STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

Alaska Geologic Materials Center *Data Report No. 374*

No. 374: 1968 Duval Corporation drill logs for the Orange Hill Property, Nabesna Quadrangle, Alaska: Drill holes Duval #1 and Duval #3

A) DUVAL No. 1 (Assay-Geology Composite Drill log, Assay Log, and Drill Log.)
B) DUVAL No. 3 (Assay Log and Log of Drill Hole)

Received *March, 2010*

PROJECT ORANGE HILL AREA AIASKA

HOLE NO. DUVAL No. 1 SCALE: 1"=50' DATE 7/12/68

COORDINATES N 91,680 E 82,940 ELEVATION 3540' (Approx)

	Rock Type		Assays	
	%Cu		oz. Au.	oz. Ag.
0				
50				
	.07		Tr	Tr
	.07		Tr	Tr
100	.06		.01	Tr
	.05		.01	.15
	.06		Tr	Tr
	.06		.02	.17
150	.05		.01	Tr
	.04		.02	Tr
	.04		.03	.19
	.08		Tr	Tr
200				
250				
	.08		Tr	Tr
300	.06		Tr	16
	.10		Tr	20
	.10		Tr	.19
	.07		Tr	.18
	.08		.01	.15
	.10		Tr	.20
350	.11		Tr	.23
	.10		Tr	.19
	.09		Tr	.19
400				

427' T.D.

	Rock Type	Assays
400		
450		
500		
550		
600		
650		
700		
750		
800		

PROJECT ORANGE HILL AREA ALASKA

HOLE NO. DUVAL No. 3 SCALE: 1"=50' DATE 7/21/68

COORDINATES N 95,090 E 80,190 ELEVATION 2910 ±

Rock Type _____ Assays

	% Cu	$\%MoS_2$		
0				
35' - 40'	.18	.008		
	.14	.017		
50	.25	.017		
	.25	.050		
	.16	.025		
	.17	.017		
	.16	.017		
100	.14	.017		
	.19	.025		
	.17	.017		
	.26	.017		
	.19	.017		
150	.24	.008		
	.28	.033		
	.27	.017		
	.19	.008		
	.13	.008		
200	.40	.025		
	.32	.033		
	.41	.058		
	.31	.050		
	.27	.017		
250	.23	.008		
	.26	.017		
	1.00	.025		
	.25	.017		
	.27	.033		
300	.24	.033		
	.13	.008		
	.91	.100		
	.35	.033		
	.29	.017		
350	.02	.008		
	.02	.008		
400				

Andesite Porph Dike
369'. T.D.

Rock Type _____ Assays

400				
450				
500				
550				
600				
650				
700				
750				
800				

LOG OF DIAMOND DRILL HOLE
DUVAL # 1
ORANGE HILL, ALASKA

Logged by Dr. Fred L. Humphrey-1969

The rocks cut by this vertical drill hole are dominantly a mixture of metavolcanics and hornfelsed fine grained sediments that were probably mostly black mudstone and greywacke. Some thin beds with high epidote were probably limy. While the pyrite content is relatively high (2-10%) there is very little chalcopyrite. Some of the pyrite could be from syngenetic pyrite in black mudstone, mobilized and recrystallized during metamorphism. There is very little metasomatic orthoclase or silicification, although this is a dominant feature in metasediments to the south and west. Pyrite decreases to generally less than 5% in lower half of hole.

Box # 2 - 50-60 Ft.

Cemented fragments of dark hornfels and andesite porphyry dike.

Box # 3 - 60-70 Ft.

Dark fine grained hornfels, probably mostly metavolcanics or meta tuffs. Many pyrite seams, mostly at angles of 45 to 70 degrees to core axis but a few are parallel to core axis. Very little diss. pyrite. Pyrite 5-10%.

Box # 6 - 89-98 Ft.

Fine grained hornfels. Some is recrystallized breccia, could be sedimentary breccia. Pyrite 5-10%, dominantly on fractures with traces of chalcopyrite. Traces of black sphalerite at 96' on vertical fracture. Traces of galena in quartz veinlet near the sphalerite.

Box # 8 - 108-115 Ft.

Fine grained hornfels but more silicious than above; probably greywacke. Pyrite 5-10% dominantly in fractures and veinlets.

Box # 10 - 125-133 Ft.

Dark fine grained hornfels. Probably this section is mostly meta-andesite or andesitic tuff mixed with black mudstone. Pyrite 5 to 10% in fractures but very little diss. Traces of orthoclase along a few fractures. Some hematite in these fractures.

Box # 12 - 143-151 Ft.

Silicious light colored fine grained hornfels. Generally mottled light and dark. Possibly originally greywacke and mudstone. Pyrite 5%. The more silicious bands are usually low in pyrite. Traces of chalco-pyrite in pyrite seams.

