APPENDIX E

LOCATIONS, LITHOLOGIC DESCRIPTIONS, PETROGRAPHIC INFORMATION AND ANALYTICAL DATA FOR GEOCHEMICAL SAMPLES

Tabulated By

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Introduction

This appendix contains the locations, lithologic descriptions, and analytical data for geochemical samples collected during this project by Keith and Reynolds. In addition, it includes a summary of petrographic observations by DuBois on muscovite granites and other plutonic rocks of the Santa Catalina Mountains. Conclusions based on the data contained in this Appendix are discussed in Chapters 4 and 5.

SAMPLING AND ANALYTICAL PROCEDURES

During the course of this project we collected several hundred rock samples in order to characterize the geochemistry of selected Cordilleran metamorphic core complexes. Samples weighing 4 to 10 Kg were collected of plutonic, metamorphic, mylonitic, and altered-mineralized rocks. In general we collected samples at blasted road-cuts with a small sledgehammer, being very careful to get fresh specimens that were representative of the entire rock unit. In mineralized zones, the most highly altered and mineralized lithologies were collected. Samples were placed into labeled cloth sample sacks; mineralized rocks were segregated from other samples. A representative hand specimen was collected for later thin section examination.

Scintillometer readings were measured at each sample locality with a Geometrics 101-A scintillometer (total gamma count). Wherever possible, readings were taken by placing the scintillometer directly on a rock surface which was quasi-planar for at least a meter in all directions; overhangs and corners were carefully aovided.

Major element chemistry of selected samples was determined by Bendix Field Engineering Corporation in Grand Junction (N. Korte - Senior analyst); determinations were done by atomic absorption except for iron and phosphorous which were analyzed by colorimetry.

Minor and major element abundances were determined by inductively coupled plasma source spectrography at the Union Carbide Oak Ridge Gaseous Diffusion Plant. Acid soluable uranium content was analyzed by fluorimetry while total uranium content was determined by delayed-counting neutron activation.

TABLE E-1

BRIEF LITHOLOGIC DESCRIPTIONS OF GEOCHEMICAL SAMPLES

Ruby Mountains, Nevada

155753 - Jurassic(?) granite: medium-grained biotite monzogranite, nonfoliated, anomalous radioactivity.

155754 - Paleozoic calc-silicate: diopside-bearing marble with brown biotite.

155755 - Jurassic(?) granite: tan-colored, medium-grained biotite monzogranite.

155756 - Jurassic(?) granite: medium-grained biotite monzogranite, nonfoliated, anomalous radioactivity.

155757 - Jurassic(?) granite: weakly foliated biotite monzogranite, anomalous radioactivity.

155758 - Jurassic(?) granite: coarse-grained biotite granite, associated with large pegmatites.

155759 - Paleozoic calc-silicate: diopside-bearing marble, highly contorted layering.

155760 - Jurassic(?) granite: medium-grained biotite monzogranite, anomalous radioactivity.

155761 - Jurassic(?) granite: coarse-grained, well-foliated granite, associated with gneiss and pegmatites.

155762 - Granitic gneiss: quartzo-feldspathic gneiss.

155763 - Jurassic(?) granite: unfoliated biotite monzogranite dike which cuts coarse-grained granite, anomalous radioactivity.

155764 - Jurassic(?) granite: coarse-grained, pegmatitic granite with mylonitic fabric.

155765 - Paleozoic(?) quartzite: interlayered quartzite, pegmatite, sillimanite-bearing schist and gneiss.

155766 - Paleozoic(?) quartzite: interlayered quartzite, pegmatitic granite, and gneiss.

155767 - Mesozoic(?) alaskite: garnet-bearing alaskite with well-developed mylonitic fabric.

155768 - Paleozoic(?) quartzite: mylonitic quartzite interlayered with granite and pegmatite.

155769 - Paleozoic(?) quartzite: interlayered quartzite, granite and fine-grained metasedimentary rocks.

155770 - Cretaceous granite: medium-grained two-mica granite, equigranular.

155771 - Cretaceous granite: medium-grained two-mica granite, muscovite less abundant than biotite.

155772 - Cretaceous pegmatite: muscovite- and garnet-bearing pegmatite with graphic texture.

155773 - Tertiary Harrison Pass Granite: biotite monzogranite with large K-feldspar megacrysts.

155774 - Tertiary Harrison Pass Granite: biotite- and hornblende-bearing monzogranite, contains sphene.

Granite Wash Mountains, Arizona

155775 - Late Cretaceous Granite Wash granodiorite: medium-grained, biotite- and hornblende-bearing granodiorite, contains sphene.

155776 - Late Cretaceous Tank Pass granite: medium-grained, equigranular biotite granite.

155777 - Dioritic border phase of Late Cretaceous Granite Wash granodiorite: medium-grained, hornblende-bearing diorite.

155778 - Late Cretaceous Tank Pass granite (aplite): garnet-bearing aplitic dike within Tank Pass granite.

Harquahala Mountains, Arizona

155779 - Socorro Mine mineralization: limonitic gouge zone with copper, lead and molybdenum minerals.

155780 - Socorro Mine mineralization: select sample of above

155781 - Precambrian Socorro granite: coarse-grained granite with large K-feldspar megacrysts.

155782 - Early Tertiary granite: medium-grained alaskitic granite containing muscovite and garnet.

155784 - Early Tertiary granite: medium-grained granite containing large muscovite and minor garnet.

155785 - Early Tertiary pegmatite: coarse-grained, muscovite and garnet-bearing pegmatite.

155786 - Precambrian granite: coarse-grained, porphyritic, biotite-rich granite, mylonitic.

155787 - Precambrian granite: coarse-grained, porphritic granite, mylonitic.

155788 - Tertiary microdiorite: dark-colored, fine- to medium-grained diorite.

Harcuvar Mountains

155789 - Tertiary ash-flow tuff: maroon, trachytic, welded ash-flow tuff.

155790 - Doland Mine mineralization: limonitic zone that contains iron and copper minerals.

155791 - Tertiary microdiorite: microdiorite adjacent to Doland Mine mineralization.

155792 - Late Cretaceous Tank Pass granite: medium-grained, leucocratic biotite granite, foliated.

155793 - Bonanza Mine mineralization: limonitic zone with copper and iron minerals.

155794 - Bonanza Mine mineralization: same as above.

155795 - Mica schist: biotite-muscovite schist interlayered with quartzo-feldspathic gneiss.

155796 - Mica schist: similar to above.

155797 - Granitic gneiss: compositionally layered granitic gneiss.

155798 - Early Tertiary(?) leucogranite: muscovite-garnet leucogranite with minor biotite.

155799 - Gneiss, quartzo-feldspathic, biotite-bearing gneiss.

155800 - Late Cretaceous Tank Pass granite: foliated leucocratic granite with minor biotite.

155801 - Gneiss: quartzo-feldspathic gneiss, biotitic with some mylonitic fabric.

155802 - Pegmatite: undeformed quartz-feldspar pegmatite.

Buckskin Mountains, Arizona

155803 - Tertiary chloritic breccia: chloritized, brecciated, gneiss which contains relict mylonitic fabric.

155804 - Tertiary dislocation zone: sample of gouge zone at dislocation surface between underlying chloritic breccia and overlying Tertiary sedimentary rocks.

155805 - Tertiary chloritic breccia: brecciated, chloritic gneiss with hematite and limonite.

155806 - Alamo mineralization: limonitic zone at the base of Paleozoic metacarbonate rocks.

155807 - Gneiss: quartzo-feldspathic gneiss with well developed mylonitic fabric.

155808 - Granitic gneiss: granodioritic gneiss with little compositional banding.

155809 - Gneiss: compositionally layered quartzo-feldspathic gneiss, micaceous schist, and granitoid rocks.

Eastern Harcuvar Mountains, Arizona

155810 - Cretaceous(?) granite: biotite granite with well-developed mylonitic fabric.

155811 - Precambrian(?) amphibolite: plagioclase-, biotite- and hornblende-bearing amphibolite with mylonitic fabric.

155812 - Granitic gneiss: quartzo-geldspathic gneiss with well-defined compositional banding and mylonitic fabric.

Snake Range, Nevada

155813 - Granite: slightly porphyritic granite with muscovite and garnet, nonfoliated.

155814 - Granite: chloritized granite exposed beneath Snake Range décollement, rock has muscovite and biotite.

Kern Mountains, Nevada

155815 - Late Cretaceous-early Tertiary Tungstonia Granite: Coarse-grained, porphyritic granite with biotite and very large muscovites.

155816 - Tertiary Skinner Canyon Granite: leucocratic granite with sparse biotite, highly jointed.

Santa Catalina Mountains, Arizona

155817 - Tertiary pegmatite in forerange banded gneiss: muscovite pegmatite with minor hematite, interlayered with augen gneiss.

155818 - Tertiary pegmatite in forerange banded gneiss: foliated pegmatite with minor muscovite and hematite.

155819 - Augen gneiss: biotite-rich, mylonitic augen gneiss, derived from Precambrian Oracle Granite.

155820 - Tertiary(?) granodiorite: medium-grained, foliated biotite granodiorite.

155821 - Augen gneiss: biotite-rich, coarse-grained augen gneiss with mylonitic fabric.

155822 - Augen gneiss: same as above.

155823 - Granitic gneiss: medium-grained biotite-gearing, granodioritic gneiss.

155824 - Tertiary pegmatite in forerange banded gneiss: coarse-grained, muscovite- and garnet-bearing pegmatite with a mylonitic fabric.

155825 - Tertiary pegmatite in forerange banded gneiss: foliated muscovite-and garnet-bearing pegmatite.

155826 - Tertiary(?) granodiorite: medium-grained foliated biotite granodiorite.

155827 - Augen Gneiss: coarse-grained, biotitic augen gneiss, contains a well-developed mylonitic fabric.

155828 - Tertiary pegmatite in forerange banded gneiss: two-mica, garnet pegmatite.

155829 - Tertiary granite: medium-grained biotite granite.

155830 - Quartz diorite: epidote-bearing quartz diorite to granodiorite , probably equivalent to Leatherwood Quartz diorite (Late Cretaceous).

155831 - Tertiary pegmatite in forerange banded gneiss: garnet-bearing, pegmatitic muscovite granite.

155833 - Early Tertiary Wilderness granite: biotite- and garnet-bearing granite with minor muscovite, mylonitic.

155834 - Early Tertiary Wilderness granite: same as above.

155835 - Precambrian Oracle Granite: coarse-grained biotite granite, porphyritic.

155836 - Early Tertiary Wilderness granite: medium-grained, foliated biotite granite, mylonitic.

