MAR 19680028: WALDEN LAKE

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REPORT ON

SULPHIDE OCCURRENCE

WADLIN LAKE AREA,

Sec. 24, Twp. 100, Rge. 10 W5M

ALBERTA.

Prepared For

HUSKY OIL CANADA LTD.

By

W. J. HENNESSEY CONSULTING LTD.

And

GEORGE A. WILSON GEOLOGICAL CONSULTANTS LTD.

PART A

BY

W. J. HENNESSEY CONSULTING LTD.

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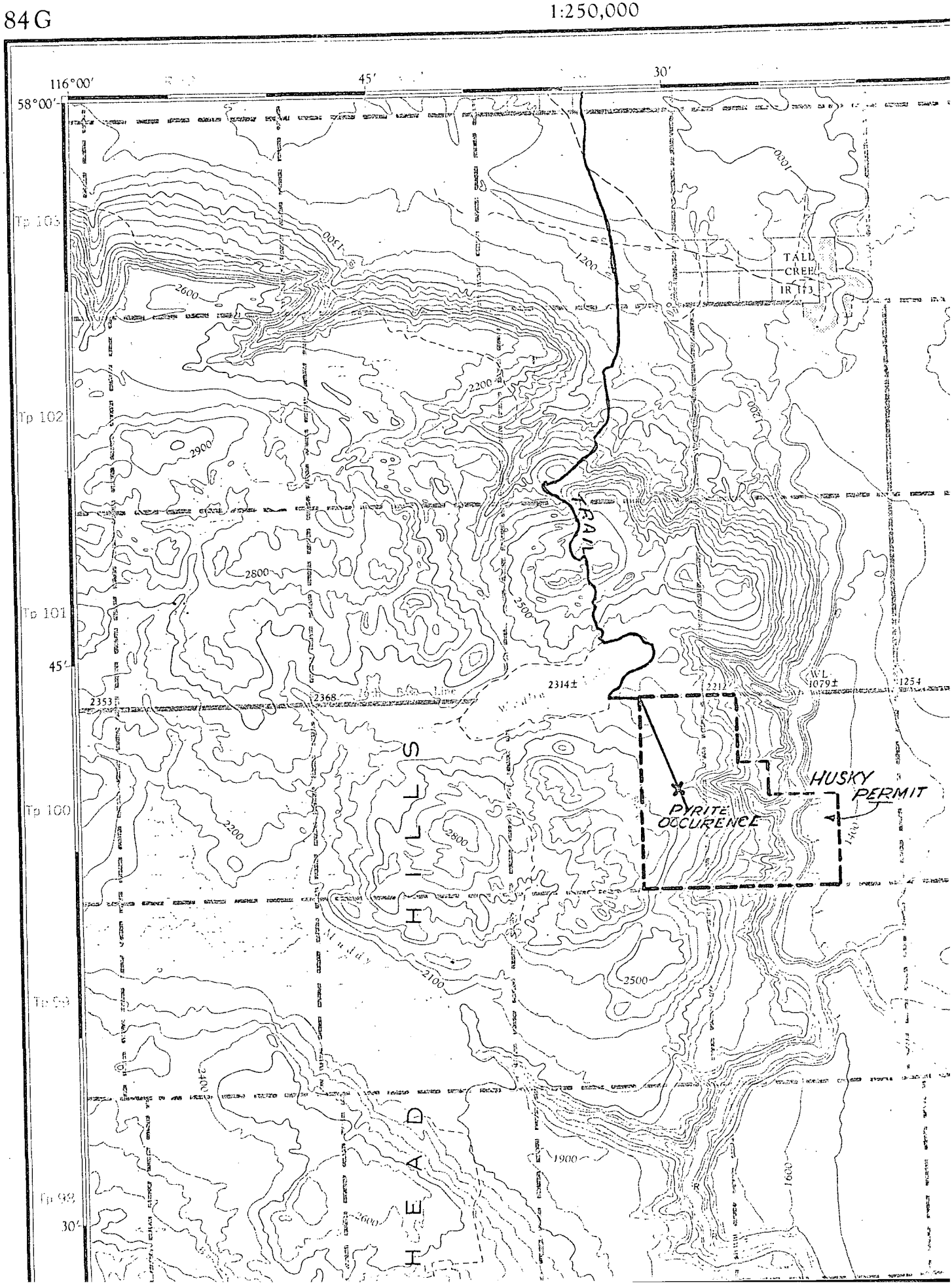

