Hunt - Sill Coll

MINING
METALLURGY
CHEMISTRY

ORE TESTING
PLANT DESIGN
METALLURGICAL RESEARCH
ASSAYS & ANALYSES

HARLEY A. SILL
CONSULTING ENGINEER
1011 SOUTH FIGUEROA STREET
LOS ANGELES 15

(100)
ITEM
19

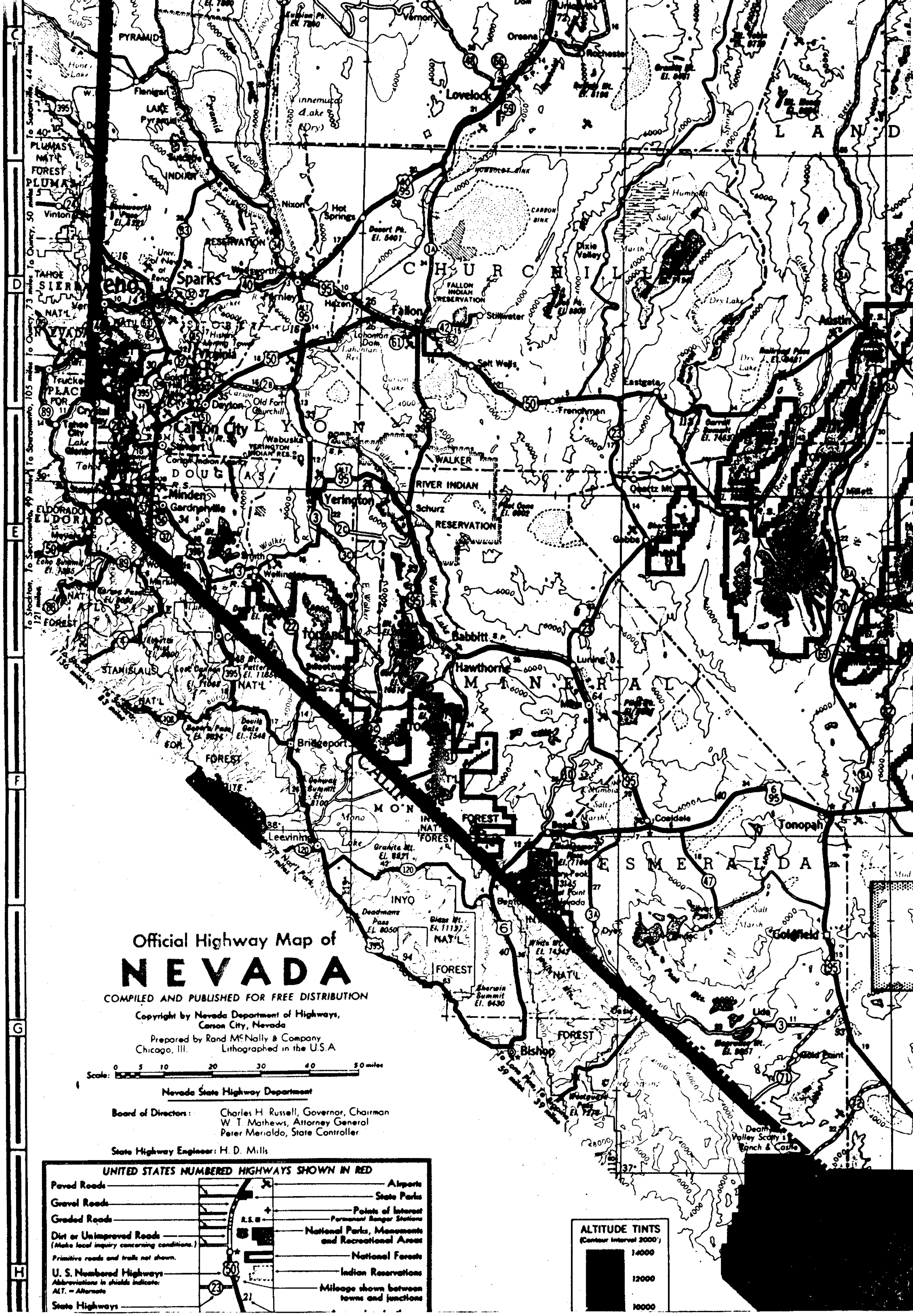
3990 0013

REPORT

ROCK HILL MINES

GENERAL TUNGSTEN COMPANY

(20 miles south of) MINA, NEVADA



Official Highway Map of NEVADA

COMPILED AND PUBLISHED FOR FREE DISTRIBUTION

Copyright by Nevada Department of Highways, Carson City, Nevada

Prepared by Rand McNally & Company
Chicago, Ill. Lithographed in the U.S.A.

