STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

Alaska Geologic Materials Center *Data Report No. 391*

No. 391

Pacific Rim Geological Consulting, Inc. 2011, Core descriptions, photographs and thin section photomicrographs from the Humble Oil DDH-04, 07, 08, 09, 10, 11, 12, 14, 15, 16, and 17 boreholes, Kemuk Mountain Prospect, Dillingham Quadrangle

DVD available upon request (266 photos, 1.29 GB)

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Kemuk Core Inspection Methodology

From May 12-14, 2010 on behalf of a client, PRGCI inspected the Kemuk Mountain core stored at the GMC facility in Eagle River, Alaska.

It was unlikely that all 8,000 feet of Kemuk Mountain core (17 holes) stored at the GMC could be inspected during the short time allotment at the GMC, so we prioritized the effort. Data bases indicated that five drill holes, H04, H07, H08, H09, and H12, contained known copper mineralization. Two of these drill holes, H07 and H09, were drilled to a total depth of two thousand (2,000) feet each and constitute just under 50 percent of all the core available for inspection. Core from drill hole H09 (76 boxes), was first examined, followed by core from H07 (62 boxes). PRGCI then examined core from drill holes H04 (4 boxes), H08 (12 boxes), and H12 (15 boxes). Our priorities after this was to examine core from holes that stepped out from the center of the Kemuk intrusion, including examining drilling that penetrated country rock. We also examined drill hole H16 (8 boxes), hole H12 (15 boxes), and hole H17 (1 box). We finished off examining skeleton cores from drill holes H10, H11, H14, and H15. Due to time limitations, the writer (Bundtzen) did not examine core from drill holes H13, H02, H05, H06, and H03.

Fairly complete logs from the 1950s Humble exploration program exist for drill holes H07-to-H17, but not for the other drill holes (see Appendix A; Whaley and Bray, 1959). Sporadic assay data also exist for drill holes H07-to-H17 (see Appendix B; Whaley and Bray, 1959) and for some selected intervals completed by Alaska Earth Sciences (AES) for portions of drill core. This information was routinely examined during the inspection of the core. The Niton^{TM} analyzer used in the study was unable to record and store data that was acquired during individual scans. In addition there seemed to be significant variance in results. For example, portions of core examined twice appeared to have different metal value readings although anomalous those areas of interest scanned remained anomalous in metal content. During discussions of core results, PRGCI makes reference to Niton results qualitatively e.g., low, medium, and high results of specific metals identified (see Table 2 for further information).

The work proceeded as follows: a) Bundtzen inspected the logged core and created notations that appear in Table 2; b) Tina Laird photographed core; and c) others, including GMC personnel, assisted in the re-boxing re-storage of core. Upon consultation and approval by GMC staff, PRGCI selected sections of core to be made into 25X40 mm thin sections, which were examined during this study. Prior to our investigation, the Kemuk core boxes were out-of sequence. Tom Bundtzen and Tina Laird created photomicrographs of the thin sections. At one site, 205029 a plug was made but a thin section was not produced. By agreement between PRGCI and the GMC, the core facility will have: 1) the core boxes completely in order; 2) a selected suite of thin sections and plugs; and 3) a photographic collection of all core boxes.

Table 1 Roster of Kemuk Property Core, Southwest Alaska

Drill Hole	Bedrock Intercept from surface (ft)	Bottom of Hole (ft)	Total bedrock record in drill hole (ft)	Total Number of Core Boxes
H02	170	487	317	2
H03	360	1,002	642	9
H04	296	468	172	4
H05	149	149	149	0
H06	265	687	422	10
H07	155	2,000	1,845	63
H08	224	577	353	12
H09	234	2,000	1,766	77
H10	200	532	332	11
H11	159	500	341	14
H12	254	637	383	15
H13	330	668	338	12
H14	91	500	409	12
H15	470	637	167	7
H16	308	601	293	8
H17	460	530	70	1
TOTALS/Average	**Average=258**	**Total=11,975**	**Total=7,999**	**257** [(1)]

[(1)] Skelton cores for drill holes H8, 10, 11, 13, 14, 15, and 16 occur in three additional boxes.

Table 2 Abbreviated Notes Taken by Pacific Rim Geological Consulting, Inc During Examination of Kemuk Core, May 12-14, 2010 @ Geological Materials Center (GMC), Eagle River, Alaska

