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Item 16

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Memorandum on

COWBOY TUNGSTEN PROPERTY

Lyon County, Nevada

Abstract

The Cowboy tungsten property is in the Pine Grove Hills, Lyon County, Nevada, 16.6 miles southeast of Wellington by good dirt road. Scheelite ore occurs in tactite that forms the backbone of a septum of metasediments in granite. One ore shoot is believed to contain 12,000 tons of probable ore or 7,200 units of WO_3. Ninety thousand tons of possible ore may exist between the highest and lowest outcrops in this ore zone. Several smaller ore shoots are believed to contain 7,500 tons of probable ore or 3,750 units of WO3, and at least as much possible ore.

The property is almost undeveloped and the owners are apparently without funds. A lease has just been taken by C. T. Eastman of Oakland, California, and development work may be started soon. If development work substantiates my opinions, a mill at or near the property might be warranted. Trucking and freight charges to the Metals Reserve plant at Salt Lake City are high. Recovery of the scheelite, part of which is very fine-grained, may be difficult.

Location

On March 27, I visited the Cowboy tungsten property in the Pine Grove Hills, Lyon County, Nevada, 16.6 miles southeast of Wellington by improved dirt roads. It is reached

from Wellington by driving II.6 miles southeast on Nevada Highway No. 22 (Dalzell Canyon road on U. S. G. S. Wellington quadrangle), then 5 miles east on the Sand Canyon road (not shown on the quadrangle). The dirt road from Wiley to the idle Pine Grove gold mill passes within a few hundred feet of the north end of the property. Minor repairs are needed to restore this road to usefulness. Hudson and Wilson, sidings on the Nevada Copper Belt Railroad, are each about 25 miles from the property by good dirt roads.

The claims are on south and westsloping hills ranging between 7500 and 8400 feet in elevation. Winter storms might isolate the property for a few days, but they would not interfere with mining operations. Water is now hauled to the camp, but an ample supply for mine, mill, and domestic use could probably be piped from springs only a few miles distant.

History and Ownership

Scheelite was discovered in this area by Mr. Drew Wilson of Smith, Nevada. Wilson and Norman T. Annett, Wellington, Nevada, located the Cowboy claims soon thereafter. The property has been leased twice, but most of the efforts appear to have been expended in promotion rather than in development. In March, 1943, C. T. Eastman and associates, 109 Monte Vista Avenue, Oakland, California, leased the property with option to buy for $300,000 on a 10% royalty basis. Mr. Eastman is (or was?) affiliated with Francis-Bobby Mines Corporation, Mariposa, California. Mr. Wilson states that lessees will begin work early in April.

Development of the Property

A zone of scheelite-bearing tactite, a mile and a half long, has been prospected with trenches and pits. An adit, at present thirty-five feet long, is being driven in ore. Ore is sledded down a steep hill at a rate of five to ten tons a day. Construction of a half mile truck road and a new ore bin would permit a substantial increase in production.

Equipment

Equipment consists of a small compressor, necessary mining implements, a wagon-sled, and two mules. Four men are working on the property.

Production

In 1941 lessees shipped 10 tons of ore to the Toulon mill, 12 miles south of Lovelock, Nevada. Recovery was about 0.25% WO_3, but the loss may have been high, for much of the scheelite is very fine-grained. A few months ago, Mr. Wilson shipped 52 tons of ore from the glory hole shown on the map (Cowboy Nos.5 and 6) to the Metals Reserve stockpile in Salt Lake City. Settlement was made on a grade of 0.78% WO_3. At the time of my visit, 50 tons of ore mined from the adit had been sorted out for shipment. I estimate that this lot averages between 1.25 and 1.50% WO_3. The mine dump contains 75 tons of 0.4% ore. This grade of ore cannot be shipped profitably, but it probably could be milled on the property.

Geology

The Cowboy claims are located along a steeply dipping hook-

shaped septum of metasediments that is completely surrounded by granite. Younger volcanic rocks cap some of the hills. This sedimentary belt varies from 10 feet to more than 100 feet in width. It generally has a central rib of tactite, which varies from a few feet to 25 feet in width.

In most of the western part of the belt the tactite dips steeply northeast, and is underlain by a sequence of amphibolite, biotite schist, fine-grained gneiss, and dense hard hornfels. The tactite grades upwards into marble. In the eastern part of the belt, exposures are not good, but the beds dip steeply, and in some places marble crops out west of the tactite. These features suggest that the two sedimentary belts, separated by volcanic talus and alluvium, are opposite limbs of a fold (syncline?).