Box # 14 - 158-165 Ft.

Similar hornfels to above but higher pyrite, 5-10%. Dominantly in fractures and not diss. Few quartz veinlets 1/16 to 1/8 inch.

Box # 16 - 173-182 Ft.

Dark to medium grey fine and very fine grained hornfels. High pyrite in fractures, practically none diss. Fractures commonly parallel to core axis but a few at 30 to 45 degrees to axis. Traces of pink ortho-clase with quartz on a few vertical fractures, and in one fracture at 45 degrees to axis.

Box # 17 - 182-192 Ft.

Dark to black very fine grained hornfels. Pyrite less than 5% contained in tight fractures at 30 to 45 degrees to core axis. No vertical fractures.

Box # 20 - 210-220 Ft.

Very fine grained, dark to black hornfels. (Intervening section same). Pyrite 1-3% in tight fractures between vertical and 45 degrees. Few thin vitreous quartz seams on vert. fractures with only traces of pyrite.

Box # 22 - 220-231 Ft.

Core much broken or brecciated. This section more silicious than above. Few quartz seams with silvery pyrite and traces of molybdenite and chalcopyrite. Pyrite mostly in fractures 1-4%. Many vertical fractures and a few at 30 degrees to axis. Traces of orthoclase in quartz veinlets.

Box # 23 - 231-241 Ft.

Massive, dark fine grained hornfels. Near middle of box, core highly fractured with thin milky quartz and gypsum veinlets containing traces of orthoclase and molybdenite.

Box # 24 and # 25 - 241-257 Ft.

241-246 is dark, fine grained hornfels. Epidote common in fractures 242-246. At 246 to 256, is diorite altered, probably a dike or sill. No quartz veinlets, pyrite low 1-4% dominantly in fractures that are vertical and 45 to 70 degrees to axis.

Box # 26 - 257-267 Ft.

Dark, fine grained hornfels. Pyrite 2-4% confined to fractures. At 265 seam of gypsum or anhydrite at 30 degrees to axis but no sulfides.

Box # 28 - 276-285 Ft.

Dark, fine grained hornfels. Scattered gypsum or anhydrite veinlets but no sulfides in them. Few fractures have traces of orthoclase and some apparently later epidote but not in the anhydrite seams. Pyrite overall low, 2-3%.

Box # 30 - 294-304 Ft.

294-298 black, dence, very fine grained hornfels. Pyrite in fractures. At 298 changes to light grey with much alteration to epidote and chlorite. Some of this latter part is brecciated as a sedimentary breccia and thus more permeable. Low pyrite in fractures and diss. overall 1-3%

Box # 31 - 304-312 Ft.

Sed. breccia stops at about 306 Ft. rock going back to dark, fine grained hornfels. Pyrite in vertical fractures, overall 2-3%. Thin alteration bands (bleaching) along pyrite fractures.

Box # 32 - 312-320 Ft.

Mostly dense, dark, fine grained hornfels with scattered spots of silicified hornfels. Strongly fractured with core loss. Pyrite low, in variable oriented fractures.

Box # 34 - 330-338 Ft.

At 329 strong silicification begins with 12 to 15 per cent of orthoclase to 336. Scattered veinlets of pyrite with traces of chalcopyrite. At 336 back into dark fine grained hornfels and grey silicic hornfels. Pyrite 3-5%.

Box #35 - 338-348 Ft.

338-340 altered hornfels with some silicification. 340-346 altered porphyritic diorite. Pyrite 3-5% on fractures.

Box # 36 - 357-366 Ft.

At 346 back into dark fine grained hornfels, but with bands containing high epidote; probably limy beds.

Box # 38 - 366-376 Ft.

Starting at 365 is conglomerate of small, rounded pebbles of dark siltstone and/or very fine grained sandstone (now meta.) Matrix very fine grained sandstone with "spots" of epidote. At 369 pass into "sandy" type hornfels with continued spots of epidote. At 372 back into dense, dark, fine grained silicic hornfels. Pyrite 2-3% on vertical fractures.

Box # 39 and on to bottom of hole - 380-427 Ft.

At 380 pass into highly altered diorite, or more probably an altered (meta) porphyritic andesite with pyrite 2-4% on fractures; then becomes at 410 Ft. shear zone of mostly dark hornfels and variable amounts of meta porphyritic rock. At 425-427 Ft. is fine grained silicic hornfels with much diss. epidote (probably was a limy fine grained sandstone). Pyrite 4 to 5% mostly in fractures.

