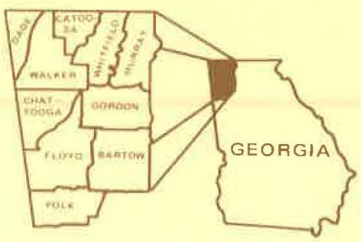
CERAMIC AND STRUCTURAL CLAYS, SHALES AND SLATES OF POLK COUNTY, GEORGIA

BRUCE J. O'CONNOR



DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

INFORMATION CIRCULAR 71

Cover Photo:

Rockmart Slate (Ordovician) at the former Marquet Cement Manufacturing Company pit 1/4 mile west of Ga. Hwy. 101 about 1 mile north of Rockmart and about 2 miles south of Aragon. Slate was used in the manufacture of portland cement at the nearby plant. (Photo by Mr. Ben Ernest, 1975)

CERAMIC AND STRUCTURAL CLAYS, SHALES AND SLATES OF POLK COUNTY, GEORGIA

By

Bruce J. O'Connor
Principal Geologist

Information Circular 71

GEORGIA DEPARTMENT OF NATURAL RESOURCES
J. Leonard Ledbetter, Commissioner

ENVIRONMENTAL PROTECTION DIVISION
Harold F. Reheis, Assistant Director

GEORGIA GEOLOGIC SURVEY
William H. McLemore, State Geologist

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INTRODUCTION

This report presents a compilation of all available published and unpublished ceramic firing tests and related analytical data on samples from Polk County, Georgia. It provides information on mined and/or undeveloped clays, shales and related materials; and is intended for use by geologists, engineers and members of the general public. The report should aid in the exploration for deposits of ceramic raw material with economic potential for future development. This information may also be of use to those who wish to obtain information on the potential use of particular deposits at specific locations.

Tests by the U.S. Bureau of Mines, subsequently referred to as USBM, were performed by the Norris Metallurgy Research Laboratory, Norris, Tennessee and the Tuscaloosa Research Center, Tuscaloosa, Alabama under cooperative agreements with the Georgia Geologic Survey and its predecessors (i.e., the Earth and Water Division of the Ga. Department of Natural Resources; the Department of Mines, Mining and Geology; and the Geological Survey of Georgia). Many of the firing tests were performed on samples collected by former staff members of the Georgia Geologic Survey (and its predecessors) during several uncompleted and unpublished studies. These include work by Bentley (1964), Smith (1968?) and Tadkod (1980). Additional unpublished data presented in this compilation include work by TVA (see Butts and Gildersleeve, 1948, p. 124 and 125). Published data include studies by the following authors: Spencer (1893, p. 217 to 287; chemical analyses only), Veatch (1909, p. 272 to 388), Smith (1931, p. 241 to 276), and Butts and Gildersleeve (1948, p. 124 and 125).

Regardless of the source, all of the ceramic firing testing data presented in this report are based on laboratory tests that are preliminary in nature and will not suffice for plant or process design. They do not preclude the use of the materials in mixes (Liles and Heystek, 1977, p. 5).

ACKNOWLEDGEMENTS

The author gratefully acknowledges the help of many individuals during the preparation of this report and the work of many who contributed to the earlier, unpublished studies included here. The cooperative work of the U.S. Bureau of Mines forms the main data base of this study. During the last several years Robert D. Thomson, Chief of the Eastern Field Operations Center, Pittsburgh, Pennsylvania, was responsible for administering the funding of costs incurred by the USBM. Others in that office who helped coordinate the program were Charles T. Chislaghi and Bradford B. Williams. Since 1966 M.E. Tyrrell, H. Heystek, and A.V. Petty, Ceramic Engineers, and Kenneth J. Liles, Research Chemist, planned and supervised the test work done at the USBM Tuscaloosa Research Center in Tuscaloosa, Alabama. Prior to 1966 this test work was supervised by ceramists H. Wilson, G.S. Skinner, T.A. Klinefelter, H.P. Hamlin and M.V. Denny at the former Norris Metallurgy Research Laboratory in Norris, Tennessee. Tests by the Tennessee Valley Authority were conducted under the supervision of H.S. Rankin and M.K. Banks at the Mineral Research Laboratory on the campus of North Carolina State College, Asheville, North Carolina, using samples collected by S.D. Broadhurst. Additional tests were conducted by professors W.C. Hansard, L. Mitchell, and J.F. Benzel at the Department of Ceramic Engineering, Georgia Institute of Technology, Atlanta, Georgia. The majority of the unpublished tests were performed on samples collected by former staff geologists of the Georgia Geologic Survey, predominantly by J.W. Smith, A.S. Furcron, R.D. Bentley, N.K. Olsen, D. Ray, M.A. Tadkod, and G. Peyton, assisted by C.W. Cressler of the U.S. Geological Survey. N.K. Olsen and C.W. Cressler also have

provided the author with valuable advice and suggestions regarding sample locations and past studies. The advice and encouragement of my colleagues on the staff of the Georgia Geologic Survey are greatly appreciated. However, the contents of this report and any errors of omission or commission therein are the sole responsibility of the author.

LOCATION OF STUDY AREA

Polk County is located at the southwestern corner of the Valley and Ridge province of northwest Georgia (Fig. 1). One company is currently mining slate in the county, and several operations have been active here in the past (Tables 1 and 2). The most abundant ceramic raw materials in the county are the shales and residual clays derived from the Floyd Shale and the Conasauga Group; however, other units such as the Rome, Red Mountain, Pennington and Gizzard Formations, as well as residual clays of the Knox Group, are locally well developed. The general nature of these and other geologic units which occur in the county are summarized on Table 3.

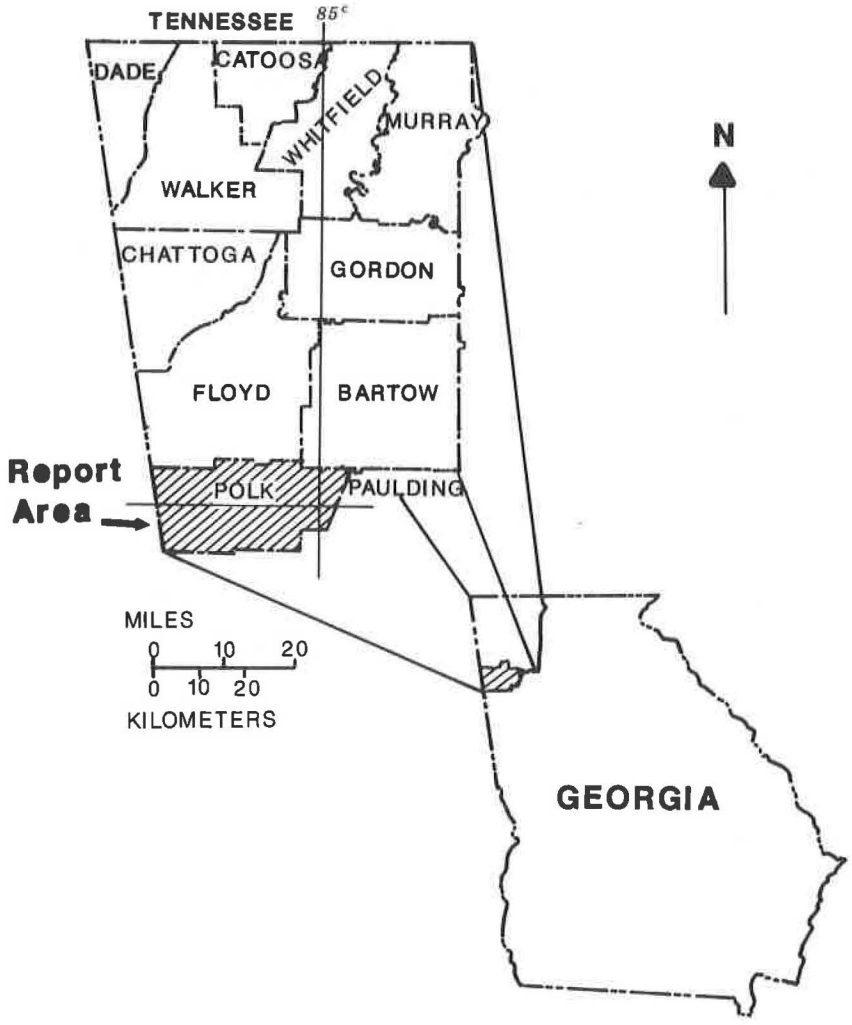


FIGURE 1

LOCATION OF POLK COUNTY REPORT AREA

(after Cressler, and others, 1976)

TABLE 1

Active Slate, Clay and Shale Mines and Pits in Polk County, Georgia*

COMPANY CONTACT	LOCATION OF MINE, PIT OR QUARRY	USE(S) GEOLOGIC AGE-FORMATION
Galite Corp. P. O. Box 468 Rockmart, GA 30153 P.S. Stephens President (404)684-6583	Rockmart mine & mill: Just south of Rockmart, 1/2 mile south of Ga. Hwy.6, east of Seaboard R.R. (Permit #046 formerly operated by Georgia Lightweight Aggregate Co., Atlanta.)	Expanded slate for lightweight aggregate. (Also landscaping stone.) (Ordovician - Rockmart Slate)

*After Kline and O'Connor, 1981, p.11

TABLE 2

Summary of 20th Century Clay, Slate and Shale Mines and Companies in Polk County, Georgia

Chattahoochee Brick Co. (Atlanta, 1885), Taylorsville pit: Sericite, Rockmart slate. (12 Acres currently permitted.)

*Galite Corp. (1952), Rockmart plant and quarry: expanded slate for lightweight aggregate, Rocmkart slate. Ceramic test: Plk. 46-7 (Butts and Gildersleeve, 1948, p. 125, and Chowns. 1977, p. 17 & 18.)

Georgia Lightweight Aggregate Co. (1953?) - see Galite Corp. above.

B. Mifflin Hood Brick Co. (TN), Aragon pit: Clay (?). Sold to Ladd Lime & Stone Co. (Butts and Gildersleeve, 1948, No. 46).

Mansfield Brick Co. (Pre-1908?), Rockmart plant and pits: Common brick from weathered Rockmart "Shale" (= Plk. 31S-1?) (Veatch, 1909, p. 424 and 113?; Smith, 1931, p. 69).

Marquette Co. (Atlanta, 1902), Rockmart (and Braswell?) plant and quarry: Cement from Conasauga Group shale. Acquired from Southern States Portland Cement Co., c. 1955 (19 acres permitted.)

Rockmart Shale Brick and Slate Co. (1912?), Rockmart plant and quarry: Vitrified paving brick from deeply weathered Rockmart Slate ("Caen stone") and residual clay (Maynard, 1912, p. 133, locn. 3p, no. 31; Shearer, 1918, p. 65-68, localaity 1; Pinson, 1949, p. 114-119)

Southern States Portland Cement Co. (1903?), Rockmart plant and quarry: Vitrified paving brick from deeply weathered Rockmart Slate ("Caen stone") and residual clay (Maynard, 1912, p. 133, locn. 3P, no. 31; Shearer, 1918, p. 65-68, locality 1; Pinson, 1994, p. 114-119)

NOTE:

The majority of the information for the companies listed above was taken from the Mining Directories (Circular 2, 1st to 18th editions) published by the Georgia Geologic Survey and its predecessors at irregular intervals since 1937. Some additional information came from the "Georgia Surface Mining and Land Reclamation Activities" published annually since 1969 by the Georgia Surface Mined Land Reclamation Program (Environmental Protection Division, Ga. Dept. of Natural Resources). Additional sources of information were found in the references cited at the end of each entry. Uncertainty in the dates is due to incomplete records in the Survey's files.

* Active pit.

TABLE 3

Generalized Summary of Stratigraphic Units in Polk County, Northwest Georgia

CHRONOSTRATIGRAPHIC UNIT	STRATIGRAPHIC UNITS C THICKNESS AND ROCK TYPES 1/
Quaternary (and Tertiary?)	* Various unnamed bodies of alluvial, colluvial and residual material. Largely clay and sand, but also, locally gravel and breccia.
Mississippian	* Floyd Shale - Approx. 100-2000 ft., dark gray clay shale with some silt and sandstone; Fort Payne Formation (or Chert) - Approx. 10-125 ft., thin- to thick-bedded chert and cherty limestone. Locally includes: Lavender Shale member - Approx. 0-100 ft., shale, massive mudstone and impure limestone.
Devonian	Armuchee Chert - Approx. 5-30 ft., thin- to thick-bedded, gray chert - locally sandy and ferruginous Frog Mountain Sandstone Approx. 5-30 ft., thin- to massive-bedded sandstone and quartzite locally with intgerbedded chert.

TABLE 3

Generalized Summary of Stratigraphic Units in Polk County, Northwest Georgia (continued)

CHRONOSTRATIGRAPHIC UNIT	STRATIGRAPHIC UNITS - THICKNESS AND ROCK TYPES 1/
Ordovician	**Rockmart Slate - Approx. 0-600 ft., dark greenish-gray slate with some siltstone, sandstone and conglomerate. Lenoir Limestone - Approx. 0-100+ ft., gray, fine-grained limestone. Includes: Mosheim Limestone Member - 35 ft., gray fossiliferous limestone; and Deaton Member - 0-100+ ft., dark gray, ferruginous carbonate, sandstone & quartzite.
Cambrian-Ordovician	(*)Knox Group - Approx. 2000-4000 ft., dominantly cherty dolostone, minor limestone, and sandstone. Includes: Newala Limestone - Approx. 300 ft., gray limestone and dolostone; Longview limestone - Approx. 350 ft., gray dolostone and limestone; Chepultepec Dolomite - Approx. 800 ft., gray dolostone with some limestone & sandstone; and Copper Ridge Dolomite - Approx. 2500 ft., gray, cherty dolostone.

TABLE 3

Generalized Summary of Stratigraphic Units in Polk County, Northwest Georgia (continued)

CHRONOSTRATIGRAPHIC UNIT	STRATIGRAPHIC UNITS - THICKNESS AND ROCK TYPES 1/
Cambrian	Conasauga Group (or Formation) - Approx. 1500-200 ft., predominantly shale, limestone and dolostone. Includes: "Upper Part" = Approx. 400-1600 ft.; "Middle Part" = Approx. 200-400 ft.; and "Lower Part" = Massive, gray limestone, - Approx. 1500 ft. or more. *Rome Formation - Approx. 500-1000 ft., shale, and interbedded sandstone, siltstone and quartzite - typically red, purple, green, yellow or brown. Shady Dolomite (or Dolostone) - Approx. 30-100 ft., cherty gray dolomite limestone with minor shale. ("Beaver Limestone" of former usage.)
Paleozoic or Precambrian	*Talladega Group - Dark slate and phyllite with local quartzite, metagraywacke, and mica schist.

NOTES:
* = Some ceramic firing tests have been made on slate, shales and clays of this unit.
*) = Same as the above, but for residual clays only.
*= Numerous firing tests have been made on this unit.
1/ Descriptions based on data in Bergenback and others, 1980; Butts and Gildersleeve, 1948; Chowns, 1972, 1977; Chowns and McKinney, 1980; Crawford, 1983; Cressler 1963, 1964a and b, 1970, 1974; Cressler and others, 1979; Croft, 1964; Georgia Geologic Survey, 1976; Thomas and Cramer, 1979.

EXPLANATION OF KEY TERMS ON THE CERAMIC TEST AND ANALYSES FORMS

The test data and analyses which are presented here were compiled on a set of standardized forms (Ceramic Tests and Analyses) in the most concise manner consistent with the various laboratories represented. These forms are modified in large part after those used by the Pennsylvania Geological Survey (e.g., O'Neill and Barnes, 1979, 1981).