155837 - Early Tertiary Wilderness granite: same as above except minor muscovite.

155838 - Early Tertiary Wilderness granite: same as above.

155839 - Early Tertiary Wilderness granite: muscovite- and biotite bearing granite.

155840 - Early Tertiary Wilderness granite: medium-grained equigranular two-mica granite.

155841 - Mylonitic schist: biotite-rich mylonitic schist that contains muscovite which replaces the biotite, probably derived from Precambrian Oracle Granite.

155842 - Pegmatite in early Tertiary Wilderness granite: muscovite-garnet pegmatite, probably cogenetic with enclosing muscovite granite.

155843 - Precambrian Oracle Granite: coarse-grained, porphyritic biotite granite, weakly deformed.

155844 - Precambrian Oracle Granite from near type section at Oracle, Arizona (north of Santa Cataline Mountains): biotite- and hornblende-bearing with large, pink rapakivi feldspars. Rock is undeformed and very fresh.

155845 - Early Tertiary Wilderness granite: foliated, medium-grained two-mica granite with abundant garnet.

155846 - Early Tertiary Wilderness granite: same as above.

155847 - Early Tertiary Wilderness granite: similar to above.

155848 - Early Tertiary Wilderness granite: garnet-bearing two-mica granite, very weakly foliated, collected near Hitchcock picnic area.

155849 - Pegmatite in Early Tertiary Wilderness granite: garnet- and muscovite-bearing pegmatite.

155850 - Early Tertiary Wilderness Granite: foliated two-mica granite, garnet-bearing, collected near Windy Point Vista.

155851 - Pegmatite in Early Tertiary Wilderness granite: foliated muscovite-garnet pegmatite from same area as sample 155850.

155852 - Early Tertiary Wilderness granite: weakly foliated medium-grained biotite granite with only minor muscovite and garnet.

155853 - Early Tertiary Wilderness granite: weakly foliated two-mica granite, trace of garnet, collected near San Pedro Vista.

155854 - Early Tertiary Wilderness granite: unfoliated tow-mica granite with minor garnet.

155855 - Pegmatite in early Tertiary Wilderness granite: weakly foliated pegmatite that contains muscovite and garnet.

155856 - Early Tertiary Wilderness granite: foliated, medium-grained, two-mica granite with a trace of garnet.

155857 - Middle Tertiary Reef of Rock granite: medium-grained biotite granite, undeformed.

155858 - Middle Tertiary Reef of Rock granite: same as above.

155859 - Middle Tertiary Reef of Rock granite: same as above.

155860 - Precambrian quartzite: muscovite-bearing arkosic quartzite, derived from Apache Group quartzites.

155861 - Precambrian schist: quartz-feldspar-muscovite schist, derived from Apache Group Rocks.

155863 - Tertiary(?) dike: north-trending rhyolite dike.

155864 - Late Cretaceous Leatherwood quartz diorite: foliated, epidote-sphene-bearing biotite quartz diorite.

155865 - Early Tertiary aplite: garnet-bearing aplite cutting Leatherwood quartz diorite.

155866 - Early Tertiary pegmatite: garnet-bearing pegmatite with phengitic(?) muscovite, part of Lemmon Rock leucogranite.

155868 - Early Tertiary garnet schlieren: garnet-rich bands within a vertically layered muscovite pegmatite.

155869 - Late Cretaceous Leatherwood quartz diorite: similar to sample 155864.

155869 - Late Cretaceous Leatherwood quartz diorite: similar to sample 155864.

155870 - Early Tertiary garnet schlieren: similar to sample 155868, except more garnet.

Further descriptions of Santa Catalina Mountains samples are found beginning with sample number 155914.

Tortolita Mountains, Arizona

155781 - Late Cretaceous Chirreon Wash granodiorite: medium grained dioritic border phase.

155872 - Early Tertiary Derrio Canyon granite: muscovite- and garnet-bearing granite, pegmatitic phase.

155873 - Late Cretaceous Chirreon Wash granodiorite: medium-grained, biotite-rich granodiorite that contains hornblende, epidote and sphene.

155874 - Late Cretaceous Chirreon Wash granodiorite: same as above.

155875 - Late Cretaceous Chirreon Wash granodiorite: same as above except mylonitic.

155876 - Late Cretaceous Chirreon Wash granodiorite: same as ab ove, mylonitic.

155877 - Early Tertiary Derrio Canyon granite: pegmatitic and aplitic phase of muscovite-bearing granite, garnetiferous.

155878 - Late Cretaceous Chirreon Wash granodiorite: same as sample 155873 except weakly mylonitic.

155879 - Inclusion in cataline quartz monzonite: biotite-rich inclusion, probably derived from Chirreon Wash pluton .

155880 - Middle Tertiary Catalina Quartz monzonite: coarst to medium-grained biotite quartz monzonite, sphene- and hornblende-bearing, weakly foliated.

155881 - Middle Tertiary Catalina quartz monzonite: same as above.

155882 - Middle Tertiary Catalina quartz monzonite: same as above.

155883 - Middle Tertiary granitic dike: dike cuts Catalina quartz monzonite, probably related to Tortolita pluton.

155884 - Inclusion in Tortolita quartz monzonite: mafic, biotite-rich inclusion, probably derived from Chirreon Wash pluton.

155885 - Middle Tertiary Tortolita quartz monzonite: medium-grained, equigranular biotite quartz monzonite.

155886 - Aplite in Middle Tertiary Tortolita quartz monzonite: fine-grained, leucocratic aplite dike.

155887 - Middle Tertiary Tortolita quartz monzonite: medium-grained, equigranular biotite quartz monzonite.

155888 - Middle Tertiary Tortolita quartz monzonite: same as above except mylonitic.

155889 - Precambrian Oracle Granite(?): strongly mylonitic biotitic granite which may have been Oracle Granite.

155890 - Precambrian Oracle Granite: weakly mylonitic Oracle Granite, porphyritic, chloritic and coarse-grained.

155891 - Precambrian Oracle Granite: mylonitic biotite-rich granite, contains some muscovite (due to mylonitization).

166892 - Precambrian Oracle Granite: same as above.

155893 - Precambrian Oracle Granite: same as above.

155894 - Precambrian Pinal Schist: schistose band exposed north of Chirreon Wash granodiorite.

155895 - Precambrian Pinal Schist: same as above.

155896 - Late Cretaceous Chirreon Wash granodiorite: mylonitic biotite-rich granodiorite, contains hornblende, epidote and sphene.

155897 - Late Cretaceous Chirreon Wash granodiorite: same as above except weakly mylonitic.

155898 - Precambrian Oracle Granite: coarse-grained, porphyritic granite with some chlorite.

155899 - Precambrian Oracle Granite: mylonitic granite with muscovite (formed during mylonitization).

155900 - Precambrian Pinal Schist: schistose band exposed north of Chirreon Wash pluton.

155901 - Precambrian Oracle Granite: mylonitic granite with minor muscovite (formed during mylonitization).

155902 - Precambrian Pinal Schist: mica schist.

155904 - Middle Tertiary Tortolita quartz monzonite: medium grained biotite quartz monzonite.

155905 - Precambrian Oracle Granite: mylonitic granite that occurs within middle Tertiary Catalina quartz monzonite.

155906 - Precambrian Pinal Schist: schistose band exposed south of the Chirreon pluton.

155907 - Early Tertiary Derrio Canyon granite: mylonitic, muscovite-garnet leucogranite.

155908 - Middle Tertiary Tortolita quartz monzonite: mylonitic biotite granite.

155909 - Middle Tertiray Tortolita quartz monzonite: mylonitic biotite granite.

155910 - Early Tertiary Derrio Canyon granite: mylonitic muscovite- and garnet-bearing leucocratic granite.

155911 - Early Tertiary Derrio Canyon granite: mylonitic muscovite- garnet pegmatite.

155912 - Early Tertiary Derrio Canyon granite: weakly mylonitic muscovite- and garnet-bearing granite.

155913 - Tertiary diorite: dark-colored diorite that intrudes Chirreon Wash pluton.

155922 - Inclusion in Catalina quartz monzonite: dioritic with K-feldspar megacrysts of probable metasomatic origin.

Santa Catalina Mountains, Arizona (continued)

155914 - Precambrian(?) diorite: foliated riorite of uncertain age.

155915 - Precambrian Oracle Granite: mylonitic granite, biotite-rich.

155916 - Precambrian Oracle Granite: same as above.

155917 - Late Cretaceous Leatherwood quartz diorite(?): mylonitic diorite of uncertain age.

155918 - Early Tertiary Wilderness granite: medium-grained, biotite granite, mylonitic.

155919 - Early Tertiary Wilderness granite: two-mica granite with garnet.

155920 - Early Tertiary Wilderness granite: same as above.

155921 - Late Cretaceous Leatherwood quartz diorite: biotite- and epidote-bearing quartz diorite.

155923 - Early Tertiary Granodiorite: unfoliated biotite granodiorite, magnetite-bearing.

155924 - Blue Rock Mine mineralization: limonitic dump material near Blue Rock Mine, anomalous radioactivity.

155925 - Blue Rock Mine mineralization: same as above.

155926 - Blue Rock Mine mineralization: select sample of limonitic shear zone with purple fluorite and possible meta-autunite anomalous radioactivity.

Galiuro Mountains, Arizona

155903 - Late Cretaceous Williamson Canyon Volcanics: andesite.