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content*[4]	*Alteration or Mineralization Present*[5]	*Niton Results (AES Analyses)*[6]
H09	1A	234-239	Pyroxene gabbro, with patches of pyroxenite; dikes cut gabbro	100	Moderate	Disseminated sulfides @ 235.2 and 238.0 feet	NA
H09	1B	239-259	Pyroxene gabbro with feldspar-bearing dikes	100	Moderate	Pyrite along high angle fractures	NA
H09	2	259-281	Gabbro and fine grained andesite?	75-100	Moderate	Stockwork like high angle fractures with pyrite	High V; moderate Ti;
H09	3	181-301	Pyroxene gabbro cut by pegmatoidal feldspar veinlets	90-100	Moderate	NA	NA
H09	4	301-325	Pyroxene gabbro with mica-rich veins	100	Moderate	Sulfides in vertical veinlet	Moderate Bi and Mo
H09	5	325-349	Gabbro but transition to pyroxenite @ 344 feet.	100	High	NA	Moderate V Moderate Mo @348 feet
H09	6	349-372	Back to gabbro @ 353 ft; then back to pyroxenite @ 368 ft	90-100	High	Pyrite-kaolinite-chlorite alteration with felsic veinlets	Moderate Mo and Bi @356 feet
H09	7	372-406	Gabbro with dark andesite dikes	100	Moderate	Trachy-andesite dikelets @ 404 ft.	NA
H09	8	406-438	Gabbro with 8-10% magnetite-rich dike @ 418 and 425 feet.	100	High	NA	Moderate V and Ni @ 425 feet.
H09	9	438-460	Gabbro with andesite dikes	100	High	Xenolith of clinopyroxenite in gabbro	High V @ 444 feet.
H09	10	460-483	Pyroxenite with 'felsic bands' and hornblende-bearing dikelets	100	High	Epidote-calcite-feldspar veinlets trace chalcopyrite?	High V moderate Pd, and moderate Mo @ 463 feet.
H09	11	483-513	Irregular patches of diorite-gabbro in pyroxenite; **Thin section 205001 @486 ft.**	100	High	Pervasive-feldspar-biotite-sericite veins	NA
H09	12	513-535	Massive fine grained pyroxenite	100	High	NA	NA
H09	13	535-558	Massive fine grained pyroxenite; with pegmatoid schlieren	100	High	Euhedral apatite grains	NA
H09	14	558-581	Massive fine grained pyroxenite; but with patches of epidote alteration; **Thin section 205002 @ 563 feet.**	100	High	Propylitic	NA

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H09	15	581-603	Pyroxenite	100	High	Chlorite selvages along fractures	NA
H09	16	603-627	Fine grained pyroxenite with thin andesite dikes	100	Moderate	Trace pyrite along high angle fractures	NA
H09	17	627-649	Fine grained pyroxenite with thin andesite dikes	100	Moderate to Low	epidote-carbonate veinlets @ 645-648	NA
H09	18	649-671	Fine grained pyroxenite but with low angle granitic dikelets @ 649 and 653 ft.	100	Moderate	Granitic dikelets	NA
H09	19	671-693	Pyroxenite with intervals of fine grained andesite dikes	100	Moderate	Shearing and felsic veinlets @ 673-674 ft.; 685-687 ft.	High Ti
H09	20	693-717	Sheared andesite dike at 714-717 ft; rest is clinopyroxenite	100	Moderate	NA	NA
H09	21	717-738	Pyroxenite with abundant andesite dikelets; some with pyrite, chalcopyrite **Thin section 205003 @ 735 feet.**	90-100	Moderate	Pyrite and chalcopyrite along high angle fractures	High Cu ; High W; and High V @ 735-737 feet.
H09	22	738-761	Pyroxenite with abundant andesite dikelets; some with disseminated pyrite and chalcopyrite	100	High	Pyrite and chalcopyrite along high angle fractures	High Cu @ 745 feet.;
H09	23	761-784	Clinopyroxenite	100	Moderate	Very minor disseminated pyrite	NA
H09	24	784-808	Clinopyroxenite with thin andesite dikes **Thin section 205004 @ 787 feet.**	100	Moderate	Disseminated pyrite in fractures	High Cu @ 787 feet.
H09	25	808-829	Sheared clinopyroxenite with felsic patches	100	Low	Chlorite fractures with disseminated pyrite	NA
H09	26	829-851	Sheared clinopyroxenite with felsic patches **Thin section 205005 @ 837 feet.**	100	Low	Chlorite fractures with disseminated pyrite	NA
H09	27	851-875	Coarse, biotite-rich clinopyroxenite with thin andesite dikes	100	Moderate	NA	NA
H09	28	875-898	Coarse, biotite-rich clinopyroxenite	100	Moderate	NA	NA
H09	29	898-918	Coarse clinopyroxenite but without biotite	100	Moderate	NA	NA