It should be noted that, although the great majority of these tests were performed by the USBM, it was decided not to reproduce their data forms directly for several reasons. First, the USBM forms contain several entries which are not essential to this project (e.g., Date received) or do not make the most efficient use of space. Second, the USBM forms have been changed several times over the span of decades covered by the present compilation. Finally, investigators from other laboratories have reported parameters which were not measured by the USBM.

The paragraphs which follow briefly describe, in alphabetical order, the more critical entries on the forms, the nature of the information included and, where possible, the various factors and implications to be considered in their interpretation. Many of the particular comments here are based on descriptive information published in the following sources. Tests by Georgia Geologic Survey authors are described in Veatch (1909, p. 50 to 64) and in Smith (1931, p. 19 to 25), while the particulars of the USBM studies are given in Klinefelter and Hamlin (1957, especially p. 5 to 41) and in Liles and Heystek (1977, especially p. 2 to 16). The discussions which follow are not intended to be exhaustive but are merely meant to remind the reader,

and potential user, of the key aspects of the information presented. Various technical texts and reports should be consulted for more detailed information (e.g., Clews, 1969; Grimshaw, 1972; Jones and Beard, 1972; Norton, 1942; Patterson and Murray, 1983). The abbreviations used on these test forms are defined in Table 4.

1. Absorption (%)

The absorption is a measure of the amount of water absorbed by open pores in the fired specimen and is given as a percentage of the specimen's dry weight. For slow firing tests, it is measured on fired specimens which have been boiled in water for 2 to 5 hours and then kept immersed in the water for up to 24 hours while cooling (Smith, 1931, p. 22; Klinefelter and Hamlin, 1957, p. 27-28; Liles and Heystek, 1977, p. 3). For the quick firing tests, however, the specimens are not boiled but only cooled and then immersed in water for 24 hours (Liles and Heystek, 1977, p. 4).

The absorption gives an indication of the amount of moisture which may be absorbed and subject to destructive freezing in outdoor structures. Less than 22% absorption is considered promising for slow-fired materials.

2. Appr. Por. (%) - Apparent Porosity, Percent

The apparent porosity is a measure of the amount of open pore space in the fired sample, relative to its bulk volume, and is expressed as a percent. As in the case of absorption values, it is based on the weight and volume of the specimen which has been boiled in water for 2 to 5 hours and then kept immersed in water for several hours as it cools (Klinefelter and Hamlin, 1957, p. 27 to 28; Liles and Heystek,

TABLE 4

Abbreviations for Terms on the Ceramic Firing Test Forms

ABBREVIATIONS

Appr. Por. = Apparent Porosity
App. Sp. Gr. = Apparent Specific Gravity

Btw. = Bartow County

°C = Degrees Celsius
Ct. = Catoosa County
Cht. = Chattooga County

Dd. = Dade County
Dist. = District
DTA = Differential Thermal Analysis

E. = East

°F = Degrees Fahrenheit
Fl. = Floyd County

g/cm^3 = Grams per cubic centimeter
Gdn. = Gordon County

Lab. & No. = Laboratory (name) and number (assigned in laboratory)
Lat. = Latitude
LOI = Loss on Ignition
Long. = Longitude
lb/in^2 = Pounds per square inch
lb/ft^3 = Pounds per cubic foot

Mry. = Murray County

N. = North
NE. = Northeast
NW. = Northwest

org. = Organic

Plk. = Polk County

S. = South
SE. = Southeast
SW. = Southwest
Sec. = Section

Table 4. Abbreviations for Terms on the Ceramic Firing Test Forms (continued)

7 1/2' topo. quad. = 7 and 1/2 minute topographic quadrangle

Temp. = Temperature
TVA = Tennessee Valley Authority

USBM = U.S. Bureau of Mines
USGS = U.S. Geological Survey

W. = West
Wkr. = Walker County
Wf. = Whitfield County

XRD = X-ray diffraction

1977, p. 3). The apparent porosity is an indication of the relative resistance to damage during freezing and thawing. Less than 20% apparent porosity is considered promising for slow-fired materials (O'Neill and Barnes, 1979, p. 14, Fig. 4).

3. App. Sp. Gr. - Apparent Specific Gravity

As reported in earlier USBM studies, the apparent specific gravity is a measure of the specific gravity of that portion of the test specimen that is impervious to water. This is determined by boiling the sample in water for 2 hours and soaking it in water overnight or 24 hours (Klinefelter and Hamlin, 1957, p. 27 to 28). These data were replaced by bulk density and apparent porosity measurements after the USBM moved its laboratories from Norris, Tennessee to Tuscaloosa, Alabama in 1965.

4. Bloating

Bloating is the term given to the process in which clay or shale fragments expand (commonly two or more times their original volume) during rapid firing. It results from the entrapment of gases which are released from the minerals during firing but which do not escape from the body of the host fragment due to the viscosity of the host at that temperature. Bloating is a desirable and essential property for the production of expanded lightweight aggregate where an artificial pumice or scoria is produced. Expanded lightweight aggregate has the advantages of light weight and high strength compared to conventional crushed stone aggregate. Bloating is not desirable, however, in making other structural clay products such as brick, tile and sewer pipe where the dimensional characteristics must be carefully controlled. In these cases bloating is extremely deleterious since it leads to variable and uncontrollable warping, expansion and general disruption of the fired clay body (Klinefelter and Hamlin, 1957, p. 39-41).

5. Bloating Test (or Quick Firing Test)

The Bloating Test refers to the process of rapidly firing (or "burning") the raw sample in a pre-heated furnace or kiln to determine its bloating characteristics for possible use as a lightweight aggregate. Although specific details of the different laboratory methods vary, all use several fragments of the dried clay or shale placed in a refractory plaque (or "boat") which in turn is placed in the pre-heated furnace for 15 minutes (Klinefelter and Hamlin, 1957, p. 41; Liles and Heystek, 1977, p. 4).

6. Bulk Density (or Bulk Dens.)

The bulk density is a measure of the overall density of the fired specimen based on its dry weight divided by its volume (including pores). Determinations are the same for slow firing and quick firing test samples, although for the latter the results are given in pounds per cubic inch as well as grams per cubic centimeter units (Klinefelter and Hamlin, 1957, p. 27 to 28 and 41; Liles and Heystek, 1977, p. 3 and 4). If quick-fired material yields a bulk density of less than 62.4 lb/ft^3 (or if the material floats in water), it is considered promising for lightweight aggregate (K. Liles, oral communication, 1984).

7. Color

The color of the unfired material, unless otherwise stated, represents the crushed and ground clay or shale. In most cases this is given for descriptive purposes only since it is generally of no practical importance for ceramic applications (only the fired color is significant). Here only broad descriptive terms such as light-brown, cream, gray, tan, etc. are used. Fired colors are more critical and therefore more specific descriptive terms and phrases are used (Klinefelter and Hamlin, 1957, p. 18 and 19). In many cases the Munsell color is given for a precise description (see discussion below).

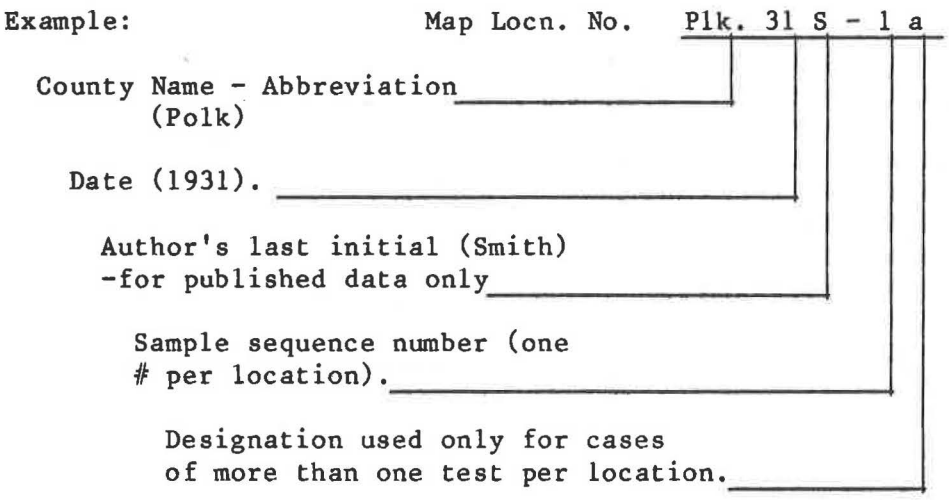
8. Color (Munsell)

This is a system of color classification based on hue, value (or brightness) and chroma (or purity) as applied to the fired samples in this compilation. It was used by Smith (1931, p. 23-25) and by the

USBM since the early 1970's (Liles and Heystek, 1977, p. 3; Liles, oral communication, 1982). In all other cases the fired color was estimated visually.

9. Compilation Map Location No.

This number or code was assigned by the author to provide a systematic designation to be used in plotting sample locations on the base maps as shown by the typical example below.



The map location number Plk. 31S-1a is derived from the county name (e.g., Plk. for Polk County), the year the tests were performed (e.g., 31 for 1931) plus the last initial of the author for major published sources (e.g., S for Smith), followed by a sequence number assigned in chronological order or sequential order for published data. (The only exceptions to this are the tests reported in Smith, 1931, wherein the sequence number of the present report is the same as the "Map location No." of Smith.) Each map location number represents a specific loca-

tion, or area, sampled at a particular time. In cases where several separate samples were collected from a relatively restricted area, such as an individual property, such samples are designated a, b, c, etc. Different map location numbers have been assigned to samples which were collected from the same general locality, such as a pit or quarry, but which were collected by different investigators at different times.

10. Cone

Standard pyrometric cones, or cones, are a pyrometric measure of firing temperature and time in the kiln. They are small, three-sided pyramids made of ceramic materials compounded in a series, so as to soften or deform in progression with increasing temperature and/or time of heating. Thus, they do not measure a specific temperature, but rather the combined effect of temperature, time, and other conditions of the firing treatment. The entire series of cones ranges from about 1112°F (600°C) to about 3632°F (2000°C) with an average interval of about 20°C between cones for a constant, slow rate of heating (Klinefelter and Hamlin, 1957, p. 29). For the past several decades the use of these cones has been limited to the Pyrometric Cone Equivalent (PCE) test (Liles and Heystek, 1977, p. 16). However, all of the ceramic firing tests reported by Veatch (1909) and Smith (1931) as well as some of the earliest USBM tests report firing conditions in terms of the standard cone numbers.

11. Drying Shrinkage

The drying shrinkage is a measure of the relative amount of shrinkage (in percent) which the tempered and molded material undergoes

upon drying. Although there are a variety of ways by which this can be measured, in this report the shrinkage values represent the percent linear shrinkage based on the linear distance measured between two reference marks or lines imprinted on the plastic specimen before drying. Even though the methods have varied in detail, the drying is usually accomplished in two stages: first, by air drying at room temperature (usually for 24 hours) and second, by drying in an oven followed by cooling to room temperature in a desiccator (Klinefelter and Hamlin, 1957, p. 30-31; Liles and Heystek, 1977, p. 3). In most cases the heating was at 212°F (100°C) for 24 hours; however, studies by Smith (1931, p. 20 and 21) employed 167°F (75°C) for 5 hours followed by 230°F (110°C) for 3 hours.

12. Dry Strength

The dry strength (or green strength) is a measure of the apparent strength of the clay or shale after it has been molded and dried. Unless otherwise indicated, it represents the tranverse, or crossbreaking, strength as opposed to either tensile strength or compressive strength. For the great majority of cases only the approximate dry strength is indicated as determined by visual inspection, using such terms as low, fair, good, or high (Klinefelter and Hamlin, 1957, p. 32-33; Liles and Heystek, 1977, p. 2). Smith (1931, p. 12-13) reports a quantitative measurement of this strength using the modulus of rupture (MOR) expressed in units of pounds per square inch (psi).

13. Extrusion Test

More extensive tests are sometimes made on clays and shales which

show good plasticity and long firing range in the preliminary test. In the Extrusion Test several bars are formed using a de-airing extrusion machine (i.e., one which operates with a vacuum to remove all possible air pockets). These bars are fired and tested for shrinkage, strength (modulus of rupture) and water saturation coefficient (Liles and Heystek, 1977, p. 8).

14. Firing Range

The term firing range indicates the temperature interval over which the material shows favorable firing characteristics. For slow-fired materials such desirable qualities include: a) good strength or hardness; b) good color; c) low shrinkage; d) low absorption; and e) low porosity. For quick-fired materials these include: a) good pore structure; b) low absorption; and c) low bulk density. For slow-firing and quick-firing tests the firing range should be at least 100°F (55°C) to be considered promising (O'Neill and Barnes, 1979, p. 15-18).

15. Hardness

The hardness, as measured on fired materials, indicates the resistance to abrasion or scratching. It is designated either in verbal, descriptive terms or in numerical terms using Mohs' hardness (Liles and Heystek, 1977, p. 3). It is used as an indication of the strength of the fired materials. Smith (1931), however, measured the fired strength with the modulus of rupture.

16. Hardness (Mohs')

The hardness of fired specimens using the Mohs' scale of hardness

is currently used by the USBM as a numerical measure of the fired bodies' strength (Liles and Heystek, 1977, p. 3). The values correspond to the hardness of the following reference minerals:

Mohs' Hardness No.	Reference Minerals
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Orthoclase
7	Quartz
8	Topaz
9	Corundum
10	Diamond

A Mohs' hardness greater than 3 is considered promising for slow-fired materials.

17. HCl Effervescence

The effervescence in HCl is visually determined as none, slight or high based on the reaction of 10 ml of concentrated hydrochloric acid added to a slurry of 10 grams powdered clay or shale (minus 20 mesh) in 100 ml of water (Klinefelter and Hamlin, 1957, p. 17; Liles and Heystek, 1977, p. 4). This test gives a general indication of the amount of calcium carbonate present in the sample. An appreciable effervescence could be an indication of potential problems with lime pops and/or frothing of slow-fired ceramic products.

18. Linear Shrinkage, (%)

The term linear shrinkage represents the relative shrinkage of the clay body after firing. In most cases it represents the percent total linear shrinkage from the plastic state and is based on measurements

between a pair of standard reference marks imprinted just after molding (Klinefelter and Hamlin, 1957, p. 30-32; Liles and Heystek, 1977, p. 3). (Also see the discussion under Drying Shrinkage.) Smith (1931, p. 22) gives the shrinkage relative to both the dry, or green, state (under the column headed Dry) as well as the plastic state (under the column headed Plastic). A total shrinkage of 10% or less is considered promising for slow-fired materials.

19. Modulus of Rupture (MOR)

The modulus of rupture is a measure of the strength of materials (for crossbreaking or transverse strength in this compilation) based on the breakage force, the distance over which the force was applied and the width and thickness of the sample. The MOR is expressed in psi units (pounds per square inch) for the limited MOR data reported here (determined by Smith, 1931, p. 21 and 23).

20. Mohs'

See Hardness (Mohs').

21. Molding Behavior

See Working Properties.

22. Munsell

See Color (Munsell).

23. "MW" face brick

"MW" stands for moderate weather conditions. This is a grade of brick suitable for use under conditions where a moderate, non-uniform

degree of frost action is probable (Klinefelter and Hamlin, 1957, p. 36 and 37; ASTM Annual Book of Standards, 1974). (Also see "SW" face brick.)

