THE EFFECTS OF MICA ON THE ROADMAKING PROPERTIES OF MATERIALS

by

L W Tubey and D C Webster

Any views expressed in this Report are not necessarily those of the Department of the Environment or of the Department of Transport

Materials Division
Highways Department
Transport and Road Research Laboratory
Crowthorne, Berkshire
1978

ISSN 0305-1315
Ownership of the Transport Research Laboratory was transferred from the Department of Transport to a subsidiary of the Transport Research Foundation on 1st April 1996.

This report has been reproduced by permission of the Controller of HMSO. Extracts from the text may be reproduced, except for commercial purposes, provided the source is acknowledged.
CONTENTS

Abstract
1. Introduction
2. Mica and the occurrence of micaceous materials
   2.1 Mica
   2.2 The occurrence of micaceous materials
3. Previous work on the properties of micaceous materials
4. Scope of investigation
5. Materials examined
   5.1 China clay sands
   5.2 Micas
   5.3 Siliceous materials
6. Assessment of the effects of mica
   6.1 Effect of mica on the particle-size distribution (PSD)
      6.1.1 PSD determination
      6.1.2 Discussion
   6.2 Effects of mica on the specific gravity and plasticity of the china clay sands
      6.2.1 Specific gravity determinations
      6.2.2 Plasticity determinations
   6.3 Effect of mica on the compacted density of china clay sands
      6.3.1 Mixes studied
      6.3.2 Compaction methods
      6.3.3 Discussion of the compaction results
   6.4 Effects of mica on breakdown under compaction
   6.5 Effects of mica on frost susceptibility
7. Determination of the mica content
8. General conclusions
9. Acknowledgements
10. References

(C) CROWN COPYRIGHT 1978

Extracts from the text may be reproduced, except for commercial purposes, provided the source is acknowledged.
THE EFFECTS OF MICA ON THE ROADMAKING PROPERTIES OF MATERIALS

ABSTRACT

This report describes the effects of the presence of mica in china clay sand on its physical properties as a roadmaking material. It shows that the addition of coarse mica to a sand reduces the density achieved for a given state of compaction, but that this effect is as much due to the resultant change in grading as to the resilience of the mica. Other effects are considered, including that of fine mica on frost susceptibility. The results are also compared with others from earlier work using a silty-clay thus bringing the known effects of mica together in a single report.

Work on measuring the mica content showed that the inclined vibrating table used previously failed to separate the mica in the china clay sands but that a modified density-column separator could be used as an alternative to the dielectric separator.

Conclusions from the study confirm that the quantity of mica normally present in the china clay sands is not deleterious and suggests that many problems attributed in the past to mica are quite likely to have resulted from other causes, such as the overall particle-size distribution.

1. INTRODUCTION

Depletion of resources, concern about the environment and planning restrictions have increased the need to use natural aggregates efficiently. This has led to a greater interest in the use of lower-grade and waste materials as alternatives to naturally occurring high-quality aggregates for roadmaking. Such use would help to conserve the supplies of good quality aggregates and would assist in problems arising from the disposal of unwanted materials.

For these reasons, the Laboratory has been studying those industrial wastes which might be suitable for use in road construction\(^1\)\(^-\)\(^4\). One such material is the sand produced during the extraction of china clay or kaolin. This has been shown\(^5\) to be suitable for a wide range of uses, but the sands used in this previous investigation contained relatively small amounts of mica. However, it is known that significant amounts of mica can be present in the sands and, as mica can give rise to problems of compaction when it is present in roadmaking materials, its presence could lead to reluctance on the part of road engineers to use the waste sand.
In view of this, a supplementary study described in the present report was made to find the effects of the presence of mica on the properties of the sands. In addition, the report contains previously unpublished information on a similar study with a silty-clay and reviews other work on the effects of mica on roadmaking materials.

2. MICA AND THE OCCURRENCE OF MICACEOUS MATERIALS

2.1 Mica

The term mica applies to a family of minerals that are all hydrated silicates of aluminium, but which may also contain small quantities of other elements such as titanium, iron and magnesium. All have a layered structure which imparts a flat, plate-like, shape to the mica crystals with the ability of successive sheets to part easily in the plane parallel to their larger surfaces (perfect basal cleavage) and to form very thin flakes. These flakes are, however, extremely resilient when subjected to pressure on their larger surfaces, behaving rather like leaves of a leaf-spring.