Scale: 0 5 10 20 30 40 50 miles

Nevada State Highway Department

Board of Directors: Charles H. Russell, Governor, Chairman
W. T. Mathews, Attorney General
Peter Merialdo, State Controller

State Highway Engineer: H. D. Mills

UNITED STATES NUMBERED HIGHWAYS SHOWN IN RED

- Paved Roads
- Gravel Roads
- Graded Roads
- Dirt or Unimproved Roads (Make local inquiry concerning conditions.)
- *Primitive roads and trails not shown.*
- U. S. Numbered Highways (Abbreviations in shields indicate: ALT. — Alternate)
- State Highways
- Airports
- State Parks
- Points of Interest
- Permanent Ranger Stations
- National Parks, Monuments and Recreational Areas
- National Forests
- Indian Reservations
- Mileage shown between towns and junctions

CONTENTS

ILLUSTRATIONS

MINING
METALLURGY
CHEMISTRY

ORE TESTING
PLANT DESIGN
METALLURGICAL RESEARCH
ASSAYS & ANALYSES

HARLEY A. SILL
CONSULTING ENGINEER
1011 SOUTH FIGUEROA STREET
LOS ANGELES 15

SUMMARY

A resume of my recommendations for your Rock Hill tungsten claims is as follows:

Property

Your property merits a systematic development campaign planned for open pit mining.

There is evidence of tungsten mineralization in both Scheelite and Huebnerite ores with Scheelite predominate.

Tungsten Ore

Since no ore has been developed it must be considered as a prospect; however, in my opinion, if judicial care is used in following the geologic indications of ore on your property, commercial ore bodies may be developed that will warrant the erection of a 100 ton mill.

Suggested Development

I suggest that the development program be accomplished by open cut mining and drifts at lower horizons be driven to prove the downward continuity of the Scheelite surface showings.

