

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Explanation for physico-chemical and ion chemistry

* Specific conductance (SC) was calculated from conductivity (C) if italicized. For every degree change in water temperature (WT), there is approximately a 2% change in conductivity. To convert raw conductivity measurement to specific conductance, the following equation was used: $SC=C/1+(0.02*(WT-25))$ (YSI Incorporated, 2009).

** Instrument used 1: Oakton600, 2: YSI Pro Plus 3: YSI Pro DSS

*** Mass Balance Equation:

$$100 * ((2 * Ca^{++}(\text{mg/l})/40.08) + (2 * Mg^{++}(\text{mg/l})/24.305) + (Na^+(\text{mg/l})/22.99) + (K^+(\text{mg/l})/39.0983) - (HCO_3^-(\text{mg/l})/61) - (Cl^-(\text{mg/l})/35.453) - (2 * SO_4^-(\text{mg/l})/96.06)) / ((2 * Ca^{++}(\text{mg/l})/40.08) + (2 * Mg^{++}(\text{mg/l})/24.305) + (Na^+(\text{mg/l})/22.99) + (K^+(\text{mg/l})/39.0983) - (HCO_3^-(\text{mg/l})/61) - (Cl^-(\text{mg/l})/35.453) - (2 * SO_4^-(\text{mg/l})/96.06))$$

ICP/OES Detection Limits

Element	IDL (mg/L)	MDL (mg/L)	Wavelength (λ) (nm)
Al	0.0280	0.280	396.153
As	0.0250	0.250	188.979
B	0.0048	0.048	249.772
Ba	0.0013	0.013	455.403
Be	0.0007	0.007	313.107
Ca	0.0100	0.100	317.933
Cd	0.0027	0.027	228.802
Co	0.0070	0.070	228.616
Cr	0.0071	0.071	267.716
Cu	0.0054	0.054	324.752
Fe	0.0062	0.062	259.939
K	0.0500	0.500	766.49
Li	0.0500	0.500	610.362
Mg	0.0030	0.030	280.271

Element	IDL (mg/L)	MDL (mg/L)	Wavelength (λ) (nm)
Mn	0.0014	0.014	257.61
Mo	0.0079	0.079	202.031
Na	0.0690	0.690	589.592
Ni	0.0150	0.150	231.604
Pb	0.0420	0.420	220.353
Se	0.0750	0.750	196.026
Si	0.0120	0.120	251.611
Sr	0.0008	0.008	421.552
V	0.0064	0.064	310.23
Zn	0.0018	0.018	213.857
U	0.3000	0.500	385.958

IDL = Instrument Detection Limit
MDL = Method Detection Limit
MDL = IDL * 10

IC Detection Limits

Element	MDL (mg/L)	Retention Time (Approx.)
F	0.01	3.943
Cl	0.05	5.931
NO ₂	0.01	7.052
Br	0.01	8.733
NO ₃	0.01	9.894
PO ₄	0.01	13.845
SO ₄	0.05	16.250

Retention Time Approximation is from averages of 4 standards and ICBV

Tritium (³H) Detection Limit

Detection Limit, 9.5 x enrichment, 1500 minutes counting 0.5

Explanation of tritium data: The detection limit, 0.5 TU, is calculated as 0 + 2 sigma for low-counting samples, and applies for 10-fold enrichment and 1500 minutes of counting. Lower limits are possible for higher enrichment factors.

A sample with a mean calculated TU value between 0 and 1 sigma, say 0.20 ± 0.35 TU, is reported thus: <0.9 TU (= 0.2 + 2 x 0.35). A sample with a mean calculated TU value between 1 and 2 sigma, say 0.51 ± 0.38, is reported thus: <1.3 (Apparent 0.5), where 1.3 = 0.51 + 2 x 0.38, rounded. Samples with calculated TU values greater than 2 are reported thus: 1.1 ± 0.4 TU.

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Sample ID	Sample Location	Sample Date	Water Temperature °C	pH	Specific Conductivity* µS/cm	Dissolved solids mg/l	Dissolved Oxygen mg/l	Instrument**
D1207012	166N2	5/29/2012	11.1	4.89	97	49	n.a.	1
D1207007	AR Lower Fish Pool	5/17/2012	17.0	7.31	406	203	n.a.	1
D1207034	AR Lower Fish Pool	7/4/2012	17.7	7.13	577	375	n.a.	2
D1207049	AR Lower Fish Pool	9/1/2012	16.9	7.05	563	366	6.27	2
D1207055	AR Lower Fish Pool	12/2/2012	3.2	5.93	615	308	n.a.	1
D1307063	AR Lower Fish Pool	5/27/2013	12.7	7.58	432	281	4.85	2
D1307085	AR Lower Fish Pool	7/22/2013	18.0	6.38	539	270	n.a.	1
D1307095	AR Lower Fish Pool	9/7/2013	14.9	7.7	550	358	6.3	2
D1307097	AR Lower Fish Pool	12/19/2013	3.9	7.79	427	214	9	1
D1407111	AR Lower Fish Pool	5/23/2014	13.5	6.6	456	228	7.9	1 and 2
D1407114	AR Lower Fish Pool	7/9/2014	15.4	6.75	543	272	5.5	1 and 2
D1407120	AR Lower Fish Pool	10/12/2014	9.0	7.49	536	348	6.7	2
D1507130	AR Lower Fish Pool	2/21/2015	4.3	7.68	377	245	8.8	2
D1507137	AR Lower Fish Pool	4/3/2015	6.6	7.59	292	190	6.3	2
D1507150	AR Lower Fish Pool	5/31/2015	13.5	7.51	376	244	8.88	3
D1507176	AR Lower Fish Pool	10/9/2015	9.2	6.61	526	341	6.19	3
D1207006	AR Spring	5/17/2012	11.3	7.05	501	251	n.a.	1
D1207033	AR Spring	7/4/2012	11.4	7.52	521	339	2.4	2
D1207050	AR Spring	9/1/2012	15.5	7.24	534	347	3.91	2
D1207056	AR spring	12/2/2012	8.1	8.94	510	255	n.a.	1
D1307060	AR Spring	5/27/2013	11.9	7.63	479	312	3.1	2
D1307083	AR Spring	7/22/2013	17.4	6.63	500	250	n.a.	1
D1307093	AR Spring	9/7/2013	14.1	6.89	569	370	0.1	2
D1307098	AR Spring	12/19/2013	5.5	7.22	565	283	0.9	1
D1407108	AR Spring	5/23/2014	11.1		504	252	4.9	1 and 2
D1407113	AR Spring	7/9/2014	11.5	7.25	439	220	1.6	1 and 2
D1407121	AR Spring	10/12/2014	10.8	7.81	238	155	4.8	2
D1407124	AR Spring	10/18/2014	10.9	7.83	482	313	1.6	2
D1507127	AR Spring	2/21/2015	6.2	7	543	353	0.3	2
D1507139	AR Spring	4/3/2015	8.9	7.36	501	326	0.1	2
D1507151	AR Spring	5/31/2015	11.6	6.83	522	339	0.09	3