427 Ft. bottom of hole.

Duval

ASSAY—GEOLOGY COMPOSITE DRILL LOG

FORM # 355
REVISED 10-62

* Dip of structures shown in geology column are measured from horizontal

PROJECT ORANGE HILL

Coörd. : **N** 443N	**BEARING**	**HOLE Nº** 1.
E 532E	**INCL.** VERTICAL	**COLLAR ELEV.**
START 7.5.68 **COMPL.** 7.12.68		**DEPTH** 427'

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu	% Oz Au.	% Oz Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
0 - 63.4' overburden			100%								
63.4' - 70.0'											
Hornfels - pyritized, sil.chl. - rock is light grey-green fg - mg. - py - 2% - 4% in narrow stringers - cpy - tr - associated with py. veinlets. Qtz. veins 1/8" to ½".											--- faults — sulfide on frac — qtz.sulfide vei
											70'
70.0' - 80.0'			100%								
Rx - darker green - more chl.& mag. - 2 - 3% - looks like a breccia, with larger (¼ - ½") fragments being darker colored - lighter colored at 77' - increase in py. to 4% - still tr-cpy.											63.4' - 80' NQ Cor below 80' - BQ Cor
80' - 90'			100%								
K-feld. chl - 6" - then increase in sil. and mag. and py. - same as described above - psuedo bx.- with darker fragments - ¼ - ½" diameter - sulfides - 1.5-3% - 0.1 cpy. - mag. - 1-2%.				.07	Tr.	Tr.					
											90'
90.0' - 100'			100%								
- finer textured rx - lacking pseudo bx. - py. increase to 3-4% (95-97') - cpy - tr. little change in rx. except greater silicification * - gal. present and ass.with increase in cpy.% - to 0.2% and qtz. stringers.				.07	Tr.	Tr.					
											100'
100' - 110'			100%								
Rx. similar to above - sil. hf. Flt. zn. at 105-106 pre-mineral - sulfides have not been broken Tr. - gal. cpy. py - 2 - 3%				.06	.01	Tr.					
											110'

LOGGED BY M. Dearborn DATE 7.12.68.

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443N	BEARING	HOLE Nº 1
E 532E	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH 427.

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	%Oz Au.	%Oz. Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
110' - 120'				100%								
- increase in chl. decrease in fracturing and sulfide content - rx. is coarser textured, darker gn. -sulfides - 1-2% tr. - cpy. mag. - 2-3% very fine.					.05	.01	.15					120'
120' - 130'				100%								
Similar to above - somewhat finer texture.					.06	Tr.	Tr.					130'
130' - 140'				100%								
Similar to above less frac. - more chl. and mag. py. - 1.5 - 3%.					.06	.02	.17					140'
140'- 150'				100%								
Similar to above					.05	.01	Tr.					150'
150'- 160'				100%								
Increase in cpy. - 150-152-0.3% py. - 1-3%. Fn. gr. Hf. - mag. - 1-2%, low grade alteration - chl. feld. py. more fracturing and increase in sulfides near 156'					.04	.02	Tr.					160'

LOGGED BY _____ DATE _____

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443N	BEARING	HOLE Nº 1.
E 532E	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH 427'

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	% Oz Au.	% Oz Ag.	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
160' - 170' Similar to above Sulfides - 4% Cpy. - tr.				100%								
					.04	.03	.19					170'
170'- 180' Similar to above.				100%								
					.08	Tr.	Tr.					180'
180' - 190' Slight increase in cpy. 0.3-5% py. - 2-3% hf. - chl qtz. - med. fn. gr. chl. is increasing mag. - 1-2%.				100%		N.A. (Not Assayed)						
												190'
190' - 200' Similar to above cpy - Tr.-.2%				100%								
						N.A.						200'
200' - 210' Similar to above Py. - 1 - 2% Mag. - 2%				100%								
						N.A.						210'

LOGGED BY _____ DATE _____

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443N	BEARING	HOLE Nº 1.
E 532E	INCL. VERTICAL.	COLLAR ELEV.
START COMPL.		DEPTH 427'

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Oz. Au.	% Oz. Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
210' - 220' Similar to above slightly more chl. - slicken side on frac. surface. sulfides - 2-3% 0.3 cpy. mag. 1-2%			100%								
					N.A.						220'
220' - 230' Similar to above epidote present - occurs as small masses. tr. - Gal. in quartz vein (227')			100%								
											230'
230' - 240' Similar to above - small fault at 238' probably post mineral.			100%								
					N.A.						240'
240' - 250' Similar to above - not as well fractured.			100%								
					N.A.						250'
250' 260' Similar to above.			100%								
					N.A.						260'

LOGGED BY _____ DATE _____

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443	BEARING	HOLE Nº 1.
E 532	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 427

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu.	% Oz Au.	% Oz Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
260' - 270' Similar to above.					N.	A.						270'
270'-280' Similar to above					N.	A.						280'
280'-290' More silicification - sulfides - 3-4%. Tr-cpy. slightly more frac.					.08	Tr.	Tr.					290'
290'-300' Intersection of fault-breccia cemented with silica-very little sulfide min.present.					.06	Tr.	.16					300'
300'-310' Hornfels-sulfide stringers 305' ½" Qtz.bearing sulfide vein best cpy in hole - + 1% over - 18".					.10	Tr.	.20					310'

LOGGED BY _____ DATE _____

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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL.

