ASX Announcement (ASX:AXE) 7 November 2019

Franklyn Halloysite-Kaolin Exploration Target

Highlights

- Substantial Exploration Target reported for the Franklyn Halloysite-Kaolin Project.
- Franklyn has near-surface mineralisation and is easily accessed by existing roads.
- The Franklyn Exploration Target is based on historical exploration results.
- Franklyn Exploration Target is in addition to the Exploration Target previously reported for the Eyre Peninsula Kaolin Project.
- The Eyre Peninsula Kaolin Project and Franklyn Kaolin Project are large projects close to the surface and existing infrastructure.
- Historical work reports for Franklyn shows halloysite between 10- 15% in drill hole sample.
- All approvals are in place with drilling at Franklyn to commence within the next 2-3 weeks.

Archer Minerals Limited ("Archer", "Company") is pleased to announce a maiden Exploration Target for its Franklyn Halloysite-Kaolin Project ("Franklyn Project") located approximately 80km East of Jamestown, South Australia (Fig. 1).

A review of historical drill results has resulted in the establishment of a maiden kaolin Exploration Target at Franklyn of 45Mt – 91Mt at a grade of 30 – 36% Al_2O_3 (-45 µm size fraction). The Franklyn Exploration Target is in addition to the Eyre Peninsula Kaolin Project Exploration Target of 55Mt – 130Mt at a grade of 33 – 36% Al_2O_3 (-53 µm size fraction) (ASX announcement 19/08/19).

Investors should be aware that the potential quantity and grade of the Exploration Targets reported are conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource at Franklyn or the Eyre Peninsula.

The Franklyn Exploration Target is based on historical drilling, across 40 Rotary drill holes and auger drilling was undertaken by the SA Government (1971 to 1992). This historical drilling intersected substantial widths of kaolin mineralisation over an extensive area during their search for copper and gold mineralisation. Limited work was undertaken on the kaolin material as it was not the focus of exploration, however Halloysite comprising over 15% of one sample was reported.

Commenting on the Franklyn Project, Archer Executive Chairman Greg English said,

"The 100% owned Franklyn Project is near-surface and ideally situated close to existing roads. The Franklyn Project complements the Eyre Peninsula Kaolin Project and provides us two very prospective projects to develop further."

"All approvals are in place and we expect to be drilling at Franklyn in the coming weeks with all drilling planned to be completed before the end of November."

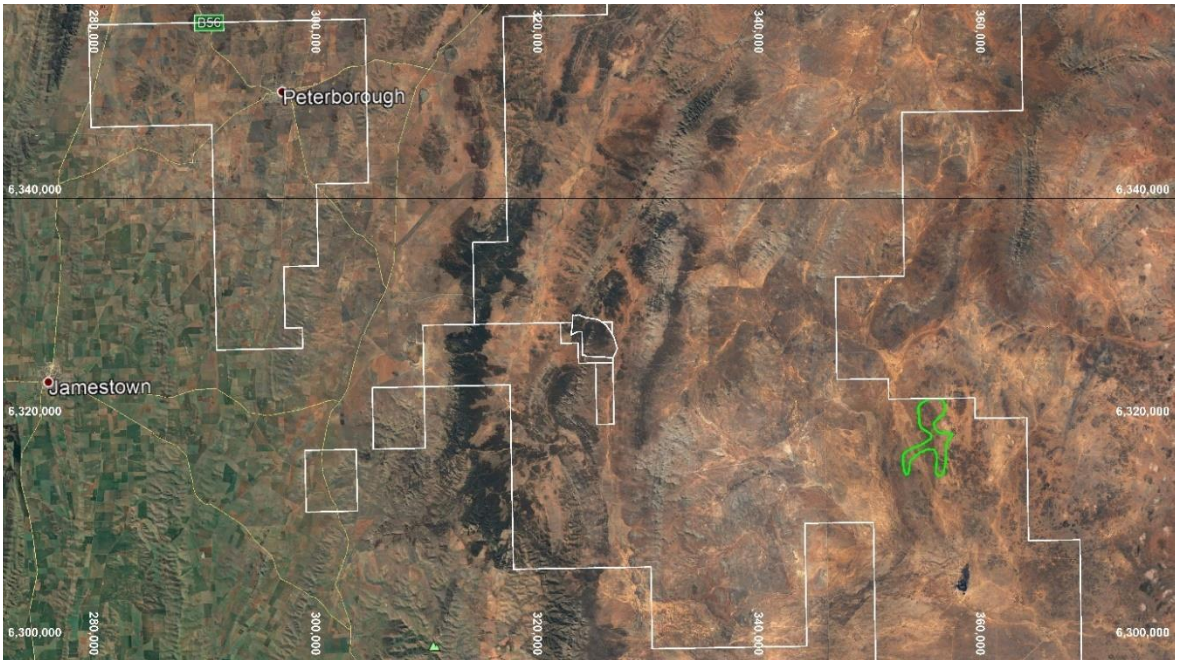

Fig. 1. Franklyn Project (green outline) within Archer tenement boundaries (white outline).

About the Project

The Franklyn Project is within EL 6160 and is 100% owned by SA Exploration Pty Ltd, a wholly-owned subsidiary of Archer. The Franklyn Project Exploration Target is calculated from the intersection of kaolin clay in historical drilling by the SA Government in its exploration for copper-gold within the Bendigo Granite.

The Franklyn Project is located approximately 15km East of Archer's Blue Hills Copper-Gold Project.

Regional Geology

Weathering of the Delamerian Granite (Bendigo Granite) has resulted in the development of a kaolinite rich profile buried under Cainozoic transported sediments. To the NE of the Exploration Target the granite outcrops and the weathering profile increases away from these exposed rocks.

