COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION
AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES

CLAY-MATERIAL RESOURCES IN VIRGINIA

PALMER C. SWEET

MINERAL RESOURCES REPORT 13

VIRGINIA DIVISION OF MINERAL RESOURCES

James L. Calver
Commissioner of Mineral Resources and State Geologist

CHARLOTTESVILLE, VIRGINIA
1976

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION
AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES

CLAY-MATERIAL RESOURCES IN VIRGINIA

PALMER C. SWEET

MINERAL RESOURCES REPORT 13

VIRGINIA DIVISION OF MINERAL RESOURCES

James L. Calver
Commissioner of Mineral Resources and State Geologist

CHARLOTTESVILLE, VIRGINIA
1976

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF PURCHASES AND SUPPLY
RICHMOND
1976

DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

Richmond, Virginia

MARVIN M. SUTHERLAND, *Director*
JERALD F. MOORE, *Deputy Director*
A. S. RACHAL, JR., *Executive Assistant*

BOARD

FRED W. WALKER, Ashland, *Chairman*
MAJOR T. BENTON, Suffolk, *Vice Chairman*
D. HENRY ALMOND, Richmond
A. R. DUNNING, Millwood
ARTHUR P. FLIPPO, Doswell
ADOLPH U. HONKALA, Richmond
J. H. JOHNSON, West Point
FREDERIC S. REED, Manakin-Sabot
COLLINS SNYDER, Accomac
WILLIAM H. STANHAGEN, Falls Church
SHERMAN WALLACE, SR., Cleveland
E. FLOYD YATES, Powhatan

CONTENTS

ILLUSTRATIONS

CLAY-MATERIAL RESOURCES IN VIRGINIA

By

PALMER C. SWEET

ABSTRACT

This report summarizes the location and potential uses of 485 samples of clay materials from Virginia that may be suitable for making ceramic or nonceramic products. The localities are plotted on a map of the state and the samples are listed by their repository numbers under product headings and under county/city headings.

INTRODUCTION

This report gives the location of clay materials in Virginia that may be potentially suitable for ceramic or nonceramic uses. A total of 485 samples of clay, shale, slate, schist, or other clay material, plotted on the state map (Plate 1), were collected mainly by members of the Virginia Division of Mineral Resources. These samples have been evaluated by the U. S. Bureau of Mines at the Electrotechnical Experiment Station and Norris Metallurgy Research Laboratory, Norris, Tennessee, Morse Laboratories, Sacramento, California, or the Tuscaloosa Metallurgy Research Center, Tuscaloosa, Alabama, under a cooperative agreement with the Virginia Division of Mineral Resources. The samples included in this report were evaluated from December 1957 through December 1975. Clay-material resources sampled in former Nansemond County are listed in this publication under the City of Suffolk. The test results of 453 of the samples were published in Mineral Resources Reports 2, 5, 6, 8, and 12 of the Virginia Division of Mineral Resources; various criteria used to evaluate these samples are presented in several of the reports. Detailed evaluation data for 168 additional samples tested by these laboratories and found not potentially suitable for ceramic or nonceramic uses can also be examined

in the reports. The test results of 32 other samples that were not included in previous reports are indicated by an asterisk and included in the Appendix of this report. Small portions of the raw sample, test briquettes, and other fired materials for many of the samples are preserved in the repository of the Division of Mineral Resources at Charlottesville. Localities from which samples were evaluated and reported either in the previous Mineral Resources Reports or in the Appendix of this report are shown on Plate 1. The samples are listed numerically as to their potential uses under product headings and under county/city headings. In parentheses after each county or city heading is noted the Mineral Resources Report where the test data for the samples may be found.

USES LISTED BY PRODUCT

ABSORBENT

Sample	*County*
R-3044	Richmond

BRICK

Sample	*County*	*Sample*	*County*
R-1	Augusta	R-595	Fauquier
R-2	Albemarle	R-596	Fauquier
R-11*	Rockingham	R-597	Fauquier
R-12*	Rockingham	R-598	Fauquier
R-38	Augusta	R-600	Prince William
R-39	Augusta	R-622	Prince William
R-234	Prince William	R-623	Orange
R-238	Loudoun	R-638	Montgomery
R-239	Loudoun	R-639	Montgomery
R-241	Loudoun	R-641	Montgomery
R-242	Fauquier	R-643	Montgomery
R-312	Stafford	R-644A	Montgomery
R-313	Stafford	R-644B	Montgomery
R-377	Rockingham	R-644C	Montgomery
R-396	Rockingham	R-645	Montgomery
R-397A	Rockingham	R-646*	Northumberland
R-397B	Rockingham	R-648	Warren
R-398	Rockingham	R-649	Warren
R-417	Fairfax	R-650	Page
R-419	Fairfax	R-651	Frederick
R-423	Prince William	R-652A	Frederick
R-424	Fairfax	R-652B	Frederick
R-425	Fairfax	R-657	Shenandoah
R-426	Fairfax	R-660	Shenandoah
R-517	Loudoun	R-663	Shenandoah
R-518	Loudoun	R-664	Shenandoah
R-519	Frederick	R-665	Shenandoah
R-520	Frederick	R-666	Warren
R-521	Frederick	R-667*	Northumberland
R-522	Frederick	R-668*	Northumberland
R-524	Frederick	R-669*	Lancaster
R-525	Frederick	R-670*	Lancaster
R-526	Frederick	R-671*	Lancaster
R-529	Fairfax	R-673	Page
R-590	Loudoun	R-674	Shenandoah
R-591	Loudoun	R-675	Shenandoah
R-592	Loudoun	R-676	Shenandoah
R-593	Fauquier	R-677	Culpeper
R-594	Fauquier	R-679	Culpeper

BRICK (continued)

Sample	*County*	*Sample*	*County*
R-681	Spotsylvania	R-1818	Alleghany
R-682	Spotsylvania	R-1819	Alleghany
R-745	Prince William	R-1820	Alleghany
R-1182	Rockingham	R-1822	Bath
R-1183A	Rockingham	R-1824	Highland
R-1183B	Rockingham	R-1825	Highland
R-1184	Rockingham	R-1826	Highland
R-1185	Rockingham	R-1828	Alleghany
R-1187	Orange	R-1849	Alleghany
R-1189	Orange	R-1850	Augusta
R-1190B	Frederick	R-1852	Augusta
R-1191A	Frederick	R-1859	Highland
R-1191B	Frederick	R-1861	Highland
R-1543	Prince William	R-1862	Roanoke
R-1544	Fluvanna	R-1864	Roanoke
R-1546	Fluvanna	R-1865	Roanoke
R-1614	Augusta	R-1868	Roanoke
R-1616	Augusta	R-1882	Scott
R-1617	Augusta	R-1883	Scott
R-1618	Augusta	R-1889	Smyth
R-1622	Augusta	R-1890	Smyth
R-1624	Augusta	R-1891	Tazewell
R-1625	Augusta	R-1892	Tazewell
R-1663	Augusta	R-1904	Smyth
R-1664	Augusta	R-1906	Tazewell
R-1665	Rockbridge	R-1907	James City
R-1668	Rockbridge	R-1908	Smyth
R-1669	Rockbridge	R-1911	Rockbridge
R-1670	Rockbridge	R-1912	Rockbridge
R-1675*	Page	R-1913	Rockbridge
R-1678*	Page	R-1923	Botetourt
R-1708	Madison	R-1924	Montgomery
R-1713	Fluvanna	R-1925	Montgomery
R-1715	Botetourt	R-1926	Montgomery
R-1716	Botetourt	R-1927	Roanoke
R-1719	Bath	R-1930	Buchanan
R-1720	Augusta	R-1932	Fluvanna
R-1722	James City	R-1934	Fluvanna
R-1771	Botetourt	R-1936	Fluvanna
R-1774	Botetourt	R-1940	Fluvanna
R-1775	Botetourt	R-1941	Scott
R-1776	Botetourt	R-1943	Scott
R-1777	Botetourt	R-1945	Wise
R-1812	Botetourt	R-1948	Wise
R-1813	Botetourt	R-1950	Wise
R-1815	Botetourt	R-1952	Wise
R-1816	Craig	R-1954	Wise
R-1817	Craig	R-1955	Wise

