PRELIMINARY REPORT

on

OCEANA MINE

General Statement:

The Oceana lode was discovered in 1890 when the country near Zeehan was over-run with prospectors sent there by local and Mainland investors. At that time the valleys and hills of the district were searched for outcrops with a thoroughness that has never since been equalled, and the prominent outcrop of this ore-body did not escape notice. It projected through the containing limestone about six feet above the general level of the flat button grass country and was an outstanding landmark in an otherwise feature-less area.

During the early stages of the development of these ore-bodies the Argenton Smelting Company erected their works at the Oceana Siding of Zeehan - Strahan Railway about 1½ miles from the mine and the two were connected by tramway. To these Smelters the Oceana Company delivered 40 tons of ore (ferro-manganese oxide and cerussite) daily until the failure of the Argenton Company owing to lack of sufficient capital to enable them to buy ore outright and smelt it at their convenience. The loss of that market for the oxidised ores compelled the mining company to direct attention to the sulphide or galena sphalerite sections of the lodes. In order to reach and attack them at depth a main shaft was sunk 145 feet and crosscuts were driven westward to intersect them. Unfortunately the machinery was erected over a vugh, the limestone roof of which giving way under the vibrating heavy burden brought about the collapse of the upper portion (40 feet) of the shaft. After many futile attempts to repair the damage the Company, discouraged and near the end of their resources, decided to cease operations. This disaster following the other trials, led inevitably to the dissolution of the Company.

Since that day the mine has been worked by successive parties of miners who, from shallow levels, have removed large quantities of zinc - lead ore of fairly high grade. The present lessees, not possessing sufficient capital to enable them to erect the necessary machinery to reopen the deeper levels, have endeavoured to carry on mining through adit openings a few feet below surface. They, in turn, have reached the limits of their resources and are unable to continue effective developments.

As the ore-bodies in the superficial workings only are open for examination, this report is of necessity an incomplete account; yet the information it contains, though limited to the results of ocular observation at surface and deduction therefrom, should prove of considerable interest and become helpful in the design of future operations. The accompanying plan will convey an idea of the relative positions of the workings and of the outline of the ore-bodies.

Production:

Regular production by the original company

commenced and finished with the period of operation of the Argenton Smelting Company.

During that period, as already stated, an output of 40tons daily was maintained. Although it is known that many thousand pounds worth of ore has been produced since that time no authentic records have been kept of that output.

Area, Situation and Access:

Two mineral leases (7837/M and 7559/M) each of 10 acres, and a 5 acre lease (9972/M), charted in the names of E. St. Clair, D. Mather and B. Grabe respectively comprise the holdings of the party. The situation of the mine at the southern end of Zeehan Field, within half a mile of the Electrolytic Zinc Co.'s works and a quarter-mile of Austral Siding of Zeehan-Strahan Railway is convenient both as regards transport and marketing. On the tramway route to Austral Siding the surmounting of an intervening hill is a difficulty; therefore, the old tramway route to Oceana Siding, being of easy down-grade all the way, may prove to be the better.

Geological Relations:

The ore-bodies are contained in the limestone member of the Silurian formation the base of which is marked by deep beds of West Coast Range Conglomerate which here forms the mass of Mt. Zeehan. As seen here the succession is: West Coast Range Conglomerate, Tubicular sandstone, limestone, slates (black and grey), younger sandstones, and younger limestones. The lower bed of limestones is that occupying the Oceana Flat and extending southward through the Pyramid leases. Northward the limestones abuts the conglomerate of north Oceans Hill and reappears eastward at Coate's Mine. It is evident that the north end of the flat marks the position of a great fault where the country south of the hill has been heaved to the westward and has brought the limestone and Aubicular sandstone into juxtaposition with the conglomerates. This fault is marked by the course of the upper reach of Oceana Creek and trends in a direction north 60° east. The main ridge of Mt. Zeehan marks the line of axis of a dislocated anticline the southern extension of which appears in Professor Range.

The structural relations of the several members of the Silurian formation represented in this area are of particular interest in connection with the occurrence of the ore-bodies; therefore, a correct interpretation is of the first importance. On the evidence at hand it appears that the major faulting is contemporary with the fissuring and, therefore, pre mineral, and both are epi-Devonian. This is clearly shown in the north Oceana workings where mineralisation extends into the conglomerate and sandstone beyond the fault. The line of lode fissuring (north 30° west) is normal so that of the line of fault (north 60° east). If ore is found in the sandstone north of the fault it will prove of much higher silver content than that on the south side in limestone. However, it is unlikely that ore-bodies of commercial importance will be found there. It is probable that ores will be found as

infillings of the fault fissure and they may be very extensive and especially wide at the limestome contact. In fact along that line it is known that a very large body of gossan (after mangano-siderite) is present.

In the limestone country the lodes dip north north-east at an average angle of 60° and lie parallel and close to the line of contact of sandstone and limestone. They are of the replacement fissure type, very extensive and wide; but their contents of lead, zinc and silver vary greatly, these ores being found in short irregular shoots, and their proportion of the whole is small. Limestone, being a rock readily susceptible to attack by mineralising solutions, is replaced by ores of iron, manganese, silver, lead and zinc. The dearth of sulphur in the invading solutions is indicated by the largeness of the bodies of mangano-siderite. As might be expected there are directional lines of replacement but laterally from the fissure lines replacement is very irregular. As a rule the galena-sphalerite shoots of ores are found along the lines of fissure, but a little is directly associated with the big mangano-siderite bodies in which the galena portions is converted into cerussite. The containing limestone is of the following composition:-

Lime	51.1	per cent
Magnesia	1.3	per cent
Oxide of iron	1.5	" "
Silica	4.1	" "

Carbonic acid, moisture, etc., 42 per cent.

