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# CEMENT MATERIALS AT MELROSE AND PALOONA

## Introduction

On properties owned by James Leary and others at Melrose and Paloona extensive deposits of high grade limestones are known. The same beds crop up again at Railton where the Tasmanian Cement Company is about to commence operations. Recently an investigation of the deposits at Railton was made by Mr. W.D. Reid, Government Chemist, and the writer to ascertain whether this material, with the associated clays, was suitable for the manufacture of Portland Cement. The chemical tests given herein relate to the Railton section of this formation, but may be applied for all practical purposes to these sections.

## Area, Situation etc.

Options over a considerable number of acres of farm lands have been secured. These lands extend from the west bank of Don River to Paloona, a distance of 2 miles.

Cornelius and Dally's lime kilns and quarries and the more important limestone quarries of the Broken Hill Proprietary Company adjoin them on the east side of Don River.

## Access

Melrose and Paloona are adjacent agricultural areas traversed by the railway to Barrington. Melrose is 8½ miles and Paloona is 10 miles by rail from Devonport, the chief shipping centre of the north western district. Don, Tarleton and Dulverton coal-fields and Latrobe Oil Shale field lie in neighbouring areas within a radius of 20 miles from these limestone deposits.

The Barrington Railway passes through the centre of the deposit and large quantities have been opened at Melrose and Paloona stations.

## Geology

The exposed surface of these beds of limestone represent a small portion only of this great formation, which outcrops here and there a distance of thirty miles. Their exposure in comparatively small isolated areas was due to the removal of younger formations by agents of erosion. Apparently they directly succeed the Caroline Creek series of the Upper Cambrian and are succeeded by the West Coast Range conglomerate base of the Silurian, and as they contain fossils of organisms suggestive of the ordovician they have been assigned tentatively to that division.

The outcrop of this formation extends unbroken from the Broken Hill Proprietary Company's quarries westward through Melrose to Paloona, rising into steep hills on the south side. Farther south it is covered with basalt soil.

At the Broken Hill Proprietary Company's works a bore was sunk in the formation 250 feet below the level of the Don River. There is no doubt that it continues to a depth far below the reach of mining operations.

The material exposed here is wavy and even

schistose in character, and where unweathered it is hard and compact and of a bluish grey colour. It weathers along bedding planes to a brown and lilac coloured clay leaving the fresh material in conical form with rounded outlines.

The large deposits of associated clay represent the unsoluble residue from the dissolution of the lime carbonate of the rock. This clay contains silica and alumina in the desired proportions.

Chemical Composition

By an inspection of the accompanying table of analyses it will be seen that the limestone is of very high grade throughout, and of fairly uniform composition. The proportion of calcium carbonate (93%) is much higher than is needed in a Portland Cement mixture, namely 75 to 77 per cent, so that the addition of clay or material of similar composition is required. A representative sample of clay showed a ratio of silica to alumina plus ferric oxide of 2.57 to 1. Clay, the composition of which bears this ratio, is suitable for use in the manufacture of Portland Cement.

With modern appliances the fine grinding of these materials can be accomplished at a low cost. In the process of crushing the limestone it was found that a considerable proportion was reduced to powder, the ultimate comminution of which was easily affected.

| Sample Number | Silica % | Ferric Oxide % | Alumina % | Calcium Carbonate % | Magnesia % | Ignition Loss % | Sulphuric Anhydrine % | Ratio: Silica / Alumina + Ferric Oxide |
|---|---|---|---|---|---|---|---|---|
| Sample No. 1 (No. 2 Quarry) | 3.00 | 0.64 | 1.32 | 94.61 | 1.59 | | | 1.53 |
| Sample No. 2 (do) | 3.00 | 0.57 | 1.63 | 93.44 | 1.45 | | | 1.36 |
| Sample No. 3 (do) | 3.68 | 1.79 | 2.17 | 90.41 | 1.81 | | | 0.93 |
| Sample No. 4 (do) | 3.00 | 0.43 | 1.17 | 94.61 | 1.30 | | | 1.87 |
| Sample No. 5 (do) | 3.68 | 0.86 | 1.90 | 92.63 | 1.45 | | | 1.33 |
| Sample No. 6 (do) | 3.52 | 1.07 | 1.73 | 93.06 | 1.23 | | | 1.25 |
| Average of samples from No. 2 quarry | 3.30 | 0.89 | 1.65 | 93.13 | 1.47 | | | 1.30 |
| Sample of clay from No. 2 quarry | 65.48 | 8.87 | 16,63 | 0.93 | | | | |
| Sample No. 1 (No. 1 quarry) | 7.40 | 1.72 | 4.20 | 85.39 | | | | |
| Sample No. 2 (do) | 8.80 | 2.00 | 4.12 | 83.21 | | | | |
| Sample No. 3 (do) | 7.00 | 1.50 | 3.10 | 87.91 | | | | |
| Average of samples from No. 1 quarry | 7.73 | 1.74 | 3.81 | 85.17 | | | | |
| Sample of oil shale | 39.20 | 3.94 | 9.90 | Lime - trace | | | | |
| Spent shale ash | 76.76 | 3.43 | 16.57 | Lime - 0.20 | | | | |