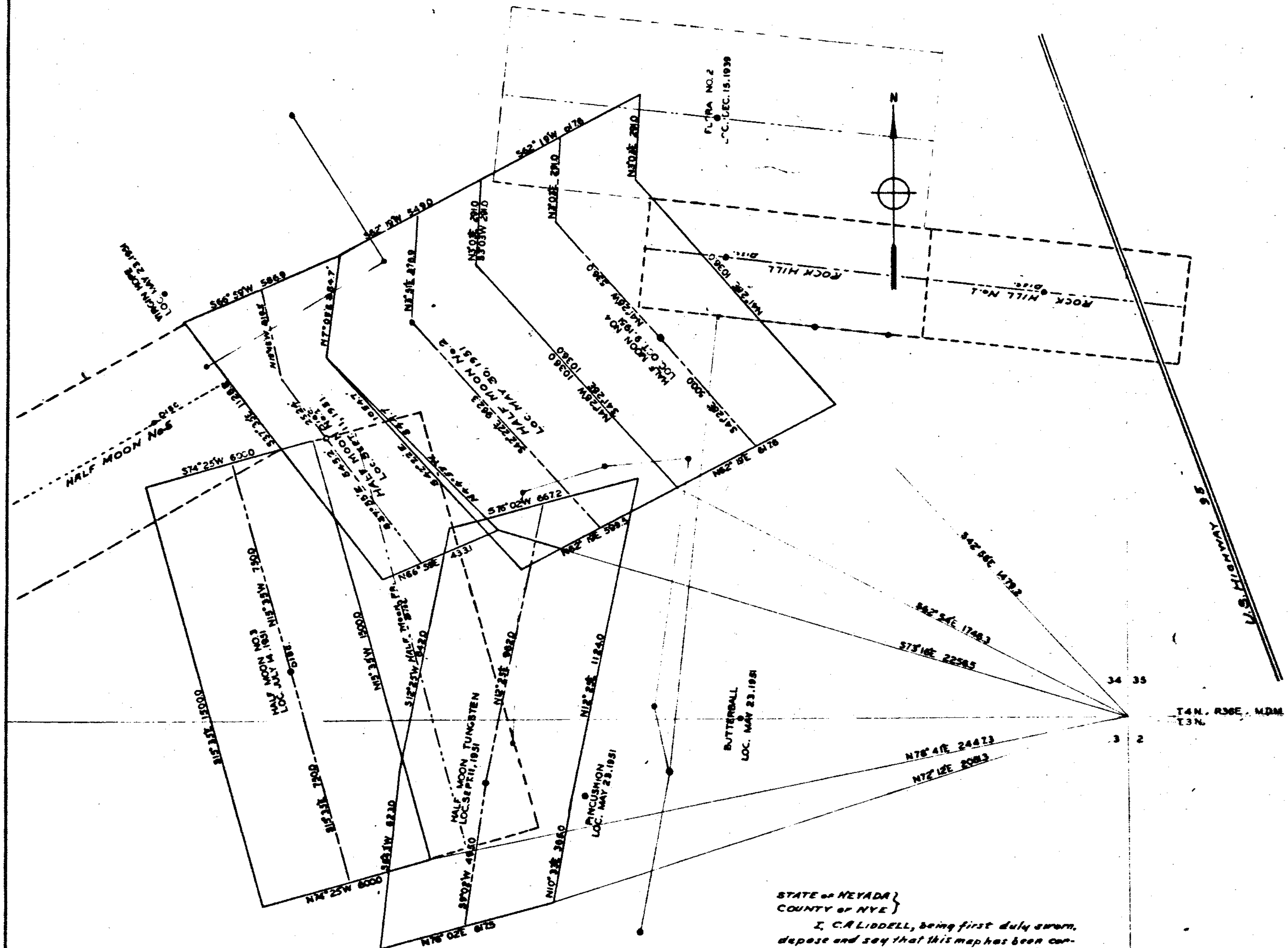
Estimated Cost

My estimate of the cost for the development under careful supervision is between $40,000 and $50,000.

The Erection of a Mill

Of course the size of the ore bodies which development will determine will control the erection and capacity of the mill.

Considering your excellent millsite formerly occupied by the Atkins-Kroll Tungsten Mill, I believe that in all probability the equipment which you now have with a few minor additions could be installed and ready for operation at 100 ton capacity at a cost of approximately $35,000.



STATE OF NEVADA }
COUNTY OF NYE }

I, C.A. LIDDELL, being first duly sworn, depose and say that this map has been correctly drawn to the designated scale from the field notes of a survey made by R.B. Jones, under my supervision in October, 1951; that it truly and correctly shows the position of the lode claims as staked upon the ground.

C.A. Liddell
Mineral Surveyor for Nevada

Subscribed and sworn to before me Nov. 10, 1951.

Notary Public in and for Mineral County, Nevada

PROPERTY OF
IRENE & SYKES
MINA, NEVADA

ENGINEER - R.B. JONES | UNSURVEYED CLAIMS SHOWN BY DOTTED LINES.

OCT. 26, 1951 | SCALE 1"=200' | MINA, NEVADA

QUITCLAIM DEED TO MINING CLAIMS

THIS INDENTURE made this 31st day of December, 1951 between G. A. PETERSON and EDITH PETERSON, Husband and Wife, Party of the First Part, and IRENE S. SYKES, an unmarried woman, Party of the Second Part,

W I T N E S S E T H :

That the said Party of the First Part, for and in consideration of the sum of $10.00 lawful money of the United States of America, to him in hand paid by the said Party of the Second Part, and other valuable consideration, the receipt whereof is hereby acknowledged, does hereby remise, release and forever quitclaim unto the said Party of the Second Part, her heirs, executors, administrators and assigns, all of their right, title and interest in and to the following described mining claims situated in the Rock Hill Mining District of Esmeralda County, State of Nevada, the original location notices, amended location notices and/or relocation notices of which are recorded in the Book of Mining Locations in the Office of the County Recorder of Esmeralda County, Nevada:

The Half Moon Tungsten Mining Claim

Half Moon No. 1 Mining Claim

Half Moon No. 2 Mining Claim

Half Moon No. 3 Mining Claim

IN WITNESS WHEREOF, the said Party of the First Part has hereunto set his hand and seal the day and year first above written.

G. A. PETERSON

EDITH PETERSON

General Tungsten Company
Mina, Nevada

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

On this 31st day of December, 1951,
before me, the undersigned Notary Public in and for said County and State, personally appeared G. A. PETERSON and EDITH PETERSON, Husband and Wife, known to me to be the persons whose names are subscribed to the within Quitclaim Deed, and personally acknowledged to me that they executed the same.

WITNESS my hand and official seal.

Signed) Milton Wichner
Notary Public in and for said
County and State

My commission expires May 20,1952

General Tungsten Company
Mina, Nevada

January 6, 1952

General Tungsten Company
Mina, Nevada

Gentlemen:

The examination of your Rock Hill Mining Claims in Esmeralda County, Nevada has been completed. I am sending my conclusions and recommendations for the development of the property herewith.

