	<0.05	<0.05	<0.05	<0.05
NH_4	1.4	1.1	0.1	0.4	1.5
SiO_2	350	599	586	537	323
B	7.48	8.64	8.84	8.87	6.67
Al	2.21	0.721	0.109	0.630	2.17
Fe(T)	0.988	0.358	0.006	0.140	1.09
Fe(II)	0.988	---	0.004	0.140	1.05
Mn	0.036	0.014	0.0042	0.016	0.056
Sr	0.020	0.014	0.012	0.013	0.013
Ba	0.177	0.085	0.086	0.095	0.108
Li	4.33	3.97	5.93	5.30	3.56
Rb	0.512	0.591	0.656	0.663	0.411
P	<0.06	0.006	0.010	<0.04	<0.2
As(T)	1.72	2.56	2.51	2.38	1.25
As(III)	1.52	1.59	1.69	2.29	1.09
Hg (ng/L)	22.6	36.3	24.6	55.9	87.9
DOC	0.9	1.6	0.6	1.3	1.2
δD (‰)	-136.90	-141.55	-144.30	-142.60	-134.90
$\delta^{18}O$ (‰)	-14.47	-15.13	-15.50	-15.46	-13.60
Charge Imbalance (%)	-4.7	0.1	-8.0	0.5	-2.3
Specific Conductance Balance (%)	-1.4	-7.9	-2.4	-3.4	1.2
Sum Cations (meq/L)	16.2	17.7	18.0	18.3	14.9
Sum Anions (meq/L)	17.0	17.7	19.5	18.2	15.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA105	10WA111	Y10G022	10WA160	10WA169
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"
Collection Date	9/7/2009	5/31/2010	7/15/2010	7/28/2010	9/16/2010
Collection Time	14:30	15:00	---	15:30	13:20
Latitude	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"
Longitude	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	35	---	---	---	---
pH	2.48	4.35	5.27	5.50	3.28
Specific Conductance (µS/cm)	3500	2462	2453	2406	2458
Temperature (°C)	76.8	82.6	83.7	88.0	80.3
Temperature (Flow Cell, °C)	69.5	73.1	---	76.5	71.5
Eh (V)	0.097	0.296	0.060	---	-0.008
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	0.9994	---	0.9995	0.9994
Constituent (mg/L)[1]					
Ca	5.22	5.53	5.76	5.87	5.87
Mg	0.05	<0.01	0.004	<0.01	0.02
Na	337	405	443	428	389
K	26.2	30.7	31.0	32.0	31.2
Alkalinity (as HCO_3)	---	---	---	3.0	---
Acidity (mN)	5.28	0.285	---	---	---
Cl	540	693	727	729	669
F	4.56	6.25	3.6	6.09	5.52
Br	1.80	2.07	2.44	2.36	2.16
SO_4	277	44.4	40.6	33.9	90.4
S_2O_3	0.4	2.0	---	2.5	14.7
S_nO_6 (µM / n)	1.7 / 6	---	---	---	---
H_2S	0.189	0.347	0.348	---	0.092
NO_3	0.09	<0.1	<0.1	<0.1	<0.1
NH_4	5.3	1.6	1.4	1.0	4.1
SiO_2	356	391	383	298	337
B	8.61	10.2	10.9	10.1	10.2
Al	4.48	0.723	0.330	0.294	2.68
Fe(T)	0.485	0.042	0.049	0.014	0.171
Fe(II)	0.471	0.006	0.049	0.014	0.171
Mn	0.015	0.0050	0.005	0.0068	0.012
Sr	0.014	0.012	0.013	0.013	0.015
Ba	0.037	0.025	0.016	0.030	0.112
Li	4.14	5.37	6.22	5.71	5.11
Rb	0.217	0.279	---	0.297	0.276
P	<0.06	<0.06	---	<0.06	<0.06
As(T)	2.34	2.80	2.87	2.86	2.75
As(III)	1.12	2.46	2.87	2.86	2.75
Hg (ng/L)	304	94.9	---	87.9	638
DOC	1.8	0.5	---	---	0.9
δD (‰)	-122.09	-136.76	-135.50	-136.12	-127.33
$\delta^{18}O$ (‰)	-8.02	-13.47	-13.40	-13.60	-10.50
Charge Imbalance (%)	3.7	-5.3	-1.0	-4.9	-4.6
Specific Conductance Balance (%)	-0.4	-3.6	2.0	2.8	2.7
Sum Cations (meq/L)	20.5	19.6	21.3	20.6	19.7
Sum Anions (meq/L)	19.7	20.7	21.5	21.7	20.6

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G042	11WA146	11WA165	12WA137	13WA112
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"	"Crystal Sister - East"
Collection Date	9/20/2010	9/8/2011	9/11/2011	9/24/2012	8/6/2013
Collection Time	---	11:15	10:38	11:15	12:20
Latitude	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"	44° 43' 43.4"
Longitude	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"	110° 42' 40.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	36	---
pH	3.33	5.74	5.75	6.11	5.77
Specific Conductance (µS/cm)	2469	2516	2474	2477	2498
Temperature (°C)	82.2	80.8	81.0	76.3	73.6
Temperature (Flow Cell, °C)	---	72.4	72.0	72.1	67.5
Eh (V)	0.260	0.030	0.033	0.000	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9994	0.9994	0.9994	0.9994
Constituent (mg/L)[1]					
Ca	5.88	5.61	5.63	6.04	6.32
Mg	0.016	0.009	0.005	0.004	0.003
Na	422	414	410	436	451
K	30.6	31.9	29.0	31.3	30.1
Alkalinity (as HCO_3)	---	10.7	10.1	11.5	6.3
Acidity (mN)	---	---	---	---	---
Cl	684	665	665	713	687
F	3.6	6.2	6.2	5.87	6.16
Br	2.01	1.90	2.00	2.25	2.21
SO_4	80.9	29.4	26.3	30.2	29.1
S_2O_3	---	2.5	3.2	19.3	---
S_nO_6 (µM / n)	---	0.3 / 4	0.1 / 4	---	---
H_2S	0.125	0.003	0.611	0.089	0.136
NO_3	<0.1	<0.05	<0.05	<0.05	<0.05
NH_4	2.9	1.7	1.5	0.3	<0.3
SiO_2	354	383	426	369	423
B	10.6	10.2	9.97	10.5	9.75
Al	2.51	0.145	0.147	0.154	0.169
Fe(T)	0.145	0.010	0.011	0.007	0.008
Fe(II)	0.144	---	0.011	0.005	0.006
Mn	0.008	0.0055	0.0050	0.0049	0.0061
Sr	0.014	0.012	0.012	0.014	0.014
Ba	0.113	0.0083	0.0084	0.0070	0.029
Li	5.55	4.12	4.01	5.83	5.66
Rb	---	0.270	0.267	0.300	0.342
P	---	0.046	0.037	0.033	<0.04
As(T)	2.78	2.79	2.76	2.83	2.82
As(III)	2.75	2.79	2.76	1.73	1.89
Hg (ng/L)	---	126	136	43.7	64.9
DOC	---	0.5	0.6	0.4	0.8
δD (‰)	-127.20	-136.44	-137.24	-139.20	-138.40
$\delta^{18}O$ (‰)	-10.60	-13.72	-13.12	-14.40	-14.21
Charge Imbalance (%)	1.0	-0.4	-1.5	-1.6	5.7
Specific Conductance Balance (%)	5.0	-8.0	-7.2	-1.1	-3.3
Sum Cations (meq/L)	21.0	19.8	19.5	20.9	21.6
Sum Anions (meq/L)	20.9	19.9	19.8	21.3	20.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA115	09WA106	10WA110	Y10G021	10WA159
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Crystal Sister - East"	"Crystal Sister - West"	"Crystal Sister - West"	"Crystal Sister - West"	"Crystal Sister - West"
Collection Date	9/19/2013	9/7/2009	5/31/2010	7/15/2010	7/28/2010
Collection Time	12:40	16:40	14:30	---	14:25
Latitude	44° 43' 43.4"	44° 43' 43.5"	44° 43' 43.5"	44° 43' 43.5"	44° 43' 43.5"
Longitude	110° 42' 40.0"	110° 42' 40.2"	110° 42' 40.2"	110° 42' 40.2"	110° 42' 40.2"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	35	---	---	---
pH	5.11	3.61	2.41	2.32	2.44
Specific Conductance (µS/cm)	2444	2599	3770	4134	3727
Temperature (°C)	81.4	---	78.4	80.8	81.1
Temperature (Flow Cell, °C)	74.0	67.2	62.5	---	76.1
Eh (V)	0.142	0.018	0.416	0.570	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9994	0.9995	---	0.9996
Constituent (mg/L)[1]					
Ca	6.11	6.37	4.75	5.46	5.37
Mg	0.014	<0.01	0.03	0.107	0.03
Na	443	411	331	393	394
K	29.0	29.8	28.6	28.8	31.2
Alkalinity (as HCO_3)	2.8	---	---	---	---
Acidity (mN)	---	0.729	6.28	---	---
Cl	666	678	569	636	653
F	6.64	5.92	5.68	1.9	5.05
Br	2.35	2.22	1.80	2.11	2.10
SO_4	33.1	53.2	342	376	276
S_2O_3	2.8	14.7	0.2	---	47.0
S_nO_6 (µM / n)	1.1 / 3	6.0 / 5	---	---	---
H_2S	0.003	0.414	0.033	0.045	---
NO_3	<0.05	<0.05	<0.1	<0.1	<0.1
NH_4	0.9	3.3	4.6	3.9	6.2
SiO_2	354	376	325	348	334
B	9.67	10.5	8.44	9.85	9.50
Al	0.418	1.92	2.88	3.61	3.89
Fe(T)	0.124	0.033	0.181	0.389	0.149
Fe(II)	0.124	0.033	0.089	0.193	0.149
Mn	0.0089	0.0075	0.013	0.018	0.013
Sr	0.014	0.014	0.012	0.014	0.014
Ba	0.013	0.016	0.025	0.030	0.031
Li	5.32	5.25	4.30	5.54	5.09
Rb	0.334	0.278	0.233	---	0.266
P	<0.04	<0.06	<0.06	---	<0.06
As(T)	2.79	2.95	2.43	2.56	2.64
As(III)	2.79	2.82	0.710	0.309	2.64
Hg (ng/L)	97.9	71.2	125	---	144
DOC	1.6	1.7	0.7	---	---
δD (‰)	-133.50	-124.56	-130.09	-128.50	-129.29
$\delta^{18}O$ (‰)	-12.40	-9.64	-9.31	-8.60	-8.41
Charge Imbalance (%)	7.1	-0.5	-3.1	-1.0	3.8
Specific Conductance Balance (%)	-3.1	-5.9	2.1	5.0	4.8
Sum Cations (meq/L)	21.2	20.2	20.8	24.7	23.6
Sum Anions (meq/L)	19.7	20.3	21.5	24.8	22.8

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA168	11WA145	11WA166	12WA138	13WA111
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Crystal Sister - West"	"Crystal Sister - West"	"Crystal Sister - West"	"Crystal Sister - West"	"Crystal Sister - West"
Collection Date	9/16/2010	9/8/2011	9/11/2011	9/24/2012	8/6/2013
Collection Time	12:50	10:40	14:00	11:40	12:00
Latitude	44° 43' 43.5"	44° 43' 43.5"	44° 43' 43.5"	44° 43' 43.5"	44° 43' 43.5"
Longitude	110° 42' 40.2"	110° 42' 40.2"	110° 42' 40.2"	110° 42' 40.2"	110° 42' 40.2"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	37	---
pH	2.36	2.49	2.42	2.52	2.72
Specific Conductance (µS/cm)	3835	3263	3456	2925	2913
Temperature (°C)	78.5	82.9	80.6	82.6	78.5
Temperature (Flow Cell, °C)	71.4	74.2	68.8	78.1	69.0
Eh (V)	0.035	0.408	0.429	0.189	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9995	0.9994	---	0.9993	0.9994
Constituent (mg/L)[1]					
Ca	5.08	4.12	---	3.53	5.21
Mg	0.06	0.055	---	0.025	0.028
Na	321	304	---	257	396
K	27.4	25.2	---	22.8	31.8
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	---	5.72	3.30
Cl	538	473	---	425	576
F	1.89	3.9	---	2.5	2.83
Br	1.70	1.90	---	1.40	1.99
SO_4	434	301	---	294	193
S_2O_3	9.0	2.2	1.9	0.7	---
S_nO_6 (µM / n)	57.1 / 5	6.1 / 4	8.5 / 5	---	---
H_2S	0.692	0.310	0.456	0.209	0.055
NO_3	<0.1	<0.05	---	<0.05	<0.05
NH_4	6.7	4.4	---	4.3	1.1
SiO_2	275	270	---	225	323
B	8.14	7.35	---	6.19	7.50
Al	5.12	3.62	---	3.46	2.96
Fe(T)	0.274	0.338	---	0.162	0.221
Fe(II)	0.271	---	---	0.156	0.209
Mn	0.016	0.013	---	0.0074	0.0096
Sr	0.013	0.012	---	0.011	0.013
Ba	0.031	0.034	---	0.048	0.049
Li	4.22	2.79	---	3.32	4.65
Rb	0.224	0.264	---	0.238	0.291
P	<0.06	0.054	---	0.029	<0.04
As(T)	2.12	1.89	---	1.74	2.45
As(III)	2.12	1.89	---	1.74	2.45
Hg (ng/L)	641	355	---	398	322
DOC	1.6	1.7	---	1.1	1.7
δD (‰)	-123.22	-129.34	---	-131.60	-130.70
$\delta^{18}O$ (‰)	-7.96	-8.27	---	-8.80	-8.54
Charge Imbalance (%)	-2.9	3.0	---	-2.3	8.4
Specific Conductance Balance (%)	7.0	0.1	---	2.3	3.1
Sum Cations (meq/L)	21.1	18.6	---	16.3	21.3
Sum Anions (meq/L)	21.8	18.0	---	16.6	19.6

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA114	10WA122	09WA115	10WA121	Y10G025
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Crystal Sister - West"	"Red Growler"	"Kaolin Spring"	"Kaolin Spring"	"Kaolin Spring"
Collection Date	9/19/2013	6/2/2010	9/9/2009	6/2/2010	7/15/2010
Collection Time	11:45	14:45	16:25	14:15	---
Latitude	44° 43' 43.5"	44° 43' 42.1"	44° 43' 41.7"	44° 43' 41.8"	44° 43' 41.8"
Longitude	110° 42' 40.2"	110° 42' 44.2"	110° 42' 44.6"	110° 42' 44.7"	110° 42' 44.7"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	38	---	---	---
pH	2.90	2.92	2.59	2.54	2.49
Specific Conductance (µS/cm)	1659	1223	1753	1696	1756
Temperature (°C)	83.9	92.8	68.0	63.5	66.4
Temperature (Flow Cell, °C)	77.0	60.3	63.5	48.8	---
Eh (V)	0.548	0.354	0.062	0.650	0.540
DO (mg/L)	---	---	<0.05	---	---
Density (g/mL at 20°C)	0.9988	0.9989	0.9988	0.9987	---
Constituent (mg/L)[1]					
Ca	2.97	5.38	3.49	2.05	2.00
Mg	0.161	0.64	0.52	0.37	0.394
Na	183	99.5	59.4	35.2	33.4
K	15.4	51.2	25.0	12.8	12.4
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	2.89	2.17	4.19	5.03	---
Cl	233	128	90.4	49.4	41.6
F	1.53	1.27	0.67	0.46	0.52
Br	0.94	0.38	0.61	0.14	0.15
SO_4	173	230	248	285	299
S_2O_3	0.8	<0.1	<0.1	<0.1	---
S_nO_6 (µM / n)	2.3 / 5	---	---	---	---
H_2S	0.002	<0.001	0.590	<0.001	0.020
NO_3	<0.05	<0.1	0.09	<0.1	<0.1
NH_4	3.0	1.9	1.3	1.2	0.8
SiO_2	157	407	293	247	266
B	3.59	1.83	1.29	0.74	0.66
Al	3.03	1.25	4.49	7.62	5.54
Fe(T)	1.23	12.0	6.42	4.68	5.31
Fe(II)	1.22	11.9	6.42	4.33	5.24
Mn	0.017	0.120	0.090	0.049	0.054
Sr	0.01	0.027	0.014	0.0092	0.009
Ba	0.061	0.069	0.069	0.049	0.055
Li	2.16	1.25	0.655	0.425	0.415
Rb	0.166	0.217	0.134	0.069	---
P	0.090	<0.06	<0.06	<0.06	---
As(T)	1.03	0.491	0.282	0.156	0.222
As(III)	1.03	0.434	0.163	0.065	0.169
Hg (ng/L)	322	21.3	378	---	---
DOC	---	1.1	1.2	1.5	---
δD (‰)	-128.50	-131.98	-129.35	-130.72	-127.90
$\delta^{18}O$ (‰)	-7.98	-14.02	-10.18	-12.22	-9.70
Charge Imbalance (%)	9.8	5.8	3.7	-1.8	-9.0
Specific Conductance Balance (%)	-4.0	8.4	-3.2	1.7	0.0
Sum Cations (meq/L)	10.6	7.88	6.83	5.80	5.99
Sum Anions (meq/L)	9.59	7.44	6.58	5.90	6.55