Character of the Ore

The ore is medium-grained tactite, consisting of variable amount of garnet, quartz, epidote, pyroxene, calcite, and scheelite, listed in approximate order of abundance. Some powellite is present, but sulfides are rare. Part of the scheelite occurs as medium and large (up to 4") sized crystals and crystal clusters. Part is very fine-grained, probably less than 100-mesh. Fluorescent colors vary from blue-white to golden yellow, even within a single crystal.

It may be impossible to obtain a good recovery from this ore in a gravity mill. Recovery from a 10 ton lot milled at Toulon was only 0.25% WO_3, but the remainder of the dump from which this ore was taken is estimated to average 0.5% WO_3, mostly as very fine-grained scheelite.

Scheelite Deposits

Scheelite deposits have been prospected intermittently along the mile and a half length of the metasedimentary belt. Croppings and distribution of float suggest that tactite occurs almost continuously along the belt. Some of the tactite is barren, some is low grade ore, and some is ore of mineable grade.

On claims Nos. 5 and 6, an ore zone is exposed almost continuously for a length of 400 feet. Intermittent exposures continue to the bottoms of canyons to the north and south, suggesting that there may be a mineable zone almost 800 feet long. The distribution of scheelite is very irregular, but I believe that a 6 foot width may average between 0.5% and 0.75% WO_3. The difference in elevation between the lowest and highest outcrops is about 275 feet.

An adit is being driven northward in ore near the south end of the zone at an elevation midway between the highest and lowest outcrops. Fifty tons of ore have been shipped from a glory hole a few feet north of the face of this adit, and fifty tons of sorted ore from the adit are about to be shipped.

If the ore shoot is 400 feet long, averages 6 feet wide, and is continuous between the surface and the elevation of the adit, it contains I2,000 tons of ore or 7200 units of WO_3. Each additional foot of depth would contain 200 tons of ore or I20 units. If ore is continuous in the rectangular block below the adit and above the lowest cropping in the canyon to the south, 40,000 more tons or 24,000 units more of WO_3 exist. If the ore shoot is 800 feet long, an additional 50,000 tons of ore may occur. In view of the small average width of the sedimentary septum, about 50 feet, it is more

than ordinarily hazardous to project the ore zone below the lowest croppings.

The tactite croppings in the southern part of claim No. 6 and the northern part of claim No. 7 are wide, but low grade. It is not likely that ther is a mineable width of ore that contains more than 0.25% WO_3.

On claim No. 9, an ore zone is exposed intermittently for 500 feet. The exposures cover a vertical range of 50 feet on a west sloping hill. The average width of ore exposed is 5 feet, and the grade is estimated to average 0.5% WO_3. Assuming 50% ore mineralization within this zone, there are 2500 tons of ore or 1250 units of WO_3 in the triangular block between the highest and lowest outcrops. Each additional foot of depth may contain 100 tons of ore or 50 units of WO_3.

Tactite crops out intermittently for 2000 feet on claims Nos. 3 and 4. Much of the tactite in this area is barren or low grade. Some is ore. It is likely that shoots of commercial grade are small, and would have to be mined separately. I believe that 5000 tons of 0.5% ore or 2500 units of WO_3 can be mined from within 50 feet of the surface.

Summary of Reserves

	Probable Ore			Possible Ore			
Claim No.	Tons	%WO_3	Units WO_3	Tons	%WO_3	Units WO_3	Remarks
6 north 5 south	I2,000	0.6	7200	40,000 50,000*	0.6	24,000	Single shoot?
9	2,500	0.5	I250	2,500	0.5	I250	Single shoot with barren zones
3 and 4	5,000	0.5	2500	5,000	0.5	2500	Several small shoots
Total	I9,500		I0,950	97,500*		27,750	

* Assuming ore shoot to be 800 feet long.

Conclusions

I am confident that the ore shoot on claims Nos. 5 and 6 can be profitably mined at a $30.00 unit price for scheelite concentrate. I believe that 500 feet of drifting may develop I2,000 tons of ore. Neither Mr. Wilson nor lessees and promoters that have been interested in the property have been able to do this work. The present lessee has told Mr. Wilson that he plans to undertake such a program.