LOCATION OF PROPERTY

General Tungsten Company properties, consisting of nine contiguous lode mining claims are situated in Rock Hill Mining District in Section 3, Township 3 N. and Section 34, Township 4 N., Range 36 East, Mount Diablo Meridian, Esmeralda County, State of Nevada.

The Eastern Corner of the property is crossed by U. S. Highway 95 approximately 10 miles north of Coldale and 30 miles south of Mina.

The claims occupy the southeastern tip of the Candelaria Hills immediately north of Columbus Marsh. The elevation range is from 4000' at the highway to 5100' above mean sea level on the crest of the ridge.

OWNERSHIP

General Tungsten Company holds title to the property shown on the claims map by right of assignment from Irene Sykes. Mrs. Sykes purchased the property from the original locators, O. A. and Edith Peterson. It is subject to no liens, encumbrances or royalty payments. The area covered by these claims is approximately 160 acres extending across Highway 95 on the East.

ACCESSIBILITY

The region is easily accessible. The mining property is situated on an excellent U.S. highway, 372 miles from Los Angeles through Bishop to Reno and from Las Vegas to Reno.

A branch line of the Southern Pacific Railroad connects Mina with the main line at Hazen, a short distance from Reno.

Interstate bus lines cross the property, both north and south, daily. A good road leads from the highway to the property giving ready access by truck to the main ore bodies.

LABOR

The nature of the mining operation being open pit precludes labor shortages and difficulties experienced at this time by underground operators.

The contractor, C. H. Church, will not need more than five men, all of whom have been with his organization over a period of years. Experienced mining supervision has been retained.

GEOLOGY

The area in which your claims are located has been described in detail by Messrs. Ferguson and Muller of the United States Geological Survey in a Professional Paper No. 216 entitled "Structural Geology of the Hawthorne and Tonopah Quadrangles." This is a comparatively new area and their Professionnal Paper is recent, 1949-1950. They describe the rocks in your claims as Ordivician Slates. This classification includes limy slates, dolomite and some sandstone. There has also been an intrusion of granitic rock.

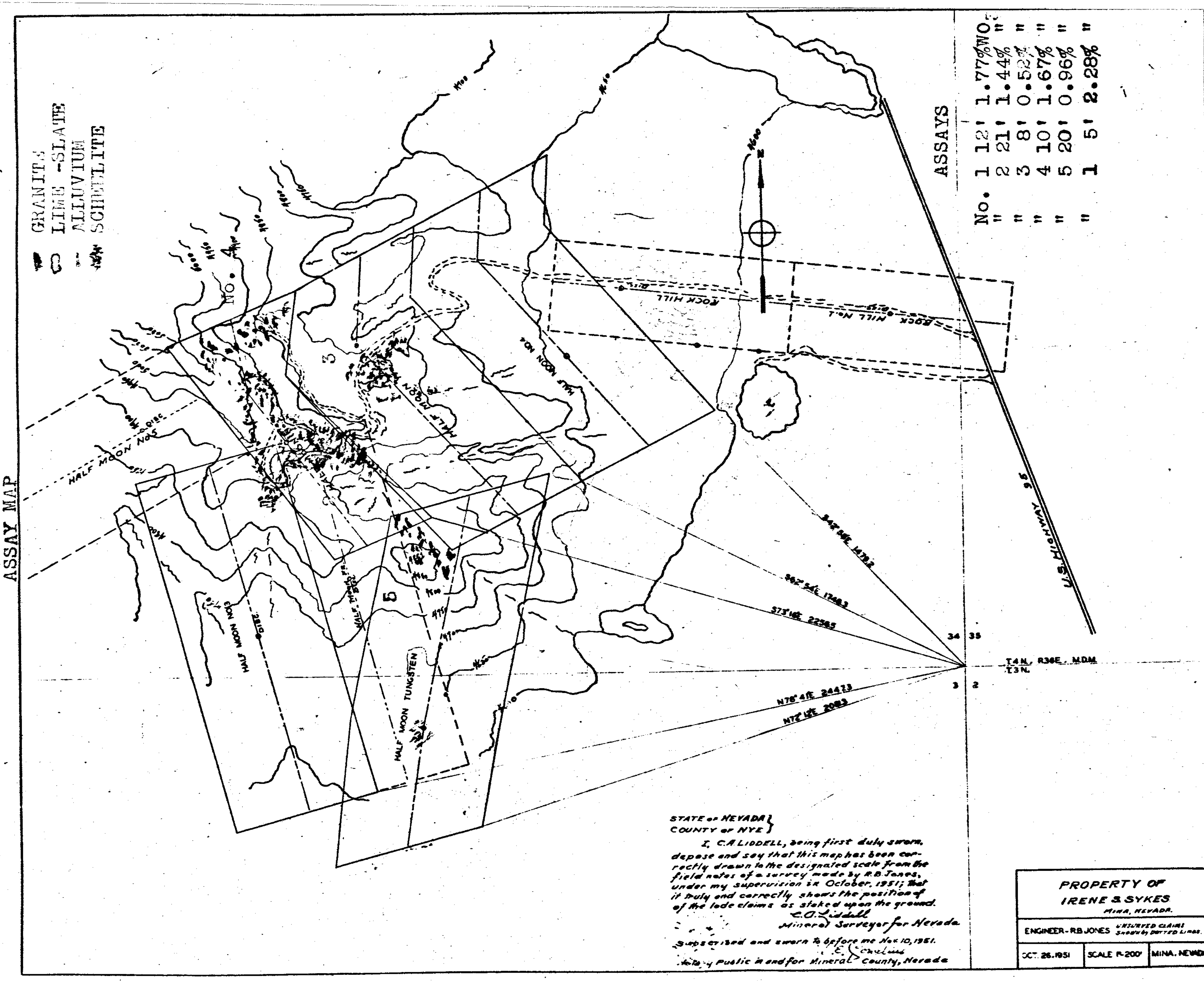
The great Sierra Batholith which was intruded near the end of Jurassic Period lies along this belt. A smaller area of granitic rock was intruded in this area. In this belt tungsten has been found in tactites, which are contact metamorphic deposits. It has also been found in pegmatites and quartz veins.