Exploration Target calculation and assumptions

Grade

The Franklyn Project Exploration Target has an average grade of between 30 and 36% Al_2O_3. The grade was determined from results of screening test work undertaken by Archer on samples made available by the Department for Energy and Mining (SA Govt). The sample material is considered at best to be a guide for calculation of the *insitu* material. The sample medium was small (<500gm) and of a composite nature, as at the time it was collected the material was considered not to be relevant to exploration.

A total of 39 samples were taken from the SA Government core library, which represented 12 holes from the Exploration Target area. The samples represented composited lengths of intervals of 6m to 24m from individual holes. Each of the samples was screened at three size fractions +53µm, -53+45µm & -45µm, it was found that the material essentially reported to either the +53µm or -45µm fractions. Two samples were identified from assay results as being not kaolin (they were oxidised siltstones). The average results from the other 37 samples are presented in Table 1 below.

-45 µm Fraction	**Average**
Al2O3 %	33
(Calculated Head) Al2O3%	21
% recovery	53
Fe2O3 %	3
SiO2%	47

Table 1. Results from analysis of 37 drill hole samples from within the area of the Franklyn Project Exploration Target.

Tonnes

The kaolin Exploration Target for the Franklyn Project is reported as a range 45Mt – 90Mt at a grade of 30– 36% Al_2O_3 (at -45µm). The Exploration Target is based upon recovery from the -45µ size fraction which is approximately 50% of the feedstock (i.e. kaolin is 50% of the *in-situ* host material).

	Tonnes (Mt)		**Grade (Al_2O_3, <45µm)**	
	Lower	Upper	Lower	upper
Franklyn Exploration Target	45	91	30%	36%

Table 2. Franklyn Halloysite-Kaolin Exploration Target showing upper and lower ranges.

<u>Assumptions</u>

The following methodology was used in the calculation of the Exploration Target at Franklyn.

- An 'outline' for Franklyn was created from historical drilling results. This surface area was used to calculate the tonnage range estimation.
- Only holes where kaolin is encountered at <21m from the surface have been included, any hole where the top of the kaolin is intersected deeper than 20m has been excluded from the Exploration target.
- A range of thicknesses (5m to 10m) was used to develop the tonnage range for the Exploration Target.
- Rock density of 1.4 for kaolin has been assumed. The density (SG) is theoretical and considered to be conservative. No work has been completed determine the accuracy of the density assumption.
- Assays are derived from a range of composite samples from holes within the 'outline' which were screened to -45µm and assayed.

Historical exploration

In the early 1970s the SA govt undertook exploration in the district over the Delamerian Granites to develop a greater understanding in the potential for copper and gold mineralisation associated with the intrusive events. Numerous holes have been drilled across the district as a part of this exploration which has occurred through to the early 1990s. Limited work has been undertaken by companies (ie CRA and BHP) in the project area, with both companies only having drilled one hole each.

In 1974 the SA Government commissioned a report (RC73000235) to look at the clays in the district, in the report hole sample material from KR 23 (Fig. 2) was screened to -2µm. It was found that this fraction represented 34% of the bulk sample, was considered to be 'wholly kaolinite' and have very low viscosity properties, which was due to the sample being 30 to 50% Halloysite (Amdel Reports MT 4025/73 & MT 4567/73, Appendix B. Extracts from these reports are appended to the end of this announcement).

It was noted that, Halloysite is detrimental in coating clays. Its shape and form inhibit satisfactory coating behaviour in slurries with a high solids content. The reflectivity of the KR 23 sample was reported as 85%.

Next Steps

The Company intends to undertake shallow aircore drilling and metallurgical test work at Franklyn to verify the results from previous explorers. All approvals are in place and drilling is expected to be completed by the end of November with results to be announced as they become available.