Coörd. : N 443	BEARING	HOLE Nº 1.
E 532.	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 427.

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	%Oz. Au.	%Oz. Ag.	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
310'-320' Similar to above-hornfels - slightly silicified with stringers of sulfides py.-3-5% - Tr.-Cpy, note- one stringer associated with small pod of epidote (318').			100%								
				.10	Tr.	.19					320'
320'- 330' Similar to above			100%								
				.07	Tr.	.18					330'
330'-340' Premineral fault ± 15" wide - rx is sheared and crushed, more silicified and bleached out. Grades back into hornfels similar to above.			100%								
				.08	.01	.15					340'
340'-350' - rx less fractured, increase in feldspar size (1/16-¼") xlls.sulfides decreasing - 1-2%-Tr-cpy.			100%								
				.10	Tr.	.20					350'
350'-360' chl. increasing-feldspars decrease sulfides- 2-4%-tr-cpy.			100%								
				.11	Tr.	.23					360'

LOGGED BY _____ DATE _____

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443.	BEARING	HOLE Nº 1.
E 532.	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 427.

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Oz. Au.	% Oz. Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
360'- 370' 361-365- > sil, bleaching but no significant change in sulfide content. fault breccia - 366' - 368.5			100%								
				.10	Tr.	.19					370'
370'-380' hornfels similar to above - sulfides 3-5% - tr.cpy. slight increase in feldspars and becoming less fractured.			100%								
				.09	Tr.	.19					380'
380'-390' Quartz veins a little wider-pyrite 5-7% - but no change in cpy. - (tr.) -rx is bleached a little more bedding approx. 45°.			100%								
					N.	A.					390'
390'-400' Similar to above.			100%								
					N.	A.					400'
400-410' Similar to above - becoming finer grained above 407' - and more chl.			100%								
					N.	A.					410'

LOGGED BY _____ DATE _____

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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 443	BEARING	HOLE Nº 1
E 532	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 427

DESCRIPTION	Geol.	Assays	INT.	C/R	% Cu	% Oz Au.	% Oz Ag.	%	oz	oz	% EQUIV.	GROUPING — RMKS.
410' - 420'				100%								
- fault - 2 feet - back into finer grained hornfels dark green-(chl), stringers sulfides (3-5%) Tr. cpy.												
						N.	A.					420'
420' - 427'				100%								
Similar to above												
						N.	A.					430'

LOGGED BY _____ DATE _____

* Dip of structures shown in geology column are measured from horizontal.

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

DUVAL NO. 3
OLD COORDINATES

PROJECT ORANGE HILL.

Coörd. : N468N	BEARING	HOLE Nº 3
E500.4E.	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH 369'

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
Overburden - 35'			100%								
35' - 40'											
- Qtz. diorite cut by qtz - sulfide stringers 1/8"- 3/8" (cpy<0.5%, py. 3% - 5%, chl.3%, biot. - 3%, hb. 20%, ep.- tr. Kfeld. - 35%, qtz-stringers-15% Tr. Gyp. str. - 1/16". Magnetite - tr.											— fault —sulfide on frac ---qtz.sulfide vei
				.18	.005						40'
40' - 50'			100%								
Qtz. sulfide vein (3/4") 60°dip - epi. 10-15% top 3 ft. associated with the wider qtz. vein. Rx. comp.qtz 20-25%, pl-feld. 30%, chl,-hb.-15-20%, bio. - 3-4%, Gyp.-1%, Py≤5% cpy.±0.5%, MoS_2 tr. - One good seam of MoS_2 tr.One good seam of MoS_2 on flat dipping qtz. vein @ 48'2.											
				.14	.01						50'
50' - 60'			100%								
1" flat dipping qtz.sul.vein (52')Cu,Mo.-qtz-30%-pl-feld.-35%-hb.-15% py.≤4% cpy.≤0.5% MoS_2 -Tr.chl.2%,ep.-1-2%,bio.-2-3%,gyp.-1%. MoS_2 is found with qtz.veins ¼" or greater in width usually borders of the vein. Rx. is fairly solid,with recovery of long (3') segments of core common.											
				.25	.01						60'
60' - 70'			97%								
Hb. - 20%, bio.-2%,Pl.-feld.-35-40% qtz.-20-25%, epidote-3%, (68-70') py.-~4%, cpy.≤ 0.5%, MoS_2-Tr.-Gypsum-1%-as stringers - Chl. - 3%											
				.25	.03						70'
70-80'			94%								
Increase in chl.-6-7% (?),ep.-2%. py.-3-4%, cpy.≤ 0.5%,Mo.tr gyp.-stringers < 2%,bio.-3% . shearing at bottom of interval.											
				.16	.015						80'