BRICK (continued)

Sample	*County*	*Sample*	*County*
R-1956	Wise	R-2528	Russell
R-1957	Wise	R-2532	Russell
R-1968	Craig	R-2538	Wythe
R-1972	Craig	R-2539	Wythe
R-1973	Albemarle	R-2541	Wythe
R-1976	Alleghany	R-2542	Wythe
R-1977	Alleghany	R-2544	Smyth
R-1978	Alleghany	R-2548	Smyth
R-1979	Craig	R-2562	Tazewell
R-1981	Alleghany	R-2563	Tazewell
R-1984	Craig	R-2566	Tazewell
R-1986	Alleghany	R-2567	Tazewell
R-1987	Alleghany	R-2573	Giles
R-1991	Prince George	R-2636	King George
R-2054	Bland	R-2709	Chesterfield
R-2055	Bland	R-2712	Greensville
R-2056	Bland	R-2714	York
R-2057	Bland	R-2735	Westmoreland
R-2058	Bland	R-2736	Westmoreland
R-2059	Bland	R-2737	Westmoreland
R-2060	Bland	R-2769	Middlesex
R-2061	Smyth	R-2770	Richmond
R-2085	Pulaski	R-2775	Gloucester
R-2087	Pulaski	R-2802	Essex
R-2088	Pulaski	R-2807	Caroline
R-2089	Pulaski	R-2808	Caroline
R-2091	Pulaski	R-2855	King and Queen
R-2092	Botetourt	R-2857	King William
R-2466	Scott	R-2858	Hanover
R-2467	Lee	R-2863	Hanover
R-2468	Scott	R-2865	Henrico
R-2474	Scott	R-2866	Chesterfield
R-2479	Scott	R-2869	Chesterfield
R-2480	Lee	R-2870	Charles City
R-2481	Lee	R-2873	Charles City
R-2482	Lee	R-2874	Charles City
R-2484	Scott	R-2875	Charles City
R-2487	Lee	R-2876	Charles City
R-2516	Washington	R-2877	James City
R-2517	Washington	R-2881	New Kent
R-2518	Washington	R-2882	New Kent
R-2519	Washington	R-2891	Chesterfield
R-2520	Washington	R-2892	Surry
R-2521	Washington	R-2893	Surry
R-2522	Washington	R-2894	Surry
R-2523	Washington	R-2896	Sussex
R-2526	Russell	R-2897	Prince George
R-2527	Russell	R-2898	Prince George

BRICK (continued)

Sample	*County*	*Sample*	*County*
R-2907	Greensville	R-3544	Campbell
R-2908	Greensville	R-3546	Bedford
R-2909	Greensville	R-3547	Bedford
R-2911	Greensville	R-3551	Charlotte
R-2912	Sussex	R-3554	Prince Edward
R-2915	Dinwiddie	R-3558	Charlotte
R-2919	Sussex	R-3559	Charlotte
R-2920	Sussex	R-3664	Pittsylvania
R-2921	Sussex	R-3668	Pittsylvania
R-2922	Sussex	R-3670	Halifax
R-2926	Southampton	R-3671	Pittsylvania
R-2927	Suffolk (City of)	R-3688	Halifax
R-2959	Suffolk (City of)	R-3689	Mecklenburg
R-2960	Isle of Wight	R-3692	Charlotte
R-2961	Isle of Wight	R-3693	Lunenburg
R-2968	Henrico	R-4065	Franklin
R-3206	Southampton	R-4066	Halifax
R-3208	Southampton	R-4067	Halifax
R-3214	Isle of Wight	R-4068	Halifax
R-3458	Cumberland	R-4072	Grayson
R-3459	Cumberland	R-4074	Floyd
R-3460	Cumberland	R-4076	Carroll
R-3461	Cumberland	R-4092	Grayson
R-3462	Goochland	R-4093	Grayson
R-3463	Goochland	R-4097	Grayson
R-3464	Goochland	R-4098	Grayson
R-3465	Goochland	R-4101	Brunswick
R-3467	Powhatan	R-4102	Brunswick
R-3468	Powhatan	R-4103	Brunswick
R-3469	Powhatan	R-4362	Amherst
R-3470	Powhatan	R-4363	Brunswick
R-3471	Powhatan	R-4364	Brunswick
R-3472	Powhatan	R-4365	Brunswick
R-3474	Amelia	R-5006*	Henrico
R-3477	Amelia	R-5007*	Henrico
R-3481	Amelia	R-5338*	Halifax
R-3482	Amelia	R-5339*	Halifax
R-3484	Nottoway	R-5731*	Henrico
R-3485	Nottoway	R-5732*	Henrico
R-3487	Nottoway	R-6190*	Henrico
R-3493	Prince Edward	R-6191*	Richmond (City of)
R-3522	Appomattox	R-6193*	Chesterfield
R-3524	Appomattox	R-6195*	Chesterfield
R-3525	Appomattox	R-6196*	Henrico
R-3532	Amherst	R-6206*	Washington
R-3540	Campbell	R-6207-B*	Washington
R-3541	Campbell	R-6209*	Washington

CERAMIC OR COLORED CERAMIC WARE

Sample	*County*
R-1626	Augusta
R-1660	Augusta
R-2009	Nelson

CLAY DUMMIES

Sample	*County*
R-2558	Dickenson
R-2561	Tazewell

COLOR ADDITIVE (PIGMENT)

Sample	*County*
R-1830	Buckingham
R-1974	Albemarle

DRAIN TILE

Sample	*County*
R-1813	Botetourt
R-1817	Craig
R-1819	Alleghany
R-1820	Alleghany
R-1828	Alleghany
R-1904	Smyth
R-1930	Buchanan
R-2480	Lee
R-2521	Washington
R-2528	Russell
R-2807	Caroline
R-2855	King and Queen
R-2858	Hanover
R-2877	James City
R-2960	Isle of Wight
R-2961	Isle of Wight
R-3523	Appomattox
R-3530	Amherst
R-3670	Halifax

FLUE LINING

Sample	*County*
R-1911	Rockbridge
R-2525	Russell
R-2543	Wythe
R-2770	Richmond
R-2779	Essex
R-2797	Caroline
R-2801	Essex
R-2808	Caroline
R-2861	Hanover

FLUE LINING

Sample	*County*
R-2864	Henrico
R-2895	Surry
R-2897	Prince George
R-2898	Prince George
R-2906	Greensville
R-2910	Greensville
R-2912	Sussex
R-2919	Sussex
R-4099	Grayson