If this work is done, and if the deposit fulfills my expectations, some arrangements should be made to mill the ore on or near the property. Possibly the idle Pine Grove gold mill, only 5 miles by road from the property, could be adapted to treat scheelite ore. Combined trucking and railroad charges for the transportation of I2,000 tons of ore to a custom mill would pay for the construction of a small mill.

Recommendation

In my opinion, it would be worthwhile for the U. S. Geological Survey to map the metamorphic septum. This work would give a more accurate

basis for the estimation of reserves, and might lead to worthwhile suggestions relative to development. A two-man party could map the area on 200-scale in two or three weeks.

M. R. Klepper
Assistant Geologist
Mill City, Nevada
April 2, 1943

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Reno, Nevada
October 31, 1943

Supplementary Memorandum on

COWBOY TUNGSTEN PROPERTY

Pine Grove Hills, Lyon County, Nevada

by

M. R. Klepper

Abstract

The Cowboy Tungsten property is situated in the Pine Grove Hills, 17½ miles southeast of Wellington, Lyon County, Nevada. The property is underlain by a discontinuous septum of metamorphic rocks between a quartz diorite intrusive to the north and a quartz monzonite intrusive to the south. Scheelite ore occurs in tactite lenses in the calcareous part of this metamorphic septum. The reserve of ore on the property is estimated to total 16,500 tons containing 7525 units of WO_3. Most, if not all, of this ore is sub-commercial under present conditions

Introduction

In March 1943 I briefly examined the Cowboy Tungsten property and submitted a memorandum. During October Peter Joralemon and I spent a week mapping the Main scheelite ore zone on the property and studying the metamorphic belt in which the bodies of scheelite ore occur. In this supplementary memorandum the geology of the area is more fully described, and the reserve of ore is reevaluated. The reader is referred to the earlier memorandum for a more complete statement of location, accessibility, ownership, etc.

Recent Operations

In March 1943 C. T. Eastman of Oakland, California leased the property from Drew Wilson of Yerington, Nevada. Mr. Wilson states that Eastman organized a corporation under the law of the state of Nevada and raised about $40,000 by sale of stock. A small crew was employed at the property from May until September. During this time the Sand Canyon road was extended to a point about 500' distant from and 150' lower than the Lower Adit in the Main ore zone. A compressor was set up at the end of this road. About 300' of underground workings were driven (Upper and Lower Adits on accompanying map). In September Eastman relinquished his lease and option. Since then the property has been idle, but none of the mining equipment has been removed. Last week several of the stock-

holders in the defunct Eastman corporation presented to Mr. Wilson a plan to re-lease the property and to resume operation.

Production

Early in 1943 Mr. Wilson shipped two 50-ton cars of ore to Metals Reserve Corp. at Salt Lake City. Settlement for these two cars was on the basis of 0.78% and 0.84% WO_3. No ore was shipped by Eastman.

Geology

The Cowboy Claims are located along an arcuate zone of sedimentary rocks that have been metamorphosed to schist, hornfels, marble tactite, amphibolite, and fine-grained gneiss. These meta-sediments occur as a discontinuous septum or relict between two intrusive masses, a sill-like, locally gneissic body of medium-grained quartz diorite to the north and a younger, larger body of medium- to coarse-grained quartz monzonite to the south. The quartz diorite and the quartz monzonite are believed to represent two phases of the Sierra Nevada batholithic intrusive. The contact between the meta-sediments and the quartz diorite is fairly regular as is shown on the accompanying map. The contact of the quartz monzonite with the meta-sediments is very irregular. Near the north margin of the main quartz monzonite mass pendants of schist and hornfels are abundant. Tongues of quartz monzonite and related aplite and pegmatite cut across the meta-sediments and the gneissic quartz diorite, and small irregular masses of quartz monzonite intrude the quartz diorite north of the belt of metamorphic rocks. At the northeast and northwest ends of the property the metamorphic belt is capped by Tertiary volcanic rocks.

The metamorphic sequence varies from less than 100' to more than 500' in thickness. The lowest exposures in this belt are biotite schist with thin interbedded layers of amphibolite and fine-grained gneiss. Hornfels, varying in thickness from a few feet to more than 100', overlies the schist and is overlain by marble. The marble grades upward into hornfels. In most of the area the width of the marble belt varies from 25' to 75', but near the northeast end of the property a width of 600' is exposed. Irregular bodies of tactite occur within the marble belt, and thin tactite lenses are locally interbedded with hornfels. The marble and upper hornfels beds are commonly covered by

gneissic quartz diorite talus, but in a few places an almost concordant contact between the meta-sediments and the intrusive quartz diorite is exposed.

