

# Whole-rock Geochemical Data for the Soldiers Pass Quadrangle, Utah

by Eric H. Christiansen

Department of Geological Sciences, Brigham Young University, Provo, UT 84602

Bibliographic citation for this data report:

Christiansen, E.H., 2009, Whole-rock geochemical data for the Soldiers Pass quadrangle, Utah: Utah Geological Survey Open-File Report 774, 3 pages; also available online, <http://geology.utah.gov/online/ofr/ofr-552.pdf>.



**OPEN-FILE REPORT 552**  
**UTAH GEOLOGICAL SURVEY**  
*a division of*  
Utah Department of Natural Resources  
**2009**

## INTRODUCTION

This report makes available raw analytical data from laboratory procedures completed to determine the geochemistry of rock samples collected during geologic mapping partially supported by the Utah Geological Survey (UGS). Additional information about these samples is available in Biek and others (2009) and Christiansen and others (2007). These data were prepared by Brigham Young University, Department of Geological Sciences, under contract to the UGS. These data are highly technical in nature and proper interpretation requires considerable training in applicable geochemical techniques.

## DISCLAIMER

This open-file release is intended as a data repository for technical analytical information gathered in support of geologic mapping of the Soldiers Pass quadrangle. These data may not conform to UGS technical or editorial standards. Therefore, it may be premature for an individual or group to take actions based on the contents of this report. The Utah Department of Natural Resources, Utah Geological Survey, makes no warranty, expressed or implied, regarding its suitability for a particular use. The Utah Department of Natural Resources, Utah Geological Survey, shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to claims by users of this product.

Geologic mapping of the Soldiers Pass quadrangle was funded by the Utah Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program through USGS STATEMAP award number 05HQAG0084. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

## REFERENCES

- Biek, R.F., Clark, D.L., and Christiansen, E.H., 2009, Geologic map of the Soldiers Pass quadrangle, Utah County, Utah: Utah Geological Survey Map 235, 3 plates, scale 1:24,000.
- Christiansen, E.H., Baxter, N., Ward, T.P., Zobell, E., Chandler, M.R., Dorais, M.J., Kowallis, B.J., and Clark, D.L., 2007, Cenozoic Soldiers Pass volcanic field, central Utah – implications for the transition to extension-related magmatism in the Basin and Range Province, *in* Willis, G.C., Hylland, M.D., Clark, D.L., and Chidsey, T.C., Jr., editors, Central Utah – diverse geology of a dynamic landscape: Utah Geological Association Publication 36, p. 123-142.
- LeBas, M.J., LeMaitre, R.W., Streckeisen, A., and Zanettin, B., 1986, A chemical classification of volcanic rocks based on the total alkali-silica diagram: *Journal of Petrology*, v. 27, p. 745-750.