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA172	11WA144	12WA141	13WA142	09WA102
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Kaolin Spring"	"Kaolin Spring"	"Kaolin Spring"	"Kaolin Spring"	"Lifeboat Spring"
Collection Date	9/16/2010	9/7/2011	9/24/2012	9/20/2013	9/7/2009
Collection Time	15:10	16:30	14:00	15:45	10:42
Latitude	44° 43' 41.8"	44° 43' 41.8"	44° 43' 41.8"	44° 43' 41.8"	44° 43' 39.8"
Longitude	110° 42' 44.7"	110° 42' 44.7"	110° 42' 44.7"	110° 42' 44.7"	110° 42' 49.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	39	---	---
pH	2.35	2.40	2.40	2.41	3.67
Specific Conductance (µS/cm)	2293	1981	1965	2103	2364
Temperature (°C)	58.4	63.9	63.4	65.7	51.0
Temperature (Flow Cell, °C)	54.5	55.4	53.8	61.0	57.0
Eh (V)	0.045	0.462	0.209	0.443	0.168
DO (mg/L)	---	---	---	---	3.2
Density (g/mL at 20°C)	0.9990	0.9987	0.9987	0.9989	0.9994
Constituent (mg/L)[1]					
Ca	1.22	0.92	0.39	2.93	6.05
Mg	0.27	0.242	0.117	1.31	0.09
Na	18.4	6.11	2.00	3.15	367
K	7.12	5.40	2.72	6.42	66.0
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	8.94	6.95	6.70	10.9	0.657
Cl	19.1	3.6	1.6	3.1	627
F	1	0.7	<0.05	1.21	5.91
Br	0.08	<0.05	<0.05	<0.04	2.05
SO_4	454	334	320	508	72.2
S_2O_3	<0.1	<0.1	<0.1	<0.05	<0.1
S_nO_6 (µM / n)	---	---	---	<0.4 / ---	---
H_2S	0.897	<0.001	0.060	0.224	<0.001
NO_3	<0.1	0.20	<0.05	<0.05	0.08
NH_4	0.6	0.4	<0.1	1.4	1.3
SiO_2	227	201	151	158	438
B	0.32	0.055	0.010	0.07	8.75
Al	18.2	10.8	8.10	31.1	1.00
Fe(T)	8.49	3.66	1.52	18.3	0.741
Fe(II)	8.36	3.66	1.48	18.2	0.627
Mn	0.031	0.028	0.014	0.085	0.019
Sr	0.0057	0.0061	0.0040	0.020	0.015
Ba	0.045	0.036	0.036	0.027	0.053
Li	0.232	0.043	0.013	0.015	5.64
Rb	0.044	0.0320	0.0197	0.040	0.479
P	<0.06	<0.05	<0.2	0.250	<0.06
As(T)	0.180	0.064	0.024	0.131	1.86
As(III)	0.130	≥0.030	0.019	0.103	0.035
Hg (ng/L)	264	60.2	54.5	83.9	29.8
DOC	1.4	1.6	1.6	---	1.8
δD (‰)	-121.86	-119.74	-123.60	-115.20	-139.15
$\delta^{18}O$ (‰)	-7.39	-5.92	-6.20	-4.78	-14.10
Charge Imbalance (%)	0.9	8.8	1.9	2.0	-1.1
Specific Conductance Balance (%)	0.1	8.5	7.2	6.7	-2.0
Sum Cations (meq/L)	7.26	5.53	5.00	7.02	19.1
Sum Anions (meq/L)	7.19	5.06	4.91	6.88	19.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA118	Y10G001	10WA170	11WA143	12WA139
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"
Collection Date	6/2/2010	6/16/2010	9/16/2010	9/7/2011	9/24/2012
Collection Time	11:35	---	14:10	16:00	12:45
Latitude	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"
Longitude	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	---	41
pH	3.38	3.42	2.56	3.40	3.55
Specific Conductance (µS/cm)	2252	2320	2899	2456	2211
Temperature (°C)	58.0	58.6	56.6	57.5	58.2
Temperature (Flow Cell, °C)	50.7	---	52.2	48.9	52.5
Eh (V)	0.605	---	0.155	0.592	0.305
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	---	1.0052	0.9994	0.9994
Constituent (mg/L)[1]					
Ca	5.40	5.67	4.68	5.72	5.46
Mg	0.12	0.085	0.17	0.067	0.070
Na	313	382	282	363	354
K	56.9	57.1	51.7	60.6	58.8
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	1.07	---	---	0.840	1.14
Cl	566	615	461	608	615
F	3.43	3.3	2.28	9.4	4.3
Br	1.68	2.08	1.48	1.70	1.93
SO_4	94.5	84.5	319	74.6	75.5
S_2O_3	<0.1	---	0.2	<0.1	2.9
S_nO_6 (µM / n)	---	---	---	---	28.0 / 3
H_2S	<0.001	---	0.069	<0.001	0.012
NO_3	<0.1	<0.1	<0.1	<0.05	<0.05
NH_4	1.0	1.0	1.1	1.3	0.6
SiO_2	420	479	373	464	413
B	7.92	9.25	6.63	9.02	8.57
Al	2.25	0.950	2.56	0.852	0.906
Fe(T)	1.29	1.13	13.6	0.988	0.683
Fe(II)	1.14	0.699	9.47	0.582	0.372
Mn	0.022	0.020	0.033	0.018	0.018
Sr	0.013	0.013	0.014	0.013	0.014
Ba	0.045	0.044	0.074	0.037	0.044
Li	4.74	5.62	3.98	4.15	5.56
Rb	0.437	---	0.348	0.456	0.471
P	<0.06	---	<0.06	0.029	<0.2
As(T)	1.51	1.46	2.39	1.75	1.52
As(III)	---	---	0.210	0.034	0.036
Hg (ng/L)	39.3	---	76.0	19.9	15.1
DOC	1.3	---	0.9	0.6	0.5
δD (‰)	-137.97	-138.60	-130.53	-139.26	-139.20
$\delta^{18}O$ (‰)	-14.27	-13.80	-10.98	-13.40	-13.80
Charge Imbalance (%)	-7.0	3.0	-2.7	0.1	-3.4
Specific Conductance Balance (%)	-3.5	2.0	6.1	-5.3	3.2
Sum Cations (meq/L)	16.7	19.7	18.0	18.8	18.4
Sum Anions (meq/L)	17.9	19.1	18.4	18.8	19.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA117	13WA118	13WA119	13WA121	13WA116
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"
Collection Date	9/19/2013	9/19/2013	9/19/2013	9/19/2013	9/19/2013
Collection Time	14:20	14:50	15:15	16:15	13:45
Latitude	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"
Longitude	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	---	---
pH	3.25	3.25	3.27	3.28	3.26
Specific Conductance (µS/cm)	2162	2154	2155	2163	2154
Temperature (°C)	55.9	56.5	57.2	57.0	56.6
Temperature (Flow Cell, °C)	---	50.0	49.3	47.5	50.3
Eh (V)	---	0.576	0.580	0.563	0.546
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9992	0.9993	0.9993	0.9993	0.9992
Constituent (mg/L)[1]					
Ca	5.33	5.39	5.36	5.40	5.38
Mg	0.179	0.183	0.175	0.171	0.175
Na	324	321	329	327	328
K	52.4	52.0	52.5	51.5	52.6
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	1.46	1.50	1.48	1.39	1.43
Cl	492	490	499	498	493
F	3.32	3.3	3.31	3.28	3.37
Br	1.74	1.72	1.73	1.66	1.76
SO_4	98.4	100	98.0	95.6	96.4
S_2O_3	<0.05	<0.05	<0.05	<0.05	<0.05
S_nO_6 (µM / n)	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---
H_2S	<0.001	<0.001	<0.001	<0.001	<0.001
NO_3	0.06	<0.05	0.07	<0.05	0.07
NH_4	0.7	0.8	0.7	0.8	0.7
SiO_2	384	378	381	384	357
B	7.45	7.18	7.30	7.19	7.61
Al	3.03	3.00	2.98	2.90	2.98
Fe(T)	4.85	4.73	4.53	4.44	4.59
Fe(II)	4.47	4.49	4.29	4.16	4.35
Mn	0.035	0.037	0.034	0.033	0.034
Sr	0.014	0.014	0.014	0.014	0.014
Ba	0.046	0.056	0.041	0.061	0.049
Li	4.63	4.56	4.67	4.62	4.68
Rb	0.481	0.480	0.479	0.481	0.477
P	<0.04	<0.04	<0.04	<0.04	<0.04
As(T)	4.34	4.25	4.15	4.31	4.23
As(III)	0.075	0.067	0.065	0.061	0.076
Hg (ng/L)	31.8	36.8	29.1	31.2	22.3
DOC	3.5	3.4	3.4	3.6	3.6
δD (‰)	-133.60	-133.70	-132.00	-133.10	-131.90
$\delta^{18}O$ (‰)	-13.34	-13.37	-13.63	-13.89	-13.77
Charge Imbalance (%)	9.2	8.2	8.7	8.4	9.8
Specific Conductance Balance (%)	-2.5	-2.6	-1.6	-2.7	-2.0
Sum Cations (meq/L)	17.4	17.2	17.5	17.4	17.5
Sum Anions (meq/L)	15.9	15.9	16.1	16.0	15.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA168	13WA169	13WA170	13WA171	13WA172
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"	"Lifeboat Spring"
Collection Date	9/24/2013	9/24/2013	9/24/2013	9/24/2013	9/24/2013
Collection Time	11:05	11:40	13:05	13:30	13:55
Latitude	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"	44° 43' 39.8"
Longitude	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"	110° 42' 49.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	---	42
pH	3.34	3.34	3.32	3.30	3.32
Specific Conductance (µS/cm)	2397	2389	2404	2382	2402
Temperature (°C)	54.4	55.0	53.0	52.4	52.5
Temperature (Flow Cell, °C)	46.9	47.5	44.6	44.8	44.1
Eh (V)	0.586	0.588	0.583	0.591	0.592
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9993	0.9994	0.9994	0.9993
Constituent (mg/L)[1]					
Ca	5.54	5.81	5.79	5.77	5.81
Mg	0.090	0.094	0.097	0.099	0.095
Na	346	353	360	364	359
K	54.5	59.2	59.8	60.5	60.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	1.15	1.12	1.04	1.11	1.03
Cl	636	637	637	640	640
F	4.46	4.43	4.41	4.36	4.41
Br	1.96	1.94	1.94	1.97	1.98
SO_4	90.7	90.4	91.4	93.4	92.5
S_2O_3	<0.05	<0.05	<0.05	<0.05	<0.05
S_nO_6 (µM / n)	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---
H_2S	0.523	0.592	0.471	0.362	0.437
NO_3	<0.05	<0.05	<0.05	<0.05	<0.05
NH_4	0.4	0.1	0.1	0.1	0.1
SiO_2	432	423	432	446	435
B	8.17	7.64	8.60	9.12	8.79
Al	1.34	1.43	1.47	1.48	1.45
Fe(T)	2.77	2.51	2.81	2.91	2.63
Fe(II)	2.28	2.32	2.50	2.56	2.32
Mn	0.020	0.021	0.023	0.023	0.021
Sr	0.014	0.014	0.014	0.014	0.014
Ba	0.040	0.048	0.048	0.051	0.048
Li	5.12	5.05	5.08	5.13	5.08
Rb	0.468	0.572	0.573	0.564	0.591
P	<0.04	<0.04	<0.04	<0.04	<0.04
As(T)	3.63	3.73	3.88	3.72	3.74
As(III)	0.059	0.053	0.057	0.047	0.044
Hg (ng/L)	38.8	33.3	40.9	27.2	28.3
DOC	2.4	2.1	2.1	1.9	2.0
δD (‰)	-138.00	-138.00	-137.70	-137.80	-137.90
$\delta^{18}O$ (‰)	-13.12	-13.62	-13.69	-13.79	-13.64
Charge Imbalance (%)	-9.3	-7.2	-5.4	-4.8	-6.1
Specific Conductance Balance (%)	-0.7	0.6	1.0	3.0	1.3
Sum Cations (meq/L)	18.1	18.5	18.9	19.1	18.8
Sum Anions (meq/L)	19.9	19.9	19.9	20.0	20.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA103	10WA120	09WA114	10WA119	Y10G002
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	"Persnickety Geyser"	"Titanic Spring"	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"
Collection Date	9/7/2009	6/2/2010	9/9/2009	6/2/2010	6/16/2010
Collection Time	12:30	13:50	15:10	12:30	---
Latitude	44° 43' 40.5"	44° 43' 40.0"	44° 43' 39.6"	44° 43' 39.6"	44° 43' 39.6"
Longitude	110° 42' 47.1"	110° 42' 48.5"	110° 42' 49.2"	110° 42' 49.2"	110° 42' 49.2"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	40	40	---	---	---
pH	5.14	3.05	2.46	2.52	2.45
Specific Conductance (µS/cm)	2339	2189	3228	3378	3102
Temperature (°C)	82.1	55.7	83.4	50.1	72.1
Temperature (Flow Cell, °C)	73.4	42.3	---	---	---
Eh (V)	0.043	0.660	-0.003	---	0.530
DO (mg/L)	0.7	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9993	0.9990	0.9995	---
Constituent (mg/L)[1]					
Ca	6.75	4.95	2.66	3.85	3.62
Mg	0.10	0.22	0.24	0.67	0.415
Na	376	279	184	299	237
K	62.8	55.1	32.3	46.3	37.3
Alkalinity (as HCO_3)	3.7	---	---	---	---
Acidity (mN)	---	1.72	7.51	9.15	---
Cl	630	477	282	443	328
F	7.16	2.97	3.42	1.44	1.9
Br	2.11	1.47	1.01	1.32	1.12
SO_4	55.8	132	449	595	522
S_2O_3	<0.1	<0.1	0.2	<0.1	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.004	<0.001	0.191	0.005	---
NO_3	0.19	<0.1	0.16	<0.1	<0.1
NH_4	1.3	1.3	3.4	0.6	0.6
SiO_2	441	398	246	121	221
B	9.05	6.66	3.90	4.76	4.95
Al	0.336	2.76	18.1	40.0	26.4
Fe(T)	0.702	2.27	3.71	6.71	6.39
Fe(II)	0.702	2.20	3.71	6.26	6.39
Mn	0.021	0.042	0.036	0.060	0.046
Sr	0.019	0.016	0.0068	0.013	0.011
Ba	0.044	0.062	0.020	0.033	0.039
Li	5.79	3.93	2.46	3.55	3.21
Rb	0.474	0.369	0.173	0.238	---
P	<0.06	<0.06	0.180	0.110	---
As(T)	2.84	0.750	1.44	1.95	1.72
As(III)	1.28	---	≥1.25	---	1.19
Hg (ng/L)	37.8	48.5	441	192	---
DOC	1.9	1.0	3.7	5.0	---
δD (‰)	-140.61	-135.65	-129.67	-122.40	-127.40
$\delta^{18}O$ (‰)	-15.02	-13.09	-7.36	-9.38	-6.60
Charge Imbalance (%)	-0.2	-2.4	1.4	-2.9	-2.0
Specific Conductance Balance (%)	-3.3	-1.5	1.0	0.4	1.0
Sum Cations (meq/L)	19.2	15.6	14.6	20.8	17.6
Sum Anions (meq/L)	19.3	16.0	14.4	21.4	17.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G024	10WA171	11WA142	12WA140	13WA120
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"	NG06 - small appendage pool to "Lifeboat Spring"
Collection Date	7/15/2010	9/16/2010	9/7/2011	9/24/2012	9/19/2013
Collection Time	---	14:30	15:30	13:20	15:45
Latitude	44° 43' 39.6"	44° 43' 39.6"	44° 43' 39.6"	44° 43' 39.6"	44° 43' 39.6"
Longitude	110° 42' 49.2"	110° 42' 49.2"	110° 42' 49.2"	110° 42' 49.2"	110° 42' 49.2"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	43	---
pH	2.51	2.63	2.53	2.24	2.28
Specific Conductance (µS/cm)	2609	1826	2492	3413	6895
Temperature (°C)	70.9	71.3	71.8	47.6	34.2
Temperature (Flow Cell, °C)	---	66.2	64.9	---	---
Eh (V)	0.330	-0.017	0.695	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9991	0.9992	0.9993	1.0016
Constituent (mg/L)[1]					
Ca	3.76	1.86	4.28	2.17	12.1
Mg	0.620	0.40	0.832	0.400	4.24
Na	202	84.8	176	193	766
K	31.7	21.1	32.9	40.5	128
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	7.21	9.12	30.4
Cl	256	101	182	339	780
F	1.7	1.24	1.9	0.9	1.38
Br	0.88	0.37	1.00	1.12	2.55
SO_4	429	334	508	456	2030
S_2O_3	---	0.4	<0.1	<0.1	<0.05
S_nO_6 (µM / n)	---	---	---	---	<0.4 / ---
H_2S	0.181	0.867	0.002	0.067	0.644
NO_3	<0.1	<0.1	<0.05	<0.05	<0.05
NH_4	1.7	1.5	3.5	0.1	5.1
SiO_2	223	224	259	260	115
B	3.72	1.38	1.92	4.31	5.37
Al	15.0	10.9	12.7	17.1	129
Fe(T)	6.20	5.88	12.5	8.76	30.8
Fe(II)	6.19	5.88	12.5	8.73	29.0
Mn	0.067	0.040	0.075	0.038	0.378
Sr	0.004	0.0047	0.0035	0.013	0.027
Ba	0.0070	0.0100	0.0055	0.037	0.046
Li	2.71	1.26	1.46	2.39	8.62
Rb	---	0.132	0.291	0.346	1.01
P	---	0.019	0.006	0.195	0.690
As(T)	1.51	1.23	1.37	0.841	2.62
As(III)	1.25	1.10	1.21	0.583	≥2.00
Hg (ng/L)	---	783	473	52.2	---
DOC	---	4.2	6.3	6.1	---
δD (‰)	-130.50	-125.70	-127.52	-121.00	-89.40
$\delta^{18}O$ (‰)	-7.20	-5.79	-5.69	-6.10	-1.98
Charge Imbalance (%)	0.0	-1.6	3.4	6.9	0.5
Specific Conductance Balance (%)	2.0	1.5	2.4	3.3	1.8
Sum Cations (meq/L)	14.8	7.92	13.4	17.6	51.3
Sum Anions (meq/L)	14.7	8.05	12.9	16.5	51.1

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA116	10WA117	Y10G023	Y10G043	11WA147
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	NG08 - white pool (1.5 m diameter)	NG08 - white pool (1.5 m diameter)	NG08 - white pool (1.5 m diameter)	NG08 - white pool (1.5 m diameter)	NG08 - white pool (1.5 m diameter)
Collection Date	9/9/2009	6/1/2010	7/15/2010	9/21/2010	9/8/2011
Collection Time	17:15	14:50	---	---	12:45
Latitude	44° 43' 44.5"	44° 43' 44.5"	44° 43' 44.5"	44° 43' 44.5"	44° 43' 44.5"
Longitude	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	---	---
pH	2.33	2.35	2.56	2.75	2.65
Specific Conductance (µS/cm)	3212	2374	1676	2034	2149
Temperature (°C)	72.9	70.8	84.7	52.5	69.2
Temperature (Flow Cell, °C)	63.3	57.1	---	---	63.8
Eh (V)	0.046	0.691	0.370	0.330	0.683
DO (mg/L)	1.6	---	---	---	---
Density (g/mL at 20°C)	0.9990	0.9988	---	---	0.9990
Constituent (mg/L)[1]					
Ca	2.91	1.01	0.88	3.41	2.77
Mg	0.11	0.07	0.089	0.144	0.12
Na	145	66.1	55.9	209	174
K	32.6	18.8	17.1	39.8	36.7
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	6.60	6.29	---	---	---
Cl	248	108	92.8	342	270
F	3.32	0.55	0.54	1.4	2
Br	1.01	0.33	0.32	1.07	1.20
SO_4	373	337	220	172	210
S_2O_3	<0.1	<0.1	---	---	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.035	<0.001	0.039	0.056	0.004
NO_3	<0.05	<0.1	<0.1	<0.1	<0.05
NH_4	1.2	0.7	1.0	1.9	2.3
SiO_2	280	217	210	278	285
B	3.54	1.55	1.63	5.32	4.44
Al	5.42	3.84	2.73	2.52	2.60
Fe(T)	1.62	1.78	2.94	1.34	1.59
Fe(II)	0.600	0.954	2.91	1.34	---
Mn	0.025	0.017	0.017	0.032	0.027
Sr	0.013	0.0059	0.007	0.017	0.014
Ba	0.130	0.045	0.096	0.142	0.124
Li	2.05	0.842	0.783	2.99	1.66
Rb	0.152	0.062	---	---	0.185
P	<0.06	<0.06	---	---	<0.05
As(T)	4.39	3.29	4.56	2.09	2.42
As(III)	0.625	0.340	4.28	1.96	0.112
Hg (ng/L)	110	71.4	---	---	45.9
DOC	0.8	0.7	---	---	0.7
δD (‰)	-130.85	-133.96	-133.70	-133.80	-133.89
$\delta^{18}O$ (‰)	-10.18	-10.94	-10.80	-13.90	-12.23
Charge Imbalance (%)	4.2	-4.2	-6.0	1.0	4.1
Specific Conductance Balance (%)	1.4	3.4	-2.0	4.0	-1.0
Sum Cations (meq/L)	13.2	8.74	6.33	13.0	11.7
Sum Anions (meq/L)	12.7	9.11	6.72	12.8	11.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA143	13WA139	11WA148	12WA144	13WA140
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	NG08 - white pool (1.5 m diameter)	NG08 - white pool (1.5 m diameter)	NG10 - little white pool	NG10 - little white pool	NG10 - little white pool
Collection Date	9/24/2012	9/20/2013	9/8/2011	9/24/2012	9/20/2013
Collection Time	15:15	14:10	13:00	15:40	14:35
Latitude	44° 43' 44.5"	44° 43' 44.5"	44° 43' 44.4"	44° 43' 44.4"	44° 43' 44.4"
Longitude	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"	110° 42' 41.7"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	44, 45	---	---	45	---
pH	2.66	2.57	3.05	2.93	3.02
Specific Conductance (µS/cm)	1909	1931	987	1142	992
Temperature (°C)	61.2	55.5	61.1	---	38.7
Temperature (Flow Cell, °C)	---	50.9	54.5	53.0	34.8
Eh (V)	0.270	0.611	0.223	0.191	0.255
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9990	0.9988	0.9987	0.9988	0.9986
Constituent (mg/L)[1]					
Ca	2.22	1.74	1.27	1.35	1.22
Mg	0.122	0.105	0.092	0.093	0.081
Na	137	119	84.1	90.2	90.6
K	31.6	26.8	21.2	22.3	20.6
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	3.42	3.91	---	1.78	1.52
Cl	235	187	129	151	146
F	0.9	1.16	1	0.5	0.77
Br	0.77	0.59	0.70	0.43	0.45
SO_4	193	221	82.9	102	90.0
S_2O_3	<0.1	<0.05	<0.1	<0.1	0.2
S_nO_6 (µM / n)	---	<0.4 / ---	---	---	0.5 / 3
H_2S	0.017	0.007	1.08	0.615	2.08
NO_3	<0.05	<0.05	0.20	<0.05	<0.05
NH_4	1.6	1.2	0.7	0.6	0.8
SiO_2	254	245	240	232	247
B	3.44	2.61	2.20	2.25	2.10
Al	2.10	2.17	1.05	0.897	0.808
Fe(T)	1.64	4.53	1.96	1.78	1.66
Fe(II)	1.63	4.43	---	1.68	1.57
Mn	0.026	0.023	0.021	0.021	0.018
Sr	0.011	0.0090	0.0051	0.0054	0.0052
Ba	0.126	0.116	0.099	0.102	0.095
Li	1.65	1.27	0.785	1.12	1.12
Rb	0.172	0.148	0.097	0.116	0.106
P	<0.2	<0.04	<0.05	<0.2	<0.04
As(T)	1.61	3.90	3.10	3.10	1.62
As(III)	0.390	0.806	≥1.75	≥2.27	1.60
Hg (ng/L)	18.1	18.5	41.5	151	12.6
DOC	1.0	1.4	0.8	0.9	1.7
δD (‰)	-138.20	-138.10	-148.11	-148.70	-150.60
$\delta^{18}O$ (‰)	-13.90	-13.67	-16.20	-17.30	-17.71
Charge Imbalance (%)	-2.6	2.6	5.6	-2.2	-0.5
Specific Conductance Balance (%)	1.7	5.9	-4.5	-1.8	3.0
Sum Cations (meq/L)	9.79	9.42	5.52	6.15	5.87
Sum Anions (meq/L)	10.0	9.18	5.22	6.29	5.90

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA116	Y10G040	11WA149	12WA142	13WA141
Area	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills	Ragged Hills
Name and Description	NG16 - unnamed small yellow feature	NG16 - unnamed small yellow feature	NG16 - unnamed small yellow feature	NG16 - unnamed small yellow feature	NG16 - unnamed small yellow feature
Collection Date	6/1/2010	9/16/2010	9/8/2011	9/24/2012	9/20/2013
Collection Time	13:47	---	13:30	14:35	15:07
Latitude	44° 43' 44.2"	44° 43' 44.2"	44° 43' 44.2"	44° 43' 44.2"	44° 43' 44.2"
Longitude	110° 42' 42.0"	110° 42' 42.0"	110° 42' 42.0"	110° 42' 42.0"	110° 42' 42.0"
Map (figure)	5, 6	5, 6	5, 6	5, 6	5, 6
Photograph (appendix)	---	---	---	46	---
pH	2.96	3.13	3.12	3.20	2.98
Specific Conductance (µS/cm)	1712	1362	1399	1475	1690
Temperature (°C)	84.6	83.0	84.5	80.1	86.2
Temperature (Flow Cell, °C)	64.0	---	76.6	---	86.3
Eh (V)	---	0.170	0.219	0.114	0.097
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9990	---	0.9990	0.9990	0.9990
Constituent (mg/L)[1]					
Ca	2.88	2.54	2.26	2.58	2.77
Mg	0.20	0.167	0.151	0.167	0.224
Na	196	175	162	179	211
K	40.8	36.7	33.8	35.0	38.3
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	1.86	---	---	1.66	1.96
Cl	322	288	263	307	329
F	1.14	1	1.6	1	1.82
Br	1.01	0.90	1.00	0.97	1.10
SO_4	149	106	91.9	103	150
S_2O_3	<0.1	---	<0.1	<0.1	<0.05
S_nO_6 (µM / n)	---	---	---	---	<0.4 / ---
H_2S	0.147	1.04	0.462	0.358	1.86
NO_3	<0.1	<0.1	<0.05	0.10	<0.05
NH_4	1.7	1.2	1.5	1.2	1.9
SiO_2	276	266	284	255	264
B	4.60	4.18	4.16	4.44	4.63
Al	2.76	1.85	1.85	2.12	3.03
Fe(T)	3.35	2.56	2.97	2.76	2.75
Fe(II)	2.94	2.44	---	2.67	2.75
Mn	0.047	0.043	0.036	0.038	0.043
Sr	0.01	0.01	0.0098	0.011	0.012
Ba	0.085	0.095	0.099	0.107	0.092
Li	2.11	2.12	1.35	2.19	2.47
Rb	0.192	---	0.202	0.248	0.255
P	<0.06	---	0.008	0.004	<0.04
As(T)	1.21	1.92	2.66	1.74	1.65
As(III)	0.910	1.92	2.59	≥1.40	≥1.20
Hg (ng/L)	194	---	278	18.1	273
DOC	1.1	---	0.9	0.7	1.5
δD (‰)	-143.43	-144.00	-143.79	-143.00	-144.80
$\delta^{18}O$ (‰)	-16.43	-16.60	-16.48	-16.40	-16.57
Charge Imbalance (%)	-1.0	-2.0	3.0	-4.6	2.0
Specific Conductance Balance (%)	2.2	6.0	-3.5	-2.0	5.1
Sum Cations (meq/L)	11.6	10.1	9.36	10.1	12.2
Sum Anions (meq/L)	11.7	10.2	9.09	10.6	11.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA167	11WA168	09WA128	09WA129	Y10G006
Area	Ragged Hills	Ragged Hills	Chocolate Pots	Chocolate Pots	Geyser Springs Group
Name and Description	"Orpiment Puddle 2"	Another "Orpiment Puddle"	upstream site on east side of Gibbon River	major hot spring downstream of 09WA128 on west side of Gibbon River	GG01 - northernmost spring on the base of hill
Collection Date	9/11/2011	9/11/2011	9/13/2009	9/13/2009	6/24/2010
Collection Time	16:00	16:20	10:45	12:15	---
Latitude	44° 43' 44.5"	---	44° 42' 36.4"	44° 42' 36"	44° 41' 25.8"
Longitude	110° 42' 41.7"	---	110° 44' 25.7"	110° 44' 26"	110° 43' 43.6"
Map (figure)	5, 6	5, 6	1	1	7
Photograph (appendix)	45	47	48	49	---
pH	2.49	3.96	5.96	6.24	2.31
Specific Conductance (µS/cm)	2930	572	743	777	2917
Temperature (°C)	26.4	64.1	52.2	62.0	73.1
Temperature (Flow Cell, °C)	---	68.6	49.8	58.0	---
Eh (V)	---	---	-0.005	-0.014	0.620
DO (mg/L)	---	---	<0.05	---	---
Density (g/mL at 20°C)	---	---	0.9985	0.9985	---
Constituent (mg/L)[1]					
Ca	2.74	1.34	21.7	22.5	2.15
Mg	0.128	0.031	1.89	1.37	0.186
Na	168	79.3	115	124	125
K	41.8	8.17	22.0	24.2	12.4
Alkalinity (as HCO_3)	---	---	335	351	---
Acidity (mN)	---	---	---	---	---
Cl	269	134	32.2	33.4	88.4
F	1.9	1.3	4.11	4.66	1.4
Br	1.20	0.80	0.19	<0.05	0.28
SO_4	383	11.0	23.5	27.5	562
S_2O_3	<0.1	1.3	<0.1	<0.1	---
S_nO_6 (µM / n)	---	2.1 / 5	---	---	---
H_2S	0.675	3.41	---	---	---
NO_3	0.20	<0.05	<0.05	0.12	<0.1
NH_4	0.6	---	0.4	0.8	2.1
SiO_2	340	116	109	124	220
B	4.34	2.17	0.48	0.46	1.33
Al	3.86	0.099	0.120	0.085	9.72
Fe(T)	28.4	0.243	5.26	2.36	0.866
Fe(II)	---	---	5.25	2.36	0.219
Mn	0.030	0.0077	1.36	1.52	0.033
Sr	0.015	0.0065	0.065	0.060	0.003
Ba	0.086	0.807	0.043	0.041	<0.0008
Li	1.86	0.775	0.815	1.01	1.39
Rb	0.192	0.061	0.114	0.128	---
P	0.045	<0.05	<0.06	<0.06	---
As(T)	9.25	6.41	0.046	0.120	0.421
As(III)	---	---	0.046	≥0.049	0.033
Hg (ng/L)	---	---	1.6	2.2	---
DOC	---	---	1.7	1.4	---
δD (‰)	---	---	-146.29	-146.96	-132.70
$\delta^{18}O$ (‰)	---	---	-19.06	-19.09	-13.00
Charge Imbalance (%)	-7.9	-2.0	1.0	0.8	-2.0
Specific Conductance Balance (%)	-9.3	-7.7	-7.1	-5.7	0.0
Sum Cations (meq/L)	13.4	3.98	7.08	7.47	12.1
Sum Anions (meq/L)	14.6	4.06	7.01	7.42	12.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G032	10WA179	11WA153	12WA152	13WA133
Area	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group
Name and Description	GG01 - northernmost spring on the base of hill	GG01 - northernmost spring on the base of hill	GG01 - northernmost spring on the base of hill	GG01 - northernmost spring on the base of hill	GG01 - northernmost spring on the base of hill
Collection Date	7/23/2010	9/17/2010	9/9/2011	9/26/2012	9/22/2013
Collection Time	---	10:05	10:10	14:45	10:48
Latitude	44° 41' 25.8"	44° 41' 25.8"	44° 41' 25.8"	44° 41' 25.8"	44° 41' 25.8"
Longitude	110° 43' 43.6"	110° 43' 43.6"	110° 43' 43.6"	110° 43' 43.6"	110° 43' 43.6"
Map (figure)	7	7	7	7	7
Photograph (appendix)	---	---	---	50	---
pH	2.30	2.44	2.48	2.46	2.37
Specific Conductance (µS/cm)	2955	2534	2363	2393	2864
Temperature (°C)	72.6	73.5	74.6	74.6	73.8
Temperature (Flow Cell, °C)	---	67.9	69.8	71.6	60.8
Eh (V)	0.630	0.647	0.035	0.321	0.676
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9991	0.9991	0.9991	0.9991
Constituent (mg/L)[1]					
Ca	2.48	2.33	2.51	2.52	2.39
Mg	0.177	0.14	0.194	0.168	0.154
Na	142	150	142	140	145
K	12.5	12.9	13.9	12.6	12.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	7.87	6.83	6.81	7.28
Cl	104	119	107	109	117
F	1.8	3.31	2.9	2.4	2.9
Br	0.34	0.38	0.60	0.37	0.31
SO_4	572	567	473	498	521
S_2O_3	---	0.2	<0.1	<0.1	0.1
S_nO_6 (µM / n)	---	---	---	---	<0.4 / ---
H_2S	0.016	0.067	0.053	0.020	<0.001
NO_3	<0.1	<0.1	<0.05	<0.05	<0.05
NH_4	2.6	3.5	3.6	3.3	3.8
SiO_2	219	217	234	196	231
B	1.61	1.54	1.67	1.59	1.35
Al	7.35	7.18	5.55	5.29	6.85
Fe(T)	0.749	0.611	0.620	0.729	1.01
Fe(II)	0.225	0.103	0.190	0.415	0.442
Mn	0.035	0.028	0.033	0.029	0.028
Sr	0.003	0.0027	0.0028	0.0029	0.0027
Ba	<0.0008	0.0008	0.0011	0.0012	0.0015
Li	1.56	1.80	1.25	1.52	1.43
Rb	---	0.122	0.148	0.164	0.166
P	---	<0.06	<0.05	<0.2	<0.04
As(T)	0.495	0.529	0.539	0.556	0.528
As(III)	0.034	0.045	0.052	0.053	0.071
Hg (ng/L)	---	59.6	62.4	79.0	57.5
DOC	---	0.5	0.6	0.7	1.4
δD (‰)	-129.20	-129.66	-129.88	-127.80	-127.70
$\delta^{18}O$ (‰)	-12.40	-11.92	-12.40	-12.00	-11.69
Charge Imbalance (%)	-1.0	-2.9	5.1	1.6	-3.8
Specific Conductance Balance (%)	3.0	7.5	3.1	6.5	-3.8
Sum Cations (meq/L)	12.9	11.8	11.0	11.1	12.3
Sum Anions (meq/L)	13.1	12.2	10.4	10.9	12.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G007	Y10G031	10WA180	11WA154	13WA157
Area	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group
Name and Description	GG06 - unnamed acid pool (1 m diameter)	GG06 - unnamed acid pool (1 m diameter)	GG06 - unnamed acid pool (1 m diameter)	GG06 - unnamed acid pool (1 m diameter)	GG06 - unnamed acid pool (1 m diameter)
Collection Date	6/24/2010	7/23/2010	9/17/2010	9/9/2011	9/22/2013
Collection Time	---	---	10:50	11:00	13:00
Latitude	44° 41' 25.1"	44° 41' 25.1"	44° 41' 25.1"	44° 41' 25.1"	44° 41' 25.1"
Longitude	110° 43' 41.9"	110° 43' 41.9"	110° 43' 41.9"	110° 43' 41.9"	110° 43' 41.9"
Map (figure)	7	7	7	7	7
Photograph (appendix)	---	---	---	51	---
pH	2.58	2.40	2.44	2.16	2.50
Specific Conductance (µS/cm)	1689	2509	2260	5320	1923
Temperature (°C)	45.9	44.1	42.2	39.2	34.9
Temperature (Flow Cell, °C)	---	---	38.9	37.7	35.1
Eh (V)	0.480	0.510	0.270	0.058	0.545
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	---	0.9991	1.0003	0.9988
Constituent (mg/L)[1]					
Ca	1.59	3.08	1.79	5.80	1.78
Mg	0.213	0.545	0.37	1.15	0.340
Na	78.5	110	81.6	226	70.6
K	15.8	25.0	20.0	53.2	16.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	7.58	24.0	5.82
Cl	26.8	33.2	31.2	35.3	23.9
F	0.75	0.74	0.82	0.9	0.65
Br	0.11	0.11	0.11	<0.05	0.08
SO_4	377	642	547	1600	423
S_2O_3	---	---	0.2	<0.1	0.1
S_nO_6 (µM / n)	---	---	0.9 / 4	---	<0.4 / ---
H_2S	---	0.683	0.083	0.349	0.097
NO_3	<0.1	<0.1	0.17	0.20	<0.05
NH_4	2.3	3.5	3.7	10.2	4.3
SiO_2	252	312	276	309	175
B	0.41	0.48	0.38	0.64	0.30
Al	8.17	20.5	16.8	63.8	9.99
Fe(T)	1.02	2.72	2.16	9.25	1.84
Fe(II)	1.02	2.72	2.11	8.89	1.84
Mn	0.034	0.070	0.042	0.128	0.040
Sr	0.005	0.012	0.0081	0.023	0.0069
Ba	0.021	0.026	0.028	0.029	0.023
Li	0.913	1.18	0.923	2.05	0.723
Rb	---	---	0.132	0.449	0.140
P	---	---	<0.06	0.064	<0.04
As(T)	0.345	0.330	0.207	0.265	0.210
As(III)	0.286	0.283	0.180	≥0.225	0.196
Hg (ng/L)	---	---	8.8	54.8	12.2
DOC	---	---	2.6	13.5	4.6
δD (‰)	-118.50	-120.50	-119.09	-118.17	-114.40
$\delta^{18}O$ (‰)	-8.20	-9.50	-8.82	-8.81	-9.76
Charge Imbalance (%)	3.0	-3.0	-4.5	-6.3	-0.3
Specific Conductance Balance (%)	3.0	2.0	2.2	-1.2	1.2
Sum Cations (meq/L)	7.48	11.5	9.41	23.2	7.97
Sum Anions (meq/L)	7.27	11.8	9.85	24.7	7.99