The metasediments trend from N20° E to N 60° W and dip between 30° and 75° north and east. It is difficult to decipher the structure of these metamorphic rocks because in most of the area they are poorly exposed. Furthermore, they are complexly intruded by quartz monzonite. Where exposed, however, the metamorphic septum contains about the same rock sequence. The distribution of the different rock types and the attitudes of the beds suggests that the metamorphic zone has been displaced by several cross faults, possibly now occupied by dikes. Minor folds were recognized at several places within the marble belt, and it seems probable that the arcuate metamorphic septum may be part of a major pre-intrusion isoclinal fold.

Scheelite Deposits

Occurrence.- At the Cowboy property scheelite occurs only in tactite. The tactite has formed either as irregular masses within the marble or as narrow bedding lenses within the hornfels. The irregular masses in marble are by far the most important. Most of these masses lie near either the footwall or the hanging wall of the marble belt and irregularly feather out into marble along both strike and dip. Locally the entire width of marble has been altered to tactite.

Mineralogy.- The mineralogy and texture of the tactite varies considerably. Two types predominate: (1) a medium- to fine-grained aggregate of garnet, epidote, clear quartz, and pyroxene; and (2) a medium- to coarse-grained aggregate of very dark brown garnet and milky quartz with very little epidote or pyroxene. Type (1) is generally mineralized with scheelite and is quantitatively the most important ore-bearing tactite. Type (2) is generally low-grade or barren. A third type of tactite is prominent near the northeast and northwest ends of the property. This variety, a dense, very fine-grained aggregate of garnet, epidote and quartz, is generally interbedded with lighter colored silicate rocks (hornfels). In a few places it contains worthwhile amounts of scheelite. Small pods consisting of quartz, well-developed epidote crystals and sericite (?) occur locally. Scheelite values are erratic within these pods. Zones of coarsely crystalline

calcite, quartz, garnet and chlorite also occur locally. In these scheelite is a rare constituent.

Most of the scheelite is very fine-grained and has a pale yellow fluorescent color. Narrow bands of more coarsely crystalline scheelite occur here and there. Powellite occurs locally in the tactite either as very small specks or as clusters of bladed crystals. Sulphides are lacking, but iron oxide and green copper stain occur in tactite near the northwest end of the property.

Origin and Localization.- The tactite bodies were probably formed by solutions genetically related to the quartz monzonite intrusive. The solutions seem to have migrated most freely along the footwall and hanging wall of the marble belt and were probably in part controlled by fractures within the marble. The tactite masses in part are localized within one or several beds, but in many places they cut irregularly across bedding.

Size and Shape.- Most of the ore bodies on the Cowboy property are prospected by only shallow surface cuts. Furthermore, a large part of the marble belt is concealed by mantle and talus. For these reasons it is difficult to predict the size and shape of ore bodies in advance of mining. The two adits in the Main ore zone suggest that the tactite masses are relatively small and that they grade into marble along the strike and dip. (See projection and section on accompanying map). Locally, as in the Lower adit, tongues of quartz monzonite cut across tactite bodies.

Grade.- The WO_3 content of the tactite varies from nil to 1.0%. The ore body exposed in the Lower adit is believed to average 0.4% or 0.5% WO_3; the ore body in the Upper adit about 0.6% WO_3. The exposures of tactite shown in solid print on the map are believed to average about 0.5% WO_3. In order to check these estimates of grade I have cut a 31' sample across the ore zone in the Upper adit and a 15' sample across an average ore zone exposed at the surface.

On other parts of the property grade of ore falls within the same range, but the average for bodies of minsable size is generally about 0.4% WO_3 (estimated). Two samples were taken to check these estimates.

Description of Individual Ore Zones

Main Ore Zone (Cowboy Nos. 5 and 6).- The Main ore zone is intermittently exposed for a length of 1000' on a rounded spur near the center of the property. The distribution of outcrops and suggested outlines of the larger ore lenses are shown on the accompanying map. Grade of ore within these bodies is estimated to average 0.5% WO_3. It is anticipated that the lenses exposed at the surface pinch out at a relatively shallow depth but that other lenses occur here and there within the marble belt below the surface.