24. PCE - Pyrometric Cone Equivalent

The PCE test measures the relative refractoriness, or temperature resistance, of the clay or shale; it is indicated in terms of standard pyrometric cones. The value given is the number of the standard pyrometric cone which softens and sags (or falls) at the same temperature as a cone made from the clay or shale being studied. These tests are usually only made on refractory materials which show favorable potential in the preliminary slow firing tests (i.e., high absorption, low shrinkage, and light fired color). The results are usually given for the upper temperature range Cone 12 (1337°C; 2439°F) to Cone 42 (2015°C; 3659°F) where the temperature equivalents are based on a heating rate of 150°C (270°F) per hour. With increasing temperature resistance the sample is designated as either a low-duty, medium-duty, high-duty, or super-duty fire clay (Klinefelter and Hamlin, 1957, p. 29-30 and 57-58; Liles and Heystek, 1977, p. 16).

25. pH

The pH is a measure of the relative acidity or alkalinity with values ranging from 0 to 14. (A pH of 7 is neutral. Values greater than this are alkaline whereas those which are less than 7 are acid.) Most of the ceramic tests by the USBM presented here show pH values as determined on the crushed and powdered raw material (in a water slurry) prior to firing (Klinefelter and Hamlin, 1957, p. 28; Liles and Heystek, 1977, p. 4).

Strongly acid or alkaline pH values may give some indication of potential problems with efflorescence and scum due to water-soluble salts in the clay. Unfortunately, no simple and direct interpretation is possible from the pH data alone. The best method for determining these salts is through direct chemical analysis as described under Soluble Salts. (Also see Solu-Br.)

26. Plasticity

See Working Properties.

27. Porosity, Apparent

See App. Por.

28. Quick Firing

See Bloating Test.

29. Saturation Coefficient

The saturation coefficient is determined only for specimens which have undergone the more extensive Extrusion Test. It is determined by submerging the fired specimen in cool water for 24 hours, followed by submerging the specimen in boiling water for 5 hours. The saturation coefficient is found by dividing the percent of water absorbed after boiling into the percent of water absorbed after the 24-hour submergence (Liles and Heystek, 1977, p. 8).

30. Shrinkage

See Drying Shrinkage and Linear Shrinkage.

31. Slaking

See Working Properties.

32. Slow Firing Test

Slow Firing Test refers to the process of firing ("burning") the dried specimen in a laboratory furnace or kiln. Although specific details of the different laboratory methods vary, all specimens are started at room temperature and are slowly heated to the desired temperature over a specific interval of time.

The majority of the slow firing tests by the USBM reported here were made using 15-minute draw trials. In this method a set of molded and dried test specimens are slowly fired in the kiln or furnace. The temperature is gradually raised to 1800°F (982°C) over a period of 3 to 4 hours (to avoid disintegration of the specimen as the chemically combined water is released) and the temperature is held constant for about 15 minutes. One specimen is removed from the kiln (a draw trial) and the temperature is raised to the next level (usually in intervals of 100°F). At each interval the temperature is again held constant for a 15-minute soak and then one specimen is withdrawn. This process is repeated until the final temperature is achieved (usually 2300 or 2400°F; 1260 or 1316°C) - see Klinefelter and Hamlin (1957, p. 19 and 30). The disadvantage of this draw trial method is that it tends to underfire the specimens, compared to the industrial process, since they are soaked for a relatively short time and quickly cooled by removal from the kiln.

Since the early 1970's the USBM has abandoned the draw trials and has adopted a method which more closely resembles the conditions of

commercial manufacture. As described by Liles and Heystek (1977, p. 2 and 3), one of the test specimens is slowly fired, over 24 hours, to 1832°F (1000°C), where it is held for a one-hour soak. The kiln is then turned off, but the specimen remains in the kiln as it slowly cools. (This gives a much closer approximation of most commercial firing processes.) This is subsequently repeated, one specimen at a time, for successive 50°C intervals usually up to 2282°F (1250°C). Unfortunately, only a relatively small part of the current data set is represented by USBM tests using this newer method.

The firing test methods used by Smith (1931, p. 21 and 22) are somewhat intermediate to the two methods described above. First, the specimens were slowly fired from 200 to 1200°F (93 to 649°C) over a period of 11 hours. The temperature was subsequently increased at a rate of 200°F per hour for approximately 4 hours followed by 100°F per hour until final temperature conditions were reached. At these later stages firing conditions were monitored using standard pyrometric cones in the kiln. The maximum firing temperature was determined from observed pyrometric cone behavior. This temperature was based on the temperature equivalent to 2 cones below the desired final cone. The kiln temperature was then held constant until the desired cone soaked down. Test specimens were then removed from the kiln and allowed to cool. Smith's firings averaged about 17 hours in the kiln and all specimens were fired to cones 06, 04, 02, 1, 3 and 5 wherever possible. No specific information is available on the methods employed by Veatch (1909) or the unpublished data from TVA or Georgia Tech.

33. Solu-Br. (Solu-Bridge)

Solu-Bridge measurements were used in the 1950's and 60's by the

USBM as a measure of the soluble salts (e.g., calcium sulfate) in the unfired raw material which might cause scum and efflorescence on fired products. "The solubridge and pH readings show the higher alkali samples. Solubridge determinations give the water soluble part of the alkalis and readings above 1.5 indicate fairly high soluble salt content. Clays containing high alkalies have rather short maturing temperatures and require closer firing control. The alkalis also influence the color and lower the vitrification temperature." (H.P. Hamlin, written communication, 1957). In this method the pulverized clay or shale is boiled in water, left to stand overnight, and filtered. The content of soluble salts in the solution is then measured using the Solu-Bridge instrument readings applied to suitable calibration tables (Klinefelter and Hamlin, 1957, p. 28-29). These data are no longer collected because consistent and meaningful results are difficult to achieve.

34. Soluble Salts

Excessive water-soluble salts can cause problems with efflorescence or scum on fired clay products. (More than 3 to 4% calcium sulfate, and 1/2% magnesium or alkali sulfates are considered excessive.)

The most accurate determinative method is to boil the finely powdered sample in distilled water for 1/2 to 1 hour and let it soak overnight. The decanted solution is then analyzed for the soluble salts using standard chemical methods. The Solu-Bridge readings may also be used as a general measure of the soluble salts (Klinefelter and Hamlin, 1957, p. 28).

35. Strength

See Dry Strength and Modulus of Rupture.

36. "SW" face brick

"SW" stands for severe weather conditions. This is a grade of brick suitable for use under conditions where a high degree of frost action is probable (Klinefelter and Hamlin, 1957, p. 36 and 37, and theASTM Annual Book of Standards, 1974). (Also see "MW" face brick.)

37. Temp. °F (°C)

The temperature at which the material was fired (both slow and quick firing tests) is given in Fahrenheit (°F) followed by the Celsius (°C) conversion in parentheses. In cases where only pyrometric cone values are available, the approximate temperature is given on the form and is based on the table of temperature equivalents in Norton (1942, p. 756, Table 128) or in Veatch (1909, p. 57).

38. Water of Plasticity (%)

This is a measure of the amount of water (as weight percent relative to the dry material) required to temper the pulverized raw clay or shale into a plastic, workable consistency. This is not a precise measurement, being dependent upon the experience of the technician, the type of equipment used and the plasticity criteria. In most cases it represents the amount of water necessary for the material to be extruded into briquettes from a laboratory hydraulic ram press. In general, high water of plasticity values tends to correlate with a greater degree of workability, higher plasticity and finer grain size. Unfortunately, high values also correlate with a greater degree of shrinkage,

warping and cracking of the material upon drying. (See Klinefelter and Hamlin, 1957, p. 20-22; Liles and Heystek, 1977, p. 2.)

39. Working Properties (or Workability)

This area of working properties includes comments on the slaking, plasticity, and molding, or extruding behavior of the tempered material (Klinefelter and Hamlin, 1957, p. 5, 19-22 and 33-34). The term slaking refers to the disintegration of the dry material when immersed in water. It may range in time from less than a minute to weeks, but generally in the present report it is given only a relative designation such as rapid, slow, or with difficulty. Plasticity likewise is designated in a comparative manner in order of decreasing plasticity: plastic, fat (or sticky), semiplastic, short (or lean), semiflint and flint. Molding behavior is referred to as good, fair, or poor and is a general designation for the ease with which the material can be molded into test bars or briquettes.

These working properties are very imprecise and strongly dependent upon the judgement and experience of the operator. They do, however, give a general indication of how the material might respond to handling in the industrial process.

Ceramic Tests and Analyses of Clays, Shales and Slates
in Polk County, Georgia *

* The data presented in this report are based on laboratory tests that are preliminary in nature and will not suffice for plant or process design.

CERAMIC TESTS AND ANALYSES

Material Clay, kaolinitic (residual). Compilation Map Location No. Plk.09V-1

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey, #76.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Poor plasticity.

Color White. Drying Shrinkage 3.7 % Dry Strength (tensile) 17 psi.

Remarks: Drying Behavior: Good.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2210 (1210) (=Cone 4)	Dark buff	-	11.1	-	-	Vitrified
2606 (1430) (=Cone 15)	Dark buff	-	11.4	-	-	Vitrified warped
3074 (1690) (=Cone 28)	Dark buff	-	-	-	-	Melted to a glass, fusion point is probably much lower.

Remarks / Other Tests At best this is a low grade fire clay. However, it is possibly useful for making paving blocks or, if mixed with nearby shales, it might be used for making terra cotta and stoneware. Its main defects are poor plasticity and low dry strength (Veatch, 1909, p. 275 and 276).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	Weight %
SiO_2	58.88
TiO_2	1.38
Al_2O_3	24.73
Fe_2O_3(total)	2.72
FeO	-
MnO	trace
MgO	0.40
CaO	trace
Na_2O	1.14
K_2O	5.01
P_2O_5	0.24
S (total)	-
C (org.)	-
CO_2	-
H_2O^-	0.61
H_2O^+	-
Ignition loss	5.31
Total	100.42

Mineralogy (approximate):

Mineral	volume %
Quartz	X (angular)
Feldspar	
Carbonate	
Mica	XX (muscovite ?)
Chlorite-vermiculite	
Montmorillonite	
Others	
"clay particles"	XX
iron oxides	X
Total	

X = present
XX = abundant

Analyst E. Everhart, Ga. Survey (in Veatch, 1909, p. 276 and, Appendix B, no. 76, p. 414 and 415). O. Veatch.

Date c. 1909. c. 1909.

Method Standard "wet". Microscope.

Sample Location Data:

County Polk. Land Lot , Sec. , Dist. .

7 1/2' topo quad. Cedartown W.(SW.1/4). Lat. , Long. .

Field No. -, Collected by O. Veatch. Date c. 1909

Sample Method Grab (?). Weathering/alteration Residual clay.

Structural Attitude -

Stratigraphic Assignment Recent (to Eocene ?) residual clay.

Sample Description & Comments White clay from one of the iron ore pits (main workings) at Oremont contains aggregates of clay particles (kaolinite and/or halloysite ?) with angular quartz grains of variable size and abundant mica flakes, probably muscovite. Yellow and red iron oxides form coatings over the quartz and clay particles (Veatch, 1909, p. 275 and 276).

Compiled by B. J. O'Connor Date 05-18-88

CERAMIC TESTS AND ANALYSES

Material Clay, kaolinitic (residual). Compilation Map Location No. Plk.09V-2

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Sample, #77.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Fair plasticity.

Color Variegated (red yellow, and white). Drying Shrinkage 2.2 % Dry Strength (tensile) Low (not (exceeding 10 or 15 psi.)

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
?	Brown	-	-	-	-	Dense, no warping or cracking.
2210 (1210) (=Cone 4)	-	-	-	-	-	Complete vitrification.

(Above this temperature the clay would probably blister and warp.)

Remarks / Other Tests This is not a high grade fire clay, but it might be used, in mixtures, for making stoneware or terra cotta because of its dense firing and low vitrification point (Veatch, 1909, p. 277).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis		Mineralogy Not determined.	
Oxide	Weight %	Mineral	volume %
SiO_2	66.20		
TiO_2	1.35	Quartz	
Al_2O_3	15.41	Feldspar	
Fe_2O_3(total)	6.06	Carbonate	
FeO	-	Mica	
MnO	-	Chlorite-vermiculite	
MgO	1.29	Montmorillonite	
CaO	0.00	Others	
Na_2O	0.34		
K_2O	4.55		
P_2O_5	-		
S (total)	-	Total	
C (org.)	-		
CO_2	-		
H_2O^-	0.20		
H_2O^+	4.70		
Ignition loss	-		
Total	100.10		

Analyst (in Spencer, 1893, p. 281 and in Veatch, 1909, p. 277 and, Appendix B, no. 77, 414 and 415).

Date c. 1893.

Method Standard "wet".

Sample Location Data: 730, 731, 804, 805

County Polk. Land Lot & 824, Sec. , Dist. 21.

7 1/2' topo quad. Cedartown E. (SE.1/4) & Felton (NE. 1/4). Lat. , Long. .

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual clay.

Structural Attitude -

Stratigraphic Assignment Recent (to Eocene ?) residual clay associated with iron ore derived from Ordovician limestones.

Sample Description & Comments Sample of red, yellow and white variegated clay from "horses" associated with iron ore in the Grady mine pits (Alabama and Georgia Iron Company) about 6 miles east of Cedartown on the Seaboard Air Line Railroad (Veatch, 1909, p. 277-278 and McCallie, 1900, p. 58-60).

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Clay, residual (kaolinitic?). Compilation Map Location No. Plk.09V-3

County Polk. Sample Number Ga. Survey.

Raw Properties: Lab & No. Ga. Survey.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Plastic.

Color Bright yellow. Drying Shrinkage 5 % Dry Strength (tensile) Low (not exceeding 15 psi.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2102 (1150) (=Cone 1)	Dark chocolate	-	10.1	-	-	Semi-vitreous, no warping or cracking.

Remarks / Other Tests This is not a high grade fire clay or kaolin; however, the clay is possibly usefull in making vitrified brick as well as common building brick although the low dry strength is a serious disadvantage (Veatch, 1909, p. 278).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot 663, Sec. _____, Dist. 2.

7 1/2' topo quad. Cedartown W.(SE. 1/4). Lat. _____, Long. _____.

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual clay.

Structural Attitude -

Stratigraphic Assignment Recent (to Eocene ?) residual clay associated with iron ores from Ordovician limestones.

Sample Description & Comments Sample of white and yellow clay (blends to a bright yellow) from the variegated red, yellow and white to purplish clays that are associated with (above and below) iron ore at the Woodstock mine approx. 1 1/2 mi. west of Cedartown (Veatch, 1909, p. 278; and McCallie, 1900, p. 44). This is an abandoned landfill site west of an industrial park just north of Prior Station Rd. Also see Plk. 46-4.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Clay, residual (from shale). Compilation Map Location No. Plk.09V-4

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity 37 % Working Properties Medium plasticity: very slow in slaking.

Color White. Drying Shrinkage 2.7 % Dry Strength (tensile) 10 psi.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2066 (1130) (=Cone 01)	White	Soft	-	-	Porous	-
2210 (1210) (=Cone 4)	Dull gray	-	12.9	4		Near vitrification
2390 (1310) (=Cone 9)	Gray	-	12.5	-		Complete vitrification

Fusion Point: Cone 27 and lower.

Remarks / Other Tests This is not a high grade fire clay, but it is very suitable for stoneware and terra cotta due to its light fired color and dense fired body at low temperature without warping or cracking. Its very low dry strength is a serious disadvantage, however (Veatch, 1909, p. 279).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart N. (E. cntr.). Lat. _____, Long. _____.