LOGGED BY M. Dearborn DATE July 21st, 196

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468N	BEARING	HOLE Nº 3
E 500.4 E.	INCL. VERTICAL.	COLLAR ELEV.
START COMPL.		DEPTH 369'

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
80' - 90' Qtz.-20 - Pl, - feld, 20, hb.-40 - 15, chl. - 2%, bio.- 2% py. <4%, cpy. 0.5%, epi.- <3% mafics decrease towards bottom of the section, as do sulfides to about >2% py. - <0.5% cpy.				100%								
					.17	.01						90'
90' - 100' Less qtz. veining, about same % sulfides, possibly more cpy-0.5% maybe. Rx.-qtz-25%, - Pl-feld-35% Hb-30%, -epidote-2%, -py-<5%, cpy ~ 0.5%. N.B. Red mineral on surface of some qtz veins - all the way down the hole (possibly zeolite- R.E. Gale).				100%								
					.16	.01						100'
100' - 110' Similar to above - potash feldspar introduced along one qtz vein at (103') - possibly a slight decrease in sulfides. - decrease in qtz. veining.				100%								
					.14	.01						110'
110' - 120' Similar to above - 113' - breccia dike-fragments of altered grn. rk. included . 1ft. wide- contacts irregular -pre mineral fragments - grn.stone, qtz, Hf. 119'- dark grn.fn.grained rk. chl., k-feld, qtz stringers- sulfides ~3%, cpy. >.5%.				95%								
					.19	.015						120'
120' - 130' Lost core 121' to 123'. dark grn at top of section then grading lt. col. rx. with larger feldspar xtls. qtz. stringers are narrower and more abundant than in granodiorite - looks like sulfides are decreasing to ~ 3%, cpy. < 0.5% - no MoS_2 is visible.				80%								
					.17	.01						130'

LOGGED BY _____ DATE _____

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468N	BEARING	HOLE Nº 3
E 500.4E.	INCL. VERTICAL.	COLLAR ELEV.
START COMPL.		DEPTH 369'

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
130' - 140' Rx. is finer grained and more highly silicified near fault bx at 133'. qtz veins are narrower but carry 4-5% sulfides with ≤ 0.5% cpy.- Tr. of MoS_2, chl.is increasing 10%. ep. - 2-3%, qtz. > 30% - possibly of fault zone being wider through interval.	?		98%	.26	.01						140'
150' - 150' Rk. is slightly coarser grained, qtz. veins are wider and more abundant, and carry both Cpy and Py. - > 4%, cpy.- > 0.5%, Tr.-MoS_2 Comp. - Hb.- 35%, - Pl-feld - 35%. Qtz.-20%, Ep. ± 1% biotite - 1-2%, chl. - 2%	Mo		100%	.19	.01						150'
150' - 160' Hb. - decreasing to ± 20% -, Pl-feld.-35%, qtz.-25-30%,-epidote 2%, chl.-3%, cpy.- > 0.5%, Py.- ~ 4%-, Mo-Tr., qtz veining is increasing, rk. is coarser grained. seems to be a prominent steep dipping sulfide bearing qtz. vein that may by repeatedly intersected.			100%	.24	.005						160'
July 22nd,1968. 160'-170' Similar to above. Med.to fn.gr. quartz diorite cpy. > 0.5% py.- ~ 4%, MoS_2 Tr. -			100%	.28	.02						170'
170' - 180' Similar to above. Cpy. ≤ 1.0%, py. - < 5%, epidote < 3%, pre-mineral fault cemented by fine matrix and sulfides. Below fault stringers of epidote are associated with sulfides.				.27	.01						180'

LOGGED BY _____ DATE _____

FORM # 355
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ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468N.	BEARING	HOLE Nº 3
E 500.4E.	INCL. VERTICAL.	COLLAR ELEV.
START COMPL.		DEPTH 369'