Five hundred tons of 0.4%-0.5% WO_3 ore are measured and indicated between the lower adit and the surface; 1000 tons of 0.5%-0.6% WO_3 ore are measured and indicated in the vicinity of the Upper adit. Inferred ore (to a depth of 30' below the outcrop) in the lenses shown on the map is estimated to total 10,000 tons averaging about 0.5% WO_3.

Cowboy No. 5: Center.- Small lenses of tactite are exposed at the margins of a poorly exposed marble belt about 200' north of the area mapped. The projected strike of the marble belt between the Main ore zone and these exposures is covered by talus and mantle. The size of these lenses averages about 4' x 15', and grade is estimated to range between 0.25% WO_3 and 0.75% WO_3. No mineable ore is inferred.

Cowboy Nos. 4 and 5.- On the spur northwest of the Main ore zone tactite ranging from 4' to 10' in width is exposed for a length of 125'. A train of ore float continues along the strike of this zone for about 50' in each direction. Narrow lenses of 0.3%-1.0% WO_3 are occur within the tactite but the grade of any mineable width is estimated to average only 0.25% WO_3. This zone is inferred to contain 2500 tons of ore of this grade.

Cowboy No. 4: North.- Tactite is exposed in two cuts and in intermittent outcrops for a length of 250'. Most of the tactite in this zone is very low grade, but ore of possible commercial grade occurs in and near the northern cut. Here a 4' to 6' width may average 0.4 or 0.5% WO_3. Ten tons of ore from this cut were milled at Toulon and about 2½ units of WO_3 were recovered. To check my estimate of grade I chipped a sample across the best 6½' width of ore in the cut. In this zone 500 tons of ore averaging 0.4-0.5% WO_3 are inferred.

Cowboy No. 3.- Tactite, interbedded with hornfels, is intermittently exposed for a length of 400' in the southern part of the claim. Most of the tactite is very fine

grained and very low grade. Short, narrow lenses of coarser-grained tactite contain from 0.25% to 1.0% WO_3. Several lenses may each contain one or two hundred tons of ore averaging 0.4 or 0.5% WO_3.

Cowboy No. 7.- Coarsely crystalline dark garnet-milky quartz tactite is exposed on a cliffy nose about 1500' northeast of the Main ore zone. The most prominent tactite band averages 10' wide for a length of more than 100'. Scattered float is found for several hundred feet to the northwest along the projected strike of this zone. Other narrower tactite bands are interlayered with the overlying and underlying hornfels. Most of the tactite is barren, but a few very narrow and discontinuous seams contain 0.5- 1.0% WO_3. No ore of possible commercial worth is inferred.

Cowboy No. 8.- Tactite is exposed in a cut 20' east of the bottom of the main canyon crossing the claim. Faulting is suggested by the presence of wedges of schist in the tactite. The tactite contains only a few grains of scheelite.

Cowboy No. 9.- Eight hundred feet north of the cut on claim 8 the canyon forks. Metamorphosed calcareous rocks are fairly well exposed for a length of almost 1000' along the crest of the low nose separating the two branches of the canyon north of this fork. Schist overlain by hornfels from 50' to 200' thick underlies the south half of the nose. Farther north the hornfels passes rather abruptly along the strike into marble. At the north end of the property the marble crops out for a width of 600'. Whether this unusual width of marble is due to a flattening of dip or to an increased thickness of formation is not known.

Discontinuous lenses of fine-grained tactite are interbedded with the hornfels and small tactite masses occur in the marble. Individual bodies are estimated to contain between 0.1 and 1.0% WO_3. A few of the best lenses may each contain 100 or 200 tons of 0.4 or 0.5 % WO_3 ore.

Possibility of Production

Mr. Wilson states that the profit from two 50-ton shipments of 0.8% WO_3 ore was very small. Most of the ore now exposed on the property occurs in relatively small lenses that are estimated to average only 0.4 to 0.6% WO_3. If these estimates of grade are correct, it is not likely that any ore can profitably be mined and shipped at present.