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H09	30	918-941	Clinopyroxenite with felsic-patches with porphyry clast @ 929 ft. **Thin Section 205006 @ 931 feet.**	100	Moderate	Chalcopyrite, bornite and malachite @ 929 ft.;	High Cu @ 929-930 feet.
H09	31	941-964	Coarse clinopyroxenite but without biotite	100	Moderate	Epidote-calcite-chrysocolla @ 949 feet	High Cu @ 949 feet.
H09	32	964-987	Coarse grained clinopyroxenite	100	Moderate	Abundant epidote alteration in groundmass (Propylitic)	NA
H09	33	987-1011	Biotite-rich clinopyroxenite	100	Moderate	Chrysocolla @ 1005 feet	Moderate Cu
H09	34	1011-1034	Fine grained clinpyroxenite; then to coarse grained version @ 1031 feet.	90-100	Moderate	2.0 feet altered zone 1032-1034 ft.; clots of epidote	NA
H09	36	1057-1079	Sheared clinopyroxenite; core more broken up than previous record	100	Moderate to High	NA	NA
H09	37	1079-1102	Coarse grained clinopyroxenite	100	High	Vertical chlorite veins	NA
H09	38	1102-1125	Biotite-rich clinopyroxenite	100	High	NA	NA
H09	39	1125-1148	Coarse biotite clinpyroxenite with andesite dikelets	100	High	Pegmatoid zone @ 1146 feet.	(272840-847 but negative results)
H09	40	1148-1172	Coarse biotite clinpyroxenite with andesite dikelets	100	High	NA	(272848-849—no anomalies)
H09	41	1172-1195	Biotite clinpyroxenite with andesite dikelets	95	High	Vertical chlorite fracture alteration stockwork @1190-92 ft.	Moderate Zn @ 1190-1192 feet. (272851-852; no anomalies)
H09	42	1195-1219	Clinopyroxenite with granodiorite dikes **Thin section of gd dike: 205007 @ 1213 ft.**	100	High	Numerous thin high angle chlorite fractures	Moderate Zn @1213 feet.
H09	43	1219-1241	Fine grained clinopyroxenite with increasing magnetism	100	High	NA	(272853-854; no anomalies)
H09	44	1241-1264	Fine grained clinopyroxenite	100	High	NA	(3098-3099=250 ppb Pt+Pd)
H09	45	1264-1288	Fine to medium grained clinopyroxenite	100	High	NA	(3101-3105; contain moderate Cu, Zn)
H09	46	1288-1316	Fine to medium grained clinopyroxenite	95	High	Sphalerite? in veinlets	(3106-3108; 3199-3200; 160 ppb Pt+Pd)
H09	47	1316-1338	Fine to medium grained clinopyroxenite	100	Very High	Epidote veinlets @ 1332 feet.	NA

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H09	48	1338-1360	Massive homogenous clinopyroxenite; with felsic porphyry fragment in core **Thin Section 205008 @1350 feet**	100	High	Chrysocolla @ 1352-1353 feet. and 1356-1357 feet. but not confirmed by Niton	NA
H09	49	1360-1383	Coarse clinopyroxenite with zones of semi-massive magnetite; **Thin section 205009 @1375 feet.**	100	Very High	Semi-massive magnetite @ 1373-1380 feet.	NA
H09	50	1383-1414	Massive homogenous clinopyroxenite with coarse splotches of magnetite	35-100	High	NA	(272855-858; no anomalies)
H09	51	1414-1437	Medium to coarse-grained clinopyroxenite	100	High	NA	(272859; no anomalies)
H09	52	1437-1458	Medium to coarse-grained clinopyroxenite	100	High	Vertical chlorite coated fractures	(272860-862 contain low Pd/Pt anomalies)
H09	53	1458-1481	Medium to coarse-grained clinopyroxenite with laminar andesite dikes	100	High	Andesite and felsic dikes with chlorite alteration	(272863-864=100 ppb Pt+Pd @1464-1470 ft.)
H09	54	1481-1503	Medium to coarse-grained clinopyroxenite with patches of breccias dikes	100	Moderate	Chlorite-biotite alteration zones throughout interval	(272865-867=50-100 ppb Pt+Pd)
H09	55	1503-1526	Medium to coarse-grained clinopyroxenite with andesite @ 1548 and 1526 feet.	100	Moderate	NA	(272868-870=415 ppb Pt+Pd)
H09	56	1526-1553	Medium to coarse-grained clinopyroxenite with dikes @ 1548 and 1550 feet.	100	High	NA	NA
H09	57	1553-1578	Broken and sheared clinopyroxenite with numerous thin dikes	100	High	Broken zone from 1572-1578 feet.	(272872-876; low PGE+Cu)
H09	58	1578-1601	Broken and sheared clinopyroxenite with numerous thin dikes	100	Moderate	NA	NA
H09	59	1601-1624	Medium to coarse-grained clinopyroxenite	100	Moderate to High	NA	NA
H09	60	1624-1646	Broken and sheared clinopyroxenite with numerous thin dikes and fractures	100	Moderate	High angle chlorite-coated fractures	NA
H09	61	1646-1667	Pyroxenite and gabbro with magnetite-pyroxene intergrowths	100	High	NA	NA
H09	62	1667-1689	Pyroxenite and gabbro with magnetite-pyroxene intergrowths	100	Moderate	Quartz crystals in vug-like cavities @ 1682 and 1684 feet.	NA
H09	63	1689-1713	Pyroxenite and gabbro with magnetite-pyroxene intergrowths	100	High	Massive magnetite @ 1711-1712 feet.	24 % Fe in Niton @1712 ft.
H09	64	1713-1738	Pyroxenite	100	High	Shear zones oblique to core	NA

