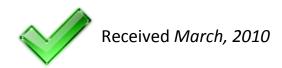


STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES

Alaska Geologic Materials Center Data Report No. 377

No. 377: 1980 U.S. Borax assay report for the Orange Hill Property,
Nabesna Quadrangle, Alaska: Technical Service Report No. TS 800914



All data reports may be downloaded free of charge from the <u>DGGS website</u>.

1977 DRILLING PROCEDURE

Contractor(s):

A joint venture - Diamond Drill Contracting

Company and Minerals Exploration Services

of Spokane, Washington

Type of rig:

Diamond Drill helicopter model mounted on

a J.I. case rubber-tired logging skidder

Bit size:

NQWL

Holes:

US-1A, -90°, 35 feet US-1B, -81°, S85E, 443 feet US-2, -90°, 556 feet US-3, -90°, 556 feet

Dates of drilling:

June 19th to August 6th

Names of drillers:

Larry Johnson (driller) Rob McWilliams (helper)

U.S. Borax supervision:

Thomas A. Henricksen Michael B. Schaubs

Overburden:

US-1A - 20'

US-1B - 10'

US-2 - 43' US-3 - 60'

Additives and mud:

Soluble oil and mud (Quick Gel) rarely used

Recovery:

Generally greater than 95%

Technical Service Report No.

Distribution:

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TS 8009-14

COPPER, MOLYBDENUM, LEAD, ZINC, GOLD, SILVER AND TUNGSTEN IN 1980 ORANGE HILL CORE AND ROCK SAMPLES

December 8, 1981

The contents of this report are "Company Confidential" and should not be disclosed to or discussed with persons outside of U.S.BORAX without approval of U.S.Borax Research Corporation.

> Technical Service Requested by:

T. A. Henricksen

Author:

D. L. Hunter

Approved by:

Kenneth K. Kendall, Jr.

Technical Service Report No. TS 8009-14

COPPER, MOLYBDENUM, LEAD, ZINC, GOLD, SILVER AND TUNGSTEN IN 1980 ORANGE HILL CORE AND ROCK SAMPLES

I. SUMMARY

In support of the ongoing examination of the Orange Hill, Alaska, locale by the Exploration Department, 30 core and 13 rock samples were analyzed for seven geochemical elements, including gold and tungsten. Results of these determinations are presented in Tables I and II.

II. INTRODUCTION

During the 1980 field season, the Exploration Department submitted to Anaheim over 40 rock and core samples from Orange Hill, Alaska. The determination of copper, molybdenum, lead, zinc, silver, gold and tungsten was requested.

III. DISCUSSION

The results of the determinations made were transmitted to the Exploration Department upon completion and are presented here in Tables I and II.

The geochemical determinations were made by the usual method of acid digestion with aqua-regia of the ground samples, followed by atomic absorption analysis of the resulting solutions.

Gold was determined by fire assay and tungsten colorimetrically using dithiol reagent, after fusion of the sample with bisulfate and digestion of the fused material in HCl.

Appendix D of Report No. TS 8001-7 contains a description of grinding and sample preparation procedures. Examples of records kept pertaining to the logging-in and analysis of samples are given in Appendices C and E of the same report.

IV. EXPERIMENTAL

A complete description of the geochemical procedure is presented in Appendix A of Report No. TS 8005-15. The fire assay and tungsten procedures are described in Appendices C and D of the same report.