FOUNDRY SOIL

Sample	*County*
R-3667	Pittsylvania

LIGHTWEIGHT AGGREGATE

Sample	*County*
R-38	Augusta
R-39	Augusta
R-397B	Rockingham
R-422	Prince William
R-517	Loudoun
R-518	Loudoun
R-644A	Montgomery
R-648	Warren
R-652A	Frederick
R-652B	Frederick
R-658	Shenandoah
R-663	Shenandoah
R-664	Shenandoah
R-665	Shenandoah
R-673	Page
R-674	Shenandoah
R-675	Shenandoah
R-676	Shenandoah
R-1183A	Rockingham
R-1184	Rockingham
R-1190A	Frederick
R-1191A	Frederick
R-1614	Augusta
R-1615	Augusta
R-1618	Augusta
R-1661	Augusta
R-1663	Augusta
R-1664	Augusta
R-1665	Rockbridge
R-1668	Rockbridge
R-1669	Rockbridge
R-1704	Clarke

LIGHTWEIGHT AGGREGATE (continued)

Sample	*County*
R-1724	Rockbridge
R-1726	Rockbridge
R-1728	Buckingham
R-1770	Botetourt
R-1771	Botetourt
R-1774	Botetourt
R-1775	Botetourt
R-1859	Highland
R-1867	Roanoke
R-1868	Roanoke
R-1877	Scott
R-1878	Scott
R-1879	Scott
R-1880	Scott
R-1881	Scott
R-1882	Scott
R-1883	Scott
R-1889	Smyth
R-1890	Smyth
R-1891	Tazewell
R-1892	Tazewell
R-1906	Tazewell
R-1908	Smyth
R-1932	Fluvanna
R-1951	Wise
R-1953	Wise
R-1954	Wise
R-1955	Wise
R-1958	Wise
R-1968	Craig
R-1976	Alleghany
R-1978	Alleghany
R-1984	Craig
R-1992	Isle of Wight
R-2055	Bland
R-2057	Bland
R-2060	Bland
R-2061	Smyth
R-2085	Pulaski
R-2087	Pulaski
R-2470	Scott
R-2475	Lee
R-2485	Scott
R-2514	Washington
R-2523	Washington
R-2531	Russell
R-2545	Smyth
R-2547	Smyth
R-2556	Buchanan
R-2557	Buchanan
R-2560	Dickenson
R-2564	Tazewell
R-2565	Tazewell
R-2572	Giles
R-2573	Giles
R-2767	Mathews
R-2807	Caroline
R-3537	Campbell
R-4362	Amherst
R-4911*	Alleghany
R-4912*	Alleghany
R-6189*	Hanover
R-6205*	Washington
R-6206*	Washington
R-6207A*	Washington
R-6207B*	Washington

MINERAL FILLER

Sample	*County*
R-13	Rockbridge
R-40	Augusta
R-2007*	Franklin
R-2062	Buckingham
R-2637	King George
R-2639	Westmoreland
R-3044	Richmond
R-4070	Franklin
R-4123	Franklin

NONPLASTIC COMPONENT

Sample	*County*
R-2890	Chesterfield
R-2916	Dinwiddie
R-2917	Dinwiddie
R-3489	Prince Edward
R-3535	Amherst
R-3538	Campbell
R-3550	Bedford
R-3553	Charlotte
R-3687	Mecklenburg
R-3691	Mecklenburg
R-3813	Henry
R-3815	Henry
R-3861	Amherst
R-4062	Floyd
R-4073	Carroll
R-4719	Floyd

PAPER COATER

Sample	*County*
R-4070	Franklin

POROUS CLAY PRODUCTS

Sample	*County*
R-3523	Appomattox
R-3530	Amherst
R-3531	Amherst
R-3541	Campbell
R-3544	Campbell
R-3545	Cumberland
R-3693	Lunenburg
R-4074	Floyd

POTTERY (Artware, flower pots, garden pottery, or stoneware)

Sample	*County*
R-13	Rockbridge
R-46	Smyth
R-591	Loudoun
R-1812	Botetourt
R-1813	Botetourt
R-1816	Craig
R-1820	Alleghany
R-1822	Bath
R-1828	Alleghany
R-1911	Rockbridge
R-2524	Washington
R-2548	Smyth
R-2658	Surry
R-2767	Mathews
R-2768	Middlesex
R-2798	Caroline
R-2809	King William
R-2812	King William
R-2876	Charles City
R-2877	James City
R-2879	New Kent
R-2910	Greensville
R-2911	Greensville
R-2914	Dinwiddie
R-2959	Nansemond
R-3523	Appomattox
R-3530	Amherst
R-3541	Campbell
R-3544	Campbell
R-3670	Halifax
R-4066	Halifax
R-4099	Grayson

QUARRY TILE

Sample	*County*
R-2	Albemarle
R-519	Frederick
R-520	Frederick
R-521	Frederick
R-522	Frederick
R-524	Frederick
R-525	Frederick
R-526	Frederick
R-1614	Augusta
R-1676*	Page
R-1677*	Page
R-1777	Botetourt
R-1815	Botetourt
R-1822	Bath
R-1932	Fluvanna
R-1954	Wise
R-1956	Wise
R-1973	Albemarle
R-2870	Charles City
R-2874	Charles City
R-2881	New Kent
R-2891	Chesterfield
R-2909	Greensville
R-5006*	Henrico
R-5339*	Halifax

REFRACTORIES

Sample	*County*
R-4	Nelson
R-6	Nelson
R-13	Rockbridge
R-306	Stafford
R-308	Stafford
R-309	Stafford
R-310	Stafford
R-311	Stafford
R-1626	Augusta
R-1660	Augusta
R-2009	Nelson
R-2918	Sussex
R-2923	Sussex
R-4070	Franklin
R-4077	Bedford
R-4099	Grayson
R-4114	Amherst
R-4123	Franklin
R-4364	Brunswick
R-4365	Brunswick

SEWER PIPE

Sample	*County*
R-1818	Alleghany
R-1912	Rockbridge
R-1913	Rockbridge
R-2528	Russell
R-2735	Westmoreland
R-2736	Westmoreland
R-2869	Chesterfield
R-2870	Charles City
R-2874	Charles City
R-2877	James City
R-2891	Chesterfield
R-2909	Greensville
R-2915	Dinwiddie
R-2921	Sussex
R-2922	Sussex
R-3537	Campbell
R-3546	Bedford
R-3547	Bedford
R-3549	Bedford
R-3554	Prince Edward
R-3667	Pittsylvania
R-3668	Pittsylvania
R-3688	Halifax
R-3690	Mecklenburg
R-4076	Carroll
R-4094	Carroll
R-4096	Grayson
R-4100	Brunswick
R-4124	Amherst
R-5338*	Halifax
R-5339*	Halifax
R-5732*	Henrico
R-6193*	Chesterfield

STRUCTURAL CLAY PRODUCTS

Sample	*County*
R-3487	Nottoway
R-3490	Nottoway
R-3530	Amherst
R-3533	Amherst
R-3534	Amherst
R-3537	Campbell
R-3541	Campbell
R-3546	Bedford
R-3547	Bedford
R-3549	Bedford
R-3554	Prince Edward
R-3663	Campbell
R-3667	Pittsylvania
R-3668	Pittsylvania
R-3671	Pittsylvania
R-3688	Halifax
R-3690	Mecklenburg
R-4094	Carroll
R-4096	Grayson
R-4100	Brunswick
R-4124	Amherst

