

431289

Halifax, N. S. September 8th, 1934

53 - L - 13 - (11)

To Mr. R. B. Westaver  
President  
Indian Path Mines Limited  
Mahon Bay, N. S.

Dear Sir:

On August 29, 1934 I made an examination of the surface and underground workings of the Indian Path Mines Limited, in company of Messrs. R. B. Westaver and de Witt Foster. With Mr. Warren Waddell the Manager as guide, I went down No. 2 shaft on No. 1 vein. This vein dips north 79 degrees to the 70 foot level which has been driven east 40 feet. No. 1 vein lies on the hanging wall of the working belt and runs S.77°E, with a perceptible curve to the south at the east end of the drift, and a flattening of the dip from 79 degrees to 72 degrees. Corrugations on the hanging wall and rolls of the vein plunge to the east at an angle of 39 degrees. All these features indicate an anticlinal fold plunging east.

No. 1 vein consists of quartz through which are segregations of scheelite, with a small percentage of arsenopyrite and small showings of galena and pyrite in places.

In the crosscut south from No. 1 vein to No. 2 vein, and about halfway between the two veins, a saddle vein of quartz showing scheelite curves at the top of the cross-tunnel on the west wall and dips north and south, while on the east wall the same saddle vein occurs near the bottom of the crosscut where it curves into a smaller fold. This saddle vein gives the exact location, curve, direction and plunge of the crest of the anticlinal fold. The apex of the fold plunge east at an angle of 34 degrees.

No. 2 vein near the south end of the crosscut dips south about 60 degrees and in the east drift runs about N 63 degrees East with a decided curve to the north towards the nose of the anticlinal fold. The angle of convergence of the two veins is thus 103 degrees - 63 degrees - 40 degrees. No. 1 and No. 2 veins are probably the same vein forming a saddle about 60 feet east of the crosscut at the 70 foot level.

No. 2 vein has a good showing of scheelite with very little arsenopyrite, galena and pyrite.

The development has been made so far in the best possible way to show the geological structure of the rocks and saddle veins. The ore-shoots will plunge east at about the same angle as the plunge of the anticlinal fold, or a little steeper, and probably like the plunge of the corrugations and rolls on the walls, or about 39 degrees.

The best way to locate exactly the shape and length of the ore-shoot is to drift east on the two N. & S. dipping veins until they meet at the apex of the anticline, also to drift west on the two veins as far as pay-ore will show. The pay-ore will probably extend to, and be larger at the apex of the fold.

I would advise then to rise along the apex of the saddle vein towards the west, to the surface and eventually make this the main incline shaft down along the apex of the saddle vein plunging east, and run drifts westward on the two legs at different levels as you go down. This incline main shaft will keep in the ore all the way down, probably to a great depth. This system of development has proved very satisfactory on the Boston-Richardson saddle vein, the Scheelite synclinal vein at Moose River and the Libbey fissure vein at Brookfield Mines. (See Geographical Survey Memoir No. 20 now out of print (Not No. 156) "The Gold Fields of N. S." in the Scientific Library at N. S. T. College).

The seven bore-holes on the property and other pits to the west show that scheelite occurs in many other saddle veins underlying and overlying the No. 1 & No.2 veins-saddle now being worked. When this saddle has been well developed and its structure will, exposed, a detailed survey should be made of the whole property, showing all the geological features known, the bore holes and scheelite occurrences, pits, strikes, dips, etc. The structure of the rock south of the zone of development appears to become flatter as one goes south. When a good plan with detailed sections have been made, it will then be possible to determine the best system of development for production.

Yours very truly  
(Sgd) E. R. Faribault.

431289

518-L - 1300

MEMO

FROM J. P. MESSENGER

TO HON. MINISTER OF MINES.

RE: INDIAN PATH GOLD MINE

On May 31st, I visited INDIAN PATH GOLD MINE. I inspected the work on the 70 foot level, since my last visit the cross-cut had been extended south about another 10 feet making a total length of 70 feet. At 54 feet and 59 feet in this cross-cut there was 3 inches and 2 inches quartz veins respectively carrying considerable scheelite.

A drift has been started east which includes the above two veins. In the centre of the belt between the two quartz veins is a heavy deposit of iron and arsenic sulphide, some curly slate and quartz veins in which several eights of free gold were found. In the base of the raise driven to connect, at the base of No. 3 workings numerous angulars of quartz and scheelite have converged into a single quartz vein. This also carries some scheelite. On the whole this structure is showing quite regular where the crosscut is driven, and the scheelite showing is better than any other time in the history of the property.

JUNE 2, 1934

*J. P. Messenger*

Samples

	g/ton	oz @ 200
3" vein @ 54" in x cut —	0.01	— 0.20
2" " @ 59' " x " —	0.21	— 4.20
Iron sulphide sample —	0.01	— 0.20

assay by *J. F. Murphy*

431289

431

52-1-1000

Halifax, N.S., September 11, 1931

Box 330

Capt. Bartlett,  
c/o Mr. E. Hart Nichols,  
St. Paul Bldg.,  
Halifax, N.S.

Dear Capt. Bartlett:-

As I was about to reply to your wire I was informed by Mr. Nichols that you were en route to Halifax. I communicated with Mr. Ball earlier in the week regarding the location of No. 5 hole. This was selected during my last visit West of No. 4 and about in line with the small shaft West of the workings at the location of No. 4 hole.