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Sample ID	Sample Location	Ca ⁺⁺ mg/l	Mg ⁺⁺ mg/l	Na ⁺ mg/l	K ⁺ mg/l	HCO ₃ ⁻ mg/l	SO ₄ ⁻⁻ mg/l	Cl ⁻ mg/l	Mass Balance*** %
D1207012	166N2	10.98	3.02	3.49	1.97	57.36	0.11	2.89	-1.2
D1207007	AR Lower Fish Pool	26.92	6.75	43.56	1.70	131.80	58.35	10.76	2.1
D1207034	AR Lower Fish Pool	29.64	7.00	64.77	1.97	144.61	98.49	16.53	0.4
D1207049	AR Lower Fish Pool	29.85	6.68	79.37	1.83	167.31	84.14	18.36	5.0
D1207055	AR Lower Fish Pool	32.17	7.81	70.36	2.25	116.18	130.78	19.76	1.7
D1307063	AR Lower Fish Pool	32.41	7.39	50.65	1.60	141.56	85.00	11.43	0.6
D1307085	AR Lower Fish Pool	31.97	6.58	70.98	2.25	142.05	103.51	17.76	2.9
D1307095	AR Lower Fish Pool	32.68	7.10	68.83	1.51	148.88	90.10	15.43	5.0
D1307097	AR Lower Fish Pool	30.26	7.90	37.69	1.58	136.68	64.00	9.20	0.1
D1407111	AR Lower Fish Pool	31.50	7.32	53.92	1.52	147.78	70.21	11.77	3.9
D1407114	AR Lower Fish Pool	34.59	8.03	72.41	1.81	158.03	108.43	18.60	1.9
D1407120	AR Lower Fish Pool	33.59	7.57	69.71	2.38	114.35	123.69	20.62	3.5
D1507130	AR Lower Fish Pool	29.00	8.73	30.23	1.71	120.81	46.36	8.98	4.8
D1507137	AR Lower Fish Pool	25.45	7.32	19.94	1.49	119.47	40.81	6.45	-3.7
D1507150	AR Lower Fish Pool	30.38	8.26	34.67	1.82	144.61	47.90	8.43	2.0
D1507176	AR Lower Fish Pool	31.68	6.65	64.88	3.32	124.47	116.61	20.47	-0.1
D1207006	AR Spring	29.68	5.30	65.14	2.08	128.75	92.71	16.28	3.3
D1207033	AR Spring	28.85	5.19	63.25	2.23	128.50	96.58	15.70	1.2
D1207050	AR Spring	31.25	5.47	60.42	1.96	130.70	86.22	15.95	3.3
D1207056	AR spring	32.36	5.80	64.27	2.26	128.99	94.74	14.60	4.7
D1307060	AR Spring	31.74	5.40	73.04	1.89	133.02	115.60	15.38	2.3
D1307083	AR Spring	32.14	5.51	65.68	2.08	136.68	94.05	15.54	3.4
D1307093	AR Spring	31.94	5.44	66.07	1.71	132.41	95.08	16.13	3.7
D1307098	AR Spring	31.19	5.34	67.56	1.92	131.19	94.72	15.50	4.4
D1407108	AR Spring	31.72	5.42	63.99	1.86	127.53	91.04	14.63	5.0
D1407113	AR Spring	32.96	6.09	68.67	2.19	150.96	123.44	16.84	-3.1
D1407121	AR Spring	32.88	6.10	60.67	1.82	123.86	116.78	16.56	-1.0
D1407124	AR Spring	32.81	6.18	59.63	2.17	127.79	97.89	20.57	0.9
D1507127	AR Spring	34.54	6.11	63.68	2.11	129.36	95.44	16.45	5.0
D1507139	AR Spring	30.85	5.44	63.38	2.10	133.63	127.12	16.33	-5.0
D1507151	AR Spring	31.94	5.55	58.56	1.99	133.63	96.74	11.52	1.3

