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NIFTY PROPERTY

INTRODUCTION

The Nifty property is along east side of Noosgulch River at latitude 52° 35' N, longitude 126° 25' W at elevation about 1200 meters on map sheet 93 B/9. The property is 15 miles north northeast of Hagensborg, where Trans West Helicopters have a base. A logging road extends from the main highway northward up the Noosgulch River to within four miles of the property.

The property is owned by Robert Dickinson and Murray McClaren and is under option to Pan Ocean Oil Ltd.

At the request of M. D. McInnis, of Pan Ocean Oil Ltd., J. R. Woodcock and T. Booth, assisted by two helpers spent eight days on a preliminary geological investigation. Most of the time was spent in mapping (Scale 1:500) the complex geology in the vicinity of the mineralization. Base stations were placed with a chain and compass and elevations established at each station to be used as a control for the geological mapping. The elevation at station 1 was arbitrarily set at 1200 meters. In addition, a small grid was placed across the trend of the mineralization to act as a control for geological mapping, soil sampling and some orientation Shootback EM work.

In their geological mapping Woodcock checked the rock types and measured distances with the aid of a hip chain while T. Booth put the data on the field map. At times this was done concurrently with the two assistants surveying control stations.

In order to facilitate reference to the geological map, several geological features have been named. These include three areas of gossan: Main Gossan, which includes the galena showing and the old adit; Central Gossan, which lies 70 meters northwest of Main Gossan and is separated from it by an area of considerable cover; and Northwest Gossan which is separated from Central Gossan by a cliff-forming dike system.

Three main dikes have also been named. These include "Andesite Dike", "Central Dike" and "Northwest Dike System". These names are marked on the geological map.

All rock types are field names only.

GENERAL GEOLOGY

Geological History

Before reviewing the details of the rock types and geology, one can summarize the main events of the geological history as follows:

1. Formation of an acid volcanic pile, apparently getting more acidic (whiter colour) near the top.

2. This has been cut by andesite feeder which enlarges upward and eventually expands into a volcanic area filling a basin on the southeast side of the acid volcanic pile.

3. Deposition of a pyrite-lithic lapillistone followed by a layer that contains barite and galena.

4. Faulting took place at some integral, probably after deposition of all of the lapillistone.

5. Subaqueous erosion removed any irregularities which may have been produced by the faulting.

6. Andesite dikes cut the underlying strata. These were probably feeders to the volcanics of intermediate composition which form the "caprock".

7. Faulting has placed some acid volcanics in juxtaposition with caprock units.

Rock Units

Four main rock units comprise the mapped volcanic strata. These include: (1) a base of interbedded acid and intermediate volcanics; (2) the acid volcanic pile; (3) porphyritic andesite which formed northeast of the acid volcanic pile and interfingered with the acid volcanics; and (4) the capping andesitic volcanics which rest on a disconformity above the underlying two rock units.

The Volcanic Base: The base on which the acid volcanic pile was deposited is a sequence of interbedded acid and intermediate volcanic rocks. These can be mapped in the forested area downslope from the Main Gossan. They can be traced from the gulley which exposes the Central Gossan, southeasterly to where they are intersected by the crosscutting andesite dike and related volcanics or to where they are obscured by very coarse rubble coming from these andesites.

The lowest horizon mapped is a dark green colour volcanic rock of intermediate composition, probably andesite. Much of it could be flow rock as the evidence of fragments is minimal. This has only been mapped in the east part of the area of investigation. It could probably be traced further to the southeast with more mapping.

Overlying the andesite horizon is a fine grained acid volcanic, generally grey or white and generally weathering to a white cherty appearance. This is similar to the lower strata within the acid volcanic pile; however the rock type does tend to get a darker colour with a greenish tint towards the northwest. It does contain lithic fragments up to two centimeters across. The matrix is possibly a tuffaceous rock.

Overlying the acid volcanic horizon and probably interlayered with it is a relatively coarse fragmental (fragments in the larger size of the tuff classification) characterized by a green colour. In places fragments of white chert are included and in places the fragments are epidotized. However, most of the green colour is probably due to chlorite. The chlorite or grey colour becomes more intense in a northwesterly direction.

