CONTENTS ENVELOPE 4561

TENEMENT: Not Related

TENEMENT HOLDER: Australian Mineral Development Laboratories

REPORT: Investigation into Longwood Kaolinised Sandstone Deposit (Pgs. 3-7)

PLANS: Not Related

The Australian
Mineral Development
Laboratories

Flemington Street, Frewville,
South Australia 5063
Phone Adelaide 79 1662
Telex AA 82520

Please address all
correspondence to
P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

14 July 1982

MD 1/1/272

Progress Report MD 1/1983

Director-General
S.A. Department of Mines & Energy
P.O. Box 151
EASTWOOD SA 5063

Attention: Mr R. Wildy

PROGRESS REPORT MD 1/1983

YOUR REFERENCE:	Letter dated 15 April 1982.
SUBJECT:	Testing of Clay.
MATERIAL:	Longwood Kaolinised Sandstone Deposit.
INFORMATION REQUIRED:	Sizing Analysis, Chemical Analysis and Firing Properties.

Investigation and Report by: Lyn J. Day.

Chief, Materials Section: Philip J. Parry.

Manager, Mineral & Materials Sciences Division: Dr William G. Spencer.

for Norton Jackson
Managing Director

Pilot Plant: Osman Place
Thebarton S.A..
Telephone 43 8053
Branch Laboratories:
Perth W.A.
Telephone 325 7311
Melbourne Vic.
Telephone 645 3093

1. INTRODUCTION

Approximately 8 kilograms of the "as mined" material from the Longwood kaolinised sandstone deposit were submitted to AMDEL for testing. It was requested that this material be wet-screened into specified size fractions and that the various fractions be analysed chemically. It was also requested that the -240 mesh fraction be tested to determine its firing properties.

2. PROCEDURES

2.1 Sizing Analysis

The "as mined" material was wet-screened on 100 mesh (150 micron) and 240 mesh (63 micron) B.S.S. screens. The over- and undersized fractions from each screening were retained and their proportion of the entire sample calculated.

2.2 Chemical Analysis

The samples were analysed using inductively coupled plasma atomic emission spectrometry.

2.3 Firing Test Procedures

The -240 mesh fraction was dried and ground to the nominal size of -1.2 millimetres, (-14 mesh B.S.S.). About two kilograms of this material was moistened and worked to maximum workability (plasticity). It was then sealed in a polythene bag and allowed to mature for a period of days.

The sample was extruded using a Boulton laboratory de-airing extruder, producing a cylindrical column of diameter about 25 millimetres. Extrusion properties were noted and moisture content determined by moisture balance. Specimens for firing were obtained by wire-cutting the extruded column. Green specimens were dried under moderate (40°C) and severe (105°C) conditions and their shrinkages and behaviour determined.

Specimens for firing were air-dried for a period of days, oven-dried at 40°C and finally oven-dried at 105°C for twelve hours. They were then fired in an oil-fuelled Major kiln over the temperature range 800-1500°C in 50°C intervals with a 30 minute soak at each temperature. Specimens were removed from the furnace to a holding kiln at 600°C. After all specimens had been fired, the holding kiln was switched off and the samples allowed to cool overnight to room temperature.

Shrinkages for dried and fired specimens were determined by measurement with a travelling microscope of the spacing of a set of marks inscribed immediately after extrusion with a pair of knife edges set 20 millimetres apart. Water absorption properties of the fired specimens were determined by weighing specimens dry and after soaking for 24 hours in water with removal of surface water. The general quality of the specimens was determined by visual inspection. Colours were assessed using a Munsell Rock Color Chart.

This sample was also tested to determine its Pyrometric Cone Equivalent or refractoriness value.

3. RESULTS

3.1 Sizing Analysis

Size Fraction	Weight %
+100 #	52
-100+240 #	11
-240 #	37

3.2 Chemical Analysis

	+100 #	-100+240 #	-240 #
SiO_2	94.5	91.1	56.4
TiO_2	0.64	0.44	0.63
Al_2O_3	2.88	5.10	29.4
Total Fe as Fe_2O_3	0.11	0.10	0.45
MnO	0.01	0.01	0.01
MgO	0.24	0.37	0.96
CaO	0.04	0.03	0.05
Na_2O	0.04	0.05	0.10
K_2O	0.91	1.30	3.22
P_2O_5	0.02	0.02	0.02
L.O.I.	1.21	0.63	9.38
Total	100.6	99.1	100.6

3.3 Firing Test

The material was extruded at a moisture content of 25.2%. It produced a medium-hard, smooth column of moderate plasticity. The extrusion rate was fast and the column wire cut cleanly.

Drying under moderate (40°C) conditions was satisfactory and produced a shrinkage of 5.6%. Drying under severe (105°C) conditions produced very slight external cracking and a shrinkage of 5.1%.

The white clay fired to a white colour over the entire range of 800-1200°C. The fired specimens were all of good appearance except that slight cracking occurred in a specimen fired at 1200°C. The fired samples showed no sign of scumming. Specimens fired at 1000°C were only of moderate hardness with a shrinkage of 6.5% and a water abosrption of 18.6%.

Full details are shown in Table 1.

4. DISCUSSION

Chemical analyses of the various fractions showed that the +100 mesh and -100+240 mesh fractions were very similar in composition. Both fractions were high in SiO_2 with the -100+240 mesh fraction containing slightly more clay impurity than the +100 mesh fraction.

The -240 mesh fraction was a white burning, refractory clay of moderate plasticity. It did not exhibit any scumming problems and showed only a very minor tendency towards cracking. This material should be very suitable for use as a pottery clay though it may need to be blended with other materials depending on the properties required of the body. Separate testing of blends would be required.

Fired samples are being returned under separate cover.

dt:3.

TABLE 1 : DRYING AND FIRING PROPERTIES

Sample No. -240 # (CE 5339)

Temperature °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
40	5.6	-	-	White N9	Satisfactory
105	5.1	-	-	White N9	Slight cracking
800	6.0	19.8	Soft	White N9	Satisfactory
850	4.9	19.6	Soft	White N9	Satisfactory
900	5.6	19.3	Soft	White N9	Satisfactory
950	5.0	19.5	Soft	White N9	Satisfactory
1000	6.5	18.6	Moderate	White N9	Satisfactory
1050	6.6	18.0	Moderate	White N9	Satisfactory
1100	7.8	16.0	Moderate	White N9	Satisfactory
1150	10.0	13.3	Hard	White N9	Satisfactory
1200	13.0	6.3	Hard	White N9	Slight cracking