USBRC Geochemical	Analysis	,	ORCG8001	**** **** ****	02-SEP-80
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Field Number	Cu	Mo eem	Pb eem	Zri rem	As ppm	Au FFM	W mea
Manne		**** **** **** ****					
OH80/1-5-10-C	4090.	166.	18.	156.	2.0	0.088	2.
OH80/1-10-15-C	3550.	114.	9.	114.	1.7	0.055	2.
OH80/1-15-20-C	1923.	119.	9 +	197.	1 0	0.022	0+
OH80/1-20-25-C	411.	40.	12.	126.	0.6	0.022	0.
OH80/1-25-30-C	49.	5.	21.	65+	0.7 <	0.005	0.
		•					
OH80/1-30-35-C	41.	5,	23.	58.	0.6	0.044	0.
OH80/1-35-40-C	3420.	193.	10.	130.		0.005	10.
OH80/1-40-45-C	3550.	333.	13.	67.	***************************************	0.005	5.
OH80/1-45-50-C	4260.	337.	113.	140.	3.2	0.044	7.
OH80/1-50-55-C	3720.	285.	15.	170.	2.8	0.011	12.
		4 73 4	(C) .	114.	₩.5 <	0.005	12.
OH80/1-55-60-C	4100.	181.	32.	54.	3.0	0.066	7.
OH80/1-60-65-C	4500.	148.	18.	84.	2.1	0.044	2.
OH80/1-65-70-C	3140.	149.	10.		2.1	0.077	2.
OH80/1-70-75-C	2700.	186.	11.	93.		0.005	7.
OH80/1-75-80-C	4130,	260.	12.	87.	£ \$ ^9 \	. 0.000	, ,
	eng mg 200, 70	A 1"" A	24.	84	2.0	0.066	7.
OH80/1-80-85-C	3720.	454.	12.	99.		0.005	7.
OH80/1-85-90-C	3560.	404.			1.8	0.011	2.
OH80/1-90-95-C							
OH80/1-95-100-							
OH80/1-100-105	343O∗	127.	1. 44 0	0/+	A. 6 "Y	V + 1. 1. U	A V
049071-105-110	3570 .	307,	10.	92.	1.9	0.055	7.
					2.7	0.022	5.
OH80/1-110-113 OH80/1-115-120					2.1	0.154	10.
				72.	1.43	0.022	0.
OH80/2-33-40-C				72.	1.4	0.022	٥.
UH6072-33-40 C	.1. (.) .1. (.) 4		•••				
OH80/2-40-45-C	-100-105 3430. 129. 14. 67. 2.4 0.110 2. -105-110 3570. 307. 10. 92. 1.9 0.055 7. -110-115 360. 122. 33. 112. 2.7 0.022 5. -115-120 3590. 362. 11. 85. 2.1 0.154 10. 2-20-33-C 1075. 60. 12. 72. 1.3 0.022 0. 2-33-40-C 1616. 92. 10. 72. 1.4 0.022 0. 2-40-45-C 1121. 66. 10. 60. 1.1 0.143 0. 2-45-50-C 2082. 93. 10. 74. 1.5 0.077 0. 2-50-55-C 1892. 106. 11. 69. 1.2 0.088 0. 2-55-60-C 1629. 85. 11. 68. 1.3 0.066 0.						
0H80/2-45-50-C	-95-100- 58100. 309. 11. 86. 2.9 0.088 7100-105 3430. 129. 14. 67. 2.4 0.110 2105-110 3570. 307. 10. 92. 1.9 0.055 7110-115 360. 122. 33. 112. 2.7 0.022 5115-120 3590. 362. 11. 85. 2.1 0.154 10. 2-20-33-C 1075. 60. 12. 72. 1.3 0.022 0. 2-33-40-C 1616. 92. 10. 72. 1.4 0.022 0. 2-33-40-C 1616. 92. 10. 72. 1.4 0.022 0. 2-45-50-C 2082. 93. 10. 74. 1.5 0.077 0. 2-50-55-C 1892. 106. 11. 69. 1.2 0.088 0. 2-55-60-C 1629. 85. 11. 68. 1.3 0.066 0.						
OH80/2-50-55-C				69.	1.2		
OH80/2-55-60-C				. 88 *	1.3		
DH80/2-60-67-C			11.	63.	1. + 3	0.055	2.