Regarding the exhibition at Lunenburg I do not know what space you have available for this purpose, but in considering the problem to make it of general interest to everybody, I think the following exhibits would create the desired results:

1. Samples of high grade ore both large and small from the property.
2. Selection of some of the interesting core arranged in a nicely made core box with glass cover (samples of core can be marked so they can be replaced in their proper core boxes)
3. Samples of articles in which Tungsten is used -
  - (a) High speed tool steel.
  - (b) Electric lamp filament.
  - (c) Ignition contacts for autos - (replacing expensive platinum points)
  - (d) Phonograph needles - tungsten point.
  - (e) Steelite, a hard alloy of cobalt, chromium and tungsten used for heavy lathe work.
  - (f) Ferro-tungsten (made in electric furnace)

COLORS

Tungstic Acid	-	has a yellow color
" " Plus Barium	" "	white "
" " " Nickel	" "	light green color
" " " Chromium	" "	dark "
" " " Cobalt	" "	blue color.

Tungsten also used as a mordant in cloth industry.

I think samples of most of these can be obtained locally and information pertaining to same can be placed upon a card.

Yours very truly,



**J.P. Mansoury,  
DEPUTY INSPECTOR OF MINES.**

JPM:R

MEMO TO DEPUTY MINISTER

NE INDIAN PATH

On January 14th I visited Indian Path and found that No. 3 shaft, which started during my last visit, had reached a depth of 42 feet. The quartz stringers carrying the Scheelite on which the shaft was started are dipping slightly Southerly, and the bottom of the shaft is now completely in the footwall. Sufficient high grade Scheelite has been cobbled from the ore taken from the shaft to fill two small fish drums, and a sample of low grade ore weighing about five hundred tons was taken from the remainder to forward to Ottawa for metallurgical treatment. This sample contains quartz, scheelite, white rock and also some sulphides of iron.

Up to the time of my visit the water was handled with the bucket and during mild weather or storms consumes a lot of time. They are preparing to install a jack and pump to be operated by gasoline on the surface. When the shaft reaches fifty feet in depth a short drift will be driven West so the crosscut can be made both South and North.

*J. P. M.*

Halifax, N.S., January 22, 1932

431289

1931

53-11-1300

REPORT ON TESTS  
PROPERTY OF INDIAN PATH MINES LIMITED AT  
INDIAN PATH, BURNING CO., NOVA SCOTIA  
BY  
J.P. MESSERVEL, B.Sc.

## **LEXX**

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Tungstate

29

In the Indian Path, near the  
Lanenburg River, Lanenburg Co.

The Indian Path Scheelite occurrence is situated in Lanenburg County on the peninsula lying between Lanenburg Bay and the Labave River. It is about six miles South from the Town of Lanenburg on the road to Riverport.

Quartz veins containing the mineral Scheelite are found there in black ferruginous slate of the Halifax slate division of the Gold Bearing Series. The strata is folded into an anticline whose axis runs in an east - west direction. So far all discoveries and prospecting work has been confined to the north limb of the fold where the strata dips to the north at an angle of about eighty degrees.

The quartz veins are of the interstratified type and traverse the metamorphosed sediments. The quartz which is a primary filling contains segregations of Scheelite with small percentages of arsenopyrite, galena and pyrite with some visible gold - all of secondary origin. It is reported that several veins in the West end of the district were worked for gold as early as 1868, but the developments on Scheelite are of recent date.

#### MINERALOGY

The mineral Scheelite is a Tungstate of Calcium ( $\text{CaWO}_4$ ), and contains 80.6 percent of Tungsten Trioxide ( $\text{WO}_3$ ) and 19.4 percent of Lime ( $\text{CaO}$ ). It is brittle, has a hardness of 4.5-5 and Sp.G. of 5.9-6.1. It has a vitreous lustre and white streak. The color varies from white to yellowish, brownish and reddish.

The mineral is rather soft and easily scratched with a knife. A most notable character is the great weight, which is easily sensible to the hand if the specimens are not too small. This high specific gravity makes it easy to separate scheelite from other minerals or gangue which occur with it. It may thus be identified either in the miners' pan or on the Wilfley table, where it would otherwise be overlooked.

Scheelite is difficult to fuse below the blow pipe, but is easily soluble in hydrochloric acid, giving an abundant precipitate of the heavy yellow tungstic oxide. If a piece of zinc is added to the solution, the yellow powder soon changes to a deep blue color.

#### USES

Metallic Tungsten is used in the manufacture of filaments, contact points, parts of low-expansion glass apparatus, acid proof wire cloth, electric laboratory furnaces, phonograph needles, for impregnation and as a mordant in the cloth industry, etc.

High-speed steel, running as high as 18 to 25% of tungsten, continues to be one of most important tungsten alloys. Highspeed steel has two distinct features of superiority over common steels:

1. It will withstand higher temperatures without softening.
2. It is a better abrasive than carbon tool steel at ordinary temperatures.

There is an actual saving of 20 to 30% in power alone, when cutting hard steel with tungsten tool steel in place of ordinary carbon tool steel. 9 to 16% of Tungsten in steel makes it brittle, while 18 to 27% of Tungsten in steel makes it tough.

Tungsten Powder. For steel making purposes, Tungsten powder contains 95 to 98% of Metallic Tungsten.

Ferro-Tungsten. Practically the whole consumption of ferro-tungsten is used in the steel industry for the manufacture of high speed and other special steels. It contains from 70 to 85% of Metallic Tungsten.

Stellite, an alloy made at Niagara, Ont. is a strong competitor of the standard high-speed steels. It is composed of Cobalt 65%, chromium 15% and tungsten 20%. It is extremely hard, takes a good polish, and is stiffer than steel. It is used for cutting tools, saws, knives, and surgical instruments since it is not affected by organic acids.