STRUCTURAL TILE

Sample	*County*
R-2516	Washington
R-2737	Westmoreland
R-2770 (glazed)	Richmond
R-2808	Caroline
R-2863	Hanover
R-2865	Henrico
R-2876 (glazed)	Charles City
R-2907	Greensville
R-2908	Greensville
R-2912	Sussex
R-2959	Suffolk (City of)
R-5732*	Henrico
R-6195*	Chesterfield

TERRA COTTA

Sample	*County*
R-1812	Botetourt
R-1819	Alleghany
R-1820	Alleghany
R-1828	Alleghany

TILE

Sample	*County*
R-1	Augusta
R-2	Albemarle
R-11*	Rockingham
R-12*	Rockingham
R-38	Augusta
R-39	Augusta
R-234	Prince William
R-312	Stafford
R-313	Stafford
R-377	Rockingham
R-423	Prince William
R-425	Fairfax

Sample	*County*	*Sample*	*County*
R-529	Fairfax	R-1850	Augusta
R-591	Loudoun	R-1852	Augusta
R-592	Loudoun	R-1859	Highland
R-593	Fauquier	R-1889	Smyth
R-594	Fauquier	R-1890	Smyth
R-595	Fauquier	R-1891	Tazewell
R-598	Fauquier	R-1892	Tazewell
R-643	Montgomery	R-1906	Tazewell
R-646*	Northumberland	R-1907	James City
R-649	Warren	R-1908	Smyth
R-651	Frederick	R-1911	Rockbridge
R-652A	Frederick	R-1922*	Chesterfield
R-652B	Frederick	R-1923	Botetourt
R-667*	Northumberland	R-1925	Montgomery
R-668*	Northumberland	R-1930	Buchanan
R-669*	Lancaster	R-1945	Wise
R-670*	Lancaster	R-1968	Craig
R-671*	Lancaster	R-1976	Alleghany
R-673	Page	R-1977	Alleghany
R-674	Shenandoah	R-1991	Prince George
R-679	Culpeper	R-2057	Bland
R-1182	Rockingham	R-2058	Bland
R-1184	Rockingham	R-2089	Pulaski
R-1185	Rockingham	R-2092	Botetourt
R-1190B	Frederick	R-2866	Chesterfield
R-1543	Prince William	R-2875	Charles City
R-1546	Craig	R-3487	Nottoway
R-1622	Augusta	R-3493	Prince Edward
R-1625	Augusta	R-3522	Appomattox
R-1663	Augusta	R-3524	Appomattox
R-1665	Rockbridge	R-3525	Appomattox
R-1669	Rockbridge	R-3532	Amherst
R-1670	Rockbridge	R-3540	Campbell
R-1678*	Page	R-3541	Campbell
R-1708	Madison	R-3544	Campbell
R-1713	Craig	R-3551	Charlotte
R-1719	Bath	R-3558	Charlotte
R-1722	James City	R-3559	Charlotte
R-1812	Botetourt	R-3664	Pittsylvania
R-1813	Botetourt	R-3670	Halifax
R-1815	Botetourt	R-3671	Pittsylvania
R-1816	Craig	R-3689	Mecklenburg
R-1818	Alleghany	R-3692	Charlotte
R-1819	Alleghany	R-3693	Lunenburg
R-1820	Alleghany	R-4065	Franklin
R-1822	Bath	R-4066	Halifax
R-1826	Highland	R-4067	Halifax
R-1828	Alleghany	R-4068	Halifax

TILE (continued)

Sample	*County*
R-4072	Grayson
R-4074	Floyd
R-4076	Carroll
R-4092	Grayson
R-4093	Grayson
R-4097	Grayson
R-4098	Grayson
R-4101	Brunswick
R-4102	Brunswick
R-4103	Brunswick
R-4362	Amherst
R-4363	Brunswick

WHITEWARE

Sample	*County*
R-4	Nelson
R-6	Nelson
R-13	Rockbridge
R-40	Augusta
R-1829 (flux)	Alleghany
R-2007*	Franklin
R-4070	Franklin
R-4077	Bedford

USES LISTED BY COUNTY OR CITY

ALBEMARLE (5)

Sample	*Potential Use*
R-2	Brick, tile, quarry tile
R-1973	Brick, quarry tile
R-1974	Color additive (pigment)

ALLEGHANY (5, 13)

Sample	*Potential Use*
R-1818	Brick, tile, sewer pipe
R-1819	Brick, tile, drain tile, terra cotta
R-1820	Brick, tile, drain tile, terra cotta, pottery
R-1828	Brick, tile, drain tile, terra cotta, pottery
R-1829	Whiteware
R-1849	Brick
R-1976	Brick, tile, lightweight aggregate
R-1977	Brick, tile
R-1978	Brick, lightweight aggregate
R-1981	Brick, lightweight aggregate
R-1986	Brick
R-1987	Brick
R-4911*	Lightweight aggregate
R-4912*	Lightweight aggregate

AMELIA (12)

Sample	*Potential Use*
R-3474	Brick
R-3477	Brick
R-3481	Brick
R-3482	Brick

AMHERST (12)

Sample	*Potential Use*
R-3530	Structural clay products, drain tile, porous clay products, pottery
R-3531	Porous clay products
R-3532	Brick, tile
R-3533	Structural clay products
R-3534	Structural clay products
R-3535	Nonplastic component
R-3861	Nonplastic component
R-4114	Refractories
R-4124	Structural clay products, sewer pipe
R-4362	Brick, tile, lightweight aggregate

APPOMATTOX (12)

Sample	*Potential Use*
R-3522	Brick, tile
R-3523	Drain tile, porous clay products, pottery
R-3524	Brick, tile
R-3525	Brick

AUGUSTA (5)

Sample	*Potential Use*
R-1	Brick, tile
R-38	Brick, tile, lightweight aggregate
R-39	Brick, tile, lightweight aggregate
R-40	Whiteware, mineral filler
R-1614	Brick, quarry tile, lightweight aggregate
R-1615	Lightweight aggregate
R-1616	Brick
R-1617	Brick
R-1618	Brick, lightweight aggregate
R-1622	Brick, tile
R-1624	Brick
R-1625	Brick, tile
R-1626	Refractories, colored ceramic ware

R-1660	Refractories, colored ceramic ware
R-1661	Lightweight aggregate
R-1663	Brick, tile, lightweight aggregate
R-1664	Brick, lightweight aggregate
R-1720	Brick
R-1850	Brick, tile
R-1852	Brick, tile

BATH (5)

Sample	*Potential Use*
R-1719	Brick, tile
R-1822	Brick, tile, quarry tile, pottery

BEDFORD (12)

Sample	*Potential Use*
R-3546	Brick, structural clay products, sewer pipe
R-3547	Brick, structural clay products, sewer pipe
R-3549	Structural clay products, sewer pipe
R-3550	Nonplastic component
R-4077	Whiteware, refractories

BLAND (6)

Sample	*Potential Use*
R-2054	Brick
R-2055	Brick, lightweight aggregate
R-2056	Brick
R-2057	Brick, tile, lightweight aggregate
R-2058	Brick, tile
R-2059	Brick
R-2060	Brick, lightweight aggregate