TABLE E-2

MAJOR ELEMENT ANALYSES

	SiO_2	Al_2O_3	K_2O	CaO	Fe_2O_3	FeO	MgO	Na_2O	P_2O_5
155820	73.82	15.3	4.40	1.67	.74	.60	.28	3.78	.03
155823	76.09	13.8	4.82	1.38	.16	.46	.18	3.44	.03
155824	77.47	15.0	1.98	1.50	.06	.15	.04	5.62	.01
155825	74.27	14.6	4.25	.37	.22	.11	.04	2.01	.01
155827	70.20	14.0	2.61	2.18	1.90	2.92	1.11	3.45	.32
155828	71.86	15.3	7.41	.69	.27	.13	.08	4.03	.01
155829	75.60	14.6	5.48	1.28	.27	.31	.14	2.89	.03
155830	64.43	15.2	2.89	2.98	1.18	2.10	1.46	3.41	.15
155831	73.28	14.7	2.30	1.42	.32	.10	.04	5.46	.01
155831	70.63	14.2	4.34	1.49	.67	.18	.09	3.72	.01
155834	71.98	13.6	3.46	1.52	.31	.22	.11	3.96	.01
155838	74.38	15.4	3.92	1.50	.75	.51	.23	3.54	.05
155839	74.10	14.0	3.47	1.10	.52	.21	.12	3.45	.03
155840	75.20	15.1	2.86	1.59	.48	.37	.18	4.39	.03
155842	76.11	14.1	4.13	.55	.23	.18	.07	2.31	.05
155843	70.20	12.0	4.55	.85	.72	1.50	.82	2.17	.17
155845	76.40	14.7	4.10	.96	.25	.24	.08	3.33	.04
155847	74.04	14.9	3.54	1.21	.48	.35	.15	3.86	.03
155848	76.41	14.6	3.64	1.15	.43	.32	.12	3.70	.03
155849	74.91	15.4	4.54	.55	.28	.12	.06	3.77	.02
155851	77.90	14.5	3.65	.61	.12	.16	.04	4.75	.03
155852	75.20	14.4	3.63	1.05	.46	.25	.14	4.19	.03
155854	72.92	14.5	3.42	1.23	.51	.40	.19	4.12	.04
155856	72.06	15.4	3.39	1.46	.81	.75	.41	4.36	.08
155866	77.95	11.8	4.19	.47	-	-	.06	3.31	.12
155870	70.63	13.5	1.92	.25	1.51	1.39	.17	2.08	.03
155871	55.39	17.7	1.55	8.30	4.82	4.60	5.40	3.31	.27
155874	68.76	15.4	3.53	2.71	1.73	1.53	.24	3.73	.13
155876	63.41	16.2	2.79	4.28	2.92	2.54	2.30	3.36	.15
155877	74.52	14.3	3.23	1.89	.52	.47	.18	4.86	.03
155878	68.94	15.6	3.40	3.48	2.63	2.34	2.20	3.52	.18
155880	68.51	14.4	4.31	2.64	2.05	1.85	1.35	3.73	.24
155881	63.35	17.1	3.49	3.11	2.15	2.44	1.78	3.86	.37
155882	61.92	17.1	4.11	3.42	1.98	2.78	2.11	4.03	.35
155885	75.20	14.6	2.97	1.18	.70	.71	.43	2.87	.06
155886	76.96	13.1	4.28	.52	.33	.24	.08	3.94	.04
155887	73.11	14.0	4.26	1.41	.90	.73	.50	3.45	.08
155888	77.27	14.4	4.49	1.48	1.22	.65	.38	3.38	.03
155889	76.40	12.4	3.03	1.88	1.48	1.49	.76	2.68	.21
155890	74.75	12.5	3.96	1.32	1.94	1.07	.82	2.25	.08
155891	71.69	15.6	1.99	.63	1.12	.41	.48	3.64	.09
155893	70.67	15.5	2.32	1.16	1.66	.53	.68	3.79	.11
155895	71.30	13.8	4.09	.84	3.23	1.34	.93	.46	.07
155898	68.47	13.7	3.92	2.08	3.93	2.11	1.33	2.25	.27
155899	74.05	13.3	4.15	1.47	2.75	.82	.71	2.39	.13

	SiO_2	Al_2O_3	K_2O	CaO	Fe_2O_3	FeO	MgO	Na_2O	P_2O_5
155901	72.43	13.5	3.81	1.90	3.04	.56	.71	3.24	.15
155902	66.62	17.5	3.68	.72	5.01	1.47	1.59	1.83	.12
155906	84.73	7.5	2.20	.69	2.16	.95	.44	1.27	.08
155912	72.17	14.5	4.23	1.29	.73	.68	.27	3.20	.06
155923	64.88	19.6	2.09	3.14	.81	1.42	.59	5.61	.14

Table 3. Uranium and Emission Spectrographic Geochemical Analyses

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	D. O. E. SAMPLE NUMBER ST LAT	LONG	L TY REP	U (PPM)	U-NT (PPM)	U/TJ	AG (PPM)	AL (%)	B (PPM)	BA (PPM)	BE (PPM)	CA (%)	CO (PPM)	CR (PPM)
155753	40-40.601	-115.378	-3-92-	6.18	8.90	0.69	<2	7.12	<10	1187	4	0.97	<4	5
155754	40-40.592	-115.381	-3-92-	0.81	1.10	0.74	<2	3.24	<10	149	1	26.87	4	30
155755	40-40.594	-115.383	-3-92-	0.46	1.00	0.46	<2	7.76	<10	631	1	0.92	<4	3
155756	40-40.602	-115.378	-3-92-	7.66	10.70	0.72	<2	7.20	<10	1103	2	0.89	<4	5
155757	40-40.616	-115.368	-3-92-	6.81	9.90	0.69	<2	7.03	<10	1085	2	0.96	<4	5
155758	40-40.600	-115.379	-3-92-	1.42	2.40	0.59	<2	7.62	<10	542	2	0.58	<4	2
155759	40-40.614	-115.380	-3-92-	1.46	1.40	1.04	<2	4.35	<10	94	1	25.74	6	38
155760	40-40.617	-115.378	-3-92-	17.14	13.80	1.24	<2	7.40	<10	1066	3	0.91	<4	3
155761	40-40.633	-115.369	-3-92-	0.71	0.50	1.42	<2	7.24	<10	696	<1	0.48	<4	2
155762	40-40.633	-115.369	-3-92-	0.71	1.10	0.65	<2	7.07	<10	311	1	1.00	<4	5
155763	40-40.646	-115.405	-3-92-	2.01	4.00	0.50	<2	7.47	<10	1715	2	1.32	<4	9
155764	40-40.658	-115.425	-3-92-	<0.25	0.20	0.63	<2	7.05	<10	5317	<1	0.64	<4	2
155765	40-40.664	-115.440	-3-92-	0.63	1.20	0.53	<2	1.19	<10	93	1	<0.05	<4	18
155766	40-40.661	-115.436	-3-92-	1.69	2.10	0.80	<2	8.08	<10	2732	1	2.39	6	4
155767	40-40.690	-115.474	-3-92-	1.20	1.60	0.75	<2	6.42	<10	916	1	0.66	<4	2
155768	40-40.855	-115.230	-3-92-	1.04	1.30	0.80	<2	2.62	<10	619	<1	0.35	<4	28
155769	40-40.861	-115.235	-3-92-	0.54	1.10	0.49	<2	6.53	<10	666	2	1.31	<4	3
155770	40-40.410	-115.435	-3-92-	4.50	5.40	0.83	<2	7.01	<10	334	9	0.66	<4	3
155771	40-40.402	-115.430	-3-92-	2.21	4.30	0.51	<2	7.09	<10	608	8	0.71	<4	3
155772	40-40.396	-115.452	-3-92-	1.51	2.00	0.75	<2	7.41	<10	17	4	0.44	<4	2
155773	40-40.316	-115.485	-3-92-	5.43	9.20	0.59	<2	6.91	<10	544	3	1.42	<4	4
155774	40-40.325	-115.516	-3-92-	3.00	5.30	0.57	<2	7.98	<10	1027	3	2.35	4	8
155775	40-33.752	-113.670	-3-92-	4.46	4.50	0.99	<2	7.28	<10	933	2	2.48	9	18
155776	40-33.845	-113.700	-3-92-	1.51	3.00	0.50	<2	6.98	<10	875	2	1.03	<4	5
155777	40-33.831	-113.684	-3-92-	1.35	1.70	0.79	<2	7.89	<10	1109	1	3.82	18	18
155778	40-33.832	-113.684	-3-92-	18.82	20.20	0.93	<2	6.72	<10	78	7	0.36	<4	3
155779	40-33.745	-113.470	-3-92-	1.25	1.50	0.83	2	2.02	<10	1444	1	18.96	6	16
155780	40-33.745	-113.470	-3-92-	6.89	6.70	1.03	337	0.08	<10	25	1	7.87	7	6
155781	40-33.729	-113.488	-3-92-	9.58	9.60	1.00	<2	6.42	<10	621	4	0.51	<4	4
155782	40-33.846	-113.342	-3-92-	0.63	0.80	0.79	<2	7.25	<10	527	2	0.78	<4	3
155784	40-33.846	-113.342	-3-92-	0.90	2.20	0.41	<2	7.93	<10	765	2	0.72	<4	3
155785	40-33.846	-113.342	-3-92-	0.90	1.80	0.50	<2	8.09	<10	863	2	0.62	<4	2
155786	40-33.856	-113.351	-3-92-	1.77	3.20	0.55	<2	8.19	<10	1752	3	2.28	8	11
155787	40-33.856	-113.351	-3-92-	2.39	3.70	0.65	<2	7.10	<10	1718	2	1.60	6	10
155788	40-33.856	-113.351	-3-92-	<0.25	1.10	0.11	<2	8.91	<10	1502	1	5.49	25	70
155789	40-34.077	-113.239	-3-92-	2.53	3.70	0.68	<2	5.96	26	4975	1	0.22	<4	5
155790	40-33.895	-113.632	-3-92-	13.04	13.20	0.99	<2	4.14	<10	332	2	2.61	14	300
155791	40-33.895	-113.632	-3-92-	0.59	0.90	0.66	<2	8.39	<10	955	1	7.30	27	125
155792	40-33.895	-113.632	-3-92-	0.35	1.00	0.35	<2	7.37	<10	1164	2	0.86	<4	3
155793	40-33.929	-113.587	-3-92-	22.97	18.20	1.26	<2	2.74	<10	368	1	8.45	22	165
155794	40-33.929	-113.587	-3-92-	21.74	22.00	0.99	<2	3.30	10	323	1	0.47	15	89
155795	40-33.992	-113.574	-3-92-	0.50	3.10	0.16	<2	6.78	<10	1722	1	0.41	16	195
155796	40-33.992	-113.574	-3-92-	1.15	2.20	0.52	<2	8.49	<10	1241	1	0.40	14	116
155797	40-33.992	-113.574	-3-92-	0.92	1.54	0.60	<2	6.85	<10	1643	1	0.84	<4	3
155798	40-33.992	-113.574	-3-92-	<0.25	0.24	0.52	<2	6.52	<10	712	1	0.59	<4	2
155799	40-34.023	-113.519	-3-92-	6.21	9.50	0.65	<2	7.07	<10	818	2	1.72	5	3
155800	40-34.023	-113.519	-3-92-	<0.25	0.50	0.43	<2	7.99	<10	2159	1	1.31	<4	2
155801	40-34.021	-113.511	-3-92-	2.48	5.00	0.50	<2	6.41	<10	1249	2	1.46	<4	3
155802	40-34.021	-113.511	-3-92-	<0.25	0.40	0.31	<2	7.70	<10	552	1	0.48	<4	2
155803	40-34.179	-113.485	-3-92-	1.29	2.50	0.52	<2	8.45	<10	940	2	4.44	20	31
155804	40-34.227	-113.576	-3-92-	2.76	4.00	0.69	<2	6.40	25	1463	4	3.19	13	84
155805	40-34.227	-113.576	-3-92-	1.59	2.30	0.69	<2	6.92	<10	2381	1	1.72	4	31
155806	40-34.226	-113.593	-3-92-	15.19	15.50	0.98	<2	4.30	22	176	2	13.61	29	45
155807	40-34.229	-113.605	-3-92-	0.71	1.30	0.55	<2	7.49	<10	1607	1	0.99	<4	4
155808	40-34.229	-113.605	-3-92-	1.13	1.00	1.13	<2	7.85	<10	1964	1	0.97	<4	3

