Recent Progress in Geological Interpretation at the Oceana Mine, Zeehan.

I The Lithology of the Limestone Bed.

II Structural Features of the Ordovician System.

III The Location of the Tear Faults

IV Relation of Geophysical Anomalies to Structure.

V Immediate Surveying Desired.

Recent Progress in Geological Interpretation at the Oceana Mine Zeehan

I The Lithology of the Limestone Bed.

Disclosures during the work in Powell's Shaft drew forceable attention to the variations of lithological character within the limestone bed. The search for a suitable site for a new shaft demanded a correlation of all established facts whether from diamond-drill results, underground work or surface exposures. Particularly did the occasion call for the recognition of the exposures in the Smelters limestone quarry which is the mating piece of the north end of the Oceana mine.

This has been done by incorporating such information on a 40' = 1" plan of the Oceana mine. Emphasis on bad ground has been laid by marking the 60 ft black shale bed in solid red and the broken ground of the tear faults in dotted red. The brecciated zone of the Oceana Tear Fault is shown as 100 feet wide while the other two — one just north of the old Main Shaft and one just South of Powells Shaft — are shown as 30 feet wide. The displacement of the black shale bed by these latter minor tear faults is shown.

The better limestone as clearly demonstrated in the Smelters quarry lies to the west of the black shale bed and search for the shaft site should be concentrated in that direction, keeping clear of the brecciation of the tear fault zones.

II Structural Features of the Ordorician System.

It became apparent in the later part of 1946.

that the the simplicity of Block 19 (the Oceana) as shown in the June 1946 presentation was far from the true structural picture. This was drawn attention to in reports submitted at that time.

When Professor Carey's photogeological map appeared it soon became apparent that the obvious incompletenesses therein must be filled in by field work. That field work has not yet been completely done as to detail but recent study in the field has given the general structural picture.

The limestone bed at the Oceana is vertical or very nearly so. Any departure from vertical is towards the east at a very high angle. In this connection it is important to realise that the 50° easterly dips seen in the overlying sandstones in the first cutting on the Oceana Tramway just over Pyramid Creek is due to hill-creep.

South of the Oceana, however, complications in the structure become apparent. Professor Carey's map shows in this locality an overturned anticline in the West Coast Range Conglomerate and Ordovicians. But at the same time that map shows easterly dips within the conglomerate south & west of the Oceana workings, which in actual fact the dip is to the west. Such westerly dips are observable looking southwards from the Oceana and recently closer examination has been made on these hills south of the Oceana Flat. This has disclosed that the beds on the South Oceana Hill are the upper members of the Conglomerate Series, and dipping west and overturned. It is further observed that the conglomerate beds on the higher south-easterly spur from Mt Zeehan lying to the west are the lower members of that series and dip west. There is thus a large overturned anticline in this locality but it is doubtful whether it is exactly as depicted by Professor Carey either as to the position of the axis or its continuity south-eastwards.

However, the combination of photogeological

interpretation and field study establishes beyond doubt the existence of an anticline overturned to the east on the South Oceana Hill.

Although not recorded in Professor Carey's map there is no doubt whatever that a major Tear Fault crosses the southern end of the Oceana Flat. Its actual position is slightly up the slope of the South Oceana Hill. Its general direction is east-west. It can be seen on the eastern slope of Mount Zeehan between Powells Staff and the mountain summit breaking the regularity of the westerly dip on the east face of the south-eastern spur of Mount Zeehan. It must cut across the northern slope of Mount Zeehan. It, of course, truncates the 1000 ft wide limestone bed at its southern end.

Professor Carey's map shows this truncation with a narrow strip of limestone continuing down Pyramid Creek to ultimately swing eastwards to the widening outcrop at the Pyramid mine and the Argenton Flat. In actual fact there is no such continuity. The narrow strip is clearly observable at the South Oceana workings but ceases entirely a few feet south thereof. For some distance south of this it is perfectly clear that there is no limestone outcrop in this narrow gorge. There is no recurrence of limestone until the Pyramid Creek turns east, but the structure responsible for this has yet to be investigated

What is the reason for this thinning and total disappearance of the limestone? In regard to the thinning, Professor Carey, who noticed other restricted widths of the limestone within the Zeehan region, has suggested a compressional 'squeezing' effect as the cause. This is very doubtful in general, but it is certainly not the explanation at the South Oceana as the original stratification is retained and there is no evidence of flowage.