BOTETOURT (5)

Sample	*Potential Use*
R-1715	Brick
R-1716	Brick
R-1770	Lightweight aggregate
R-1771	Brick, lightweight aggregate
R-1774	Brick, lightweight aggregate
R-1775	Brick, lightweight aggregate
R-1776	Brick
R-1777	Brick, quarry tile
R-1812	Brick, tile, terra cotta, pottery
R-1813	Brick, tile, drain tile, pottery
R-1815	Brick, tile, quarry tile
R-1923	Brick, tile
R-2092	Brick, tile

BRUNSWICK (12)

Sample	*Potential Use*
R-4100	Structural clay products, sewer pipe
R-4101	Brick, tile
R-4102	Brick, tile
R-4103	Brick, tile
R-4363	Brick, tile
R-4364	Brick, refractories
R-4365	Brick, refractories

BUCHANAN (6)

Sample	*Potential Use*
R-1930	Brick, tile, drain tile
R-2556	Lightweight aggregate
R-2557	Lightweight aggregate

BUCKINGHAM (5)

Sample	*Potential Use*
R-1728	Lightweight aggregate
R-1830	Color additive (pigment)
R-2062	Mineral filler

CAMPBELL (12)

Sample	*Potential Use*
R-3537	Structural clay products, sewer pipe,

Sample	*Potential Use*
	lightweight aggregate
R-3538	Nonplastic component
R-3540	Brick, tile
R-3541	Brick, tile, structural clay products, porous clay products, pottery
R-3544	Brick, tile, porous clay products, pottery
R-3663	Structural clay products

CAROLINE (8)

Sample	*Potential Use*
R-2797	Flue lining
R-2798	Pottery
R-2807	Brick, drain tile, lightweight aggregate
R-2808	Brick, structural tile

CARROLL (12)

Sample	*Potential Use*
R-4073	Nonplastic component
R-4076	Brick, tile, sewer pipe
R-4094	Structural clay products, sewer pipe

CHARLES CITY (8)

Sample	*Potential Use*
R-2870	Brick, quarry tile, sewer pipe
R-2873	Brick
R-2874	Brick, quarry tile, sewer pipe
R-2875	Brick, tile
R-2876	Brick, structural tile, pottery

CHARLOTTE (12)

Sample	*Potential Use*
R-3551	Brick, tile
R-3553	Nonplastic component
R-3558	Brick, tile
R-3559	Brick, tile
R-3692	Brick, tile

CHESTERFIELD (8, 13)

Sample	*Potential Use*
R-2709	Brick
R-2866	Brick, tile
R-2869	Brick, sewer pipe
R-2890	Nonplastic component
R-2891	Brick, quarry tile, sewer pipe
R-6193*	Brick, sewer pipe
R-6195*	Brick, structural tile

CLARKE (2)

Sample	*Potential Use*
R-1704	Lightweight aggregate

CRAIG (5)

Sample	*Potential Use*
R-1816	Brick, tile, pottery
R-1817	Brick, drain tile
R-1968	Brick, tile, lightweight aggregate
R-1972	Brick
R-1979	Brick
R-1984	Brick, lightweight aggregate

CULPEPER (2)

Sample	*Potential Use*
R-677	Brick
R-679	Brick, tile

CUMBERLAND (12)

Sample	*Potential Use*
R-3458	Brick
R-3459	Brick
R-3460	Brick
R-3461	Brick
R-3545	Porous clay products

DICKENSON (6)

Sample	*Potential Use*
R-2558	Clay dummies
R-2560	Lightweight aggregate

DINWIDDIE (8)

Sample	*Potential Use*
R-2914	Pottery
R-2915	Brick, sewer pipe
R-2916	Nonplastic component
R-2917	Nonplastic component

ESSEX (8)

Sample	*Potential Use*
R-2779	Flue lining
R-2801	Flue lining
R-2802	Brick

FAIRFAX (2)

Sample	*Potential Use*
R-417	Brick
R-419	Brick
R-424	Brick
R-425	Brick, tile
R-426	Brick
R-529	Brick, tile

FAUQUIER (2)

Sample	*Potential Use*
R-242	Brick
R-593	Brick, tile
R-594	Brick, tile
R-595	Brick, tile
R-596	Brick
R-597	Brick
R-598	Brick, tile

FLOYD (12)

Sample	*Potential Use*
R-4062	Nonplastic component
R-4074	Brick, tile, porous clay products
R-4719	Nonplastic component

FLUVANNA (5)

Sample	*Potential Use*
R-1544	Brick
R-1546	Brick, tile
R-1713	Brick, tile
R-1932	Brick, quarry tile, lightweight aggregate
R-1934	Brick
R-1936	Brick
R-1940	Brick

FRANKLIN (12, 13)

Sample	*Potential Use*
R-2007*	Whiteware, mineral filler
R-4065	Brick, tile
R-4070	Whiteware, refractories, paper coater, mineral filler
R-4123	Refractories, mineral filler

FREDERICK (2)

Sample	*Potential Use*
R-519	Brick, quarry tile
R-520	Brick, quarry tile
R-521	Brick, quarry tile
R-522	Brick, quarry tile
R-524	Brick, quarry tile
R-525	Brick, quarry tile
R-526	Brick, quarry tile
R-651	Brick, tile
R-652A	Brick, tile, lightweight aggregate
R-652B	Brick, tile, lightweight aggregate
R-1190A	Lightweight aggregate
R-1190B	Brick, tile
R-1191A	Brick, lightweight aggregate
R-1191B	Brick

GILES (6)

Sample	*Potential Use*
R-2572	Lightweight aggregate
R-2573	Brick, lightweight aggregate

GLOUCESTER (8)

Sample	*Potential Use*
R-2775	Brick

GOOCHLAND (12)

Sample	*Potential Use*
R-3462	Brick

Sample	*Potential Use*
R-3463	Brick
R-3464	Brick
R-3465	Brick

GRAYSON (12)

Sample	*Potential Use*
R-4072	Brick, tile
R-4092	Brick, tile
R-4093	Brick, tile
R-4096	Structural clay products, sewer pipe
R-4097	Brick, tile
R-4098	Brick, tile
R-4099	Flue lining, pottery, refractories

GREENSVILLE (8)

Sample	*Potential Use*
R-2712	Brick
R-2906	Flue lining
R-2907	Brick, structural tile
R-2908	Brick, structural tile
R-2909	Brick, quarry tile, sewer pipe
R-2910	Flue lining, pottery
R-2911	Brick, pottery

HALIFAX (12, 13)

Sample	*Potential Use*
R-3670	Brick, tile, drain tile, pottery
R-3688	Brick, structural clay products, sewer pipe
R-4066	Brick, tile, pottery
R-4067	Brick, tile
R-4068	Brick, tile
R-5338*	Brick, sewer pipe
R-5339*	Brick, quarry tile, sewer pipe

HANOVER (8, 13)

Sample	*Potential Use*
R-2858	Brick, drain tile
R-2861	Flue lining
R-2863	Brick, structural tile
R-6189*	Lightweight aggregate

HENRICO (8, 13)

Sample	*Potential Use*
R-2864	Flue lining
R-2865	Brick, structural tile
R-2968	Brick
R-5006*	Brick, quarry tile
R-5007*	Brick
R-5731*	Brick
R-5732*	Brick, structural tile, sewer pipe
R-6190*	Brick
R-6196*	Brick