The most common and distinctive mica is Muscovite (K₂O 3Al₂O₃ 6SiO₂H₂O). Muscovite, which may include some Sericite* as well, is silvery white in colour and, because of the high sheen parallel to its cleavage plane, its flakes glitter strongly in the light.

2.2 The occurrence of micaceous materials

Those roadmaking materials which contain mica can be classified into two groups based on their particle size:

a) Gravels: Alluvial or residual gravels may contain relatively coarse mica flakes. They appear to be associated with intensely weathered outcrops of intrusions of granite and pegmatite, mainly in the tropics. Generally, the individual outcrops are small in extent, although several of them may be encountered along the line of a road. China clay sand is a by-product of this type derived from the extraction of kaolin from the Cornish granite.

* Sericite is a secondary mica, formed by the chemical decomposition of a range of minerals including feldspars. It has similar chemical and physical properties to Muscovite and, apart from its different origin is difficult to distinguish from fine grained Muscovite.
b) Fine-grained soils, such as silty-clays, containing much finer mica particles. The outcrops of these materials are generally more extensive and their origins more complex, the soils having been derived from both igneous and metamorphic rocks.

3. PREVIOUS WORK ON THE PROPERTIES OF MICACEOUS MATERIALS

Difficulties that were attributed to the presence of mica have been reported from the southern states of the USA, Rhodesia, Ghana and Angola. These reports are in general terms only and it is apparent that little was known about how the presence of mica was affecting the properties of the materials, the magnitudes of these effects, or the proportions of mica present in the materials.

Because of this, a survey was carried out in 1961 by what is now the TRRL Overseas Unit. It showed that the occurrence of micaceous materials was more widespread than the literature had suggested and that it was with fine-grained materials that most difficulties occurred. The survey also showed that, although both types of micaceous materials occur in the UK, they were not considered to be a serious problem at that time.

As a result of the survey, further studies were made to obtain more information on the effect of the presence of mica on materials that contain it in significant amounts. These studies\(^7,^8\) showed that:

1. For micaceous soils with mica contents between 56 and 68 per cent, the plastic limit was 20 - 30 per cent above the optimum moisture content, unlike most materials in which the plastic limit is close to the optimum moisture content.

2. Coarse mica always had a greater effect than the same quantity of fine mica.

3. The plastic limit increased markedly as the mica content increased, until for the highly micaceous mixes the moisture content at the plastic limit exceeded that of the liquid limit. This is thought to be due to the mica flakes holding absorbed water in their cleavage planes thus increasing their plastic limit. This is also true for the liquid
limit but to a lesser extent. Additionally, the mica under the impact action of the liquid-limit bowl acts as a lubricant allowing the sample to slide down the sides of the bowl to close the groove, instead of its closing by the normal plastic flow of the surface material. If the mica flakes are relatively coarse in size it may not be possible to carry out the test at all.

4. The addition of mica resulted in a reduction in the maximum dry density obtainable with any given compactive effort, this change in density being proportional to the amount of mica added. This was accompanied by a consequential reduction in strength (California Bearing Ratio).

5. The presence of the mica did not adversely affect the strengths of either cement- or lime-stabilized materials other than by its effects on their densities. Micaceous materials are reputed to be cement-hungry but tests on the cement-stabilized china-clay sands showed that the sand with the highest strength was the most micaceous and the sand (Melbur) requiring most cement had only a low mica content. This suggests that another factor such as grading or angularity (harshness) rather than the presence of the mica was the more likely reason for the higher cement requirement.

6. The quantity of mica present could be determined by using either an inclined vibrating table or the dielectric properties of the mica to separate out the mica flakes.

4. SCOPE OF INVESTIGATION
The assessment of china clay sands as roadmaking materials showed that in the case of the sands studied, the amounts of mica present were too small to have any significant effect. However, because of the possibility that some sands may contain larger proportions of mica and in order to allay suspicions of its possible detrimental effects, the present investigation was made to find out how much mica would need to be present before it became a problem. This was done by adding quantities of fine and coarse mica to the sands and finding what effect this had on the properties of the sands.
Any fine material added to a coarse material will, of course, affect its properties and to distinguish between a mere grading effect and the particle shape effect of the mica, samples were also tested with silicas of similar gradings to the micas added in the same proportions. The results of the investigation are described in the following sections.