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G008	Y10G030	10WA181	11WA155	12WA154
Area	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group
Name and Description	GG08 - unnamed acid pool (0.5 m diameter)	GG08 - unnamed acid pool (0.5 m diameter)	GG08 - unnamed acid pool (0.5 m diameter)	GG08 - unnamed acid pool (0.5 m diameter)	GG08 - unnamed acid pool (0.5 m diameter)
Collection Date	6/24/2010	7/23/2010	9/17/2010	9/9/2011	9/26/2012
Collection Time	---	---	11:45	11:30	16:15
Latitude	44° 41' 22.3"	44° 41' 22.3"	44° 41' 22.3"	44° 41' 22.3"	44° 41' 22.3"
Longitude	110° 43' 40.7"	110° 43' 40.7"	110° 43' 40.7"	110° 43' 40.7"	110° 43' 40.7"
Map (figure)	7	7	7	7	7
Photograph (appendix)	---	---	---	52	---
pH	2.84	2.80	2.85	2.69	2.79
Specific Conductance (µS/cm)	1188	1356	1219	1739	1513
Temperature (°C)	60.4	62.7	58.9	60.1	60.5
Temperature (Flow Cell, °C)	---	---	53.4	53.9	54.0
Eh (V)	0.670	0.500	0.700	0.089	0.206
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	---	0.9988	0.9989	0.9989
Constituent (mg/L)[1]					
Ca	1.24	1.96	1.68	2.35	3.20
Mg	0.184	0.320	0.27	0.445	0.940
Na	90.5	94.2	90.2	113	93.8
K	13.3	18.0	17.9	24.1	26.5
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	3.16	4.76	5.85
Cl	92.6	101	94.4	100	83.8
F	1.8	1.6	2.48	3	1.6
Br	0.31	0.26	0.31	0.70	0.28
SO_4	196	261	251	361	415
S_2O_3	---	---	<0.1	<0.1	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	0.031	0.140	0.023	0.011
NO_3	<0.1	<0.1	<0.1	<0.05	<0.05
NH_4	1.9	3.4	3.2	5.9	4.2
SiO_2	169	191	180	205	108
B	1.40	1.52	1.17	1.45	1.14
Al	4.89	7.07	8.42	14.4	21.7
Fe(T)	0.764	10.5	1.30	2.43	11.0
Fe(II)	0.430	10.4	0.461	0.690	10.8
Mn	0.028	0.045	0.037	0.051	0.111
Sr	0.004	0.006	0.0060	0.0071	0.013
Ba	0.049	0.085	0.048	0.036	0.047
Li	1.08	1.17	1.11	1.08	1.03
Rb	---	---	0.123	0.211	0.262
P	---	---	<0.06	0.020	0.103
As(T)	0.327	3.22	0.411	0.414	1.78
As(III)	0.010	2.78	0.015	0.011	1.45
Hg (ng/L)	---	---	23.8	29.6	26.3
DOC	---	---	1.9	2.9	10.0
δD (‰)	-136.50	-134.90	-135.42	-133.50	-121.10
$\delta^{18}O$ (‰)	-13.10	-11.80	-12.30	-11.63	-13.00
Charge Imbalance (%)	6.0	-3.0	-1.5	6.3	-4.1
Specific Conductance Balance (%)	4.0	2.0	6.5	-0.8	2.2
Sum Cations (meq/L)	6.49	7.49	6.84	9.21	8.54
Sum Anions (meq/L)	6.13	7.69	6.95	8.65	8.90

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA158	Y10G009	13WA156	12WA153	13WA134
Area	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group
Name and Description	GG08 - unnamed acid pool (0.5 m diameter)	GG09 - unnamed feature	GG10 - unnamed spring near Geyser Creek	GG11 - unnamed acid spring	GG11 - unnamed acid spring
Collection Date	9/22/2013	6/24/2010	9/22/2013	9/26/2012	9/22/2013
Collection Time	13:50	---	12:10	15:35	11:30
Latitude	44° 41' 22.3"	44° 41' 25.5"	44° 41' 25.4"	44° 41' 25.2"	44° 41' 25.2"
Longitude	110° 43' 40.7"	110° 43' 44.2"	110° 43' 41.8"	110° 43' 42.6"	110° 43' 42.6"
Map (figure)	7	7	7	7	7
Photograph (appendix)	---	---	51	53	---
pH	2.85	2.94	6.11	2.61	2.19
Specific Conductance (µS/cm)	1006	990	2020	2767	4731
Temperature (°C)	59.6	90.5	61.4	88.7	87.5
Temperature (Flow Cell, °C)	52.6	---	52.7	77.4	72.0
Eh (V)	0.394	0.310	0.052	0.194	0.498
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9986	---	0.9992	0.9994	0.9996
Constituent (mg/L)[1]					
Ca	0.91	2.87	4.11	2.78	3.22
Mg	0.183	0.640	0.079	0.081	0.180
Na	63.8	18.9	376	300	252
K	12.1	12.8	27.4	19.6	27.4
Alkalinity (as HCO_3)	---	---	87.1	---	---
Acidity (mN)	2.22	---	---	5.82	12.8
Cl	68.6	10.7	433	357	288
F	1.22	0.55	14.6	6.7	5.05
Br	0.18	<0.1	1.36	1.09	0.86
SO_4	167	346	140	528	869
S_2O_3	<0.05	---	0.8	1.5	<0.05
S_nO_6 (µM / n)	<0.4 / ---	---	<0.4 / ---	5.0 / 3	1.8 / 4
H_2S	0.015	---	1.18	0.158	0.057
NO_3	<0.05	<0.1	0.21	<0.05	<0.05
NH_4	3.2	34.7	0.4	17.7	<0.05
SiO_2	171	306	230	197	263
B	0.89	0.79	6.01	4.70	3.88
Al	3.43	7.20	1.20	6.99	19.2
Fe(T)	1.64	5.79	0.284	1.39	3.67
Fe(II)	1.52	5.79	0.282	1.33	3.64
Mn	0.024	0.105	0.019	0.014	0.025
Sr	0.0033	0.028	0.0052	0.0033	0.0038
Ba	0.045	0.086	0.013	0.0051	0.012
Li	0.710	0.137	4.10	3.84	3.11
Rb	0.105	---	0.427	0.358	0.350
P	0.060	---	<0.04	<0.2	<0.04
As(T)	0.479	0.370	2.36	1.88	1.66
As(III)	0.409	0.262	2.31	1.85	1.64
Hg (ng/L)	19.0	---	99.5	330	74.9
DOC	4.6	---	1.9	1.2	2.0
δD (‰)	-139.00	-135.10	-136.20	-129.70	-128.70
$\delta^{18}O$ (‰)	-14.74	-10.40	-14.28	-11.30	-10.48
Charge Imbalance (%)	4.9	-18	3.9	-0.2	5.6
Specific Conductance Balance (%)	8.9	12	-2.1	6.6	-5.8
Sum Cations (meq/L)	5.21	4.97	17.8	18.3	20.9
Sum Anions (meq/L)	4.96	5.93	17.1	18.4	19.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA164	13WA159	13WA160	10WA182	12WA135
Area	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Geyser Springs Group	Sylvan Spring
Name and Description	GG12 - unnamed small acid pool	GG12 - unnamed small acid pool	GG14 - unnamed acid spring	unnamed geyser east side of Geyser Creek on hillside	Bridge Pool
Collection Date	9/26/2012	9/22/2013	9/22/2013	9/17/2010	9/23/2012
Collection Time	16:45	14:30	15:20	12:15	14:30
Latitude	44° 41' 22.5"	44° 41' 22.5"	44° 41' 20.8"	44° 41' 20.0"	44° 41' 43.2"
Longitude	110° 43' 40.8"	110° 43' 40.8"	110° 43' 41.1"	110° 43' 37.2"	110° 46' 1.5"
Map (figure)	7	7	7	7	8
Photograph (appendix)	54	---	---	55	56
pH	2.61	2.71	2.47	8.21	6.90
Specific Conductance (µS/cm)	1743	1565	1862	2520	1243
Temperature (°C)	80.4	69.9	45.5	---	84.0
Temperature (Flow Cell, °C)	63.1	67.9	41.5	50.1	62.8
Eh (V)	0.499	0.622	0.634	0.317	-0.042
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9988	0.9988	0.9988	0.9995	0.9991
Constituent (mg/L)[1]					
Ca	1.29	1.24	1.46	6.83	4.07
Mg	0.223	0.223	0.270	0.02	0.070
Na	102	98.3	49.6	455	252
K	17.4	20.2	22.0	36.2	11.0
Alkalinity (as HCO_3)	---	---	---	100	339
Acidity (mN)	4.85	3.59	5.68	---	---
Cl	101	75.4	16.6	673	125
F	1.1	1.94	0.56	16.6	14.3
Br	0.25	0.19	0.04	2.06	0.37
SO_4	350	315	394	91.8	76.8
S_2O_3	<0.1	<0.05	<0.05	0.3	2.4
S_nO_6 (µM / n)	---	<0.4 / ---	<0.4 / ---	---	---
H_2S	0.011	0.074	0.164	0.139	0.634
NO_3	0.14	<0.05	<0.05	<0.1	<0.05
NH_4	8.3	5.3	4.2	2.0	0.3
SiO_2	144	168	227	231	285
B	1.32	0.96	0.27	8.58	2.24
Al	7.23	6.96	8.15	0.085	0.179
Fe(T)	0.962	0.705	2.77	0.017	0.008
Fe(II)	0.394	0.705	1.96	0.003	0.005
Mn	0.031	0.037	0.037	0.011	0.060
Sr	0.0039	0.0038	0.0031	0.0077	0.0088
Ba	0.0034	0.0052	0.011	0.0071	0.015
Li	0.557	0.553	0.246	6.63	0.843
Rb	0.157	0.148	0.178	0.573	0.110
P	0.022	<0.04	<0.04	<0.06	<0.2
As(T)	0.151	0.160	0.052	3.45	0.637
As(III)	0.011	≥0.003	0.019	1.73	≥0.483
Hg (ng/L)	44.9	27.3	15.1	17.6	537
DOC	1.0	1.3	2.0	0.5	0.8
δD (‰)	-134.40	-137.20	-140.70	-137.54	-132.90
$\delta^{18}O$ (‰)	-10.30	-12.08	-17.28	-14.43	-14.00
Charge Imbalance (%)	3.6	4.2	2.7	-6.2	1.3
Specific Conductance Balance (%)	8.9	-4.4	7.3	1.5	-4.0
Sum Cations (meq/L)	8.60	7.77	7.28	22.0	11.5
Sum Anions (meq/L)	8.30	7.45	7.09	23.4	11.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA164	10WA203	11WA158	10WA135	Y10G035
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring
Name and Description	Coffin Spring	Dante's Inferno	Dante's Inferno	Evening Primrose Spring	Evening Primrose Spring
Collection Date	9/10/2011	9/22/2010	9/10/2011	6/6/2010	7/23/2010
Collection Time	13:40	11:30	12:05	12:10	---
Latitude	44° 42' 1.0"	44° 41' 56.3"	44° 41' 56.3"	44° 41' 57.9"	44° 41' 57.9"
Longitude	110° 45' 55.0"	110° 46' 3.3"	110° 46' 3.3"	110° 45' 59.1"	110° 45' 59.1"
Map (figure)	8	8	8	8	8
Photograph (appendix)	57	---	58	---	---
pH	3.47	5.58	5.76	5.61	5.51
Specific Conductance (µS/cm)	875	2340	2504	2189	2314
Temperature (°C)	90.0	79.8	80.4	79.4	78.4
Temperature (Flow Cell, °C)	68.9	68.3	63.5	47.6	---
Eh (V)	0.289	0.022	-0.056	0.390	0.000
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9989	0.9996	0.9996	0.9995	---
Constituent (mg/L)[1]					
Ca	4.74	4.01	4.33	5.05	6.01
Mg	0.222	0.02	0.013	0.01	0.016
Na	62.7	430	418	375	435
K	30.8	45.5	43.6	20.7	22.3
Alkalinity (as HCO_3)	---	15.9	34.9	10.4	---
Acidity (mN)	0.777	---	---	---	---
Cl	1.7	576	529	497	552
F	0.8	17.6	18.1	15	16.5
Br	<0.05	1.62	1.70	1.50	1.71
SO_4	314	196	192	103	130
S_2O_3	<0.1	12.7	15.9	59.5	---
S_nO_6 (µM / n)	---	---	3.7 / 4	---	---
H_2S	0.046	0.300	1.41	1.50	0.600
NO_3	<0.05	0.07	<0.05	0.19	<0.1
NH_4	29.8	1.3	2.9	---	1.5
SiO_2	409	509	550	370	362
B	1.83	8.85	8.53	7.41	8.79
Al	0.353	0.309	0.243	0.118	0.120
Fe(T)	0.516	0.022	0.008	0.018	0.065
Fe(II)	0.410	0.022	0.005	0.018	0.064
Mn	0.455	0.023	0.019	0.015	0.017
Sr	0.022	0.014	0.015	0.017	0.019
Ba	0.089	0.0071	0.0042	0.029	0.040
Li	0.011	5.89	4.23	4.51	5.50
Rb	0.115	0.475	0.433	0.218	---
P	0.007	<0.06	0.032	<0.06	---
As(T)	0.0020	2.99	2.75	2.38	2.89
As(III)	0.001	2.97	2.46	2.38	2.89
Hg (ng/L)	30.1	808	632	82.3	---
DOC	4.7	1.3	1.0	0.7	---
δD (‰)	-122.97	-121.29	-120.59	-123.23	-123.50
$\delta^{18}O$ (‰)	-14.68	-9.29	-8.94	-9.65	-9.10
Charge Imbalance (%)	-6.3	-2.3	-0.8	3.5	8.0
Specific Conductance Balance (%)	-4.2	4.2	-6.9	-8.1	-2.0
Sum Cations (meq/L)	5.68	20.9	20.2	17.7	20.6
Sum Anions (meq/L)	6.05	21.4	20.3	17.1	19.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA202	11WA157	12WA133	10WA138	Y10G034
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring
Name and Description	Evening Primrose Spring	Evening Primrose Spring	Evening Primrose Spring	Sylvan Spring	Sylvan Spring
Collection Date	9/22/2010	9/10/2011	9/23/2012	6/6/2010	7/23/2010
Collection Time	10:55	11:15	10:30	14:50	---
Latitude	44° 41' 57.9"	44° 41' 57.9"	44° 41' 57.9"	44° 41' 58.4"	44° 41' 58.4"
Longitude	110° 45' 59.1"	110° 45' 59.1"	110° 45' 59.1"	110° 46' 2.8"	110° 46' 2.8"
Map (figure)	8	8	8	8	8
Photograph (appendix)	---	59	---	---	---
pH	5.55	5.66	5.61	2.01	1.93
Specific Conductance (µS/cm)	2234	2349	2252	4632	5729
Temperature (°C)	80.0	79.3	79.0	86.2	87.5
Temperature (Flow Cell, °C)	70.4	68.4	70.4	50.3	---
Eh (V)	-0.001	-0.100	0.014	0.365	0.350
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9995	0.9994	0.9994	0.9993	---
Constituent (mg/L)[1]					
Ca	5.50	5.58	5.55	1.40	2.07
Mg	0.01	0.013	0.011	0.25	0.429
Na	414	401	412	8.20	13.9
K	22.6	22.1	22.3	18.0	27.1
Alkalinity (as HCO_3)	19.0	36.8	36.2	---	---
Acidity (mN)	---	---	---	16.9	---
Cl	564	505	521	5.4	2.7
F	16.7	16.3	16	0.13	0.23
Br	1.63	1.70	1.55	<0.1	<0.1
SO_4	129	123	128	892	1290
S_2O_3	58.8	61.1	51.4	<0.1	---
S_nO_6 (µM / n)	5.6 / 4	---	4.0 / 5	---	---
H_2S	0.355	0.961	0.410	0.495	0.342
NO_3	0.13	<0.05	<0.05	0.09	<0.1
NH_4	2.3	2.0	1.9	10.1	15.0
SiO_2	411	374	374	238	351
B	8.10	7.72	7.88	1.04	2.71
Al	0.104	0.105	0.094	28.7	43.8
Fe(T)	0.022	0.007	0.012	4.00	6.23
Fe(II)	0.022	0.006	0.009	4.00	6.23
Mn	0.018	0.018	0.018	0.058	0.106
Sr	0.018	0.019	0.017	0.019	0.027
Ba	0.040	0.022	0.019	0.089	0.090
Li	5.08	3.67	5.21	0.019	0.029
Rb	0.244	0.324	0.360	0.040	---
P	<0.06	0.006	<0.2	0.070	---
As(T)	2.74	2.94	2.88	0.031	0.063
As(III)	2.74	2.68	2.71	0.027	0.053
Hg (ng/L)	262	288	426	85.2	---
DOC	0.6	1.0	1.3	---	---
δD (‰)	-122.30	-122.63	-123.40	-121.21	-119.10
$\delta^{18}O$ (‰)	-9.35	-8.99	-9.05	-11.37	-10.70
Charge Imbalance (%)	-0.3	3.5	4.4	0.8	-8.0
Specific Conductance Balance (%)	1.7	-9.4	-2.6	0.1	0.0
Sum Cations (meq/L)	19.6	18.9	19.6	14.0	17.9
Sum Anions (meq/L)	19.7	18.2	18.7	13.9	19.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA159	12WA167	13WA164	10WA137	11WA160
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring
Name and Description	Sylvan Spring	Sylvan Spring	Sylvan Spring	SYL05 - unnamed pool near the top of drainage	SYL10 (2 m diameter)
Collection Date	9/10/2011	9/27/2012	9/23/2013	6/6/2010	9/10/2011
Collection Time	13:05	13:30	13:30	14:00	13:30
Latitude	44° 41' 58.4"	44° 41' 58.4"	44° 41' 58.4"	44° 41' 57.7"	44° 41' 58.3"
Longitude	110° 46' 2.8"	110° 46' 2.8"	110° 46' 2.8"	110° 46' 4.0"	110° 46' 1.8"
Map (figure)	8	8	8	8	8
Photograph (appendix)	---	---	60	61	62
pH	1.88	1.98	2.04	2.19	2.06
Specific Conductance (µS/cm)	6565	5638	5305	3247	4268
Temperature (°C)	87.4	85.1	84.6	82.7	83.4
Temperature (Flow Cell, °C)	74.8	77.0	70.1	66.1	73.0
Eh (V)	0.023	0.184	0.343	0.549	0.031
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9999	0.9996	0.9996	0.9989	0.9993
Constituent (mg/L)[1]					
Ca	3.02	2.58	2.09	3.03	3.32
Mg	1.11	0.865	0.708	0.36	0.651
Na	18.4	17.2	14.9	13.7	20.1
K	29.2	22.3	23.4	17.5	23.2
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	25.7	26.9	22.2	11.4	14.8
Cl	6.5	3.7	2.0	1.2	2.8
F	0.4	0.3	0.14	0.24	0.4
Br	<0.05	<0.05	<0.04	<0.1	<0.05
SO_4	1450	1270	1170	632	841
S_2O_3	<0.1	<0.1	<0.05	<0.1	<0.1
S_nO_6 (µM / n)	---	---	<0.4 / ---	---	---
H_2S	0.456	0.295	0.336	0.307	0.224
NO_3	<0.05	0.06	<0.05	0.10	<0.05
NH_4	31.7	18.5	<0.02	4.1	13.3
SiO_2	427	259	284	179	354
B	3.51	1.62	1.53	0.28	1.54
Al	47.3	41.6	42.8	20.2	22.9
Fe(T)	11.6	17.0	16.2	2.01	7.39
Fe(II)	---	17.0	16.2	0.969	5.80
Mn	1.08	0.246	0.143	0.123	0.483
Sr	0.027	0.027	0.024	0.021	0.017
Ba	0.090	0.098	0.105	0.074	0.064
Li	0.033	0.036	0.025	0.056	0.064
Rb	0.110	0.094	0.090	0.049	0.082
P	0.096	0.253	0.225	<0.06	0.019
As(T)	0.094	0.068	0.060	0.0071	0.042
As(III)	0.075	0.064	≥0.049	0.003	0.017
Hg (ng/L)	438	528	460	64.6	369
DOC	1.7	7.2	5.7	0.9	1.8
δD (‰)	-118.87	-117.40	-119.20	-121.41	-120.52
$\delta^{18}O$ (‰)	-10.52	-10.90	-10.66	-11.54	-10.28
Charge Imbalance (%)	-1.2	-7.9	3.6	-5.4	1.3
Specific Conductance Balance (%)	-1.3	-1.1	-12	-2.7	-0.3
Sum Cations (meq/L)	21.0	17.7	14.4	9.68	13.5
Sum Anions (meq/L)	21.3	19.2	13.9	10.2	13.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA163	11WA161	12WA165	13WA162	12WA166
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring
Name and Description	SYL10 (2 m diameter)	SYL11 - unnamed hot spring on the north side of drainage	SYL11 - unnamed hot spring on the north side of drainage	SYL11 - unnamed hot spring on the north side of drainage	SYL14 - unnamed pool, upper most spring in drainage
Collection Date	9/23/2013	9/10/2011	9/27/2012	9/23/2013	9/27/2012
Collection Time	13:00	14:15	11:50	12:20	12:45
Latitude	44° 41' 58.3"	44° 41' 58.8"	44° 41' 58.8"	44° 41' 58.8"	44° 41' 58.0"
Longitude	110° 46' 1.8"	110° 46' 2.4"	110° 46' 2.4"	110° 46' 2.4"	110° 46' 4.1"
Map (figure)	8	8	8	8	8
Photograph (appendix)	---	---	63	---	---
pH	2.14	1.81	1.78	1.90	1.51
Specific Conductance (µS/cm)	4271	7040	7274	5651	14354
Temperature (°C)	80.9	76.7	---	76.6	---
Temperature (Flow Cell, °C)	67.0	71.9	69.1	62.4	73.5
Eh (V)	0.422	0.027	0.182	0.326	0.544
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	0.9991	0.9993	0.9990	1.0007
Constituent (mg/L)[1]					
Ca	2.21	0.11	0.32	0.15	1.23
Mg	0.563	0.02	0.104	0.029	0.431
Na	19.7	0.84	1.34	1.31	6.19
K	33.1	2.01	2.61	1.55	19.0
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	16.7	22.6	25.8	18.6	61.1
Cl	3.7	1.2	1.9	0.72	3.8
F	0.17	0.2	0.1	0.09	0.2
Br	<0.04	<0.05	<0.05	<0.04	<0.05
SO_4	901	1150	1270	911	3090
S_2O_3	<0.05	<0.1	<0.1	<0.05	<0.1
S_nO_6 (µM / n)	<0.4 / ---	---	---	<0.4 / ---	---
H_2S	0.560	0.487	0.191	0.709	0.104
NO_3	<0.05	<0.05	<0.05	0.06	<0.05
NH_4	<0.02	10.7	7.5	8.5	26.6
SiO_2	273	82.4	55.3	59.9	105
B	1.11	2.14	1.35	1.73	0.68
Al	29.2	3.03	5.22	3.05	49.6
Fe(T)	10.8	0.246	1.26	0.367	15.0
Fe(II)	10.8	0.246	1.24	0.367	9.57
Mn	0.168	0.0041	0.015	0.0069	0.037
Sr	0.018	0.0021	0.0040	0.0027	0.030
Ba	0.075	0.086	0.084	0.080	0.091
Li	0.040	<0.001	0.001	<0.001	0.007
Rb	0.090	0.0062	0.0089	0.0061	0.041
P	0.114	0.019	<0.2	<0.04	0.137
As(T)	0.040	0.0005	0.0015	0.0040	0.054
As(III)	0.038	<0.0005	<0.001	0.002	≥0.006
Hg (ng/L)	720	117	77.3	128	534
DOC	3.5	3.4	2.4	4.5	9.6
δD (‰)	-120.10	-111.19	-112.80	-110.20	-113.40
$\delta^{18}O$ (‰)	-10.75	-6.64	-7.93	-6.94	-8.63
Charge Imbalance (%)	3.1	0.9	-0.7	-1.6	-3.5
Specific Conductance Balance (%)	-11	-1.3	2.9	-2.2	-0.1
Sum Cations (meq/L)	11.8	18.4	19.7	14.6	41.3
Sum Anions (meq/L)	11.4	18.2	19.9	14.8	42.8

