W.A. No. .....

NAME Geol Rpt

SUBJECT .....

.....

.....

STANDARD

82FNW 180-07

PROPERTY FILE

002448

FOR DEPARTMENTAL USE ONLY

L49-117 No. 20.

2 prints to accompany this MSS.

82F/14W

82F/NW-60, 180

WESTERN EXPLORATION COMPANY, LTD.

Standard and Mammoth Mines.

This company bought both the Mammoth and Standard properties in 1928. In 1929 a new mill was built at Silverton and a 16,000-foot tramline built to the Mammoth, but in 1930 all work stopped. Lessees worked at the Standard off and on until 1937. Milling of Mammoth ore commenced in 1935 and continued until late in 1937, with one long shut-down in 1936. In 1937 and 1938 a number of the Standard workings were cleaned out and rehabilitated, and some exploratory development was done; in 1937 3,800 tons was put through the Mammoth mill.

The company recommenced operations in 1940, milling tailings reclaimed from Slocan Lake, and in the succeeding two years on ore from the two mines as well. Only a few thousand tons of tailings were milled in the spring of 1943, bringing the total recovered to about 130,000 tons, and in the latter part of the year all ore came from underground. Late in 1942 a contract was obtained with Metals Reserve Corporation for marketing of lead and zinc concentrates.

A.M. Ham is manager, Richard Avison mine superintendent, and C.C. Starr engineer and geologist.

STANDARD

This mine is on Emily Edith Creek, about 2 miles east of Silverton. Mining during the summer of 1943 was at the rate of 60 to 70 tons per day from the 6 and 5 levels, the only two accessible. Ore was hauled by truck and milled with that from

the Mammoth.

The company has opened up and reconditioned 6 and 5 levels and at the start of their work, in 1937-38, two sub-levels between 6 and 7 as well. Some exploratory development was done, chief of which was the extension of 6 level eastward for 970' beyond the 1937 face. Other development consisted of short drives for mining purposes. A good deal of diamond drilling has been done.

Mining is currently being done at several points between 6 and 5 levels, and a little above 5 level. One ore body on the east end, at and above 6 level was discovered by the present company, in new ground, but the bulk of the ore has come from the old workings, either parts of ore bodies which were left or new ore bodies which were formerly unrecognized but lay close to and between old workings.

The current operation is largely one of salvage, extracting remnants left by the former operators. These remnants were commonly zincy. In the course of this work, however, new ore has been encountered, and some of it is comparable in metal content to that mined in past years. At the same time the company is anxious to expand its horizons and is doing what exploratory work is possible under existing conditions, the most adverse of which is the scanty supply of labor.

Mining is by square set stoping for the most part, as the ground is bad. This is occasionally modified when heavy stulling is resorted to in sections of better ground. The work is very carefully watched and mining is never allowed to extend for any distance ahead of the timbering, particularly because

some stoping is done alongside old stopes and workings the outlines of which are never known with certainty.

Old plans and records have proved unreliable, as workings have been broken into when unexpected. This seems partly due to faulty surveys in the past and due also to the fact that leasers worked since the former operation. C.C. Starr is resurveying and checking what workings are accessible and is carrying a complete series of records of current work. Diamond drilling is done whenever desirable, and it seems likely that this present operation will completely mine out the lode in the general block of ground at present accessible.

The grade of ore is not known. The sampling records were not seen and production figures at year's end are combined with those of the Mammoth. The ore varies widely in metal content and not many faces at any one time are open to inspection.

Mining costs are at present high, running in the neighborhood of $6.00 per ton. They have been as low as $4.50 and the superintendent is confident that given more normal times he can mine ore for less than $5.00 per ton.

Tonnage estimates cannot be made. Ore bodies are irregular and are seldom if ever fully outlined prior to mining. All the management will and can say is that at the present scale of operation there is a year's mining ahead.

Geology and Mineralization

Cairnes in Memoir 184 has a good description of the Standard lode. The writer, in company with C.C. Starr, walked along the outcrop past the Alpha and Echo, and almost to the

Sandow. It appears likely, from scanty evidence, that the Standard and Alamo lodes are the same, and not the Standard and Idaho as believed by some. Workings are all inaccessible and open-cuts all sloughed in along the outcrop, and only sheared ground with some quartz and calcite stringers are to be seen. Outcrops are extremely few along the course of the lode except on the higher ridges.

Not much time was spent at the Standard, and the following remarks are based on a few observations plus ideas and information gained from Starr, who has given the various problems much serious time and thought.