Alloy, is a similar alloy, composed of nickel, chromium and tungsten, and is used for relay contacts in railway signals and for surgical instruments. An Alloy composed of copper 44%, nickel 50%, tungsten 4% and iron 2%, is practically unattacked by boiling concentrated sulphuric acid. The addition of 1% of tungsten to aluminum - cobalt alloys increases their tensile strength three times.

Platinoid is an alloy which can be used for many purposes as a substitute for platinum. Its composition is copper 60%, zinc 25%, nickel 14% and tungsten 1%. Its high melting point, great conductivity, hardness and cheapness make it superior to platinum for many electrical purposes. In addition to the above qualities, its low volatility renders it of great value in the manufacture of targets and filaments in X-Ray tubes. A very low current consumption is obtained with a tungsten filament in a lamp filled with nitrogen gas.

Certain magnet steels are manufactured which contain the following elements in addition to the iron: Cobalt 30% - 40%, Tungsten 5% - 9%, Chromium 1.5% - 3.0%. The higher the tungsten content, the weaker the magnet.

The following is the composition of a corrosion proof alloy commonly used in making chemical apparatus: Chromium - 60 parts; Nickel - 20 parts; Tungsten - 20 parts; Silicon - less than 1%; Carbon - less than 1%.

Tungsten trioxide is used to give a yellow color to glass and porcelain. Its chemical compounds with potassium and sodium form the "tungsten bronzes" used for decorative purposes. The sodium compounds form yellow, blue, red bronzes and the potassium compound forms magenta.

In the manufacture of other colors, tungsten is chemically combined with, -

- Barium - to produce a white color
- Nickel - to produce a light green color
- Chromium - to produce a dark green color
- Cobalt - to produce a blue color

DEVELOPMENTS

The first work was performed in the vicinity of No. 1 Shaft located in the western portion of the property (See attached plans No. 1 and 2). A large amount of trenching was done showing up a zone of slate carrying stringers of quartz and Scheelite and finally in 1927 a small prospect shaft was sunk to a depth of 30 feet to prove up the mineralization below the surface of bed rock.

In 1928 about 900 feet east of No. 1 shaft a large quartz boulder containing Scheelite was found. This was traced to its source by trenching and No. 2 shaft was eventually sunk to a depth of 75 feet at that point.

Another parallel rich showing of scheelite was opened up just south of No. 2 Shaft and at the time of writing has reached a depth of 30 feet.

DIAMOND DRILLING

Between June 17, 1931, and November 6th, 1931, seven diamond drill holes ranging from 60 to 230 feet in depth were drilled on the property. This amount was sufficient to prove the continuity of the structure over a distance of at least 1500 feet east and west and to a vertical depth of at least 160 feet. No. 2 plan gives the location and horizontal projection of the bore holes, and No. 3 plan shows graphically the zones in each hole where indications of Scheelite were found in the drill cores. The following are copies of the logs of the seven diamond drill holes: *can found on pages of this report.*

CONCLUSION

The work done so far is largely of a prospecting nature, but has proven the existence of, at least, two main ore zones ("pay chutes") which apparently dip to the eastward. In these zones some of the scheelite occurs in large segregations which can be hand-cobbed and picked as the ore is mined. To recover the balance a simple metallurgical treatment of grinding followed by water concentration will have to be used. The associated sulphides mentioned in the first part of this report would also be recovered along with the scheelite concentrates. These sulphides can be removed by either an electro-magnetic or electro-static separator, thus making a clean scheelite concentrate.

(2) I may mention here that the Tungsten Alloys Corporation, a subsidiary of North American Mines, Incorporated, of Boston, Mass., is operating a Scheelite property in Arizona. It is situated in the Las Guijas Range at an elevation of 3100 feet and located 63 miles by road southwest of Tuscon, Arizona, or about 25 miles from Amado Station on the Southern Pacific Railway. Their production is about 50 tons of ore per day averaging about 1 1/2 - 2% of Tungstic acid and the mill tailings analyse about 0.2% of Tungstic Acid.

The Indian Path property is well situated for shipment of concentrates by water either at the LaHave River or at Lunenburg Harbor.

(3) A transmission line of the hydro-electric system runs along the main road of the district about 1000 feet from No. 2 Shaft.

(2) No. 3 shaft has reached a depth of 42 feet. The quartz stringers carrying the scheelite on which the shaft was started are dipping slightly southerly, and the bottom of the shaft is now some feet in the footwall. Considerable high grade scheelite has been hand cobbled from the ore taken from this shaft.

431229

S 3-E = 1200

INDIAN PATH TUNGSTEN

We explored underground over a length of 300 ft. The diamond drilling under this section indicates approximately the same conditions as amount of scheelite as the drilling under the adjoining 700 ft. West. We can therefore assume, quite fairly, that these zones, or other similar zones extend over a total length of 1000 ft. These assumptions are further corroborated by shafts #3 and #4, in which the veins exposed still show scheelite as well as the adjacent dumps, where high-grade specimens were found.

Over the 300 ft. explored in the present workings two zones have been outlined having a total average width of 18 ft., at an indicated grade of 0.46% WO<sub>3</sub>. If these zones, or other zones, can be assumed from the diamond drilling to extend over the length of 1000 ft. a large tonnage above the 120 ft. level is indicated. This tonnage suggests a content of 720 tons of metallic tungsten.

A cost of \$43,000 is estimated as necessary to bring the property to production at 100 tons a day. Thereafter a cost of \$15,000 per month to produce, or treat, 100 tons per day, or 3000 tons per month.