HENRY (12)

Sample	*Potential Use*
R-3813	Nonplastic component
R-3815	Nonplastic component

HIGHLAND (5)

Sample	*Potential Use*
R-1824	Brick
R-1825	Brick
R-1826	Brick, tile
R-1859	Brick, tile, lightweight aggregate
R-1861	Brick

ISLE OF WIGHT (8)

Sample	*Potential Use*
R-1992	Lightweight aggregate
R-2960	Brick, drain tile
R-2961	Brick, drain tile
R-3214	Brick

JAMES CITY (8)

Sample	*Potential Use*
R-1722	Brick, tile
R-1907	Brick, tile
R-2877	Brick, drain tile, sewer pipe, pottery

KING AND QUEEN (8)

Sample	*Potential Use*
R-2855	Brick, drain tile

KING GEORGE (8)

Sample	*Potential Use*
R-2636	Brick
R-2637	Mineral filler

KING WILLIAM (8)

Sample	*Potential Use*
R-2809	Pottery
R-2812	Pottery
R-2857	Brick

LANCASTER (13)

Sample	*Potential Use*
R-669*	Brick, tile
R-670*	Brick, tile
R-671*	Brick, tile

LEE (6)

Sample	*Potential Use*
R-2467	Brick
R-2475	Lightweight aggregate
R-2480	Brick, drain tile
R-2481	Brick
R-2482	Brick
R-2487	Brick

LOUDOUN (2)

Sample	*Potential Use*
R-238	Brick
R-239	Brick
R-241	Brick
R-517	Brick, lightweight aggregate
R-518	Brick, lightweight aggregate
R-590	Brick
R-591	Brick, tile, pottery
R-592	Brick, tile

LUNENBURG (12)

Sample	*Potential Use*
R-3693	Brick, tile, porous clay products

MADISON (2)

Sample	*Potential Use*
R-1708	Brick, tile

MATHEWS (8)

Sample	*Potential Use*
R-2767	Lightweight aggregate, pottery

MECKLENBURG (12)

Sample	*Potential Use*
R-3687	Nonplastic component
R-3689	Brick, tile
R-3690	Structural clay products, sewer pipe
R-3691	Nonplastic component

MIDDLESEX (8)

Sample	*Potential Use*
R-2768	Pottery
R-2769	Brick

MONTGOMERY (5)

Sample	*Potential Use*
R-638	Brick
R-639	Brick
R-641	Brick
R-643	Brick, tile
R-644A	Brick, lightweight aggregate
R-644B	Brick
R-644C	Brick
R-645	Brick
R-1924	Brick
R-1925	Brick, tile
R-1926	Brick

NELSON (5)

Sample	*Potential Use*
R-4	Whiteware, refractories
R-6	Whiteware, refractories
R-2009	Refractories, ceramic ware

NEW KENT (8)

Sample	*Potential Use*
R-2879	Pottery
R-2881	Brick, quarry tile
R-2882	Brick

NORTHUMBERLAND (13)

Sample	*Potential Use*
R-646*	Brick, tile
R-667*	Brick, tile
R-668*	Brick, tile

NOTTOWAY (12)

Sample	*Potential Use*
R-3484	Brick
R-3485	Brick

Sample	*Potential Use*
R-3487	Brick, tile, structural clay products
R-3490	Structural clay products

ORANGE (2)

Sample	*Potential Use*
R-623	Brick
R-1187	Brick
R-1189	Brick

PAGE (2, 13)

Sample	*Potential Use*
R-650	Brick
R-673	Brick, tile, lightweight aggregate
R-1675*	Brick
R-1676*	Quarry tile
R-1677*	Quarry tile
R-1678*	Brick, tile

PITTSYLVANIA (12)

Sample	*Potential Use*
R-3664	Brick, tile
R-3667	Structural clay products, sewer pipe, foundry soil
R-3668	Brick, structural clay products, sewer pipe
R-3671	Brick, tile, structural clay products

POWHATAN (12)

Sample	*Potential Use*
R-3467	Brick
R-3468	Brick
R-3469	Brick
R-3470	Brick
R-3471	Brick
R-3472	Brick

PRINCE EDWARD (12)

Sample	*Potential Use*
R-3489	Nonplastic component
R-3493	Brick, tile
R-3554	Brick, structural clay products, sewer pipe

PRINCE GEORGE (8)

Sample	*Potential Use*
R-1991	Brick, tile
R-2897	Brick, flue lining
R-2898	Brick, flue lining

PRINCE WILLIAM (2)

Sample	*Potential Use*
R-234	Brick, tile
R-422	Lightweight aggregate
R-423	Brick, tile
R-600	Brick
R-622	Brick
R-745	Brick
R-1543	Brick, tile

PULASKI (6)

Sample	*Potential Use*
R-2085	Brick, lightweight aggregate
R-2087	Brick, lightweight aggregate
R-2088	Brick
R-2089	Brick, tile
R-2091	Brick

RICHMOND (8)

Sample	*Potential Use*
R-2770	Brick, structural tile, flue lining
R-3044	Mineral filler, absorbent

RICHMOND (CITY OF) (13)

Sample	*Potential Use*
R-6191*	Brick

ROANOKE (5)

Sample	*Potential Use*
R-1862	Brick
R-1864	Brick
R-1865	Brick
R-1867	Lightweight aggregate
R-1868	Brick, lightweight aggregate
R-1927	Brick

ROCKBRIDGE (5)

Sample	*Potential Use*
R-13	Pottery, whiteware, refractories, mineral filler

Sample	*Potential Use*
R-1665	Brick, tile, lightweight aggregate
R-1668	Brick, lightweight aggregate
R-1669	Brick, tile, lightweight aggregate
R-1670	Brick, tile
R-1724	Lightweight aggregate
R-1726	Lightweight aggregate
R-1911	Brick, tile, flue lining, pottery
R-1912	Brick, sewer pipe
R-1913	Brick, sewer pipe

ROCKINGHAM (2, 13)

Sample	*Potential Use*
R-11*	Brick, tile
R-12*	Brick, tile
R-377	Brick, tile
R-396	Brick
R-397A	Brick
R-397B	Brick, lightweight aggregate
R-398	Brick
R-1182	Brick, tile
R-1183A	Brick, lightweight aggregate
R-1183B	Brick
R-1184	Brick, tile, lightweight aggregate
R-1185	Brick, tile

RUSSELL (6)

Sample	*Potential Use*
R-2525	Flue lining
R-2526	Brick
R-2527	Brick
R-2528	Brick, drain tile, sewer pipe
R-2531	Lightweight aggregate
R-2532	Brick

SCOTT (6)

Sample	*Potential Use*
R-1877	Lightweight aggregate
R-1878	Lightweight aggregate
R-1879	Lightweight aggregate
R-1880	Lightweight aggregate
R-1881	Lightweight aggregate
R-1882	Brick, lightweight aggregate
R-1883	Brick, lightweight aggregate
R-1941	Brick
R-1943	Brick
R-2466	Brick
R-2468	Brick
R-2470	Lightweight aggregate
R-2474	Brick
R-2479	Brick
R-2484	Brick
R-2485	Lightweight aggregate

SHENANDOAH (2)