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H09	65	1738-1762	Pyroxenite	100	Moderate	Near vertical fractures with chlorite and epidote	Moderate Co @ 1749-1751 feet.
H09	66	1762-1785	Pyroxenite but with lamprophyre and granodiorite dikes; **thin section 205010 @ 1753 feet.**	100	Moderate	Granodiorite @ 1778-1781 feet.	NA
H09	67	1785-1807	Interlocking pyroxenite and granodiorite	100	Low-Moderate	Zeolite fracture fillings @ 1802 ft.	NA
H09	68	1807-1827	Pyroxene gabbro with amphiboles in fractures	100	Moderate	High angle fractures with pyrite, zeolites, and chlorite	Moderate Cu (272787-789=115 ppb Pt+Pd)
H09	69	1827-1853	Pyroxene gabbro with amphiboles in fractures	100	Moderate	Disseminated sulfides in gabbro	Moderate Cu, and Mo @ 1836-1838 feet.; (272880-882=74 ppb Pt+Pd)
H09	70	1853-1875	Pyroxene gabbro with abundant andesite dikes at various intervals; **Thin sections 205011 @1874 ft. and 205012 @1861 ft.**	100	Low-Moderate	Stockwork style fractures of chlorite and epidote; malachite @ 1861 feet.	Moderate Cu
H09	71	1875-1897	Biotite gabbro and pyroxenite 50:50	100	Low-Moderate	Highly sheared high angle fractures with calcite, stilbite and analcite	NA
H09	72	1897-1920	Back to classic clinopyroxenite	100	Moderate	Andesite dike @ 1918-1919 feet.	Moderate Cu @ 1918 feet.
H09	73	1920-1943	Alternating pyroxenite and gabbro with disseminated pyrite in fractures	100	Moderate	Pyrite infilling fractures @ 1932-1933 feet.	Moderate Cu @ 1932-1933 ft.
H09	74	1943-1966	Pyroxenite with thin gabbro/andesite dikelets	100	Moderate	Andesite dikes @ 1948 and 1963 feet.	Moderate Cu @ 1943 ft.; High Cu at 1963 ft.
H09	75	1966-1988	Pyroxenite with thin gabbro/andesite dikelets	100	High	High angle andesite dikelets contain abundant disseminated sulfides, including trace chalcopyrite	High Cu at 1978-1979 feet.
H09	76	1988-2000 **END OF HOLE**	Mainly pyroxenite with thin gabbro/andesite dikelets **Thin section 205013 @ 1963 feet.**	100	High	High angle andesite dikelets contain abundant epidote, disseminated sulfides,	Moderate Mo and Cu @ 1992-1993 feet; high Cu @ 1990 feet .

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H07	1	155-186	Pyroxenite	70	High	NA	High Bi; Moderate Pb
H07	2	186-216	Medium grained pyroxenite	95	High	NA	Moderate Cu @209-211 ft.; (03217-03222=Moderate Cu)
H07	3	216-243	Medium grained pyroxenite	80-90	Moderate	NA	(03223-03224)
H07	4	243-276	Fine grained clinopyroxenite; with fine grained feldspar porphyry?	75-90	Low-Moderate	High angle white calcite stringers in fractures	Moderate Cu @ 276 ft. (03225-03230)
H07	5	276-307	Coarse pyroxenite with thin gabbroic dikelets	95-100	Moderate	NA	(03230-03234)
H07	6	307-338	Coarse pyroxenite with thin gabbroic dikelets	100	High	Pyrite bearing diopside-rich zone @ 331 feet.	(272967-968=100 ppb Pt+Pd) at 331-338 ft.
H07	7	338-371	Coarse pyroxenite with thin gabbroic dikelets	95-100	Moderate	½ inch fine pyrite zone @ 349 feet.	(272969-970)
H07	8	371-411	Sugary pyroxenite with slickensided fault zone	23-100; average=55	High	Joints are coated with talc-chlorite layer	Moderate Cu @ 317-375 feet. in fine dike
H07	9	411-435	Epidote veinlet zones in pyroxenite	100	Moderate	Strong epidotization (propylitic)	NA
H07	10	435-469	Homogenous, fine grained pyroxenite	100	Variable; Moderate	Strong epidotization (propylitic); with apatite grains	NA
H07	11	469-499	Medium to coarse grained pyroxenite with felsic streaks **Thin Section 205014 @ 474 feet.**	100	Variable; Moderate	NA	NA
H07	12	499-527	Medium to coarse grained pyroxenite with felsic streaks	100	High	Fine grained bands of andesite	NA
H07	13	527-557	Medium to coarse grained pyroxenite with hornblende bands	100	High	Disseminated sulfide in cpx	Moderate Cu @ 528-529 feet. (272974-975=195 ppb Pt+Pd)
H07	14	557-587	Interlayered pyroxenite and andesite **Thin Section 205015 @575 feet.**	100	Moderate; Variable	Sulfide dusting in andesite; epidote from 575-585 feet.	NA
H07	15	587-616	Medium grained pyroxenite **Thin Section 205016 @ 608 feet.**	100	Low	Sulfide dust in fine grained phase	Moderate Cu @ 608-610 feet.
H07	16	616-643	Fine grained phases of pyroxenite with gabbro	100	Moderate-High	Talc-chlorite-coated joints	NA
H07	17	643-671	Fine grained phase at start and grading to medium grained pyroxenite with depth	100	Moderate	NA	NA