A dark grey fine-grained volcanic rock occurs in several places within this lower sequence and also as a few thin layers within the acid volcanic pile. This is probably an andesite. In places it has been mapped as a separate unit or rock type.

The Acid Volcanic Pile: On the map, the acid volcanics have been divided into five units. Some of these are legitimate divisions where the relationships between the units can be determined in the field; in other cases such subdivisions include areas of acid volcanic rock whose relationship to the adjacent units is still unknown.

1. The white to light grey acid volcanic rock forming most of the Main Gossan and fingering southeastward into the andesitic volcanics has a very fine-grained matrix which is probably tuffaceous. It contains abundant disseminated pyrite and some obvious lithic fragments. In places the abundance of pyrite makes it a grey colour and in other places it has a greenish tint. However, throughout most of the units it is light grey to white and it generally weathers a white colour.

2. At the top of the white tuffaceous unit is a pyrite lapillistone in which abundant pyrite (some is as fragments) is mixed with white volcanic fragments and lapilli. Much of this highly pyritiferous rock has been separated out as a unit on the map; in other places areas of local disseminated pyrite are indicated with orange hachures. Under the hand lens much of the rock appears to be mainly pyrite; however its low specific gravity and its lack of conductivity indicates a very porous rock.

4. The bedded acid volcanics of Northwest Gossan, where examined, includes two types of strata. In one type, thinly bedded white-weathering fine-grained rock is interbedded with greenish grey beds generally less than ten centimeters thick. These thinly bedded zones are interbedded with more massive beds of fine-grained greyish green rock. The thinly bedded parts of this unit are very pyritic. This area of light coloured acid volcanics is separated from the acid volcanics of Central Gossan by a dike system.

Smaller areas of thinly bedded acid volcanics on the lower slope of Central Gossan have also been included within this unit. However, this second area of thinly bedded volcanics is bounded by minor faults and its correlation with acid volcanics of other areas is uncertain.

5. The upper parts of Central Gossan contain highly pyritic fragmental rock in direct contact with the overlying andesitic volcanic caprock. This changes downward into less pyritic acid volcanics. The change downward is somewhat irregular, partly due to minor faults which cut this gossan area.

Lying along the south side of Central Gossan is an area of acid volcanics which are very fine-grained, weather white, are generally grey to greenish grey on the fresh surface, and have relatively low pyrite content. These rocks have been mapped as a separate unit because their relationship to the other acid volcanic units is unknown, because they generally have a darker fresh surface and because they have a low pyrite content.

A fault bounds this unit on the northwest. A fault may separate this questionable unit from the acid volcanics of Main Gossan; however if such fault does exist, it cannot be mapped because of lack of exposures.

The Andesite Dike and Flows: Andesite which contains white feldspar phenocrysts occurs as a dike cutting the acid volcanics below the trail. This dike expands upward and changes to flow rock which fills a basin or a relatively low lying area on the east side of the acid volcanic pile. The rock type on the northwest part of this large mass of volcanic rock is similar to that found lower down in the dike. However, toward the southeast, (away from the dike) the volcanic rock becomes epidotized.

A small layer of pyritite acid volcanics appears to be completely interlayered with this andesitic volcanic horizon. However, whether this area of acid volcanics is actually an interlayer within the andesitic unit indicating continuing acid volcanism or whether its apparent interlayering is due to geometry is not known.

The Caprock: The capping andesitic volcanics may be underlain by a disconformity. Faults which cut through the acid volcanics of Central Gossan do not appear to displace the andesitic volcanics of the caprock. These faults may be very minor in displacement; however some of them have up to ten centimeters of gouge and some of them can be traced for tens of meters through the underlying acid volcanics.

Thus it appears that there has been erosion prior to deposition of the caprock. Such erosion had to be subaqueous. The caprock volcanics rest directly on pyrite lapillistone (e.g. at Central Gossan) and the pyrite lapillistone under the disconformity is not oxidized except for the small amount of oxidation induced by the present aerial exposure.

The lower 0.5 meters of the caprock overlying the pyrite lapillistone of Central Gossan is bleached. This probably indicates incorporation of some pyrite and formation of some acid during deposition.

Miscellaneous Andesitic Dikes: Several dikes of an andesitic composition (field identification) cut the acid volcanics; some of these acted as feeders for overlying andesitic volcanics. Most striking of these is the porphyritic andesite dike which expands drastically upward before it merges the large area of similar rock type which has been interpreted as a basin of andesitic lavas (see previous section).