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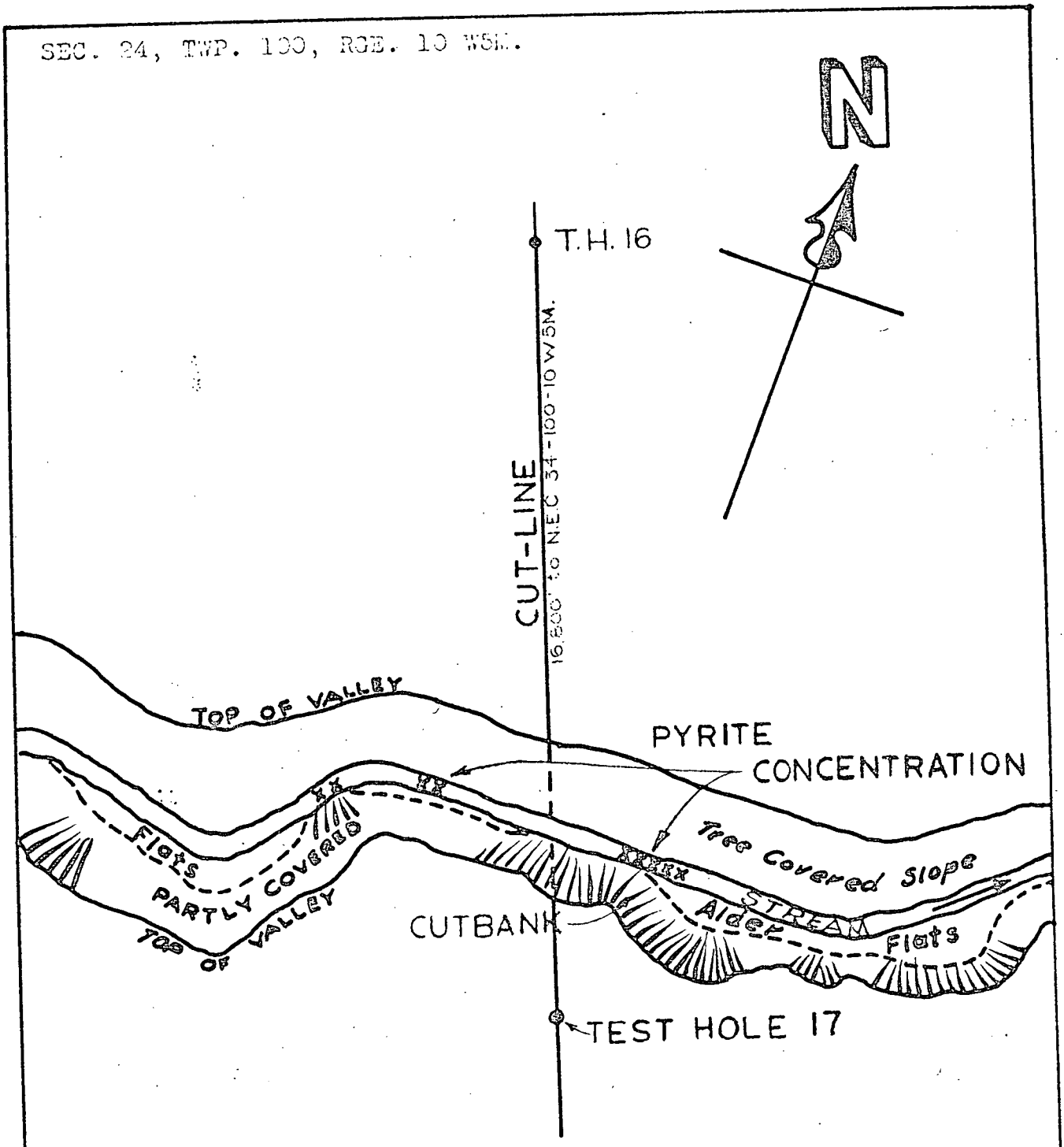


SKETCH MAP – Figure 1

SHOWING NATURE OF OCCURRENCE

SCALE

200' 100' 0 200'

(APPROX)

AUG 26, '68.