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H07	18	671-702	Medium to coarse grained pyroxenite	100	Moderate	NA	High Cu @ 685-687 ft.,
H07	19	702-733	Medium to coarse grained pyroxenite With numerous thin fine grained dikes **Thin section 205017 @710 feet.**	100	Moderate	Contact zone of secondary biotite with chlorite (Propylitic)	NA
H07	20	733-765	Medium to coarse grained pyroxenite	85-100	Low-Moderate	NA	NA
H07	21	765-792	Medium to coarse grained pyroxenite	90-100	Low-Moderate	Numerous high angle epidote veins @ 790-792 feet.	(272977=39 ppb Pt+Pd)
H07	22	792-819	Medium to coarse grained pyroxenite with fine grained dikes; shear zone @ 806-807 ft	100	Moderate	Numerous high angle epidote veins @ 794-796 feet.	Moderate Cu @ 806-808 feet.
H07	23	819-856	Medium to coarse grained pyroxenite with fine grained dikes	45-100; average=80	Moderate	High angle epidote veins @ 830-836 ft.	NA
H07	24	856-886	Medium to coarse grained pyroxenite	100	Moderate-High	Disseminated sulfides @ 872-874 feet.	NA
H07	25	886-915	Medium to coarse grained pyroxenite	100	Moderate	Epidote and trace sulfides @ 908-911 feet.	NA
H07	26	915-943	Medium to coarse grained pyroxenite	100	Moderate	Chlorite-calcite fracture surfaces @ 940-943 feet.	(272980=30 ppb Pt+Pd @ 942 feet)
H07	27	943-972	Fine to medium grained pyroxenite	100	Moderate	Chlorite-calcite fracture surfaces @ 944-964 feet.	(272981=33 ppb Pt+Pd @ 948-955 feet)
H07	28	972-1001	Fine to medium grained pyroxenite	100	Moderate	Talc-chlorite-filled shear zones in core @ 985-1001	NA
H07	29	1001-1029	Fine to medium grained pyroxenite	100	Moderate	Talc-chlorite-filled shear zones in core @ 1001-1021	NA
H07	30	1029-1059	Fine to medium grained pyroxenite, but with diorite phases	100	Moderate	NA	(203235-237)
H07	31	1059-1088	Fine to medium grained pyroxenite, but with diorite phases; much of core was split	100	95-100	Chloritized zones with sulfides @ 1071-1074 feet.	Moderate Cu @ 1071-1074 feet. (032237-242)
H07	32	1088-1116	Fine to medium grained pyroxenite,	100	95-100	NA	(032243-245)
H07	33	1116-1146	Fine to medium grained pyroxenite	100	90-100	Small chlorite-epidote veinlets @ 1122-1133	NA Run blocks in error