Sample	*Potential Use*
R-657	Brick
R-658	Lightweight aggregate
R-660	Brick
R-663	Brick, lightweight aggregate
R-664	Brick, lightweight aggregate
R-665	Brick, lightweight aggregate
R-674	Brick, tile, lightweight aggregate
R-675	Brick, lightweight aggregate
R-676	Brick, lightweight aggregate

SMYTH (6)

Sample	*Potential Use*
R-46	Pottery
R-1889	Brick, tile, lightweight aggregate
R-1890	Brick, tile, lightweight aggregate
R-1904	Brick, drain tile

Sample	*Potential Use*
R-1908	Brick, tile, lightweight aggregate
R-2061	Brick, lightweight aggregate
R-2544	Brick
R-2545	Lightweight aggregate
R-2547	Lightweight aggregate
R-2548	Brick, pottery

SOUTHAMPTON (8)

Sample	*Potential Use*
R-2926	Brick
R-3206	Brick
R-3208	Brick

SPOTSYLVANIA (2)

Sample	*Potential Use*
R-681	Brick
R-682	Brick

STAFFORD (2)

Sample	*Potential Use*
R-306	Refractories
R-308	Refractories
R-309	Refractories
R-310	Refractories
R-311	Refractories
R-312	Refractories, tile
R-313	Refractories, tile

SUFFOLK (CITY OF) (8)

Sample	*Potential Use*
R-2927	Brick
R-2959	Brick, structural tile, pottery

SURRY (8)

Sample	*Potential Use*
R-2658	Pottery
R-2892	Brick
R-2893	Brick
R-2894	Brick
R-2895	Flue lining

SUSSEX (8)

Sample	*Potential Use*
R-2896	Brick
R-2912	Brick, structural tile, flue lining
R-2918	Refractories
R-2919	Brick, flue lining
R-2920	Brick
R-2921	Brick, sewer pipe
R-2922	Brick, sewer pipe
R-2923	Refractories

TAZEWELL (6)

Sample	*Potential Use*
R-1891	Brick, tile, lightweight aggregate
R-1892	Brick, tile, lightweight aggregate
R-1906	Brick, tile, lightweight aggregate
R-2561	Clay dummies
R-2562	Brick
R-2563	Brick
R-2564	Lightweight aggregate
R-2565	Lightweight aggregate
R-2566	Brick
R-2567	Brick

WARREN (2)

Sample	*Potential Use*
R-648	Brick, lightweight aggregate
R-649	Brick, tile
R-666	Brick

WASHINGTON (6, 13)

Sample	*Potential Use*
R-2514	Lightweight aggregate
R-2516	Brick, structural tile
R-2517	Brick
R-2518	Brick
R-2519	Brick
R-2520	Brick
R-2521	Brick, drain tile
R-2522	Brick
R-2523	Brick, lightweight aggregate
R-2524	Pottery
R-6205*	Lightweight aggregate
R-6206*	Brick, lightweight aggregate

Sample	*Potential Use*
R-6207A*	Lightweight aggregate
R-6207B*	Brick, lightweight aggregate
R-6209*	Brick

WESTMORELAND (8)

Sample	*Potential Use*
R-2639	Mineral filler
R-2735	Brick, sewer pipe
R-2736	Brick, sewer pipe
R-2737	Brick, structural tile

WISE (6)

Sample	*Potential Use*
R-1945	Brick, tile
R-1948	Brick
R-1950	Brick
R-1951	Lightweight aggregate
R-1952	Brick
R-1953	Lightweight aggregate
R-1954	Brick, quarry tile, lightweight aggregate
R-1955	Brick, lightweight aggregate
R-1956	Brick, quarry tile
R-1957	Brick
R-1958	Lightweight aggregate

WYTHE (6)

Sample	*Potential Use*
R-2538	Brick
R-2539	Brick
R-2541	Brick
R-2542	Brick
R-2543	Flue lining

YORK (8)

Sample	*Potential Use*
R-2714	Brick

APPENDIX

SUPPLEMENTAL TEST DATA

Test results of the following 32 samples are not included in previous Mineral Resources Reports; they are listed below by county and repository number:

Alleghany—R-4911, R-4912

Chesterfield—R-6193, R-6195

Franklin—R-2007

Halifax—R-5338, R-5339

Hanover—R-6189

Henrico—R-5006, R-5007, R-5731, R-5732, R-6190, R-6196

Lancaster—R-669, R-670, R-671

Northumberland—R-646, R-667, R-668

Page—R-1675, R-1676, R-1677, R-1678

Richmond (City of)—R-6191

Rockingham—R-11, R-12

Washington—R-6205, R-6206, R-6207A, R-6207B, R-6209

A word of caution: 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. Evaluation remarks are based on test data determined usually for only one sample believed to be representative of material at each locality. Detailed exploration, sampling, and tests should be carried out to prove any particular locality for commercial development.

SAMPLE: R-11 *County:* Rockingham

Date: May 1959, Electrotechnical Experiment Station

Locality: Roadcut on State Highway 259, about 3.0 miles (4.8 km) northwest of Cootes Store.

Description: Red-gray shale.

Formation or Age: Brallier Formation

Sampled Interval: Middle 15 feet (5m) of 40-foot (12-m) cut.

Raw Properties:

Working properties: not plastic, short working, slightly gritty
Water of plasticity: 15.0%
Drying defects: none
Drying shrinkage: 3.0%
ph: 6.0

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Orange buff	Soft, crumbly	3.0	13.7	2.70
2000	Light red	Hard	5.5	9.1	2.67
2100	Medium red	Very hard	5.5	7.3	2.59
2200	Dk. red-brown	Steel hard	7.0	5.5	2.49
2300	Dark brown	Steel hard	—	5.5	2.29
2400	Dark brown	———	—	—	—

Quick Firing Test:

Temp. °F	Bulk Sp. Gr.	Weight lb./ft.^{3}	% Abs.	Remarks
1900	2.35	146.4	5.2	No bloating
2000	1.62	100.9	6.1	No bloating
2100	1.33	82.9	7.9	Slight bloating
2200	1.20	79.7	8.8	Slight bloating
2300	1.06	66.0	10.1	Fair bloating, very sticky

Potential Use: Brick and tile.

SAMPLE: R-12 *County:* Rockingham

Date: May 1959, Electrotechnical Experiment Station

Locality: Roadcut on State Highway 259, about 3.0 miles (4.8 km) northwest of Cootes Store.

Description: Red-gray shale.

Formation or Age: Brallier Formation

Sampled Interval: Upper 10 feet (3m) of 40-foot (12-m) cut.

Raw Properties:

Working properties: fair plasticity, slightly gritty
Water of plasticity: 21.0%
Drying defects: none
Drying shrinkage: 4.0%
pH: 5.3

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Orange-buff	Soft, crumbly	4.0	15.5	2.70
2000	Light red	Fair, hard	8.0	8.5	2.66
2100	Red	Very hard	10.0	4.3	2.58
2200	Dark red	Steel hard	10.0	3.1	2.51
2300	Dark brown	Steel hard	—	2.7	—
2400	———	———	—	—	—

Quick Firing Test:

Temp. °F	Bulk Sp. Gr.	Weight lb./ft.^{3}	% Abs.	Remarks
1900	2.39	148.9	4.1	No bloating
2000	2.15	133.3	0.3	No bloating
2100	1.82	113.0	3.9	No bloating
2200	1.75	109.0	1.8	No bloating, very sticky
2300	1.42	88.5	4.2	No bloating, beginning to melt

Potential Use: Brick and tile.