5. MATERIALS EXAMINED

5.1 China clay sands

Samples of the two sand wastes used were supplied by English Clays Lovering Pochin and Co. Ltd (ECLP). These were:-

a) Black Alder sand. A sand of low mica content with a grading well within the grading envelope for Type 2 sub-base materials as defined by Clause 804 of the Specification for Road and Bridge Works 10.

b) Melbur sand. A sand tending to have a higher percentage of material passing the 10mm BS sieve than is permitted by Clause 804, although the sample supplied was just within the grading envelope.

5.2 Micas

To find the effect of adding mica to the sands, as described later in Section 6, two samples of mica were also supplied by ECLP. These were:-

Tyfil mica. A very highly micaceous concentrate with 95 per cent finer than 75 microns and used as the fine mica added to the two sands.

Lee Moor mica. A concentrate of flake mica, some 75 per cent of which was between 212 and 600 microns in size. This was used as the coarse mica added to the two sands.

5.3 Siliceous materials

Graded silica sands and pulverized silicas were blended to provide silica sands with the same proportions (by weight) on each size of sieve as the fine and coarse mica concentrates (Table 1). Mica has an unusual particle shape and is also resilient. It is thus markedly different from the minerals (such as quartz) of which sands are commonly composed; indeed silica (as quartz) is the main constituent of the china clay sands and it was decided
to include these further tests with silica added instead of mica to compare their relative effects on the physical properties of the sands.

6. ASSESSMENT OF THE EFFECTS OF MICA

6.1 Effect of mica on the particle-size distribution (PSD)

6.1.1 PSD determination: The PSDs of both sands were determined using the procedure given by Test 7A, BS1377\textsuperscript{11} (Standard Method by wet sieving), but dry sieving (Test 7B, BS1377) was considered more appropriate for determining the PSD of the micas. The results are given in Fig.1 and Table 1 respectively.

6.1.2 Discussion: The presence of mica can cause difficulty in PSD determination unless the test procedure is carefully chosen. This is because the thin plate-like shape of micas contrasts markedly with that of minerals present in most soils, gravels or crushed rocks. These are generally approximately cubical or spherical in shape. This thin wafer-like shape inhibits the use of those PSD tests that use sedimentation techniques, because they are all based on Stokes' Law, which applies only to spherical particles. Additionally the large surface-area-to-volume ratio of the mica enables it to 'float' by surface tension on liquids of lower density, and multiple uncleaved flakes can also hold quantities of liquid absorbed between the individual flakes. The cleavability of the mica flakes can also cause difficulty in sieving because while insufficient shaking can give an incomplete size separation, too vigorous or excessive shaking can cause the mica flakes to cleave excessively. However, this is of theoretical rather than practical importance if the sieving is done according to the procedures recommended in BS1377.
### TABLE 1
Particle-size distributions of the mica concentrates

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Percentage passing sieve</th>
<th>Lee Moor (Coarse)</th>
<th>Tyfil (Fine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0 mm</td>
<td></td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>2.36 mm</td>
<td></td>
<td>99.7</td>
<td>-</td>
</tr>
<tr>
<td>1.18 mm</td>
<td></td>
<td>99.4</td>
<td>100</td>
</tr>
<tr>
<td>600 microns</td>
<td></td>
<td>93.5</td>
<td>99.9</td>
</tr>
<tr>
<td>300 microns</td>
<td></td>
<td>43.5</td>
<td>99.7</td>
</tr>
<tr>
<td>150 microns</td>
<td></td>
<td>10.4</td>
<td>98.8</td>
</tr>
<tr>
<td>75 microns</td>
<td></td>
<td>3.5</td>
<td>94.5</td>
</tr>
<tr>
<td>53 microns</td>
<td></td>
<td>-</td>
<td>86.6</td>
</tr>
</tbody>
</table>

### TABLE 2
Specific gravity determinations

<table>
<thead>
<tr>
<th>A. Materials added to the china clay sands</th>
<th>B. China clay sands and sand mixes</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Grade</td>
<td>Specific Gravity</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>------------------</td>
</tr>
<tr>
<td>Mica</td>
<td>fine</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>coarse</td>
<td>2.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica</td>
<td>fine</td>
<td>2.68</td>
</tr>
<tr>
<td></td>
<td>coarse</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.2 *Effects of mica on the specific gravity and plasticity of the china clay sands*

6.2.1 Specific gravity determinations: These were made using the procedure given by Test 6A, BS1377 and the results are given in Table 2.