**Table 1. Major- and trace-element analyses of volcanic rocks from the Soldiers Pass quadrangle**

Sample #	Map Unit	Rock Type	Rock Name	Latitude (N)	Longitude (W)	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	Subtotal	LOI	Total
SP-5	Tb	lava flow	trachybasalt	40.18296	111.97442	46.05	2.59	15.90	12.47	0.14	3.95	9.80	3.13	2.10	0.51	96.63	1.89	98.52
SP-PB-95	Tb	lava flow	trachybasalt	40.16843	111.98270	48.02	2.73	16.20	12.24	0.14	4.55	7.87	3.29	2.32	0.78	98.13	1.79	99.92
SP-1303	Tb	lava flow	trachybasalt	40.15122	111.98023	48.44	2.71	16.13	11.99	0.16	4.39	7.93	3.44	2.34	0.71	98.23	1.32	99.55
SP-1403	Tb	lava flow	trachybasalt	40.16741	111.98253	47.89	2.68	16.76	12.15	0.14	2.48	8.71	3.38	2.36	0.72	97.28	1.83	99.11
SP-203	Tb	lava flow	trachybasalt	40.14549	111.98637	48.10	2.64	16.21	12.08	0.16	4.06	8.31	3.49	2.27	0.71	98.01	1.28	99.29
SP-3003	Tb	lava flow	trachybasalt	40.16849	111.98271	48.55	2.67	16.33	11.93	0.16	4.75	7.59	3.35	2.30	0.72	98.36	1.08	99.44
SP-3103	Tb	lava flow	trachybasalt	40.17209	111.98247	48.02	2.69	16.05	11.92	0.16	4.65	7.54	3.20	2.46	0.70	97.39	1.26	98.65
SP-3203	Tb	lava flow	trachybasalt	40.17540	111.97634	48.09	2.27	17.42	11.35	0.14	4.91	9.58	2.99	1.89	0.60	99.22	1.02	100.24
SP-3303	Tb	lava flow	trachybasalt	40.17759	111.97360	48.85	2.68	16.58	11.93	0.16	5.05	7.61	3.49	2.24	0.69	99.26	1.06	100.32
SP-3403-A	Tb	lava flow	trachybasalt	40.18424	111.97330	48.91	2.64	16.80	12.06	0.16	5.18	8.13	3.29	2.15	0.69	100.02	0.60	100.62
SP-4003	Tb	lava flow	trachybasalt	40.15062	111.98955	47.89	2.74	16.01	11.99	0.14	4.43	8.10	3.40	2.20	0.68	97.59	1.20	98.79
SP-3403	Tsb	lava flow	shoshonite	40.14677	111.99395	51.29	1.37	14.86	9.65	0.12	3.73	10.23	3.28	2.32	0.50	97.35	-	97.35
SP-3503	Tsb	lava flow	shoshonite	40.14690	111.99342	50.84	1.44	15.47	10.65	0.13	4.20	9.20	3.60	2.46	0.57	98.56	-	98.56
SP-3703	Tsb	lava flow	shoshonite	40.14757	111.99435	52.19	1.62	15.28	9.33	0.10	3.00	9.41	3.57	2.55	0.52	97.58	3.03	100.61
SP-3803	Tsb	lava flow	shoshonite	40.14815	111.99458	50.96	1.34	14.68	9.18	0.14	3.82	10.76	3.54	2.37	0.54	97.32	3.24	100.56
SP-3903	Tsb	lava flow	shoshonite	40.15083	111.99655	50.21	1.36	14.54	9.52	0.12	3.59	10.15	3.15	2.31	0.46	95.40	3.20	98.60
SP-903-3	Tsa	lava flow	andesite	40.15750	111.97230	54.70	0.98	14.48	7.81	0.12	4.11	8.63	3.22	2.29	0.34	96.68	2.63	99.31
SP-ATS-95	Tsa	lava flow	andesite	40.15820	111.97107	56.20	1.02	14.99	8.14	0.13	4.41	7.82	3.46	2.44	0.35	98.94	1.50	100.44
SP-GDL-95	Tsa	lava flow	andesite	40.15824	111.97106	55.71	1.03	14.98	8.01	0.15	4.38	7.78	3.49	2.39	0.35	98.28	1.63	99.91
SP-JB-95	Tsa	lava flow	andesite	40.15826	111.97106	54.61	1.03	14.72	8.07	0.13	4.27	7.94	3.36	2.40	0.29	96.81	1.82	98.63