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA167	12WA168	13WA165	13WA166	10WA136
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring
Name and Description	SYL14 - unnamed pool, upper most spring in drainage	SYL15 - Unnamed pool east of Sylvan Spring	SYL15 - Unnamed pool east of Sylvan Spring	SYL16 - unnamed pool	Unnamed caved in spring just north of Evening Primrose
Collection Date	9/23/2013	9/27/2012	9/23/2013	9/23/2013	6/6/2010
Collection Time	15:00	14:00	14:00	14:20	12:50
Latitude	44° 41' 58.0"	44° 41' 58.4"	44° 41' 58.4"	44° 41' 58.6"	44° 41' 58.3"
Longitude	110° 46' 4.1"	110° 46' 2.6"	110° 46' 2.6"	110° 46' 2.7"	110° 45' 58.8"
Map (figure)	8	8	8	8	8
Photograph (appendix)	64	65	---	66	67
pH	1.69	1.99	2.04	2.04	3.17
Specific Conductance (µS/cm)	10407	5701	5282	5239	2255
Temperature (°C)	77.7	80.2	81.3	76.9	90.0
Temperature (Flow Cell, °C)	67.6	74.0	65.0	62.6	59.2
Eh (V)	0.675	0.186	0.348	0.383	0.209
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	1.0000	0.9996	0.9995	0.9995	0.9994
Constituent (mg/L)[1]					
Ca	0.78	2.60	2.13	2.14	6.69
Mg	0.179	0.857	0.727	0.732	0.09
Na	4.40	17.1	15.1	15.1	339
K	13.6	23.3	23.7	23.5	24.7
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	42.3	25.1	22.4	22.7	2.11
Cl	0.62	3.8	2.0	2.0	438
F	0.23	0.1	0.27	0.27	9.15
Br	<0.04	<0.05	<0.04	<0.04	1.30
SO_4	2150	1260	1190	1180	307
S_2O_3	<0.05	<0.1	<0.05	<0.05	<0.1
S_nO_6 (µM / n)	1.3 / 10	---	<0.4 / ---	<0.4 / ---	---
H_2S	0.265	0.263	0.410	0.458	0.451
NO_3	4.77	<0.05	<0.05	<0.05	<0.1
NH_4	<0.02	18.7	<0.02	<0.02	3.3
SiO_2	118	258	288	295	412
B	2.78	1.67	1.54	1.56	6.56
Al	36.8	44.1	43.4	43.8	5.43
Fe(T)	8.14	17.4	16.5	17.1	0.349
Fe(II)	5.33	17.4	16.5	16.7	0.349
Mn	0.019	0.247	0.145	0.146	0.045
Sr	0.018	0.027	0.025	0.025	0.026
Ba	0.090	0.096	0.100	0.102	0.084
Li	0.003	0.036	0.025	0.026	4.04
Rb	0.0350	0.095	0.091	0.092	0.239
P	<0.04	0.278	0.229	0.240	<0.06
As(T)	0.022	0.095	0.060	0.060	2.39
As(III)	0.006	≥0.067	≥0.045	≥0.046	2.23
Hg (ng/L)	---	508	362	363	59.5
DOC	6.9	6.8	5.7	6.1	0.8
δD (‰)	-114.00	-116.80	-118.70	-119.10	-129.72
$\delta^{18}O$ (‰)	-7.75	-10.60	-11.06	-10.89	-13.47
Charge Imbalance (%)	4.8	-3.5	0.7	-0.2	-3.9
Specific Conductance Balance (%)	-6.8	-0.6	-9.2	-7.3	0.2
Sum Cations (meq/L)	26.6	18.2	14.5	14.4	17.3
Sum Anions (meq/L)	25.3	18.8	14.4	14.5	18.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA162	11WA163	Y10G033	12WA134	13WA147
Area	Sylvan Spring	Sylvan Spring	Sylvan Spring	Sylvan Spring	Monument Geyser Basin
Name and Description	Unnamed slightly turbid hot spring (6 m by 4 m)	Unnamed circular 2m pool	SYL01 - unnamed feature	Unnamed spring south of Bridge Pool	Unnamed acid spring - northernmost sampled in area
Collection Date	9/10/2011	9/10/2011	7/23/2010	9/23/2012	9/22/2013
Collection Time	11:30	12:25	---	13:40	12:30
Latitude	44° 42' 2.2"	44° 42' 0.1"	44° 41' 59.8"	44° 41' 41.7"	44° 41' 6.5"
Longitude	110° 45' 52.6"	110° 45' 52.5"	110° 45' 55.3"	110° 46' 0.6"	110° 45' 11.8"
Map (figure)	8	8	8	8	9
Photograph (appendix)	68	69	---	70	71
pH	6.66	5.62	7.63	6.33	2.31
Specific Conductance (µS/cm)	2039	1494	1382	1091	3066
Temperature (°C)	73.0	82.5	79.9	78.6	84.1
Temperature (Flow Cell, °C)	59.3	63.9	---	67.7	---
Eh (V)	-0.011	0.077	0.370	-0.029	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9995	0.9991	---	0.9990	0.9990
Constituent (mg/L)[1]					
Ca	3.30	3.45	3.49	4.85	1.71
Mg	0.024	<0.02	0.020	0.149	0.115
Na	387	256	260	209	78.1
K	16.9	16.6	15.0	12.1	32.7
Alkalinity (as HCO_3)	391	31.1	---	231	---
Acidity (mN)	---	---	---	---	9.16
Cl	266	286	302	102	79.8
F	15.4	14	9.7	12.2	1.24
Br	1.20	0.80	0.85	0.31	0.21
SO_4	176	143	98.4	127	544
S_2O_3	3.2	7.7	---	15.0	0.1
S_nO_6 (µM / n)	2.6 / 4	6.3 / 4	---	---	1.0 / 7
H_2S	1.77	0.212	0.440	0.571	0.135
NO_3	<0.05	<0.05	<0.1	<0.05	<0.05
NH_4	3.1	4.9	3.3	0.4	8.9
SiO_2	288	321	291	262	251
B	4.53	4.84	4.94	1.79	1.99
Al	0.100	0.537	0.510	0.193	10.6
Fe(T)	<0.002	0.003	0.065	0.009	4.23
Fe(II)	<0.002	0.003	0.063	0.005	4.16
Mn	0.014	0.032	0.033	0.084	0.019
Sr	0.017	0.013	0.012	0.011	0.014
Ba	0.013	0.030	0.021	0.031	0.072
Li	2.98	2.16	2.75	0.684	0.684
Rb	0.183	0.121	---	0.104	0.185
P	0.006	0.010	---	<0.2	<0.04
As(T)	1.30	1.56	1.58	0.488	0.397
As(III)	≥0.621	1.56	1.55	≥0.274	0.385
Hg (ng/L)	702	469	---	672	178
DOC	2.0	1.9	---	1.0	2.2
δD (‰)	-124.41	-126.17	-123.00	-131.50	-118.80
$\delta^{18}O$ (‰)	-11.33	-12.68	-11.10	-13.30	-10.27
Charge Imbalance (%)	-2.1	0.7	11.0	-1.7	-6.1
Specific Conductance Balance (%)	-5.9	-4.2	-3.0	-3.4	-7.2
Sum Cations (meq/L)	17.9	12.2	12.4	9.69	11.0
Sum Anions (meq/L)	18.3	12.2	11.1	9.85	11.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA148	13WA149	13WA150	13WA151	10WA204
Area	Monument Geyser Basin	Monument Geyser Basin	Monument Geyser Basin	Monument Geyser Basin	Gibbon Canyon
Name and Description	Unnamed acid spring (1.5 m diameter)	Unnamed acid spring	Unnamed acid spring - across from trail end on hillslope	Unnamed acid spring - southernmost spring sampled	Beryl Spring
Collection Date	9/22/2013	9/22/2013	9/22/2013	9/22/2013	9/22/2010
Collection Time	14:12	15:25	16:16	17:00	13:30
Latitude	44° 41' 5.6"	44° 41' 4.3"	44° 41' 3.9"	44° 41' 3.2"	44° 40' 43.4"
Longitude	110° 45' 11.3"	110° 45' 10.8"	110° 45' 10.8"	110° 45' 10.3"	110° 44' 44.7"
Map (figure)	9	9	9	9	1
Photograph (appendix)	72	73	74	---	75
pH	2.05	1.92	1.95	1.73	6.88
Specific Conductance (µS/cm)	4619	5721	5015	8400	2198
Temperature (°C)	62.3	66.4	59.7	73.7	90.5
Temperature (Flow Cell, °C)	49.6	55.2	53.5	64.5	79.7
Eh (V)	0.252	0.587	0.551	0.467	-0.073
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9990	0.9994	0.9995	0.9996	0.9994
Constituent (mg/L)[1]					
Ca	0.53	2.00	2.25	1.54	3.69
Mg	0.116	0.241	0.309	0.278	0.01
Na	3.32	16.8	19.4	8.00	407
K	10.9	22.1	25.7	13.3	21.6
Alkalinity (as HCO_3)	---	---	---	---	107
Acidity (mN)	16.8	22.7	23.7	31.8	---
Cl	4.5	5.6	7.9	8.1	572
F	0.86	0.58	0.26	0.14	18.8
Br	<0.04	<0.04	<0.04	<0.04	1.78
SO_4	831	1180	1200	1550	72.0
S_2O_3	<0.05	<0.05	<0.05	<0.05	0.8
S_nO_6 (µM / n)	1.0 / 3	<0.4 / ---	<0.4 / ---	3.7 / 5	---
H_2S	0.111	0.564	0.064	0.396	0.249
NO_3	<0.05	<0.05	<0.05	<0.05	0.03
NH_4	5.7	5.9	3.1	0.4	0.7
SiO_2	139	251	228	201	269
B	0.46	0.25	0.12	0.04	7.51
Al	13.0	36.9	58.5	23.0	0.197
Fe(T)	0.735	4.98	10.0	1.42	0.006
Fe(II)	0.735	2.82	9.89	1.33	0.006
Mn	0.012	0.030	0.027	0.024	0.018
Sr	0.011	0.021	0.028	0.012	0.0082
Ba	0.057	0.060	0.045	0.087	0.0014
Li	0.011	0.018	0.016	0.005	5.77
Rb	0.022	0.097	0.105	0.051	0.327
P	<0.04	<0.04	0.080	<0.04	<0.06
As(T)	0.050	0.040	0.118	0.011	2.92
As(III)	0.050	0.027	0.117	0.011	2.89
Hg (ng/L)	49.8	86.2	73.8	80.7	88.0
DOC	2.4	1.9	4.0	3.1	0.5
δD (‰)	-110.80	-126.20	-112.60	-110.30	-139.51
$\delta^{18}O$ (‰)	-6.80	-13.16	-8.52	-5.49	-14.52
Charge Imbalance (%)	-2.9	-2.7	2.4	0.6	-5.4
Specific Conductance Balance (%)	3.7	-0.2	8.1	0.4	2.8
Sum Cations (meq/L)	11.5	17.3	17.7	23.3	19.3
Sum Anions (meq/L)	11.8	17.8	17.3	23.2	20.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA116	12WA117	12WA118	12WA119	12WA121
Area	Secret Valley Hot Springs	Secret Valley Hot Springs	Secret Valley Hot Springs	Secret Valley Hot Springs	Secret Valley Hot Springs
Name and Description	Unnamed hillside seep	Unnamed hillside seep	Unnamed hillside seep	Unnamed hillside seep	Secret Valley Creek above confluence with 12WA122
Collection Date	9/20/2012	9/20/2012	9/20/2012	9/20/2012	9/20/2012
Collection Time	11:45	12:20	13:03	13:45	15:20
Latitude	44° 40' 17.2"	44° 40' 18.1"	44° 40' 15.9"	44° 40' 17.9"	44° 39' 55.5"
Longitude	110° 47' 9.2"	110° 47' 7.6"	110° 47' 5.6"	110° 47' 0.3"	110° 47' 5.8"
Map (figure)	10	10	10	10	10
Photograph (appendix)	76, 77	78, 80	79, 80	80	81
pH	5.55	8.48	6.00	5.65	7.27
Specific Conductance (µS/cm)	286	279	305	289	180
Temperature (°C)	30.5	35.6	33.5	37.1	11.8
Temperature (Flow Cell, °C)	29.1	32.9	32.5	36.7	17.1
Eh (V)	0.156	0.145	0.147	0.111	0.151
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9986	0.9986	0.9987	0.9985	0.9985
Constituent (mg/L)[1]					
Ca	20.7	22.0	22.0	22.1	13.9
Mg	1.14	1.19	1.20	1.18	1.07
Na	32.5	52.1	34.5	35.1	22.2
K	6.63	6.83	6.92	7.17	4.41
Alkalinity (as HCO_3)	137	157	156	163	90.0
Acidity (mN)	---	---	---	---	---
Cl	1.5	0.7	0.7	0.6	0.6
F	11.4	11.7	11.7	11.5	7.3
Br	<0.05	<0.05	<0.05	<0.05	<0.05
SO_4	1.4	1.2	1.3	1.3	1.0
S_2O_3	<0.1	<0.1	<0.1	<0.1	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.004	0.005	0.004	0.005	0.004
NO_3	0.11	0.25	<0.05	<0.05	<0.05
NH_4	<0.1	<0.1	<0.1	<0.1	<0.1
SiO_2	117	115	117	120	60.9
B	0.017	0.017	0.015	0.020	0.009
Al	3.10	4.18	3.62	3.90	0.257
Fe(T)	0.005	0.004	<0.002	0.004	0.026
Fe(II)	0.003	0.003	<0.002	0.004	0.026
Mn	0.927	3.01	2.09	3.04	0.027
Sr	0.021	0.024	0.023	0.024	0.016
Ba	0.0001	0.0011	0.0015	0.0054	0.0026
Li	0.067	0.070	0.073	0.076	0.042
Rb	0.040	0.040	0.041	0.042	0.0220
P	<0.2	<0.2	<0.2	0.003	<0.2
As(T)	0.0004	0.0007	0.0008	0.0010	0.0003
As(III)	<0.001	<0.001	<0.001	<0.001	<0.001
Hg (ng/L)	7.0	3.7	3.2	3.5	3.0
DOC	1.9	1.0	3.4	0.8	2.3
δD (‰)	-143.50	-143.30	-143.10	-143.80	-139.50
$\delta^{18}O$ (‰)	-19.00	-19.00	-18.90	-19.00	-18.10
Charge Imbalance (%)	6.9	4.2	5.1	5.0	-1.3
Specific Conductance Balance (%)	-10	-4.3	-9.6	-2.4	-1.1
Sum Cations (meq/L)	2.77	2.92	2.98	3.05	1.87
Sum Anions (meq/L)	2.58	2.80	2.83	2.90	1.89