TUNGSTEN ORE

A study of the colored pictures included in this report will clearly show a mass of very white quartz veins and veinlets covering your claims and the tungsten deposition is definitely associated with these quartz inclusions in the granite, lime and slates. The limestone has been altered

Harley A. Sill
General Tungsten Company
Mina, Nevada

ASSAY MAP



ASSAYS

No. 1	12'	1.77%	WO_3
" 2	21'	1.44%	"
" 3	8'	0.52%	"
" 4	10'	1.67%	"
" 5	20'	0.96%	"
" 1	5'	2.28%	"

STATE OF NEVADA }
COUNTY OF NYE }

I, C.A. LIDDELL, being first duly sworn, depose and say that this map has been correctly drawn to the designated scale from the field notes of a survey made by R.B. Jones, under my supervision in October, 1951; that it truly and correctly shows the position of the lode claims as staked upon the ground.

C.A. Liddell
Mineral Surveyor for Nevada

Subscribed and sworn to before me Nov 10, 1951.
E. [illegible]
Notary Public in and for Mineral County, Nevada

PROPERTY OF
IRENE & SYKES
MINA, NEVADA.

ENGINEER - R.B. JONES — UNSURVEYED CLAIMS SHOWN BY DOTTED LINES.

OCT. 26.1951 | SCALE 1"=200' | MINA, NEVADA

to tactite. The scheelite follows the trend of these quarts veins and sometimes occurs as veinlets or thin coating along fracture planes.

Quartz is the most common gangue mineral in scheelite or hubnerite veins. There is an accompanying deposition of Fluorite which seems to be especially associated with hubnerite. I collected an especially good specimen of hubnerite occurring on your claims. However, scheelite is the predominant tungsten mineral and the one which must be considered in the development of your property.

Your scheelite is not confined to veinlets in or near the quarts or as a thin coating along fracture planes. It also occurs in a series of lenses across your claims as disseminated scheelite. Two such lenses have been opened by a bulldozer. These ore bodies have not been fully delineated. I lamped these cuts with a violet-ray lamp and then sampled them.

ASSAYS

In one cut, which had just been opened, I cut a sample across 21 feet and got a tungstic oxide content of 0.40%. A second mineralization as evidenced by a small ore pile of perhaps 10 tons from the same cut gave 0.86% WO_3. The overburden between these two lenses showed a continuous presence of scheelite which, although I did not sample it,

Harley A. Hill
General Tungsten Company
Mina, Nevada

appeared to be commercial. It is my opinion that it could be used as a mill feed. Lamping has shown other areas which have indicated the presence of commercial ore bodies.