The explanation of both thinning and disappearance at the South Oceana area is contained in the detailed effect of the overfold and the associated Waller Upthrust. As a preliminary to such explanation the following facts must be kept in mind:-

(1) The overfold has a southerly pitch.
(2) The horizontal movement on the south side of the major tear fault at the South Oceana has been eastwards.
(3) A vertical component is a characteristic of the tear faults although the dominant movement is horizontal.

The overfold broke on its west-dipping eastern limb. The western portion overrode the eastern on the Waller Upthrust. This is the structure of the South Oceana Hill, the narrow strip of limestone in the northern part of the Pyramid Creek Gorge being the remnant of the limestone bed, the remainder of which was in the overriding portion but now eroded. The disappearance of this strip southwards is simply the effect of the southerly pitch of the fold. In this South Oceana structural unit the Waller Upthrust is in the Pyramid Creek Gorge whereas in the structural unit to the north — Block 19 — which carries the Oceana ore-bodies — that major fracture lies to the west of the limestone outcrop. Both horizontal and vertical components of the movement on the South Oceana Tear Fault has brought about the present conglomerate-limestone-Waller Upthrust relationship.

If this interpretation is correct the limestone at the South Oceana mine can be expected to widen downwards & westwards with a steeply overhanging conglomerate wall — a structure which is favourable for ore-deposition.

III The Location of the Tear Faults.

The approximate position of the South Oceana

Tear [illegible]

Tear Fault has been given above but detailed survey is needed to fix it more closely. //

Between this major tear fault and the southern end of the Occana workings there is at least one minor tear fault. These minor tear faults are indicated by their topographic expression on the ridge on the eastern side of the Occana Flat. The toe of the western slope of this ridge has been surveyed from the northern end to as far south as opposite Powells Shaft. South of this only visual examination is at present possible. Within the limits of this visual limit there seem to be indicated two such minor faults.

IV Relation of Geophysical Results to Structure.

No 2 Anomaly is largely within the breccia of the Occana Tear Fault, apparently springing outwards from the northern conglomerate wall.

No 1 Anomaly seems to start on the southern edge of the Occana Tear Fault breccia zone. The geophysical map shows it as continuous to beyond the No 3 Bore location. However, the result of that bore and the additional bore recently put down to a shallower depth show that there has exists a narrow blank or marked constriction which the geophysical work has not recorded. It would seem that the break is of minor importance as there is one quite close both to north & south.

Nevertheless, this break and that disclosed both by the 80 ft level workings north of the crosscut from the Main Shaft and No 5 Bore, assume an importance for future exploration to the southwards because they are both coincident with minor tear faults.

Passing on to the southern portion of the Occana Flat it is abundantly evident that the more intense phase of the geophysical anomalies at the southern end are associated with the South Occana Tear Fault. The geophysical map stops short by a few hundred feet of the South Occana Tear Fault and the anomalies

are widening and intensifying as they approach it. South of the tear fault and springing from it is the South Oceana ore-body. Evidence is accumulating of the importance of this ore occurrence and a similar conclusion seems to be indicated for those on the north side of this major tear fault.

The irregularity of the geophysical anomalies between Hide and the Oceana workings, particularly the cols is probably associated with the minor tear faults.

V. Immediate Surveying Desired.

It is thus important that the position of these tear faults be determined as closely as possible. This calls for some surveying. Particularly is it necessary to survey the toe of the ridge on the eastern side of the Oceana Flat and in addition the northern toe of the South Oceana Hill and the slopes to the west and north-west thereof.

In addition, it will be helpful to have the 600 ft contours mapped within this area.

It will then be possible to fix the probable positions of the tear faults as a prerequisite to the drawing of drilling campaign in this locality.

Loftus Hills

18th October 1948.