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	CU (PPM)	FE (%)	LI (PPM)	MG (%)	MN (PPM)	MO (PPM)	NA (%)	NB (PPM)	NI (PPM)	P (PPM)	SC (PPM)	TH (PPM)	TI (PPM)	V (PPM)	Y (PPM)
155753	2	1.48	82	0.20	202	<4	2.77	22	4	373	2	39	1193	11	9
155754	<2	1.68	49	2.37	279	<4	0.41	9	13	171	5	3	1412	29	8
155755	<2	0.59	37	0.13	48	<4	2.20	4	<2	707	4	6	906	<2	5
155756	2	1.56	36	0.22	195	<4	2.51	21	2	363	2	54	1272	12	11
155757	3	1.61	30	0.20	181	<4	2.52	28	3	323	3	60	1361	13	13
155758	3	0.68	42	0.12	112	<4	2.69	9	<2	377	5	8	946	<2	3
155759	2	2.11	23	2.23	372	<4	0.49	10	18	180	5	3	1863	38	8
155760	2	1.41	29	0.18	181	<4	3.03	24	2	363	2	70	1235	11	16
155761	<2	0.53	42	0.13	27	<4	1.92	<4	<2	177	5	3	1004	<2	1
155762	<2	0.76	42	0.18	69	<4	2.50	4	<2	163	5	9	1131	2	2
155763	4	2.54	30	0.40	289	<4	2.07	19	6	763	4	98	3012	34	24
155764	<2	0.66	23	0.14	48	<4	2.05	<4	<2	245	6	<2	1137	2	1
155765	4	0.48	23	0.12	73	<4	0.19	<4	4	43	1	<2	577	33	1
155766	7	3.38	27	0.81	542	<4	2.51	10	6	1160	6	28	4208	65	17
155767	3	0.59	19	0.07	217	<4	2.07	6	2	296	2	4	385	<2	5
155768	6	1.36	17	0.25	90	<4	0.36	5	8	160	3	12	1651	21	5
155769	2	0.12	8	<0.05	25	<4	4.25	<4	2	165	1	7	108	2	2
155770	3	0.63	60	0.10	253	<4	3.39	30	<2	1112	2	6	610	3	10
155771	6	0.86	88	0.14	216	<4	3.15	34	3	559	1	14	949	7	7
155772	6	0.44	40	<0.05	374	<4	3.97	12	<2	296	<1	<2	46	<2	6
155773	51	1.51	66	0.34	417	<4	2.23	15	3	391	3	25	1942	22	12
155774	2	2.84	49	0.71	548	<4	2.61	21	3	820	6	23	4035	48	19
155775	25	2.76	20	1.13	628	<4	2.62	5	15	717	7	7	2696	80	12
155776	22	1.62	22	0.27	332	<4	3.14	10	4	783	2	2	1510	26	5
155777	64	5.37	29	2.15	833	<4	2.41	<4	18	1167	13	7	5186	165	16
155778	4	0.30	2	<0.05	873	<4	3.22	61	<2	59	6	19	151	<2	18
155779	71	1.02	17	4.94	1035	4	0.28	7	15	342	3	7	929	24	10
155780	40981	8.61	8	3.34	797	441	<0.05	<4	14	<5	1	<2	18	<2	9
155781	12	1.71	17	0.26	469	<4	1.85	18	3	534	5	38	1630	16	28
155782	8	0.30	3	0.05	914	<4	3.30	7	<2	193	3	<2	143	2	18
155784	<2	0.43	4	0.07	245	<4	3.06	18	<2	174	5	9	377	6	8
155785	2	0.42	4	0.07	73	<4	3.25	17	<2	120	5	<2	399	5	5
155786	21	4.57	67	0.99	860	<4	2.66	11	8	2484	13	4	5921	81	32
155787	5	3.99	44	0.87	907	<4	2.33	15	7	2022	12	4	6119	64	38
155788	46	6.21	19	2.95	880	<4	3.13	<4	56	3102	18	<2	9082	205	19
155789	6	1.12	35	0.05	564	<4	0.16	14	5	264	1	14	1219	12	16
155790	6219	8.50	51	0.37	1686	8	<0.05	<4	80	2233	10	<2	1349	142	8
155791	50	5.89	25	3.60	1025	<4	2.39	<4	66	1788	27	<2	6662	192	18
155792	38	0.80	9	0.12	178	<4	3.37	7	<2	224	2	3	826	14	3
155793	9884	4.63	25	1.59	1428	<4	0.45	<4	96	1247	7	3	1451	131	9
155794	45685	6.80	19	0.30	1110	<4	0.27	<4	48	296	4	<2	528	91	3
155795	<2	5.43	19	1.18	672	<4	0.53	7	82	233	16	25	5553	114	16
155796	7	5.24	13	1.08	679	<4	0.83	5	36	177	14	13	5073	105	17
155797	20	1.26	4	0.18	138	<4	2.44	<4	2	318	2	14	1183	13	7
155798	5	0.46	2	<0.05	69	<4	2.56	<4	2	49	<1	<2	188	4	1
155799	25	2.23	10	0.63	454	<4	2.37	13	4	631	7	30	2333	47	31
155800	2	0.58	6	0.13	118	4	2.91	<4	3	241	1	2	508	8	2
155801	14	2.55	6	0.43	465	<4	1.77	21	3	1318	8	10	3655	31	42
155802	4	0.50	1	<0.05	91	<4	3.92	<4	2	42	2	<2	94	5	4
155803	100	5.39	27	2.06	1110	5	2.74	8	27	1871	14	15	5610	167	20
155804	102	2.72	72	1.01	513	11	0.20	9	30	1080	11	23	2215	77	24
155805	21	5.20	57	2.10	1519	<4	0.76	5	17	1185	13	6	3312	98	29
155806	88	14.43	49	0.73	432	7	<0.05	46	14	330	8	8	2583	207	23
155807	14	1.06	4	0.20	138	<4	2.59	<4	3	276	1	3	1163	22	3
155808	33	1.02	6	0.21	107	<4	2.37	<4	3	360	1	<2	1324	22	1

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	ZN (PPM)	ZR (PPM)	K (%)	SR (PPM)	CE (PPM)	TGAM (CPS)	SITE	S-GC
155753	77	19	3.70	116	88	19800	0001	JG
155754	52	<2	0.72	847	19	6600	0002	DCM
155755	27	<2	3.95	228	33	9600	0003	JG
155756	79	19	4.24	118	125	19800	0004	JG
155757	75	25	3.98	107	153	19800	0005	JG
155758	32	<2	3.49	159	25	9600	0006	JG
155759	77	2	0.15	819	31	6600	0007	DCM
155760	70	17	4.34	109	138	27000	0008	JG
155761	21	<2	5.08	224	19	9000	0009	JG
155762	27	<2	3.23	164	32	9000	0010	JG
155763	94	8	3.94	184	400	18000	0011	JG
155764	27	<2	4.76	572	12	6000	0012	JG
155765	14	<2	0.85	7	<10	6000	0013	CZQ
155766	79	2	3.07	432	139	9000	0014	JG
155767	24	<2	3.79	217	23	6300	0015	MZDM
155768	28	<2	1.51	84	58	6000	0016	CZQ
155769	4	<2	1.70	294	30	7500	0017	CZQ
155770	40	3	4.18	115	32	8400	0018	KG
155771	51	4	3.98	170	61	7200	0019	KG
155772	37	2	3.53	25	<10	6000	0020	KG
155773	61	13	2.68	245	56	12000	0021	THP
155774	88	5	2.23	430	100	7800	0022	THP
155775	80	6	2.34	537	44	6000	0023	KSD
155776	70	3	2.63	375	35	6600	0024	KG
155777	109	9	1.52	682	35	3600	0025	KD
155778	34	16	2.88	37	13	6000	0026	KA
155779	331	13	0.90	128	29	6000	0027	SDCQ
155780	4582	<2	<0.02	105	<10	6000	0028	SDCQ
155781	71	28	3.45	96	94	6000	0029	PCG
155782	8	2	2.86	222	10	4800	0030	TMG
155784	14	2	3.20	236	10	4800	0031	TMG
155785	13	<2	3.88	236	<10	4800	0032	TMG
155786	114	5	3.24	334	104	6000	0033	PCG
155787	101	<2	2.83	265	123	6000	0034	PCG
155788	81	53	1.03	1095	86	5400	0035	TMD
155789	41	83	6.03	45	63	8400	0036	TT
155790	36	4	2.08	109	69	10800	0037	DDLD
155791	81	70	0.64	787	57	5400	0038	TMD
155792	37	<2	3.37	377	28	6000	0039	KG
155793	64	3	0.64	231	70		0040	BDMD
155794	156	<2	2.55	81	25		0041	BDMD
155795	134	2	4.35	220	152	10200	0042	MMS
155796	96	<2	4.15	105	81	8400	0043	MMS
155797	21	<2	3.98	320	69	7800	0044	MGG
155798	7	<2	4.20	245	<10	4200	0045	KG
155799	54	4	2.85	259	98	13200	0046	MGN
155800	21	<2	3.58	520	<10	5400	0047	KG
155801	65	3	3.10	196	97	7800	0048	MGN
155802	5	<2	3.99	287	<10	5400	0049	PEG
155803	100	4	1.05	693	58	3000	0050	CB
155804	119	17	6.26	156	68	9000	0051	DISL
155805	188	4	3.57	132	64	7800	0052	CB
155806	74	4	0.61	146	<10	5400	0053	PALD
155807	36	<2	4.17	390	33	6000	0054	MGN
155808	46	<2	4.38	442	42	7800	0055	GG