In addition to my own sampling of this property various other samplings have been made recently of the ore exposures on these claims. They are as follows:

Description	Tungstic Oxide WO_3
Rock Hill #1	1.40 %
Rock Hill #1A	1.67 %
Center Ridge #1	2.28 %
Center Ridge #2	0.17 %
Center Ridge #12	0.51 %
Rock Hill #3	0.85 %
Rock Hill #1B	0.20 %
Anaconda Copper Lab #5	0.96 %
1-Cu-Jay Carpenter	0.16 %
2-Cu-Jay Carpenter	0.11 %
3-CTA-Jay Carpenter	0.52 %
SD-2	0.12 %
Rock Hill #3	0.31 %
Center Ridge	0.20 %
70 lbs. Metallurgy Test	1.44 %
Stock Pile	0.60 %

Although I did not take these samples, apparently

Harley A. Hill
General Tungsten Company
Mina, Nevada

they have been taken by reputable people and assuming that they might not have been taken in accordance with strict scientific sampling methods (and I would have no reason for believing that they were not) they nevertheless indicate the presence of scheelite in various outcroppings on the property.

SUGGESTED DEVELOPMENT

In my opinion much of your mineralization can be developed at least to a shallow depth by open cutting. Further development may show sufficient longitudinal continuity and width to permit open pit mining. Additional development will prove the correctness of this premise.

Your property has no developed ore and as such must be considered as a prospect. However, in my opinion, if judicious care is used in following the geologic signs which indicate ore and which have been substantiated by the use of the violet-ray lamp along the outcrops showing on your property, commercial ore bodies will be developed for beneficiation in a mill to be erected, when these ore bodies have been delineated by further development.

It is my further opinion that your claims merit a systematic development campaign.

I suggest that if such a program is initiated that it be accomplished by open cut mining as much as possible and that as a complement to this work that drifts be driven into these ore bodies at lower horizons, to prove the downward continuity of these scheelite surface showings.

Harley A. Sill
General Tungsten Company
Mina, Nevada

I recommend that a viewing of the topography of your holdings be made by studying the photographs included in this report. In my opinion they indicate the soundness of the basis for opening further ore bodies within your claims. I do not believe that the shattered character of the terrain lends itself to diamond drilling and I do not recommend it as adapted to your development program. The two methods suggested will establish the ore bodies to be extracted from your holdings.

I would like to stress the continuation of open cut #2 which shows 21 feet of a well disseminated scheelite. My two samples from this area gave an analysis of 0.40% WO_3 and 0.86%. Such a value justifies a continuance of this work because it is commercial ore.

COSTS

To adequately accomplish such a program as I have herein suggested would, in my opinion, require from $40,000.00 to $50,000.00. With careful supervision it might more nearly approach the lower figure.

MILL TONNAGE

The ore tonnage developed in the above program would determine the size of your mill. There are certain fixed

Harley A. Hill
General Tungsten Company
Mina, Nevada

charges in the operation of a mill. Therefore, too small an operation would increase the cost of milling beyond economic limits. A larger tonnage would permit running of a lower grade ore but here again too large a mill would not be economic as in order to keep it in full operation it might be necessary to get the required tonnage by extracting marginal ores. I suggest that until the size of your ore bodies has been more definitely determined, that you tentatively think in terms of perhaps a 100 ton plant.

In closing, I want to again express my opinion that your property merits the program suggested.