6.2.2 Plasticity determinations: No attempt was made to carry out the plasticity tests as it was apparent both visually and from the PSD tests that the sands contained too little plastic material for the determination of their plastic limits to have been possible.

6.3 *Effect of mica on the compacted density of china clay sands*

6.3.1 Mixes studied: Compaction tests were made on the Melbur and Black Alder sands alone and with the following amounts of mica or silica added:

(i) 15 per cent fine mica
(ii) 15 per cent coarse mica
(iii) 25 per cent fine mica
(iv) 25 per cent coarse mica
(v) 25 per cent fine silica
(vi) 25 per cent coarse silica.

6.3.2 Compaction methods: In the main evaluation of the china clay sands it proved difficult to obtain well-defined compaction curves using the BS Vibrating Hammer Test (Test 14, BS1377\(^1\)); the Modified Vibrating Hammer Test (MVHT) developed by Pike and Acott\(^2\) was therefore used as a more satisfactory alternative. It was also used in this study of the compaction properties of the Melbur and Black Alder sands with micas or silicas added. The results are given in Figs 2 and 3.

6.3.3 Discussion of the compaction results: The results in Figs 2 and 3 show that the maximum dry densities of the sands with added mica or silica differed appreciably from those of the sands alone. These results agree well with previously unpublished data when 20 per cent of fine and coarse micas and silicas were added to a silty clay. These compaction curves are given in Fig 4 and the grading curves of the clay-mica and clay-silica mixes are shown in Fig 5.
Both sets of results show that the micaceous mixes behaved differently from the siliceous ones. The addition of silica resulted in higher densities being obtained, but the addition of mica always resulted in a lower density than that for its siliceous counterpart. This suggests that the changes in density shown in the figures can have two components. The first (and larger) is the change in density produced solely as a result of the change in grading produced by the addition of the micas or silicas. The second, confined to the micaceous materials only, is due to some physical property unique to the mica. This is almost certainly the resilience of the mica flakes which allows them to deform under load and recover after the load has been removed, rather like leaves of a leaf-spring. It is worth recording that during the early work using dropping-hammer compaction, considerable hammer-rebound was noticed with the more micaceous mixes containing coarse mica. This elastic deformation would absorb energy, so that for any given compactive effort a lower density would result. The effects are more pronounced with the coarse mica than with the fine.

Examination of the compaction curves in Figs 2 - 4 shows that each one per cent of mica has reduced the density by the amounts in Table 3.

<table>
<thead>
<tr>
<th>Mica size</th>
<th>Reduction in density Mg/m$^3$/per cent mica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty clay</td>
<td>0.007</td>
</tr>
<tr>
<td>Melbur china clay sand</td>
<td>0.007</td>
</tr>
<tr>
<td>Black Alder china clay sand</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Coarse</td>
</tr>
<tr>
<td>Silty clay</td>
<td>0.012</td>
</tr>
<tr>
<td>Melbur china clay sand</td>
<td>0.012</td>
</tr>
<tr>
<td>Black Alder china clay sand</td>
<td>0.014</td>
</tr>
</tbody>
</table>

These amounts are much smaller than had been suggested in earlier studies because the reduction in density caused by the change in grading was not then differentiated from that due to the properties of the mica. It would, therefore, appear that, although the micaceous materials may be
troublesome to compact, the mica is often blamed unfairly, whereas a non-micaceous material with the same grading would be almost as difficult.

It is possible that the shape of the mica also enhances the reduction in density. The presence of plate-like particles in a mass of predominantly rounded particles would tend to decrease the packing efficiency by increasing the size of some of the voids around them and thus also contribute to the lowering of the density.