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	D. D. E. SAMPLE ST LAT	LONG	NUMBER L TY REP	U (PPM)	U-INT (PPM)	U/TU	AG (PPM)	AL (%)	B (PPM)	BA (PPM)	BE (PPM)	CA (%)	CD (PPM)	CR (PPM)
155809	40-34.229	-113.601	-3-92-	1.16	1.40	0.83	<2	7.36	<10	1217	2	2.39	8	11
155810	40-34.071	-113.316	-3-92-	<0.25	0.23	0.94	<2	7.90	<10	5193	<1	0.85	<4	2
155811	40-34.067	-113.344	-3-92-	0.60	0.60	1.00	<2	7.89	<10	766	1	3.42	13	29
155812	40-34.077	-113.297	-3-92-	0.71	0.50	1.42	<2	8.23	<10	1287	1	3.89	15	8
155813	40-38.972	-114.195	-3-92-	7.90	10.20	0.77	<2	7.64	<10	145	5	0.75	<4	5
155814	40-38.964	-114.177	-3-92-	5.24	8.33	0.63	<2	7.79	<10	507	3	1.58	<4	6
155815	40-39.650	-114.168	-3-92-	1.39	3.00	0.46	<2	7.26	<10	1293	2	1.19	<4	6
155816	40-39.637	-114.059	-3-92-	9.67	10.80	0.90	<2	6.64	<10	83	3	0.54	<4	5
155817	40-32.309	-110.739	-3-92-	0.50	0.50	1.00	<2	7.66	<10	1571	1	0.69	<4	8
155818	40-32.309	-110.739	-3-92-	<0.25	0.60	0.41	<2	7.70	<10	285	1	0.90	<4	9
155819	40-32.309	-110.739	-3-92-	2.31	2.70	0.86	<2	6.87	<10	782	3	1.55	7	12
155820	40-32.311	-110.729	-3-92-	1.50	1.70	0.88	<2	7.30	<10	1335	1	1.17	<4	13
155821	40-32.311	-110.730	-3-92-	0.92	1.50	0.61	<2	6.65	<10	733	1	1.74	7	17
155822	40-32.311	-110.730	-3-92-	0.96	1.50	0.64	<2	7.15	<10	739	1	1.80	6	14
155823	40-32.311	-110.730	-3-92-	0.42	0.70	0.60	<2	7.21	<10	1441	1	1.02	<4	6
155824	40-32.311	-110.730	-3-92-	0.50	15.00	0.03	<2	7.43	<10	332	2	0.98	<4	9
155825	40-32.310	-110.721	-3-92-	0.54	2.00	0.27	<2	7.74	<10	187	1	0.87	<4	6
155826	40-32.310	-110.721	-3-92-	0.96	1.50	0.64	<2	7.49	<10	1701	1	1.03	<4	6
155827	40-32.316	-110.709	-3-92-	0.69	3.00	0.23	<2	7.28	<10	754	2	1.91	11	22
155828	40-32.317	-110.709	-3-92-	1.04	1.40	0.74	<2	7.57	<10	151	1	0.66	<4	4
155829	40-32.316	-110.709	-3-92-	0.57	1.10	0.52	<2	7.37	<10	1533	1	0.97	<4	10
155830	40-32.333	-110.694	-3-92-	2.49	2.80	0.89	<2	7.50	<10	875	1	2.48	12	23
155831	40-32.333	-110.694	-3-92-	0.59	0.80	0.74	<2	7.74	<10	78	1	0.83	<4	6
155833	40-32.338	-110.694	-3-92-	0.64	0.50	1.28	<2	7.28	<10	2972	<1	0.97	<4	8
155834	40-32.338	-110.694	-3-92-	0.49	0.50	0.98	<2	7.41	<10	2417	1	1.08	<4	6
155835	40-32.338	-110.694	-3-92-	2.33	2.70	0.86	<2	7.69	<10	789	2	2.18	16	23
155836	40-32.341	-110.717	-3-92-	0.45	1.10	0.41	<2	7.97	<10	2271	1	1.39	<4	6
155837	40-32.347	-110.717	-3-92-	0.30	0.70	0.43	<2	7.39	<10	1778	<1	1.17	<4	7
155838	40-32.351	-110.724	-3-92-	0.94	1.10	0.85	<2	7.32	<10	1923	1	1.12	<4	5
155839	40-32.361	-110.717	-3-92-	0.86	0.90	0.96	<2	7.06	<10	1038	1	0.82	<4	5
155840	40-32.362	-110.714	-3-92-	<0.25	1.05	0.12	<2	7.43	<10	1141	1	1.14	<4	6
155841	40-32.362	-110.714	-3-92-	4.15	6.30	0.66	<2	7.03	<10	541	1	0.74	7	14
155842	40-32.362	-110.714	-3-92-	1.34	1.80	0.74	<2	7.99	<10	605	1	0.41	<4	3
155843	40-32.362	-110.714	-3-92-	7.29	8.10	0.90	<2	7.29	<10	671	2	0.76	7	16
155844	40-******	-*******	-3-92-	4.40	4.90	0.90	<2	6.07	<10	592	3	1.60	7	17
155845	40-32.366	-110.709	-3-92-	1.42	1.30	1.09	<2	6.52	<10	903	1	0.69	<4	4
155846	40-32.370	-110.703	-3-92-	0.63	1.10	0.57	<2	6.74	<10	1777	1	0.90	<4	4
155847	40-32.372	-110.697	-3-92-	0.76	1.90	0.40	<2	7.04	3	1879	2	0.54	<10	11
155848	40-32.378	-110.687	-3-92-	0.50	0.80	0.63	<2	7.94	2	1677	1	0.95	<10	9
155849	40-32.378	-110.687	-3-92-	1.43	1.50	0.95	<2	8.22	<10	567	2	0.71	<4	3
155850	40-32.368	-110.716	-3-92-	2.02	1.40	1.44	<2	7.97	<10	1936	1	0.95	<4	5
155851	40-32.368	-110.716	-3-92-	1.11	1.70	0.65	2	7.11	<10	127	2	0.51	<4	1
155852	40-32.384	-110.694	-3-92-	1.35	1.30	1.04	<2	7.48	<10	1030	2	0.87	<4	1
155853	40-32.401	-110.690	-3-92-	1.63	2.20	0.74	<2	7.60	<10	1012	3	0.83	<4	2
155854	40-32.405	-110.699	-3-92-	1.28	1.40	0.91	<2	7.15	<10	1320	2	0.96	<4	4
155855	40-32.411	-110.720	-3-92-	2.20	3.40	0.65	<2	8.06	<10	35	4	0.21	<4	2
155856	40-32.411	-110.720	-3-92-	0.50	2.90	0.17	<2	7.89	<10	1106	10	1.23	<4	7
155857	40-32.456	-110.784	-3-92-	0.33	33.10	0.01	<2	6.89	<10	70	6	0.62	<4	4
155859	40-32.456	-110.784	-3-92-	<0.25	11.70	0.01	<2	6.75	<10	52	5	0.58	<4	3
155860	40-32.448	-110.777	-3-92-	2.41	2.30	1.05	<2	1.70	14	160	1	0.30	5	13
155861	40-32.448	-110.777	-3-92-	1.07	6.40	0.17	<2	10.61	<10	704	6	0.20	38	61
155863	40-32.447	-110.761	-3-92-	0.54	3.30	0.16	<2	6.59	<10	1142	2	0.64	<4	3
155864	40-32.447	-110.761	-3-92-	0.87	4.20	0.21	<2	7.89	<10	929	11	2.71	13	32
155865	40-32.447	-110.761	-3-92-	2.19	3.60	0.61	<2	7.90	<10	20	4	0.19	<4	2
155868	40-32.436	-110.757	-3-92-	0.64	28.50	0.02	<2	7.95	<10	21	2	0.39	<4	5

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	CU (PPM)	FE (%)	LI (PPM)	MG (%)	MN (PPM)	MO (PPM)	NA (%)	NB (PPM)	NI (PPM)	P (PPM)	SC (PPM)	TH (PPM)	TI (PPM)	V (PPM)	Y (PPM)
155809	30	4.25	12	0.79	481	<4	2.73	11	10	1343	11	<2	4592	78	38
155810	7	0.63	4	0.08	106	<4	2.76	<4	<2	291	1	<2	334	5	1
155811	122	3.12	9	1.09	553	<4	3.03	4	28	640	8	5	2410	69	11
155812	27	4.95	10	1.60	885	<4	2.57	<4	18	929	12	<2	3347	97	22
155813	16	1.06	67	0.14	1062	<4	3.29	38	6	268	6	30	713	9	25
155814	7	1.62	18	0.25	623	<4	2.62	16	3	402	6	17	1327	22	15
155815	7	1.36	22	0.33	249	<4	2.39	7	4	518	2	10	965	15	11
155816	6	0.51	5	0.10	228	<4	2.44	11	7	209	2	53	624	7	4
155817	36	0.91	10	0.11	174	<4	2.06	5	9	169	5	<2	428	10	4
155818	14	1.13	9	0.11	744	<4	2.32	12	5	115	12	6	481	8	17
155819	28	4.34	22	0.73	818	<4	1.57	11	7	1521	15	22	5404	69	62
155820	24	1.63	9	0.22	270	<4	2.38	<4	9	233	4	14	986	12	16
155821	20	4.88	22	0.86	940	<4	1.84	7	11	2064	14	14	6177	69	39
155822	28	3.89	18	0.63	909	<4	2.21	12	10	1617	12	19	4380	50	43
155823	24	0.80	5	0.13	180	<4	2.05	<4	5	136	2	2	574	6	5
155824	30	0.79	5	0.10	2417	<4	2.91	4	5	90	2	<2	257	3	90
155825	33	0.80	5	0.06	1112	<4	2.69	8	7	96	5	2	227	3	41
155826	10	1.70	15	0.25	403	<4	2.10	4	3	136	5	20	1122	11	19
155827	50	6.05	23	1.11	1703	<4	1.92	19	15	2333	22	30	7399	72	61
155828	12	0.77	4	0.07	859	<4	2.23	13	3	54	8	<2	230	2	22
155829	53	0.95	6	0.13	195	<4	1.98	<4	6	206	2	7	537	8	13
155830	65	4.19	30	1.29	899	<4	1.70	6	15	1099	10	11	3935	101	18
155831	18	0.65	6	<0.05	592	<4	2.84	7	3	74	4	<2	130	3	18
155833	10	0.96	4	0.09	107	<4	2.01	<4	6	222	1	7	429	6	4
155834	14	0.88	5	0.10	135	<4	2.27	<4	6	108	1	4	484	6	3
155835	20	6.45	18	1.31	1201	<4	1.93	9	17	2650	24	17	8118	111	74
155836	9	2.64	15	0.47	402	<4	2.26	4	6	968	6	8	2468	27	14
155837	9	1.84	14	0.30	290	4	2.28	<4	6	687	4	5	1563	16	9
155838	11	1.26	10	0.19	251	<4	2.21	<4	3	331	3	14	877	11	7
155839	10	0.93	10	0.11	212	<4	2.12	4	2	127	3	8	722	5	5
155840	12	1.20	9	0.17	279	<4	2.79	4	5	126	4	2	746	7	2
155841	64	4.98	21	1.04	1450	<4	1.57	24	10	413	22	37	5287	45	23
155842	9	0.64	5	0.07	995	<4	1.66	19	4	158	14	<2	420	6	4
155843	29	4.41	27	1.07	1306	<4	1.43	16	10	1346	19	27	4994	48	29
155844	31	3.75	42	0.48	765	<4	1.55	7	9	2298	11	18	3600	59	47
155845	18	0.56	5	0.08	1130	<4	2.07	8	4	297	4	<2	193	2	10
155846	76	1.19	9	0.15	223	<4	2.17	8	3	178	3	4	695	6	5
155847	12	1.11	21	0.17	512	4	2.52	6	15	180	3	<2	715	7	6
155848	6	0.99	23	0.14	467	<4	2.43	5	7	133	4	<2	635	7	5
155849	8	0.58	8	0.08	539	<4	2.92	10	4	117	2	5	270	2	8
155850	13	1.49	20	0.20	545	<4	2.69	12	4	208	3	5	1021	6	8
155851	52	0.40	4	<0.05	735	<4	3.43	11	2	200	1	<2	96	<2	8
155852	6	1.03	27	0.15	422	<4	2.73	9	3	253	3	3	660	4	15
155853	7	1.99	45	0.26	1040	<4	2.53	15	<2	270	4	<2	1379	12	12
155854	5	0.98	23	0.14	458	<4	2.56	8	3	190	2	2	602	5	5
155855	31	0.57	16	<0.05	5093	<4	4.13	143	2	266	<1	<2	110	<2	3
155856	26	1.73	117	0.35	639	<4	2.68	16	6	911	3	5	1628	20	17
155857	12	0.73	33	0.14	533	<4	2.88	40	3	140	3	26	1047	6	24
155859	7	0.60	23	0.10	442	<4	2.99	38	4	123	2	26	829	4	21
155860	20	1.68	12	0.15	120	<4	<0.05	4	8	570	3	5	3245	34	21
155861	389	2.55	53	0.75	310	<4	0.34	<4	34	579	19	28	5062	112	37
155863	46	0.94	7	0.16	379	4	2.18	13	2	229	3	16	1151	6	12
155864	8	4.17	236	1.66	777	<4	2.12	<4	22	1384	9	5	4082	106	14
155865	8	0.36	1	<0.05	2929	<4	4.46	150	4	358	<1	9	38	<2	2
155868	4	3.30	32	0.13	34419	<4	2.74	24	2	259	9	50	280	<2	269