Assuming a 60% recovery, or 0.28% WO<sub>3</sub> per ton treated, the return is \$5.60 per ton at present prices. The following margins, over and above mining and milling costs, can be expected:-

3000 tons at \$5.00/ton with WO <sub>3</sub> at \$20 per unit	the margin is 60¢ per ton.
" " " " " " " " \$25 " " " "	"\$2.00 " "
" " " " " " " " \$30 " " " "	"\$3.40 " "

These figures are based on the assumption that all ore mined will be of 0.46% grade and there is not much question that some of the rock mined will be lower, which may mean both selective development and mining. This fact, together with the probable short life of the property necessitates a reasonable margin being received over operating costs.

Recoveries will depend on grade of concentrate desired. For this reason we submit the following figures:-

For a 25% concentrate	\$30.00 per unit
40%	\$35.00
60%	\$40.00

1942

### INDIAN PATH

After a brief period of idleness work was resumed in February 1942, at Indian Path tungsten mine by Tungsten Mines Limited. The first work performed was the sinking of a three compartment vertical shaft on the south side of the anticline to a depth of 150 feet.

A station was cut at 130 feet from which a crosscut was driven 100 feet south to intersect the A and B zones. The drift on A zone was driven 70 feet east and 175 feet west from the crosscut. The drift on B zone was driven 15' east and 225 feet west from the crosscut. Stopes above this level were started away with sub-levels.

Shaft sinking was resumed in September when the vertical shaft was deepened an additional 100 feet.

A station was cut at the 230 foot level and a crosscut driven south a distance of 68.5 feet or a total of 91 feet from the shaft where it intersected the A zone. Two major faults dipping  $25^{\circ}$  south were intersected in the sinking of the shaft and the anticlinal axis was passed through in the 230 foot level crosscut at 62 feet from the shaft, giving a horizontal displacement south of 60 feet, since the axis dips about  $85^{\circ}$  south.

A total of 790 feet of crosscutting and drifting was performed in addition to 246 feet of shaft sinking and two stations 20 feet by 20 feet.

Buildings erected on the property consisted of blacksmith shop and steel sharpening shop, hoist house, compressor, change and First Aid house, dynamite storage, store warehouse, oil storage, chemical laboratory, crusher, stamp and concentrating buildings, office, cabin, cockhouse and dining hall, bunk house and boiler house to supply heat to above buildings.

The ore from the mine is dumped onto a grizzly, the oversize passes over a picking belt where the waste and large pieces of high grade is sorted out, and the balance falls into a 9" x 15" crusher, thence onto a conveyor belt where it joins the undersize from the grizzly. The belt discharges into a storage bin from whence the ore is fed automatically into 20 stamps.

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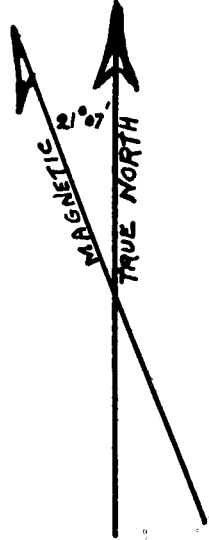
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NORTH BOUNDARY (3280')



2640'

1000'

N.E. Corner of Archibald Mill Runs Area Corner A2.A3. Block 3, 958, 959, LJO

Many old Trenches here. Large Quartz float showing gold  
Original Find Schaalite & Gold  
ANGULAR  
Mill Road (Approx. Not Surveyed)

No. 1. shaft 35' Deep MUCH schaalite

No. 2 Shaft 70' Deep  
No. 3 Shaft Rich Schaalite

Large Quartz Float

MINE ROAD

LUXEMBURG ROAD  
POWER LINE

MASON'S HOUSE

Block 3

4280'

- LEGEND —
- — Diamond Drill Hole
  - — Shaft or Pit
  - XXX — Trench

COPIED FROM SKETCH PLAN.  
OF E. W. MOORE, Nov. 1928.  
Showing additional information,  
as location of Boreholes,  
Nos. 2 & 3 shafts

Scale - 1" = 400 feet

J.P.M.

PLAN No. 1.

58-X-13

Dec. 1931.