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Sample ID	Sample Location	Si mg/l	F ⁻ mg/l	Br ⁻ mg/l	Fe ⁺⁺ mg/l	SI Calcite log Q/K	SI Gypsum log Q/K	SI Quartz log Q/K	CO ₂ (g) fugacity
D1207012	166N2	4.20	0.67	b.d.	b.d.	0.000	n.a.	1.261	0.017
D1207007	AR Lower Fish Pool	8.93	3.32	0.12	0.15	0.242	0.005	2.073	0.005
D1207034	AR Lower Fish Pool	8.41	3.95	0.27	b.d.	0.175	0.009	1.898	0.008
D1207049	AR Lower Fish Pool	8.32	4.37	1.29	0.08	0.160	0.008	1.942	0.011
D1207055	AR Lower Fish Pool	4.63	4.28	0.50	b.d.	0.002	0.013	2.012	0.022
D1307063	AR Lower Fish Pool	5.95	3.21	0.13	b.d.	0.501	0.009	1.659	0.003
D1307085	AR Lower Fish Pool	5.34	4.11	0.42	0.15	0.020	0.010	1.192	0.026
D1307095	AR Lower Fish Pool	9.60	4.15	0.24	0.10	0.748	0.009	2.429	0.002
D1307097	AR Lower Fish Pool	10.24	2.58	0.39	0.08	0.576	0.007	4.277	0.002
D1407111	AR Lower Fish Pool	8.20	3.39	0.18	0.08	0.037	0.007	2.217	0.019
D1407114	AR Lower Fish Pool	8.77	4.01	0.42	0.33	0.069	0.011	2.184	0.016
D1407120	AR Lower Fish Pool	9.48	1.41	b.d.	b.d.	0.281	0.012	3.126	0.003
D1507130	AR Lower Fish Pool	8.60	2.33	0.71	b.d.	0.393	0.005	3.527	0.002
D1507137	AR Lower Fish Pool	6.90	1.71	b.d.	b.d.	0.305	0.004	2.539	0.002
D1507150	AR Lower Fish Pool	9.27	2.55	0.72	b.d.	0.442	0.005	2.497	0.003
D1507176	AR Lower Fish Pool	9.52	4.03	0.86	0.07	0.026	0.011	3.119	0.014
D1207006	AR Spring	9.71	4.15	b.d.	b.d.	0.102	0.009	2.891	0.007
D1207033	AR Spring	9.49	3.62	0.19	b.d.	0.330	0.009	2.806	0.003
D1207050	AR Spring	8.59	3.70	1.11	b.d.	0.210	0.008	2.126	0.006
D1207056	AR spring	4.92	3.82	0.46	b.d.	8.592	0.009	1.554	0.000
D1307060	AR Spring	6.28	3.91	0.19	b.d.	0.484	0.011	1.814	0.002
D1307083	AR Spring	6.49	3.98	0.39	b.d.	0.043	0.009	1.485	0.018
D1307093	AR Spring	9.95	3.91	0.25	b.d.	0.079	0.009	2.620	0.011
D1307098	AR Spring	11.83	3.97	0.47	b.d.	0.138	0.010	4.597	0.005
D1407108	AR Spring	9.07	3.78	0.09	b.d.		0.009	2.728	
D1407113	AR Spring	10.21	3.85	0.38	b.d.	0.215	0.012	3.011	0.006
D1407121	AR Spring	10.09	4.20	0.45	b.d.	0.695	0.011	3.054	0.001
D1407124	AR Spring	10.25	3.81	0.84	b.d.	0.769	0.010	3.088	0.001
D1507127	AR Spring	11.16	4.08	0.65	b.d.	0.085	0.011	4.199	0.008
D1507139	AR Spring	9.75	3.67	b.d.	b.d.	0.217	0.012	3.232	0.004
D1507151	AR Spring	9.96	2.86	0.59	b.d.	0.061	0.010	2.927	0.011

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Sample ID	Sample Location	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	d-excess	^3H TU	^3H Error	Notes
D1207012	166N2	-10.2	-78.1	3.8	n.a.	n.a.	questionable field equipment due to pH
D1207007	AR Lower Fish Pool	-11.2	-84.5	5.1	n.a.	n.a.	AR Lower Fish Pool (#12 pool) (84 paces)
D1207034	AR Lower Fish Pool	-11.4	-86.6	4.5	n.a.	n.a.	
D1207049	AR Lower Fish Pool	-11.8	-87.9	6.6	n.a.	n.a.	
D1207055	AR Lower Fish Pool	-12.8	-94.1	8.5	n.a.	n.a.	
D1307063	AR Lower Fish Pool	-11.6	-88.6	4.4	n.a.	n.a.	
D1307085	AR Lower Fish Pool	-11.9	-88.9	6.0	n.a.	n.a.	
D1307095	AR Lower Fish Pool	-11.8	-86.7	7.5	n.a.	n.a.	
D1307097	AR Lower Fish Pool	-12.0	-87.0	9.4	n.a.	n.a.	Both YSI and Oakton taken into field
D1407111	AR Lower Fish Pool	-11.4	-85.4	5.6	n.a.	n.a.	CDT calibrated, Sonde redeployed
D1407114	AR Lower Fish Pool	-12.3	-89.8	8.7	n.a.	n.a.	DO with #3; others with #2
D1407120	AR Lower Fish Pool	-12.7	-89.3	12.1	n.a.	n.a.	
D1507130	AR Lower Fish Pool	-12.9	-92.4	10.7	n.a.	n.a.	
D1507137	AR Lower Fish Pool	-12.4	-86.6	12.5	n.a.	n.a.	
D1507150	AR Lower Fish Pool	-12.3	-87.0	11.6	n.a.	n.a.	
D1507176	AR Lower Fish Pool	-12.4	-90.0	9.5	n.a.	n.a.	
D1207006	AR Spring	-12.6	-93.3	7.9	n.a.	n.a.	AR Spring (10 paces from pool)
D1207033	AR Spring	-12.6	-92.7	8.2	n.a.	n.a.	
D1207050	AR Spring	-12.1	-91.7	5.4	n.a.	n.a.	
D1207056	AR spring	-12.7	-93.0	8.6	n.a.	n.a.	
D1307060	AR Spring	-12.7	-93.2	8.7	n.a.	n.a.	
D1307083	AR Spring	-12.7	-93.4	8.5	n.a.	n.a.	Discharge at pool with 30% capture of spring area
D1307093	AR Spring	-13.2	-93.5	12.3	n.a.	n.a.	
D1307098	AR Spring	-12.8	-94.8	7.9	n.a.	n.a.	Both YSI and Oakton taken into field
D1407108	AR Spring	-12.6	-92.6	8.4	n.a.	n.a.	CDT calibrated, Sonde redeployed
D1407113	AR Spring	-13.0	-93.9	9.9	n.a.	n.a.	DO with #3; others with #2. Large hail event was happening on and off all day. Sp Con possibly affected by precipitation.
D1407121	AR Spring	-13.0	-93.1	10.9	n.a.	n.a.	
D1407124	AR Spring	-13.2	-92.9	12.8	1.5	±0.30	Collected with Tritium sample
D1507127	AR Spring	-12.6	-92.0	8.4	n.a.	n.a.	
D1507139	AR Spring	-13.5	-94.3	13.5	n.a.	n.a.	
D1507151	AR Spring	-13.1	-94.3	10.7	n.a.	n.a.	spring well