INTRODUCTION

During the drilling of a series of shallow test holes, a concentration of sulfide nodules was discovered in the bed of a small stream, tributary to Wabasca River, and located in Section 24, Township 100, Range 10 W5M. The original reports indicated that approximately 100 feet of mineralized ground was visible in the stream bank. Although the occurrence was suspected of being iron sulphide, it was deemed advisable to conduct further investigations.

On August 23, 1968, the writer, accompanied by Mr. George Wilson, P. Geol., went to Fort Vermilion, and were met by Mr. J. D. Fowlie of Sigma Explorations Ltd., and proceeded to the locality.

LOCATION

From Fort Vermilion, Alberta, a road is being constructed to the site of proposed lumbering operations in the Buffalo Head Hills. This road is usable by wheeled vehicles as far as Rat Creek, from whence a trail, usable only by Nodwell-type tracked vehicles continues to Wadlin Lake. The 26th Base Line intersects the trail on the south shore of Wadlin Lake. From the north-east corner of section 34, Township 100, Range 10 W5M, a cut-line is followed to the site in section 24, Township 100, Range 10 W5M. At the point where the cut-line intersects the stream, large shale cutbanks

→ Figure 1

occur. (See sketch map). The stream bed contains many concretionary boulders, and pyrite nodules can be found interspersed among them.

GEOLOGY

The local bedrock is a shale-sand sequence, of probable Lower Cretaceous age. The contact between the Upper Mannville and Lower Colorado strata is located nearby, but was not identified. It appears probable that the sulphide occurrence is in rocks situated near the top of the Upper Mannville group. At the location in question, a small stream has eroded through a series consisting mainly of soft, grey shale, with a minor amount of interbedded sand, friable and rusty stained, fine to medium grained, and clayey. Large concretionary nodules, up to 3 feet in diameter, are numerous, and form bands in the sequence. The concretions are usually bun-shaped, and consist of calcareous siltstone, containing coalified plant fragments, pyritized material, pyrite crystals and probably bone fragments.

Within the concretions, calcite filled shrinkage fractures are very common, and frequently exhibit "gypsum flower" structures on the fracture surfaces. Throughout the shale section, laths and crystals of selenite are common, and seem to be recently crystallized from circulating ground-water. The section is intermittently exposed over a vertical height of 50 to 100 feet, and

was investigated for a distance of about 1000 feet along the stream. The beds appear to be essentially flat-lying.

Traces of pyrite can be found throughout the section, but it appears to be more plentiful in the lower 25-30 feet of the bank. It occurs in the form of crystal aggregates, discrete crystals, and nodules disseminated through the shale. Along the stream, but especially at the cut-line crossing, the banks are undergoing slumping and creeping. The shale weathers very readily into mud, thereby assisting the process. As the slumped material enters the stream, the clay and sand particles are washed away, leaving a residue of concretions and pyrite in the stream bottom. Much evidence of washing of the banks was seen, and this is ascribed to a heavy rainfall which occurred just before the discovery was reported, and which probably aided in the concentration of pyrite by the stream. The amount of pyrite in the stream diminishes rapidly downstream from the cut-line crossing, but a fair amount is present for at least 300 feet upstream. The relative scarcity or abundance of pyrite in the water is most likely a function of the proximity of the stream to the base of the shale banks. It is uncertain whether or not the higher content of pyrite in the lower part of the banks is related to washing by rainfall, or to its actual presence within the rocks. In either case, the

average content of pyrite in the shale is only a fraction of one percent.

CONCLUSION

The presence of pyrite in Lower Cretaceous strata is a very common phenomenon. The unusual aspect of this occurrence is that it has been concentrated by washing in the bed of a small stream choked by concretionary boulders. The effect therefore, is that of a hydraulic placer mining operation. At present, possibly a few hundred pounds of pyrite could be hand-picked from the stream bottom. Unless analysis of the samples indicates the presence of valuable minerals, no further action should be undertaken.

W. J. HENNESSEY CONSULTING LTD.

[redacted]

W. J. Hennessey, P. Geol.

PART B

BY

GEORGE A. WILSON GEOLOGICAL CONSULTANTS LTD.

INTRODUCTION

At the request of Husky Oil Ltd., the writer, George A. Wilson of George A. Wilson Geological Consultants Ltd., and Mr. W. J. Hennessey of W. J. Hennessey Consulting Ltd. examined a pyrite occurrence located in Section 24 of Township 100, Range 10, W4th Meridian to determine its potential value.