Canada  
Department of Mines

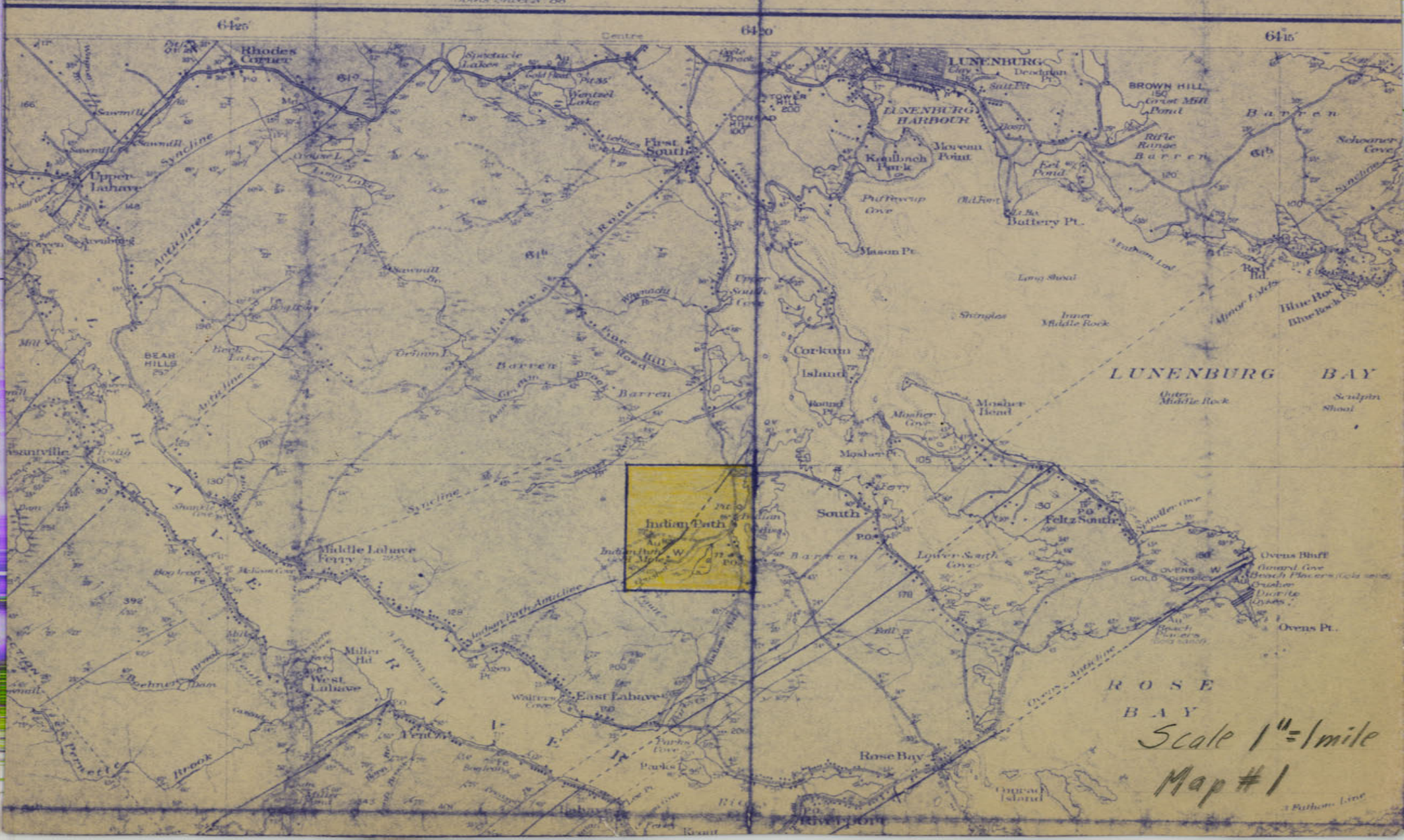
HON. CHARLES STEWART, MINISTER, CHARLES CAMSELL, DEPUTY MINISTER

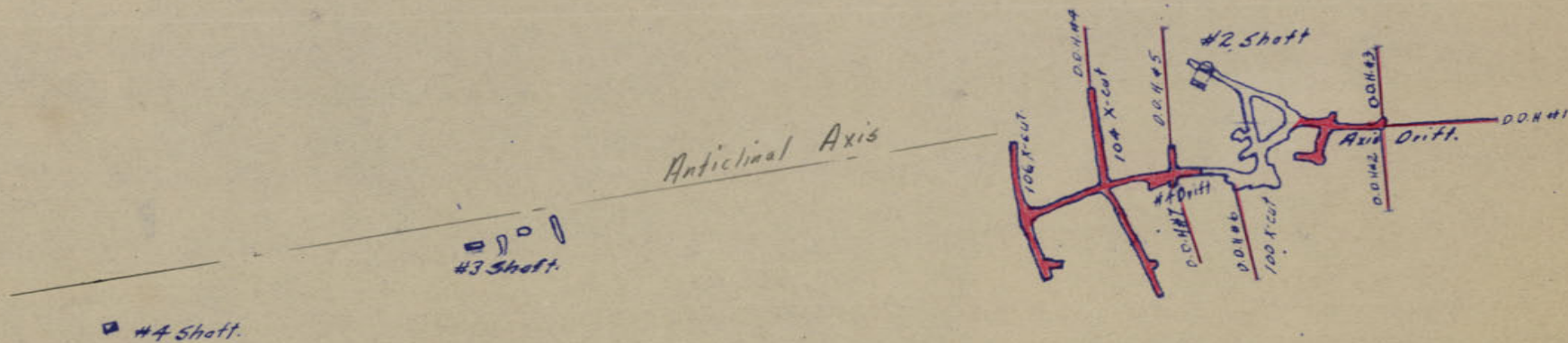
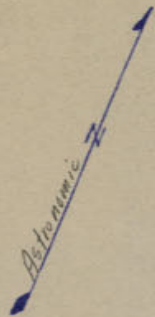
GEOLOGICAL SURVEY

W. H. COLLINS, DIRECTOR

Issued 1929

Map Sheet No. 88

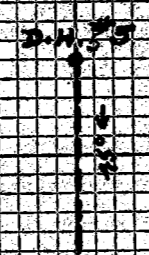




INDIAN PATH MINES  
Plan of 70ft. Level  
Scale 1in. ~ 150ft.