Field No. _____, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual clay from shale.

Structural Attitude -

Stratigraphic Assignment Residual clay probably derived from Ordovician Rockmart State not Silurian shale as suggested by Veatch (1909, p. 278).

Sample Description & Comments Sample of semi-hard to soft clay shale from the F. M. Randall property on the Southern Railroad about 1 mile north of Aragon. A small pit here shows 8 - 10 ft. of fine grained, closely jointed white to lavendar clay and clay shale. A small amount of this material has been mined for use in making terra cotta and stoneware (Veatch, 1909, p. 278-279).

Compiled by B. J. Connor Date 6-21-88

CERAMIC TESTS AND ANALYSES

Material Clay, residual (Rockmart slate). Compilation Map Location No. Plk.09V-5

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey, #74.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Very poor plasticity.

Color Light buff or cream. Drying Shrinkage - % Dry Strength (tensile) Low (not exceeding 12 psi.).

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
1922 (1050) (=Cone 05)	Pale buff or cream	Soft	-	-	-	Friable, similar to raw material; no cracking or warping.
1994 (1090) (=Cone 03)	Cream	Soft	4.1	-	-	No cracking or warping.
2210 (1210) (=Cone 4)	Buff with black specks	-	11.9	-	-	Vitrified; no cracking or warping.
2570 (1410) (=Cone 14)	Dark grey to buff with black specks	-	12.0	-	-	Complete vitrification.

Fusion Point: Cone 18

Remarks / Other Tests This is not a fire clay, but it is excellent for terra cotta mixtures as it fires to a light colored, dense body at a low firing range. However, it cannot be used by itself due to its low dry strength and lack of plasticity (Veatch, 1909, p. 352).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	Weight %
SiO_2	67.56
TiO_2	1.10
Al_2O_3	20.80
Fe_2O_3 (total)	2.00
FeO	-
MnO	-
MgO	1.06
CaO	0.58
Na_2O	1.07
K_2O	2.06
P_2O_5	-
S (total)	-
C (org.)	-
CO_2	-
H_2O^-	0.10
H_2O^+	-
Ignition loss	3.92
Total	100.26

Mineralogy: Not determined.

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

Analyst E. Everhart, Ga. Survey (in Veatch, p. 352-353, and Appendix B, no. 74, p. 414-415).

Date c. 1909.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Yorkville (NW. 1/4). Lat. _____, Long. _____.

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual clay from slate.

Structural Attitude -

Stratigraphic Assignment Residual clay derived from weathering of the "Rockmart formation" (Veatch, 1909, p. 351); but mapped as Mississipian Floyd Shale by Cressler (1970, Fig. 5).

Sample Description & Comments Sample from the Carlton clay pit (H. M. Carlton) on a hill between the Seaboard and Southern Railroad lines 4 miles east of Rockmart. It is composed of soft, friable, cream to light yellow colored clay with relict slaty structure and an unctous, talcose feel. It locally contains small geodes lined with drusy quartz crystals. The pit exposes clay to a depth of 15 ft. (overlain by 30 ft. of chert, sandstone and iron ore breccia) and is being mined for terra cotta manufacture (Veatch, 1909, p. 351-353). It is similar to the "Caen" stone described below for Plk.09V-6.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Clay, residual (Rockmart slate -"Caen" stone). Compilation Map Location No. Plk.09V-6

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey, #73.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Little or no plasticity.

Color Yellow or brownish. Drying Shrinkage 1 % Dry Strength (tensile) not exceeding 8 or 10 psi.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
1922 (1050) (=Cone 05)	Good red	-	4	-	-	Very porous, no warping or cracking.
2102 (1150) (=Cone 1)	Dark red	Steel hard	6.5	-	-	-

Remarks / Other Tests Cannot be used by itself for making brick by the stiff mud process unless it is mixed with a plastic clay (Veatch, 1909, p. 353-354).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size -40 mesh. Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	Weight %
SiO_2	64.28
TiO_2	-
Al_2O_3	21.15
Fe_2O_3(total)	5.77
FeO	-
MnO	-
MgO	0.09
CaO	trace
Na_2O	0.92
K_2O	3.62
P_2O_5	trace
S (total)	-
C (org.)	-
CO_2	-
H_2O^-	-
H_2O^+ ("water")	4.88
Ignition loss	-
Total	100.71

Mineralogy: Not determined.

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

Analyst E. Everhart, Ga. Survey (in Veatch, 1909, p. 353 and Appendix B, no. 73, p. 414 and 415).

Date c. 1909.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart S. (NE.1/4) . Lat. _____, Long. _____.

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual clay from slate.

Structural Attitude -

Stratigraphic Assignment Recent (to Eocene ?) clay derived from weathering of the Rockmart Slate (Ordovician).

Sample Description & Comments Sample of "Caen" stone from near Rockmart (and apparently similar to the location of the analysis cited above) which is an altered (ie. weathered) slate, yellow and brownish in color, and having the typical "woody" texture due to relict layering of the original slate (Veatch, 1909, p. 353 and 354; also see discussion in Smith, 1931, p. 69 - 70=Plk. 31S-1).

Compiled by B. J. O'Connor Date 5-18-88

CERAMIC TESTS AND ANALYSES

Material Clay, bauxitic. Compilation Map Location No. Plk.09V-7

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey. #78.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Poor plasticity.

Color White (?). Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined.

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Remarks / Other Tests The chemical analysis indicates that this is a highly refractory clay, probably best suited for fire-clay uses; however, its poor plasticity requires that it be mixed with a stronger, more plastic clay before it could be practically used (Veatch, 1909, p. 275).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide		Weight %
SiO_2		44.66
TiO_2		1.49
Al_2O_3		38.49
Fe_2O_3		0.54
FeO		-
MnO		0.25
MgO		-
CaO		-
Na_2O		-
K_2O		-
P_2O_5		-
S	(total)	-
C	(org.)	-
CO_2		-
H_2O^-		0.54
H_2O^+		-
Ignition loss		14.08
Total		100.05

Mineralogy: Not determined.

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

Analyst E. Everhart, Ga. Survey (in Veatch, 1909, p. 275 and Appendix B, no. 78, p. 414 - 415).

Date c. 1909.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot , Sec. , Dist. .

7 1/2' topo quad. Borden Springs (NE. 1/4). Lat. , Long. .

Field No. -, Collected by H. N. Van Devander Date c.1909.

Sample Method Grab (?). Weathering/alteration Residual (?) clay.

Structural Attitude -

Stratigraphic Assignment Eocene (?) residual clay.

Sample Description & Comments Sample collected and submitted to the Survey by Mr. H. N. VanDevander, of Cedartown, from the Love place 1 1/2 miles north of Esom Hill (Veatch., 1909, p. 275).

Compiled by B. J. O'Connor Date 5-18-88

CERAMIC TESTS AND ANALYSES

Material Clay (bauxitic?). Compilation Map Location No. Plk.09V-8

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey, #46.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties Medium plasticity; lean but not mealy.

Color Pink. Drying Shrinkage 2.8 % Dry Strength (tensile) Low.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2246 (1230) (=Cone 5)	White	-	9	-	-	Checked surface
2354 (1290) (=Cone 8)	White	-	10.8	-	-	Cracked
2462 (1350) (=Cone 11)	White	-	12.9	-	-	Cracked
2606 (1430) (=Cone 15)	Dull white	-	-	-	-	Cracked badly
3218 (1770) (=Cone 32)	-	-	-	-	-	Unfused

Remarks / Other Tests Clay would probably be usefull for refractory clay products, but it would probably have to be calcined before firing.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	Weight %
SiO_2	44.23
TiO_2	1.84
Al_2O_3	38.95
Fe_2O_3 (total)	0.93
FeO	-
MnO	-
MgO	0.07
CaO	0.00
Na_2O	0.01
K_2O	0.11
P_2O_5	0.00
S (total)	0.00
C (org.)	-
CO_2	-
H_2O^-	0.27
H_2O^+	-
Ignition loss	13.76
Total	100.17

Mineralogy: Not determined.

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

Analyst E.Everhart, Ga. Survey (in Veatch, 1909, p. 271, and Appendix B, no. 46, p. 412-413).

Date c. 1909.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot 214, Sec. , Dist. 2.

7 1/2' topo quad. Cedartown W. (W.cntr.). Lat. , Long. .

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab (?). Weathering/alteration Residual (?) clay.

Structural Attitude -

Stratigraphic Assignment Eocene (?) residual clay.

Sample Description & Comments Sample is from white and pink clays, chemically similar to kaolin and intimately associated with bauxite, from the Hampton Mine (National Bauxite Company) 3 miles south of Cave Spring. This mine was newly opened at the time it was sampled (Veatch, 1909, p. 270-271). Note: this location is listed in Floyd Co. by Veatch; however, the description indicates it is in Polk Co. (as also shown in White, et al, 1966, Pl.3). Approximately 1/4 mi. N. of Santa Claus Rd. and about 1 mi. E. of Little Cedar Creek.

Compiled by B. J. O'Connor Date 6-21-88

CERAMIC TESTS AND ANALYSES

Material Clay (bauxitic ?). Compilation Map Location No. Plk.09V-9

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Survey, #47.

Date Reported 1909. Ceramist O. Veatch, Ga. Survey.

Water of Plasticity - % Working Properties -

Color Cream. Drying Shrinkage 3 % Dry Strength (tensile) Low.

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2246 (1230) (=Cone 5)	White	-	7.7	-	-	Friable
2354 (1290) (=Cone 8)	White (with black specks)	-	9.9	-	-	Friable
2498 (1370) (=Cone 12)	Cream	-	11.1	-	-	Friable
3254 (1790) (=Cone 33)	-	-	-	-	-	Unfused

Remarks / Other Tests This clay will probably fire to Cone 36; however, it does not form a dense body and it would probably be best to mix a dense burning clay with it (Veatch, 1909, p. 272). It is probably suitable for refractory products, but it may be necessary to have it calcined before firing.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	Weight %
SiO_2	43.35
TiO_2	1.95
Al_2O_3	38.06
Fe_2O_3(total)	0.84
FeO	-
MnO	trace
MgO	0.00
CaO	0.00
Na_2O	trace
K_2O	trace
P_2O_5	trace
S (total)	0.00
C (org.)	-
CO_2	-
H_2O^-	2.17
H_2O^+	-
Ignition loss	13.66
Total	100.03

Mineralogy: Not determined.

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

Analyst E. Everhart, Ga. Survey (in Veatch, 1909, p. 272 and Appendix B, no. 47, p. 412-413).

Date c. 1909.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot 1220, Sec. , Dist. 3.

7 1/2' topo quad. Cedartown W. (NW. 1/4). Lat. , Long. .

Field No. -, Collected by O. Veatch. Date c. 1909.

Sample Method Grab(?). Weathering/alteration Residual (?) clay.

Structural Attitude -

Stratigraphic Assignment Eocene (?) residual clay.

Sample Description & Comments Sample of fine grained, cream colored clay with a small amount of sand from the Reese Mine (National Bauxite Company), about 2 miles south of Cave Spring (Veatch, 1909, p. 271-272). Note: this is listed in Floyd Co. by Veatch; however, the description and data in White, et al (1966, Plate 3) indicates that it is in Polk Co. about 1/4 mi. W. of Mill Race Creek & about 1/2 mi. S. of the Floyd Co. line.

Compiled by Bruce J. O'Connor Date 6-21-88

CERAMIC TESTS AND ANALYSES

Material Weathered slate (Rockmart). Compilation Map Location No. Plk.31S-1

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Tech., #1.

Date Reported 1931. Ceramist R. W. Smith, Ga. Survey.

Water of Plasticity - % Working Properties (Slow slaking).

Color - Drying Shrinkage approx. 1.5% Dry Strength (MOR) approx. 40 psi.

Slow Firing Tests: (As estimated from Fig. 5A only, Smith, 1931, p. 77.)

Approx. Temp. °F (°C)	Color (Munsell)	Approx. Hardness (MOR, psi.)	Approx. Linear Shrinkage, % (dry basis)	Approx. Absorption %	Appr. Por. %	Other data:
1840 (1005)	-	500	2.9	-	-	-
1920 (1050)	-	900	3.6	19.7	-	-
2000 (1095)	-	1320	4.2	16.5	-	-
2060 (1125)	-	1870	6.0	14.1	-	-
2090 (1145)	-	2025	7.1	11.7	-	-
2160 (1180)	-	2760	8.3	8.7	-	-

Remarks / Other Tests As late as 1916 the Rockmart Shale Brick and Slate Company was making a vitrified paving brick from deeply weathered slate (Shearer, 1918, p. 67), but it is difficult to process because of its slow slaking (Smith, 1931, p. 69).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size -16 mesh (?) Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis (weight %):

Oxide	(1)	(2)	(3)
SiO_2	58.20	66.32	58.47
TiO_2	-	0.82	0.96
Al_2O_3	18.83	19.79	19.68
Fe_2O_3	-	3.91	6.84
FeO	5.78	-	2.01
MnO	-	0.06	0.00
MgO	3.51	0.40	2.05
CaO	4.35	0.10	0.00
Na_2O	3.20[t]	1.23	0.82
K_2O	-	1.94	4.20
P_2O_5	-	-	0.00
S	0.49	-	0.11
C	0.82	-	-
CO_2	0.60	-	0.00
H_2O^-	4.07[t]	0.30*	0.59*
H_2O^+	-		
Ignition loss	-	5.20*	4.76*
Total	99.85	100.07	100.49

Mineralogy

Mineral	volume %
Quartz	
Feldspar	
Carbonate	
Mica	
Chlorite-vermiculite	
Montmorillonite	
Others	
Total	

(* = reported as "moisture")
([t] = reported as "Alkalis" and "Water")

Analyst Slocum & Vandeventer, USGS; and E. Everhart, Ga. Survey

Date 1: USGS, 1897 (in Eckel, 1906); 2: M-31, Maynard, 1912, p. 133; and 3: S-267, Shearer, 1918, p.68.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot 865, Sec. 3, Dist. 18 (Shearer, 1918, p. 65)

7 1/2' topo quad. Rockmart South (NE. 1/4). Lat. _____, Long. _____.

Field No. - Ceramic Test Sample Collected by R. W. Smith Date c. 1930.

Sample Method Grab. Weathering/alteration Weathered saprolitic ("Caenstone").

Structural Attitude Bedding strikes N.82° E to N.40° W and dips 10° SW to 25° SE; slaty clevage strikes N.15° to 70°E and dips 15° to 68°SE and horizontal joints (Shearer, 1918, p. 67)

Stratigraphic Assignment Deeply weathered Rockmart [Slate]-Ordovician (near the base of the formation).

Sample Description & Comments "Grades from gray slate through soft, partly weathered slate, usually of red or yellow color and locally known as 'caenstone', into yellow or red ocherous clay". Fresher slate is avoided as it does not form bricks hard and tough enough to withstand the abrasion required for paving blocks (Shearer, 1918, p. 67 and 68). Located near the base of the north slope of the ridge just south of the center of Rockmart, approx. 2,000 ft. SE of Euharlee Creek, approx. 2,000 ft. SSE if the junction of the Southern and the L&N Railroads and approx. 2,800 ft. WNW of the junction of the L&N and Seaboard railroads (Shearer, 1918, Fig. 4).

Compiled by B. J. O'Connor Date 6-21-88

CERAMIC TESTS AND ANALYSES

Material Gray, slaty shale (Rockmart). Compilation Map Location No. Plk.31S-2

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Tech., #2.