Differences in density caused by differences in specific gravity can be discounted. Theoretical calculations of the SG's of the micaceous silty clay mixes give higher SG's for the latter and therefore higher compacted densities would be expected. The evidence is even clearer for the china clay sands because the SG's of the sand mixes were checked (Table 2). These results show that these differences are only small with the total variation between any of the mixes being no greater than the variation between the two duplicate determinations required by the BS for the test (Test 6A, BS1377). Moreover, any difference in density due to difference in SG between the mica and silica should be the same for both coarse and fine materials since the same proportions by weight were used.

The increase in the optimum moisture contents of the micaceous mixes is thought to be primarily a function of the particle shapes. The larger surface area of the mica compared to the more rounded silica means that more water is needed to coat the mica particles and so more water is needed to lubricate the particles for compaction. In addition, the ability of mica to absorb or store water within its lattice enhances this effect because this water, although removed during a moisture content determination, does not make any contribution to the compaction behaviour.

6.4 Effects of mica on breakdown under compaction

Materials intended for use as Type 2 sub-bases have to satisfy the grading requirements given in Clause 804. To see whether these sand wastes were liable to breakdown during compaction and thus change in grading, the gradings of the samples used for the MvHT were measured after compaction as part of the main evaluation of the sands. Similar grading tests were carried out on the sands to which mica or silica had been added and their
gradings were compared with those calculated from the known gradings of the sands and the added mica or silica. The results, two examples of which are illustrated in Fig 6 show that the presence of mica or silica did not adversely affect the breakdown behaviour and in this respect the presence of the mica was not deleterious.

6.5 Effects of mica on frost susceptibility

Current practice requires that no material used within 450 mm of the road surface shall be frost susceptible as defined by the test described in TRRL Report LR90°. For bulk fill this is not a particularly severe limitation in the use of a material, but at sub-base and base levels it assumes greater importance. Tests were, therefore, made to find the frost susceptibility of the china clay sands and the effect that the presence of mica might have on this property. The results are given in Table 5.

| TABLE 5 |
| Frost heave test results for china clay sands |

<table>
<thead>
<tr>
<th>Material</th>
<th>Frost heave (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sand only</td>
</tr>
<tr>
<td>Melbur</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>(Mean)</td>
</tr>
<tr>
<td>Black Alder</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>(Mean)</td>
</tr>
</tbody>
</table>

The effect of the addition of mica and silica on the frost susceptibility of the sands shows the important role of the particle size distribution in determining the frost heave. In general, coarse, free draining materials are not susceptible but the susceptibility increases with increases in fines content. Thus of the two sands included in this study that from Black Alder, the coarser, had the lower frost heave, whilst a third sand in the main study which had the highest fines content also had the highest mean heave (17mm). The addition of fine material to the sand, whether in the form of mica or
silica, enormously increased the frost susceptibility, whereas the coarse mica and silica slightly reduced the frost heave. The fine mica, however, appears to have a further adverse effect additional to that resulting from the alteration in grading. This effect is confined to the fine mica only and suggests that the fine mica may, in some way, facilitate the water penetration, possibly by increasing the number of capillary-sized pores and hence the suction. The coarse mica probably produces larger pores which do not appear to increase the suction.

7. DETERMINATION OF THE MICA CONTENT
In a previous study of methods for determining the mica content of micaceous soils, two methods were evolved, one using an inclined vibrating table, the other utilizing the dielectric properties of the mica, which gave comparable quantitative determinations of the mica content of three highly micaceous materials from Ghana. It was also known that a heavy liquid separation technique capable of giving quantitative mineral separations had been developed by Muller, but this apparatus was not then available commercially.

In this present study some preliminary investigations into the mica contents of the china clay sands were initiated, but were discontinued when the engineering results indicated that at the levels at which the mica was present, it (the mica) was not a problem and it was likely that appreciably higher quantities could be tolerated before problems were likely to arise.

The limited programme did, however, confirm the desirability of segregating the sample into size-fractions for mica determination and the need to reduce the coarser fragments, composed of multiple mineral grains, to their individual mineral constituents as far as possible. It also showed that:

1. The vibrating table used previously was not suitable and failed to separate the mica in the china clay sands.

2. Muller's separator which is now available commercially, was suitable for determining the mica in the china clay sands if a two stage separation were used to remove minerals with SG's higher and lower than that of the micas.
8. GENERAL CONCLUSIONS

The results obtained during the investigations show that:-

1. The proportion of mica normally present in china clay sand is too low to cause problems in their use for most aspects of road construction.