Dark green andesitic dikes occur throughout the area, generally less than one meter thick. These are characterized by lack of pyrite and by presence of tension (or shrinkage) gashes. Central Dike is of similar rock type; however it is much thicker than normal. It cuts through the northwest part of Main Gossan. Galena mineralization has been mapped on both sides of this dike.

A dark coloured, possibly andesitic, porphyry dike forms the prominent cliffs of the Northwest Dike System. This dike rock merges with an enlarged area of similar volcanic rock at its lower end. Although this mass of rock at the lower end of the dike has been included within the same rock unit, more detailed mapping aided by thin section work might separate it from the dike rock as volcanic rock.

The Gossan Areas

As previously noted, the gossan areas have been differentiated and named for ease of reference. Main Gossan is coincident with the upper part of the white fine-grained acid volcanic pile. Much of this might be a pyrite-rich lapillistone. Pyrite fragments are mixed with lithic fragments or with barite fragments or with jasper fragments. In places the white rock is grey with abundance of fine-grained pyrite evenly distributed throughout.

The pyrite acid volcanics may interfinger with andesitic volcanics in a southeasterly direction. The boundary between the pyritic zones is arbitrary and generalized; closer studies will change the detail.

Central Gossan has extremely high pyrite content at the top. Obvious pyrite fragments are embedded in a pyrite-lithic matrix. High pyrite content changes sharply downward to lesser amounts of pyrite within the acid volcanic pile. In places, there may be sharp changes in pyrite content across small faults.

The relatively thinly bedded volcanics of Northwest Gossan contain considerable pyrite. All rock types, including the more massive greyish green beds, weather a very yellow colour. The yellow limonite is especially noticeable in the inaccessible vertical cliffs that extend up to the andesite caprock.

MINERALIZATION

The best galena mineralization is exposed in the benches south of Central Dike, near station 13. The mineralization may have an overall relationship to the bedding in this area; however in detail it is quite erratic. The same zone of lead mineralization occurs on north side of the andesite dike where it is exposed in a very small area between the talus below and the andesite caprock. Sparse chalcopyrite occurs with some of the galena and zinc analyses reported by M. McClaren indicate presence of light coloured sphalerite. Sparse galena also occurs in the "barite trench" with some barite-pyrite fragmental (between stations 16 and 17). Galena is also scattered throughout the acid volcanics just north of station 1 and it is exposed as a roughly banded mass (one meter by two meters) on the north end of the bench near station 3. This unusual occurrence might be a large boulder incorporated in the tuffaceous rock.

Some of the galena from the bench near station 13 develops a bluish tarnish on exposure.

Barite mineralization overlies or is associated with the galena on both sides of Central Dike and minor amounts are also found in the trench near station 14. Abundant pyrite, some of which appears to be a barite-pyrite fragmental occurs in the "barite trench", between stations 16 and 17. The most intense barite mineralization occurs in the trench at station 17 and in a pile of rock removed from the trench at station 18.

Jasper occurs in minor amounts above the barite mineralization south of Central Dike and as a mixture with pyrite in exposures at the head of a trench southwest of station 14.

The various types of mineralization occur in a zone near the top of the acid pile where they are associated with high pyrite zones. In some exposures a thin layer of acid volcanics lies above the mineralized zone, separating it from the overlying andesites of the caprock.

Mapping has shown that this mineralized zone and the enveloping pyritic volcanics probably forms a continuous zone which is not displaced by faulting. However, there is the possibility that erosion has cut into the zone north of and east of station 15 and that the overlying caprock volcanics project downward through the mineralized zone to rest on the underlying acid volcanics.

GEOLOGICAL STRUCTURE

The bedding attitudes taken in the acid volcanic pile of the Main Gossan, the mineralized zone, the underlying volcanic formations and the overlying caprock strike between 90° and 110° azimuth and dip between 40° and 50° northeast.

Attitudes taken on bedding in the Central Gossan zone generally strike east to northeast and dip 40° to 50° northwest. This indicates a change in a northwesterly direction; possibly across a fault.