The location of and access to the showing have been adequately described by Mr. W. J. Hennessey in Part A of this report and will not be repeated here.

The pyrite occurrence is in two parts. One consists of scattered nodules in the sediments dominantly shale, which form the banks of a gully thirty to forty feet deep. The other part is a type of residual placer deposit in the stream bed.

This description emphasizes the outcrops at the point where the picket line shown on the map following page 3 of Part A crosses the stream.

GEOLOGY

The sulphide occurrence is in a stream gully near the area where the stream commences its steep eastward descent from the upper level of the Buffalo Head Hills with an elevation approximating 2500 feet to the Wabasca River with an elevation less than 1100 feet, some four miles east. (See Map Part A)

Both the cross and long profiles of the stream indicate that it is a young one.

Bedrock in the area of the sulphide occurrence in Section 24, Township 100, Range 10, W4th consists of unconsolidated bentonitic and concretionary shales, siltstones and sandstones and combinations of them, probably in the lower part of the upper Cretaceous section.

Note; This view regarding the age of the succession differs from that of W. J. Hennessey who considers the section to be in the upper part of the lower Cretaceous. Microfossil studies of samples collected from shale and from concretions in place combined with subsurface mapping could establish the stratigraphic position of the strata with a fair degree of precision but it is questionable whether the cost of such a study is warranted.

The shales are dark grey to nearly black, soft and bentonitic. Some of the beds have remnants of plants in them. The siltstones and

George A. Wilson

sandstones are generally yellowish-grey to grey. Thickness ranges from a few inches to three feet. At the top of some of the sandstones there is a two inch layer rich in orange-brown iron hydroxides. Pyrite in cubes and clusters of cubes is abundant in all lithologies. Selenite crystals from 1/16 x 3/8" to 1/8 x 1/2" are common to abundant in the shales. All of the beds are soft and easily eroded.

The concretions are abundant in some silty and sandy layers. They range from three inches to three feet in diameter. Pyrite is an important constituent of some beds in the concretions. All broken concretions displayed abundant contraction fractures filled with calcite sometimes accompanied by radiating clusters of selenite or with voids left by the solution of selenite or gypsum crystals. Selenite crystals 1/16" in diameter projected as much as 1/4" from the weathered surfaces of some nodules. One nodule included fossil remains of gastropods, plant material, phosphatic (?) material, probably bone, as well as a cellular structure three inches wide which appeared to be the cross-section of a large bone.

Pyrite occurs throughout the section as small, cubic or pyritohedral crystals or clusters of them or as nodules from 1/8" subspherical to 2" x 1/4" and disc shaped. Some have a form reminiscent of replaced plants. Others could be the result of deposition in burrows. A few nodules appeared to have a faint banding suggestive of colloidal deposition. In all types the outer surface is covered with coarse euhedral crystals which probably grew by replacement of the host rock.

Pyrite nodules were not found in the upper ten feet of section. They occurred in twenty to thirty feet of section in the lower part but are most abundant in the lower ten feet. This is probably due to concentration by migration downslope during slumping and erosion. The pyrite comprises a fraction of one per cent of the section. Pyrite nodules form most of the finer material in the creek bed and in places pyrite from 1/16 to 2" across forms a layer up to two inches thick in the bed of the stream.

Similar occurrences of pyrite nodules were found in the creek bed and in the shales adjoining it for some two hundred feet upstream from the cat line but were not found more than two hundred feet downstream.

CONCLUSIONS.

A combination of slumping and erosion of the banks of the gully has carried shale pebbles and sand with pyrite nodules to the bed of the stream which had sufficient velocity and volume to remove sand and clay but insufficient to remove pyrite. These processes have resulted in the spectacular concentration of pyrite nodules with little economic value.

W. J. Hennessey has pointed out that a few hundred pounds of pyrite could be removed but that unless it proved to have a valuable mineral it has little economic value. It is my opinion that it would require a considerable proportion of valuable mineral to be present, and that is unlikely, for this pyrite occurrence to be valuable.