2. The main effect of the presence of mica is that its resilience reduces the degree of compaction achievable, for a given compactive effort, by about 0.007 Mg/m$^3$ and 0.012 Mg/m$^3$ for each one per cent of fine and coarse mica respectively.

3. Other effects of mica on the physical properties are:-
   
a) Both the liquid and plastic limits are increased; the increase is greater for the PL than for the LL and at high mica contents inversion occurs giving a negative value for the PI.
   
b) The increase in PL means that it may be as much as 20 to 30 per cent above the optimum moisture content, unlike most materials, where the two are nearly the same.
   
c) The presence of fine mica has the adverse effect of markedly increasing the frost susceptibility.
   
d) The presence of mica inhibits the use of sedimentation techniques based on Stokes' Law for determining the particle size distribution of micaceous materials.

4. The proportions of mica present can be determined using either the dielectric properties of the mica, or a commercially available density column separator, but the inclined vibrating table separator was not suitable for use with the china clay sands.

5. The distinctive colour, lustre and thin flakey-shape renders the presence of even trace quantities of mica very obvious. Consequently many of the
difficulties attributed to its presence in the past are more likely to result from other causes such as the overall particle size distribution.

9. ACKNOWLEDGEMENTS

The work described in this Report was carried out in the Materials Division (G F Salt, Division Head) of the Highways Department of the Transport and Road Research Laboratory. The authors would like to thank English Clays, Lovering Pochin and Co Ltd for supplying the micas and china clay sands and the Scottish Branch of TRRL who carried out the frost tests.

10. REFERENCES


7. TUBEY L W and N J BULMAN. Micaceous soils: methods of determining mica content and the use of routine tests in the evaluation of such soils. Proc 2nd Conf Austr Road Research Board, 1964, 2, 880 - 901

8. TUBEY L W. A laboratory investigation to determine the effect of mica on the properties of soils and stabilized soils. Department of Scientific and Industrial Research Road Research, Note No. RN/4077/LWT (Unpublished)

10. MINISTRY OF TRANSPORT. Specification for road and bridge works (5th Edit) London 1976 (HMSO)

11. BRITISH STANDARDS INSTITUTION. Methods of test for soils for civil engineering purposes. BS 1377, 1975, London 1975 (British Standards Institution)


13. CRONEY D and J C JACOBS. The frost susceptibility of soils and road materials Ministry of Transport, RRL Report LR90, Crowthorne, 1967. (Road Research Laboratory)


Fig. 1 GRADING OF THE TWO CHINA CLAY SAND WASTES
Fig. 2 COMPACCIÓN TEST RESULTS ON MELBUR MATERIALS USING MODIFIED VIBRATING HAMMER COMPACCIÓN
Fig. 3 COMPACtion TEST RESULTS ON BLACK ALDER MATERIALS USING MODIFIED VIBRATING HAMMER COMPACTION
Fig. 4 COMPACTION TEST RESULTS ON A MICACEOUS AND A SILICEOUS SILTY-CLAY USING 2.5 kg RAMMER COMPACTION (TEST 12, BS 1377)
Fig. 6 EFFECTS OF MICA ON THE BREAKDOWN OF MELBUR SAND WITH ADDED MICA
THE EFFECTS OF MICA ON THE ROADMAKING PROPERTIES OF MATERIALS: L W Tubey and D C Webster: Department of the Environment Department of Transport TRRL Supplementary Report 408: Crowthorne, 1978 (Transport and Road Research Laboratory). This report describes the effects of the presence of mica in china clay sand on its physical properties as a roadmaking material. It shows that the addition of coarse mica to a sand reduces the density achieved for a given state of compaction, but that this effect is as much due to the resultant change in grading as to the resilience of the mica. Other effects are considered, including that of fine mica on frost susceptibility. The results are also compared with others from earlier work using a silty-clay thus bringing the known effects of mica together in a single report.

Work on measuring the mica content showed that the inclined vibrating table used previously failed to separate the mica in the china clay sands but that a modified density-column separator could be used as an alternative to the dielectric separator.

Conclusions from the study confirm that the quantity of mica normally present in the china clay sands is not deleterious and suggests that many problems attributed in the past to mica are quite likely to have resulted from other causes, such as the overall particle-size distribution.

ISSN 0305-1315