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Sample ID	Sample Location	Sample Date	Water Temperature °C	pH	Specific Conductivity* µS/cm	Dissolved solids mg/l	Dissolved Oxygen mg/l	Instrument**
D1507177	AR Spring	10/9/2015	12.9	6.08	522	339.095	0.04	3
D1207005	AR Upper Fish Pool	5/17/2012	14.8	6.69	406	203	n.a.	1
D1207035	AR Upper Fish Pool	7/4/2012	17.1	7.43	559	363	n.a.	2
D1207051	AR Upper Fish Pool	9/1/2012	19.3	7.61	608	395	7.86	2
D1207054	AR Upper Fish Pool	12/2/2012	1.1	7.33	684	342	n.a.	1
D1307062	AR Upper Fish Pool	5/27/2013	11.9	7.26	339	220	2.34	2
D1307084	AR Upper Fish Pool	7/22/2013	19.5	6.25	532	266	n.a.	1
D1307090	AR Upper Fish Pool	9/7/2013	18.0	7.43	520	338	8.2	2
D1207004	AR Fishless Pool	5/17/2012	12.9	6.28	322	161	n.a.	1
D1207053	AR Fishless Pool	12/2/2012	1.2	8.77	686	343	n.a.	1
D1307065	AR Fishless Pool	5/27/2013	11.9	6.83	341	222	1.66	2
D1307086	AR Fishless Pool	7/22/2013	19.0	6.87	485	243	n.a.	1
D1307091	AR Fishless Pool	9/7/2013	15.5	6.88	474	308	0.7	2
D1307099	AR Fishless Pool	12/19/2013	0.8	7.07	307	154	4.7	1
D1407110	AR Fishless Pool	5/23/2014	12.7	6.42	399	200	3	1 and 2
D1407115	AR Fishless Pool	7/9/2014	17.5	6.93	510	255	2.7	1 and 2
D1407119	AR Fishless Pool	10/12/2014	8.5	7.45	500	325	4.5	2
D1507128	AR Fishless Pool	2/21/2015	3.9	7.58	268	174	9.1	2
D1507138	AR Fishless Pool	4/3/2015	6.5	7.47	281	183	2.5	2
D1507148	AR Fishless Pool	5/31/2015	11.2	6.88	323	210	3.14	3
D1507178	AR Fishless Pool	10/9/2015	9.8	6.61	533	346.2	5.36	3
D1407100	Bluewater Creek	4/25/2014	12.7	7.03	496	248	n.a.	1
D1507142	Bluewater Creek	4/7/2015	9.5	7.38	640	320	n.a.	1 and 2
D1207024	Camp 2 Canyon B	6/12/2012	18.7	7.40	515	258	0.56	1
D1507141	Cottonwood Gulch spring	4/7/2015	6.4	6.49	289	145	n.a.	1 and 2

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Sample ID	Sample Location	Ca ⁺⁺ mg/l	Mg ⁺⁺ mg/l	Na ⁺ mg/l	K ⁺ mg/l	HCO ₃ ⁻ mg/l	SO ₄ ⁻⁻ mg/l	Cl ⁻ mg/l	Mass Balance*** %
D1507177	AR Spring	32.07	5.49	59.41	2.09	133.38	100.08	19.13	-1.3
D1207005	AR Upper Fish Pool	28.02	7.07	44.43	1.82	131.19	60.57	10.15	3.4
D1207035	AR Upper Fish Pool	28.14	7.70	66.46	1.63	103.73	123.70	20.49	1.2
D1207051	AR Upper Fish Pool	26.90	6.63	78.21	1.74	101.29	131.43	21.34	3.2
D1207054	AR Upper Fish Pool	31.03	8.22	74.24	1.97	105.19	158.34	26.45	-2.3
D1307062	AR Upper Fish Pool	28.13	8.21	35.53	1.31	137.90	63.45	8.88	-2.3
D1307084	AR Upper Fish Pool	30.23	7.67	75.50	1.87	111.42	127.96	25.72	2.4
D1307090	AR Upper Fish Pool	32.59	8.53	59.47	1.21	161.21	83.08	13.52	2.0
D1207004	AR Fishless Pool	32.64	10.78	15.28	2.46	185.49	16.72	6.36	-4.8
D1207053	AR Fishless Pool	32.90	10.56	88.75	2.77	114.10	158.15	26.85	4.2
D1307065	AR Fishless Pool	33.73	11.57	20.96	2.30	171.46	26.85	5.40	1.2
D1307086	AR Fishless Pool	31.45	9.89	50.16	2.70	146.44	79.94	16.08	1.3
D1307091	AR Fishless Pool	36.86	11.52	36.63	2.18	207.46	40.02	9.97	-0.9
D1307099	AR Fishless Pool	28.14	9.65	10.64	2.10	147.66	10.85	4.02	-0.8
D1407110	AR Fishless Pool	35.84	10.89	25.97	2.66	185.61	32.28	7.13	-0.4
D1407115	AR Fishless Pool	37.22	12.35	64.09	2.98	148.27	116.99	17.43	3.4
D1407119	AR Fishless Pool	28.80	9.57	70.22	2.69	98.73	128.38	22.97	4.0
D1507128	AR Fishless Pool	24.94	8.67	10.37	0.21	114.71	19.60	3.77	0.4
D1507138	AR Fishless Pool	25.47	8.22	9.21	1.89	118.98	18.24	3.32	-0.6
D1507148	AR Fishless Pool	29.91	10.02	13.83	2.21	155.11	16.67	3.91	-0.4
D1507178	AR Fishless Pool	30.32	9.48	62.58	3.21	116.05	122.29	19.81	0.9
D1407100	Bluewater Creek	66.51	19.10	11.12	1.12	286.78	24.69	5.41	0.3
D1507142	Bluewater Creek	59.06	16.21	9.65	1.15	259.57	20.20	5.69	-1.1
D1207024	Camp 2 Canyon B	58.39	27.53	8.78	2.02	328.52	3.68	8.61	-0.8
D1507141	Cottonwood Gulch spring	40.68	8.63	2.49	1.01	164.99	5.90	3.08	-0.7