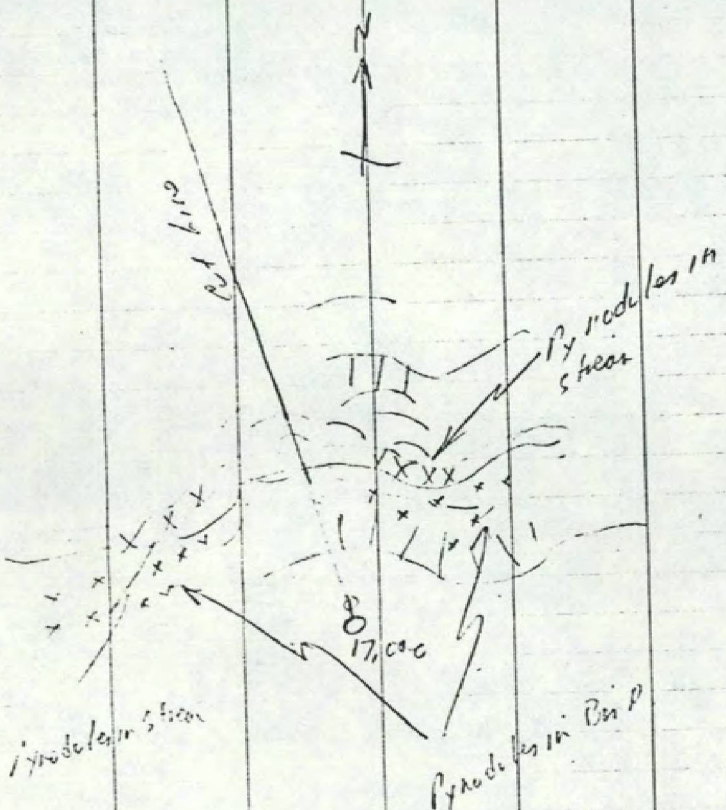
My conclusion is that the prospect does not merit additional activity.

[redacted]

George A. Wilson, P. Geol., Eng.
GEORGE A. WILSON GEOLOGICAL
CONSULTANTS LTD.

George A. Wilson

Pg 1



Scale approx 100' to 1"

Aug 24/68 Clear High O'cast
Left Camp Wadlin Lake.
Go east on base line
Set Alt 2425 @ high cr tat 9:20
Cr. Base Line & Picket line. 2420 9:30
Picket Line 155°. Line 12-3

East edge of [illegible] 2260' (Corrected 2250 11:25
Elev. Rock Bed 2180± 2220
([illegible] 30')

Rock bed [illegible] large calc concretions 3' - 3' generally with dolomite filled shrinkage cracks. Some concretions appear sandy but most do not. Some bedded some not bedded.

[illegible] mixture of soft black shale, calcite [illegible] irregular blocks.

[illegible] mostly slumped but partly [illegible] unconsolidated laterally & has slumped down [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Some sandstones have very rusty 2" layer at top.

Shale [illegible] selenite in crystals 1/8" x 1/32".

P 24 P 3.

Downstream other poor cut banks revealed no new occurrences.

Outcrop extends for 1000' ± upstream. Examined for 500' bank strata is similar. Concretions have ~~few~~ to more pyrnodules & scattered gypsum x'ls. Some shale beds just above concretion have horizontally radiating gypsum x'ls 1/16" x 3/8"

Pyrnodules are most are in lower 3' of bank. - Caused by stream erosion? or principle interval occurrence?

Line 12-3 at Base Line 2410 16:55
PIN XXXIV CX

High Point on Base Line (12-3 ... camp) 2400' 17:05

Wadley ... 2240' 1750

Poor Quality Original

Aug 24 P 2.

Frequency of occurrence of pyrite nodules shows moderate rate of decrease up to a level about 15' below top. From there up there are none.

Elev top bench 2220 (corrected 2780) aneroid 13:45
Specimen 1. From layer. 15' below top.

Specimen 2. From uncommon shale. 25' below top at extend.
Specimen 3 From concretion

2' broken concretion in stream bed contains arenaceous layers with traces Gastropod.? Lab (x15) shows frags to 2" D with internal cellular structure. Also has common pyrite ½" x 2" ⊥ beds + may be either in burrows or replaced plant material.

Result. Pyrite concretion or replacement clusters formed in calcareous concretion or in shale in bank. For a distance of about 150' along stream. The bank has slumped towards stream & has been eroded by stream leaving a concentration of pyrite concretions along stream bed. For about 150'

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