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	ZN (PPM)	ZR (PPM)	K (%)	SR (PPM)	CE (PPM)	TCAM (CPS)	SITE	S-GC
155809	75	2	2.47	390	62	6000	0056	MSM
155810	14	<2	3.62	627	<10	4200	0057	KG
155811	57	3	1.29	409	25	2400	0058	AMPM
155812	97	2	1.62	313	18	3000	0059	SG
155813	101	15	2.08	63	46	8400	0060	JGR
155814	73	6	2.39	210	35	9000	0061	JGR
155815	77	7	2.23	349	79	6600	0062	TMG
155816	35	23	2.79	55	20	13200	0063	TG
155817	39	<2	3.35	347	<10	6000	0064	PEG
155818	36	<2	2.37	158	13	5400	0065	PEG
155819	84	3	2.33	149	158	7800	0066	GG
155820	61	<2	2.62	328	73	6600	0067	TGD
155821	135	2	1.67	229	121	7200	0068	GG
155822	121	2	1.45	272	160	7200	0069	GG
155823	36	<2	2.58	324	28	5400	0070	TGD
155824	34	2	1.98	192	<10	5400	0071	PEG
155825	34	2	2.01	152	13	6000	0072	PEG
155826	66	2	2.34	365	82	6600	0073	TGD
155827	207	3	1.98	199	128	7800	0074	GG
155828	46	2	2.65	121	<10	6000	0075	PEG
155829	50	2	3.03	297	47	6000	0076	TGR
155830	114	3	1.98	445	57	5400	0077	TGD
155831	30	2	2.60	70	<10	6000	0078	PEG
155833	25	<2	2.71	489	34	6000	0079	TMG
155834	40	<2	2.43	467	30	6600	0080	TMG
155835	191	2	1.58	252	154	5400	0081	YG
155836	99	<2	2.38	516	61	5400	0082	TMG
155837	64	<2	2.51	463	43	5400	0083	TMG
155838	66	2	2.27	518	96	6000	0084	TMG
155839	47	<2	2.15	257	28	5400	0085	TMG
155840	82	<2	1.77	294	21	6600	0086	TMG
155841	307	3	2.32	143	213	10200	0087	MS
155842	47	2	3.48	166	<10	8400	0088	PEG
155843	180	3	3.01	107	209	9600	0089	YG
155844	97	2	2.11	127	134	9000	0090	YG
155845	32	<2	2.24	216	<10	4800	0091	TMG
155846	46	<2	1.98	350	31	5400	0092	TMG
155847	96	2	2.23	540	37	5400	0093	TMG
155848	50	2	2.33	357	38	4800	0094	TMG
155849	43	6	1.89	161	22	5400	0095	PEG
155850	120	<2	2.32	376	35	4800	0096	TMG
155851	598	5	1.74	57	<10	5400	0097	PEG
155852	67	<2	2.03	274	29	4800	0098	TMG
155853	112	2	2.14	230	49	5400	0099	TMG
155854	47	<2	1.98	333	21	4800	0100	TMG
155855	38	11	1.61	34	<10	4800	0101	PEG
155856	85	<2	2.09	414	62	5400	0102	TMG
155857	39	6	1.90	31	51	10800	0103	TG
155859	28	6	1.83	29	57	10800	0105	TG
155860	24	2	0.91	54	62	3600	0106	YG
155861	152	4	4.46	269	134	9000	0107	YSCM
155863	28	22	2.52	175	57	8400	0108	TG
155864	137	2	1.47	512	40	6000	0109	TGD
155865	63	12	1.27	12	12	5400	0110	AP
155868	258	68	0.66	10	53	8400	0113	SS

OR SAMPLE NUMBER	D. O. E. SAMPLE NUMBER ST LAT	LONG	L TY REP	U (PPM)	U-NT (PPM)	U/TJ	AG (PPM)	AL (%)	B (PPM)	BA (PPM)	BE (PPM)	CA (%)	CO (PPM)	CR (PPM)
155869	40-32.436	-110.757	-3-92-	1.74	5.00	0.35	<2	8.16	<10	969	4	2.84	13	32
155870	40-32.433	-110.752	-3-92-	10.90			<2	7.04	<10	19	2	0.21	<4	11
155871	40-32.573	-111.028	-3-92-	0.56	0.80	0.73	<2	9.00	<10	581	1	5.33	25	31
155872	40-32.524	-111.074	-3-92-	<0.25	0.90	0.14	<2	7.41	<10	1345	1	0.83	<4	12
155873	40-32.548	-111.032	-3-92-	2.41	4.20	0.57	<2	7.64	<10	768	2	1.93	6	18
155874	40-32.549	-111.020	-3-92-	2.25	3.60	0.63	<2	7.73	<10	928	2	1.90	6	18
155875	40-32.532	-111.076	-3-92-	1.29	1.90	0.68	<2	8.47	<10	530	5	2.66	11	22
155876	40-32.532	-111.076	-3-92-	2.34	2.60	0.90	<2	8.12	<10	891	3	2.96	11	26
155877	40-32.532	-111.076	-3-92-	<0.25	0.80	0.16	<2	7.45	<10	898	1	1.27	<4	10
155878	40-32.540	-111.047	-3-92-	3.04	3.50	0.87	<2	7.95	<10	1132	2	2.51	10	23
155879	40-32.483	-111.081	-3-92-	1.61	2.30	0.70	<2	8.93	<10	1734	2	3.91	17	37
155880	40-32.484	-111.081	-3-92-	1.07	1.80	0.59	<2	7.60	<10	1224	2	1.85	6	22
155881	40-32.489	-111.077	-3-92-	0.71	1.50	0.47	<2	8.03	<10	1333	2	2.43	9	31
155882	40-32.489	-111.077	-3-92-	1.14	1.70	0.67	<2	8.31	<10	1578	2	2.50	9	26
155883	40-32.457	-110.966	-3-92-	0.80	2.90	0.28	<2	6.66	<10	193	2	0.54	<4	13
155884	40-32.474	-110.982	-3-92-	2.54	6.00	0.42	<2	6.38	<10	1195	2	1.01	15	33
155885	40-32.476	-110.981	-3-92-	0.86	2.70	0.32	<2	6.98	<10	988	2	0.93	<4	11
155886	40-32.476	-110.979	-3-92-	3.50	6.70	0.52	<2	6.17	<10	89	3	0.37	<4	12
155887	40-32.478	-110.978	-3-92-	0.76	2.10	0.35	<2	6.78	<10	904	2	1.00	<4	14
155888	40-32.465	-111.030	-3-92-	0.61	1.60	0.38	<2	6.99	<10	1172	2	1.02	<4	8
155889	40-32.473	-111.089	-3-92-	0.91	4.00	0.23	<2	6.38	<10	572	3	1.43	4	22
155891	40-32.586	-111.030	-3-92-	2.21	3.60	0.61	<2	7.97	<10	2313	2	0.62	<4	9
155892	40-32.583	-111.029	-3-92-	2.42	4.80	0.50	<2	7.97	<10	2557	2	0.47	<4	14
155893	40-32.582	-111.029	-3-92-	2.33	3.60	0.65	<2	7.59	<10	2128	2	0.88	<4	14
155894	40-32.581	-111.029	-3-92-	0.94	2.30	0.41	<2	6.07	<10	668	3	0.16	15	87
155895	40-32.576	-111.028	-3-92-	1.99	4.00	0.50	<2	6.98	<10	978	2	0.45	6	69
155896	40-32.573	-111.028	-3-92-	1.78	3.50	0.51	<2	7.85	<10	813	2	2.33	8	17
155897	40-32.573	-111.028	-3-92-	1.53	2.36	0.65	<2	8.14	<10	842	1	3.01	12	19
155898	40-32.592	-111.033	-3-92-	1.16	1.60	0.73	<2	6.55	<10	966	1	1.39	8	16
155899	40-32.580	-111.091	-3-92-	3.01	2.60	1.16	<2	6.41	<10	799	6	1.00	6	24
155900	40-32.580	-111.091	-3-92-	0.76	1.80	0.42	<2	4.46	<10	590	2	0.44	5	36
155901	40-32.581	-111.093	-3-92-	2.21	3.30	0.67	<2	5.86	<10	879	3	1.16	5	15
155902	40-32.623	-111.045	-3-92-	1.98	3.50	0.57	<2	10.03	<10	729	2	0.54	15	63
155903	40-32.957	-110.655	-3-92-	1.21	1.50	0.81	<2	7.64	<10	1304	1	1.70	10	12
155904	40-32.478	-110.978	-3-92-	0.80	2.00	0.40	<2	6.90	<10	864	2	0.93	<4	9
155905	40-32.478	-111.093	-3-92-	0.44	2.50	0.18	<2	6.82	<10	1066	2	1.25	4	14
155906	40-32.526	-111.039	-3-92-	1.33	2.70	0.49	<2	3.47	<10	694	1	0.48	4	54
155907	40-32.560	-111.107	-3-92-	0.54	1.10	0.49	<2	6.95	<10	1433	1	0.72	<4	9
155908	40-32.502	-111.034	-3-92-	2.37	2.90	0.82	<2	7.26	<10	1423	2	1.13	<4	16
155909	40-32.494	-111.041	-3-92-	2.23	3.40	0.66	<2	6.88	<10	1192	2	0.62	<4	17
155910	40-32.563	-111.078	-3-92-	<0.25	0.50	0.25	<2	6.82	<10	1617	1	0.83	<4	9
155911	40-32.557	-111.113	-3-92-	<0.25	0.60	0.21	<2	7.91	<10	1406	2	1.29	<4	13
155912	40-32.557	-111.113	-3-92-	0.46	1.10	0.42	<2	6.96	<10	1823	1	0.95	<4	9
155913	40-32.556	-111.060	-3-92-	0.82	1.20	0.68	<2	7.48	<10	829	1	4.50	25	127
155914	40-32.312	-110.740	-3-92-	<0.25	0.60	0.21	<2	7.37	<10	512	2	1.84	<4	7
155915	40-32.311	-110.725	-3-92-	2.36	4.50	0.52	<2	6.90	<10	1049	3	1.42	6	18
155916	40-32.322	-110.707	-3-92-	1.95	2.40	0.81	<2	6.73	<10	856	2	1.75	8	22
155917	40-32.332	-110.695	-3-92-	0.68	1.20	0.57	<2	6.82	<10	746	3	1.93	6	20
155918	40-32.340	-110.695	-3-92-	<0.25	0.30	0.42	<2	8.14	<10	2150	1	1.59	<4	15
155919	40-32.370	-110.702	-3-92-	<0.25	0.60	0.21	<2	6.91	<10	1372	1	0.77	<4	14
155920	40-32.401	-110.689	-3-92-	0.36	1.20	0.30	<2	7.05	<10	1150	2	0.76	<4	11
155921	40-32.447	-110.757	-3-92-	2.62	2.90	0.90	<2	7.72	<10	943	7	2.69	10	27
155922	40-32.489	-111.077	-3-92-	2.94	2.80	1.05	<2	8.45	<10	1214	3	4.64	21	55
155923	40-32.325	-110.775	-3-92-	0.50	0.90	0.56	<2	8.82	<10	1142	2	2.12	4	6
155924	40-32.300	-110.500	-3-92-	10.28	1780.00	0.01	<2	7.23	<10	535	3	4.93	14	45