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA123	12WA120	12WA122	10WA113	10WA114
Area	Secret Valley Hot Springs	Secret Valley Hot Springs	Secret Valley Hot Springs	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Secret Valley Creek at mouth	Tributary to Secret Valley Creek - upstream site	Tributary to Secret Valley Creek - downstream site	Azure Spring	Azure Spring - overflow (2 m from pool exit)
Collection Date	9/20/2012	9/20/2012	9/20/2012	5/29/2010	5/29/2010
Collection Time	16:55	14:30	15:40	13:00	14:30
Latitude	44° 39' 31.2"	44° 40' 13.7"	44° 39' 55.6"	44° 33' 39.5"	44° 33' 39.5"
Longitude	110° 46' 9.9"	110° 47' 0.1"	110° 47' 5.8"	110° 49' 55.9"	110° 49' 55.9"
Map (figure)	10	10	10	11	11
Photograph (appendix)	82	83	84	85	---
pH	7.16	5.62	8.10	8.86	8.79
Specific Conductance (µS/cm)	193	286	277	1648	1660
Temperature (°C)	10.7	28.3	18.4	77.2	73.1
Temperature (Flow Cell, °C)	12.0	28.5	19.5	64.5	---
Eh (V)	0.159	0.136	0.139	0.060	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9985	---	0.9986	0.9992	0.9992
Constituent (mg/L)[1]					
Ca	14.4	19.8	17.3	1.22	1.20
Mg	1.10	1.08	0.952	0.02	0.02
Na	24.1	34.3	36.3	303	304
K	4.61	7.36	8.45	13.7	13.6
Alkalinity (as HCO_3)	97.6	150	139	196	188
Acidity (mN)	---	---	---	---	---
Cl	0.7	0.7	0.8	321	327
F	7.2	9.4	9.5	29	29.4
Br	<0.05	<0.05	<0.05	0.96	0.99
SO_4	1.3	1.8	1.9	44.7	45.0
S_2O_3	<0.1	<0.1	<0.1	6.3	5.8
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.004	0.005	0.005	0.023	---
NO_3	<0.05	<0.05	<0.05	<0.1	<0.1
NH_4	<0.1	<0.1	<0.1	0.5	---
SiO_2	66.4	112	96.1	227	227
B	0.010	0.017	0.019	4.13	4.05
Al	0.252	2.02	0.065	0.280	0.220
Fe(T)	0.025	0.003	0.010	<0.002	<0.002
Fe(II)	0.025	0.001	0.010	<0.002	<0.002
Mn	0.017	0.0085	0.0023	0.0047	0.0041
Sr	0.018	0.023	0.020	0.01	0.01
Ba	0.0032	0.0006	0.0014	0.0015	0.0011
Li	0.046	0.073	0.076	2.61	2.51
Rb	0.0240	0.042	0.049	0.156	0.154
P	<0.2	0.004	<0.2	<0.06	<0.06
As(T)	0.0002	0.0006	0.0003	1.52	1.44
As(III)	<0.001	<0.001	<0.001	0.410	---
Hg (ng/L)	1.8	5.2	1.7	52.8	27.3
DOC	2.1	0.6	3.8	1.0	---
δD (‰)	-139.80	-142.90	-138.80	-141.25	-141.18
$\delta^{18}O$ (‰)	-18.20	-18.80	-17.80	-16.52	-16.52
Charge Imbalance (%)	-1.7	-0.5	-5.0	-5.6	-5.6
Specific Conductance Balance (%)	-2.2	-7.3	-4.0	-5.6	-5.7
Sum Cations (meq/L)	1.98	2.77	2.73	13.8	13.9
Sum Anions (meq/L)	2.01	2.78	2.87	14.6	14.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA139	09WA139	09WA140	09WA138	09WA141
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Clepsydra Geyser	Ojo Caliente - source (30 m depth)	Ojo Caliente - source (15 m depth)	Ojo Caliente - source (1 m depth)	Ojo Caliente - pool exit (pool exit)
Collection Date	6/7/2010	9/15/2009	9/15/2009	9/15/2009	9/15/2009
Collection Time	10:25	14:10	15:00	11:00	15:30
Latitude	44° 33' 4.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"
Longitude	110° 48' 28.8"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"
Map (figure)	11	11	11	11	11
Photograph (appendix)	86	---	---	---	---
pH	8.74	7.55	7.41	7.52	7.45
Specific Conductance (µS/cm)	1786	1684	1684	1687	1694
Temperature (°C)	59.1	94.3	94.3	93.5	91.4
Temperature (Flow Cell, °C)	54.1	78.6	72.8	78.4	---
Eh (V)	0.127	-0.104	-0.063	-0.137	-0.144
DO (mg/L)	---	<0.05	---	---	<0.05
Density (g/mL at 20°C)	---	0.9991	0.9990	---	0.9990
Constituent (mg/L)[1]					
Ca	0.39	0.89	0.87	---	0.91
Mg	<0.01	<0.01	<0.01	---	<0.01
Na	348	310	317	---	316
K	14.5	9.55	9.43	---	9.47
Alkalinity (as HCO_3)	358	231	234	234	237
Acidity (mN)	---	---	---	---	---
Cl	326	313	319	330	342
F	19.8	32.3	32.3	32.7	32.4
Br	0.96	0.94	0.96	1.01	0.96
SO_4	22.5	20.6	20.8	20.8	21.0
S_2O_3	---	0.3	0.3	---	0.3
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.031	1.99	2.05	---	1.47
NO_3	<0.1	0.12	0.09	0.09	<0.05
NH_4	---	0.7	0.5	---	0.6
SiO_2	338	245	241	---	242
B	3.51	4.23	4.20	---	4.22
Al	0.351	0.288	0.293	---	0.292
Fe(T)	0.006	<0.002	<0.002	<0.002	<0.002
Fe(II)	0.005	<0.002	<0.002	<0.002	<0.002
Mn	0.0020	0.0010	0.0007	---	0.0008
Sr	<0.00001	0.0060	0.0057	---	0.0066
Ba	0.0004	0.0007	0.0004	---	0.0005
Li	2.44	3.70	3.54	---	3.58
Rb	0.093	0.148	0.150	---	0.148
P	<0.06	<0.06	<0.06	---	<0.06
As(T)	2.41	1.52	1.54	---	1.50
As(III)	1.01	≥1.17	≥1.23	---	≥1.28
Hg (ng/L)	---	97.2	69.9	---	56.4
DOC	---	6.7	3.3	---	0.8
δD (‰)	-142.69	-141.34	-141.39	---	-141.59
$\delta^{18}O$ (‰)	-16.25	-16.45	-16.54	---	-16.45
Charge Imbalance (%)	-4.7	-3.2	-2.7	---	-7.5
Specific Conductance Balance (%)	-5.4	-5.7	-4.0	---	-2.0
Sum Cations (meq/L)	15.7	14.3	14.6	---	14.5
Sum Anions (meq/L)	16.4	14.7	15.0	---	15.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA142	09WA143	09WA144	09WA145	09WA146
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (3.6 m from pool exit)	Ojo Caliente - overflow (8.1 m from pool exit)	Ojo Caliente - overflow (11.7 m from pool exit)	Ojo Caliente - overflow (15 m from pool exit)	Ojo Caliente - overflow (20 m from pool exit)
Collection Date	9/15/2009	9/15/2009	9/15/2009	9/15/2009	9/15/2009
Collection Time	16:00	16:20	16:40	17:00	17:20
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	89	---	---	---	---
pH	7.52	7.64	7.71	7.79	7.90
Specific Conductance (µS/cm)	1700	1704	1704	1708	1731
Temperature (°C)	88.7	85.5	82.5	78.3	74.1
Temperature (Flow Cell, °C)	---	---	---	---	---
Eh (V)	-0.187	-0.169	-0.164	-0.150	-0.134
DO (mg/L)	<0.05	0.08	0.18	0.7	2.3
Density (g/mL at 20°C)	0.9990	0.9990	0.9990	0.9990	0.9990
Constituent (mg/L)[1]					
Ca	0.90	0.89	0.88	0.90	0.88
Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Na	322	329	329	322	329
K	9.67	10.0	9.84	9.68	9.73
Alkalinity (as HCO_3)	238	239	240	241	244
Acidity (mN)	---	---	---	---	---
Cl	337	343	351	354	311
F	32.4	32.7	32.6	32.7	33.1
Br	0.85	0.87	0.94	0.91	0.98
SO_4	20.6	20.9	20.1	20.6	21.4
S_2O_3	0.3	0.4	0.4	0.6	0.7
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	1.28	0.991	0.940	0.677	0.418
NO_3	<0.05	<0.05	<0.05	0.10	<0.05
NH_4	0.5	0.6	0.7	0.7	0.6
SiO_2	257	238	248	238	251
B	4.31	4.41	4.34	4.29	4.33
Al	0.290	0.287	0.282	0.287	0.283
Fe(T)	<0.002	<0.002	<0.002	<0.002	<0.002
Fe(II)	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	0.0008	0.0009	0.0011	0.0009	0.0010
Sr	0.0059	0.0061	0.0070	0.0062	0.0068
Ba	0.0005	0.0004	0.0003	0.0004	0.0006
Li	3.60	4.78	3.70	3.65	3.67
Rb	0.148	0.157	0.152	0.149	0.149
P	<0.06	<0.06	<0.06	<0.06	<0.06
As(T)	1.41	1.46	1.57	1.48	1.51
As(III)	1.38	1.45	1.39	1.48	1.38
Hg (ng/L)	49.0	47.4	46.6	39.9	36.1
DOC	0.7	0.7	0.7	0.7	0.8
δD (‰)	-142.01	-141.12	-140.64	-141.19	-140.57
$\delta^{18}O$ (‰)	-16.29	-16.33	-16.36	-16.29	-16.21
Charge Imbalance (%)	-4.8	-2.9	-5.4	-8.2	1.1
Specific Conductance Balance (%)	-2.3	-0.6	-0.2	-1.0	-6.2
Sum Cations (meq/L)	14.8	15.3	15.1	14.8	15.1
Sum Anions (meq/L)	15.5	15.7	16.0	16.1	14.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA147	10WA106	10WA176	10WA177	10WA178
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (26 m from pool exit)	Ojo Caliente - source (1 m depth)	Ojo Caliente - source (30 m depth)	Ojo Caliente - source (15 m depth)	Ojo Caliente - source (1 m depth)
Collection Date	9/15/2009	5/29/2010	9/17/2010	9/17/2010	9/17/2010
Collection Time	17:40	14:36	10:45	12:00	14:10
Latitude	---	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"
Longitude	---	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"
Map (figure)	11	11	11	11	11
Photograph (appendix)	90	---	---	---	---
pH	8.19	7.57	7.68	7.55	7.72
Specific Conductance (µS/cm)	1746	1696	1600	1600	1633
Temperature (°C)	64.8	93.3	---	---	93.8
Temperature (Flow Cell, °C)	---	73.8	81.8	73.7	85.4
Eh (V)	-0.117	-0.080	-0.208	-0.098	-0.152
DO (mg/L)	4.2	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9992	0.9991	0.9991	0.9992
Constituent (mg/L)[1]					
Ca	0.92	0.87	0.83	0.85	0.84
Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Na	318	311	313	312	310
K	9.90	9.41	9.42	9.74	9.45
Alkalinity (as HCO_3)	247	233	227	235	237
Acidity (mN)	---	---	---	---	---
Cl	328	330	327	337	334
F	33.5	31.2	33.3	33.5	33.9
Br	0.92	1.02	1.03	1.04	1.03
SO_4	21.4	27.7	23.7	30.7	24.8
S_2O_3	0.5	0.3	0.5	0.5	0.4
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.130	1.39	1.91	1.71	1.93
NO_3	<0.05	<0.1	0.10	<0.1	<0.1
NH_4	0.6	0.7	0.7	0.7	0.6
SiO_2	245	255	238	218	228
B	4.47	4.24	4.19	4.23	4.22
Al	0.288	0.273	0.254	0.274	0.273
Fe(T)	<0.002	<0.002	<0.002	<0.002	<0.002
Fe(II)	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	0.0011	0.0007	0.0012	0.0007	0.0008
Sr	0.0068	0.0071	0.0074	0.0074	0.0083
Ba	0.0003	0.0003	0.0005	0.0003	0.0004
Li	3.73	3.70	4.51	3.77	3.74
Rb	0.159	0.149	0.147	0.147	0.148
P	<0.06	<0.06	<0.06	<0.06	<0.06
As(T)	1.53	1.41	1.31	1.36	1.30
As(III)	0.656	---	1.29	1.34	1.24
Hg (ng/L)	27.8	30.6	43.4	76.7	31.1
DOC	0.7	0.9	2.7	1.8	0.8
δD (‰)	-139.74	-140.60	-141.60	-141.22	-140.89
$\delta^{18}O$ (‰)	-15.98	-16.34	-16.71	-16.61	-16.45
Charge Imbalance (%)	-5.7	-6.8	-4.4	-9.0	-8.9
Specific Conductance Balance (%)	-6.7	-3.9	1.5	3.1	0.5
Sum Cations (meq/L)	14.6	14.3	14.5	14.4	14.3
Sum Anions (meq/L)	15.5	15.3	15.2	15.8	15.6

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA177	11WA178	11WA179	11WA180	11WA181
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - source (0.5 m depth)	Ojo Caliente - source (30 m depth)	Ojo Caliente - source (15 m depth)	Ojo Caliente - source (1 m depth)	Ojo Caliente - pool exit (pool exit)
Collection Date	9/14/2011	9/14/2011	9/14/2011	9/14/2011	9/14/2011
Collection Time	10:12	9:55	12:15	13:15	13:45
Latitude	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"
Longitude	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	88
pH	---	7.53	7.52	7.27	7.71
Specific Conductance (µS/cm)	1695	---	1675	1685	1635
Temperature (°C)	94.2	---	---	---	92.5
Temperature (Flow Cell, °C)	---	64.0	64.8	68.2	80.5
Eh (V)	---	-0.085	-0.062	-0.076	-0.093
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	0.9992	0.9991	0.9991	0.9991
Constituent (mg/L)[1]					
Ca	---	0.84	0.83	0.84	0.86
Mg	---	<0.02	<0.02	<0.02	<0.02
Na	---	315	313	314	313
K	---	9.07	9.08	8.99	8.92
Alkalinity (as HCO_3)	---	222	249	233	235
Acidity (mN)	---	---	---	---	---
Cl	---	308	310	311	321
F	---	31.2	31.5	31.7	32
Br	---	1.30	1.20	1.70	1.00
SO_4	---	23.1	23.1	19.1	21.2
S_2O_3	---	2.5	---	0.6	0.4
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	1.86	1.94	---	1.72	1.47
NO_3	---	<0.05	<0.05	0.20	<0.05
NH_4	---	<0.1	---	<0.1	<0.1
SiO_2	---	234	215	243	233
B	---	4.31	4.28	4.33	4.33
Al	---	0.247	0.264	0.267	0.268
Fe(T)	---	0.004	<0.002	0.003	0.003
Fe(II)	---	---	---	<0.002	0.003
Mn	---	0.0007	0.0009	0.0008	0.0009
Sr	---	0.0064	0.0063	0.0067	0.0067
Ba	---	0.0006	0.0003	0.0003	0.0003
Li	---	3.39	3.41	3.39	3.37
Rb	---	0.189	0.187	0.188	0.188
P	---	<0.05	<0.05	<0.05	<0.05
As(T)	---	1.41	1.44	1.45	1.45
As(III)	---	≥0.818	≥0.777	≥1.07	≥0.981
Hg (ng/L)	---	1490	---	90.2	63.9
DOC	---	1.9	---	1.4	1.1
δD (‰)	---	-142.92	-141.03	-139.47	-141.15
$\delta^{18}O$ (‰)	---	-17.41	-16.49	-16.25	-16.32
Charge Imbalance (%)	---	-0.1	-4.1	-1.9	-4.8
Specific Conductance Balance (%)	---	-7.3	-5.4	-6.4	-1.7
Sum Cations (meq/L)	---	14.4	14.4	14.4	14.3
Sum Anions (meq/L)	---	14.5	15.0	14.7	15.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA182	11WA183	11WA184	11WA185	11WA186
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (3.8 m from pool exit)	Ojo Caliente - overflow (6 m from pool exit)	Ojo Caliente - overflow (10 m from pool exit)	Ojo Caliente - overflow (15 m from pool exit)	Ojo Caliente - overflow (21 m from pool exit)
Collection Date	9/14/2011	9/14/2011	9/14/2011	9/14/2011	9/14/2011
Collection Time	14:10	14:30	14:50	15:40	16:20
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	---
pH	7.63	7.81	8.05	8.03	8.13
Specific Conductance (µS/cm)	1708	1722	---	1726	1741
Temperature (°C)	88.2	86.7	---	80.6	74.8
Temperature (Flow Cell, °C)	78.8	75.9	68.2	71.1	63.7
Eh (V)	-0.085	-0.067	-0.034	-0.026	0.037
DO (mg/L)	---	---	---	0.7	2.2
Density (g/mL at 20°C)	0.9991	0.9991	0.9991	0.9991	0.9992
Constituent (mg/L)[1]					
Ca	0.84	0.84	0.85	0.85	0.85
Mg	<0.02	<0.02	<0.02	<0.02	<0.02
Na	317	314	317	319	324
K	9.33	9.25	9.08	9.36	9.39
Alkalinity (as HCO_3)	237	251	238	240	244
Acidity (mN)	---	---	---	---	---
Cl	314	315	313	318	322
F	32	32.1	32.1	32.8	32.8
Br	1.20	1.30	1.30	1.80	1.20
SO_4	21.3	21.0	21.0	20.7	22.1
S_2O_3	0.4	0.4	0.7	0.7	0.5
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	1.62	1.17	0.930	0.538	0.219
NO_3	<0.05	<0.05	0.20	<0.05	<0.05
NH_4	<0.1	<0.1	<0.1	<0.1	<0.1
SiO_2	232	234	250	251	251
B	4.38	4.37	4.42	4.47	4.48
Al	0.271	0.269	0.272	0.274	0.275
Fe(T)	0.004	0.003	0.004	0.002	<0.002
Fe(II)	0.004	0.003	0.003	0.002	<0.002
Mn	0.0009	0.0009	0.0009	0.0008	0.0008
Sr	0.0067	0.0066	0.0068	0.0069	0.0067
Ba	0.0003	0.0003	0.0003	0.0003	0.0003
Li	3.39	3.41	3.37	3.47	3.44
Rb	0.190	0.190	0.191	0.195	0.194
P	<0.05	<0.05	0.052	<0.05	<0.05
As(T)	1.32	1.39	1.47	1.53	1.49
As(III)	1.28	1.39	1.40	1.51	1.07
Hg (ng/L)	45.6	53.5	45.8	16.3	18.1
DOC	1.1	1.1	1.4	1.2	1.0
δD (‰)	-141.06	-141.32	-140.63	-139.93	-139.49
$\delta^{18}O$ (‰)	-16.31	-16.30	-16.25	-16.12	-16.03
Charge Imbalance (%)	-2.4	-5.0	-2.3	-3.0	-2.9
Specific Conductance Balance (%)	-6.1	-6.7	-8.9	-6.7	-6.5
Sum Cations (meq/L)	14.5	14.4	14.5	14.6	14.8
Sum Anions (meq/L)	14.9	15.1	14.8	15.0	15.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA187	12WA155	12WA156	12WA157	12WA158
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (32 m from pool exit)	Ojo Caliente - source (30 m depth)	Ojo Caliente - source (15 m depth)	Ojo Caliente - source (0.05 m depth)	Ojo Caliente - pool exit (pool exit)
Collection Date	9/14/2011	9/26/2012	9/26/2012	9/26/2012	9/26/2012
Collection Time	16:42	10:45	11:30	12:00	12:30
Latitude	---	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	---
Longitude	---	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	87	---	---	---
pH	8.43	7.60	7.60	7.68	7.63
Specific Conductance (µS/cm)	1756	1593	1584	1635	1634
Temperature (°C)	65.3	---	---	---	---
Temperature (Flow Cell, °C)	47.0	74.2	72.7	93.1	92.2
Eh (V)	0.119	---	---	---	---
DO (mg/L)	2.8	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9991	0.9991	0.9990	0.9991
Constituent (mg/L)[1]					
Ca	0.87	0.86	0.85	0.89	0.87
Mg	<0.02	<0.003	<0.003	<0.003	<0.003
Na	324	301	301	309	313
K	9.36	8.78	8.83	9.20	9.03
Alkalinity (as HCO_3)	245	220	226	227	226
Acidity (mN)	---	---	---	---	---
Cl	321	309	312	317	325
F	33.6	30.2	30.6	30.8	30.8
Br	1.30	0.98	0.87	1.15	1.04
SO_4	22.6	24.2	23.8	23.3	26.6
S_2O_3	0.3	2.6	1.7	1.0	0.4
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.084	1.32	1.32	0.620	0.639
NO_3	<0.05	<0.05	<0.05	<0.05	<0.05
NH_4	<0.1	<0.1	<0.1	<0.1	<0.1
SiO_2	254	211	203	213	216
B	4.54	3.92	3.91	4.09	4.08
Al	0.279	0.255	0.267	0.280	0.260
Fe(T)	<0.002	0.014	0.011	0.034	0.007
Fe(II)	<0.002	0.014	0.004	0.028	0.001
Mn	0.0009	0.0007	0.0008	0.0010	0.0008
Sr	0.0071	0.0065	0.0064	0.0065	0.0066
Ba	0.0003	0.0003	0.0003	0.0003	0.0004
Li	3.52	3.53	3.55	3.76	3.77
Rb	0.199	0.208	0.208	0.215	0.213
P	<0.05	<0.2	<0.2	<0.2	<0.2
As(T)	1.63	1.19	0.944	1.45	1.44
As(III)	0.589	≥0.507	≥0.652	≥1.13	≥1.13
Hg (ng/L)	14.4	370	271	156	65.6
DOC	1.1	1.3	1.1	0.7	1.0
δD (‰)	-138.70	-140.80	-140.70	-141.40	-140.80
$\delta^{18}O$ (‰)	-15.80	-16.30	-16.30	-16.70	-16.50
Charge Imbalance (%)	-3.1	-4.0	-5.4	-3.7	-4.3
Specific Conductance Balance (%)	-7.9	-3.1	-2.0	-2.7	-1.1
Sum Cations (meq/L)	14.8	13.8	13.8	14.2	14.4
Sum Anions (meq/L)	15.3	14.4	14.6	14.7	15.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	12WA159	12WA160	12WA161	12WA162	12WA163
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (4.3 m from pool exit)	Ojo Caliente - overflow (9.8 m from pool exit)	Ojo Caliente - overflow (15 m from pool exit)	Ojo Caliente - overflow (20 m from pool exit)	Ojo Caliente - overflow (31 m from pool exit)
Collection Date	9/26/2012	9/26/2012	9/26/2012	9/26/2012	9/26/2012
Collection Time	13:00	13:30	14:00	14:30	15:00
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	---
pH	7.73	7.81	7.88	8.02	8.26
Specific Conductance (µS/cm)	1640	1649	1649	1673	1694
Temperature (°C)	---	---	---	---	---
Temperature (Flow Cell, °C)	87.9	85.6	83.5	75.5	66.0
Eh (V)	---	---	---	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9992	0.9991	0.9992	0.9991
Constituent (mg/L)[1]					
Ca	0.88	0.90	0.89	0.91	0.92
Mg	<0.003	<0.003	<0.003	<0.003	<0.003
Na	309	310	318	319	327
K	9.11	9.16	9.35	9.27	9.62
Alkalinity (as HCO_3)	234	233	236	238	241
Acidity (mN)	---	---	---	---	---
Cl	322	322	321	325	333
F	31.3	31.5	31.6	32.4	32.9
Br	1.05	1.08	1.05	1.05	1.07
SO_4	22.3	21.9	22.3	22.4	23.3
S_2O_3	0.4	0.4	0.5	0.6	0.4
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.562	0.480	0.318	0.087	0.039
NO_3	<0.05	<0.05	<0.05	<0.05	<0.05
NH_4	<0.1	<0.1	<0.1	<0.1	<0.1
SiO_2	217	201	209	214	232
B	4.06	4.13	4.16	4.18	4.31
Al	0.271	0.276	0.277	0.280	0.281
Fe(T)	0.009	0.009	0.005	0.005	0.008
Fe(II)	0.009	0.009	0.004	0.005	0.008
Mn	0.0009	0.0009	0.0008	0.0008	0.0008
Sr	0.0067	0.0067	0.0069	0.0067	0.0070
Ba	0.0004	0.0003	0.0003	0.0003	0.0003
Li	3.76	3.74	3.76	3.77	3.84
Rb	0.216	0.219	0.221	0.221	0.224
P	<0.2	<0.2	<0.2	<0.2	<0.2
As(T)	1.45	1.47	1.40	1.49	1.48
As(III)	≥1.25	≥1.31	1.40	1.48	0.662
Hg (ng/L)	61.1	36.9	34.5	17.0	5.7
DOC	0.9	0.7	0.6	0.8	0.6
δD (‰)	-140.40	-141.30	-140.10	-140.00	-137.80
$\delta^{18}O$ (‰)	-16.30	-16.50	-16.30	-16.20	-15.30
Charge Imbalance (%)	-5.4	-5.0	-2.8	-3.7	-3.4
Specific Conductance Balance (%)	-2.4	-2.9	-2.0	-2.9	-2.5
Sum Cations (meq/L)	14.2	14.2	14.6	14.6	15.0
Sum Anions (meq/L)	15.0	15.0	15.0	15.2	15.5