Technical Service Report No. TS 8009-14

TABLE I

USBRC Geochemical Analysis --- ORXG8001 --- 26-AUG-80

	Field	Cu .	Mo	Pb	Zn	As	Au	· W
	Number	PPM	ppm	ppm	FFM	PPM	PPM	PPM
								· · · · · · · · · · · · · · · · · · ·
	A/80/ORH-1-R	1730.	77.	783.	1520.	6.7	0,286	7+
	A/80/ORH-2-R	857,	56.	7.	110.	1.3	0,099	2.
	A/80/ORH-3-R	1170.	7,	12.	211.	2.1	0,099	. O+
	A/80/ORH-4-R	31,	< 5.	12.	14.	0.5	0,110	0.
	A/80/DRH-5-R	41.	< 5.	7.	16.	0.6 <	0.005	0.
	A/80/ORH-6-R	488,	< 5.	11.	10.	1.4	2,970	0.
1	A/80/ORH-7-R	267.	2350.	31.	100.	2.8	0,187	50.
	A/80/ORH-8-R	1534,	524.	17.	148.	3,7	0.066	43,
	A/80/ORH-9-R	4330.	156.	24.	1360.	7.3	0.308	24.
	A/80/ORH-10-R	3840.	435,	27.	1530.	10.8	0.154	29.
	A/80/ORH-11-R	414.	< 5₊	12.	< 5.	2.4	2,420	72.
	A/80/ORH-12-R	71.	7,	16.	28.	0.9	0,055	0.
	AZ80Z0RH-13-R	118.	< 5.	< 5.	< 5.	0.3 <	0.005	0 +

Technical Service Report No. TS 8009-14 TABLE II

USBRC Geochemical Analysis --- ORCG8001 --- 02-SEP-80

Field Number	Cu eem	Mo ppm	Pb ppm	Zn rem	As PPM	Au	W maa
	···· ··· ··· ··· ···						
OH80/1-5-10-C	4090.	166.	18.	156.	2.0	0.088	2.
OH80/1-10-15-C	3550,	114.	9.	114,	1.7	0.055	2.
OH80/1-15-20-C	1923.	119.	9.	197,	1.0	0.022	ō.
OH80/1-20-25-C	411,	40.	12.	126.	0.6	0,022	0.
OH80/1-25-30-C	49.	5.	21.	65.		0.005	0,
	77.4		X. I. V	00+	0.07	. 0+000	•
OH80/1-30-35-C	41.	5.	23,	58,	0.6	0.044	0.
OH80/1-35-40-C	3420,	193.	10.	130.	2.3 4	0.005	10.
OH80/1-40-45-C	3550.	333.	13.	67.	2.2 -	0.005	5.
OH80/1-45-50-C	4260.	337.	113.	140.	3.2	0.044	フ。
OH80/1-50-55-C	3720.	285.	15.	170.	2.8	0.011	12.
1241	25	52				74	
OH80/1-55-60-C	4100.	181.	32.	114.		0.005	12.
OH80/1-60-65-C	4500.	148.	1.83 *	54.	3.0	0.066	7.
OH80/1-65-70-C	3140.	149.	10.	84.	2.1	0.044	2.
OH80/1-70-75-C	2700.	186.	11.	93.	2.1	0.077	2. *
OH80/1-75-80-C	4130,	260.	12.	87,	2.4 <	0.005	7.
71175 J. 25 25 25 25 25 25 25 25 25 25 25 25 25					2		
0H80/1-80-85-C	3720.	454.	24.	84.	2.0	0.066	7.
OH80/1-85-90-C	3560.	404.	12.	99.		0.005	7 .
OH80/1-90-95-C	2557.	169.	12.	163.	1.48	0.011	. 2.
OH80/1-95-100-	58100.	309.	11.	86.	2.9	0.088	7.
DH80/1-100-105	3430.	129.	14.	67.	2.4	0.110	2.
OH80/1-105-110	3570₊	307.	10.	92.	1.,9	0.055	7.
OH80/1-110-115	360.	122.	33.	112.	2.7	0.022	5 .
OH80/1-115-120	3590.	362,	11.	85.	$\frac{2}{2}, 1$	0,154	10.
OH80/2-20-33-C	1075.	60.	12.	72,	1.3	0.022	0,
0H80/2-33-40-C	1616.	92.	10.	72.	1.4	0.022	0.
						, 10 , 10	
OH80/2-40-45-C	1121.	66.	10.	60.	1 . 1	0.143	0.
OH80/2-45-50-C	2082.	93.	10.	74.	1.5	0.077	0.
OH80/2-50-55-C	1892.	106.	11.	69.	1.2	0.088	0.0
OH80/2-55-60-C	1629.	85.	11.	68.	1.3	0.066	. 0.
OH80/2-60-67-C	1817.	106,	11.	53.	1.3	0.055	2.