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	CU (PPM)	FE (%)	LI (PPM)	MG (%)	MN (PPM)	MO (PPM)	NA (%)	NB (PPM)	NI (PPM)	P (PPM)	SC (PPM)	TH (PPM)	TI (PPM)	V (PPM)	Y (PPM)
155869	5	4.28	115	1.73	1084	<4	2.18	4	19	1608	10	8	4242	109	15
155870	26	3.53	26	0.11	41525	<4	1.28	55	<2	178	10	20	318	<2	256
155871	63	6.21	35	2.74	1043	<4	2.29	<4	48	1312	20	4	6280	204	23
155872	5	0.56	6	0.05	129	<4	2.62	6	26	91	4	<2	381	7	1
155873	64	2.17	45	0.75	515	<4	2.51	4	29	595	5	8	2435	59	10
155874	37	2.03	34	0.67	503	<4	2.54	6	30	543	4	7	2456	55	12
155875	26	3.57	34	1.20	1073	<4	2.97	4	32	778	8	8	3513	96	16
155876	30	3.49	21	1.16	741	<4	2.43	4	31	707	8	5	3339	94	15
155877	14	0.52	5	0.09	186	<4	3.08	<4	27	74	1	<2	288	6	2
155878	43	3.27	50	1.11	723	<4	2.31	6	35	830	7	7	3442	88	15
155879	74	5.08	18	1.91	779	<4	2.57	12	61	2548	12	9	7261	142	29
155880	33	2.49	18	0.76	541	<4	2.47	14	34	1121	6	6	3554	58	25
155881	29	3.48	18	1.11	782	<4	2.62	17	42	1700	8	<2	4753	85	33
155882	33	3.39	14	1.15	743	<4	2.41	15	38	1616	9	3	4597	86	30
155883	4	0.47	12	0.06	127	<4	2.71	6	25	148	2	12	361	4	3
155884	115	7.22	72	1.69	1385	<4	1.65	12	45	2003	11	14	6379	124	40
155885	9	1.00	19	0.25	300	<4	2.21	6	25	285	2	30	946	14	10
155886	8	0.25	5	<0.05	69	<4	2.08	9	22	111	2	11	247	2	9
155887	8	1.03	26	0.27	334	<4	2.19	7	28	307	3	8	998	15	7
155888	15	1.13	21	0.20	263	<4	2.29	<4	23	269	2	13	947	15	5
155889	14	1.98	19	0.43	547	<4	1.93	13	26	920	10	11	2648	32	12
155891	10	1.31	16	0.33	149	<4	3.00	10	6	413	2	14	1226	30	9
155892	128	1.70	15	0.43	556	6	2.64	7	7	694	3	12	713	28	11
155893	7	1.67	14	0.43	570	<4	2.94	<4	9	619	3	18	752	32	6
155894	8	3.00	31	0.71	422	<4	1.19	<4	31	426	10	11	883	47	7
155895	49	2.95	21	0.56	324	<4	0.33	9	24	316	11	9	3498	55	31
155896	37	2.67	23	0.94	559	<4	2.83	<4	12	778	7	6	2822	77	12
155897	12	3.74	42	1.44	715	<4	2.24	5	17	880	8	4	3982	100	20
155898	26	3.64	28	0.69	789	<4	1.46	9	12	1501	13	16	5168	62	40
155899	22	2.15	28	0.39	712	<4	1.59	11	14	616	9	22	2548	40	53
155900	7	1.83	25	0.29	272	<4	0.68	4	13	678	6	7	1614	28	20
155901	32	2.60	31	0.35	675	<4	1.92	11	9	874	10	17	2696	53	47
155902	30	4.31	61	0.93	833	<4	1.29	4	33	528	18	7	3188	81	15
155903	21	4.14	28	0.98	642	<4	1.52	7	10	1222	10	5	3782	114	15
155904	7	0.88	27	0.23	245	<4	2.26	7	11	236	3	14	793	12	5
155905	20	2.01	16	0.39	471	<4	1.65	11	8	850	10	16	2435	32	11
155906	4	1.92	37	0.24	289	<4	0.87	5	12	361	4	9	2066	32	6
155907	5	0.87	5	0.11	391	<4	2.45	11	4	325	2	3	564	8	6
155908	10	1.46	8	0.31	358	<4	2.29	7	8	438	3	15	1438	22	10
155909	7	1.29	7	0.26	268	<4	2.38	6	5	330	2	20	1112	18	10
155910	16	0.66	10	0.12	333	<4	2.42	6	4	198	2	4	343	5	3
155911	7	0.44	7	0.06	120	<4	3.34	<4	<2	142	1	<2	347	5	3
155912	36	1.08	11	0.16	388	<4	2.59	6	<2	282	2	4	503	5	9
155913	45	6.84	29	2.97	987	<4	1.95	<4	66	2419	17	6	8805	162	31
155914	13	1.19	11	0.19	219	<4	2.98	<4	2	109	3	9	930	14	7
155915	24	3.33	18	0.61	868	<4	1.90	9	7	1023	13	23	4246	54	56
155916	13	3.93	23	0.72	937	<4	1.85	10	9	1228	13	19	5103	69	50
155917	10	2.55	20	0.78	704	<4	2.18	15	8	1142	6	6	2195	48	17
155918	2	0.70	5	0.10	118	<4	3.25	<4	4	133	1	3	468	5	3
155919	6	0.66	6	0.06	217	<4	2.47	7	3	146	4	8	369	4	4
155920	2	1.28	35	0.15	530	<4	2.69	10	<2	160	3	8	776	8	6
155921	<2	3.38	113	1.36	531	<4	2.24	<4	18	919	7	10	3443	90	15
155922	91	6.23	20	2.25	927	<4	2.58	13	62	2950	15	9	7418	168	35
155923	7	2.31	27	0.45	354	<4	3.32	<4	4	1079	4	6	2209	35	10
155924	523	4.19	49	2.67	1183	41	0.13	17	23	536	13	34	3520	53	60