SP-4103	Tsa	lava flow	andesite	40.15850	111.97190	56.44	1.05	15.26	8.30	0.12	4.08	7.07	3.50	2.40	0.40	98.62	1.38	100.00
SP-4303	Tsa	lava flow	andesite	40.15742	111.97103	55.54	1.02	15.23	7.71	0.11	3.97	7.31	3.54	2.43	0.39	97.25	-	97.25
SP-403	Tsa	lava flow	andesite	40.15853	111.97093	57.53	1.07	15.46	7.86	0.16	4.14	7.42	3.56	2.49	0.41	100.10	-	100.10
SP-4203	Tsa	lava flow	andesite	40.15789	111.97078	56.20	1.03	15.06	8.18	0.15	4.48	7.88	3.52	2.40	0.39	99.27	1.26	100.53
SP-KM-95	Tsc	ash-flow tuff	rhyolite	40.17569	111.95466	72.26	0.25	13.25	0.96	0.02	0.53	1.74	2.12	6.01	0.07	97.19	4.58	101.77
SP-603-A	Tsc	ash-flow tuff	rhyolite	40.20338	111.97778	72.58	0.22	13.35	1.58	0.03	0.57	1.20	2.27	5.99	0.06	97.85	2.79	100.64
SP-803-A	Tsc	ash-flow tuff	rhyolite	40.17485	111.95498	71.32	0.23	12.99	1.60	0.03	0.38	2.63	2.37	5.83	0.02	97.39	3.47	100.86
SP-490	Tsc	ash-flow tuff	rhyolite	40.20456	111.97915	71.09	0.22	13.21	1.63	0.02	0.59	1.07	4.79	5.94	0.00	98.57	3.54	102.11
SP-SP1	Tsc	ash-flow tuff	rhyolite	40.20439	111.97877	71.24	0.23	12.77	1.55	0.02	0.30	1.80	2.14	6.02	0.03	96.10	3.73	99.83
SP-103-A	Tsc	pumice clast	rhyolite	40.14294	111.98414	72.59	0.23	13.15	1.69	0.03	0.48	1.57	2.21	6.15	0.05	98.14	2.76	100.90
SP-1203-A	Tsc	pumice clast	rhyolite	40.15833	111.97417	72.04	0.15	12.84	1.10	0.06	0.48	2.00	2.16	6.20	0.05	97.07	3.25	100.32
SP-603-B	Tsc	pumice clast	trachydacite	40.15686	111.97667	68.72	0.24	13.75	1.40	0.05	0.35	2.11	2.96	6.64	0.09	96.31	4.75	101.06
SP-1005	Tsc	pumice clast	trachydacite	40.17658	111.96550	64.76	0.31	14.14	1.27	0.05	0.56	3.61	3.01	5.80	0.15	93.66	6.35	100.01
SP-1703	Tst	ash-flow tuff	trachydacite	40.15765	111.97958	62.95	0.83	16.77	4.00	0.06	1.16	4.24	2.85	4.64	0.20	97.71	2.14	99.85
SP-1803	Tst	ash-flow tuff	trachydacite	40.15621	111.97524	63.56	0.73	15.81	3.83	0.06	1.20	4.20	2.75	4.54	0.17	96.84	2.79	99.63
SP-1903	Tst	ash-flow tuff	trachydacite	40.15631	111.97585	63.82	0.80	17.05	3.19	0.05	1.06	4.21	2.87	4.68	0.18	97.92	2.27	100.19
SP-2003	Tst	ash-flow tuff	trachydacite	40.15646	111.97629	63.51	0.80	16.89	4.03	0.06	1.04	4.17	2.85	4.65	0.18	98.17	2.26	100.43
SP-2103	Tst	ash-flow tuff	trachydacite	40.15677	111.97680	64.37	0.78	16.80	3.61	0.06	1.07	4.03	2.92	4.77	0.20	98.60	2.22	100.82
SP-2203	Tst	ash-flow tuff	trachydacite	40.17320	111.95648	62.72	0.84	16.62	3.89	0.05	1.01	3.98	2.82	4.51	0.19	96.63	3.24	99.87
SP-2403	Tst	ash-flow tuff	trachydacite	40.17317	111.95404	65.08	0.74	16.34	3.78	0.05	1.02	3.90	3.02	4.60	0.18	98.69	1.86	100.55
SP-703	Tst	ash-flow tuff	trachydacite	40.17380	111.95702	63.76	0.84	16.97	4.20	0.05	1.02	4.04	2.83	4.46	0.18	98.35	1.87	100.22