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H07	34	1146-1191	Andesite dikes in pyroxenite	60-100	Moderate	NA	NA something wrong with numbering sequence
H07	35	1191-1220	Pyroxenite but with leucocratic units	75-100	Moderate	NA	High Cu @ 1219 feet. (272985-986=35 ppb Pt+Pd @ 1219 feet)
H07	36	1220-1248	Light colored unit (diorite to monzonite) for most of core box; upper part in contact with pyroxenite	75-100	Low	NA	(272987 @1221=ND)
H07	37	1248-1277	Monzonite to 166 ft.; then back to pyroxenite **Thin section 205018 @ 1266 ft.**	100	Moderate	NA	High Co @ 1269 ft; Moderate Cu @ 1266
H07	38	1277-1305	Pyroxenite but with fine grained phases	100	Moderate	High angle carbonate veinlets @ 1303-1305 feet	Moderate Cu @ 1303 ft.
H07	39	1305-1335	Medium grained pyroxenite	100	Moderate	High angle epidote veinlets @ 1315 feet.	Moderate Pd @ 1315 feet.
H07	40	1335-1361	Medium grained pyroxenite; with pegmatoidal zone @ 1356-1359 ft.	100	Low	Dark gray andesite cuts core @ 30^{o}	NA
H07	41	1361-1391	Medium grained pyroxenite	100	Moderate	NA	NA
H07	42	1391-1428	Medium grained pyroxenite with andesite phases	100	Moderate-High	Pyrite and calcite from 1401-1411 feet.	NA
H07	43	1428-1457	Medium grained pyroxenite with andesite phases	70-100	Moderate	Trace sulfides in fine grained phases @ 1448-1452 feet.	Moderate Cu @1448-1452 ft.
H07	44	1457-1486	Medium grained pyroxenite with flow-banded andesite phases	100	High	NA	NA
H07	45	1486-1512	Medium grained pyroxenite with thin leucocratic phases	100	Moderate	Veins @ 1501-1503 feet	(032246-247)
H07	46	1512-1538	Fragmental, fine grained pyroxenite **Thin Section 205020 @ 1520 feet.**	100	Moderate	Chlorite-pyrite veins @ 1524 feet.	Moderate Cu @ 1524 feet.; (032248-253 are splits AES core)
H07	47	1538-1564	Medium grained pyroxenite	100	Moderate	NA	(03253-56)
H07	48	1564-1592	Medium grained pyroxenite	100	Moderate-High	Chlorite stockwork fractures @ 1575-1585 feet.	NA
H07	49	1592-1621	Medium grained pyroxenite with chlorite alteration	100	Moderate	Chlorite alteration throughout core box	(272984)

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H07	50	1621-1651	Fine grained pyroxenite	100	Moderate-High	NA	(272990-991)
H07	51	1651-1676	Fine to medium grained pyroxenite	50-100	Moderate-High	NA	Core was cut but no tags
H07	52	1676-1704	Fine to medium grained pyroxenite	100	Moderate	Chlorite carbonate high angle veinlets @ 1698-1701 feet.	Moderate Cu @ 1680 ft.
H07	53	1704-1733	Fine to medium grained pyroxenite	100	Moderate-High	High angle epidote veining @ 1706-1709 feet.	Very High V @ 1717 ft.
H07	54	1733-1761	Fine to medium grained pyroxenite	100	High	NA	NA
H07	55	1761-1788	Pyroxenite—then gabbro--non-magnetic—from 1765-1775-then back to pyroxenite	100	Low	NA	NA
H07	56	1788-1815	Fine to medium grained pyroxenite	100	Moderate	NA	(272992-994=150 ppb Pt+Pd @ 1813 ft.
H07	57	1815-1842	Fine to medium grained pyroxenite	100	Moderate	Epidote-carbonate veining @ 1816-1817 feet.	NA
H07	58	1842-1869	Fine to medium grained biotite pyroxenite **Thin Section 205021 @ 1859 feet. Thin section 205022 @ 1868 feet.**	100	Low-Moderate	NA	Very High Cu @ 1868 feet.; native copper found in thin section
H07	59	1869-1897	Fine to medium grained pyroxenite	100	Moderate	NA	NA
H07	60	1897-1925	Fine to medium grained pyroxenite	100	Moderate	Veins @ 1920-1925 feet.	(3256-3260) All core has been quartered
H07	61	1925-1953	Fine to medium grained pyroxenite; felsic dike @ 1923-1928 feet.	100	Moderate	NA	Moderate Cu @ 1922-1924 ft. (03261-03265) All core has been quartered
H07	62	1953-1982	Fine to medium grained pyroxenite	100	Moderate	NA	(03266-03272) All core has been quartered
H07	63	1982-2000 **END OF HOLE**	Fine to medium grained pyroxenite	100	Moderate	NA	(03272-03275) All core has been quartered
H08	1A	224-236	Fine grained pyroxenite	100	Moderate	Chlorite-kaolinite alteration along high angle fractures; native copper @ 228 feet.	High Cu @ 227-229 ft. (3092-3093)
H08	1B	236-246	Gabbro begins at 236.5 feet; then back to pyroxenite @ 238.5 feet.	75-100	High	NA	Moderate copper @