Map. #2

Blind hole



#1 shaft  
360 deg



#2 shaft  
D.H. 45

#3 shaft

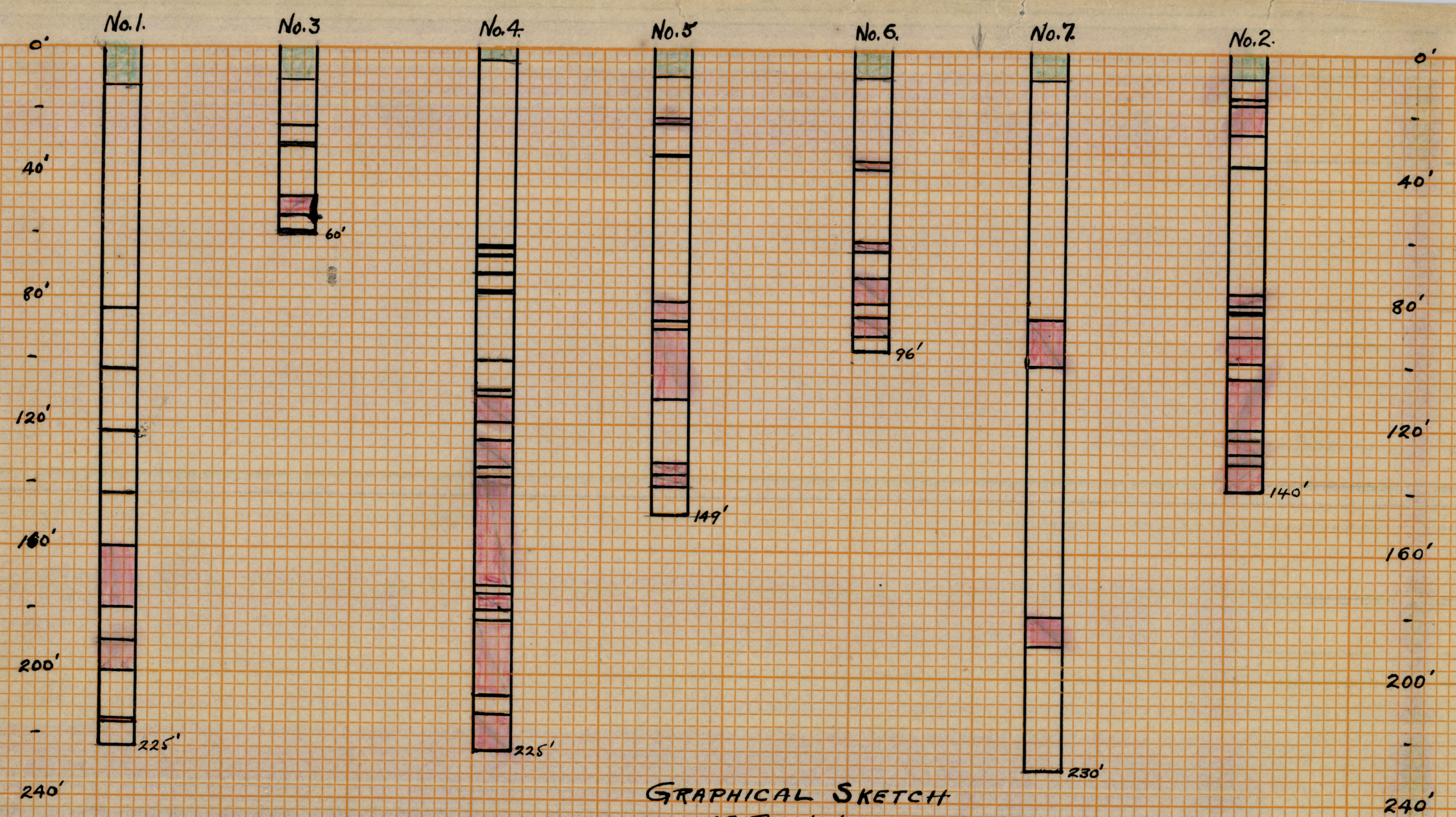
SKETCH PLAN  
showing  
LOCATION and HORIZONTAL PROJECTION  
of  
DIAMOND DRILL HOLES.

Scale 1" = 100 ft

J.F.M.  
Dec. 1931

PLAN No. 2

Bind here



GRAPHICAL SKETCH  
 OF Boreholes  
 SHOWING  
 Zones where Scheelite  
 was indicated.

SCALE 1" = 40 feet.