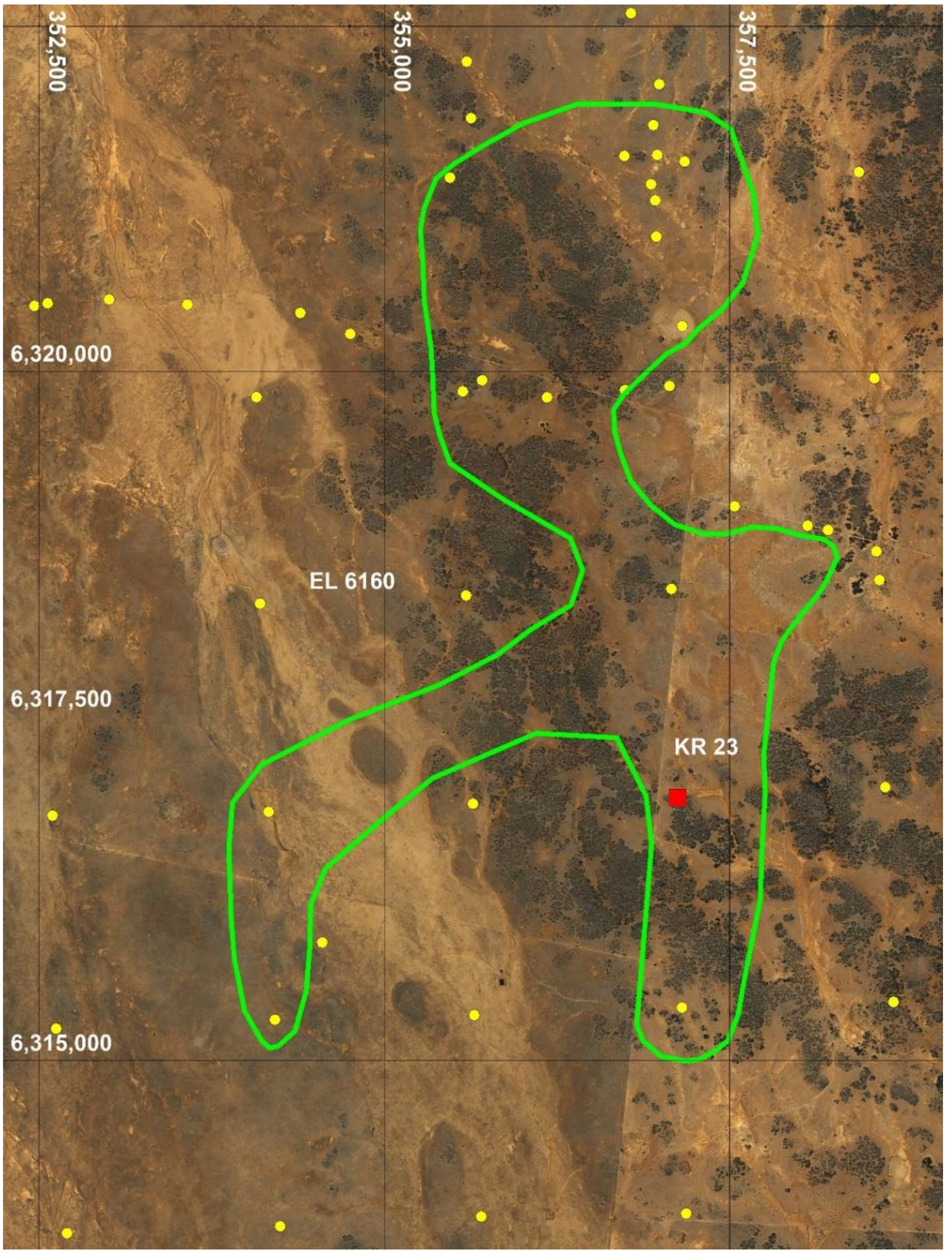

Fig. 2. Map showing drill hole collar locations, including hole KR 23.

About Archer

Archer provides shareholders exposure to financial returns from innovative technologies and the materials that underpin them. The Company's strategy is to build an industry-leading Materials Technology company, that delivers maximum value to shareholders through the commercialisation of assets at various stages of the materials lifecycle. Archer has strong intellectual property, broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to over $300 million of R&D infrastructure.

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For more information about Archer's activities, please visit our:

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https://archerx.com.au/

Twitter:
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Competent Person Statement

The information in this announcement that relates to Exploration Results is based on information compiled by Mr Wade Bollenhagen, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy and is a full-time employee of Archer Exploration Limited.

Mr Bollenhagen has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr. Bollenhagen consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

JORC Code, 2012 Edition – Table 1 **Section 1 Sampling Techniques and Data** *(Criteria in this section apply to all succeeding sections.)*

Criteria	JORC Code Explanation	Commentary
Sampling Techniques	• Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as downhole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling. • Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used. • Aspects of the determination of mineralisation that are Material to the Public Report. • In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.	• No details are reported on the sampling techniques provided. • All historical work will need repeating for any resource reporting.
Drilling Techniques	• Drill type (e.g. core, reverse circulation, open hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).	• Most samples being reported on are from RAB drilling and are small composite samples (<500gm) • No other details provided
Drill Sample Recovery	• Method of recording and assessing core and chip sample recoveries and results assessed. • Measures taken to maximise sample recovery and ensure representative nature of the samples. • Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	• Drill sample recovery is unknown, it is considered poor

Criteria	JORC Code Explanation	Commentary
Logging	• Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies. • Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography. • The total length and percentage of the relevant intersections logged.	• Simple hand written logs exist from the time of drilling and trenching. • It is a quantitative in nature. • It is assumed whole holes are logged. • Kaolin was not the focus of the drilling at the time and little attention was made to it in the exploration of the day.
Sub-Sampling Techniques and Sample Preparation	• If core, whether cut or sawn and whether quarter, half or all core taken. • If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry. • For all sample types, the nature, quality and appropriateness of the sample preparation technique. • Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples. • Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling. • Whether sample sizes are appropriate to the grain size of the material being sampled.	• Sampling methodology has not been exhaustively reviewed, it is believed that sub-sampling would have occurred at the drill rig, however the nature of this is unknown. • Quality control measures are unknown, along with sample size being appropriate.

Criteria	JORC Code Explanation	Commentary
Quality of Assay Data and Laboratory Tests	• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total. • For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc. • Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	• The samples used in the report come from composited 'waste material in the exploration for base metals, they were never intended for grade estimation, only as an indication of material intersected in drilling. • The assaying of the samples was undertaken using certified (ALS) laboratory techniques and is accurate for the sample presented to the laboratory. • Reflectivity quoted on sample KR 23, is reported as being derived from a Ziess Elrepho Reflectometer at effective wavelengths of 457 and 570nm (comparable to a GE meter).
Verification of Sampling and Assaying	• The verification of significant intersections by either independent or alternative company personnel. • The use of twinned holes. • Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols. • Discuss any adjustment to assay data.	• No verification of historical work has been undertaken by Archer.
Location of Data Points	• Accuracy and quality of surveys used to locate drillholes (collar and downhole surveys), trenches, mine workings and other locations used in Mineral Resource estimation. • Specification of the grid system used. • Quality and adequacy of topographic control.	• Data points were all originally recorded in AMG co-ordinates and cannot be used for resource estimation, all work will need to be replicated for accuracy.
Data Spacing and Distribution	• Data spacing for reporting of Exploration Results. • Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. • Whether sample compositing has been applied.	• Data spacing and accuracy is sufficient for an Exploration target, but is insufficient for any resource estimation • Compositing has occurred.