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA122	13WA123	13WA124	13WA125	13WA126
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - source (70 m depth)	Ojo Caliente - source (50 m depth)	Ojo Caliente - source (35 m depth)	Ojo Caliente - source (18 m depth)	Ojo Caliente - source (0.3 m depth)
Collection Date	9/20/2013	9/20/2013	9/20/2013	9/20/2013	9/20/2013
Collection Time	13:00	13:50	15:00	15:25	15:50
Latitude	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"	44° 33' 46.1"
Longitude	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"	110° 50' 17.2"
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	---
pH	7.96	8.05	7.60	7.74	7.73
Specific Conductance (µS/cm)	1618	1615	1597	1603	1592
Temperature (°C)	---	---	---	---	---
Temperature (Flow Cell, °C)	71.9	69.9	60.7	68.6	58.7
Eh (V)	-0.027	-0.011	0.014	-0.018	0.030
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9991	0.9991	0.9991	0.9992	0.9991
Constituent (mg/L)[1]					
Ca	0.88	0.88	0.87	0.86	0.93
Mg	<0.001	<0.001	<0.001	<0.001	0.002
Na	335	328	326	327	331
K	9.46	9.34	9.27	9.32	9.47
Alkalinity (as HCO_3)	226	227	228	229	233
Acidity (mN)	---	---	---	---	---
Cl	300	297	300	299	301
F	29.6	30.9	31	31	30.3
Br	0.96	0.98	0.95	0.95	0.96
SO_4	22.0	21.8	22.2	22.9	22.0
S_2O_3	0.5	0.4	0.5	0.4	0.5
S_nO_6 (µM / n)	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---	<0.4 / ---
H_2S	1.51	1.64	1.40	1.50	0.809
NO_3	0.09	0.08	0.10	0.11	<0.05
NH_4	<0.05	<0.05	<0.05	<0.05	<0.05
SiO_2	240	230	231	228	228
B	4.06	3.97	3.95	3.94	3.99
Al	0.254	0.255	0.255	0.254	0.257
Fe(T)	0.007	0.014	0.003	0.007	0.007
Fe(II)	0.007	0.012	0.003	0.002	0.007
Mn	0.0005	0.0014	0.0005	0.0006	0.0015
Sr	0.0066	0.0072	0.0064	0.0060	0.0075
Ba	0.0004	0.0004	0.0003	0.0002	0.0005
Li	3.69	3.67	3.66	3.64	3.69
Rb	0.214	0.208	0.212	0.212	0.216
P	<0.04	<0.04	<0.04	<0.04	<0.04
As(T)	1.25	1.38	1.36	1.43	1.53
As(III)	1.25	1.36	1.33	1.42	1.52
Hg (ng/L)	123	149	156	139	211
DOC	7.1	6.6	4.9	3.3	---
δD (‰)	-141.20	-142.20	-141.40	-141.60	-140.30
$\delta^{18}O$ (‰)	-16.73	-16.21	-16.77	-16.80	-16.43
Charge Imbalance (%)	8.8	7.2	5.9	6.1	6.4
Specific Conductance Balance (%)	-2.1	-3.2	-2.1	-2.1	-0.8
Sum Cations (meq/L)	15.3	15.0	15.0	15.0	15.2
Sum Anions (meq/L)	14.1	14.0	14.1	14.1	14.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA126-1	13WA126-2	13WA126-3	13WA126-4	13WA126-5
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - pool exit (pool exit)	Ojo Caliente - overflow (3 m from pool exit)	Ojo Caliente - overflow (6 m from pool exit)	Ojo Caliente - overflow (10 m from pool exit)	Ojo Caliente - overflow (15 m from pool exit)
Collection Date	9/20/2013	9/20/2013	9/20/2013	9/20/2013	9/20/2013
Collection Time	18:00	18:10	18:20	18:30	18:40
Latitude	44° 33' 46.1"	---	---	---	---
Longitude	110° 50' 17.2"	---	---	---	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	---
pH	---	---	---	---	---
Specific Conductance (µS/cm)	---	---	---	---	---
Temperature (°C)	---	---	---	---	---
Temperature (Flow Cell, °C)	---	---	---	---	---
Eh (V)	---	---	---	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	---	---	---	---
Constituent (mg/L)[1]					
Ca	---	---	---	---	---
Mg	---	---	---	---	---
Na	---	---	---	---	---
K	---	---	---	---	---
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	---	---	---	---
Cl	---	---	---	---	---
F	---	---	---	---	---
Br	---	---	---	---	---
SO_4	---	---	---	---	---
S_2O_3	---	---	---	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	---	---	---
NO_3	---	---	---	---	---
NH_4	---	---	---	---	---
SiO_2	---	---	---	---	---
B	---	---	---	---	---
Al	---	---	---	---	---
Fe(T)	---	---	---	---	---
Fe(II)	---	---	---	---	---
Mn	---	---	---	---	---
Sr	---	---	---	---	---
Ba	---	---	---	---	---
Li	---	---	---	---	---
Rb	---	---	---	---	---
P	---	---	---	---	---
As(T)	---	---	---	---	---
As(III)	---	---	---	---	---
Hg (ng/L)	86.4	26.2	55.9	45.6	32.7
DOC	---	---	---	---	---
δD (‰)	---	---	---	---	---
$\delta^{18}O$ (‰)	---	---	---	---	---
Charge Imbalance (%)	---	---	---	---	---
Specific Conductance Balance (%)	---	---	---	---	---
Sum Cations (meq/L)	---	---	---	---	---
Sum Anions (meq/L)	---	---	---	---	---

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA126-6	13WA126-7	09WA132	09WA133	09WA134
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin
Name and Description	Ojo Caliente - overflow (20 m from pool exit)	Ojo Caliente - overflow (30 m from pool exit)	Unnamed Spring, Quagmire Group - source	Unnamed Spring, Quagmire Group - overflow (1.8 m from pool exit)	Unnamed Spring, Quagmire Group - overflow (5.6 m from pool exit)
Collection Date	9/20/2013	9/20/2013	9/14/2009	9/14/2009	9/14/2009
Collection Time	18:50	19:00	16:20	17:00	17:30
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	11	11	11	11	11
Photograph (appendix)	---	---	---	---	---
pH	---	---	8.72	8.75	8.70
Specific Conductance (µS/cm)	---	---	1528	1580	---
Temperature (°C)	---	---	89.3	76.2	68.0
Temperature (Flow Cell, °C)	---	---	81.2	---	---
Eh (V)	---	---	-0.146	-0.163	-0.127
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	---	0.9989	0.9990	0.9990
Constituent (mg/L)[1]					
Ca	---	---	1.20	1.25	1.26
Mg	---	---	<0.01	<0.01	<0.01
Na	---	---	288	300	300
K	---	---	8.50	8.81	8.91
Alkalinity (as HCO_3)	---	---	186	199	203
Acidity (mN)	---	---	---	---	---
Cl	---	---	318	333	330
F	---	---	27.7	29.2	29.3
Br	---	---	0.89	0.88	0.90
SO_4	---	---	19.1	19.6	20.3
S_2O_3	---	---	0.4	0.5	0.5
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	1.49	0.282	0.238
NO_3	---	---	0.11	0.18	<0.05
NH_4	---	---	0.6	0.6	0.7
SiO_2	---	---	229	232	231
B	---	---	3.99	4.14	4.18
Al	---	---	0.256	0.275	0.276
Fe(T)	---	---	<0.002	<0.002	<0.002
Fe(II)	---	---	<0.002	<0.002	<0.002
Mn	---	---	0.0008	0.0017	0.0019
Sr	---	---	0.0037	0.0039	0.0038
Ba	---	---	0.0004	0.0003	0.0006
Li	---	---	2.28	2.37	2.41
Rb	---	---	0.116	0.120	0.120
P	---	---	<0.06	<0.06	<0.06
As(T)	---	---	1.62	1.63	1.64
As(III)	---	---	1.51	1.52	1.19
Hg (ng/L)	22.4	19.4	51.7	33.2	30.5
DOC	---	---	1.2	0.8	1.6
δD (‰)	---	---	-142.40	-140.91	-140.86
$\delta^{18}O$ (‰)	---	---	-16.35	-15.92	-15.71
Charge Imbalance (%)	---	---	-6.2	-6.8	-6.7
Specific Conductance Balance (%)	---	---	-3.1	-2.7	-5.9
Sum Cations (meq/L)	---	---	13.0	13.6	13.6
Sum Anions (meq/L)	---	---	13.8	14.5	14.5

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA135	09WA136	09WA137	09WA150A	09WA150B
Area	Lower Geyser Basin	Lower Geyser Basin	Lower Geyser Basin	Upper Geyser Basin	Upper Geyser Basin
Name and Description	Unnamed Spring, Quagmire Group - overflow (7.0 m from pool exit)	Unnamed Spring, Quagmire Group - overflow (16 m from pool exit)	Unnamed Spring, Quagmire Group - overflow (23 m from pool exit)	Beehive Geyser - outflow	Beehive Geyser - outflow
Collection Date	9/14/2009	9/14/2009	9/14/2009	9/16/2009	9/16/2009
Collection Time	17:45	17:55	18:15	13:24	13:29
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	11	11	11	12	12
Photograph (appendix)	---	---	---	91	---
pH	8.75	8.81	9.11	9.15	9.28
Specific Conductance (µS/cm)	1600	1627	1632	1859	---
Temperature (°C)	67.1	58.6	38.0	---	---
Temperature (Flow Cell, °C)	---	---	---	20.1	---
Eh (V)	-0.103	-0.071	0.002	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9989	0.9989	0.9991	0.9990	0.9992
Constituent (mg/L)[1]					
Ca	1.28	1.27	1.30	0.49	0.49
Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Na	302	312	316	355	351
K	8.99	9.25	9.22	19.6	19.5
Alkalinity (as HCO_3)	204	207	211	168	165
Acidity (mN)	---	---	---	---	---
Cl	332	356	338	412	411
F	29.5	29.8	30.6	27.1	27
Br	0.85	0.98	0.98	1.14	1.15
SO_4	20.3	20.9	22.7	29.8	29.8
S_2O_3	0.5	0.4	0.2	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.144	0.122	0.062	---	---
NO_3	0.16	0.15	0.09	<0.05	<0.05
NH_4	0.5	0.5	0.6	---	---
SiO_2	245	242	249	292	292
B	4.18	4.27	4.35	4.65	4.61
Al	0.280	0.274	0.201	0.095	0.099
Fe(T)	<0.002	<0.002	<0.002	0.002	<0.002
Fe(II)	<0.002	<0.002	<0.002	0.002	<0.002
Mn	0.0020	0.0019	0.0016	0.0008	0.0007
Sr	0.0036	0.0041	0.0031	0.0014	<0.00001
Ba	0.0004	0.0003	0.0004	0.0013	0.0013
Li	2.43	2.46	2.53	5.13	4.98
Rb	0.120	0.124	0.123	0.234	0.228
P	<0.06	<0.06	<0.06	<0.06	<0.06
As(T)	1.67	1.75	1.73	1.45	1.53
As(III)	1.09	0.762	0.280	1.07	1.20
Hg (ng/L)	30.2	18.0	16.7	---	---
DOC	0.9	1.0	1.3	---	---
δD (‰)	-141.06	-139.24	-138.90	---	---
$\delta^{18}O$ (‰)	-15.82	-15.21	-14.87	---	---
Charge Imbalance (%)	-6.6	-8.5	-4.8	1.6	0.9
Specific Conductance Balance (%)	-3.8	-1.4	-4.5	-5.2	-5.2
Sum Cations (meq/L)	13.7	14.1	14.4	16.7	16.5
Sum Anions (meq/L)	14.6	15.4	15.1	16.4	16.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA157	09WA148	09WA151	09WA152	09WA153
Area	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin
Name and Description	Giant Geyser - outflow	Grand Geyser - outflow	Grotto Geyser - main outflow	Grotto Geyser - main outflow	Grotto Geyser - main outflow
Collection Date	9/16/2009	9/16/2009	9/16/2009	9/16/2009	9/16/2009
Collection Time	15:00	12:00	16:15	16:20	15:25
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	12	12	12	12	12
Photograph (appendix)	92	93	94	---	---
pH	9.23	9.49	9.32	9.31	9.30
Specific Conductance (µS/cm)	2091	2010	2059	2060	2044
Temperature (°C)	---	---	---	---	---
Temperature (Flow Cell, °C)	30.0	20.5	28.9	29.4	31.3
Eh (V)	---	---	---	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9996	0.9993	0.9994	0.9994
Constituent (mg/L)[1]					
Ca	0.44	0.46	0.32	0.37	0.31
Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Na	433	381	407	418	408
K	18.5	19.3	16.9	16.9	17.4
Alkalinity (as HCO_3)	595	370	561	564	557
Acidity (mN)	---	---	---	---	---
Cl	297	363	299	303	296
F	30.9	32.1	31.2	31.4	30.9
Br	0.80	0.94	0.74	0.86	0.91
SO_4	13.5	18.8	13.9	14.4	13.8
S_2O_3	---	---	---	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	---	---	---
NO_3	<0.05	<0.05	0.07	<0.05	<0.05
NH_4	---	---	---	---	---
SiO_2	284	334	272	279	286
B	3.14	4.09	3.17	3.09	3.04
Al	0.344	0.309	0.388	0.394	0.384
Fe(T)	<0.002	<0.002	0.002	<0.002	<0.002
Fe(II)	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	0.0027	0.0013	0.0005	0.0006	0.0006
Sr	0.0063	0.0040	0.0058	0.0056	0.0057
Ba	0.0017	0.0035	0.0017	0.0015	0.0020
Li	4.41	4.53	4.22	4.30	4.22
Rb	0.123	0.143	0.111	0.111	0.115
P	<0.06	<0.06	<0.06	<0.06	<0.06
As(T)	1.50	1.70	1.45	1.46	1.39
As(III)	0.242	0.438	0.296	0.264	0.391
Hg (ng/L)	---	---	---	---	---
DOC	---	---	---	---	---
δD (‰)	---	---	---	---	---
$\delta^{18}O$ (‰)	---	---	---	---	---
Charge Imbalance (%)	-0.6	-3.8	-4.4	-2.8	-3.3
Specific Conductance Balance (%)	-6.4	-9.9	-8.5	-7.0	-8.1
Sum Cations (meq/L)	19.7	17.7	18.5	19.0	18.6
Sum Anions (meq/L)	19.8	18.3	19.4	19.6	19.2

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA155	09WA154	09WA156	09WA149	09WA159
Area	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin	Upper Geyser Basin
Name and Description	Grotto Geyser - main outflow	Grotto Geyser - west outflow	Grotto Geyser - west outflow	Lion Geyser - outflow	Old Faithful Geyser - outflow
Collection Date	9/16/2009	9/16/2009	9/16/2009	9/16/2009	9/16/2009
Collection Time	14:30	15:30	14:35	13:05	17:12
Latitude	---	---	---	---	---
Longitude	---	---	---	---	---
Map (figure)	12	12	12	12	12
Photograph (appendix)	---	---	---	95	96
pH	9.44	9.32	9.43	9.60	9.36
Specific Conductance (µS/cm)	2039	2112	2109	2149	2403
Temperature (°C)	---	---	---	---	---
Temperature (Flow Cell, °C)	29.0	30.4	29.1	20.5	22.3
Eh (V)	---	---	---	---	---
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	0.9994	0.9994	0.9992	0.9993
Constituent (mg/L)[1]					
Ca	0.30	0.33	0.29	0.38	0.86
Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Na	407	428	433	426	465
K	17.4	18.1	17.7	23.6	28.0
Alkalinity (as HCO_3)	555	577	578	189	222
Acidity (mN)	---	---	---	---	---
Cl	295	314	306	496	568
F	31.3	32.2	32.3	32.7	36.4
Br	0.80	0.90	0.89	1.32	1.56
SO_4	12.5	14.0	14.0	22.6	19.8
S_2O_3	---	---	---	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	---	---	---
NO_3	<0.05	0.13	0.06	<0.05	<0.05
NH_4	---	---	---	---	---
SiO_2	285	295	297	366	377
B	3.11	3.21	3.22	5.55	6.08
Al	0.370	0.375	0.341	0.349	0.426
Fe(T)	<0.002	0.003	0.003	<0.002	<0.002
Fe(II)	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	0.0012	0.0006	0.0005	0.0009	0.0008
Sr	0.0055	0.0057	0.0062	<0.00001	0.0035
Ba	0.0029	0.0017	0.0020	0.0012	0.0015
Li	4.20	4.43	4.48	6.00	6.98
Rb	0.117	0.118	0.120	0.279	0.345
P	<0.06	0.026	<0.06	0.023	<0.06
As(T)	1.46	1.43	1.49	1.67	2.02
As(III)	0.539	0.269	0.357	1.47	0.878
Hg (ng/L)	---	---	---	---	---
DOC	---	---	---	---	---
δD (‰)	---	---	---	---	---
$\delta^{18}O$ (‰)	---	---	---	---	---
Charge Imbalance (%)	-3.2	-3.1	-1.0	3.6	-0.2
Specific Conductance Balance (%)	-8.6	-7.0	-7.5	-6.0	-4.4
Sum Cations (meq/L)	18.5	19.5	19.7	20.0	22.0
Sum Anions (meq/L)	19.1	20.1	19.9	19.3	22.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA160	09WA158	09WA131	13WA175	09WA130
Area	Upper Geyser Basin	Upper Geyser Basin	Lone Star Geyser	Lone Star Geyser	Lone Star Geyser
Name and Description	Old Faithful Geyser - outflow	Sawmill Geyser - outflow	Lone Star Geyser - outflow near Geyser	Lone Star Geyser - outflow near Firehole River	Firehole River above Lonestar Geyser
Collection Date	9/16/2009	9/16/2009	9/14/2009	9/24/2013	9/14/2009
Collection Time	17:17	16:25	17:40	13:05	15:00
Latitude	---	---	44° 25' 6.1"	---	44° 25' 1.4"
Longitude	---	---	110° 48' 19.9"	---	110° 48' 25.6"
Map (figure)	12	12	1	1	1
Photograph (appendix)	---	97	98	---	99
pH	9.40	9.08	9.14	9.31	7.55
Specific Conductance (µS/cm)	2260	2033	2025	2037	81
Temperature (°C)	---	---	---	18.4	---
Temperature (Flow Cell, °C)	20.8	31.0	36.7	18.4	20.5
Eh (V)	---	---	0.452	---	0.329
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9993	0.9993	0.9991	0.9993	0.9983
Constituent (mg/L)[1]					
Ca	0.80	0.44	1.18	1.51	3.21
Mg	<0.01	<0.01	<0.01	0.015	0.36
Na	444	398	398	408	10.1
K	26.5	18.0	20.2	19.4	3.23
Alkalinity (as HCO_3)	217	383	192	212	22.6
Acidity (mN)	---	---	---	---	---
Cl	557	369	514	498	7.6
F	34.6	31.1	17.4	17.7	2
Br	1.36	1.10	1.36	1.59	<0.05
SO_4	17.8	18.5	22.4	29.6	1.7
S_2O_3	---	---	0.4	---	---
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	---	0.426	---	---
NO_3	<0.05	<0.05	0.28	<0.05	0.09
NH_4	---	---	0.9	---	<0.1
SiO_2	391	337	383	251	41.3
B	5.72	4.01	5.32	5.17	0.103
Al	0.450	0.332	0.227	0.233	0.025
Fe(T)	<0.002	<0.002	<0.002	0.008	0.017
Fe(II)	<0.002	<0.002	<0.002	---	0.006
Mn	0.0006	0.0010	0.0007	0.0035	0.0038
Sr	0.0034	0.0025	0.024	0.024	0.0047
Ba	0.0011	0.0017	0.0008	0.0012	0.0017
Li	6.62	4.66	2.86	2.87	0.036
Rb	0.322	0.132	0.171	0.292	0.0170
P	<0.06	<0.06	<0.06	<0.04	<0.06
As(T)	1.94	1.79	1.54	1.41	0.019
As(III)	0.812	0.353	1.38	---	0.005
Hg (ng/L)	---	---	16.1	---	5.1
DOC	---	---	0.7	---	1.0
δD (‰)	---	---	-136.32	---	-133.69
$\delta^{18}O$ (‰)	---	---	-15.19	---	-18.08
Charge Imbalance (%)	-2.5	-1.6	-4.0	-2.1	-1.3
Specific Conductance Balance (%)	-1.9	-6.8	-1.4	-1.0	-2.7
Sum Cations (meq/L)	21.0	18.4	18.3	18.7	0.72
Sum Anions (meq/L)	21.5	18.7	19.1	19.1	0.73

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA174	12WA113	12WA114	12WA115	09WA120
Area	Lone Star Geyser	Forest Springs	Forest Springs	Forest Springs	Crater Hills
Name and Description	Firehole River above Lonestar Geyser	Unnamed spring near Clear Lake Trail	Unnamed mud pot near Clear Lake Trail	Unnamed spring	Sulphur Spring
Collection Date	9/24/2013	9/18/2012	9/18/2012	9/18/2012	9/10/2009
Collection Time	12:30	12:10	13:15	14:52	16:55
Latitude	44° 25' 0.1"	44° 42' 54.2"	44° 42' 54.4"	44° 42' 44.5"	44° 39' 17.2"
Longitude	110° 48' 27.3"	110° 28' 24.6"	110° 28' 26.5"	110° 28' 25.6"	110° 28' 51.3"
Map (figure)	1	13	13	13	14
Photograph (appendix)	---	100	101	102	103
pH	6.90	2.04	2.15	1.98	3.93
Specific Conductance (µS/cm)	95	4686	---	5349	3929
Temperature (°C)	11.0	53.4	42.0	74.1	88.2
Temperature (Flow Cell, °C)	---	49.5	38.0	49.7	78.0
Eh (V)	---	0.255	---	0.222	-0.028
DO (mg/L)	---	---	---	---	<0.05
Density (g/mL at 20°C)	0.9983	0.9997	---	0.9995	1.0003
Constituent (mg/L)[1]					
Ca	3.47	2.44	6.00	3.66	6.76
Mg	0.367	3.08	5.87	4.85	0.37
Na	13.6	4.65	14.0	3.50	662
K	3.48	12.1	20.9	7.43	148
Alkalinity (as HCO_3)	25.1	---	---	---	---
Acidity (mN)	---	23.7	---	20.7	1.81
Cl	11.1	2.6	3.9	2.1	958
F	2.26	0.7	1.6	0.1	37.9
Br	<0.04	<0.05	<0.05	<0.05	2.48
SO_4	3.0	1140	1420	1050	470
S_2O_3	---	<0.1	---	<0.1	1.3
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	1.62	---	0.267	0.992
NO_3	0.09	0.09	0.97	0.09	<0.05
NH_4	---	16.0	131	11.4	14.0
SiO_2	47.4	244	359	210	735
B	0.150	<0.02	<0.06	<0.02	23.5
Al	0.033	60.9	78.1	24.0	6.79
Fe(T)	0.028	17.5	20.9	9.69	0.134
Fe(II)	---	17.5	---	9.62	0.134
Mn	0.0071	0.094	0.134	0.150	0.242
Sr	0.0049	0.052	0.069	0.027	0.129
Ba	0.0019	0.038	0.053	0.082	0.090
Li	0.052	0.011	0.045	0.015	6.68
Rb	0.0190	0.063	0.129	0.069	1.19
P	<0.04	0.363	0.277	0.121	0.087
As(T)	0.029	0.017	0.058	0.012	6.02
As(III)	---	0.017	---	0.002	5.40
Hg (ng/L)	---	28.0	---	111	5.0
DOC	---	9.4	---	2.5	1.0
δD (‰)	---	-100.00	---	-119.80	-127.07
$\delta^{18}O$ (‰)	---	-5.03	---	-10.50	-12.35
Charge Imbalance (%)	0.0	6.1	5.7	-8.9	-7.5
Specific Conductance Balance (%)	1.8	-5.6	---	-4.1	4.8
Sum Cations (meq/L)	0.89	15.5	21.0	14.9	34.4
Sum Anions (meq/L)	0.89	14.6	19.8	16.3	37.1

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA126	Y10G015	Y10G038	10WA188	12WA147
Area	Crater Hills	Crater Hills	Crater Hills	Crater Hills	Crater Hills
Name and Description	Sulphur Spring	Sulphur Spring	Sulphur Spring	Sulphur Spring	Sulphur Spring
Collection Date	6/4/2010	6/30/2010	7/26/2010	9/19/2010	9/25/2012
Collection Time	14:30	---	---	13:30	14:30
Latitude	44° 39' 17.2"	44° 39' 17.2"	44° 39' 17.2"	44° 39' 17.2"	44° 39' 17.2"
Longitude	110° 28' 51.3"	110° 28' 51.3"	110° 28' 51.3"	110° 28' 51.3"	110° 28' 51.3"
Map (figure)	14	14	14	14	14
Photograph (appendix)	---	---	---	---	---
pH	3.30	3.12	3.66	3.93	3.79
Specific Conductance (µS/cm)	3786	3960	3879	3804	3797
Temperature (°C)	86.5	86.0	87.1	89.0	88.9
Temperature (Flow Cell, °C)	67.9	---	---	74.5	73.0
Eh (V)	0.157	0.130	0.130	0.062	0.102
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	1.0003	---	---	1.0004	1.0006
Constituent (mg/L)[1]					
Ca	6.24	6.41	6.91	6.31	6.37
Mg	0.56	0.610	0.536	0.34	0.475
Na	579	640	653	632	624
K	139	128	141	149	140
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	3.05	---	---	---	2.36
Cl	817	833	882	884	825
F	25.5	33.7	37.6	31.9	27.2
Br	2.50	2.67	2.78	2.63	2.52
SO_4	528	541	515	475	472
S_2O_3	<0.1	---	---	1.5	1.0
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.292	2.04	0.563	0.431	0.452
NO_3	<0.1	<0.1	<0.1	<0.1	<0.05
NH_4	15.5	10.7	12.6	16.1	16.0
SiO_2	731	697	727	689	650
B	22.0	24.6	26.2	24.2	23.8
Al	8.66	9.11	7.86	7.03	6.18
Fe(T)	0.347	0.484	0.357	0.186	0.252
Fe(II)	0.343	0.484	0.351	0.183	0.252
Mn	0.237	0.236	0.253	0.246	0.227
Sr	0.120	0.118	0.121	0.117	0.115
Ba	0.081	0.078	0.080	0.082	0.092
Li	6.32	7.18	7.30	7.02	6.89
Rb	1.13	---	---	1.24	1.14
P	0.070	---	---	<0.06	0.103
As(T)	5.63	5.86	5.94	6.16	5.93
As(III)	5.55	5.83	5.92	≥5.50	5.31
Hg (ng/L)	16.5	---	---	12.5	77.0
DOC	0.5	---	---	0.5	0.7
δD (‰)	-126.18	-127.20	-126.70	-127.53	-124.80
$\delta^{18}O$ (‰)	-12.32	-12.50	-12.30	-12.51	-12.30
Charge Imbalance (%)	-6.3	0.0	-4.0	-4.7	-0.6
Specific Conductance Balance (%)	1.5	3.0	4.0	3.4	0.1
Sum Cations (meq/L)	31.1	33.6	33.9	33.2	32.7
Sum Anions (meq/L)	33.2	33.7	35.4	34.8	32.9