Date Reported 1931. Ceramist R. W. Smith, Ga. Survey.

Water of Plasticity - % Working Properties Almost no plasticity; very slow slaking; molding behavior very poor--unable to form test bars after aging 5 days.

Color Light grayish brown. Drying Shrinkage - % Dry Strength -

Slow firing tests: Not determined (working properties too poor to form test bars on roll press).

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Remarks / Other Tests Material unsuited, by itself, for manufacture of heavy clay products (Smith, 1931, p. 71).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) Hard and tough grinding.

Particle Size -16 mesh. Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2	68.13		
TiO_2	1.02	Quartz	
Al_2O_3	18.22	Feldspar	
Fe_2O_3 (total)	6.45	Carbonate	
FeO	-	Mica	
MnO	trace	Chlorite-vermiculite	
MgO	trace	Montmorillonite	
CaO	0.00	Others	
Na_2O	0.44		
K_2O	2.02		
P_2O_5	0.14		
S (total)	0.00	Total	
C (org.)			
CO_2	-		
H_2O^-	*	(* = analysis recalculated on a H_2O^- -free basis	
H_2O^+	-	by Smith, 1931, p. 70.)	
Ignition loss	3.46		
Total	99.88*		

Analyst E. Everhart, Ga. Survey.

Date c. 1931.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot 435 and 436 Sec. 3, Dist. 18.

7 1/2' topo quad. Rockmart N. (SE 1/4). Lat. , Long. .

Field No. , Collected by R. W. Smith. Date c. 1930.

Sample Method Grab. Weathering/alteration Slaty.

Structural Attitude -

Stratigraphic Assignment Rockmart [Slate] - Ordovician.

Sample Description & Comments Hard gray shale and slaty shale from the J. G. Randall property 1 mile east of Aragon, 1/2 to 3/4 mile east of the Seaboard RR (Smith, 1931, p. 70-71).

Compiled by B. J. O'Connor Date 5-18-88

CERAMIC TESTS AND ANALYSES

Material Hard shale (Rockmart). Compilation Map Location No. Plk.31S-3

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Tech., #3.

Date Reported 1931. Ceramist R. W. Smith, Ga. Survey.

Water of Plasticity - % Working Properties Very poor plasticity, grainy; slow slaking; molding behavior too poor to form test bars even after aging 5 days.

Color Light brown. Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined (working properties too poor).

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Remarks / Other Tests Material not suitable, by itself, for manufacture of heavy clay products; however, it might be suitable for light-weight aggregate manufacture (Smith, 1931, p. 71).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) Fairly easy grinding.

Particle Size -16 mesh. Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2	63.53		
TiO_2	0.98	Quartz	
Al_2O_3	19.77	Feldspar	
Fe_2O_3 (total)	6.51	Carbonate	
FeO	-	Mica	
MnO	-	Chlorite-vermiculite	
MgO	trace	Montmorillonite	
CaO	0.00	Others	
Na_2O	1.09		
K_2O	1.47		
P_2O_5	0.18		
SO_3	0.03	Total	
C (org.)	-		
CO_2	-		
H_2O^-	*		
H_2O^+	-		
Ignition loss	6.53		
Total	100.09*		

(* = analysis recalculated on an H_2O^- -free basis by Smith, 1931, p. 71.)

Analyst E. Everhart, Ga. Survey.

Date c. 1931.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Felton (NW 1/4). Lat. _____, Long. _____.

Field No. _____, Collected by R. W. Smith. Date c. 1930.

Sample Method Grab samples from pit and road outcrops. Weathering/alteration -

Structural Attitude Strike N. 10°E., dip 55°SE.

Stratigraphic Assignment Rockmart Slate - Ordovician.

Sample Description & Comments From the M. O. Huntington property on the Central of GA. RR, 3 miles south of Cedartown, south of Cedar Creek: hard, brownish drab siliceous shale from a pit (formerly for road metal) beside the old Cedartown-Buchannan road, just east of the RR, and from road cuts on the road south to the RR crossing (Smith, 1931, p. 71).

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Hard, slaty shale (Rockmart). Compilation Map Location No. Plk.31S-4

County Polk. Sample Number -

Raw Properties: Lab & No. Ga. Tech., #4.

Date Reported 1931. Ceramist R. W. Smith, Ga. Survey.

Water of Plasticity - % Working Properties Almost no plasticity; very slow slaking; molding behavior too poor, after aging 5 days, to form test bars on roll-press.

Color Brownish-drab. Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined (working properties too poor).

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Remarks / Other Tests This material is not suited, by itself, for manufacture of heavy clay products, but might be used for light-weight aggregate manufacture (Smith, 1931, p. 72).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) Difficult, tough-grinding.

Particle Size -16 mesh. Retention Time -

Chemical & Mineralogical Data:

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2	60.46		
TiO_2	0.91	Quartz	
Al_2O_3	23.39	Feldspar	
Fe_2O_3 (total)	7.04	Carbonate	
FeO	-	Mica	
MnO	trace	Chlorite-vermiculite	
MgO	trace	Montmorillonite	
CaO	0.00	Others	
Na_2O	0.19		
K_2O	1.59		
P_2O_5	0.49		
SO_3	0.05	Total	
C (org.)	-		
CO_2	-		
H_2O^-	*		
H_2O^+	-		
Ignition loss	5.94		
Total	100.06*		

(* = analysis recalculated on an H_2O^- -free basis by Smith, 1931, p. 72.)

Analyst E. Everhart, Ga. Survey.

Date c. 1931.

Method Standard "wet".

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Benedict (NE 1/4). Lat. _____, Long. _____.

Field No. _____, Collected by R. W. Smith. Date c. 1930.

Sample Method Grab. Weathering/alteration Weathered slate.

Structural Attitude Strike N. 40°E., dip 60°SE. in outcrops along road.

Stratigraphic Assignment Rockmart Slate - Ordovician.

Sample Description & Comments Hard, brownish-drab to grayish-drab slaty shale (or weathered slate) from the Dr. Ledbetter Estate on both sides of the Seaboard RR, about 2 1/2 miles southwest of Cedartown (Smith, 1931, p. 72).

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Clay/silt. Compilation Map Location No. Plk.46-1

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Norris, Tn.; #Ga-22.

Date Reported 7-18-46. Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Fair plasticity.

Color Dark tan (wet) to light tan (dry). Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness	Linear Shrinkage, % (Approx.)	Absorption %	Appr. Por. %	Other data: Remarks
2192 (1200)	Very deep purplish red	Very hard	25	-	-	No evidence of bloating from overfiring.

Remarks / Other Tests Seems to merit further investigation for use by itself or in blends for making dark brick and tile having an unusual color.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time 10 hours.

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. _____. Lat. _____, Long. _____.

Field No. - , Collected by K. H. Teague (TVA). Date c. June 1946.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Recent.

Sample Description & Comments Sample from "mud pond" settling basin from iron ore washings. Collected by K. H. Teague, TVA, Knoxville, Tn.

Compiled by B. J. O'Connor Date 1-25-82

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.46-2

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Norris, Tn.; #Ga-23.

Date Reported 7-18-46. Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Fairly good plasticity.

Color Dark gray (dry) to black (wet). Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
2192 (1200)	-	-	-	-	-	Bloated from overfiring.

Remarks / Other Tests Overfiring at 1200°C indicates this clay could only be used for low-temperature or commoner types of building brick and hollow tile with a light color.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time 10 hours.

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Indian Mtn. (SE cor.). Lat. _____, Long. _____.

Field No. -, Collected by K. H. Teague (TVA). Date c. June 1946.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Recent.

Sample Description & Comments Blue clay from Hodge iron ore pit 8 miles west of Cedartown.

Compiled by B. J. O'Connor Date 1-25-82

CERAMIC TESTS AND ANALYSES

Material Clay (impure kaolin ?. Compilation Map Location No. Plk.46-3

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Norris, Tn.; #GA-24.

Date Reported 7-18-46. Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Fairly good plasticity.

Color Very light lavender. Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
2192 (1200)	Dark neutral gray	Hard	approx. 12.5	-	-	No bloating from overfiring.

Remarks / Other Tests Seems worthy of further investigation for making gray brick and tile and possibly lower grade refractories as well as to see if it can be purified, by washing, to make kaolin suitable for stoneware, chemical pottery, art pottery, terra cotta, etc.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time 10 hours.

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Cedartown E. (S. edge). Lat. _____, Long. _____.

Field No. -, Collected by K. H. Teague (TVA). Date c. June 1946.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Recent.

Sample Description & Comments Sample of white clay from Lucas iron ore pit (Grady property) about 1/4 mi. S. of the Seaboard Coast Line RR and about 1/2 mi. W. of Grady Rd. (Leweicki, 1948, Fig. 13, p. 10).

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Clay (soft and gritty). Compilation Map Location No. Plk.46-4

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Norris, Tn.; #Ga-26.

Date Reported 7-18-46. Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Fairly good plasticity and slaked with water.

Color Lavender (dry). Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Remarks
2192 (1200)	Rather dark brown-buff	Hard	approx. 12.5	-	-	No evidence of bloating.

Remarks / Other Tests Recommend further tests for use in making building brick and tile as well as low-grade firebrick.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time 10 hours.

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Cedartown West (SE. 1/4). Lat. _____, Long. _____.

Field No. -, Collected by K. H. Teague (TVA). Date c. June 1946.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Recent.

Sample Description & Comments Sample of clay from the Woodstock iron ore pit 1 mile west of Cedartown just north of Prior Station Rd. Also see Plk. 09V-3.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Shale/Slate (Rockmart). Compilation Map Location No. Plk.46-5

County Polk. Sample Number 11.

Raw Properties: Lab & No. N.C. State College Research Lab Asheville, North Carolina; TVA #108.

Date Reported 10-8-46. Ceramist M. K. Banks, TVA.

Water of Plasticity - % Working Properties -

Color Black to gray. Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined.

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Preliminary Bloating (Quick Firing) Tests: Negative.

Temp. °F (°C)	Absorption %	Bulk Density g/cm^3	Bulk Density lb/ft^3	Pore Structure
2350 (1288)	-	-	-	-
2400 (1316)	-	-	-	-
2450 (1343)	-	-	-	-

Remarks Not usable, by itself, for expanded light weight aggregate manufacture.

Crushing Characteristics (unfired material) -

Particle Size -8 mesh. Retention Time 30 min. (in muffle furnace).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Felton (SW 1/4). Lat. _____, Long. _____.

Field No. 11., Collected by (TVA). Date 1946?

Sample Method Grab (?). Weathering/alteration _____

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Interim report on tests from N.C. Research Lab via H. S. Rankin (TVA, 10-22-46). Location is 5 miles southeast of Cedartown, between U. S. 27 and the Central of Ga. Railroad. Material is a dense black to gray, tough shale (quite fissile in places) from a zone of outcrops on the road for a width of about 150 feet.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Shale/Slate (Rockmart). Compilation Map Location No. Plk.46-6

County Polk. Sample Number 12.

Raw Properties: Lab & No. N.C. State College Research Lab
Asheville, North Carolina; TVA #109.

Date Reported 10-8-46. Ceramist M. K. Banks, TVA.

Water of Plasticity - % Working Properties -

Color Brownish to gray. Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined.

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Preliminary Bloating (Quick Firing) Tests: Negative.

Temp. °F (°C)	Absorption %	Bulk Density g/cm^3	Bulk Density lb/ft^3	Pore Structure
2350 (1288)	-	-	-	-
2400 (1316)	-	-	-	-
2450 (1343)	-	-	-	-

Remarks Not usable, by itself, for expanded light weight aggregate manufacture.

Crushing Characteristics (unfired material) -

Particle Size -8 mesh. Retention Time 30 min. (in muffle furnace).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Benedict (NW 1/4). Lat. _____, Long. _____.

Field No. 12., Collected by (TVA). Date 1946?

Sample Method Grab (?). Weathering/alteration _____

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Interim report on tests from N.C. Research Lab via H. S. Rankin (TVA, 10-22-46). Location is about 3 miles southwest of Cedartown, and 1/4 mile east of Akes (on Seaboard Railroad). Sample taken from new road cut is a brownish to gray, relatively soft shale which weathers to hard red and brown splinters. This is fairly typical of the rock in this area.

Compiled by B. J. Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.46-7

County Polk. Sample Number 13.

Raw Properties: Lab & No. N.C. State College Research Lab
Asheville, North Carolina; TVA #110.

Date Reported 10-8-46. Ceramist M. K. Banks, TVA.

Water of Plasticity - % Working Properties -

Color Dark gray to black Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined.

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Preliminary Bloating (Quick Firing) Tests: Positive.

Temp. °F (°C)	Absorption %	Bulk Density g/cm^3	Bulk Density lb/ft^3	Pore Structure
2350 (1288)	-	-	28	Fair.
2400 (1316)	-	-	31	Poor.
2450 (1343)	-	-	-	-

Remarks Bloating range = approx. 2250-2350°F; best (inferred) at approx. 2300°F.

Crushing Characteristics (unfired material) -

Particle Size -8 mesh. Retention Time 30 min. (in muffle furnace).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart S. (N. side). Lat. _____, Long. _____.

Field No. 13., Collected by (TVA). Date 1946?

Sample Method Grab (?). Weathering/alteration _____

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Interim report on tests from N.C. Research Lab via H. S. Rankin (TVA, 10-22-46). Sample of fresh, dark gray to black slate "from quarry 1/4 mile southeast of Seaboard Railroad Station at Rockmart, Polk Co." (Butts and Gildersleeve, 1948, p. 125, Table 8, no. 5 and map location no. 50) northeast of the railroad.

Compiled by B. J. O'Connor Date 5-18-88

CERAMIC TESTS AND ANALYSES

Material Clay, red. Compilation Map Location No. Plk.47-1a

County Polk. Sample Number "Red".

Raw Properties: Lab & No. USBM, Norris, Tn.; #Ga-37 red.

Date Reported 12-1-47 Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Fair plasticity; softened readily with water.

Color Red. Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Approx. Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
2100 (1149) Cone 2:	Dark reddish brown	Very hard	25	-	-	-

Remarks / Other Tests Test specimen briquettes fired harder than would be necessary for most commercial clay products. This clay warrants further testing to determine if it is suitable for making building brick and tile.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. -, Collected by A. O. Sloan. Date c. August 1947.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments Sample of clay (designated "red") from Mr. A. O. Sloan of the Sloan-Reese Cigar Company, Cedartown, Ga. (Exact location unspecified, but probably is from the Cedartown area.)

Compiled by B. J. O'Connor Date 1-25-82

CERAMIC TESTS AND ANALYSES

Material Clay, yellow. Compilation Map Location No. Plk.47-1b

County Polk. Sample Number "Yellow".

Raw Properties: Lab & No. USBM, Norris, Tn.' #Ga-37 yellow.

Date Reported 12-1-47 Ceramist H. Wilson, USBM.

Water of Plasticity - % Working Properties Somewhat better than fair plasticity, and softened readily with water.

Color Yellow. Drying Shrinkage - % Dry Strength -

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
2100 (1149) Cone:	Very dark reddish chocolate or purplish red	Very hard	18.75	-	-	-

Remarks / Other Tests This clay is worthy of further testing to see if it is suitable for making building brick and tile.

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. -, Collected by A. O. Sloan. Date c. August 1947.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments Sample of clay (designated "yellow") from Mr. A.O. Sloan of the Sloan-Reese Cigar Company, Cedartown, Ga. (Exact location unspecified, but probably the same as for the "red" sample and from the Cedartown area.)