Criteria	JORC Code Explanation	Commentary
Orientation of Data in Relation to Geological Structure	• Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. • If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	• It is unknown if the drilling has introduced any bias, as there is too little information at this stage. • The types of rocks that have been weathered to produce the kaolin cover very large aerial extents, far beyond the areas deemed exploration targets. • Faults and other fracture type systems can enhance local weathering, ie deepen the system, it is unknown what influence if any these have played in the kaolin development,
Sample Security	• The measures taken to ensure sample security.	• Unknown for the time, best practices for the era are believed to have been used.
Audits or Reviews	• The results of any audits or reviews of sampling techniques and data.	• No audits undertaken.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code Explanation	Commentary
Mineral Tenement and Land Tenure Status	• Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings. • The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	• Tenement status confirmed on SARIG • All work being reported is from EL 6160, SA Exploration Pty Ltd (a subsidiary of AXE) owns the tenement. • The granted tenement is in good standing with no known impositions.
Exploration Done by Other Parties	• Acknowledgment and appraisal of exploration by other parties.	• SA govt 1971 to 1973 & 1992, exploring for base metals and gold. • BHP, 1980, exploring for base metals and gold. • CRA 1985, exploring for base metals and gold.
Geology	• Deposit type, geological setting and style of mineralisation.	• Deep weathering of the Bendigo Granite has resulted in the development on kaolin.
Drillhole Information	• A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: – Easting and northing of the drill hole collar – Elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar – Dip and azimuth of the hole – Downhole length and interception depth – Hole length • If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	• Collar data used in the Exploration target are presented as Appendix A to the release. • All holes were drilled vertically. • Elevations are unknown.

Criteria	JORC Code Explanation	Commentary
Data Aggregation Methods	• In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated. • Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail. • The assumptions used for any reporting of metal equivalent values should be clearly stated.	• Assays from composited samples are being reported as an average only due to the quality of the original sample medium, an Exploration target range for Kaolin is being presented as between 30 to 36 % AL2O3. • Additional fresh material needs to be recovered to verify the averaged results.
Relationship Between Mineralisation Widths and Intercept Lengths	• These relationships are particularly important in the reporting of Exploration Results. • If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported. • If it is not known and only the downhole lengths are reported, there should be a clear statement to this effect (e.g. 'downhole length, true width not known').	• It is unknown if there are relationships between hole angles (vertical) and the geometry of the weathered rocks containing kaolin. • Only down hole lengths are known.
Diagrams	• Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported. These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	• Plans are shown indicating drill holes in the area and those being used to influence the Exploration Target.
Balanced Reporting	• Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	• The reporting is considered to be balanced.
Other Substantive Exploration Data	• Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	• None to report at this stage of the review.

Criteria	JORC Code Explanation	Commentary
Further Work	• The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling). • Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	• Exploration work is required to confirm the historical work and advance the projects towards a more certain nature, which will hopefully lead to a confidence level where resources can be estimated. •

Appendix A Drill Hole Collars used to calculate Franklyn Exploration Target (MGA Zone 54)

Hole ID	MGA Easting	MGA Northing	Dip	Depth	Drill Type	Operator	Year
85CBRC 1	357161	6320328	-90	10.5	RC	CRA	1985
BM 76	356994	6322081	-90	28.35	Rotary	SA govt	1971
BM 72	355628	6321836	-90	79.25	Rotary	SA govt	1971
BM 73	355476	6321403	-90	51.51	Rotary	SA govt	1971
BM 77	356979	6321569	-90	41.76	Rotary	SA govt	1971
BM 78	356972	6320976	-90	32	Rotary	SA govt	1971
BG 27	357177	6321520	-90	42.37	Rotary	SA govt	1971
BG 28	356742	6321561	-90	34.14	Rotary	SA govt	1971
BG 29	356952	6321786	-90	64.01	Rotary	SA govt	1971
BG 30	356935	6321357	-90	44.5	Rotary	SA govt	1971
BG 31	356966	6321240	-90	53.34	Rotary	SA govt	1971
K 236	354552	6315858	-90	10	Rotary	BHP	1980
KR 1	355644	6316865	-90	48	Rotary	SA govt	1972
KR 4	357068	6319895	-90	39.5	Rotary	SA govt	1973
KR 5	355570	6319854	-90	57	Rotary	SA govt	1973
KR 8	355593	6318375	-90	71	Rotary	SA govt	1973
KR 9	357082	6318422	-90	27	Rotary	SA govt	1973
KR 10	354162	6316806	-90	49	Rotary	SA govt	1973
KR 11	352594	6316779	-90	78	Rotary	SA govt	1973
KR 13	352622	6315232	-90	91.5	Rotary	SA govt	1973
KR 14	354207	6315297	-90	47	Rotary	SA govt	1973
KR 15	355653	6315331	-90	87	Rotary	SA govt	1973
KR 16	352699	6313749	-90	29.5	Rotary	SA govt	1973
KR 17	354246	6313799	-90	44.75	Rotary	SA govt	1973
KR 18	355702	6313870	-90	69	Rotary	SA govt	1973
KR 20	357190	6313892	-90	90.5	Rotary	SA govt	1973
KR 21	357159	6315385	-90	28	Rotary	SA govt	1973
KR 22	358691	6315427	-90	69	Rotary	SA govt	1973
KR 23	357119	6316918	-90	52.5	Rotary	SA govt	1973
KR 24	358631	6316963	-90	74.25	Rotary	SA govt	1973
KR 25	358588	6318486	-90	73.25	Rotary	SA govt	1973
KR 27	358442	6321445	-90	51	Rotary	SA Govt	1973
CRN 48	354754	6320271	-90	78	RC	SA Govt	1982
CRN 49	355712	6319934	-90	56.5	RC	SA Govt	1982
CRN 50	356181	6319810	-90	73	RC	SA Govt	1982
CRN 51	356746	6319863	-90	17	RC	SA Govt	1982
CRN 95	357539	6319021	-90	9	RC	SA Govt	1992
CRN 96	358069	6318880	-90	5	RC	SA Govt	1992
CRN 97	358217	6318849	-90	62.5	RC	SA Govt	1992
CRN 98	358568	6318695	-90	57.5	RC	SA Govt	1992

A P P E N D I X B

Laboratory examination of clay sample from Kia-Ora

AMDEL reports MT.4025/73 and MT.4567/73

by

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REPORT MT 4025/73

1. INTRODUCTION

At the request of the Department of Mines, South Australia, preliminary tests have been conducted on a sample of white clay from the Kia-Ora-South Dam area prospect. The sample represents the interval from 21-30 metres of hole KR23 (11500E - 19000N), County of Kimberley and was obtained by rotary-air drilling.