FILE

USBRC Geochemical Analysis ORXG8001	26-AUG-80		ORXG8001		Analysis	Geochemical	HERRE
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Field Number	Cu ppm	Mo PPm	Pb ppm	Zn ppm	As Frm	Au eem	니 >>>m
A/80/ORH-1-R A/80/ORH-2-R A/80/ORH-3-R A/80/ORH-4-R A/80/ORH-5-R	1730. 857. 1170. 31. 41.	77. 56. 7. < 5. < 5.	783. 7. 12. 12.	1520. 110. 211. 14. 16.	6.7 1.3 2.1 0.5 0.6 <	0.286 0.099 0.099 0.110	7. 2. 0. 0.
A/80/ORH-6-R A/80/ORH-7-R A/80/ORH-8-R A/80/ORH-9-R A/80/ORH-10-R	488. 267. 1534. 4330. 3840.	< 5. 2350. 524. 156. 435.	11. 31. 17. 24. 27.	10. 100. 148. 1360.	1.4 2.8 3.7 7.3	2.970 0.187 0.066 0.308 0.154	0. 50. 43. 24. 29.
A/80/ORH-11-R A/80/ORH-12-R A/80/ORH-13-R	414. 71. 118.	< 5. 7. < 5.	12. 16. < 5.	< 5. 28. < 5.	2.4 0.9 0.3 <	2.420 0.055 0.005	72. 0. 0.

HOLE SUMMARIES

DEPTH	DESCRIPTION	ASSAYS
0-20'	US-1A overburden	-
20-35'	hornfelsed (biotitized) f.g. metasediments	ave. 0.1 Cu less than 0.017 MoS ₂
	US-1B	
0-280'	mixture of dark-green metavolc. and metased.; minor diorite and porphyritic trondhjemite dikes; py:cpy is 5-10:1, total sulfide ave. less than 5%	ave. 0.13 Cu, less than 0.017 MoS ₂
280-443' EQH	mostly f.g. diorite; xenoliths of metavolc. and metased.; py:cpy is 5-10:1; total sulfide ave. 2%	ave. 0.19 Cu, less than 0.017 MoS ₂
	US-2	
0-43'	overburden	-
0-220'	mostly diorite "sill"; py:cpy is 2-3:1; total sulfides ave. 1%	ave. 0.109 Cu, less than 0.017 MoS ₂
220-550' EQH	mostly f.g. metavolc.; several post- mineral andesite dikes; py:cpy is 2-3:1; total sulfide ave. less than 1%; slight increase at bottom of hole of sulfides and Cu content	ave. 0.177 Cu, less than 0.017 MoS ₂
	US-3	
0-51.9'	overburden	-
51.9-130'	predominantly hornfelsed (biotitized) f.g. metavolcanics; numerous diorite dikes; ave. py:cpy is 4:1; 1% total sulfides	ave. 0.25 Cu, 0.036 MoS ₂
130-550'	predominantly biotitized qtz. diorite with numerous pendants of dark horn-felsed f.g. metavolcanics and metasediments; locally abundant barren qtz. vn. stockwork; ave. py:cpy is 1:1; total sulfides 1%; last 60 feet of hole average 0.41 Cu, but less than 0.017 MoS2 local intense (10%) magnetite in veins an replacements	

CORE LOG

US-R1

0 - 245', overburden, coarse gravel and sand with scattered boulders.