Notes: Major oxides reported in weight percent and trace elements reported in parts per million (ppm) by X-ray fluorescence spectrometry. Analyses by Brigham Young University, Department of Geological Sciences. Sample location coordinates determined from topographic base map (NAD27). Rock name using total alkali-silica diagram of LeBas and others (1986). LOI is loss on ignition at 1000°C for 4 hours.

Sample #	F	Cl	Sc	V	Cr	Ni	Cu	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	La	Ce	Nd	Sm	Pb	Th	U
SP-5	56	58	19	244	27	20	26	108	23	39	1061	24	242	40	1146	47	118	38	11	8	6	3
SP-PB-95	345	61	17	238	20	15	26	112	23	43	981	26	269	43	899	53	122	44	12	6	8	3
SP-1303	-	-	17	230	17	15	26	90	22	45	887	26	273	38	974	53	132	53	11	8	5	2
SP-1403	330	76	19	248	21	17	24	118	24	44	1018	25	267	43	878	54	124	42	14	6	8	4
SP-203	-	-	16	201	17	16	28	77	22	43	934	25	253	36	1074	59	152	56	12	9	4	4
SP-3003	-	-	19	244	18	15	31	93	22	43	908	27	276	39	920	51	145	53	10	7	4	2
SP-3103	-	-	17	223	14	14	29	84	21	56	1114	26	279	37	924	49	139	54	12	7	4	4
SP-3203	-	-	21	250	51	32	31	89	22	36	1145	22	245	32	709	43	115	44	13	6	3	4
SP-3303	-	-	20	245	21	16	27	94	22	43	893	27	274	39	907	48	137	51	8	7	5	4
SP-3403-A	-	-	20	266	29	22	31	97	22	39	959	26	264	38	837	45	131	51	10	7	5	4
SP-4003	-	-	18	221	15	14	27	87	21	42	918	26	262	38	966	57	147	57	13	15	4	2
SP-3403	1290	-	20	264	215	68	33	89	20	54	908	26	226	12	1255	60	148	54	9	13	2	2
SP-3503	1317	-	21	172	256	67	32	79	21	49	922	25	243	12	1270	54	157	54	13	10	5	-
SP-3703	1485	-	21	222	195	47	34	88	20	62	931	26	225	12	1232	56	137	53	13	12	1	4
SP-3803	-	-	22	207	227	61	35	93	20	53	901	30	221	13	1203	62	149	55	13	10	4	2
SP-3903	6	104	19	276	214	73	29	100	21	52	1000	25	210	13	1171	51	117	41	12	14	6	3
SP-903-3	-	-	23	167	200	48	37	84	20	59	884	19	219	11	1322	45	122	42	11	19	5	5
SP-ATS-95	158	98	20	187	197	54	40	98	20	57	910	18	205	11	1214	36	92	33	9	12	5	3
SP-GDL-95	103	76	22	182	196	55	31	86	20	56	903	18	207	11	1163	38	94	35	10	12	6	3
SP-JB-95	95	77	21	183	193	57	39	87	20	57	910	18	207	11	1159	39	97	36	10	11	6	3
SP-4103	-	-	23	177	194	52	42	81	20	59	881	18	233	11	1233	40	107	40	7	15	5	2
SP-4303	-	-	24	179	193	49	34	80	21	61	905	18	235	11	1212	48	118	44	10	17	6	2
SP-403	-	-	21	175	189	51	31	82	19	60	886	18	229	11	1213	39	117	40	12	14	5	4
SP-4203	40	75	21	179	184	52	36	85	20	55	900	17	207	10	1147	38	94	36	9	13	6	3
SP-KM-95	730	185	-	19	6	2	2	23	14	245	214	22	161	16	981	49	90	35	5	29	23	8
SP-603-A	513	50	-	13	3	3	3	32	14	232	360	22	168	15	1090	58	133	29	8	29	20	8
SP-803-A	650	9	-	17	3	3	-	26	14	239	237	17	147	14	1047	49	112	33	5	29	20	9
SP-490	302	188	-	21	3	2	5	34	14	238	218	21	164	16	1039	59	98	37	6	31	24	8
SP-SP1	245	172	-	19	5	-	-	28	14	248	207	22	150	15	1014	53	85	32	6	30	23	8
SP-103-A	530	575	-	23	5	2	2	28	14	241	211	20	157	16	953	51	104	34	6	29	22	8
SP-1203-A	57	187	-	13	1	1	1	17	14	250	161	16	120	14	674	44	95	30	4	29	22	10
SP-603-B	196	9674	-	18	-	1	4	36	13	217	290	18	224	15	2191	71	166	44	7	37	22	8
SP-1005	595	6541	-	8	1	-	6	30	13	221	505	28	287	14	2859	65	98	39	8	34	16	6
SP-1703	1433	77	16	60	5	3	5	60	20	153	687	32	347	15	1573	68	134	56	15	19	12	7
SP-1803	1100	27	13	54	7	5	7	58	19	151	630	32	335	15	1390	69	144	55	12	19	14	6
SP-1903	1307	67	13	52	4	4	6	58	19	156	646	34	352	15	1474	71	152	60	16	20	14	6
SP-2003	1507	94	15	64	6	4	7	58	20	150	691	34	356	15	1550	65	152	58	14	19	13	6
SP-2103	1244	180	14	61	8	2	6	58	20	154	765	36	353	16	3003	60	114	48	10	19	14	6
SP-2203	2113	79	15	70	6	6	6	67	21	152	676	33	343	15	1780	64	135	54	13	20	14	7
SP-2403	1264	102	12	53	5	4	6	55	19	157	638	34	340	15	1618	66	151	58	14	22	14	7
SP-703	1873	44	16	67	6	6	7	68	20	152	660	33	342	15	1640	68	139	57	13	19	12	5