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
180' - 190' Similar to above. steep dipping qtz. vein carrying Cu, Mo, sulfides. Epidote - 3%, py. ≺5%, cpy. ≤1% - Mo-tr, Hb-25%, Qtz.-25, Pl-feld 35%, chl.- 5%.			97%								
				.19	.005						190'
190' - 200' Similar to above. 5½" post mineral dike at 191' flat dipping cuts off the sulfide stringers - epidote ~5%, cpy. - ≻0.5%, py. 3%, MoS_2-Tr. Major quartz veining still steep dip.		Dike	95%								
				.13	.005						200'
200' - 210' Increase in qtz. veining near 200' also increase in cpy, then decreases below 202. Rx. is becoming finer grained, darker green and slightly porphyritic with feldspar xls 1/8" in diam. cpy. ≺1.0%, py.-3-5%, MoS_2 tr. in the wider qtz. veins.			100%								
				.40	.015						210'
210' - 220' Similar to above. Looks like a significant increase in MoS_2 near 215-220. Cpy.- ≺1.0%, py. ≺4%., Hb.- 35%-, Pl-feld-30%, qtz.- 25%, epidote- 1%-, chl.- ?, Gypsum stringers still present.			100%								
				.32	.02						220'
220' - 230' Similar to above. Increase in MoS_2 at 228.5' - 230.5'			100%								
				.41	.035						230'

LOGGED BY _____ DATE _____

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468	BEARING	HOLE Nº 3
E 500.4	INCL. VERTICAL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
230' - 240' Hb.- 25-30%, Pl-Feld-30%, qtz 25%-, epidote - 3-4%, cpy - >1% py. -~4%, MoS_2 >0.1%, stringer $\frac{1}{4}$"- massive cpy. qtz veins up to 1"- steeply dipping - MoS_2 and Cu. increasing.	?		100%	.31	.03						240'
240' - 250' Epidote <2%, qtz - 35%, Hb.30% pl-feld - 25%, sulfides -~5%, cpy. - ≤1%, MoS_2 - >Tr. - some fair stringers of cpy.- 1/8-$\frac{1}{4}$" wide associated with larger qtz. vein. - rk. is more silicified towards base of section.	?		100%	.27	.01						250'
250' - 260' Good cpy to 251 (>1.0%) then total sulfides decrease and cpy. <0.5% and py. - >3%., MoS_2 - decrease, Epidote - 2%, chl-.5% (?), Hb. 30%, pl-feld - 35%, qtz. 20%,- Gypsum - 1%.Stringers gyp. consistant throughout hole.			100%	.23	.005						260'
July 23rd,1968. 260-270' Py. -<4%, cpy 0.5%, MoS_2 Tr. - rk. similar to above.			95%	.26	.01						270'
270' - 280' 272-274 - broken veins of massive cpy. 270-276 finer grained darker grn. rk. with - 4% epidote - (chl.Hb) - 45% - then grades into lighter colored, coarser grained qtz. diorite. Qtz. veins decrease as well as Cu-cpy. -< 0.5%. py.< 4%.			100%	1.00	.015						280'

LOGGED BY _____ DATE _____

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468N	BEARING	HOLE No. 3
E 500.4E.	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
280' - 290' Rx.similar to above Py. -∠4%, Cpy. -∠0.5%-, Mo-Tr., Qtz. sulfide stringers are narrower and not as abundant, and carry mainly py. rock solid-less broken.			100%								
				.25	.01						290'
290' - 300' Similar to above. py ∠4%, cpy.-∠0.5%, Mo-Tr.-, narrow qtz. stringers carrying mainly py.			100%								
				.27	.02						300'
300' - 310' Similar to above. Hb.-25%, Pl-feld.- 40%, qtz.25%, epidote - Tr.-, gypsum 1%, cpy. ∠0.5%, py.-∠4%. One ½" qtz.-sulfide vein - others are 1/8" or less.			100%								
				.24	.02						310'
310' - 320' Similar to above - py. ∠4%, cpy. ∠0.5%, MoS_2-Tr. At 277' increase in epidote (3-4%) and gypsum to 3%.			98%								
				.13	.005						320'
320' - 330' Hb.-25%, Pl-feld-40%, Qtz.25%, epidote tr, gypsum ∠ 1% cpy.-∠0.5% - MoS_2-Tr, py.- 4%., qtz. veins wider - more sulfides at 327'. 327-330' 1% cpy, py.-4% MoS_2-Tr, Mag.-Tr.(in qtz.va.)											
				.91	.06						330'

LOGGED BY _____ DATE _____

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ORANGE HILL

Coörd. : N 468	BEARING	HOLE Nº 3
E 500.4	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu.	% Mo.	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
330' - 340' Finer grained - increase in epidote and chl., - py.- ~4%, cpy.≤0.5%, Mo.-Tr., fault breccia at 337' - pre-mineral fault.			100%								
				.35	.02						340'
340' - 350' More bleaching and silicification - increase in cpy. and MoS_2 - cpy. <1.0%, MoS_2-Tr. Py.-4% Qtz.- 40%, Pl.feld.-25%, Hb.25% epidote- 1%, Mag.-Tr.Gyp-1%-349' contact w/ andesite porphyry - and - 349'-350'			95%								
				.29	.01						350'
350' - 360' Breccia for 1' - then into dense barren andesite porphyry. Looks like contact may be at about 40° - but if surface is irregular then it could be any angle. Massive, little visible structure fine py. <1%, Tr. cpy, no qtz veining.			98%								
				.02	.005						360'
360' - 369' Barren andesite porphyry.											
Bottom 369'				.02	.005						370'

LOGGED BY _____ DATE _____

LOG OF DIAMOND DRILL HOLE
DUVAL # 3
ORANGE HILL, ALASKA

Logged by Dr. Fred L. Humphrey-1969

The rock section cut by this vertical hole at the northwest edge of Orange Hill is hydrothermally altered diorite and quartz diorite, except for a large inclusion of fine grained hornfelsed sediments and volcanics between 119 and 180 feet and a mixture of hornfelses and altered fine grained diorite between 180 and 263 feet.