| Magnesia % | Ignition Loss % | Sulphuric Anhydrine % | Ratio: Silica / Alumina | Ferric Oxide |
|---|---|---|---|---|
| 2.25 | 5.90 | | | 2.57 |
| 1.45 | | | | 1.25 |
| 2.39 | | | | 1.44 |
| 1.16 | | | | 1.52 |
| 1.66 | | | | 1.39 |
| 0.82 | 46.42 | | | |
| 1.30 | | 0.31 | | 3.83 |

Production of Limestone

On the East side of Don River the lime kilns of Messrs. Cornelius and Dally have been in operation many years. The product has been sold in local markets for building and agricultural purposes, but the quantity has not been very great.

Adjoining these works are the Broken Hill Proprietary Company's quarries from which 50,000 tons per annum of high grade limestone are taken and shipped to Newcastle. Only material of the highest quality is desired. About 100,000 tons of second grade limestone, perfectly suitable for the manufacture of Portland Cement, has been dumped.

Quarrying

As the limestone formation rises into hills of considerable height open-cutting methods of operation will be employed. The country has been cleared of almost every tree and stump, therefore the cost of breaking will be very small.

Coal Supplies

Coal-bearing strata of Permo-Carboniferous age occupies a great extent of country between Mersey and Don Rivers. The coal occurs in a seam 15 to 22 inches thick, and has been opened by means of shafts and tunnels at many widely separated points. The most important collieries are at Dulverton, Tarleton and Spreyton. One or two of these are worked to supply local requirements amounting to 2,000 tons yearly. The seam has been worked intermittently since 1850, but owing to its small size and the faulted nature of the ground without marked success. The reason for its limited applicability to industrial uses is that it contains a comparatively high proportion of sulphur. At the Mersey Valley Oil Company's Colliery at Dulverton, however, the amount of sulphur is not sufficient to seriously affect the value of the coal. In other respects the coal is of excellent quality, and if required as a fuel in the manufacture of Portland Cement it will serve the purpose admirably. An idea of the quality of the coal may be obtained by reference to the analyses given in the sub-joined table:-

| | No. 1 sample | No. 2 sample |
|---|---|---|
| Approximate Analysis | | |
| Moisture at 105°C | 13.58 | 13.42 |
| Volatile hydrocarbons | 36.28 | 35.06 |
| Fixed Carbon | 45.30 | 46.88 |
| Ash | 4.84 | 4.64 |

| | No. 1 sample | No. 2 sample |
|---|---|---|
| **Ultimate Analysis** | | |
| Sulphur | 4.39 | 4.04 |
| Hydrogen | 6.83 | 6.13 |
| Carbon | 65.02 | 58.03 |
| Oxygen | 18.05 | 26.22 |
| Nitrogen | 0.87 | 0.94 |
| **Heat Value** | | |
| Colories | 6142 | 5950 |
| B. T. Units | 11056 | 10711 |
| Evaporative Power | 11.43 | 11.08 |
| Specific Gravity | 1.31 | 1.32 |

**Summary**

In this district are found all the raw materials required in the manufacture of Portland Cement. Limestone, clay and coal occur here in abundance and of such quality as to leave no duobt of their suitability for cement making. In addition to these advantages an ample supply of water, free from deleterious impurities, is available from nearby sources.

Situated in an agricultural area within easy reach of populous districts and connected by rail and road with an important shipping centre the conditions for economical operation and the facilities for the transportation of the product to overseas markets are very favourable.

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GOVERNMENT GEOLOGIST.

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