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	Si mg/l	F ⁻ mg/l	Br ⁻ mg/l	Fe ⁺⁺ mg/l	SI Calcite log Q/K	SI Gypsum log Q/K	SI Quartz log Q/K	CO ₂ (g) fugacity
D1507177	AR Spring	10.14	4.20	0.74	b.d.	0.005	0.010	2.815	0.029
D1207005	AR Upper Fish Pool	9.31	3.37	0.32	0.12	0.042	0.006	2.378	0.015
D1207035	AR Upper Fish Pool	8.97	4.18	0.28	b.d.	0.245	0.010	2.072	0.003
D1207051	AR Upper Fish Pool	9.18	4.78	1.12	b.d.	0.378	0.010	1.931	0.002
D1207054	AR Upper Fish Pool	4.84	4.95	0.70	b.d.	0.116	0.015	2.327	0.003
D1307062	AR Upper Fish Pool	5.97	3.00	b.d.	b.d.	0.194	0.006	1.729	0.005
D1307084	AR Upper Fish Pool	6.49	4.17	0.33	b.d.	0.010	0.011	1.361	0.024
D1307090	AR Upper Fish Pool	12.10	3.81	0.27	b.d.	0.470	0.008	2.691	0.005
D1207004	AR Fishless Pool	8.95	1.55	b.d.	0.11	0.017	0.002	2.483	0.034
D1207053	AR Fishless Pool	5.00	4.47	0.49	b.d.	3.940	0.015	2.283	0.000
D1307065	AR Fishless Pool	6.64	1.58	b.d.	b.d.	0.093	0.003	1.925	0.015
D1307086	AR Fishless Pool	5.48	2.92	0.27	0.13	0.099	0.008	1.172	0.013
D1307091	AR Fishless Pool	13.88	2.59	0.27	0.22	0.155	0.005	3.440	0.018
D1307099	AR Fishless Pool	7.78	1.01	0.62	b.d.	0.091	0.001	3.795	0.007
D1407110	AR Fishless Pool	8.31	2.00	0.17	b.d.	0.030	0.004	2.327	0.029
D1407115	AR Fishless Pool	9.00	3.61	0.36	0.15	0.125	0.012	2.050	0.012
D1407119	AR Fishless Pool	8.58	4.76	0.50	b.d.	0.184	0.011	2.896	0.002
D1507128	AR Fishless Pool	12.72	1.30	b.d.	b.d.	0.266	0.002	5.321	0.002
D1507138	AR Fishless Pool	7.51	0.87	b.d.	0.13	0.236	0.002	2.778	0.003
D1507148	AR Fishless Pool	9.37	1.33	b.d.	0.07	0.087	0.002	2.802	0.012
D1507178	AR Fishless Pool	9.21	4.30	0.82	0.22	0.023	0.011	2.936	0.013
D1407100	Bluewater Creek	7.30	0.69	0.01	b.d.	0.509	0.005	2.043	0.017
D1507142	Bluewater Creek	6.43	0.54	0.08	b.d.	0.932	0.004	2.074	0.008
D1207024	Camp 2 Canyon B	12.35	1.03	0.39	3.73	1.640	0.001	2.669	0.010
D1507141	Cottonwood Gulch spring	4.70	b.d.	b.d.	b.d.	0.031	0.001	1.751	0.021

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	d-excess	^3H TU	^3H Error	Notes
D1507177	AR Spring	-13.1	-93.9	11.0	n.a.	n.a.	discharge was measured volumetrically and with low-flow weir, both at 0.002 cfs (1GPM)
D1207005	AR Upper Fish Pool	-11.5	-85.3	6.5	n.a.	n.a.	AR upper (1st) Fish pond (#11) (75 paces)
D1207035	AR Upper Fish Pool	-12.2	-90.3	7.4	n.a.	n.a.	
D1207051	AR Upper Fish Pool	-12.5	-92.4	7.8	n.a.	n.a.	
D1207054	AR Upper Fish Pool	-12.8	-94.3	8.3	n.a.	n.a.	
D1307062	AR Upper Fish Pool	-12.3	-87.7	10.4	n.a.	n.a.	
D1307084	AR Upper Fish Pool	-12.5	-91.7	8.6	n.a.	n.a.	
D1307090	AR Upper Fish Pool	-11.5	-85.1	6.5	n.a.	n.a.	
D1207004	AR Fishless Pool	-10.4	-79.7	3.8	n.a.	n.a.	AR Fishless upper pond (#10) (35 paces)
D1207053	AR Fishless Pool	-12.4	-92.1	7.2	n.a.	n.a.	
D1307065	AR Fishless Pool	-11.2	-85.2	4.1	n.a.	n.a.	
D1307086	AR Fishless Pool	-10.2	-79.6	1.6	n.a.	n.a.	
D1307091	AR Fishless Pool	-9.8	-76.1	2.5	n.a.	n.a.	
D1307099	AR Fishless Pool	-11.6	-82.0	10.6	n.a.	n.a.	Both YSI and Oakton taken into field
D1407110	AR Fishless Pool	-10.0	-80.6	-0.3	n.a.	n.a.	CDT calibrated, Sonde redeployed
D1407115	AR Fishless Pool	-10.8	-85.1	1.0	n.a.	n.a.	DO with #3; others with #2
D1407119	AR Fishless Pool	-11.9	-87.5	7.5	n.a.	n.a.	
D1507128	AR Fishless Pool	-12.8	-90.7	11.9	n.a.	n.a.	
D1507138	AR Fishless Pool	-11.8	-85.9	8.2	n.a.	n.a.	
D1507148	AR Fishless Pool	-12.3	-84.2	14.0	n.a.	n.a.	1 small ZBS was seen in the fishless pool. It hovered near the surface of the water.
D1507178	AR Fishless Pool	-12.0	-87.1	8.5	n.a.	n.a.	
D1407100	Bluewater Creek	-9.7	-74.8	2.8	n.a.	n.a.	
D1507142	Bluewater Creek	-9.4	-74.4	0.6	n.a.	n.a.	
D1207024	Camp 2 Canyon B	-11.6	-85.7	7.2	n.a.	n.a.	
D1507141	Cottonwood Gulch spring	-11.5	-89.5	2.2	5.6	±0.27	Collected with Tritium sample. High level of green filamentous algae. Qualitative invertebrate inventory showed worms, leaches, algae and mosquito larve (?). Old outhouse was across the creek (50 m) from a new spring outlet right on the channel. It was not currently used but underground tank had not been removed. and possibly leaching into stream bed.