Biotite and hornblende (?) are commonly chloritized and plagioclase is commonly partly epidotized, although some is sericitized and argillized.

Metasomatic orthoclase, confined to fractures, is scarce down to a depth of about 290 feet where it increases, both along fractures and in quartz veinlets to a range of 1 to 10%. Chalcopyrite increases from an average of about 1/2% to about 1% in the lower 50 feet of the hole. Molybdenite also has a relative increase in the lower portion of the hole.

Box # 2 - 41-42 Ft. (Rock inplace starts at 41')

Fine to medium grained chloritized diorite. Epidote spotty but common along fractures. Pyrite 5%, mostly on fractures but some disseminated. Chalcopyrite less than 1%, generally in quartz veinlets.

Box # 3 - 42-51 Ft.

Fine grained altered diorite, some almost hornfels texture. Chlorite 10-15%. Epidote 5% diss. and fracture coatings. Pyrite +5%. Chalcopyrite -1%, mostly on fractures and in quartz veinlets.

Box # 4 - 51-60 Ft.

Fine to medium grained chloritized diorite. Chlorite 20%, biotite (?) -5%, epidote 5%, pyrite +5%, chalcopyrite -1% in fractures and in scattered quartz veinlets. This medium grained altered diorite has a ratio of about 70-30 light to dark minerals.

Box # 5 - 60-70 Ft.

Similar to above but less epidote. Few glassy quartz veinlets. ± 5% pyrite and -1% chalcopyrite mostly in quartz veinlets.

Box # 6 - 70-80 Ft.

Fine grained altered diorite. Chlorite +20%. Rock highly fractured and "healed" by quartz and pyrite. Pyrite ± 5% and only traces of chalcopyrite.

Box # 7 - 80-89 Ft.

Fine to medium grained altered diorite. Chlorite 5-10%. Epidote 5-10% diss. At 80' traces of molybdenite in 1/4 inch quartz veinlet with "blobs" of silvery pyrite. Pyrite 4-5%, traces of chalcopyrite. Many tight fractures vertical to 30 degrees to core axis but only few quartz veinlets.

Box # 8 - 89-98 Ft.

Medium grained chloritized diorite, traces of epidote. Pyrite 5% mostly in fractures and quartz veinlets. Chalcopyrite -1/2%. Few milky quartz veinlets with traces of molybdenite. Few traces of pink orthoclase in scattered fractures.

Box # 9 - 98-108 Ft.

Similar to above. Med. grained diorite, 30-40% ferro mag mineral, now mostly chlorite, but some biotite that may be biotitized chlorite. No recognizable hornblende. No epidote, but traces of orthoclase on fracture walls. Pyrite 5-8% in fractures and on walls of thin quartz veinlets. Chalcopyrite ± 1/2%.

Box # 10 - 108-117 Ft.

108 to 113 similar to above.
113-114 brecciated with epidote, chlorite and traces of orthoclase.
114-117 chloritized diorite. Pyrite ± 5%, chalcopyrite -1/2%.
Highly fractured, mostly steep dips.

Box # 11 - 117-129 Ft.

At 119 change from above to "hybrid" mixture (not brecciated) of

probable hornfelsed inclusion and altered fine grained diorite. Pyrite 2-4%, only traces of chalcopyrite.

Box # 12 - 129-138 Ft.

Similar to above but dominantly hornfels. Some brecciation. Pyrite 2-4% mostly in fractures. Chalcopyrite sparsely scattered in fractures -1/2%. Traces of molybdenite on slip surfaces.

Box # 13 - 138-146 Ft.

Similar to above hornfels type but are a few scattered plagioclase "phenocrysts". So possibly some chilled diorite in inclusion or meta-andesite. (This is proving to be a pretty large inclusion). Very few thin quartz veinlets. Pyrite +5% mostly in fractures with chalcopyrite ∓ 1/2%.

Box # 14 - 146-155 Ft.

Same as above. Pyrite +5% in fractures with scattered chalcopyrite ±1/2%. Very little diss. sulfide.

Box # 15 - 155-165 Ft.