The Big or Million Dollar stope is famous throughout the Slocan, and the factors governing its formation naturally form the subject of much interest. Cairnes states that it formed at the junction or split with the I vein, but Starr is not so sure that that is the whole story. The Big Stope persisted from near 3 level to below 6 and bore an outline that is suggestive of two coalescing ore bodies rather than a single one. Unfortunately the stope is all caved, as are some sections of drift, but there is an "eye" in the lode or rather in the main shearing of the lode that is probably important.

The I vein has been tentatively correlated with the Robin vein by Cairnes and others, but there is no proof of this, and on 6 level there is some doubt whether the I vein continues as a separate entity or swings back into the Standard lode. Starr has studied the surface in some detail, and has come to the conclusion that the Mammoth vein and Robin vein are probably the

same, but there is no evidence that the Robin vein joins the Standard lode as the I vein.

One generality of extreme importance, and a condition found in the vicinity of many stopes is that there is a series of splits from the lode which start as strong fissures, diverge to the southeast, then swing parallel to the lode and commonly tend to reconverge. These form "eyes" in the structure, either closed or open to the east, and the eastern end of the split is always weaker than the western. The I vein is only one member of a series of such splits, and while it is not known to converge and rejoin the main lode neither is it known to continue as a separate (branch) fissure or shear.

The lode is a broad, complex structure with the footwall the best defined of a number of shears. The footwall is commonly a shear zone of black, gougy material that may be 5 feet or more wide or there may be several such shears in a broader zone perhaps 20 or 30 feet wide. The hanging wall is definitely weaker and is not everywhere well-defined; it tends locally to be discontinuous and to jump on north-south jogs. In the body of the lode, which is 20 to 50 feet and more in width there are subparallel shears and slips. There are no marked or systematic "crossovers" or diagonal shears from foot to hanging, but rather the above-mentioned divergences from the footwall eastward that start strong and either play out to form an "uncompleted eye" or else reconverge weakly with the footwall or with the lode as a whole.

The rectangular jogs in the hanging wall are rectangular

on the west end of each and there is a curved section to the east acting to compensate. Some of these are the site of ore.

The pattern as a whole suggests the following, in the writer's opinion: The Standard lode is a normal fault with the hanging wall moving relatively down and east. This is the dominant direction of shearing. A subordinate direction of shearing is present in the branches and eyes, which form a weak and curved set of fissures, dipping steeply southward. A set of tensional fissures is locally developed and is expressed (in part) by the rectangular hanging-wall jogs. The picture os obscured by the fact that the lode is a broad zone of failure in incompetent rocks that are devoid of markers.

There is much dyke rock in the mine. No well-defined and continuous dykes are recognized, such as may be matched across individual fissures or across the lode as a whole. Rather there are masses of dyke the boundaries of which are so irregular that projection of them more than a few feet is impossible. There are also zones of dyke-argillite breccia. Whitish ribs and patches are seen in many places, grading into black argillites, and it is not always easy or possible to tell what is dyke-rock and what is bleached argillite. The surface of the ground is so heavily covered that no light is shed on the problem, but the impression is that here is a swarm of dykes, highly irregular in detail and probably interconnected and ramifying. Whether or not the presence of the dykes has any direct bearing on the occurrence of ore is not known.

Ore bodies form chiefly near the footwall, rarely in the footwall shear itself as local gobs, and commonly just above

it or separated from it by a few feet. Ore bodies are also distributed through the entire width of the lode and there are, on 5 level, 4 ore bodies in the plane of the lode, including that in the I vein.

There is no obvious rake to the ore bodies but, rather, they lie as irregular pod-like masses in the lode. In some the long axis of the pod is more or less horizontal, and this fact has made necessary the driving of several sub-levels at short vertical intervals.

According to Starr relatively steeper sections of the lode are in general the most favorable for the occurrence of ore bodies.

There is a tendency for the ore in the present stoping ground to be limited or bounded by slips which strike normal to the footwall of the lode and dip 45 to 80 degrees to the southwest. These slips do not offset the footwall but some do offset the hanging wall of the lode.

Bedding is only locally seen in the argillites and in only a very few places can it be definitely recognized. However, an impression is gained that might be important and is worth setting down even though the evidence for it is extremely scanty. In short, the present known zone of ore deposition appears to lie on or near a plunging synclinal roll in the major structure. The plunge of this synclinal roll is a bit flatter on the average, apparently, than the lode. This concept has not been substantiated by the few observable outcrops on this section of the property.

The two structural concepts put forward here, one of the

mechanics of rock failure along the course of the lode and the other of localization within the lode on an axis of folding, are unsupported by positive factual evidence, but it is felt that they form useful working hypotheses which should be of value even if not entirely correct.