Compiled by B. J. O'Connor Date 1-25-82

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1a

County Polk. Sample Number 1

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-A.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 33.0 % Working Properties Fairly long working, plastic, smooth. pH = 5.10

Color Pink. Drying Shrinkage 4.0 % Dry Strength Good.

Remarks Drying Characteristics: Good.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, % *	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	-	Soft (2)	4.0	22.4	-	2.45
2000 (1093)	Pink	Fair hard (3)	7.0	19.3	-	2.52
2100 (1149)	Pink	Hard (4)	7.0	18.8	-	2.52
2200 (1204)	Pink	Hard (4)	8.5	13.9	-	2.52
2300 (1260)	Grayish-pink	Very hard (5)	12.5	4.8	-	2.43
2400 (1316)	Pinkish-gray	Steel hard (6)	15.0	2.5	-	2.42

Remarks*/ Other Tests High shrinkage at high temperature, high absorption at low temperature. Not commercially favorable. Potential Use: Stoneware; could be combined with clay of opposite properties to make tile, brick.

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written Communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1b

County Polk. Sample Number 2

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-B.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 32.0 % Working Properties Short working, fairly plastic, smooth. pH = 5.29

Color Light tan. Drying Shrinkage 4.0 % Dry Strength Fair.

Remarks Drying Characteristics: Good, rough.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Dark flesh	Soft (2)	4.0	25.7	-	2.56
2000 (1093)	Dark flesh	Fair hard (3)	5.5	18.2	-	2.49
2100 (1149)	Dark flesh	Fair hard (3)	5.5	17.9	-	2.48
2200 (1204)	Dark flesh	Hard (4)	6.0	13.7	-	2.46
2300 (1260)	Flesh-brown	-	11.0	7.7	-	2.41
2400 (1316)	Gray-brown	-	11.0	5.4	-	2.42

Remarks*/ Other Tests Too soft, high absorption. Not commercially favorable.
Potential Use: None.

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1c

County Polk. Sample Number 3

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-C.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 28.0 % Working Properties Fairly long working, plastic, smooth. pH = 4.85

Color Light tan. Drying Shrinkage 5.0 % Dry Strength Good.

Remarks Drying Characteristics: Good.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, % *	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Flesh	Soft (2)	5.0	23.5	-	2.52
2000 (1093)	Flesh	Fair hard (3)	9.5	14.7	-	2.55
2100 (1149)	Flesh	Hard (4)	14.0	9.2	-	2.53
2200 (1204)	Flesh-brown	Hard (4)	15.0	4.1	-	2.49
2300 (1260)	Flesh-gray	Steel hard (6)	15.5	1.7	-	2.49
2400 (1316)	Gray	Steel hard (6)	15.5	2.2	-	2.52

Remarks*/ Other Tests High shrinkage and high absorption. Not commercially favorable. Potential Use: None except amature pottery.

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1d

County Polk. Sample Number 4

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-D.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 37.0 % Working Properties Plastic, long working, fatty, smooth. pH = 4.50

Color Cream. Drying Shrinkage 5.0 % Dry Strength Good.

Remarks Drying Characteristics: Good.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Pale flesh	Soft (2)	5.0	27.2	-	2.57
2000 (1093)	Light pink	Soft-hard (3)	9.0	24.7	-	2.57
2100 (1149)	Light pink	Hard (4)	9.5	21.0	-	2.58
2200 (1204)	Off white	Very hard (5)	11.0	15.7	-	2.58
2300 (1260)	Yellow-gray	Steel hard (6)	15.5	6.5	-	2.52
2400 (1316)	Yellow gray	Steel hard (6)	18.5	5.0	-	2.50

Remarks*/ Other Tests High shrinkage, high absorption. Raw color not desirable for paper coating. Not commercially favorable. Potential Use: Stoneware

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1e

County Polk. Sample Number 5

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-E.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 27.0 % Working Properties Short working, fine grit, fatty. pH = 4.50

Color Pink-brown. Drying Shrinkage 1.5 % Dry Strength Fair.

Remarks Drying Characteristics: Fair, some cracks.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Dark flesh	Soft (2)	2.5	25.9	-	2.53
1900 (1038)	Dark flesh	Soft (2)	2.5	25.1	-	2.54
2000 (1093)	Dark flesh	Fair hard (3)	2.5	21.6	-	2.54
2100 (1149)	Red-brown	Hard (4)	5.5	13.6	-	2.54
2200 (1204)	Red-brown	Hard (4)	9.5	8.7	-	2.52
2300 (1260)	Dark red-brown	Steel hard (6)	10.0	8.7	-	2.44

Remarks*/ Other Tests High absorption, crazing, appreciable quartz content. Not commercially favorable. Potential Use: Decorative brick at 2050°F (1121°C).

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1f

County Polk. Sample Number 6

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-F.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 40.0 % Working Properties Long working, plastic, smooth, fatty. pH = 5.25

Color Cream. Drying Shrinkage 4.0 % Dry Strength Good.

Remarks Drying Characteristics: Fair, some cracking.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')**	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Pale flesh	Soft (2)	9.0	34.0	-	2.66
2000 (1093)	Pinkish white	Fair hard (3)	9.0	40.8	-	2.92
2100 (1149)	Pinkish white	Fair hard (3)	9.0	34.1	-	2.70
2200 (1149)	Off white	Hard (4)	9.0	33.2	-	2.69
2300 (1260)	White	Hard (4)	10.0	30.5	-	2.73
2400 (1316)	White	Hard (4)	10.0	42.3	-	3.37

Remarks*/ Other Tests Cracks - causes high absorption. Raw color not favorable for paper coating, but washing might improve it. Not commercially favorable. Potential Use: Pottery clay, possible stoneware additive.

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (written communication, 1987).

**Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.63-1g

County Polk. Sample Number 7

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1570-G.

Date Reported 11-26-63 Ceramist M.V. Denny, USBM.

Water of Plasticity 33.0 % Working Properties Long working, plastic, smooth, fatty. pH = 5.15

Color Pink. Drying Shrinkage 1.5 % Dry Strength Good.

Remarks Drying Characteristics: Good.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')*	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Appr. Sp. Gr.
1800 (982)	Flesh	Soft-crumbly	7.5	32.7	-	2.70
2000 (1093)	Pink	Soft (2)	7.5	32.4	-	2.72
2100 (1149)	Went to pieces in kiln		-	-	-	-
2200 (1149)	Went to pieces in kiln		-	-	-	-
2300 (1260)	Off white	Fair hard (3)	7.5	29.9	-	2.75
2400 (1316)	Cream	Hard (4)	15.0	16.2	-	2.77

Remarks / Other Tests High quartz content not favorable. Might be added to a clay needing quartz. Potential Use: None.

Preliminary Bloating (Quick Firing) Tests: Negative.

*Based on comparison of Tyrrell's 1967 revisions of Denny's 1964 data sheets.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 1 to 7, Collected by C. Porter Date c.1963

Sample Method Grab(?) Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.64-1

County Polk. Sample Number 21

Raw Properties: Lab & No. USBM, Norris, Tenn. No. 1553-S

Date Reported 4-8-64 (revised 1967) Ceramist M.V.Denny, USBM (revised by M.E. Tyrrell, Tuscaloosa, Ala.).

Water of Plasticity 23.4 % Working Properties *Long working, smooth, plastic, fatty. (Low plasticity). pH=7.80 (Slight effervescence with HCl.)

Color Gray. Drying Shrinkage 1.0(0.0) % Dry Strength Good. (Low.)

Remarks Drying Characteristics: Fair crazing. (No defects).

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	Fair hard (3)	0.5(0.0)	18.7	32.5	1.74
1900 (1038)	Light brown	Hard (4)	4.5(4.0)	14.0	26.3	1.88
2000 (1093)	Red brown (brown)	Very hard (5)	10.5(10.0)	9.4	19.0	2.02
2100 (1149)	Chocolate (brown)	Steel hard (6)	10.5(10.0)	3.2	7.3	2.29
2200 (1204)	Black-brown (dark-brown)	Hard cracked (6)	12.5	0.6	1.4	2.41
2300 (1260)	Black	Glassy	Melted (Expanded)	-	-	-

Remarks*/ Other Tests Firing range rather short, slightly uneven surface. (Should fire to "SW" face brick specifications at about 2050°F, 1121°C.)

Potential Use: Tile? (Face brick. Sewer pipe.)

Preliminary Bloating (Quick Firing) Tests: Negative.

Note: Appr. Por. and Bulk Dens. plus data and remarks in parentheses are from 1967 revised data sheets by Tyrrell.

*With revisions by K.J. Liles (written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size -20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 21, Collected by J.W. Smith? Date c. 1963

Sample Method Grab (?) Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No futher data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.64-2

County Polk. Sample Number 22

Raw Properties: Lab & No. USBM, Norris, Tenn., No. 1553-T

Date Reported 4-8-64 (revised 1967) Ceramist M.V. Denny, UDBM (revised by M.E. Tyrrell, Tuscaloosa, Ala.).

Water of Plasticity 34.4 % Working Properties Long working, smooth, plastic, fatty. (Moderate plasticity.) pH = 5.80 (Not effervescent with HCl.)

Color Red - brown Drying Shrinkage 1.0 (0.0)% Dry Strength Good. (Low.)

Remarks Drying Characteristics: Fair - internal cracks. (No defects.)

Slow firing tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	Soft (2)	2.0	28.8	43.5	1.51
1900 (1038)	Tan	Fair hard (3)	5.0	24.4	39.3	1.61
2000 (1093)	Light brown	Fair hard (3)	5.5(5.0)	18.9	33.3	1.76
2100 (1149)	Brown	Hard (4)	9.5(9.0)	12.7	24.9	1.96
2200 (1204)	(brown) Chocolate	Very hard (5)	10.5(10.0)	6.1	13.4	2.20
2300 (1260)	Dark brown	Steel hard (6)	15.0	3.3	7.4	2.23

Remarks*/ Other Tests (Should fire to "SW" face brick specifications at about 2150°F, 1177°C.) Poetntial Use: Brick, doubtful tile, if color not objectionable - 2150°F (1177°C). (Face brick. Sewer pipe.)

Preliminary Bloating (Quick Firing) Tests: Negative.

Note: Appr. Por. and Bulk Dens. plus data and remarks in parentheses are from 1967 revised data sheets by Tyrrell.

*With revisions by K.J. Liles (written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C.).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volum %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 22, Collected by J.W. Smith (?). Date c. 1963.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.64-3

County Polk. Sample Number 23

Raw Properties: Lab & No. USBM, Norris, Tenn., No. 1553-U

Date Reported 4-8-64. (revised 1967) Ceramist M.V. Denny, USBM (revised by M.E. Tyrrell, Tusaloosa, Ala.)

Water of Plasticity 26.5 % Working Properties Long working, smooth, plastic, fatty, (Low plasticity.) pH=7.21 (Not effervescent with HCl.)

Color Gray-green Drying Shrinkage 0.5(0.0) % Dry Strength Fair. (Low.)

Remarks Drying Characteristics: Fair, rough surface. (No defects.)

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	Soft (2)	0.0	26.6	41.5	1.56
1900 (1038)	Tan	Soft (2)	0.5(0.0)	24.1	38.3	1.59
2000 (1093)	Light brown	Fair hard (3)	4.5(4.0)	18.9	32.7	1.73
2100 (1149)	Light brown	Fair hard (3)	4.5(4.0)	17.3	30.4	1.76
2200 (1204)	Brown	hard (4)	4.5(4.0)	12.6	23.9	1.90
2300 (1260)	Dark brown	Very hard (5)	9.5(9.0)	8.5	17.6	2.07

Remarks*/ Other Tests Lower temperatures too soft and too high absorption, uneven surface. (Should fire to "MW" face brick specifications at about 2150°F, 1177°C.) Potential Use: None. (Face brick.)

Preliminary Bloating (Quick Firing) Tests: Negative.

Note: Appr. Por. and Bulk Dens. plus data and remarks in parentheses are from 1967 revised data sheets by Tyrrell.

*With revisions by K.J. Liles (written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. - . Lat. _____, Long. _____.

Field No. 23, Collected by J.W. Smith (?) . Date c. 1963.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Shale? (Slate?). Compilation Map Location No. Plk.64-4

County Polk. Sample Number 24

Raw Properties: Lab & No. USBM, Norris, Tenn.; #1553-V

Date Reported 4-8-64. (revised 1967) Ceramist M.V. Denny, USBM (revised by M.E. Tyrrell, Tuscaloosa, Ala.)

Water of Plasticity 26.8 % Working Properties Long working, smooth, plastic, fatty. (Low plasticity.) pH=6.20 (Not effervescent with HCl.)

Color Yellow. Drying Shrinkage 0.5(0.0)% Dry Strength Good. (Low.)

Remarks Drying Characteristics: Good, slightly uneven surface. (No defects.)

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	Soft (2)	0.5(2.5)	28.3	43.9	1.55
1900 (1038)	Tan	Fair hard (3)	0.5(2.5)	24.8	40.4	1.63
2000 (1093)	Light red-brown	Hard (4)	5.0	19.1	34.2	1.79
2100 (1149)	Red-brown	Hard (4)	5.0	17.4	32.2	1.85
2200 (1204)	Red-brown	Very hard (5)	5.5(5.0)	14.4	28.1	1.95
2300 (1260)	Dark red-brown	Steel hard (6)	9.5(9.0)	10.1	21.1	2.09

Remarks*/ Other Tests Speckled, high absorption, slightly uneven surface. (Should fire to "MW" face brick specifications at about 2150°F, 1177°C.) Potential Use: Decorative tile, inside brick, outside brick in mild winter climate; pottery. (Face brick.)

Preliminary Bloating (Quick Firing) Tests: Negative.

Note: Appr. Por. and Bulk Dens. plus data and remarks in parentheses are from 1967 revised data sheets by Tyrrell.

*With revisions by K.J. Liles (written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size -20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat._____, Long. _____.

Field No. 24, Collected by J.W. Smith? . Date c. 1963.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Talladega Formation (Precambrian?).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay (Knox). Compilation Map Location No. Plk.64-5

County Polk. Sample Number 89.

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1556-H

Date Reported 6-26-64. (revised 1967) Ceramist M.V. Denny, USBM (revised by M.E. Tyrrell, Tuscaloosa, Ala.)

Water of Plasticity 30.6 % Working Properties Low plasticity. pH=6.0 Not effervescent with HCl.

Color White. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks Drying Characteristics: No defects

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Pink	2	0.0	28.1	41.0	1.46
1900 (1038)	Pink	3	5.0	20.0	33.2	1.66
2000 (1093)	Off-white	4	11.0	9.9	19.6	1.98
2100 (1149)	Gray	6	15.0	1.2	2.7	2.29
2200 (1204)	-	-	Expanded	-	-	-

Remarks/Other Tests Abrupt vitrification. Potential Use: Not suitable for use as the principal component in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. - _____. Lat. _____, Long. _____.

Field No. 89, Collected by J.W. Smith? Date c.1963

Sample Method Grab(?) Weathering/alteration Residual clay?

Structural Attitude -

Stratigraphic Assignment Tertiary(?) clay from Knox Group carbonates.

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay (Knox) Compilation Map Location No. Plk.64-6

County Polk. Sample Number 94

Raw Properties: Lab & No. USBM, Norris, Tenn.; No. 1556-M

Date Reported 6-26-64 (revised 1967) Ceramist M.V. Denny, USBM (revised by M.E. Tyrrell, Tuscaloos, Ala.)

Water of Plasticity 30.2 % Working Properties Low plasticity, pH=5.5 Not effervescent with HCl.