The plan of the workings shows that the mineralised section of the limestone is very wide and that the richest parts are along two parallel lines 150 feet apart. Moreover, it is seen that near the southern end the mineralised belt swings to the west, which is in conformity with the outline of the limestone. Mineralisation is greatest at the north end near the fault.

The Nature of the Ores:

The marketable ores are argentiferous sulphides of lead and zinc and carbonate of lead. They are closely associated with oxides of iron and manganese which are alteration products of mangano-siderite. Cerussite almost barren of silver, is associated with these oxides. Lead and zinc sulphites with a little pyrite and chalcopyrite are as a rule, intimately associated in distinct shoots and set in a siderite gangue. The sulphidic minerals can be separated without difficulty in any of the ordinary processes of milling and concentration

The Value of the Ores:

The loss of the records of production precludes the possibility of arriving at an estimate of value of the ores. An idea of their quality, however, may be obtained by referring to the following table of analysis:-

Description of ore	per cent				oz. per ton silver
	Lead	zinc	iron	man-ganese	
Selected galena and sphalerite	31.2	22.0			7.0
Selected galena and sphalerite	12.36	43.0			1.8
Gossan	2.5		48.0	15.4	166
"	16.5		26.78	nil	5.65
Selected Cerussite	52.3				0.85
" "					

The silver content of the ore is very low. This is the general rule where galena ores are contained in limestone rock. On the conversion of galena to cerussite the original silver content is carried away as chloride and re-precipitated.

The Mine Workings:

The lode has been opened at many point by means of shallow-level adits, open-cuts, trenches, and shafts over a distance of 1,300 feet. In most cases the sites of the openings were chosen because of known ore shoots, but the major shafts openings were chosen with the object of developing the lodes as a whole according to a pre-arranged plan. Operation by way of adits is limited to shallow depths because the lode follows the valley floor of Oceana Creek; the shaft method is the only feasible one after the removal of outcropping ferro-manganese ore by open-cut.

The ore-body is exposed in a deep open-cut in the eastern workings. It is exposed here over 20 feet in width and consists largely of ferro-manganese gossan. At the end of the cut a shaft has been sunk 15 feet in a shoot of galena and siderite two feet in width from which a fair tonnage of clean galena was obtained. About 80 feet north-eastward a main shaft 12' x 4' and of three compartments was sunk by the old company to a depth of 55 feet. The site is well chosen and it is proposed to extend this opening under the new development scheme. Over a hundred feet north-west is No. 1 shaft, 35 feet deep and likewise of three compartments a drive from this shaft exposes the ore-body 260feet. Through these shallow openings and No. 2 open-cut a large quantity of galena and sphalerite in gossan and mangano-siderite was obtained from the lode.

No. 2 shaft (145 feet deep) sunk in massive limestone, is the main place of attack of the ore-bodies. From the 40 foot level a drive follows the hanging wall of the lode 450 feet in a north-westerly direction. Stoping was performed at these points, but as a whole the lode at the level and this position is poor in its content

of zinc, lead, and silver. From the 75 foot level a western crosscut exposes the whole width of the ore channel (150 feet) and drives north-west (450 feet and south-east (150 feet) explore its reserve of the marketable ores. At this level the sulphides and carbonates are more in evidence but the shoots of galena and sphalerite are extraordinarily erratic as regards size, shape, and quality. It is reported that very little stoping was performed at this level. The results of exploration however, atthis level were regarded as encouraging. The reported occurrence of ore-shoots is confirmed by the presence pf much galena and sphalerite in the dumps from rises connecting those workings with surface.

Further north-westward is Fox Shaft (70 feet deep) and two other shallower shafts all in limestone. From these workings and all the adit nearby a large amount of ore has been taken, Eastward along the course of the creek to the tramline is a very wide body of unexplored gossan. Grape adit only 20 feet below surface, cuts across that large body the size of which no doubt is due to its proximity to the channel of the fault. In Grabe adit crosscut the following succession has been recorded calcareous slate to 150 feet; a 5 foot hand of siderite; 20 feet of black pug; 18 feet of gossan containing sphalerite and cerussite; a wide ferromanganese body with a little cerussite; yellowish-brown oxidised lode matter. At 200 feet the adit collapsed and beyond that point is not open for inspection.

The other workings of note are adits in sandstone and conglomerate cut into north Oceana Hill. Hydrous oxide of iron sediment has almost filled these workings clearly indicating the extensions of mineralisation, beyond the fault.

General Remarks:

There has been developed a very large body of mangano-siderite containing shoots of galena and sphalerite, the whole being replacements of limestone. In the zone of oxidation the mangano- siderite has been converted into ferromanganese oxides and the galena into cerussite. At present the ferromanganese ore is unmarketable and the cerussite is valuable because of its load content only.

The valuable primary components of the lodes galena and sphalerite are unevenly distributed in short irregular shoots and are in small proportion only. Replacement deposits of this type are natoriously erratic as regards size and outline and content of commercial ore, but as a rule they are much larger than the vein type of deposits though poor in silver. At the northern end the body of mineral bearing oxidised rock is very extensive and here may be found some of the most important concentrations. Moreover, it is likely that another important body of ore, may occur.

It is inadvisable and perhaps hazardous to attempt an estimate of value based on examination of the ore exposed in the superficial openings, The shaft level openings are inaccessible. Therefore it is left

to the engineer to decide whether the information given herein is sufficient to warrant the expenditure of the necessary money to equip and reopen the mine. One advantage to be kept in mind is the value of existing development works.

In workings this large ore-body in the oxidised zone very heavy timber will be required to support the roofs and walls of the mine openings. Provision should be made also to cope with a very large volume of water.

A. McIntosh Reid,
DIRECTOR OF MINES.

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