Testing was designed to evaluate the potential of the material as a source of paper coating grade clay.

2. PROCEDURE AND RESULTS

2.1 Preparation

Upon receipt the material was dried to zero moisture, lightly crushed in a mortar and pestle and representative sub-samples were obtained for testing. A minus 2 micron fraction was obtained by sedimentational techniques using Calgon (0.3% based on the dry weight of the material) as dispersant.

2.2 Mineralogy

The mineralogy of a sample of the raw material and of the minus 2 micron fraction of the sample was investigated by X-ray Diffraction techniques.

The bulk material consists of crystalline kaolinite with a minor proportion of quartz (approximately 6%). The minus 2 micron material appears to be free of contaminants and is composed wholly of kaolinite.

2.3 Yield of Minus 2 Micron Material

The proportion of minus 2 micron clay, in a sub-sample of the bulk material, was determined by pipette analysis and sedimentational techniques.

The yield of minus 2 micron clay was calculated at 34% of the bulk sample.

2.4 Reflectivity

The reflectivity (brightness) was measured on a Zeiss Elrepho Reflectometer at effective wavelengths of 457 and 570 mm. The result, relative to the brightness of magnesium oxide, is equivalent to the value obtainable using a G.E. meter.

Reflectivity (-2 micron fraction)	= 85.7
Yellowness	= 6.3

2.5 Viscosity Studies

Viscosity studies were carried out on the prepared minus 2 micron fraction of the clay in accordance with the standard routine test methods employed by English China clays. The method allows for the calculation of the maximum of 5 poise.

Two viscosity measurements, at different solids concentrations and maximum deflocculation, were recorded using a Brookfield Viscometer fitted with a No. 3 spindle rotating at 100 rpm.

The solids contents were plotted against the inverse of the square root of the viscosity (in poise) and the 5 poise viscosity concentration then read from the graph.

Results are shown in Table 1 and Graph 1.

3. DISCUSSION

The material investigated has a high yield of minus 2 micron kaolinite which has a satisfactory brightness for paper coating operations but poor rheological properties.

The material warrants further investigation to initially establish the possible cause of the low viscosity concentration then further testing aimed at improving the rheology. Various methods such as pugging or blending, to alter the particle size distribution of the clay, have been used effectively in certain cases to decrease the viscosity of a clay-water slurry which thus allows a higher solids content at the required 5 poise viscosity limit.

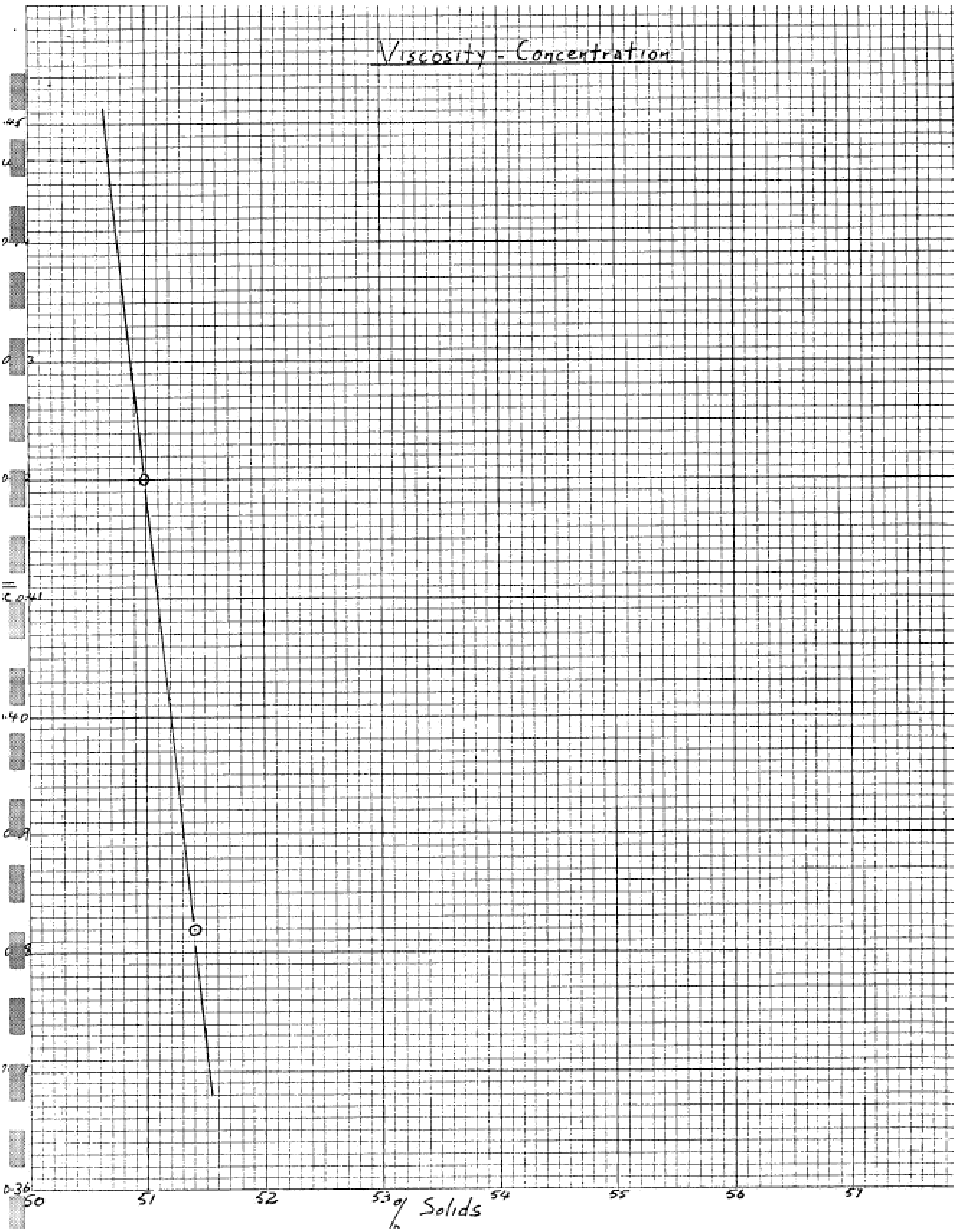
Paper manufacturers generally specify a solids concentration of greater than 69% for a resultant viscosity of 5 poise.