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA129	Y10G014	Y10G037	10WA127	10WA189
Area	Crater Hills	Crater Hills	Crater Hills	Crater Hills	Crater Hills
Name and Description	Sulphur Spring	CH08 - unnamed acid spring downhill from Sulphur Spring	CH08 - unnamed acid spring downhill from Sulphur Spring	CH08 - unnamed acid spring downhill from Sulphur Spring	CH08 - unnamed acid spring downhill from Sulphur Spring
Collection Date	9/21/2013	6/30/2010	7/26/2010	6/4/2010	9/19/2010
Collection Time	13:30	---	---	15:15	14:40
Latitude	44° 39' 17.2"	44° 39' 15.3"	44° 39' 15.3"	44° 39' 15.3"	44° 39' 15.3"
Longitude	110° 28' 51.3"	110° 28' 58.9"	110° 28' 58.9"	110° 28' 58.9"	110° 28' 58.9"
Map (figure)	14	14	14	14	14
Photograph (appendix)	---	---	---	---	---
pH	3.89	3.00	3.04	3.07	3.18
Specific Conductance (µS/cm)	3810	3794	3877	3755	3826
Temperature (°C)	86.4	72.8	73.5	71.0	72.2
Temperature (Flow Cell, °C)	66.7	---	---	56.8	64.7
Eh (V)	0.243	0.210	0.210	0.213	0.147
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	1.0004	---	---	1.0002	1.0004
Constituent (mg/L)[1]					
Ca	6.38	9.46	10.6	9.26	9.61
Mg	0.471	5.85	6.14	5.49	5.55
Na	660	597	614	551	611
K	144	123	134	129	141
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	1.60	---	---	4.16	3.52
Cl	816	771	813	759	832
F	33.6	24.3	26.2	---	---
Br	2.40	2.43	2.44	2.39	2.49
SO_4	463	608	627	607	626
S_2O_3	0.9	---	---	<0.1	0.1
S_nO_6 (µM / n)	<0.4 / ---	---	---	---	---
H_2S	0.838	0.627	0.277	0.041	0.159
NO_3	<0.05	<0.1	<0.1	<0.1	<0.1
NH_4	17.5	10.6	11.8	15.4	16.5
SiO_2	689	420	441	544	427
B	25.5	22.7	23.3	20.8	22.7
Al	6.60	18.2	18.9	18.1	18.7
Fe(T)	0.288	0.386	0.396	0.291	0.288
Fe(II)	0.287	0.375	0.384	0.283	0.287
Mn	0.233	0.566	0.617	0.589	0.608
Sr	0.119	0.101	0.110	0.107	0.110
Ba	0.094	0.074	0.079	0.078	0.082
Li	6.71	6.66	6.67	5.82	6.55
Rb	1.25	---	---	1.000	1.10
P	0.060	---	---	<0.06	<0.06
As(T)	6.05	4.85	4.83	4.48	5.19
As(III)	5.70	4.85	4.76	3.92	5.19
Hg (ng/L)	5.9	---	---	33.9	32.0
DOC	3.2	---	---	1.2	1.1
δD (‰)	-125.00	-118.00	-116.70	-117.39	-116.85
$\delta^{18}O$ (‰)	-12.09	-8.20	-7.90	-8.18	-7.91
Charge Imbalance (%)	4.6	0.0	-2.0	-3.2	-1.1
Specific Conductance Balance (%)	1.3	6.0	7.0	2.9	6.7
Sum Cations (meq/L)	34.4	32.9	33.9	31.3	34.2
Sum Anions (meq/L)	32.8	32.8	34.4	32.3	34.6

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA128	09WA119	10WA128	Y10G013	Y10G036
Area	Crater Hills	Crater Hills	Crater Hills	Crater Hills	Crater Hills
Name and Description	CH08 - unnamed acid spring downhill from Sulphur Spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring
Collection Date	9/21/2013	9/10/2009	6/4/2010	6/30/2010	7/26/2010
Collection Time	12:00	16:00	16:00	---	---
Latitude	44° 39' 15.3"	44° 39' 12.0"	44° 39' 12.0"	44° 39' 12.0"	44° 39' 12.0"
Longitude	110° 28' 58.9"	110° 29' 2.0"	110° 29' 2.0"	110° 29' 2.0"	110° 29' 2.0"
Map (figure)	14	14	14	14	14
Photograph (appendix)	104	---	---	---	---
pH	3.07	2.21	2.00	1.81	2.04
Specific Conductance (µS/cm)	3999	4348	4808	7418	4611
Temperature (°C)	72.4	81.2	82.0	79.4	82.2
Temperature (Flow Cell, °C)	---	72.5	54.8	---	---
Eh (V)	0.422	0.078	0.535	0.500	0.520
DO (mg/L)	---	<0.1	---	---	---
Density (g/mL at 20°C)	1.0004	0.9994	0.9994	---	---
Constituent (mg/L)[1]					
Ca	10.1	31.9	22.8	30.9	33.2
Mg	5.14	11.6	9.57	14.2	13.6
Na	644	31.1	24.6	31.4	35.0
K	134	17.3	14.2	20.1	15.9
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	4.16	13.3	17.8	---	---
Cl	792	2.0	4.1	0.7	1.5
F	28.5	0.6	0.95	0.32	0.43
Br	2.61	<0.05	<0.1	<0.1	<0.1
SO_4	620	972	1080	1720	1040
S_2O_3	0.3	<0.1	<0.1	---	---
S_nO_6 (µM / n)	<0.4 / ---	---	---	---	---
H_2S	0.129	0.281	0.012	0.306	0.018
NO_3	0.91	0.16	<0.1	<0.1	<0.1
NH_4	18.0	11.4	5.4	6.0	8.2
SiO_2	442	467	274	321	356
B	22.0	0.82	0.52	0.53	1.01
Al	16.8	15.1	22.5	36.0	15.3
Fe(T)	0.490	14.5	16.2	30.2	16.3
Fe(II)	0.490	14.5	16.0	29.9	16.3
Mn	0.560	0.677	0.569	0.732	0.746
Sr	0.089	0.084	0.100	0.196	0.071
Ba	0.094	0.070	0.059	0.063	0.061
Li	6.35	0.045	0.032	0.050	0.056
Rb	1.20	0.108	0.073	---	---
P	<0.04	<0.06	0.090	---	---
As(T)	5.99	0.016	0.016	0.030	0.018
As(III)	5.99	0.015	0.013	0.027	0.015
Hg (ng/L)	71.7	244	207	---	---
DOC	2.4	1.8	2.5	---	---
δD (‰)	-113.90	-122.55	-131.42	-124.50	-120.90
$\delta^{18}O$ (‰)	-7.47	-10.31	-13.95	-12.00	-10.00
Charge Imbalance (%)	3.7	-7.9	-4.9	-3.0	-3.0
Specific Conductance Balance (%)	3.6	-4.5	3.2	2.0	1.0
Sum Cations (meq/L)	35.1	12.2	16.0	24.4	15.9
Sum Anions (meq/L)	33.8	13.2	16.8	25.1	16.4

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA190	12WA145	13WA143	13WA144	13WA145
Area	Crater Hills	Crater Hills	Crater Hills	Crater Hills	Crater Hills
Name and Description	CH09 - unnamed acid spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring	CH09 - unnamed acid spring
Collection Date	9/19/2010	9/25/2012	9/21/2013	9/21/2013	9/21/2013
Collection Time	15:20	11:00	11:15	11:45	12:10
Latitude	44° 39' 12.0"	44° 39' 12.0"	44° 39' 12.0"	44° 39' 12.0"	44° 39' 12.0"
Longitude	110° 29' 2.0"	110° 29' 2.0"	110° 29' 2.0"	110° 29' 2.0"	110° 29' 2.0"
Map (figure)	14	14	14	14	14
Photograph (appendix)	---	105	---	---	---
pH	2.14	1.78	2.15	2.13	2.12
Specific Conductance (µS/cm)	4055	9639	4233	3949	4229
Temperature (°C)	76.8	79.6	64.4	63.2	62.6
Temperature (Flow Cell, °C)	66.8	68.9	64.3	63.3	58.7
Eh (V)	0.507	0.248	0.527	0.533	0.537
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9995	1.0009	0.9994	0.9994	0.9995
Constituent (mg/L)[1]					
Ca	29.8	32.0	26.5	26.8	27.1
Mg	12.3	14.2	11.6	11.5	11.5
Na	33.6	30.7	30.2	30.3	30.1
K	17.9	31.0	14.5	14.4	14.4
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	14.6	49.3	15.5	15.9	15.7
Cl	2.2	1.3	4.4	4.5	4.0
F	1.17	0.1	0.46	0.78	0.78
Br	0.03	<0.05	<0.04	<0.04	<0.04
SO_4	980	2580	931	937	953
S_2O_3	<0.1	<0.1	<0.05	<0.05	<0.05
S_nO_6 (µM / n)	---	---	<0.4 / ---	<0.4 / ---	<0.4 / ---
H_2S	0.092	0.487	0.020	0.015	0.051
NO_3	<0.1	<0.05	<0.05	0.09	0.05
NH_4	14.4	14.4	12.2	1.0	1.0
SiO_2	354	236	347	340	346
B	1.33	0.73	0.79	0.79	0.80
Al	12.6	78.1	18.4	18.3	18.3
Fe(T)	14.9	70.0	27.5	28.3	27.4
Fe(II)	14.9	70.0	27.5	28.3	27.4
Mn	0.721	0.853	0.656	0.653	0.655
Sr	0.064	0.451	0.088	0.088	0.089
Ba	0.060	0.076	0.065	0.065	0.062
Li	0.046	0.043	0.038	0.039	0.039
Rb	0.104	0.172	0.114	0.116	0.117
P	<0.06	1.26	0.140	0.140	0.140
As(T)	0.019	0.068	0.029	0.040	0.027
As(III)	0.018	0.062	0.026	≥0.026	0.025
Hg (ng/L)	121	134	84.4	89.3	109
DOC	1.4	17.1	3.8	3.2	3.4
δD (‰)	-119.73	-117.10	-120.20	-120.00	-120.20
$\delta^{18}O$ (‰)	-9.75	-9.72	-9.51	-9.42	-9.41
Charge Imbalance (%)	5.8	4.4	6.5	4.3	3.9
Specific Conductance Balance (%)	16	8.6	-8.9	12	-6.3
Sum Cations (meq/L)	13.6	30.2	13.5	13.3	13.5
Sum Anions (meq/L)	12.9	28.9	12.7	12.8	13.0

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	09WA121	10WA129	Y10G016	Y10G039	10WA187
Area	Crater Hills	Crater Hills	Crater Hills	Crater Hills	Crater Hills
Name and Description	CH13 - unnamed yellow acidic hot pool	CH13 - unnamed yellow acidic hot pool	CH13 - unnamed yellow acidic hot pool	CH13 - unnamed yellow acidic hot pool	CH13 - unnamed yellow acidic hot pool
Collection Date	9/10/2009	6/4/2010	6/30/2010	7/26/2010	9/19/2010
Collection Time	18:00	17:35	---	---	12:10
Latitude	44° 39' 14.0"	44° 39' 14.0"	44° 39' 14.0"	44° 39' 14.0"	44° 39' 14.0"
Longitude	110° 28' 37.4"	110° 28' 37.4"	110° 28' 37.4"	110° 28' 37.4"	110° 28' 37.4"
Map (figure)	14	14	14	14	14
Photograph (appendix)	106	---	---	---	---
pH	2.21	1.80	2.16	2.27	2.08
Specific Conductance (µS/cm)	3526	6995	2762	3699	3649
Temperature (°C)	86.1	78.8	82.9	85.4	78.3
Temperature (Flow Cell, °C)	77.1	41.1	---	---	63.1
Eh (V)	0.070	0.274	0.330	0.300	0.214
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9989	0.9994	---	---	0.9990
Constituent (mg/L)[1]					
Ca	0.60	0.46	0.38	0.52	0.43
Mg	0.20	0.12	0.091	0.133	0.13
Na	1.90	1.00	2.00	2.20	1.30
K	6.67	6.21	4.29	6.16	6.89
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	12.0	24.6	---	---	13.3
Cl	1.6	2.6	1.3	1.5	5.1
F	0.43	0.11	0.22	0.27	0.13
Br	<0.05	<0.1	<0.1	<0.1	<0.1
SO_4	735	1300	528	614	708
S_2O_3	<0.1	<0.1	---	---	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	0.151	0.448	0.171	0.050	0.077
NO_3	0.17	<0.1	<0.1	<0.1	<0.1
NH_4	18.0	11.1	10.1	11.4	14.0
SiO_2	276	219	241	268	245
B	2.75	1.73	2.65	2.79	3.01
Al	14.3	13.7	6.92	11.4	14.2
Fe(T)	2.34	1.06	1.02	1.35	1.49
Fe(II)	2.34	1.05	1.01	1.35	1.49
Mn	0.030	0.021	0.023	0.029	0.026
Sr	0.064	0.053	0.036	0.046	0.059
Ba	0.105	0.082	0.092	0.093	0.091
Li	0.004	<0.002	0.018	0.017	<0.002
Rb	0.0224	0.0179	---	---	0.0248
P	0.070	0.120	---	---	0.063
As(T)	0.0039	0.0032	0.0040	0.0040	0.0045
As(III)	0.004	0.003	0.003	0.004	0.004
Hg (ng/L)	263	983	---	---	251
DOC	2.0	1.8	---	---	1.3
δD (‰)	-114.64	-115.33	-115.60	-117.30	-115.72
$\delta^{18}O$ (‰)	-9.00	-9.00	-10.00	-10.50	-9.60
Charge Imbalance (%)	-7.6	-0.3	23.0	-10	-5.5
Specific Conductance Balance (%)	9.3	5.1	32	6.0	7.4
Sum Cations (meq/L)	8.98	20.0	8.85	7.51	11.1
Sum Anions (meq/L)	9.69	20.0	7.04	8.30	11.7

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	13WA127	12WA146	13WA146	10WA124	Y10G011
Area	Crater Hills	Crater Hills	Crater Hills	Mud Volcano	Mud Volcano
Name and Description	CH13 - unnamed yellow acidic hot pool	CH19 - unnamed acid spring (10 cm by 5 cm) 10 m south of CH09	CH19 - unnamed acid spring (10 cm by 5 cm) 10 m south of CH09	Sulphur Caldron	Sulphur Caldron
Collection Date	9/21/2013	9/25/2012	9/21/2013	6/4/2010	6/30/2010
Collection Time	11:00	13:15	12:50	11:30	---
Latitude	44° 39' 14.0"	44° 39' 11.5"	44° 39' 11.5"	44° 37' 41.5"	44° 37' 41.5"
Longitude	110° 28' 37.4"	110° 29' 2.0"	110° 29' 2.0"	110° 25' 55.9"	110° 25' 55.9"
Map (figure)	14	14	14	15	15
Photograph (appendix)	---	107	---	108	---
pH	2.14	1.45	1.57	1.90	1.91
Specific Conductance (µS/cm)	3739	22714	13766	6723	8556
Temperature (°C)	64.7	80.9	61.1	75.3	76.8
Temperature (Flow Cell, °C)	45.7	---	62.0	62.4	---
Eh (V)	0.468	---	0.507	-0.009	0.490
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	0.9990	1.0036	1.0007	0.9997	---
Constituent (mg/L)[1]					
Ca	1.34	32.1	1.34	32.9	35.9
Mg	1.21	14.3	0.563	6.22	9.05
Na	1.32	31.6	3.75	16.9	19.5
K	4.58	99	20.7	20.3	20.6
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	15.2	122	58.9	25.1	---
Cl	1.0	176	3.1	19.1	0.8
F	0.02	0.7	1.51	0.46	0.47
Br	<0.04	<0.05	<0.04	<0.1	<0.1
SO_4	737	5840	2810	1470	1630
S_2O_3	0.2	---	<0.05	<0.1	---
S_nO_6 (µM / n)	<0.4 / ---	---	<0.4 / ---	---	---
H_2S	0.164	---	0.001	0.009	3.83
NO_3	<0.05	0.34	<0.05	0.16	<0.1
NH_4	2.3	13.6	<0.02	19.8	17.9
SiO_2	120	139	128	205	236
B	<0.01	<0.02	<0.01	2.59	3.11
Al	22.6	219	42.2	33.2	32.5
Fe(T)	24.4	96.4	81.2	5.80	8.34
Fe(II)	24.4	95.2	80.0	5.80	7.98
Mn	0.064	1.05	0.134	0.527	0.625
Sr	0.063	1.40	0.405	0.164	0.182
Ba	0.066	0.157	0.075	0.073	0.074
Li	0.004	0.029	0.003	0.014	0.022
Rb	0.0190	0.239	0.0270	0.060	---
P	0.390	4.17	0.740	<0.06	---
As(T)	0.021	0.089	0.080	0.110	0.0020
As(III)	0.019	0.086	≥0.046	≥0.002	0.001
Hg (ng/L)	155	---	160	36.0	---
DOC	6.2	---	11.9	3.4	---
δD (‰)	-114.30	---	-123.10	-112.63	-111.60
$\delta^{18}O$ (‰)	-7.67	---	-8.43	-10.64	-10.00
Charge Imbalance (%)	4.2	-1.0	-7.6	-8.5	2.0
Specific Conductance Balance (%)	8.4	4.4	-9.2	-2.6	9.0
Sum Cations (meq/L)	10.3	65.8	36.4	20.7	20.2
Sum Anions (meq/L)	9.90	66.4	39.3	22.5	19.8

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	Y10G029	10WA185	Y10G012	Y10G028	10WA186
Area	Mud Volcano	Mud Volcano	Mud Volcano	Mud Volcano	Mud Volcano
Name and Description	Sulphur Caldron	Sulphur Caldron	Turbulent Pool	Turbulent Pool	Turbulent Pool
Collection Date	7/26/2010	9/19/2010	6/30/2010	7/26/2010	9/19/2010
Collection Time	---	10:10	---	---	10:45
Latitude	44° 37' 41.5"	44° 37' 41.5"	44° 37' 42.4"	44° 37' 42.4"	44° 37' 42.4"
Longitude	110° 25' 55.9"	110° 25' 55.9"	110° 25' 57.3"	110° 25' 57.3"	110° 25' 57.3"
Map (figure)	15	15	15	15	15
Photograph (appendix)	---	---	---	---	---
pH	1.70	1.78	2.16	1.95	1.87
Specific Conductance (µS/cm)	9575	9966	3350	5239	7075
Temperature (°C)	76.5	75.8	60.0	60.6	59.0
Temperature (Flow Cell, °C)	---	68.6	---	---	55.1
Eh (V)	0.500	0.418	0.520	0.500	0.464
DO (mg/L)	---	---	---	---	---
Density (g/mL at 20°C)	---	1.0008	---	---	0.9997
Constituent (mg/L)[1]					
Ca	34.1	26.9	14.4	14.5	11.4
Mg	8.52	6.57	3.81	3.98	3.53
Na	26.4	27.4	11.0	14.1	15.5
K	31.3	37.7	7.74	11.4	16.4
Alkalinity (as HCO_3)	---	---	---	---	---
Acidity (mN)	---	47.4	---	---	29.2
Cl	1.4	3.6	1.3	1.2	3.5
F	0.67	1.76	0.17	0.29	1.23
Br	<0.1	<0.1	<0.1	<0.1	<0.1
SO_4	2320	2650	620	1010	1550
S_2O_3	---	<0.1	---	---	<0.1
S_nO_6 (µM / n)	---	---	---	---	---
H_2S	---	0.019	0.054	---	0.017
NO_3	<0.1	<0.1	<0.1	<0.1	<0.1
NH_4	26.7	38.9	2.8	5.4	9.6
SiO_2	318	310	126	174	204
B	5.00	5.60	0.34	0.64	0.81
Al	59.9	88.5	7.38	14.8	29.3
Fe(T)	12.8	16.1	2.62	3.32	5.41
Fe(II)	12.7	16.0	2.59	3.32	5.41
Mn	0.618	0.507	0.324	0.320	0.283
Sr	0.189	0.174	0.157	0.155	0.132
Ba	0.080	0.080	0.063	0.062	0.061
Li	0.020	0.022	0.009	0.012	0.007
Rb	---	0.119	---	---	0.0380
P	---	0.230	---	---	<0.06
As(T)	0.0020	0.0036	0.0010	0.0010	0.0007
As(III)	0.002	0.002	<0.0005	<0.0005	<0.001
Hg (ng/L)	---	120	---	---	49.8
DOC	---	5.3	---	---	4.3
δD (‰)	-110.40	-110.68	-111.70	-106.40	-106.09
$\delta^{18}O$ (‰)	-9.80	-9.65	-10.30	-8.50	-8.20
Charge Imbalance (%)	-4.0	-1.8	-6.0	-3.0	-6.2
Specific Conductance Balance (%)	2.0	1.3	-1.0	1.0	1.3
Sum Cations (meq/L)	31.4	30.0	9.76	15.5	19.3
Sum Anions (meq/L)	32.6	30.6	10.4	15.9	20.5

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	11WA156	13WA130	13WA131	13WA132
Area	Mud Volcano	Mud Volcano	Mud Volcano	Mud Volcano
Name and Description	MV01 - unnamed acid pool (12 m by 20 m)	MV01 - unnamed acid pool (12 m by 20 m)	MV02 - unnamed small acid pool to the east of MV01	MV03 - unnamed small acid pool to the south of MV01
Collection Date	9/9/2011	9/21/2013	9/21/2013	9/21/2013
Collection Time	16:20	15:55	16:20	16:55
Latitude	44° 37' 6.1"	44° 37' 6.1"	44° 37' 5.8"	44° 37' 5.2"
Longitude	110° 26' 4.5"	110° 26' 4.5"	110° 26' 5.6"	110° 26' 4.8"
Map (figure)	15	15	15	15
Photograph (appendix)	109	---	110	111
pH	2.10	1.90	1.86	1.82
Specific Conductance (µS/cm)	4679	6914	7419	7986
Temperature (°C)	71.6	67.6	58.0	55.7
Temperature (Flow Cell, °C)	66.0	60.2	51.0	48.6
Eh (V)	0.041	0.529	0.594	0.496
DO (mg/L)	---	---	---	---
Density (g/mL at 20°C)	0.9996	0.9998	1.0001	1.0002
Constituent (mg/L)[1]				
Ca	13.2	8.81	15.9	23.6
Mg	6.55	4.35	7.85	10.4
Na	20.9	18.0	25.0	25.4
K	22.7	20.2	26.6	32.3
Alkalinity (as HCO_3)	---	---	---	---
Acidity (mN)	20.9	28.5	34.5	37.6
Cl	5.8	0.27	0.42	0.53
F	0.4	1.23	1.29	1.37
Br	<0.05	<0.04	<0.04	<0.04
SO_4	1240	1550	1850	2020
S_2O_3	<0.1	<0.05	<0.05	<0.05
S_nO_6 (µM / n)	---	<0.4 / ---	6.9 / 6	<0.4 / ---
H_2S	0.040	0.046	0.158	0.033
NO_3	<0.05	<0.05	0.09	<0.05
NH_4	33.3	<0.02	<0.2	<0.2
SiO_2	288	251	263	226
B	0.39	0.35	0.094	0.02
Al	36.8	46.7	57.3	77.0
Fe(T)	13.5	11.4	15.1	17.4
Fe(II)	13.5	11.4	14.4	17.4
Mn	0.216	0.148	0.337	0.438
Sr	0.215	0.197	0.320	0.319
Ba	0.067	0.086	0.064	0.066
Li	0.009	0.008	0.012	0.014
Rb	0.088	0.088	0.122	0.156
P	0.231	0.140	0.300	0.750
As(T)	0.0030	0.0030	0.0020	0.0030
As(III)	0.002	0.002	0.001	0.003
Hg (ng/L)	35.4	96.2	106	22.3
DOC	8.5	8.4	9.4	13.0
δD (‰)	-106.83	-106.20	-105.30	-105.50
$\delta^{18}O$ (‰)	-6.43	-6.04	-6.74	-7.74
Charge Imbalance (%)	-5.5	-1.5	-6.9	1.2
Specific Conductance Balance (%)	4.3	-7.1	3.3	-7.1
Sum Cations (meq/L)	15.3	19.0	21.8	25.1
Sum Anions (meq/L)	16.1	19.2	23.4	24.8

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Table 2. Water analyses for samples collected from Yellowstone National Park – Continued.