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H08	2	246-279	Fine grained pyroxenite	50-100	Moderate-High	Feldspar-chlorite veinlets @ 263-264 ft.	Moderate Cu @ 263-264 feet.
H08	3	279-310	Highly magnetic, fine to medium grained pyroxenite **Thin Section 205023 @ 306 feet.**	100	High-Very High	High angle, quartz-epidote-chlorite fractures @ 306-309 ft. disseminated sulfides in fractures	Moderate Cu @ 306-309 feet.
H08	4	310-329	Highly magnetic, fine to medium grained pyroxenite	100	Moderate-High	Thin quartz veinlets in leucocratic zones @ 315-318 ft	Moderate Cu @ 318 ft. (3194-3197; but no Cu)
H08	5	329-360	Fine to medium grained pyroxenite	100	Moderate	Epidote sulfide veins @ 331 feet.	High Cu @ 344 feet.
H08	6	360-386	Fine to medium grained pyroxenite	80-100	Moderate	High angle fractures in-filled with disseminated sulfides @ 380 feet.	Moderate Cu @ 380 feet.
H08	7	386-413	Fine to medium grained pyroxenite; gabbro begins @ 408 ft.	80-100	Low-Moderate	High angle veinlets @ 402 and 406 feet.	Moderate Cu and Zn @ 402 feet.
H08	8	413-443	Medium grained pyroxene gabbro	50-100	Nonmagnetic	Veinlets @ 416 and 422 feet.	Moderate Cu @ 422 ft.
H08	9	443-475	Medium grained pyroxene gabbro **Thin section 205024 @ 472 feet.**	90-100	Low-Nonmagnetic	Numerous high angle fractures @ 445-456 feet.	Moderate Cu @ 445 ft.; Moderate Cu and Zn @ 452 feet.
H08	10	475-521	Medium grained pyroxene gabbro to 512 ft.; then back into pyroxenite	10-60; Lowest recorded	Low-Moderate	High angle small veinlets pervasive when back into pyroxenite	Low Zn and Ni @ 512 ft.; High Cd and Cu and Moderate Mo @ 513 ft.
H08	11	521-553	Fine to medium grained pyroxenite	80-100 Variable	Moderate	NA	NA
H08	12	553-577 **END OF HOLE**	Fine to medium grained magnetic pyroxenite	50-100 Variable	High	NA	NA
H04	16	296-365	Composited fine and coarse grained pyroxenite; logged as fine grained gabbro; **Thin section 205025 @ 355 feet.**	30-85	Low to Nonmagnetic	Magmatic sulfides at 355-360 feet.	Moderate Cu, V, and High Ti @ 355-360 ft. (205698-706; most of core was quartered)
H04	17	365-419	Composited fine grained mafic intrusion (Gabbro?)	25-75	Low to Nonmagnetic	NA	High Cu @ 374 ft. Moderate Cu and V @ 401 ft.(205708-205716; all core was quartered)

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H04	18	419-460	Composited fine grained mafic intrusion (Gabbro?); **Thin section 205026 @439 ft.**	65	Low to Nonmagnetic	Thin and isolated, high angle factures with chlorite and epidote; various locations	Moderate Cu, Co and Zn @ 450 ft.; (205717-205723)
H04	19	460-468 **END OF HOLE ?**	Composited fine grained mafic intrusion (Gabbro?);	70	Low to Nonmagnetic	Thin and isolated, high angle factures with chlorite and epidote; various locations	Moderate Cu and Cr @ 464-466 feet.
H16	1	256-308	Purple-hued banded hornfels	45	Nonmagnetic	NA	NA
H16	2	308-370	Purple-hued banded hornfels from argillaceous sediments	40	Nonmagnetic	NA	NA
H16	3	370-431	Purple-hued banded hornfels from argillaceous sediments; with andesite dikes	45	Nonmagnetic	NA	Moderate Zn in fractures @ 385
H16	4	431-487	Purple-hued banded hornfels from argillaceous sediments; with andesite dikes	80	Nonmagnetic	NA	NA
H16	5	487-515	Purple-hued banded hornfels from argillaceous sediments	90-100	Nonmagnetic	NA	NA
H16	6	515-549	Purple-hued banded hornfels from argillaceous sediments; nearly complete core recovery except in fault zones	50-100	Weakly magnetic	NA	NA
H16	7	549-581	Purple-hued banded hornfels from argillaceous sediments **Thin section 205027 @ 581 feet.**	100	Weakly magnetic	NA	NA
H16	8	581-601 **END OF HOLE**	Purple-hued banded hornfels from argillaceous sediments; bands of marble	85	Weakly magnetic	NA	NA
H12	1	254-294	254-280 believed to be large glaciogenic boulder; then 280-294 is weakly magnetic gabbro **Thin Section 205028 @ 282 ft.**	65-100	Weakly magnetic	NA	NA
H12	2	294-315	Medium grained, pyroxene-rich gabbro **205029 Thin Section plug @ 312 feet—but no thin section not made**	75	Weakly magnetic	Abundant epidote clots in gabbro zones	Very High Cu @ 312 feet.
H12	3	315-336	Medium grained, pyroxene-rich gabbro	80	Weakly magnetic	Disseminated sulfides in high angle carbonate-bearing fractures	NA
H12	4	336-356	Altered, greenish medium grained gabbro	80-100	Weakly magnetic	Entire gabbro section in box is distinctly, hydrothermally altered (Propylitic)	Very High Cu @ 346 feet.
H12	5	356-378	Altered, greenish medium grained gabbro	80-100	Weakly magnetic	Gabbro is hydrothermally altered	(3130-3129) All core quartered