OR SAMPLE NUMBER	ZN (PPM)	ZR (PPM)	K (%)	SR (PPM)	CE (PPM)	TGAM (CPS)	SITE	S-GC
155869	213	3	1.55	557	44	5400	0114	TGD
155870	121	46	1.24	6	43	9600	0115	GS
155871	114	12	1.03	750	43		0116	TED
155872	22	<2	2.70	317	<10		0117	TMG
155873	81	3	2.28	463	36		0118	TED
155874	71	3	2.20	507	42		0119	TGD
155875	133	<2	1.25	506	44		0120	TGD
155876	88	2	1.76	654	36		0121	TGD
155877	30	<2	2.01	398	<10		0122	TMG
155878	89	3	2.14	554	43		0123	TGD
155879	113	10	1.76	837	140		0124	INC
155880	70	5	2.63	459	108		0125	TG
155881	90	6	2.04	533	115		0126	TG
155882	82	6	2.20	597	116		0127	TG
155883	16	5	2.77	76	26		0128	TD
155884	202	2	3.09	147	103		0129	INC
155885	36	4	2.77	227	25		0130	TG
155886	12	9	2.63	29	<10		0131	APL
155887	39	2	2.42	209	39		0132	TG
155888	43	2	2.72	288	57		0133	TG
155889	38	<2	1.98	141	79		0134	YG
155891	23	6	1.43	450	24		0136	YD
155892	43	6	1.73	432	35		0137	YD
155893	42	5	1.53	353	69		0138	YD
155894	71	2	1.64	58	65		0139	YS
155895	62	3	2.58	73	73		0140	YS
155896	60	3	1.24	415	42		0141	TGD
155897	73	3	1.38	588	48		0142	TGD
155898	89	2	2.21	147	106		0143	YD
155899	64	3	2.35	163	119		0144	YD
155900	40	2	1.47	72	54		0145	YS
155901	71	2	2.54	196	100		0146	YD
155902	96	96	2.35	98	70		0147	YS
155903	82	59	2.70	322	40		0148	KV
155904	23	2	2.61	197	42		0149	TG
155905	42	<2	2.55	168	72		0150	YD
155906	39	<2	1.51	107	60		0151	MS
155907	36	<2	2.38	243	51		0152	TMG
155908	36	3	2.58	341	92		0153	TG
155909	28	3	2.87	321	76		0154	TG
155910	36	<2	1.80	355	23		0155	TMG
155911	11	<2	1.88	638	22		0156	TMG
155912	41	<2	2.60	295	73		0157	TMG
155913	107	27	0.92	553	78		0158	TD
155914	41	<2	1.06	328	47		0159	YD
155915	69	3	2.57	165	223		0160	YD
155916	101	2	2.09	165	70		0161	YD
155917	109	<2	1.37	369	39		0162	TGD
155918	19	<2	1.95	536	26		0163	TG
155919	34	<2	2.36	265	29		0164	TMG
155920	49	<2	2.38	230	32		0165	TMG
155921	51	4	1.74	544	46		0166	TGD
155922	116	13	1.35	743	120		0167	INC
155923	72	<2	1.43	763	76		0168	TGD
155924	122	12	2.54	169	123		0169	BRD

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	D. ST	O. LAT	E. LONG	SAMPLE NUMBER L TY REP	U (PPM)	U-NT (PPM)	U/TJ	AG (PPM)	AL (%)	B (PPM)	BA (PPM)	BE (PPM)	CA (%)	CO (PPM)	CR (PPM)
155925	40	-32.301	-110.501	-3-92-	2.53	2060.00	0.00	<2	6.83	<10	581	2	5.46	13	37
155926	40	-32.300	-110.500	-3-92-	97.52	106.80	0.91	<2	8.50	<10	808	4	2.91	18	16

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	CU (PPM)	FE (%)	LI (PPM)	MG (%)	MN (PPM)	MO (PPM)	NA (%)	NB (PPM)	NI (PPM)	P (PPM)	SC (PPM)	TH (PPM)	TI (PPM)	V (PPM)	Y (PPM)
155925	372	3.66	43	2.38	1166	50	0.12	11	22	508	12	36	2976	43	57
155926	521	4.07	41	1.33	1095	5	0.42	12	11	1177	15	30	2644	57	98

METAMORPHIC CORE COMPLEXES

OR SAMPLE NUMBER	ZN (PPM)	ZR (PPM)	K (%)	SR (PPM)	CE (PPM)	TGAM (CPS)	SITE	S-GC
155925	125	10	2.80	156	119		0170.	BRD
155926	194	11	2.23	104	211		0171	BRD

PETROLOGIC SUMMARY OF THE EOCENE WILDERNESS GRANITE AND RELATED ROCKS, SANTA CATALINA MOUNTAINS, ARIZONA

by

James F. DuBois

Mineralogy

The mineralogy of the Wilderness Granite and related rocks of the Santa Catalina Mountains of Arizona is quite simple. The major minerals are plagioclase, alkali feldspar, and quartz. Accessory minerals include magnetite, garnet, apatite, and zircon. Plagioclase is the most abundant mineral throughout the plutonic complex, ranging in modal abundance from 20 to 60 percent; an average of 35 percent is typical for the rocks. Generally, plagioclase is less abundant in the pegmatitic phases and more abundant lower in the sequence. The plagioclase occurs both as euhedral phenocrysts and finer interstitial grains. Anorthite content of the plagioclase ranges from 10 to 20 percent. Albite and Carslbad twinning are present, as are delicate oscillatory and normal zoning.

Alkali feldspar is generally less abundant than plagioclase and ranges from 5 to 45 percent in modal abundance. In all of the rocks examined alkali feldspar occurs as anhedral grains ranging from 1mm to several centimeters in diameter. The larger grains are common in the pegmatitic rocks. Some of the larger alkali feldspars are poikilitic with oikocrysts of euhedral plagioclase or muscovite. Finer-grained alkali feldspar is commonly intergrown with quartz in a micrographic texture.

Quartz is ubiquitous within the samples studied, comprising between 20 and 50 percent of any given rock. It is more abundant in rocks from the upper portions of the complex, but averages a little over 30 percent overall. No phenocrysts of quartz are present; instead, the mineral is fine-grained and interstitial except where recrystallized to form lensoid blasts. Undulatory extinction is characteristic.

Muscovite occurs in almost all of the samples and ranges from a trace to 20 percent modal abundance. Two types of muscovite have been identified which may be distinguished on the basis of color. Light-green, celadonitic muscovite appears as coarse, blocky plates up to 5mm in length. It is phenocrystic and one of the earliest formed minerals. Green muscovite does not occur below the level of sampling represented by sample 155828. White muscovite is of a finer grain size than green muscovite. White muscovite appears as very fine-grained aggregates surrounding green muscovite. The

white muscovite is invariably oriented parallel to foliation in the rocks and is interpretted to have been devoloped during deformation. Concentration of opaque minerals along the cleavages in white muscovite may represent metals exsolved out of the muscovite during its conversion from green to white.

Biotite appears in all of the rocks except some of the pegmatitic phases. It ranges from a trace to nearly 20 percent in abundance, with the lower portions of the complex being more biotite rich. The biotite occurs as fine aggregates of platelets, but also forms coarser grains up to 3mm long. As with muscovite, finer-grained biotite parallels foliation in the rocks while coarser grains appear randomly distributed in original igneous textural relationships. No petrographic evidence could be found for any systematic chemical variation in biotite composition.

Garnet is common among trace minerals found in the rocks and is another expression of their peraluminous character (see Chapter 5 for a more complete discussion of the geochemistry of these rocks). The garnets are less than 0.3mm in diameter except for certain pegmatitic samples. Garnet crystals are euhedral and pink. Garnet appears to have formed early since it occurs as inclusions in coarse, green muscovite and other minerals. Garnet is never found in rocks that do not contain coarse green muscovite; therefore it only occurs in upper parts of the plutonic complex. Garnet is not a product of mylonitic deformation because it occurs in rocks that are undeformed. Where garnet is found in deformed rocks, the foliation wraps around garnet grains.

Two samples contain approximately 30 percent garnet(samples 155868 and 155870) and deserve special mention. These rocks appear to be equigranular garnet-muscovite aplite; these rocks are described as garnet schlieren in Chapters 4 and 5. The muscovite is fine-grained, greenish and stubby. Plagioclase is fine-grained and subhedral. Quartz is fine- to very fine-grained, anhedral and interstitial. These four minerals are present in sub-equal amounts whereas alkali feldspar and opaques are absent. A trace of acicular apatite and sphene occur as minute inclusions in the garnet. The extreme abundance of garnet as well as the aplitic texture of these samples indicates that they represent highly differentiated igneous rocks. As discussed in Chapter 5, these rocks have high uranium contents, as much as 28.5 ppm.

Apatite, zircon, and rarely sphene are present in trace amounts. These minerals are euhedral and fine-grained. Apatite is rod-like and is usually included in recrystallized quartz. Zircon is present in only one sample studied; it is clear and lacks overgrowths. The rocks are rather unique in their general lack of accessory minerals.

Grains of corundum were observed in a few thin sections of garnet-muscovite pegmatites. The corundum is 0.5mm in diameter or smaller. It has high relief and is clear with low first-order interference colors. The grains show rhombohedral cross-sections.

Textures

In undeformed rocks of the complex, original igneous textures are preserved and the paragenetic relationships are relatively clear. Plagioclase, green muscovite, and coarse-grained biotite can be regarded as early-formed minerals because they are coarse, euhedral, and poikilitically included by other mineral phases. Plagioclase show delicate oscillatory and normal zoning indicating a possible history as a solid phase circulating within a fluid melt. Two alkali feldpars and quartz comprise the interstitial crystallization products. These are fine-grained with serrate grain boundaries. Myrmekitic intergrowths are common in the interstitial material, imparting a micrographic texture that is characteristic of shallow intrusion. High water pressure is implied by petrography and field relationships of the rocks. The high water pressure may be manifest primarily in the appearence of extensive pegmatitic phases (see Keith and others, 1980; and Keith and Reynolds, Chapter 5 of this report). Pegmatitic rocks are primarily found in the upper parts of the complex. Alkali feldspars and muscovite are quite coarse-grained and modal percentages cannot be accurately determined from thin sections. Granophyric texture is predominant with phenocrystic phases only identifiable where they are engulfed by large alkali feldspar grains.

A spectrum of intensity of deformation is represented in the samples examined during this study. A detailed discussion of mineralogic and textural changes between undeformed and highly mylonitic rocks is included in Chapter 5 which also discusses the chemical changes (or lack thereof) undergone by the rocks during mylonitization. In general, the more deformed rocks are found in the lower parts of the plutonic complex (Keith and others, 1980). The deformation may be characterized as somewhat brittle and low temperature. No blastic developement is present and the large feldspar grains are more accurately termed porphyroclasts. Foliation is represented microscopically by planes of intense deformation. Less competent minerals such as biotite and muscovite can be seen to have behaved fairly plastically, while the feldspars were cracked and physically eroded during the mylonitic deformation (see Chapters 4 and 5 for discussions of similar results obtained from other core complexes).

Conclusions

Petrologically, the system is quite simple. Plagioclase is more abundant than alkali feldspar (predominantly orthoclase). Muscovite, garnet and corundum attest to the peraluminous nature of the inturion. The lack of accessory minerals in the plutonic complex suggests that the original melt was depleted in many of the rarer large-ion elements that facilitate the formation of minerals such as zircon. A shallow depth of intrusion is implied by micrographics textures and field relationships (Keith and others, 1980; Banks, 1980). High water pressure is clearly indicated for the crystallizing magma. Igneous textures formed during this crystallization are overprinted by deformational fabric. The deformation appears to have been a brittle processes involving the physical breakdown of feldspars. Foliation is primarily defined by mica minerals 'smeared'out along shear planes in the rock. No blastic development is present.