Cordially yours,

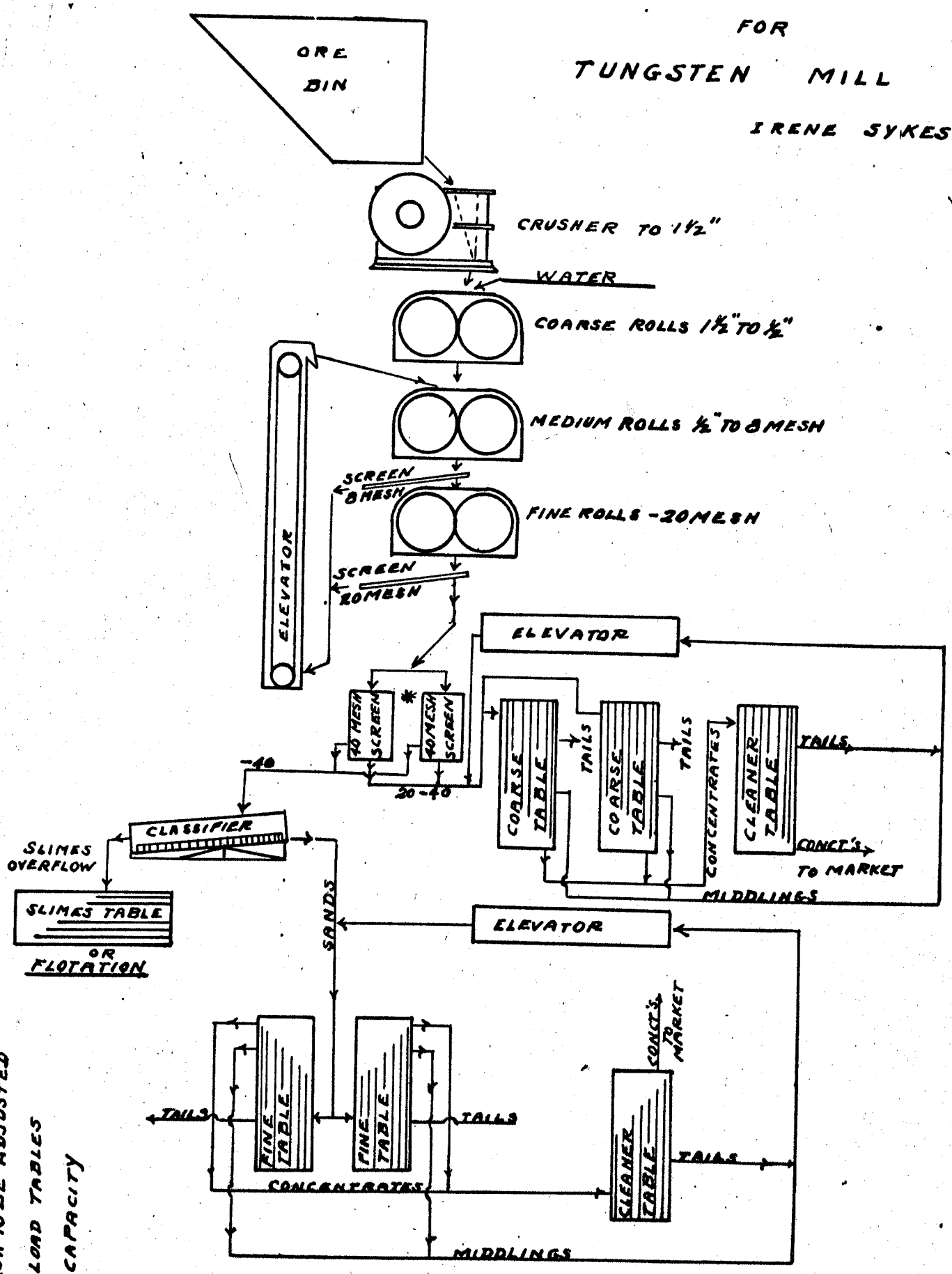
Harley A. Sill

Harley A. Sill
Consulting Engineer

Harley A. Sill
General Tungsten Company
Mina, Nevada

PROPOSED FLOW SHEET
FOR
TUNGSTEN MILL

IRENE SYKES



* MESH TO BE ADJUSTED TO LOAD TABLES TO CAPACITY

HARLEY A. SILL

CONSULTING ENGINEER

JAN. 8, 1952

METALLURGY

PRODUCT	Weight-Grams	% WO_3	Grams WO_3	% Total	
Recovered Heads	26,535	1.5 C	398	100.00	
Concentrates 10 - 20 mesh	690	5.24	36	9.00	
Middlings 10 - 20 mesh	2,440	.42	10	2.5	
Concentrates 20 - 40	435	45.24	196	49.5	
Middlings 20 - 40	1,540	3.25	50	12.5	
Concentrates 40 - 150 mesh	330	9.04	30	7.5	
Middlings 40 - 150 mesh	1,000	0.335	3	0.7	Recovery 81.2% Classifd Feed
Slimes	800	0.48	4	1.0	2.5% Slimes 91.2% Overall Recovery
Trough 150	2,620	1.60	42	10.5	
Tails	16,700	0.16	27	6.8	

F L O T A T I O N

Flotation Heads	494	1.33C	6.6	100	
Flotation Concentrates	103	5.3	5.5	83	
Flotation Tails	391	0.28	1.1	17	

Harley A. Sill
General Tungsten Company
Mina, Nevada

MILLING

The research on your metallurgical problem involving the recovery of tungsten from your Nevada scheelite property was based on a sample submitted by you. The analysis of the head sample was 1.44% WO_3. This is considerably higher than the normal ore subjected to beneficiation in milling the tungsten bearing areas of the United States. A study was made of the ore to determine its general characteristics before breaking it down for segregation of the tungsten from the accompanying gangue. Experience with the metallurgical treatment of scheelite ores from many different areas has established the fact that scheelite is inclined to shatter badly when subjected to grinding. Therefore, in our consideration of your problem the primary thought was to release the mineral without excessive grinding. Our secondary consideration was to apply the simplest metallurgy to the treatment of your ore and thus decrease the capital cost.