Accompanying this report are two maps on a scale of 1 inch to 200 feet, one of the Standard, Alpha and Echo levels and the other of the lode and ore bodies where they can be plotted. These maps were compiled in 1943 by C.C. Starr.

MAMMOTH

The Mammoth is at an elevation of about 5,000 feet on the steep northern valley wall of Silverton Creek. A steep road leads to it from the Standard, and a tramline extends from No. 7 adit to the mill at Silverton..

The hillside is subject to many snow slides, and winter is not exactly pleasant. The road becomes blocked and the camp is surrounded by live slides. The tramline is not used for transporting men, and in most winters the property has been shut down. It is believed that the winter of 1942-3 was the only one during which operation was continuous.

The vein dips 45 degrees southward, a little more steeply than the hillside, and has been opened by 5 adits between elevations of 5,028 and 5,809 feet. There are 7 levels, apart from some surface work, including short adits. The vein has been developed underground for a maximum length (on No. 7 level) of 920 feet. Ore is developed in 4 ore bodies on Nos. 2, 3 and 4 levels for an average aggregate length of about 400 feet. These ore bodies are from 3 to 10 feet wide and are normal examples of

Slocan vein deposits. Between Nos. 5 and 7 levels there is one pipe-like ore body from about 25 to 70 feet wide and 90 to 190 feet long. The upper limit of this ore body is somewhere between Nos. 5 and 4 levels.

All known ore is mined out above No. 4 with the exception of some ore above No. 2 that is too badly oxidized to mill. One block of ore remains above No. 5, on which stoping has begun. This is on a "normal" section of the vein. A former stope on the large ore body was lost about 40 feet above 5, but some attempt may be made to reclaim it. Almost the entire output comes from stopes above Nos. 6 and 7 levels.

Production during the latter part of 1943 was 75 to 80 tons per day. Stoping is by square set in the big ore body and, due to the badly sheared nature of the ground, great care has to be taken. In the upper levels heavy stulling was found to give sufficient support, and many sections are still open after 6 or 7 years.

The grade of ore is not known. Assay records were not seen, and the ground is so tightly timbered that little or no ore can be seen in place.

Mining costs are reported to have been as low as $4.30 per ton, and could be held at about that figure under more normal and efficient operating conditions.

A careful record of all geological data is kept by Starr, including geological floor plans of the square set stopes. No development is being done, although an 8th level is contemplated for the future.

Geology

Only one day was spent on the property, so the writer has nothing to add to Cairnes' description in Memoir 184. Cairnes stresses the fact that the structures in this section are complex and Starr, who has done more detailed work, substantiates this opinion.

The writer gained one impression of the localization of mineralization that he cannot substantiate, but the impression was so strong that it is worth while putting forward. The Mammoth ore zone appears to be localized on a fold in the sedimentary structure. This seems to be more of a bend or flexure than a syncline or anticline, as no symmetry is indicated. It forms a zone of weakness and crumpling along which the large pipe-like ore body was formed. The ore zone plunges down the dip at about 45 degrees, roughly conforming, in spite of irregularities, with the structure. Bedding can rarely be positively identified anywhere in the mine except in the No. 7 adit crosscut, but the general impression gained is one worth considering and worth making some effort, underground and on the surface, to prove.

Following the same line of reasoning the apparent fact is that ore bodies tend to occur in veins in this section beneath ridges and not beneath gulleys. If this is true, and obviously the present surface can have had no effect on the formation of ore, it is not a far cry to suggest that same factors of structure which have localized ore deposition have also locally influenced erosion, i.e., local topography to some degree outlines local structures. The concept is vague but interesting, that ore deposits are related

to topography through the influence of sedimentary structures. The writer believes that this is partly so, but is ready to admit that proof would be difficult. It is, however, a view not generally held and one that might be of great benefit to exploration in some sections of the camp.

Reserves and future

No tonnage estimates can be made. The large ore body is made up of individual masses of lead and zinc whose distribution and overall extent vary from floor to floor in the stopes. It seems evident only that mining under conditions such as the present (75-80 tons per day) will continue for at least a year from October, 1943. After that, although remnants might be left, further development is called for.

Seemingly the only possible development is to drive a new level at say 150 feet below No. 7. This will have to be by winze because an adit, below the tram terminal, would be at a focus of snow slides. An adit could be driven in summer to provide drainage, and a raise be driven for mining, or else a large bore-hole could be drilled for drainage and the level be driven from a winze.

Another course of development could take the form of detailed surface investigation on the course of the vein. The ridge crests are heavily timbered and covered with overburden but trenching, and ground sluicing in the spring might disclose another ore zone. The present ore zone was found as a result of such work.

February 1st, 1944.

M. S. Hedley