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	Sample Date	Water Temperature °C	pH	Specific Conductivity* µS/cm	Dissolved solids mg/l	Dissolved Oxygen mg/l	Instrument**
D1207013	Grasshopper Spring	5/30/2012	13.1	6.94	1452	726	n.a.	1
D1407125	Grasshopper Spring	10/18/2014	13.8	7.4	1467	953	7.8	2
D1507166	Grasshopper Spring	6/27/2015	12.0	6.89	1506	979	n.a.	3
D1507170	Gravel Pit Cattle Tank	7/4/2015	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
D1507131	La Jara Spring	3/28/2015	9.3	7.15	279	181	3	2
D1507173	Little Water Canyon	8/28/2015	15.8	6.57	184	119.3	1.29	3
D1507136	McGaffey Lake	4/3/2015	1.8	8.13	168	109	6.9	2
D1207023	New Well Spring	6/13/2012	9.0	5.83	571	286	8.31	1
D1207018	Ojitos 1	6/11/2012	13.6	6.84	140	91	4.03	2
D1207019	Ojitos 2	6/11/2012	21.5	6.97	159	103	7.46	2
D1207017	Ojo Redondo	6/11/2012	9.3	6.64	143	93	42	2
D1507132	Ojo Redondo	3/28/2015	5.9	7.46	116	75	7.9	2
D1207020	PO Flats	6/11/2012	7.8	7.49	94	61	0.31	2
D1407126	PO Flats	10/19/2014	10.7	6.64	110	71	2.1	2
D1507133	PO Flats	3/28/2015	5.9	6.87	113	74	7.1	2
D1407101	Rio Nutria Above Confluence	4/25/2014	7.5	7.81	470	235	n.a.	1
D1507146	Rio Nutria Above Confluence	4/16/2015	7.8	8.07	678	339	n.a.	1
D1507163	Rio Nutria Above Confluence	6/26/2015	14.4	7.94	401	261	5.38	3
D1307075	Rio Nutria below confluence	6/17/2013	19.8	8.17	664	432	8.33	2
D1407103	Rio Nutria below confluence	4/25/2014	12.2	7.09	677	339	n.a.	1
D1407118	Rio Nutria below confluence	7/11/2014	16.9	7.65	645	323	n.a.	1
D1507145	Rio Nutria below confluence	4/16/2015	5.2	7.24	396	198	n.a.	1
D1507162	Rio Nutria below confluence	6/26/2015	16.7	7.98	647	421	8.37	3
D1507175	Rio Nutria below confluence	10/3/2015	9.8	7.77	698	350	n.a.	1

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	Ca ⁺⁺ mg/l	Mg ⁺⁺ mg/l	Na ⁺ mg/l	K ⁺ mg/l	HCO ₃ ⁻ mg/l	SO ₄ ⁻⁻ mg/l	Cl ⁻ mg/l	Mass Balance*** %
D1207013	Grasshopper Spring	240.84	52.10	24.92	1.64	256.27	633.56	7.91	-0.5
D1407125	Grasshopper Spring	251.45	45.08	24.86	2.00	217.83	672.44	9.71	-1.3
D1507166	Grasshopper Spring	238.24	49.83	19.12	1.82	219.54	660.76	9.64	-2.2
D1507170	Gravel Pit Cattle Tank	1.42	0.09	435.45	25.21	979.93	103.88	96.20	-3.1
D1507131	La Jara Spring	34.70	4.85	10.18	1.11	126.92	20.74	5.85	-1.4
D1507173	Little Water Canyon	29.43	4.44	3.55	1.24	107.76	1.38	6.75	0.9
D1507136	McGaffey Lake	29.15	4.23	4.71	1.16	111.66	6.99	2.81	-0.4
D1207023	New Well Spring	82.52	17.80	6.53	0.60	362.44	3.77	5.41	-2.4
D1207018	Ojitos 1	13.14	3.48	5.84	0.74	67.97	5.58	2.63	-3.6
D1207019	Ojitos 2	11.24	3.07	5.69	0.67	56.75	7.71	3.24	-4.6
D1207017	Ojo Redondo	11.89	2.83	7.97	1.13	58.58	10.27	2.72	-2.0
D1507132	Ojo Redondo	11.19	2.01	5.79	0.89	42.10	10.62	2.80	0.4
D1207020	PO Flats	7.70	2.38	4.53	0.77	45.40	3.55	1.87	-4.4
D1407126	PO Flats	14.50	2.95	5.35	2.30	48.81	10.54	4.61	4.5
D1507133	PO Flats	10.75	1.96	3.58	0.85	24.28	16.16	4.03	1.5
D1407101	Rio Nutria Above Confluence	69.40	14.85	3.92	1.98	300.20	5.67	2.24	-2.0
D1507146	Rio Nutria Above Confluence	48.99	12.34	6.17	1.62	212.22	17.82	3.66	-2.4
D1507163	Rio Nutria Above Confluence	55.41	14.16	5.16	2.49	226.86	1.51	3.43	4.6
D1307075	Rio Nutria below confluence	86.67	20.51	12.31	0.97	303.86	89.71	5.38	-3.2
D1407103	Rio Nutria below confluence	97.13	24.51	11.73	0.93	331.32	79.71	5.34	1.1
D1407118	Rio Nutria below confluence	92.73	23.81	11.22	0.79	316.43	95.83	5.59	-1.7
D1507145	Rio Nutria below confluence	86.38	22.67	10.47	0.84	326.44	85.13	1.22	-3.7
D1507162	Rio Nutria below confluence	90.18	22.83	10.25	0.78	328.27	89.05	5.24	-3.8
D1507175	Rio Nutria below confluence	95.00	23.37	11.20	1.11	333.03	86.65	5.74	-1.7