Same dark fine grained hornfels but again scattered plagioclase "phenocrysts" or metacrysts. Latter are saussuritized or epidotized. Traces of orthoclase on fractures. Increase in quartz veinlets at about 160 ft. with increase in chalcopyrite to about 1%. Pyrite ∓ 5%. Traces of magnetite on fractures.

Box # 16 - 165-174 Ft.

Similar to above. Chalcopyrite in thin quartz veinlets 1/2 to 1%. Pyrite 5%.

Box # 17 - 174-183 Ft.

Probable mixture of chilled fine grained diorite with small plagioclase phenocrysts and fine grained hornfels. Phenocrysts are epidotized and also epidote along fractures. Pyrite 5%, chalcopyrite ±1/2%.

Box # 18 - 183-192 Ft.

Has igneous texture but much finer grained than the ordinary diorite. Phenocrysts are epidotized. Pyrite 3-4% on fractures and in quartz veinlets. Chalcopyrite ∓ 1/2%.

Box # 19 - 192-202 Ft.

Similar to above - looks like chilled diorite. Sulfides same as above. At 200-202 rock is bleached, hydrothermally altered, with some orthoclase on fractures and in thin quartz-gypsum veinlets. Chalcopyrite 1/2-1%.

Box # 20 - 202-212 Ft.

Similar fine grained rock to above. Is darker than above but has igneous texture and sericitized or argillized plagioclase phenocrysts, but very little epidote. Pyrite 4-5% in fractures and in their quartz seams. Chalcopyrite 1/2%.

Box # 21 - 212-221 Ft.

Similar to above but more silicified and traces of orthoclase in fractures. Some molybdenite "smears" in steep quartz veinlets. Chalcopyrite 1/2-1%. Pyrite 5%.

Box # 22 - 221-229 Ft.

Similar to above and certainly a very fine grained diorite. Some epidote in plagioclase phenocrysts. Ferromagnesian minerals in fine grained ground mass appear to be chloritized. Sulfides same as above.

Box # 23 - 229-236 Ft.

Similar to above. Rock much fractured and broken on mostly vertical fractures. Striations commonly show vertical slippage. Gypsum common in fractures. Traces of moly in some very thin quartz veinlets in vertical fractures. Other sulfides about same as above. Some of the rock is more similar to hornfels than to fine grained diorite, so is still a mixture.

Box # 24 - 236-244 Ft.

Very fine grained dark rock, appears to be mostly hornfels. Highly fractured with many vertical quartz veinlets. Chalcopyrite, pyrite and traces of moly in the quartz. Most of the quartz containing moly is milky white with gypsum.

Box # 25 - 244-253 Ft.

Mixed very fine grained hornfels and fine grained altered diorite. Some plagioclase epidotized. Traces of orthoclase along fractures. Pyrite ±5% with chalcopyrite 1/2 to 1%. (all in fractures and quartz veinlets.) Very

little disseminated sulfides. Traces of moly on surfaces of some quartz veinlets.

Box # 26 - 253-263 Ft.

Similar down to 260 then brecciated, apparently post mineral.

Box # 27 - 263-272 Ft.

Below brecciated zone is coarse grained altered diorite with 20% chlorite. Plagioclase shows broad twinning and some is "glassy". Few phenocrysts are epidotized. Quartz and gypsum veinlets up to 1/2 inch wide. Traces of orthoclase on fractures. Pyrite 5%, chalcopyrite +1%. Beginning to get more diss. sulfides.

Box # 28 - 272-282 Ft.

272-274 highly fractured, mostly vertical. Remainder same rock as above. Fragments in breccia zone show some molybdenite smears. Chalcopyrite $\pm$1% as above.

Box # 29 - 282-291 Ft.

Medium grained diorite. Biotite is chloritized and some epidote in plagioclase. At 288-291 increase in quartz veinlets with chalcopyrite and molybdenite. Pyrite 5%, chalcopyrite 1/2 to 1%. Sulfides in fractures, in quartz veinlets and some diss. Some milky quartz.

Box # 30 - 291-301 Ft.

Coarse grained altered diorite. Biotite chloritized. Traces of orthoclase. Chalcopyrite mostly in fractures and quartz veinlets 1/2%. Pyrite +5%.

Box # 31 - 301-311 Ft.

Similar chloritized diorite. Orthoclase-quartz-gypsum veining at 306-307 with silvery pyrite and some molybdenite. Orthoclase also with quartz-gypsum at 309. Pyrite 5-6¢, chalcopyrite 1/2%.

Box # 32 - 311-320 Ft.

311 to 316 coarse grained diorite very weak fracturing. Biotite and hornblende not all chloritized. At 316 again strong fracturing with orthoclase up to 10% on vertical fractures and disseminated. Pyrite 3-4%, chalcopyrite to +1/2%