It is recommended that initially Electron Microscopy be used to study the particle shape, size and particle size distribution of the kaolinite. A programme for future work will depend upon the results obtained.

TABLE 1

Viscosity - Concentration

Solids %	Viscosity (poise)
51.4	6.86
51.0	5.68
From graph	
50.7	5.00


Viscosity - Concentration
0.36
0.40
50
51
52
53
54
55
56
57
% Solids

REPORT MT 4567/73

1. INTRODUCTION

This report follows on from Report MT 4025/73 which recommended that further work be carried out on a -2 micron sample of clay, sample No. A232/73, to investigate possible mechanisms, of improving the viscosity of the material.

The bulk material is composed of crystalline kaolinite with a minor proportion of quartz (app. 6%) and the -2 micron fraction is wholly kaolinite. The yield of -2 micron clay is 34% of the bulk sample and the reflectivity 85, measured on a Zeiss Elrepho at 457 nm, relative to magnesium oxide (100).

2. INVESTIGATION

A sample of the -2 micron material extracted from the bulk clay was examined by electron microscopy to assess the particle size distribution, shape and presence of other minerals which may possibly affect the viscosity of the material in a clay-water slurry.

As a result of this examination, a -1 micron fraction was extracted from the bulk sample and blended with the -2 micron material in a 4:6, -2 micron to -1 micron, proportion for further viscosity studies. The viscosity was measured using a Brookfield Viscometer fitted with a number 3 spindle rotating at 100 r.p.m. Results are shown on Graph 1.

3. DISCUSSION

The seven micrographs, Figs. 1-7, appended to this report show a mixture of kaolinite and halloysite particles. Halloysite is the tubular mineral varying between 0.05 and 0.2 micron in diameter and 0.5 to 3 micron in length. It possibly constitutes between 30% and 50% of the total material.

The remaining material is kaolinite and appears to be predominantly well crystallised. The hexagonal outline of kaolinite is seen in the majority of the single particles and it is assumed that the denser areas of the micrographs are composites of particles of similar shape. The particle size varies in the -2 micron fraction from 2 micron to approximately 0.2 micron and finer. However, the bulk of the materials is 0.5 to 1 micron in diameter.

The -1 micron material has a similar proportion of halloysite present, ranging up to 2.5 micron in length. The kaolinite is typically hexagonal in outline with a particle size diameter averaging less than 0.5 micron.

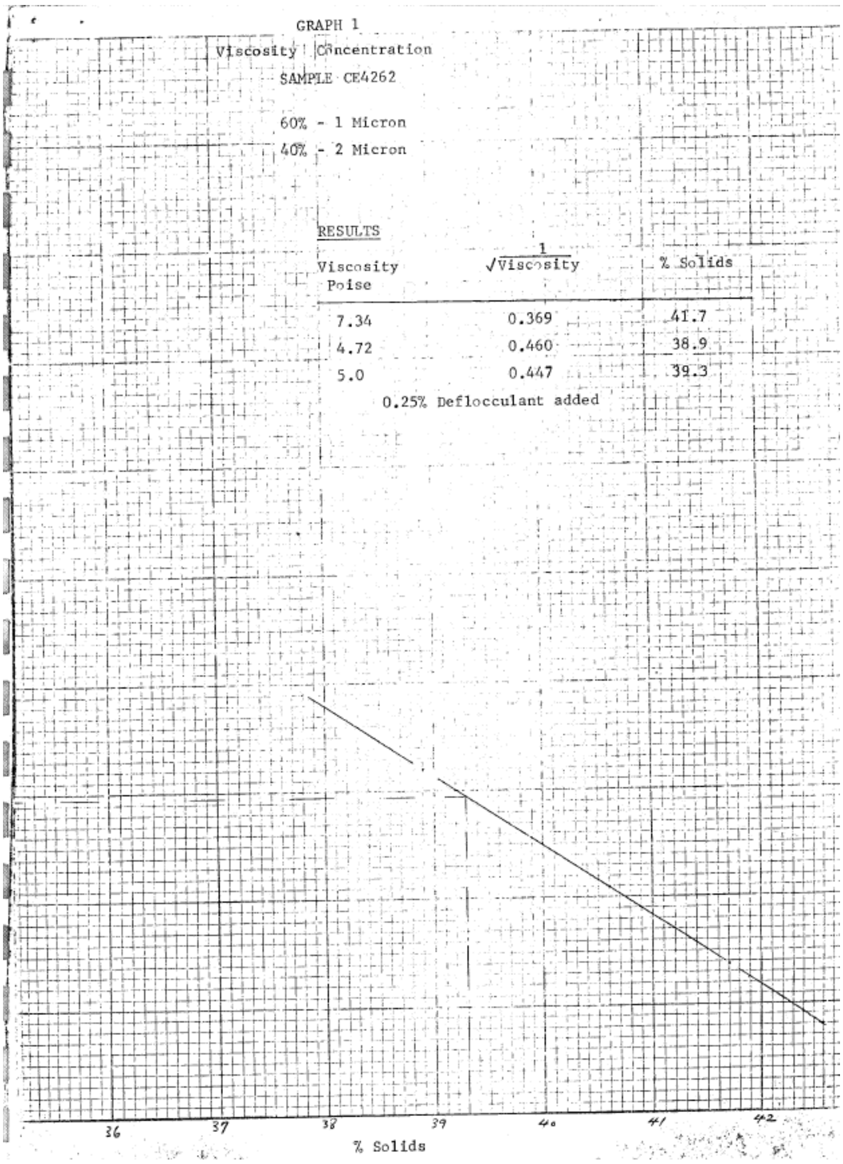
The blended sample, containing 60% -1 micron material and 40% -2 micron material, was designed to eliminate the coarse halloysite particles which may have been causing the high viscosity. It was assumed that the finer halloysite particles are better suited to flow in a high solids slurry due to the reduced fluid volume requirement for rotation.