Well bedded acid volcanic rock is exposed north of the Northwest Dike System. Bedding attitudes in this area are consistent, with dips between 40° and 50° northwest.

Several attitudes were taken away from the area of mineralization. One measurement on bedded pyrite zones along the creek west of Noosgulch River indicated a strike of 0° azimuth and a dip of 40° west. Another attitude taken higher on the mountain to the south of this same creek and west of Noosgulch River indicated a strike of 90° azimuth and a dip of 75° south. An attitude taken on some highly sheared and epidotized andesitic volcanics in the creek about one half mile below camp indicated a strike of 0° azimuth and a dip of 5° south.

Faults have been mapped in several places. There are several which cut and displace the Central Gossan area. Some of these place highly pyritic acid volcanics adjacent to slightly pyritic acid volcanics. The mapped fault lying along the east side of Central Gossan dips 55° southwest. This fault contains about ten centimeters of comminuted rock or gouge. Another small fault separates the so-called andesite porphyry from the acid volcanics. These faults, if they have had any displacement, must have produced an irregular surface and this irregular surface must have been removed by subaqueous erosion prior to deposition of the overlying andesitic caprock. The contact or the so-called "disconformity" does not appear to be offset by the little mapped faults.

A more important fault separates the Central Gossan from Northwest Gossan. This fault appears to juxtaposition andesitic caprock on the east with acid volcanics on the west. The porphyry dike has been injected along this fault system and now separates the two gossan areas and forms a conspicuous resistant ridge. The small sliver of pyritic acid volcanics which lies between the dike and the caprock andesites and appears to project upward into the caprock may be a sliver of the northwest block of bedded acidic volcanics. This interpretation is uncertain as the definitive exposures are on inaccessible cliffs.

The area between Main Gossan and Central Gossan is largely covered by vegetation and overburden. Possibly a fault occurs in this area to separate the small exposures of highly pyritic rock of the Main Gossan zone from the relatively low pyrite light grey fine-grained acid volcanics to the northwest. The map also shows a block of what appears to be andesitic caprock completely surrounded by faults. This vertical thin layer of andesitic rock may be a gravity slide from the caprock. However, other interpretations are possible (e.g. a dike).

Most of the apparent lateral discontinuities between acid volcanics of the Main Gossan and the adjacent andesitic volcanics to the east probably result from deposition in gulleys and basins.

GEOPHYSICAL WORK

Resistivity measurements with a multimeter show that the highly pyritic rock of the acid volcanic zone (called pyrite-lithic lapillistone) is non-conductive. In order to get any conductivity on this pyrite, both probes must be on the same crystal. This contrasts with the more massive areas of galena, especially the relatively coarse grained galena, where blocks of sulphide mineralization and rock exposures up to one meter across have fair conductivity. Thus, it appears that the electrical methods such as EM should be able to differentiate the galena sections from the pyritic sections if the galena bodies are of sufficient size and are close enough to the surface to be detected.

The grid lines and a line across the main galena showing (station 13) were tested with the Shootback EM equipment. Many small spurious anomalies resulted from the work done on rainy days; however when two of these lines were re-checked on a sunny day the anomalies were absent. No explanation is offered for this discrepancy. Experience has shown such discrepancies in other places, although not so numerous.

The conclusion is that the Shootback EM did not show any significant anomalies, probably because the size of the conductors within reach were too small. The topography rises at an angle of over 30° and the strata dip about 40° into the hill. Thus the distance to the potential contact increases sharply over the short horizontal distances to the northeast.

GEOCHEMICAL WORK

Four grid lines based at 75-meter intervals were slashed, blazed and ribboned and stations were established at the 25 meter horizontal distances along the lines. The slope changes were recorded and the approximate elevations calculated and these appear on a separate map. All soil samples taken at 25 meter spacing have been submitted to Vangeochem Lab Ltd. for zinc and lead analyses.

Where a good podsol has developed the rusty B horizon was sampled. On much of the steep slope, however, the soil of the A and the B horizons and talus has been mixed because of downslope creep. The resulting soil mixture varies from a greyish brown to a dark brown colour.

Rock chip samples of the acid volcanics were taken in several places and these have been submitted for geochemical analyses for copper, lead, zinc, and manganese. Also the better mineralized parts of the benches and trenches were chip sampled and the samples submitted for assays for lead, zinc and silver.