Sample Code Number	10WA161	10WA162	10WA163	10WA164
Area	Snake Hot Springs	Snake Hot Springs	Snake Hot Springs	Snake Hot Springs
Name and Description	Unnamed pool (5 m by 4 m) about 0.7 km west of Snake Hot Springs	45 meters downstream of 10WA161	60 meters downstream of 10WA162	25 meters downstream of 10WA163
Collection Date	9/14/2010	9/14/2010	9/14/2010	9/14/2010
Collection Time	12:14	13:26	13:50	14:25
Latitude	44° 10' 4.6"	44° 10' 5.3"	---	44° 10 '5.2"
Longitude	110° 35' 22.7"	110° 35' 24.8"	---	110° 35' 29.7"
Map (figure)	16	16	16	16
Photograph (appendix)	112	113, 114	115	---
pH	6.40	6.48	6.44	6.41
Specific Conductance (µS/cm)	2068	2136	2049	2033
Temperature (°C)	58.0	56.2	49.0	48.7
Temperature (Flow Cell, °C)	50.8	50.0	44.5	45.6
Eh (V)	-0.042	-0.023	-0.002	-0.018
DO (mg/L)	---	---	---	---
Density (g/mL at 20°C)	0.9994	0.9993	0.9993	0.9994
Constituent (mg/L)[1]				
Ca	152	152	172	171
Mg	26.1	26.2	29.9	29.9
Na	283	284	245	243
K	49.6	49.4	43.0	43.1
Alkalinity (as HCO_3)	527	531	591	583
Acidity (mN)	---	---	---	---
Cl	148	152	132	130
F	2.9	3	2.4	2.4
Br	0.68	0.68	0.59	0.58
SO_4	515	521	459	463
S_2O_3	0.2	0.3	0.5	0.3
S_nO_6 (µM / n)	---	---	---	---
H_2S	0.860	0.461	0.123	0.006
NO_3	0.06	<0.1	<0.1	<0.1
NH_4	1.8	1.7	1.1	1.4
SiO_2	54.0	53.0	44.0	47.0
B	2.97	2.92	2.51	2.50
Al	0.008	0.005	0.006	0.006
Fe(T)	0.036	0.033	0.267	0.232
Fe(II)	0.035	0.033	0.267	0.229
Mn	0.017	0.017	0.027	0.026
Sr	1.74	1.73	1.64	1.64
Ba	0.049	0.049	0.059	0.060
Li	1.75	1.73	1.52	1.52
Rb	0.139	0.135	0.127	0.131
P	<0.06	<0.06	<0.06	<0.06
As(T)	0.320	0.350	0.268	0.310
As(III)	≥0.238	≥0.270	0.268	≥0.177
Hg (ng/L)	44.4	36.5	14.4	5.1
DOC	1.0	0.8	1.4	1.0
δD (‰)	-141.10	-140.70	-139.68	-140.98
$\delta^{18}O$ (‰)	-18.03	-18.11	-18.27	-18.28
Charge Imbalance (%)	0.0	-1.2	0.2	0.1
Specific Conductance Balance (%)	3.5	1.0	-0.4	0.0
Sum Cations (meq/L)	20.9	21.0	20.4	20.3
Sum Anions (meq/L)	20.9	21.2	20.4	20.3

[1] Except for Acidity (mN), S_nO_6 (µM), Hg (ng/L), and δD and $\delta^{18}O$ (‰)

Acknowledgments

Many people assisted in the preparation of this report by providing field assistance, lab analyses, information, or review. In particular we are grateful to Charlie Alpers, Yamin Deng, Mandy Hoyer, Dale Peart, Qinghai Guo, Gary Campbell, Deb Repert, Kenna Butler, and Brett Uhle. We also would like to thank many collaborators from the University of Illinois including Rachel Whitaker, Peter Diebold, Angela Kouris, Maria Bautista, Whitney England, Dave Drause, Nicole H. Held, and Michael Reno. We also are grateful to the staff of Yellowstone National Park including Hank Haesler, Christie Hendrix, Dan Mahoney, Stacey Gunther, and the Ranger Staff at Norris Geyser Basin for escorting us and educating us about the many thermal features of Norris.

References Cited

Ball, J.W., McCleskey, R.B., and Nordstrom, D.K., 2010, Water-chemistry data for selected springs, geysers, and streams in Yellowstone National Park, Wyoming, 2006-2008: U.S. Geological Survey Open-File Report 2010-1192, p. 109.

Ball, J.W., McCleskey, R.B., Nordstrom, D.K., and Holloway, J.M., 2006, Water-chemistry data for selected springs, geysers, and streams in Yellowstone National Park, Wyoming, 2003-2005: U.S. Geological Survey Open-File Report 2006-1339, p. 137.

Ball, J.W., McCleskey, R.B., Nordstrom, D.K., Holloway, J.M., and Verplanck, P.L., 2002, Water-chemistry data for selected springs, geysers, and streams in Yellowstone National Park, Wyoming, 1999-2000: U.S. Geological Survey Open-File Report 02-382, p. 104.

Ball, J.W., Nordstrom, D.K., Cunningham, K.M., Schoonen, M.A.A., Xu, Y., and DeMonge, J.M., 1998a, Water-chemistry and on-site sulfur-speciation data for selected springs in Yellowstone National Park, Wyoming, 1994-1995: U.S. Geological Survey Open-File Report 98-574, p. 35.

Ball, J.W., Nordstrom, D.K., Jenne, E.A., and Vivit, D.V., 1998b, Chemical analyses of hot springs, pools, geysers, and surface waters from Yellowstone National Park, Wyoming, and Vicinity, 1974-1975: U.S. Geological Survey Open-File Report 98-182, p. 46.

Ball, J.W., Nordstrom, D.K., McCleskey, R.B., Schoonen, M.A.A., and Xu, Y., 2001, Water-chemistry and on-site sulfur-speciation data for selected springs in Yellowstone National Park, Wyoming, 1996-1998: U.S. Geological Survey Open-File Report 01-49, p. 42.

Deng, Y., Nordstrom, D.K., and Blaine McCleskey, R., 2011, Fluoride geochemistry of thermal waters in Yellowstone National Park: I. Aqueous fluoride speciation: Geochimica et Cosmochimica Acta, v. 75, p. 4476-4489.

Gihring, T.M., Druschel, G.K., McCleskey, R.B., Hamers, R.J., and Banfield, J.F., 2001, Rapid arsenite oxidation by *Thermus aquaticus* and *Thermus thermophilus*: Field and Laboratory Investigations: Environmental Science & Technology, v. 35, p. 3857-3862.

Gooch, F.A., and Whitfield, J.E., 1888, Analyses of waters of the Yellowstone National Park with an account of the methods of analysis employed: Bulletin 47, p. 84.

Holloway, J.M., Nordstrom, D.K., Böhlke, J.K., McCleskey, R.B., and Ball, J.W., 2011, Ammonium in thermal waters of Yellowstone National Park: Processes affecting speciation and isotope fractionation: Geochimica and Cosmochimica Acta, v. 75, p. 4611-4636.

McCleskey, R.B., Ball, J.W., Nordstrom, D.K., Holloway, J.M., and Taylor, H.E., 2005, Water-chemistry data for selected springs, geysers, and streams in Yellowstone National Park, Wyoming, 2001-2002: U.S. Geological Survey Open-File Report 2004-1316, p. 94.

McCleskey, R.B., Nordstrom, D.K., Susong, D.D., Ball, J.W., and Holloway, J.M., 2010a, Source and fate of inorganic solutes in the Gibbon River, Yellowstone National Park, Wyoming, USA: I. Low-flow discharge and major solute chemistry: Journal of Volcanology and Geothermal Research, v. 193, p. 189-202.

McCleskey, R.B., Nordstrom, D.K., Susong, D.D., Ball, J.W., and Taylor, H.E., 2010b, Source and fate of inorganic solutes in the Gibbon River, Yellowstone National Park, Wyoming, USA. II. Trace element chemistry: Journal of Volcanology and Geothermal Research, v. 196, p. 139-155.

Nordstrom, D.K., Ball, J.W., and McCleskey, R.B., 2005, Ground water to surface water: chemistry of thermal outflows in Yellowstone National Park, *in* Inskeep, W.P., and McDermott, T.R., eds., Geothermal biology and geochemistry in Yellowstone National Park: Bozeman, Montana, Thermal Biology Institute and Department of Land Resources and Environmental Sciences, Montana State University, p. 73-94.

Nordstrom, D.K., McCleskey, R.B., and Ball, J.W., 2009, Sulfur geochemistry of hydrothermal waters in Yellowstone National Park, Wyoming, USA. IV. Acid-sulfate waters: Applied Geochemistry, v. 24, p. 191-207.

Whittlesey, L.H., 1988, Wonderland nomenclature: a history of the place names of Yellowstone National Park: p. 867.

Appendix – Photographs

1. AMP01 - Unnamed spring near Lemonade Creek, **Amphitheater Springs Area**

2. AMP02 - Unnamed spring on hillside, **Amphitheater Springs Area**

3. Frying Pan Spring, **Nymph Lake Area**

4. Unnamed stream feeding into Frying Pan Spring, **Nymph Lake Area**

5. NL01 - Unnamed hillside spring, **Nymph Lake Area**

6. NL03 - Unnamed hillside spring, **Nymph Lake Area**

7. NL10 - Unnamed hillside spring, **Nymph Lake Area**

8. NL13 - Kate Campbell sampling an unnamed spring, **Nymph Lake Area**

9. Northernmost unnamed spring, **West Nymph Creek Thermal Area**

10. “Yellow Cinder Pool,” **West Nymph Creek Thermal Area** (insert shows overflowing cinders with penny for scale)

11. Branch Spring, **Norris Geyser Basin**

12. Bathtub Spring, **Norris Geyser Basin**

13. Cinder Pool, with overflowing black cinders, **Norris Geyser Basin**

14. Cistern Spring as seen from boardwalk, September 2009, **Norris Geyser Basin**

15. Cistern Spring empty after Steamboat Geyser eruption, August 2013, **Norris Geyser Basin**

16. Emerald Spring as seen from boardwalk, **Norris Geyser Basin**

17. Kirk Nordstrom measuring electrical conductivity of Green Dragon Spring, **Norris Geyser Basin**

18. Medusa Spring, **Norris Geyser Basin** (NPS photo)

19. Blaine McCleskey placing the sampling line at Minute Spring, **Norris Geyser Basin**

20. Pearl Geyser, **Norris Geyser Basin** (NPS photo)

21. Perpetual Spouter, **Norris Geyser Basin**

22. “Bidet Spring” with Perpetual Spouter in background, **Norris Geyser Basin**

23. Recess Spring, **Norris Geyser Basin**

24. Rediscovered Geyser, **Norris Geyser Basin**

25. Charlie Alpers at Steamboat Geyser, **Norris Geyser Basin**

26. “Arsenic Dust,” **Norris Geyser Basin**

27. Second Erupter, **Norris Geyser Basin**

28. The weir at Tantalus Creek as seen in September 2011, **Norris Geyser Basin**

29. “Beowulf Spring,” **Norris Geyser Basin**

30. “Outbreak Spring,” a new spring near Bathtub Spring, **Norris Geyser Basin**

31. Nordstrom operating a conductivity probe at unnamed pool, **Norris Geyser Basin**

32. “Out There Spring SE,” **Norris Geyser Basin**

33. “Out There Spring NW,” **Norris Geyser Basin**

34. McCleskey, Campbell, and Chiu at unnamed spring (Cinder Pool in background), **Norris Geyser Basin**

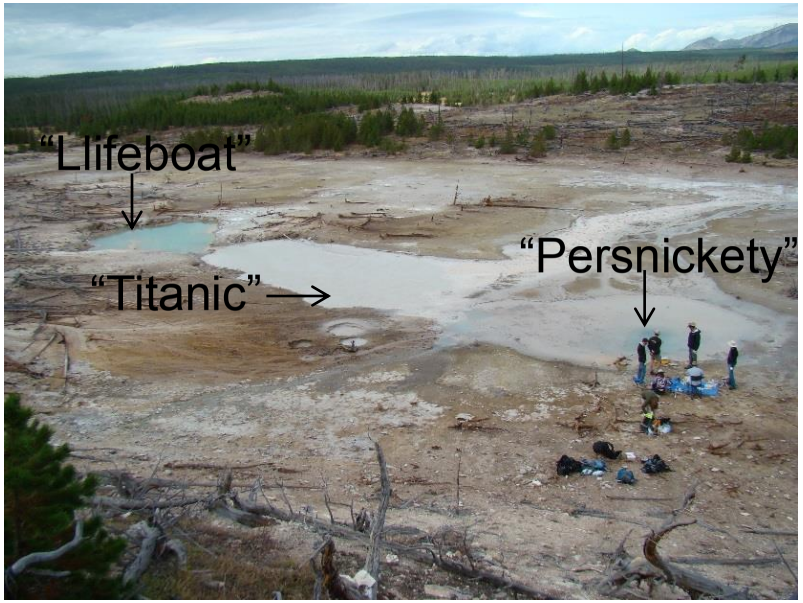
35. “Crystal Sisters” as they appeared in September 2009. (East pool in foreground), **Ragged Hills Area**

36. “Crystal Sister East” in September 2012, **Ragged Hills Area**

37. McCleskey measuring conductivity at “Crystal Sister West” in September 2012, **Ragged Hills Area**

38. “Red Growler,” **Ragged Hills Area**

39. “Kaolin Spring,” **Ragged Hills Area**



40. Hilltop view of (L to R) “Lifeboat” and “Titanic” Springs, and “Persnickety Geyser”, **Ragged Hills Area**

41. “Lifeboat Spring” with “Titanic Spring” in background in September 2012, **Ragged Hills Area**

42. Additional sampling site in “Lifeboat Spring,” September 2013, **Ragged Hills Area**

43. NG06: small appendage pool to “Lifeboat Spring” in September 2012, **Ragged Hills Area**

44. NG08: white pool, **Ragged Hills Area**

45. NG10 being sampled; “Orpiment Puddle 2” is the adjacent yellow pool. The white pool is NG08. **Ragged Hills Area**

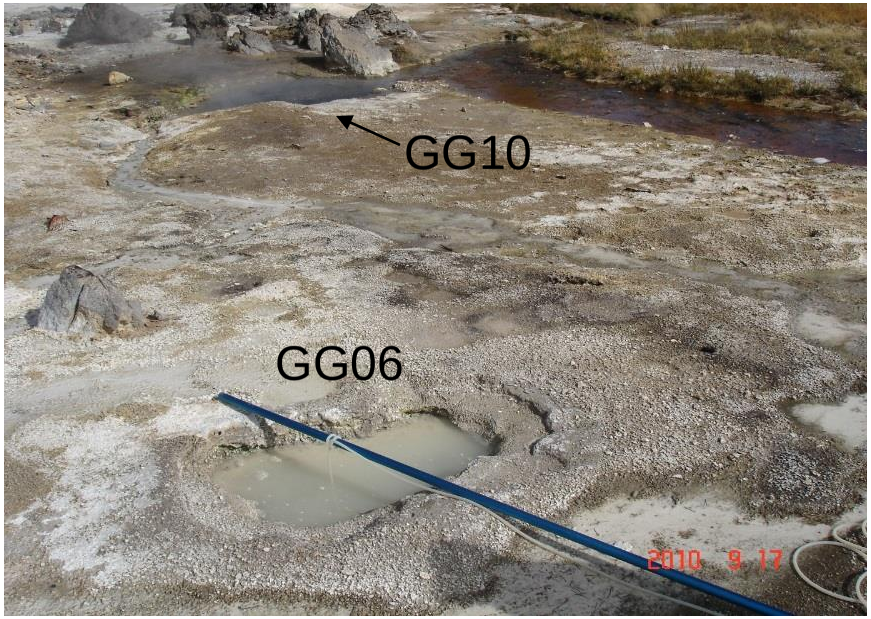
46. NG16: an unnamed small feature, with electrodes for scale, **Ragged Hills Area**

47. “Another Orpiment Puddle,” near NG08, NG10, and NG16, **Ragged Hills Area**

48. Chocolate Pots, upstream site on east side of Gibbon River, **Chocolate Pots I**

49. Downstream site, **Chocolate Pots II**

50. GG01: northernmost spring, **Geyser Springs Group**



51. GG06 being sampled, GG10 in background, **Geyser Springs Group**

52. GG08: smaller unnamed acid spring, **Geyser Springs Group**

53. GG11: unnamed acid spring, **Gibbon Geyser Group**

54. GG12: unnamed small acid pool, **Gibbon Geyser Group**

55. Blaine McCleskey and Kate Campbell at an unnamed geyser, **Gibbon Geyser Group**

56. Bridge Pool, **Sylvan Springs Area**

57. Coffin Spring, S**ylvan Springs Area** (NPS Photo)

58. Dante's Inferno, **Sylvan Springs Area**

59. Evening Primrose, **Sylvan Springs Area**

60. Sylvan Spring, **Sylvan Springs Area**

61. SYL05: unnamed pool upgradient from Evening Primrose, **Sylvan Springs Area**

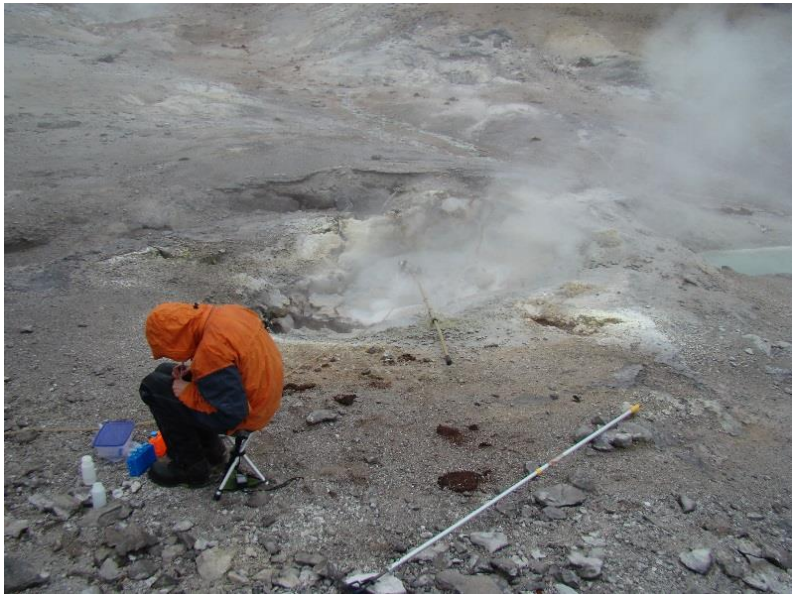
62. SYL10: unnamed spring, **Sylvan Springs Area**

63. SYL11: unnamed spring, with Sylvan Spring in background, **Sylvan Springs Area**

64. SYL14: unnamed spring, **Sylvan Springs Area**

65. SYL15: unnamed pool directly adjacent to Sylvan Spring, as it appeared in 2012, **Sylvan Springs Area**

66. SYL16: another unnamed pool directly adjacent to Sylvan Spring, as it appeared in 2013, **Sylvan Springs Area**



67. Unnamed caved in spring north of Evening Primrose, **Sylvan Springs Area**

68. Unnamed slightly turbid pool, S**ylvan Springs Area**

69. Unnamed circular pool, **Sylvan Springs Area**

70. Unnamed spring south of Bridge Pool, **Sylvan Springs Area**

71. Unnamed acid spring, northernmost sampled in area, **Monument Geyser Basin**

72. Unnamed acid spring, with “monuments” in background, **Monument Geyser Basin**

73. Unnamed acid spring, **Monument Geyser Basin**

74. Unnamed acid spring, **Monument Geyser Basin**

75. Beryl Spring, **Gibbon Canyon**

76. Unnamed hillside seep, **Secret Valley Hot Springs**

77. View downhill from 12WA116, **Secret Valley Hot Springs**

78. Unnamed seep, **Secret Valley Hot Springs**

79. View downhill from 12WA118, **Secret Valley Hot Springs**

80. View from downhill of the seeps, showing mineral terraces, **Secret Valley Hot Springs**

81. Secret Valley Creek above confluence with 12WA122, **Secret Valley Hot Springs**

82. Secret Valley Creek at mouth, **Secret Valley Hot Springs**

83. Tributary to Secret Valley Creek, upstream site, **Secret Valley Hot Springs**

84. Tributary to Secret Valley Creek, downstream site, **Secret Valley Hot Springs**

85. Randall Chiu at Azure Spring, **Lower Geyser Basin**

86. Clepsydra Geyser, **Lower Geyser Basin** (NPS photo)

87. Ojo Caliente at source, **Lower Geyser Basin**

88. Ojo Caliente, looking from pool exit toward source, **Lower Geyser Basin**

89. Ojo Caliente drainage, **Lower Geyser Basin**

90. Ojo Caliente drainage into Firehole River, **Lower Geyser Basin**

91. Beehive Geyser, **Upper Geyser Basin** (NPS photo)

92. Outflow from Giant Geyser, **Upper Geyser Basin**

93. Outflow from Grand Geyser (erupting in background) near Firehole River, **Upper Geyser Basin**

94. Drainage from Grotto Geyser, **Upper Geyser Basin**

95. Lion Geyser, **Upper Geyser Basin** (NPS photo)

96. Drainage from Old Faithful (in background), **Upper Geyser Basin**

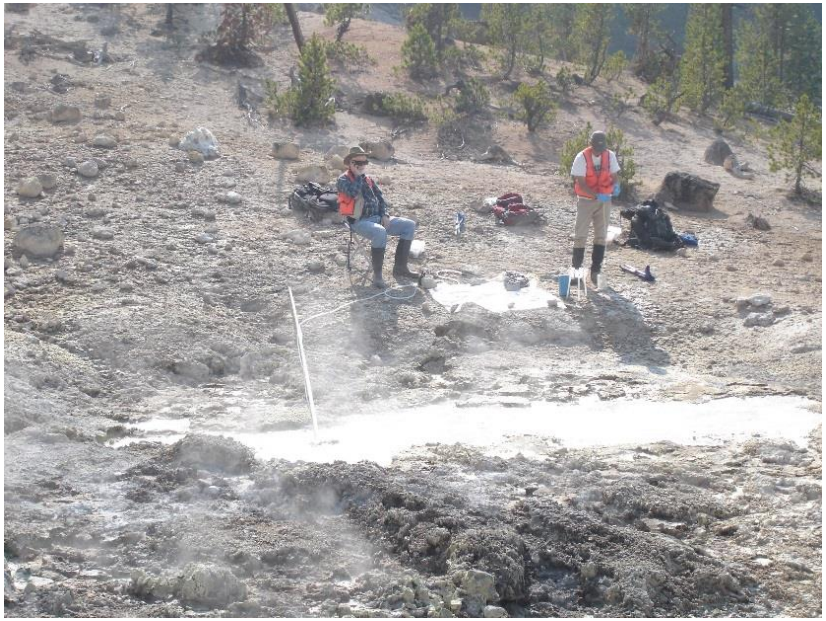
97. Sawmill Geyser, **Upper Geyser Basin** (NPS photo)

98. Lone Star Geyser drainage near geyser, **Lone Star Geyser Area**

99. Firehole River above Lone Star Geyser drainage, **Lone Star Geyser Area**

100. Unnamed spring near Clear Lake Trail, **Forest Springs Area**

101. Nordstrom placing the sampling pole in an unnamed mud pot near Clear Lake Trail, **Forest Springs Area**



102. Unnamed spring, **Forest Springs Area**

103. Sulphur Spring, **Crater Hills Area**

104. CH08: unnamed spring downhill from Sulphur Spring, **Crater Hills Area**

105. CH09: unnamed acid spring, **Crater Hills Area**

106. CH13: unnamed acid spring, **Crater Hills Area**

107. CH19: foremost hole in foreground, unnamed puddle just south of CH09, **Crater Hills Area**

108. Sulphur Caldron, **Mud Volcano Area**

109. MV01: unnamed acid pool, **Mud Volcano Area**

110. MV02: unnamed pool east of MV01, **Mud Volcano Area**

111. MV03: unnamed pool south of MV01, **Mud Volcano Area**

112. Unnamed pool near the **Snake Hot Springs**

113. Looking downstream from 10WA161, near **Snake Hot Springs**

114. Closeup of drainage showing fine white filaments on stream bed, near **Snake Hot Springs**

115. Nordstrom measuring conductivity, near **Snake Hot Springs**