As the results indicate, the solids content of the blend at 5 poise viscosity has fallen to 39.3% from the previous result on the -2 micron material of 50.7%.

The dependency of viscosity on particle size has been adequately demonstrated, although, the reason for the increase in the viscosity of the blended sample is unknown. Blending with a higher proportion of finer material has thus failed to produce a superior product.

A long term project investigating the interrelationships of the physical parameters of the clay particles and their effect on the viscosity of a high solids slurry is recommended if further work is required. However, there can be no guarantee that this type of investigation will yield more favourable results for this particular clay.

Unfortunately work of this type is not documented and there is little basis for recommendation. However, at this stage the results show blending to be effective in altering the viscosity of a slurry and indicate that there is a possibility of improvement by further adopting these methods.



ELECTRON MICROGRAPHS OF EXTRACTED CLAY FRACTION
FROM SAMPLE CE 4262

-2 micron fraction

PLATE 1

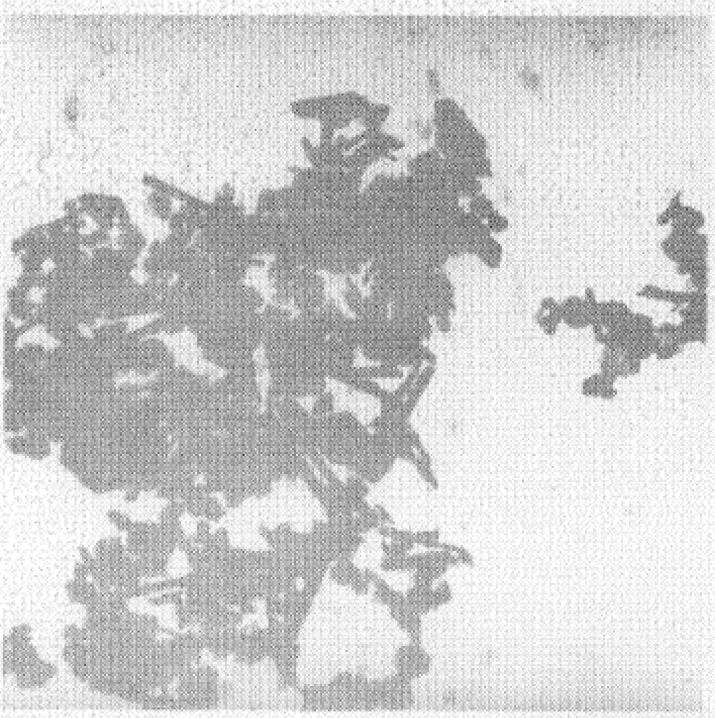
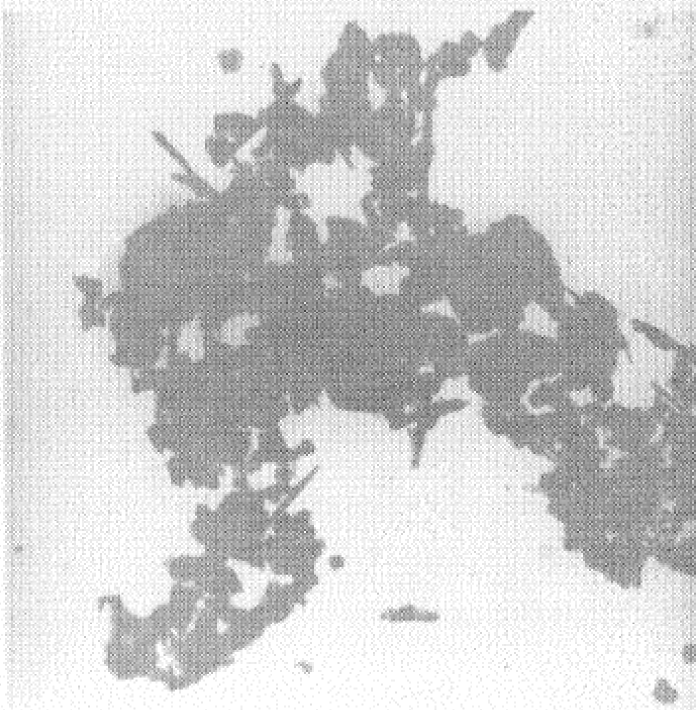