Summary of Reserve

Zone	Measured			Indicated			Inferred			Total	
	Tons	% WO_3	Units	Tons	% WO_3	Units	Tons	% WO_3	Units	Tons	Units
Main											
Lower adit	200	0.45	90	300	0.45	135	500	0.45	225	1000	450
Upper adit	400	0.55	220	600	0.55	330	500	0.55	275	1500	825
All other	-		-	-		-	9000	0.50	4500	9000	4500
Total	600		310	900		465	10,000		5000	11,500	5775
Nos. 4, 5	-		-	-		-	2500	0.25	625	2,500	625
No. 4 North	-		-	-		-	500	0.45	225	500	225
No. 3	-		-	-		-	1000	0.45	450	1,000	450
No. 9	-		-	-		-	1000	0.45	450	1,000	450
Grand Total	600		310	900		465	15,000		6,750	16,500	7,325

Nolan (3)
Lemmon
Lasky
File

COWBOY MINE - ~~MINERAL~~ Co. LYON

45 elements minus U, Th

LAB NO.	M-138625	M-138626	M-138627	M-138628	M-138629	M-138630	M-138631	M-138632
FIELD NO.	MDY851	MDY852	MDY853	MDY854	MDY855	MDY856	MDY857	MDY858
FE %-S	4.0	1.6	4.4	4.1	8.5	1.9	2.0	0.42
MG %-S	1.6	0.16	0.37	0.63	0.16	0.32	0.17	<0.10
CA %-S	3.5	0.10	5.4	2.1	12.	0.30	0.60	0.89
TI %-S	0.48	0.35	0.55	0.40	0.05	0.25	0.19	0.08
MN PPM-S	800.	<200.	1000.	230.	2900.	<200.	370.	520.
AG PPM-S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AS PPM-S	<200.	<200.	<200.	<200.	<200.	<200.	<200.	<200.
AU PPM-S	<10.	<10.	<10.	<10.	<10.	<10.	<10.	<10.
B PPM-S	11.	13.	<10.	<10.	<10.	230.	<10.	20.
BA PPM-S	1400.	2100.	1300.	1600.	60.	350.	180.	770.
BE PPM-S	3.7	1.8	1.7	1.9	1.2	2.1	3.1	2.9
BI PPM-S	<10.	<10.	<10.	<10.	16.	<10.	<10.	<10.
CD PPM-S	<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
CO PPM-S	15.	2.2	12.	6.8	5.9	3.1	2.0	<1.0
CR PPM-S	26.	<10.	18.	12.	<10.	<10.	<10.	<10.
CU PPM-S	82.	27.	48.	40.	11.	6900.	17.	4.9
LA PPM-S	52.	46.	37.	41.	70.	69.	45.	33.
MO PPM-S	<10.	<10.	<10.	<10.	<10.	<10.	<10.	<10.
NB PPM-S	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.
NI PPM-S	23.	6.2	13.	7.3	6.8	3.9	3.8	1.8
PB PPM-S	<10.	71.	<10.	<10.	<10.	<10.	15.	<10.
SB PPM-S	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
SC PPM-S	13.	<10.	15.	11.	<10.	<10.	<10.	<10.
SN PPM-S	13.	<10.	10.	<10.	39.	<10.	<10.	<10.
SR PPM-S	770.	110.	720.	1700.	440.	20.	67.	180.
TE PPM-S	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.
V PPM-S	120.	48.	130.	150.	110.	77.	13.	<10.
W PPM-S	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
Y PPM-S	25.	23.	21.	17.	47.	37.	30.	18.
ZN PPM-S	<50.	53.	<50.	50.	<50.	<50.	<50.	<50.
ZR PPM-S	400.	430.	190.	190.	32.	160.	320.	110.
SI %-S	30.	37.	32.	27.	36.	37.	39.	39.
AL %-S	9.9	9.6	9.8	9.8	9.0	6.6	9.6	7.1
NA %-S	2.8	0.17	3.1	1.1	<0.15	0.15	6.4	3.4
K %-S	3.3	3.8	2.0	1.1	0.31	3.6	>5.0	4.4
P %-S	0.18	0.06	0.12	0.15	0.17	0.08	0.05	0.03
CE PPM-S	<100.	<100.	<100.	<100.	<100.	110.	<100.	<100.
GA PPM-S	22.	14.	15.	15.	38.	12.	20.	11.
LI PPM-S	<50.	<50.	<50.	<50.	<50.	<50.	65.	56.
RE PPM-S	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.
TL PPM-S	<10.	<10.	<10.	<10.	<10.	<10.	<10.	<10.
HG PPM-S	<500.	<500.	<500.	<500.	<500.	<500.	<500.	<500.
SE PPM-S	<200.	<200.	<200.	<200.	<200.	<200.	<200.	<200.