Color Gray. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks Drying Characteristics: No defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/ccr.
1800 (982)	Pink	2	0.0	26.4	39.6	1.50
1900 (1038)	Pink	3	2.5	20.1	33.6	1.67
2000 (1093)	Pink	4	5.0	18.1	31.0	1.71
2100 (1149)	Gray-pink	5	10.0	15.1	27.0	1.79
2200 (1204)	Gray	6	14.0	0.8	1.9	2.32
2300 (1260)	Gray	6	14.0	0.8	1.8	2.31

Remarks / Other Tests Abrupt vitrification. Potential Use: Not suitable for use as the principal component in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 94, Collected by J.W. Smith? Date c.1963

Sample Method Grab(?) Weathering/alteration Residual clay?

Structural Attitude -

Stratigraphic Assignment Tertiary(?) clay from Knox Group carbonates.

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay. Compilation Map Location No. Plk.66-1

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-6-1

Date Reported 5-4-66 Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 24.7 % Working Properties Low plasticity.

Color White. Drying Shrinkage 0.0 % Dry Strength Poor.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc *
1800 (982)	Cream	1	0.0	28.4	47.7	1.68
1900 (1038)	Cream	1	0.0	25.7	47.2	1.82
2000 (1093)	Cream	1	0.0	23.7	46.8	1.99
2100 (1149)	Ivory	2	5.0	11.6	28.0	2.41
2200 (1204)	Gray	4	2.8	3.1	8.8	2.95
2300 (1260)	Gray	5	7.5	2.8	8.7	3.10

Remarks / Other Tests Fabrication - probably difficult if not impossible without a plasticizer (low green strength). Pyrometric cone equivalent (P.C.E.) - Cone 12-13. Potential Use: Earthen-ware; stone-ware; flue lining.

Preliminary Bloating (Quick Firing) Tests: Negative.

* Corrections and additional data from USBM files (K.J. Liles, written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size -20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. -, Collected by T. Harris? Date c. 1966

Sample Method Grab (?) Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments Clay from Thomas Harris farm, Rt. 1, Rockmart, Georgia.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay (newala). Compilation Map Location No. Plk.66-2

County Polk. Sample Number 131

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-8-11

Date Reported 10-6-66 Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 24.5 % Working Properties Low plasticity
pH=7.0 Not effervescent with HCl.

Color White. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Cream	No bond	-	-	-	-
1900 (1038)	Cream	2	0.0	28.9	43.1	1.49
2000 (1093)	Cream	3	0.0	21.0	35.9	1.71
2100 (1149)	Ivory	4	5.0	15.5	28.7	1.85
2200 (1204)	Light gray	5	7.5	5.7	12.4	2.18
2300 (1260)	Gray	6	10.0	3.0	6.6	2.20

Remarks / Other Tests Too low in green strength to be used alone as a natural body. Potential Use: Artware or stoneware body mixtures.

Preliminary Bloating (Quick Firing) Tests: Negative.

*Additional data from USBM files (K.J. Liles, written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C.).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 131, Collected by J.W. Smith (?). Date c. 1966.

Sample Method Grab (?). Weathering/alteration Residual clay.

Structural Attitude -

Stratigraphic Assignment Tertiary(?) clay from Newala Limestone (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rocmkart). Compilation Map Location No. Plk.66-3

County Polk. Sample Number 132

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-8-12

Date Reported 10-6-66. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 32.9 % Working Properties Moderate plasticity.
pH=5.0 Not effervescent with HCl.

Color Red. Drying Shrinkage 2.5 % Dry Strength Fair.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	2	2.5	29.8	46.2	1.55
1900 (1038)	Tan	3	7.5	17.9	34.2	1.91
2000 (1093)	Brown	4	17.5	4.6	11.3	2.45
2100 (1149)	Red-brown	5	17.5	3.9	9.6	2.47
2200 (1204)	-	-	Expanded	-	-	-

Remarks / Other Tests Abrupt vitrification. High firing shrinkage.
Potential Use: Not suitable for use in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

*Additional data from USBM files (K.J. Liles, written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size -20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat._____, Long. _____.

Field No. 132, Collected by J.W. Smith?. Date c. 1966.

Sample Method Grab (?). Weathering/alteration Weathered.

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.66-4

County Polk. Sample Number 134

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-8-14.

Date Reported 10-6-66. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 22.8 % Working Properties Low plasticity.
pH=6.6 Not effervescent with HCl.

Color Gray. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	2	0.0	21.8	35.3	1.62
1900 (1038)	Tan	2	0.0	19.9	33.4	1.68
2000 (1093)	Tan	3	0.0	16.6	29.4	1.77
2100 (1149)	Brown	4	5.0	8.5	17.1	2.01
2200 (1204)	Dark brown	5	7.5	1.7	3.7	2.19
2300 (1260)	-	-	Expanded	-	-	-

Remarks*/Other Tests Low green strength. Potential Use: Not suitable for use in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

*Revisions and additional data from USBM files (K.J. Liles, written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. - _____. Lat. _____, Long. _____.

Field No. 134, Collected by J.W. Smith? Date c.1966

Sample Method Grab(?) Weathering/alteration Weathered.

Structural Attitude - _____

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.66-5

County Polk. Sample Number 135

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-8-15.

Date Reported 10-6-66. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 24.7 % Working Properties Low plasticity.
pH=6.0 Not effervescent with HCl.

Color Tan. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	2	0.0	24.5	38.5	1.57
1900 (1038)	Tan	2	0.0	23.7	37.7	1.59
2000 (1093)	Tan	2	0.0	21.5	35.7	1.66
2100 (1149)	Brown	4	5.0	14.0	26.2	1.87
2200 (1204)	Dark brown	5	7.5	4.9	10.6	2.16
2300 (1260)	-	-	Expanded	-	-	-

Remarks*/Other Tests Low green strength; abrupt vitrification. Potential Use: Not suitable for use in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

*Revisions and additional data from USBM files (K.J. Liles, written communication, 1987).

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. - . Lat. _____, Long. _____.

Field No. 135, Collected by J.W. Smith? Date c.1966

Sample Method Grab(?) Weathering/alteration Weathered.

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay or shale. Compilation Map Location No. Plk.67-1

County Polk. Sample Number 145

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-9-8.

Date Reported 1-10-67 Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 23.9 % Working Properties Low plasticity.
pH=4.8 Not effervescent with HCl.

Color Tan. Drying Shrinkage 2.5 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	2	5.0	22.2	36.6	1.65
1900 (1038)	Tan	2	5.0	19.5	33.9	1.74
2000 (1093)	Tan	3	5.0	19.5	33.9	1.74
2100 (1149)	Light brown	4	5.0	18.1	31.9	1.76
2200 (1204)	Red-brown	5	7.5	16.5	29.5	1.79
2300 (1260)	Dark brown	6	7.5	15.6	27.9	1.79

Remarks / Other Tests High absorptions at all firing temperatures. Potential Use: Not Suitable for use as the principal component in vitreous clay products.

Preliminary Bloating (Quick Firing) Tests: Negative.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C.).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 145, Collected by J.W. Smith (?). Date c. 1966.

Sample Method Grab (?). Weathering/alteration Residual clay.

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate or shale. Compilation Map Location No. Plk.67-2

County Polk. Sample Number 156

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-9-19

Date Reported 1-11-67. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 18.6 % Working Properties Low plasticity.
pH=5.0 Not effervescent with HCl.

Color Brown. Drying Shrinkage 2.5 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Light tan	2	5.0	26.5	40.3	1.52
1900 (1038)	Light tan	2	5.0	25.9	39.4	1.52
2000 (1093)	Light tan	3	5.0	21.2	35.0	1.65
2100 (1149)	Light brown	4	5.0	16.4	29.2	1.78
2200 (1204)	Dark brown	5	10.0	9.7	19.3	1.99
2300 (1260)	Gray	6	10.0	5.4	11.2	2.08

Remarks*/Other Tests Should fire to "MW" face brick specifications at about 2150°F (1177°C). Potential Use: Building brick.

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles (Written Communication, 1987)

Crushing Characteristics (unfired material) -

Particle Size -20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. - _____. Lat._____, Long. _____.

Field No. 156 _____, Collected by J.W. Smith? _____. Date c. 1966.

Sample Method Grab (?). Weathering/alteration -

Structural Attitude - _____

Stratigraphic Assignment - _____

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay (Rome). Compilation Map Location No. Plk.67-3

County Polk. Sample Number 157

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-9-20.

Date Reported 1-11-67. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 18.6 % Working Properties Low plasticity.
pH=5.1 Not effervescent with HCl.

Color Brown. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Tan	2	0.0	22.4	37.4	1.67
1900 (1038)	Tan	3	0.0	19.6	34.3	1.75
2000 (1093)	Light brown	4	2.5	15.2	28.1	1.85
2100 (1149)	Light brown	4	5.0	9.9	19.6	1.98
2200 (1204)	Red-brown	5	5.0	7.2	14.7	2.04
2300 (1260)	Dark brown	6	5.0	3.5	7.3	2.08

Remarks*/Other Tests Should fire to "SW" face brick specifications at about 2150°F (1177°C). Low green strength. Potential Use: Building brick. (Also see "Extrusion Tests")

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles, (written communication, 1987).

Map Location No. Plk. 67-3

TUSCALOOSA METALLURGY RESEARCH LABORATORY

Clay Evaluation: Extrusion Tests

Sender's identification: 157 Date 2-10-67

Tuscaloosa number: G-9-20

Body composition: Raw clay through 16-mesh: 100%.

Tempering water: 23% of dry batch weight.

Vacuum on machine: 23 inches of mercury.

Drying: 24 hours in air; 24 hours at 140°F (60°C).

Drying shrinkage: 1.0%

Modulus of rupture, dry unfired: 370 psi.

Firing:

Time- 24 hours.

Temperature- 2140°F (1171°C).

Cone- 5 over.

Total shrinkage: 8.3%.

Absorption, 5-hour boiled: 1.1%

Absorption, 24-hour soaked: 0.4%.

Saturation coefficient: 0.36

Apparent Porosity: 2.7%

Bulk density: 2.42 gm/cc.

Fired modulus of rupture: 5270 psi.

Mohs' hardness: 8

Color: Red-brown

Comments Fired too high for face brick. possible use as quarry tile.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO			
CaO		Montmorillonite	
Na_2O		Others	
K_2O			
P_2O_5			
S (total)		Total	_____
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss	_____		
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 157, Collected by J.W. Smith? Date c.1966

Sample Method Grab(?) Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment Rome Formation (Cambrian).

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Clay or shale. Compilation Map Location No. Plk.67-4

County Polk. Sample Number 158

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; G-9-21.

Date Reported 1-11-67. Ceramist M.E. Tyrrell, USBM.

Water of Plasticity 25.3 % Working Properties Low plasticity.
pH=4.8 Not effervescent with HCl.

Color Tan. Drying Shrinkage 0.0 % Dry Strength Low.

Remarks No drying defects.

Slow Firing Tests:

Temp. °F (°C)	Color	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. % *	Other data: Bulk Dens. gm/cc
1800 (982)	Pink	3	2.5	23.0	36.3	1.58
1900 (1038)	Salmon	4	5.0	19.1	31.9	1.67
2000 (1093)	Tan	5	5.0	14.6	16.3	1.80
2100 (1149)	Light brown	5	10.0	7.5	15.0	2.00
2200 (1204)	Dark brown	6	10.0	4.7	9.8	2.08
2300 (1260)	Gray	7	10.0	4.1	8.4	2.04

Remarks*/Other Tests Should fire to "MW" face brick specifications at about 2050°F (1121°C). Potential Use: Building brick. (Also face brick or quarry tile - see "Extrusion Tests")

Preliminary Bloating (Quick Firing) Tests: Negative.

*With revisions by K.J. Liles, (written communication, 1987).

Map Location No. Plk. 67-4

TUSCALOOSA METALLURGY RESEARCH LABORATORY

Clay Evaluation: Extrusion Tests

Sender's identification: 158 Date 1-12-68

Tuscaloosa number: G-9-21

Body composition: Raw clay through 6-mesh: 100%.

Tempering water: 27% of dry batch weight.

Vacuum on machine: 28 inches of mercury.

Drying: 24 hours in air; 24 hours at 140°F (60°C).

Drying shrinkage: 2.1%

Modulus of rupture, dry unfired: 200 psi.

Firing:

Time- 24 hours.

Temperature- 2060°F (1127°C).

Cone- 1

Total shrinkage: 9.4%.

Absorption, 5-hour boiled: 2.1%

Absorption, 24-hour soaked: 1.9%.

Saturation coefficient: 0.90

Apparent Porosity: 4.9%

Bulk density: 145.4 lb/cu ft

Fired modulus of rupture: 3650 psi.

Mohs' hardness: 6

Color: Light brown.

Comments Should be satisfactory for face brick or quarry tile.

Crushing Characteristics (unfired material) -

Particle Size - 20 mesh. Retention Time 15 min. draw trials (following 3-4 hr. to 1800°F, 982°C).

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. -. Lat. _____, Long. _____.

Field No. 157, Collected by J.W. Smith? Date c.1966

Sample Method Grab(?) Weathering/alteration -

Structural Attitude -

Stratigraphic Assignment -

Sample Description & Comments No further data available.

Compiled by B. J. O'Connor Date 9-25-86

CERAMIC TESTS AND ANALYSES

Material Slate (Rocmkart). Compilation Map Location No. Plk.77-1

County Polk. Sample Number -

Raw Properties: Lab & No. USBM, Tuscaloosa, AL; No. Ga-23-1.

Date Reported 8-30-77 Ceramist K.J. Liles, USBM.

Water of Plasticity - % Working Properties -

Color - Drying Shrinkage - % Dry Strength -

Slow Firing Tests: Not determined

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:

Preliminary Bloating (Quick Firing) Tests: Positive.

Temp. °F (°C)	Absorption %	Bulk Density g/cm^3	Bulk Density lb/ft^3	Remarks
1832 (1000)	3.1	2.41	150.3	No expansion.
1922 (1050)	3.5	2.19	136.3	No expansion.
2012 (1100)	4.4	1.87	116.9	Slight expansion.
2102 (1150)	8.7	1.08	67.3	Good pore structure - sticky.

Remarks Marginal for lightweight aggregate. Heavy. Tests on crushed and pelletized material were negative as they had no bond strength and crumbled on firing.

Crushing Characteristics (unfired material) -

Particle Size - Retention Time -

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide	Weight %	Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica	
MnO		Chlorite-vermiculite	
MgO		Montmorillonite	
CaO		Others	
Na_2O			
K_2O			
P_2O_5			
S (total)		Total	
C (org.)			
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____ _____

Date _____ _____

Method _____ _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart S. (N. side). Lat. _____, Long. _____.

Field No. -, Collected by D.H. White, USBM. Date Feb. 1977.

Sample Method Bulk sample. Weathering/alteration Fresh slate.

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Sample of crushed and raw slate from Galaite Corp. (Ga. Lightweight Aggregate Co.) quarry just south of Rockmart, 1/2 mi. south of Ga. Hwy. 6 and east of the Seaboard Coast Line R.R. Samples tested to see if present production of expanded aggregate with 60 lbs/ft^3 could be improved (made lighter) do not give much promise for improvement except possibly for extensive experimenttation with different additives combined with fine grinding, blending, and extrusion of pelletizing.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.80-1

County Polk. Sample Number Clay No. 1.

Raw Properties: Lab & No. Marazzi Ceramiche, #M.P. 1790.

Date Reported March 1980. Ceramist L. Lorici.