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	Si mg/l	F ⁻ mg/l	Br ⁻ mg/l	Fe ⁺⁺ mg/l	SI Calcite log Q/K	SI Gypsum log Q/K	SI Quartz log Q/K	CO ₂ (g) fugacity
D1207013	Grasshopper Spring	5.61	0.71	0.23	b.d.	0.791	0.193	1.551	0.017
D1407125	Grasshopper Spring	6.51	0.81	0.06	b.d.	2.352	0.210	1.741	0.006
D1507166	Grasshopper Spring	6.18	b.d.	b.d.	b.d.	0.557	0.202	1.793	0.016
D1507170	Gravel Pit Cattle Tank	2.26	5.53	0.27	1.77	n.a.	0.000	0.373	
D1507131	La Jara Spring	8.73	0.56	b.d.	b.d.	0.164	0.003	2.842	0.006
D1507173	Little Water Canyon	5.93	0.41	0.75	0.55	0.030	0.000	1.450	0.015
D1507136	McGaffey Lake	6.33	0.11	b.d.	b.d.	1.084	0.001	2.911	0.001
D1207023	New Well Spring	7.18	0.75	0.54	b.d.	0.012	0.001	2.375	0.083
D1207018	Ojitos 1	8.13	0.73	0.29	b.d.	0.018	0.000	2.185	0.006
D1207019	Ojitos 2	8.11	0.79	0.59	b.d.	0.026	0.000	1.564	0.005
D1207017	Ojo Redondo	8.85	0.66	b.d.	b.d.	0.007	0.001	2.882	0.007
D1507132	Ojo Redondo	9.39	0.32	b.d.	0.08	0.039	0.001	3.572	0.001
D1207020	PO Flats	7.16	0.73	b.d.	b.d.	0.035	0.000	2.491	0.001
D1407126	PO Flats	9.62	0.70	0.32	b.d.	0.007	0.001	2.941	0.006
D1507133	PO Flats	7.71	b.d.	b.d.	b.d.	0.004	0.001	2.938	0.002
D1407101	Rio Nutria Above Confluence	5.52	0.42	b.d.	b.d.	3.342	0.001	1.944	0.003
D1507146	Rio Nutria Above Confluence	4.64	0.33	b.d.	b.d.	3.254	0.003	1.602	0.001
D1507163	Rio Nutria Above Confluence	5.28	0.11	b.d.	b.d.	3.637	0.000	1.358	0.002
D1307075	Rio Nutria below confluence	4.04	0.72	b.d.	b.d.	12.910	0.018	0.819	0.002
D1407103	Rio Nutria below confluence	5.79	0.53	b.d.	b.d.	0.893	0.018	1.658	0.018
D1407118	Rio Nutria below confluence	5.77	0.93	0.09	b.d.	3.855	0.020	1.342	0.006
D1507145	Rio Nutria below confluence	5.35	b.d.	b.d.	b.d.	0.912	0.019	2.111	0.012
D1507162	Rio Nutria below confluence	5.35	0.20	0.63	b.d.	8.420	0.018	1.246	0.003
D1507175	Rio Nutria below confluence	5.57	0.64	0.51	b.d.	4.363	0.019	1.767	0.004

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	d-excess	^3H TU	^3H Error	Notes
D1207013	Grasshopper Spring	-13.1	-95.3	9.9	n.a.	n.a.	
D1407125	Grasshopper Spring	-13.1	-95.1	9.5	1.8	±0.28	Collected with Tritium sample
D1507166	Grasshopper Spring	-13.5	-94.1	14.2	n.a.	n.a.	Cattle tanks were dry but spring box had approximately 15inches of water. Appeared that tube was clogged. Measurements were from spring box
D1507170	Gravel Pit Cattle Tank	13.4	14.9	-92.1	n.a.	n.a.	Pipes lead from dry spring box downhill approximately 500 meters to two tanks that had stagnant water. Pipes were dry.
D1507131	La Jara Spring	-11.6	-82.8	9.8	5.7	±0.33	Collected with Tritium sample
D1507173	Little Water Canyon	-7.2	-49.6	8.1	n.a.	n.a.	
D1507136	McGaffey Lake	-9.8	-79.1	-0.7	n.a.	n.a.	
D1207023	New Well Spring	-13.2	-95.1	10.4	n.a.	n.a.	
D1207018	Ojitos 1	-10.2	-76.6	5.2	n.a.	n.a.	
D1207019	Ojitos 2	-10.3	-76.8	5.9	n.a.	n.a.	
D1207017	Ojo Redondo	-11.9	-85.9	9.6	n.a.	n.a.	
D1507132	Ojo Redondo	-12.2	-86.6	10.9	4.1	±0.29	Collected with Tritium sample
D1207020	PO Flats	-10.6	-77.5	7.2	n.a.	n.a.	
D1407126	PO Flats	-10.9	-74.9	12.2	n.a.	n.a.	No apparent flow in springbox. Pumped water from bottom of well, but pump was not strong enough to show any decline in water level. Pumped for 30 minutes.
D1507133	PO Flats	-10.7	-80.9	4.4	4.9	±0.29	Collected with Tritium sample
D1407101	Rio Nutria Above Confluence	-10.5	-83.0	1.4	n.a.	n.a.	
D1507146	Rio Nutria Above Confluence	-10.6	-81.1	3.9	n.a.	n.a.	
D1507163	Rio Nutria Above Confluence	-4.2	-48.6	-15.1	n.a.	n.a.	isolated pool in shade with no surface flow in or out, stagnant pool
D1307075	Rio Nutria below confluence	-11.8	-87.5	7.2	n.a.	n.a.	
D1407103	Rio Nutria below confluence	-11.5	-86.6	5.4	n.a.	n.a.	
D1407118	Rio Nutria below confluence	-11.8	-88.1	6.0	n.a.	n.a.	
D1507145	Rio Nutria below confluence	-12.1	-87.8	9.4	n.a.	n.a.	
D1507162	Rio Nutria below confluence	-12.2	-87.2	10.1	n.a.	n.a.	One transect of benthic samples as well as 1 net collection along same transctet for invertebrates
D1507175	Rio Nutria below confluence	-11.9	-87.3	7.7	n.a.	n.a.	