245' - 255', (chips) porphyritic dacite. A fine grained light gray rock characterized by 10-15% opaque white subhedral to more commonly euhedral plagioclase phenocrysts set in a very fine grained quartzo-feldspathic matrix. The phenocrysts appear weakly altered, possibly to a clay or sericite. The groundmass feldspar appears relatively fresh. An elongate grass green mineral is present in the groundmass which appears to be secondary chlorite, probably replacing hornblende or a pyroxene. An extremely fine opaque dust (magnetite?) is associated with chlorite. Trace to minor euhedral magnetite and pyrite is scattered throughout the rock. The magnetite/pyrite ratio is approximately 10:1. Minor epidote-quartz chips are present between 245'-255' and apparently represent secondary veinlets. The rock appears very similiar in composition and texture to the Tertiary dacite-andesite sills exposed on the Orange Hill property.

US-R2

0 - 180', overburden, coarse gravel and sand with abundant boulders.

180' - 195', (core) quartz diorite with propylitic alteration developed between 180'-185' and adjacent to thin quartz-pyrite veinlets which cut the rock between 185'-195'. The rock appears hypidiomorphic-granular, coarse grained and exhibits a "salt and pepper" texture. 180'-185' has experienced hydrotheral propylitic alteration which is distinctive with its mottled pink to greenishgray color. Fresh rock is composed of 10-15% anhedral quartz, 35-405 euhedral plagioclase withsubhedral biotite, hornblende and minor chlorite and pyrite. Chlorite partially replaces hornblende. Biotite books exhibit a deep reddish brown color and appear to be unaltered. Pyrite occurs as thin discontinous stringers, often with quartz and as descreet grains. Very fine pyrite grains are occassionally observed aligned on feldspar twins. Propylitic alteration is indicated by the complete replacement of bictite and hornblende by chlorite accompanied with secondary aridote and pyrite. Plagioclase is altered to either a clay or sericite and displays a salmon pink color. 185'-187' is gradational between fresh and altered rock. The plagioclase is weakly altered and chlorite replaces hornblende and biotite, minor epidote is present.. The fresh rock is cut by thin discontinous quartzpyrite veinlets with variable propylitic alteration halos. The degree of alteration appears related to vein size. Trace amounts of chalcopyrite occur with secondary chlorite which replaces hornblende.

US-R3

- 0 150', overburden, coarse gravel and sand with abundant boulders
- 150' 155', (chips) quartz diorite. The rock is hypidiomorphicgranular, medium grained and exhibits a light gray-green color. It
 is composed predominantly of plagioclase-quartz-biotite-hornblende
 with secondary chlorite which replaces both mafic minerals. Minor
 pyrite is present as descreet euhedral grains, small grain clusters.
 and as thin discontinous stringers. Trace to minor chalcopyrite
 is present as very fine stringers associated with chlorite that
 has replaced hornblende. Plagioclase appears relatively fresh except
 for a few grains which exhibit a slight pinkish color. Occassional
 chips contain abundant epidote with associated chlorite and pyrite.
 The rock appears similiar in texture and mineralogy to the quartz
 diorite identified in US-R2 and appears to have suffered similiar
 but somewhat more weakly developed propylitic alteration.
- 155' 160' (chips) poor chip recovery, highly contaminated with sand, chips also quite small due to worn bit.

GEOLOGIC SUMMARY

The drill hole data suggests the area tested west of
Orange Hill is underlain by quartz diorite with weak to well
developed propylitic alteration. The alteration appears fracture

controlled and is recognized by; 1) complete replacement of hornblende and biotite by chlorite, 2) secondary epidote and possibly minor carbonate, 3) increased pyrite content, 4) partial alteration of plagioclase to sericite or a clay mineral. Tertiary dikes or sills similiar to those exposed on Orange Hill cut the quartz diorite.

The rock type and alteration appear to indicate the area west of Orange Hill and beneath the Nabesna River channel represents the deeply eroded outer edge of the porphyry system. The available data indicates the area hosts little potential for either hypogene or supergene copper porphyry mineralization. The data is insufficient to evaluate the area southwest of Orange Hill.

The drill hole locations are plotted on; Geologic Map of Orange Hill and Vicinity, 1977, by T. A. Hendrickson and M. P. Schaubs and is on file at U.S. Borax's Spokane, Washington exploration office.

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