A study of your ore indicates two types of mineralization: (1) Tungsten occurring in veinlets associated with quartz or in fracture planes, (2) Tungsten disseminated through the matrix. The first of these ores could probably be subjected to jigging with a possible jigbed concentrate with the

Harley A. Gill
General Tungsten Company
Mina, Nevada

finer tungsten going into a hutch product for further concentration on Concentrating Tables. It is doubtful if the disseminated scheelite could be so treated. As I viewed your ore, the larger tonnage would occur as disseminations and, therefore, in my opinion, a jig may not serve a useful purpose in the recovery of the values from your ore.

With this thought as a premise for our research, your ore was crushed through a gyratory crusher to approximately 3/8" and then further reduced in a set of rolls through 10 mesh. The undersize from the rolls was screened through vibratory screens making three sizes -

(1) -10 + 20

(2) -20 + 40

(3) -40 + 150

(4) Slimes

These various products were removed as made to become a classified feed to the Concentrating Tables. The purpose of screening after the secondary crushing through the rolls was to remove all minus 10 mesh products as it was made and thus prevent, as much as possible, the over-grinding of the ore with its consequent fragmentation of the scheelite to a degree that would cause excessive losses in the subsequent beneficiation of the ore. The various sizes in the chart above were then tabled separately for the recovery of

Harley A. Gill
General Tungsten Company
Mina, Nevada

as much of the scheelite as possible in a concentrate with an accompanying middling for recrushing, and return to the circuit and the formation of a tailing to waste. The same procedure was followed in the subsequent classified feed of the other meshes. The tabling of the -10 plus 20 mesh indicated that there were occluded values in the coarser meshes. An analysis of this concentrate showed but slightly over 5% WO_3 indicating that the mass of the scheelite was in the finer meshes.

The second classified feed treated on the Table was -20 plus 40 mesh. The concentration of this product showed that the bulk of the values was in this range. A rougher concentrate was made which analyzed 45.24% WO_3. It is my opinion that this rougher product could be raised to at least 60% WO_3 by recleaning. We stressed recovery rather than grade of concentrate mainly because of the limited amount of products available for re-cleaning.

The third product fed to the Table was -40 plus 150 mesh. In this tabling some losses were made and were attributable to the fineness of the product. All of the sand tailings from the various classified tablings were collected into a combined tailing which analyzed 0.16%, equivalent to more than 90% recovery on these coarser sizes. The coarser feed from -10 to plus 20 mesh accounted in a

Harley A. Gill
General Tungsten Company
Mina, Nevada

considerable measure for this tailing content. Crushing all of the ore to -20 mesh would probably reduce tailing losses materially and increase recoveries.

The slimes were saved and floated with some additional recovery.

As a substitute for Flotation, Slime Tables could be installed for the recovery of the finer scheelite, although perhaps not so effectively.

After working with your ore it is my opinion that simple metallurgy could be applied to its treatment with a satisfactory over-all recovery of its tungsten values.

I suggest for your Flow Sheet -

(1) Stage crushing using either a gyratory or jaw type crusher followed by rolls as a secondary grinding medium.

(2) Vibratory screens in circuit with the rolls and the preparation of a classified feed of at least three sizes.

I furthermore suggest that all screen products as they pass 20 mesh to be eliminated from the grinding circuit and be tabled separately. All of the feed should be ground to -20 mesh. By eliminating the finer meshes by screening they will not be subjected to unnecessary grinding while the oversize is being brought down to the proper mesh.

Even with the use of rolls as a secondary grinder some Slimes will be made and they should be removed by

Harley A. Gill
General Tungsten Company
Mina, Nevada

classification and treated separately either by Flotation or Slime Tables.

I understand from you that you have purchased some used equipment in Reno as a nucleus for a mill. In looking over the list of equipment submitted by you, apparently all of this machinery could be utilized in the construction of a mill. No sizes are given for the crusher, or rolls, therefore I cannot determine the capacity of these grinding mediums. If they are large enough for 100 tons daily capacity you would have a good start toward an efficient mill.

If the method of beneficiation herein suggested is followed, you would have a mill involving simple metallurgy. With a feed crushed to -20 mesh by stage grinding together with vibratory screens and sufficient tables for efficient concentration. Thus a mill with a low capital investment could be anticipated.

In studying the list of machinery which you have submitted, the Blake type jaw crusher may not crush the roll feed sufficiently fine to produce a minus 20 mesh product without the use of a set of finishing rolls. This should be borne in mind in estimating necessary additions to the equipment you have acquired. Moreover, the condition of this

Harley A. Gill
General Tungsten Company
Mina, Nevada