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H12	6	378-400	Medium grained, clinopyroxene gabbro	100	Weakly magnetic	Feldspar segregations @ 408-409 and 412-413 feet.	Moderate Cu @ 412-413 feet.
H12	7	400-417	Medium grained, clinopyroxene gabbro	100	Weakly magnetic	NA	(272921-922; 150 and 158 ppm Cu)
H12	8	417-445	Medium grained, clinopyroxene gabbro	100	Weakly magnetic	NA	NA
H12	9	445-468	Medium grained, clinopyroxene gabbro	100	Weakly magnetic	NA	(272925-272927 contain 61-276 ppm Cu)
H12	10	468-490	Fresh, medium grained, clinopyroxene gabbro	100	Weakly magnetic	NA	NA
H12	11	490-514	Fresh, medium grained gabbro but fine grained felsic phase present also	100	Moderate	NA	(272928-272929 contain 252 and 147 ppm Cu; 31 and 37 ppb PGE) from 507-514 ft.
H12	12	514-537	Fresh, medium grained gabbro but fine grained phase present also	100	Moderate	NA	(272930-272933 contain 196-402 ppm Cu)
H12	13	537-560	Fresh, medium grained, clinopyroxene gabbro	100	Moderate	NA	(272934 contains 686 ppm Cu)
H12	14	560-591	Xenoliths of pyroxenite in the gabbro	100	Moderate	NA	High V @ 588-591
H12	15	591-637 END OF HOLE	Alkali leucratic zone along with gabbro0	100	Weak-Moderate	Xenoliths of pyroxenite in gabbro, implying magmatic stoping	Moderate to High Ni and Moderate Cr from 620-637 feet.
H14	1	92-500	**Skeleton core**, in down-hole sequence: hornblende gabbro, minor peridotite and pyroxenite then gabbro again, then monzodiorite, peridotite and finally gabbro at TOD	Variable 40-100	Weak	NA	Very High Cr at 455 feet (in peridotite)
H17	1	240-530	**Skeleton core**, in down-hole sequence: eolian silt, cobbles and boulders sans, peat, and finally hard pyroxenite @ 460 feet; Biotite pyroxenite all the way to TD.	Variable 20-100	Weak-Moderate	NA	NA
H10	1	205-532 EOH @ 532 f	**Skeleton core,** in down-hole sequence: sand and gravel until 230; then magnetic pyroxenite to 460; then gabbro, diorite, and 'andesite' and back to pyroxenite	50-100	Weak-Moderate	NA	NA

Drill Hole	*Box #*	*Interval (Feet)* [1]	*Rock Type(s) Present* [2]	*Estimated Core Recovery* [3]	*Estimated Magnetite Content* [4]	*Alteration or Mineralization Present* [5]	*Niton Results (AES Analyses)* [6]
H11	1	159-500	**Skeleton core**, in down-hole sequence: pyroxenite all the way to the bottom of the hole	45-100	Weak-Moderate	NA	NA

[1] Interval estimates are rounded to the nearest foot

[2] Rock types assigned are on the basis of mineralogical and textural observations at GMC; selectively augmented by descriptions of Whaley and Bray (1959) and PRGCI thin section observations; Some rock units identified at the GMC changed because of what was observed in thin section. Thin section locations taken by PRGCI in bold. This particularly true of finer grained units.

[3] Core recovery by dividing footage observed from core box lengths; locally by observations by Whaley and Bray (1959)

[4] Estimate based on use of PRGCI magnet survey @ GMC facility; Weak=<8.0 % iron; Moderate=8-12% iron; High=12-15% iron; and very high=>15% iron. More-or-less consistent with iron content estimated by Humble geologists but not always so.

[5] Alteration based solely on PRGCI observations at GMC and petrographic analysis of thin sections

[6] Niton results expressed qualitatively; e.g., For copper: moderate=>200 ppm <1,000 ppm; high=>1,000 ppm; <5,000 ppm; very high >5,000 ppm. For molybdenum: moderate=>20 ppm; <40 ppm; High=>40 ppm; < 400 ppm; very high >400 ppm. For bismuth: Moderate=.10 ppm; < 50 ppm; high=>50 ppm; < 150 ppm; very high >150 ppm. For vanadium: moderate=>500 ppm; < 1,000 ppm; high=>1,000 ppm; < 10,000 ppm; very high=>10,000. For zinc: moderate >200 ppm; < 500 ppm; high=>500 ppm.; < 1,000 ppm; very high=>1,000 ppm. For tungsten: moderate=>100 ppm; < 1,000 ppm; high=>1,000 ppm. For cobalt: moderate=>50 ppm; < 500 ppm; high=>500 ppm. Numbers in parentheses are those sample number intervals analyzed mainly by AES, but perhaps by others, for which PRGCI did not have analytical data. When numbers in parentheses do not have values, that can mean either that no anomalies were detected or they were not found in data files, but left in table pending acquisition of that data