Water of Plasticity - % Working Properties Micaceous.

Color Buff-tan. Drying Good. % Dry Strength Low.
Pressing Foliated. Fluidizing Good.

Slow Firing Tests: (50 x 100 x 8 mm. pressed tiles.)

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs')	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
1976 (1080) (= cycle 1)	-	-	-	-	-	-
2030 (1110) (= cycle 2)	-	-	foliated	-	foliated	-
1994 (1090) (= cycle 3)	-	-	6.1	-	foliated	-

(DTA and Dilatometric Analyses on file. - unpubl. report.)

Remarks / Other Tests Schistose, chloritic clay with high micaceous mineral content. Difficult to handle due to low green strength. ("Cl": much too refractory and not at all suitable for making tiles.)

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size < 40 Retention Time Cycle 1: 40-45 min.
Cycle 2: 70-75 min. in roller kiln.
Cycle 3: 200-230 min.

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	(A) Weight %	(B)
SiO_2	60.00	64.2
TiO_2	1.04	1.1
Al_2O_3	19.98	20.4
Fe_2O_3	6.90	7.5
FeO	-	-
MnO	0.00	-
MgO	2.00	1.3
CaO	0.11	-
Na_2O	0.17	0.3
K_2O	4.28	4.3
P_2O_5	-	-
S (total)	-	-
C (org.)	-	-
CO_2	-	-
H_2O^-	-	-
H_2O^+	-	-
Ignition loss	5.36	(5.0)
Total	99.84	99.1

Mineralogy

Mineral	volume % (A)	(B)
Quartz		X
Feldspar		
Carbonate		
Mica (Muscovite)		X
Chlorite-(+kaolinite) vermiculite	(29)	X
Montmorillonite		
Illite	(71)	X
Total	-	-

X = present.

Analyst A) R. Landrum, GA Survey. M. A. Tadkod, GA Survey.
B) Marazzi Ceramiche. M. Ceramiche.
Date Aug. and Sept. 1979. Aug. and Sept. 1979.

Method A) Atomic Absorption X-ray diffraction.
B) XRF and Spectrophotometry.

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Taylorsville (W. side). Lat._____, Long. _____.

Field No. 1., Collected by M. A. Tadkod. Date July 1979.

Sample Method Grab. Weathering/alteration Weathered slate.

Structural Attitude -

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Sample from outcrop on W. side of Ga. Hwy. 113 about 1/2 mile S. of Taylorsville city limits and just N. of Mt. Sinai Church (after M. A. Tadkod, unpubl. data, 1979 and 1980).

Compiled by B. J. O'Connor Date 2-10-82

CERAMIC TESTS AND ANALYSES

Material Slate (Rocmkart). Compilation Map Location No. Plk.80-2

County Polk. Sample Number Clay No. 2.

Raw Properties: Lab & No. Marazzi Ceramiche, #M.P. 1791.

Date Reported March 1980. Ceramist L. Lorici.

Water of Plasticity - % Working Properties Schistose.

Color Buff-tan. Drying Good. % Dry Strength Low.
Pressing Difficult. Fluidizing Good.

Slow Firing Tests: (50 x 100 x 8 mm. pressed tiles.)

Temp. °F (°C)	Color (Munsell)	Hardness (Mohs")	Linear Shrinkage, %	Absorption %	Appr. Por. %	Other data:
1976 (1080) (= cycle 1)	-	-	-	-	-	-
2030 (1110) (= cycle 2)	-	-	1.2	-	13.8	-
1994 (1090) (= cycle 3)	-	-	3.1	-	9.3	-

DTA AND Dilatometric Analyses on file. - unpubl. report).

Remarks / Other Tests Schistose, chloritic clay with a high micaceous mineral content giving a low green strength and high refractoriness. ("Cl": much too refractory and not at all suitable for making tiles.)

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size < 40 Retention Time Cycle 1: 40-45 min.
Cycle 2: 70-75 min. in roller kiln.
Cycle 3: 200-230 min.

Chemical & Mineralogical Data:

Chemical Analysis

Oxide	(A) Weight %	(B)
SiO_2	61.92	66.4
TiO_2	0.43	1.0
Al_2O_3	19.90	18.4
Fe_2O_3	6.44	6.4
FeO	-	-
MnO	0.00	-
MgO	2.10	1.9
CaO	0.11	-
Na_2O	0.24	0.4
K_2O	4.04	4.0
P_2O_5	-	-
S (total)	-	-
C (org.)	-	-
CO_2	-	-
H_2O^-	-	-
H_2O^+	-	-
Ignition loss	4.70	(4.6)
Total	99.88	98.5

Mineralogy

Mineral	volume % (A)	(B)
Quartz		X
Feldspar		
Carbonate		
Mica (Muscovite)		X
Chlorite-(+kaolinite)	(24)	X
vermiculite		
Montmorillonite		
Illite	(76)	
Total	-	-

X = present
(A) = clays and micas only.

Analyst A) R. Landrum, GA Survey. M. A. Tadkod, GA Survey.
B) Marazzi Ceramiche. M. Ceramiche.
Date Aug. and Sept. 1979. Aug. and Sept. 1979.

Method A) Atomic Absorption. X-ray diffraction.
B) XRF and Spectrophotometry.

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart North (E. side). Lat. _____, Long. _____.

Field No. 2 and A shale, Collected by M. A. Tadkod and O'Connor Date July 1979 and Nov. 1980

Sample Method Grab. Weathering/alteration Weathered slate.

Structural Attitude Slaty clevage (bedding) strikes N22°E, dip 21°E.

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Sample from the W. side of Ga. Hwy. 113 about 3 mi. S. of Taylorsville city limits. Both samples are inferred to represent the same outcrop just N. of Denton Springs Rd.; however, manuscript maps show location "2" (by Tadkod, 1979 and 1980, unpubl. data) approx. 1/2 mi. further S. of "A" (sampled by Benzel and O'Connor.

Compiled by B. J. O'Connor Date 6-17-88

CERAMIC TESTS AND ANALYSES

Material Slate (Rockmart). Compilation Map Location No. Plk.80-3a

County Polk. Sample Number Shale A.

Raw Properties: Lab & No. Georgia Tech., #AS.

Date Reported 12-10-80. Ceramist J. F. Benzel, Georgia Tech.

Water of Plasticity - % Working Properties -

Color _____ Drying Shrinkage 0.125 % Dry Strength (MOR) - psi.
Drying Wt. Loss 23.29

Slow Firing Tests: (1x1x= 9 in. bars.)

Temp. °F (°C)	Color (Munsell)	Hardness (MOR, psi.)	Linear Shrinkage, % (total)	Absorption %	LOI %	Other data:
Cone 1: 2120 (1160)	-	571	0.05	11.54	3.64	-
	(1 sample bar fired.)					

Remarks / Other Tests Exploratory test firing as possible substitute in 8" sewer pipe bend (see Plk. 80-3b).

Preliminary Bloating (Quick Firing) Tests: Not determined.

CERAMIC TESTS AND ANALYSES

Material Shale (blend). Compilation Map Location No. Plk.80-3b

County Polk (+Floyd and Hancock). Sample Number Shale A-blend.

Raw Properties: Lab & No. Georgia Tech., #3A.

Date Reported 12-10-80. Ceramist J. F. Benzel, Georgia Tech.

Water of Plasticity - % Working Properties -

Color _____ Drying Shrinkage 3.34 % Dry Strength (MOR) 341 psi.
Drying Wt. Loss 22.43

Slow Firing Tests: (1x1x = 9 in. bars.)

Temp. °F (°C)	Color (Munsell)	Hardness (MOR, psi.)	Linear Shrinkage, % (total)	Absorption %	Appr. Por. %	Other data:
Cone 1: 2120 (1160)	-	2296	4.82 (8.16)	7.58	3.88	-
	(3 sample bars fired).					

Remarks / Other Tests Experimental 8" sewer pipe blend: 30% Shale A (= Plk. 80-3a) + 35% Floyd Top (= Fl. 80-4a) + 35% Linton shale (+ 8% grog). Not as good as X5 blend (= Fl. 80-4d).

Preliminary Bloating (Quick Firing) Tests: Not determined.

Crushing Characteristics (unfired material) -

Particle Size _____ Retention Time

Chemical & Mineralogical Data: Not determined.

Chemical Analysis		Mineralogy	
Oxide		Mineral	volume %
SiO_2			
TiO_2		Quartz	
Al_2O_3		Feldspar	
Fe_2O_3		Carbonate	
FeO		Mica (Muscovite)	
MnO		Chlorite-(+kaolinite)	
MgO		vermiculite	
CaO		Montmorillonite	
Na_2O		Illite	
K_2O			
P_2O_5			
S (total)			
C (org.)		Total	
CO_2			
H_2O^-			
H_2O^+			
Ignition loss			
Total			

Analyst _____

Date _____

Method _____

Sample Location Data:

County Polk. Land Lot _____, Sec. _____, Dist. _____.

7 1/2' topo quad. Rockmart North (E. side). Lat. _____, Long. _____.

Field No. Shale A., Collected by Benzel and O'Connor Date Nov. 1980

Sample Method Grab. Weathering/alteration Weathered slate.

Structural Attitude Slaty clevage (bedding) strikes N22°E, dip 21°E.

Stratigraphic Assignment Rockmart Slate (Ordovician).

Sample Description & Comments Sample from the W. side of Ga. Hwy. 113 about 3 mi. S. of Taylorsville city limits, from outcrop just N. of Denton Springs Rd. This may be site sampled for Plk.80-2; however, manuscript maps show location "2" (by Tadkod, 1979 and 1980, unpubl. data) approx. 1/2 mi. further S.

Compiled by B. J. O'Connor Date 6-17-88

American Society for Testing and Materials, 1974 Annual Book of ASTM Standards:

C4-62 (Reapproved 1970) Standard specification for clay drain tile, Part 16, p. 1-7.

C13-69 (Replaced by C700-74) Specifications for standard strength clay sewer pipe, Part 16, p. 409-413.

C24-72 Pyrometric cone equivalent (PCE) of refractory materials, Part 17, p. 9-14.

C27-70 Classification of fireclay and high-alumina refractory brick, Part 17, p. 15-17.

C43-70 Standard definitions of terms relating to structural clay products, Part 16, p. 33-35.

C62-69 Standard specification for building brick (solid masonry units made from clay or shale), Part 16, p. 121-125.

C216-71 Standard specification for facing brick (solid masonry units made from clay or shale), Part 16, p. 121-125.

C410-60 (Reapproved 1972) Standard specification for industrial floor brick, Part 115, p. 217-218.

C479-72 Standard specification for vitrified clay liner plates, Part 16, p. 283-284.

C330-69 Specification for lightweight aggregates for structural concrete, Part 14, p. 229-232.

C315-56 (Reapproved 1972) Standard specification for clay flue linings, Part 16, p. 169-171.

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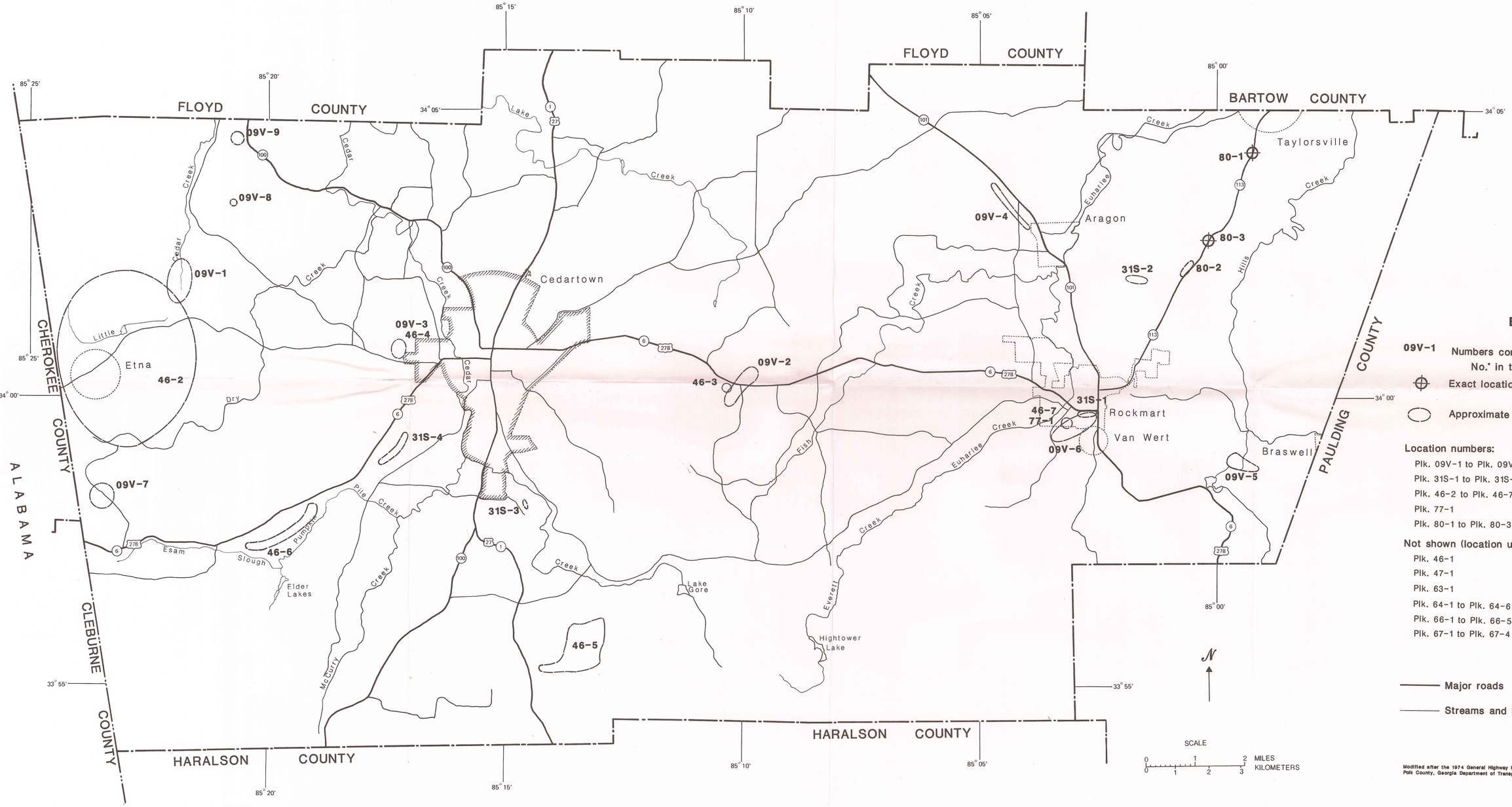
CLAY, SHALE AND SLATE TEST LOCATIONS IN POLK COUNTY

Georgia Geologic Survey
Information Circular 71
Plate 1



EXPLANATION

09V-1 Numbers correspond to the "Map Location No." in the text.

Exact location for a single outcrop sampled.

Approximate location for a single sample.

Location numbers:

Plk. 09V-1 to Plk. 09V-9
Plk. 31S-1 to Plk. 31S-4
Plk. 46-2 to Plk. 46-7
Plk. 77-1
Plk. 80-1 to Plk. 80-3

Not shown (location unknown):

Plk. 46-1
Plk. 47-1
Plk. 63-1
Plk. 64-1 to Plk. 64-6
Plk. 66-1 to Plk. 66-5
Plk. 67-1 to Plk. 67-4

Major roads

Streams and lakes

Modified after the 1974 General Highway Map of Polk County, Georgia Department of Transportation