Rock specimens have been taken from many parts of the property and from many rock units and these are presently in storage at J. R. Woodcock Consultants Ltd. The locations are also shown on the sample number map.

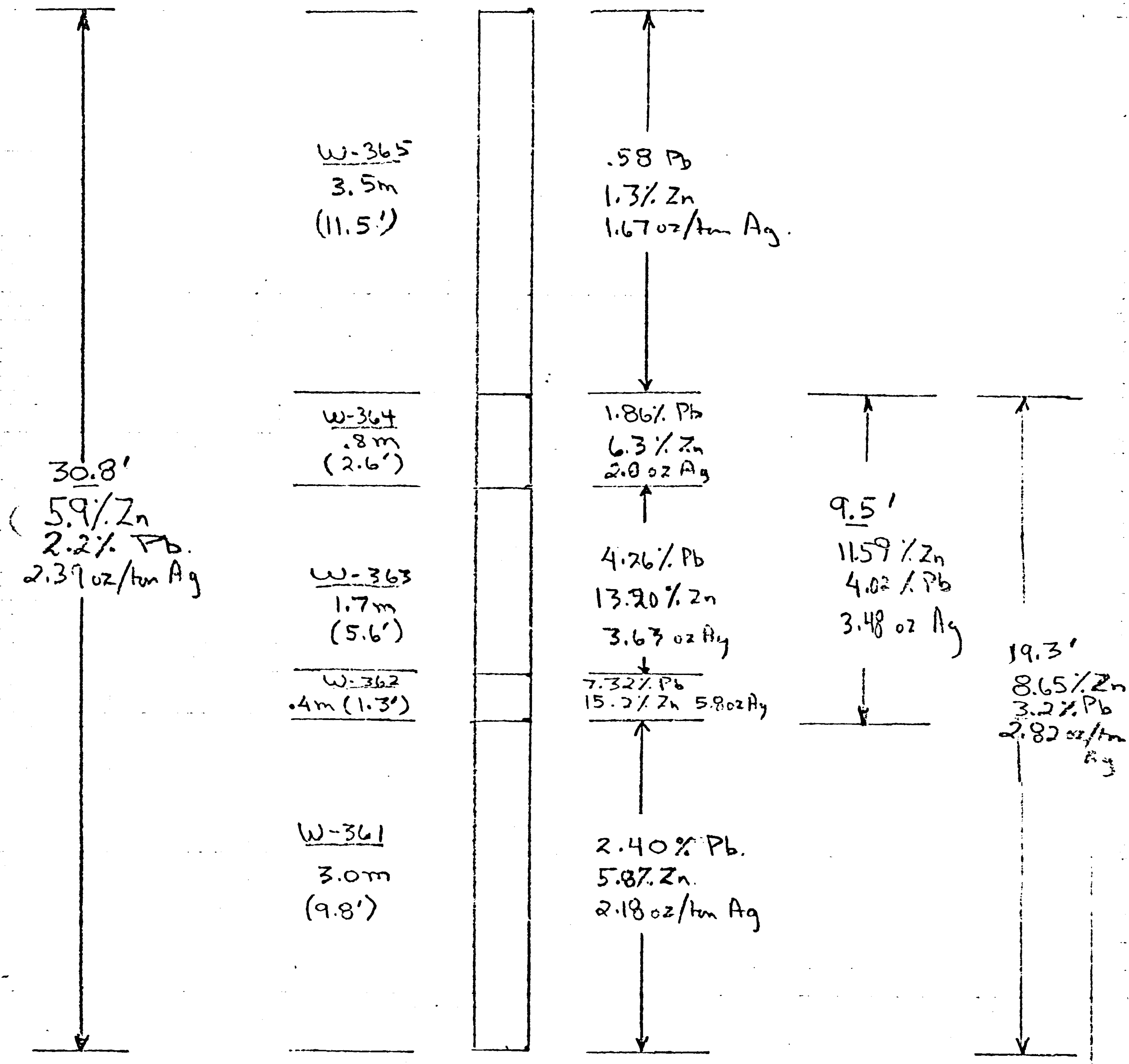
J. R. Woodcock

J. R. Woodcock

September 2, 1977

NIFTY

CHIP SAMPLING 'B'