PLATE 2

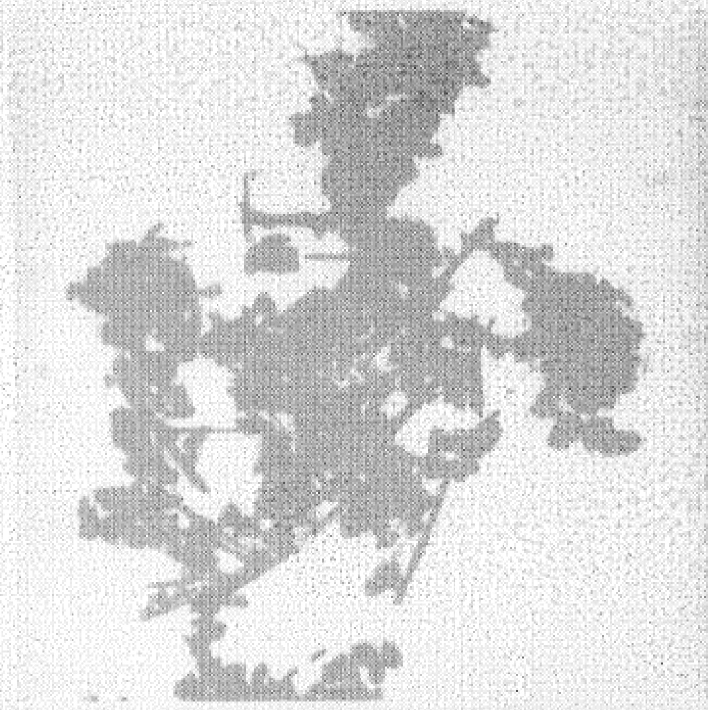
MAGNIFICATION: 10,000X
SCALE: 1 cm = 1 micron



ELECTRON MICROGRAPHS OF EXTRACTED CLAY FRACTION
FROM SAMPLE [illegible]

-2 micron fraction

PLATE 3



MAGNIFICATION: 10,000 x
SCALE: 1 cm = 1 micron

ELECTRON MICROGRAPHS OF EXTRACTED CLAY FRACTION
FROM SAMPLE [illegible]

[illegible]

PLATE [illegible]

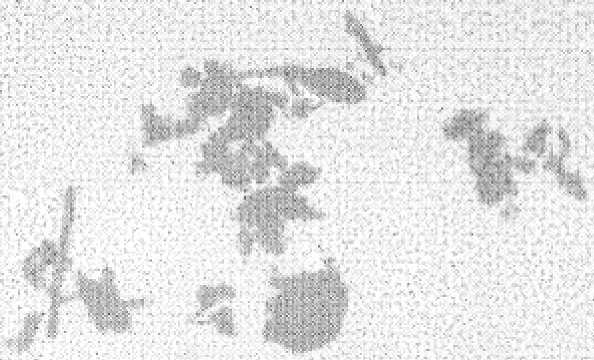
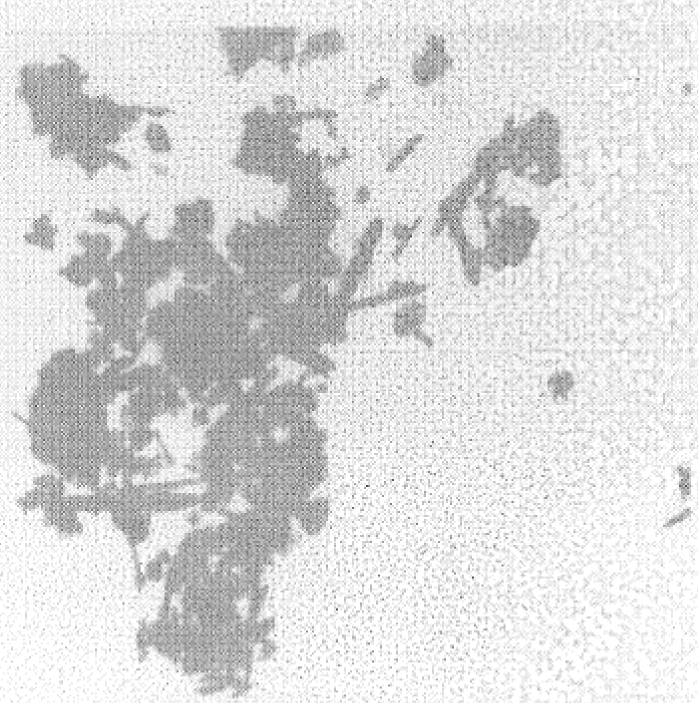


PLATE [illegible]



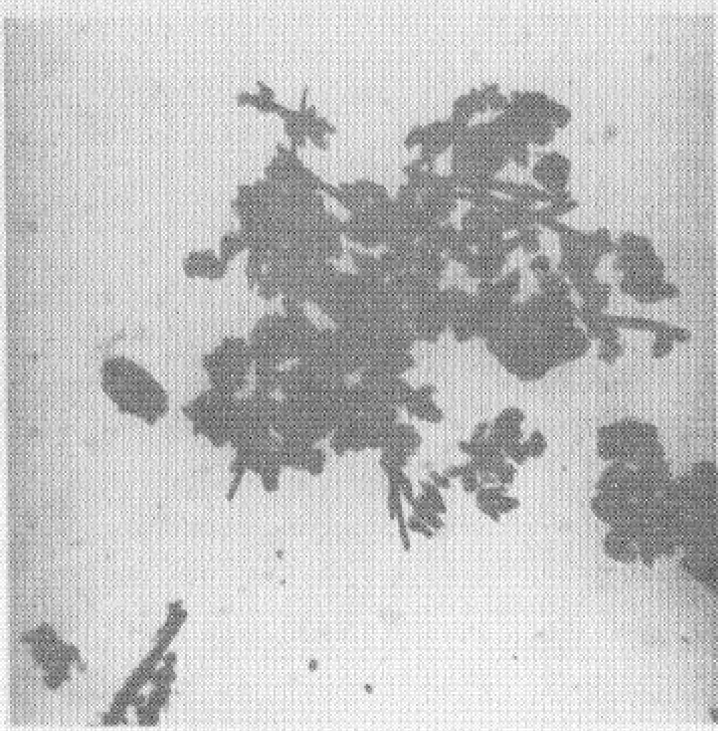
MAGNIFICATION: 10,000X
SCALE: 1 cm = 1 micron

ELECTRON MICROGRAPHS OF EXTRACTED CLAY FRACTION
FROM SAMPLE CR 4262

-1 micron fraction

PLATE 6

PLATE 7



MAGNIFICATION: 10,000X
SCALE: 1 cm = 1 micron