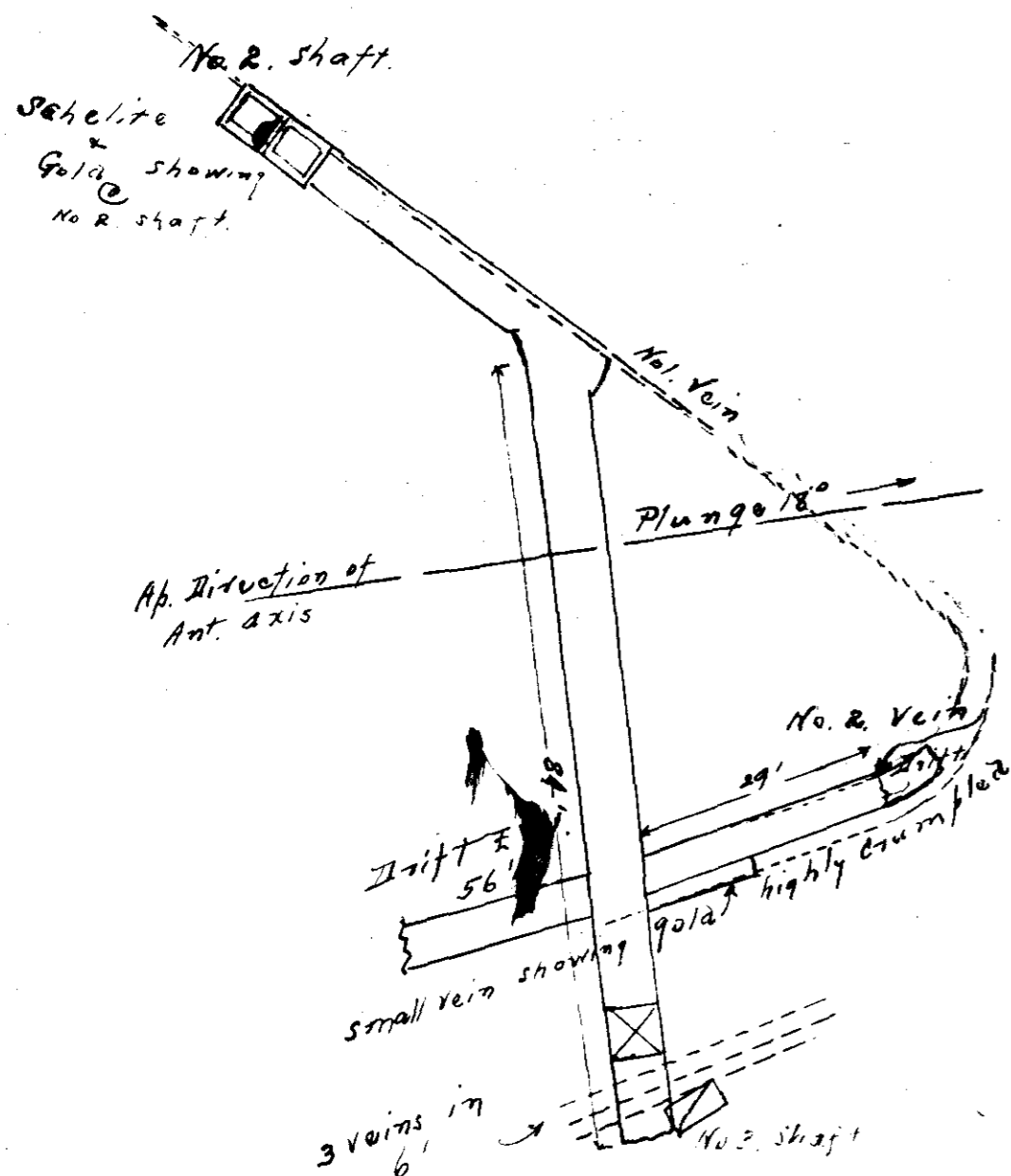
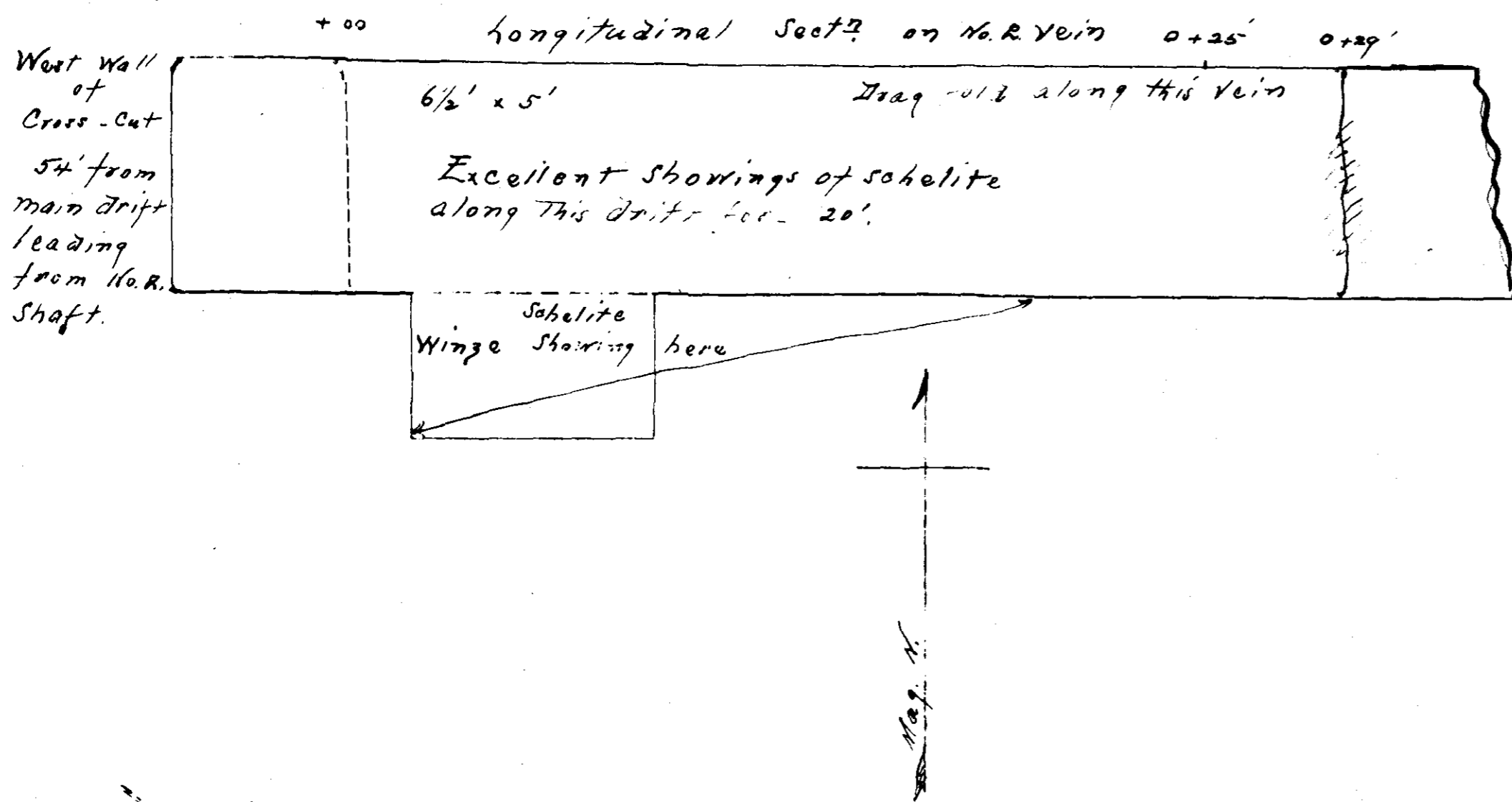
J.P.M.