CHIP SAMPLE 'A'

W 357
3.2m
(10.5')

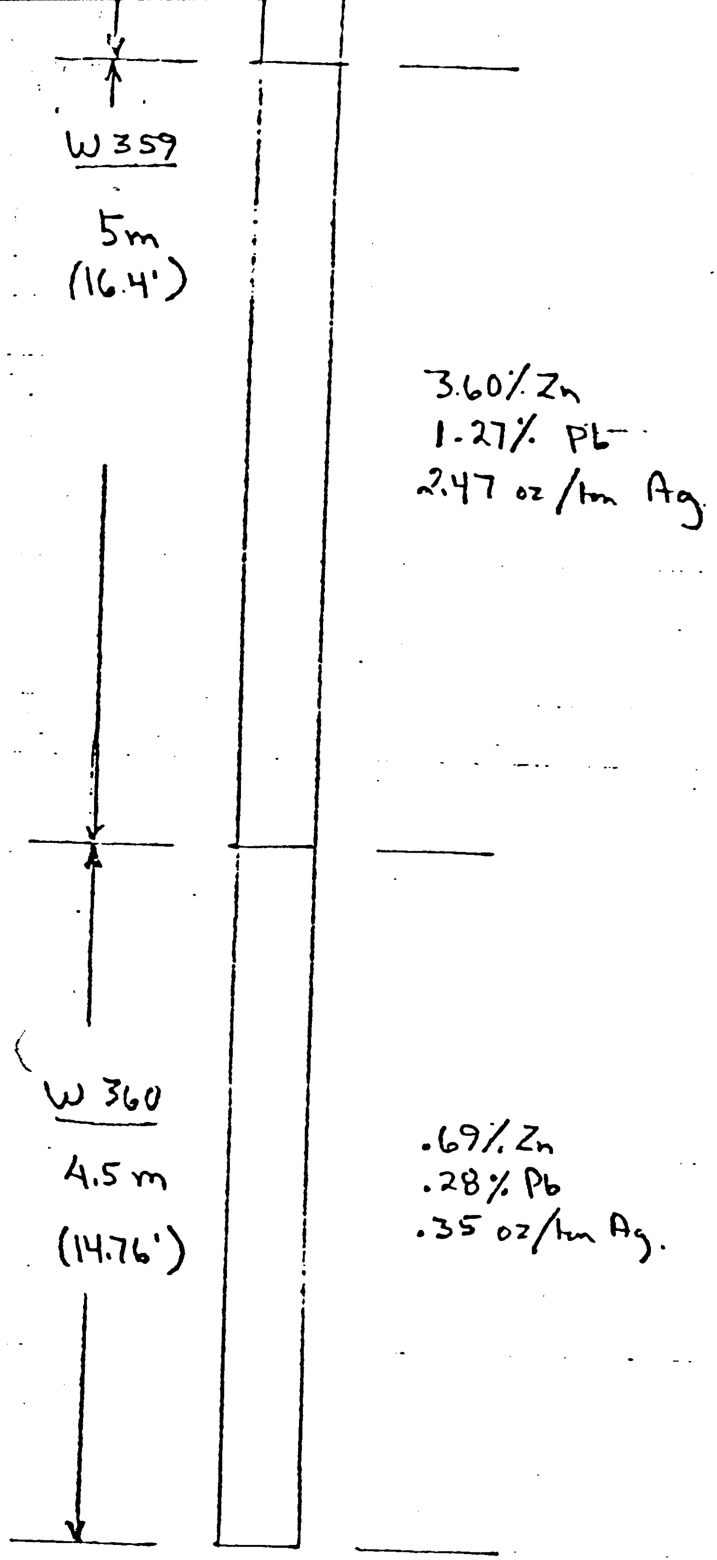
1.02% Zn
.29% Pb
8.70 oz/ton Ag.

W 358
3m
('9.84')

.4% Zn
.24% Pb
7.84 oz/ton Ag.

W 359
5m
(16.4')

3.60% Zn
1.27% Pb
2.47 oz/ton Ag.


W 359
5m
(16.4')
3.60% Zn
1.27% Pb
2.47 oz/ton Ag.
W 360
4.5 m
(14.76')
.69% Zn
.28% Pb
.35 oz/ton Ag.