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Sample ID	Sample Location	Sample Date	Water Temperature °C	pH	Specific Conductivity* μS/cm	Dissolved solids mg/l	Dissolved Oxygen mg/l	Instrument**
D1207021	Rock Springs	6/13/2012	14.0	7.43	136	88	n.a.	2
D1407104	Sawyer Creek	5/15/2014	8.5	6.7	1299	650	n.a.	1
D1207022	Serna Spring	6/13/2012	11.3	7.38	421	274	n.a.	2
D1307074	Tampico Draw above confluence	6/17/2013	18.2	8.02	670	436	8.5	2
D1407102	Tampico Draw above confluence	4/25/2014	14.0	7.53	655	328	n.a.	1
D1407117	Tampico Draw above confluence	7/11/2014	14.4	7.42	673	337	n.a.	1
D1507144	Tampico Draw above confluence	4/16/2015	6.8	7.78	655	n.a.	n.a.	1
D1507153	Tampico Draw above confluence	6/5/2015	13.2	7.81	667	434	8.62	3
D1507164	Tampico Draw above confluence	6/26/2015	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
D1507165	Tampico Draw above confluence	6/26/2015	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
D1507174	Tampico Draw above confluence	10/3/2015	13.6	7.52	652	347	n.a.	1
D1207011	Turkey Spring	5/28/2012	16.2	7.34	571	371	3	2

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Sample ID	Sample Location	Ca ⁺⁺ mg/l	Mg ⁺⁺ mg/l	Na ⁺ mg/l	K ⁺ mg/l	HCO ₃ ⁻ mg/l	SO ₄ ⁻⁻ mg/l	Cl ⁻ mg/l	Mass Balance*** %
D1207021	Rock Springs	11.73	3.64	5.11	0.80	60.41	5.71	2.22	-1.9
D1407104	Sawyer Creek	217.03	35.91	9.78	0.52	372.81	402.34	12.16	-2.1
D1207022	Serna Spring	42.72	19.58	8.79	1.00	239.19	9.04	5.16	-1.2
D1307074	Tampico Draw above confluence	86.03	20.22	12.42	1.00	311.80	86.62	5.63	-4.1
D1407102	Tampico Draw above confluence	91.35	22.02	11.43	0.91	325.95	79.13	5.17	-1.7
D1407117	Tampico Draw above confluence	99.07	23.54	11.07	0.74	334.01	84.79	5.65	-0.1
D1507144	Tampico Draw above confluence	93.21	22.63	10.73	0.87	335.59	85.24	5.40	-3.0
D1507153	Tampico Draw above confluence	87.57	21.02	10.52	0.65	330.59	82.53	3.18	-4.7
D1507164	Tampico Draw above confluence	96.05	22.08	10.32	0.73	326.93	99.82	10.22	-4.4
D1507165	Tampico Draw above confluence	94.01	23.06	9.92	0.55	270.06	100.90	5.97	2.5
D1507174	Tampico Draw above confluence	94.57	22.65	11.07	1.03	332.79	94.71	5.83	-3.4
D1207011	Turkey Spring	92.38	14.52	13.54	1.25	367.32	11.69	8.74	-0.7

Ground and Surface Water Physico-chemical, Major Ion and Isotope Chemistry, Zuni Mountains, Mount Taylor Ranger District, New Mexico

Sample ID	Sample Location	Si mg/l	F ⁻ mg/l	Br ⁻ mg/l	Fe ⁺⁺ mg/l	SI Calcite log Q/K	SI Gypsum log Q/K	SI Quartz log Q/K	CO ₂ (g) fugacity
D1207021	Rock Springs	7.86	0.71	0.36	b.d.	0.073	0.000	2.071	0.002
D1407104	Sawyer Creek	4.00	0.51	0.07	0.48	0.487	0.134	1.358	0.035
D1207022	Serna Spring	7.08	0.77	0.62	b.d.	0.686	0.001	2.105	0.007
D1307074	Tampico Draw above confluence	4.12	0.72	b.d.	b.d.	8.896	0.017	0.899	0.002
D1407102	Tampico Draw above confluence	5.94	0.58	0.02	b.d.	2.702	0.017	1.567	0.007
D1407117	Tampico Draw above confluence	5.64	1.06	0.21	b.d.	2.289	0.019	1.464	0.009
D1507144	Tampico Draw above confluence	5.40	0.40	0.56	b.d.	4.006	0.019	1.967	0.004
D1507153	Tampico Draw above confluence	5.58	0.30	b.d.	b.d.	4.995	0.017	1.519	0.004
D1507164	Tampico Draw above confluence	5.65	0.33	0.65	b.d.	n.a.	0.021	0.930	n.a.
D1507165	Tampico Draw above confluence	5.61	0.39	b.d.	b.d.	n.a.	0.021	0.923	n.a.
D1507174	Tampico Draw above confluence	5.66	0.66	0.63	b.d.	2.698	0.021	1.520	0.007
D1207011	Turkey Spring	5.74	0.70	0.27	3.42	2.210	0.003	1.379	0.013

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Sample ID	Sample Location	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	d-excess	^3H TU	^3H Error	Notes
D1207021	Rock Springs	-12.0	-87.4	8.6	n.a.	n.a.	
D1407104	Sawyer Creek	-10.8	-79.5	6.7	n.a.	n.a.	
D1207022	Serna Spring	-11.6	-85.3	7.8	n.a.	n.a.	
D1307074	Tampico Draw above confluence	-11.8	-87.2	7.5	n.a.	n.a.	
D1407102	Tampico Draw above confluence	-11.6	-86.3	6.3	n.a.	n.a.	
D1407117	Tampico Draw above confluence	-11.9	-87.6	7.6	n.a.	n.a.	
D1507144	Tampico Draw above confluence	-13.1	-88.8	15.8	n.a.	n.a.	
D1507153	Tampico Draw above confluence	-12.3	-87.1	11.4	n.a.	n.a.	
D1507164	Tampico Draw above confluence	-12.5	-87.6	12.1	n.a.	n.a.	
D1507165	Tampico Draw above confluence	-12.4	-87.5	11.4	n.a.	n.a.	Hanging Garden spring base of wall
D1507174	Tampico Draw above confluence	-12.1	-87.8	9.4	n.a.	n.a.	
D1207011	Turkey Spring	-12.2	-90.2	7.6	n.a.	n.a.	