- LEGEND -  
 Surface — [green box]  
 zone showing Scheelite — [pink box]

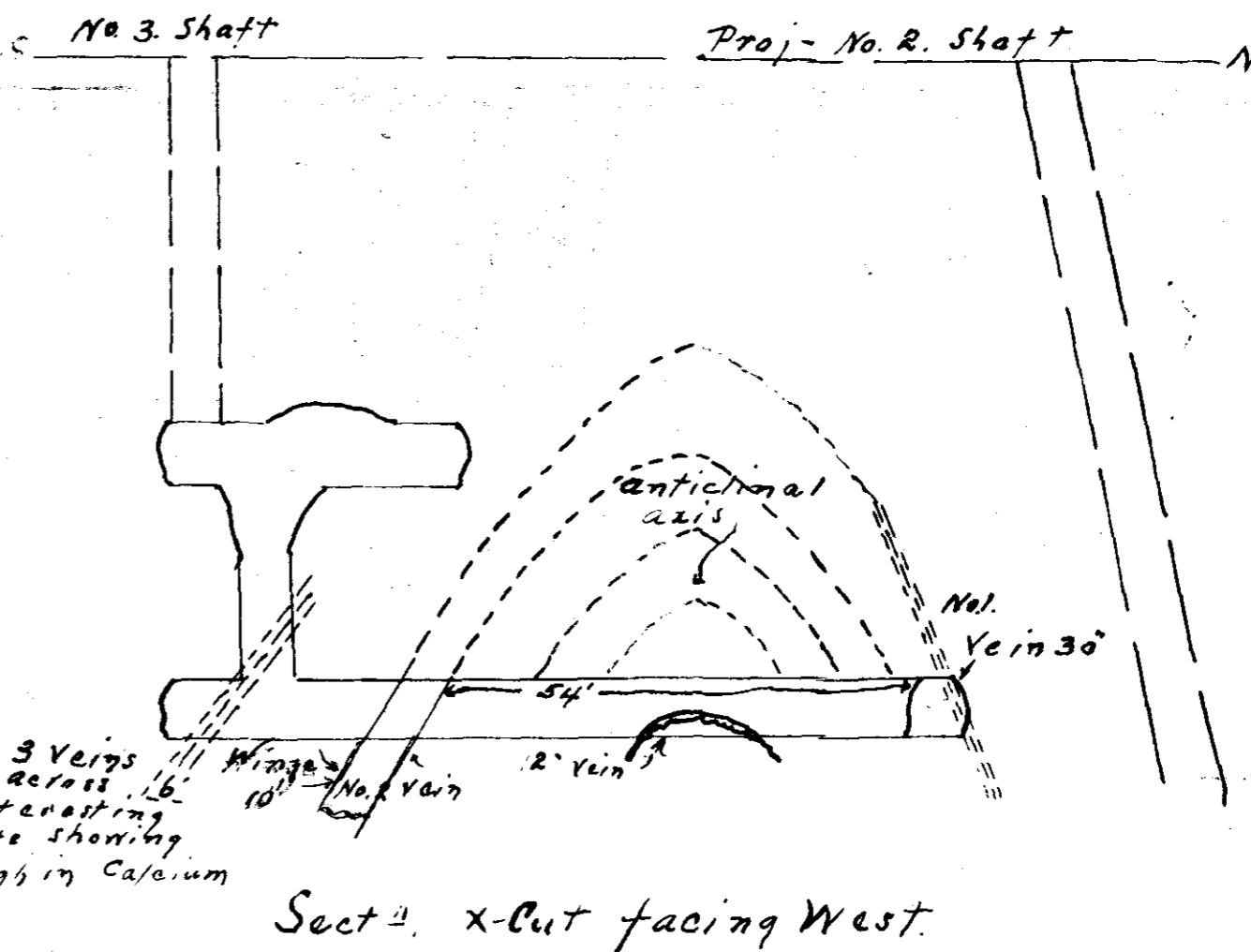
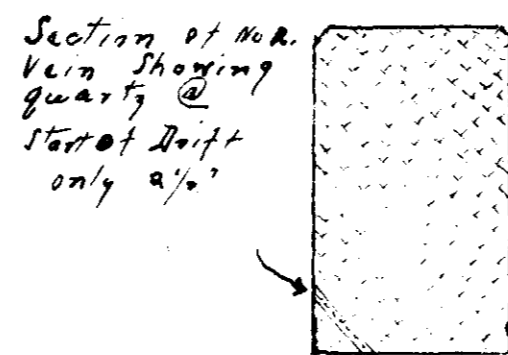
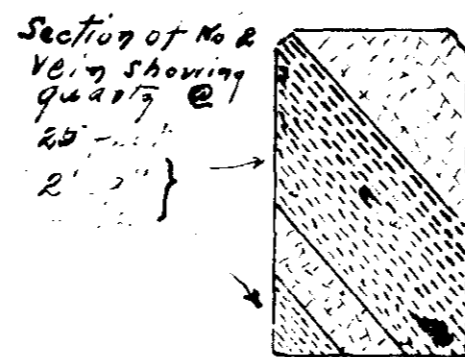
PLAN NO. 3

53-6-15

Indian Path Mines Ltd.  
Lunenburg Co. N.S.



Plan of 70' level.  
Scale - 1" = 20'



June 16-34  
W.W.

Plan to Jan 1-35  
Warren Macdell

000124

000124

Surface Plan Indian Path Mines  
 Transit survey by W.C. Offer M.E. 1934  
 all Bearings Magnetic  
 Scale 1 = 60  
 Norman Maddell