SAMPLE: R-646 *County:* Northumberland

Date: January 1960, Electrotechnical Experiment Station

Locality: On the northwest side of State Road 621, approximately 1.75 miles (2.82 km) northeast of Morrisons Corner.

Description: Light-gray and yellowish-orange clay.

Formation or Age: Pleistocene

Sampled Interval: Nine feet (three meters) of augered clay.

Raw Properties:

Working properties: plastic and smooth working, slightly gritty

Water of plasticity: 33.0%

Drying defects: none

Drying shrinkage: 6.0%

pH: 4.4

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Buff	Crumbly, soft	7.5	19.3	2.71
2000	Orange-buff	Fair hard	11.5	12.9	2.65
2100	Light red	Very hard	12.5	9.7	2.59
2200	Dark red brown	Very hard	14.0	7.0	2.55
2300	Very dark red and brown	Steel hard	14.0	5.2	2.47
2400	Medium gray	(Slight expansion)	12.5	8.6	2.32

Potential Use: Brick and tile.

SAMPLE: R-667 *County:* Northumberland

Date: February 1960, Electrotechnical Experiment Station

Locality: Exposure on the Potomac River at the end of State Road 636.

Description: Six feet (two meters) of yellowish-orange clay underlain by 4 feet (1 m) of light to medium-gray clays which contain openings filled with iron oxide. Three feet (1 meter) of sand and gravel overburden.

Formation or Age: Pleistocene

Sampled Interval: Ten feet (three meters) of augered clay.

Raw Properties:

Working properties: plastic and smooth working

Water of plasticity: 30.0%

Drying defects: none

Drying shrinkage: 5.0%

pH: 4.5

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Medium red	Crumbly, soft	7.5	19.3	2.60
2000	Medium red-brown	Fair hard	11.0	13.0	2.53
2100	Dark red-brown	Hard	11.0	11.0	2.57
2200	Dark brown	Very hard	14.0	6.3	2.41
2300	Dark gray-brown	Steel hard	14.0	6.3	2.17
2400	Dark gray-brown	(Expanded)	(Expanded)	12.2	2.13

Remarks: Fair color range

Potential Use: Brick and tile.

SAMPLE: R-668 *County:* Northumberland

Date: February 1960, Electrotechnical Experiment Station

Locality: Approximately 2.0 miles (3.2 km) northeast of Remo, at the end of State Road 761.

Description: Light-gray and yellowish-orange clay covered by 1 foot of overburden and underlain by gray sand.

Formation or Age: St. Marys Formation

Sampled Interval: Nine and one-half feet (three meters) of augered clay.

Raw Properties:

Working properties: plastic and smooth working

Water of plasticity: 33.0%

Drying defects: none

Drying shrinkage: 5.0%

pH: 4.5

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Light red	Crumbly, soft	7.5	20.7	2.85
2000	Medium red	Crumbly, soft	11.5	13.1	2.76
2100	Medium red-brown	Fair hard	11.5	5.8	2.58
2200	Dark red-brown	Hard	15.5	7.4	2.66
2300	Dark brown	Very hard	15.5	5.7	2.62
2400	Very dark brown	Steel hard	15.5	5.3	2.53

Remarks: Good color range

Potential Use: Brick and tile.

SAMPLE: R-669 *County:* Lancaster

Date: February 1960, Electrotechnical Experiment Station

Locality: On the north side of State Road 653, approximately 1.5 miles (2.4 km) southwest of Somers.

Description: Light-gray and yellowish-brown clays, covered by a thin overburden and underlain by sand.

Formation or Age: St. Marys Formation

Sampled Interval: Three and one-half feet (one meter) of augered clay.

Raw Properties:

Working properties: long working, plastic, sticky

Water of plasticity: 33.0%

Drying defects: none

Drying shrinkage: 10.0%

pH: 5.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Dark buff	Crumbly, soft	10.5	19.3	2.69
2000	Dark buff	Crumbly, soft	10.5	17.0	2.67
2100	Medium red	Crumbly, soft	11.5	13.1	2.65
2200	Medium red-brown	Very hard	15.0	11.3	2.60
2300	Dark brown	Very hard	15.5	9.2	2.59
2400	Dark gray-brown	Steel hard	16.0	6.5	2.52

Remarks: Good color range

Potential Use: Brick and tile.

SAMPLE: R-670 *County:* Lancaster

Date: February 1960, Electrotechnical Experiment Station

Locality: On the west side of State Road 612, approximately 3.25 miles (5.23 km) south of Lancaster.

Description: Pale red, dark reddish-brown, yellowish-brown, and light-gray clay covered by 2 feet (1 m) of loamy overburden and underlain by yellowish-brown sand.

Formation or Age: Yorktown Formation

Sampled Interval: Ten feet (three meters) of augered clay.

Raw Properties:

Working properties: plastic, smooth, long working

Water of plasticity: 28.0%

Drying defects: none

Drying shrinkage: 5.5%

pH: 4.9

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Dark buff	Crumbly, soft	5.5	17.8	2.73
2000	Dark buff	Crumbly, soft	6.5	16.4	2.72
2100	Medium red	Hard	10.0	15.1	2.68
2200	Medium red-brown	Very hard	11.0	9.2	2.61
2300	Dark brown	Very hard	11.5	5.7	2.60
2400	Dark gray-brown	Steel hard	11.5	4.6	2.51

Potential Use: Brick and tile.

SAMPLE: R-671 *County:* Lancaster

Date: February 1960, Electrotechnical Experiment Station

Locality: Roadcut on State Road 733, approximately 0.75 mile (1.21 km) northeast of Slabtown.

Description: Yellowish-brown and light gray clay that is underlain by light-brown sandstone. The light gray clay which weathers to form angular fragments is exposed at the surface.

Formation or Age: St. Marys Formation

Sampled Interval: Four feet (1 meter) of augered clay.

Raw Properties:

Working properties: plastic, smooth, very fine grit, long working

Water of plasticity: 29.0%

Drying defects: none

Drying shrinkage: 5.0%

pH: 5.0

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Dark buff	Crumbly, soft	5.5	17.9	2.70
2000	Light red	Fair hard	7.5	14.8	2.68
2100	Medium red	Fair hard	10.0	13.5	2.67
2200	Dark red-brown	Very hard	10.5	8.7	2.57
2300	Dark red-brown	Very hard	10.5	8.5	2.56
2400	Dark brown	Steel hard	10.5	6.4	2.56

Potential Use: Brick and tile.

SAMPLE: R-1675 *County:* Page

Date: April 1961, Norris Metallurgy Research Laboratory

Locality: Large open pit of the abandoned Stanley manganese mine, located 1.0 mile (1.6 km) south of Stanley at the north end of Roundhead Mountain.

Description: A 15-foot (5-m) exposure of grayish-orange, reddish-brown, and white clay is overlain by approximately 10 feet (3 m) of sand and gravel.

Formation or Age: Residual clay

Sampled Interval: Composite sample from exposure 15 feet (5 m) in height.

Raw Properties:

Working properties: plastic, long working, fatty, smooth

Water of plasticity: 38.0%

Drying defects: none

Drying shrinkage: 1.5%

pH: 6.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Light red-buff	Fair hard	10.0	15.9	2.60
2000	Medium red	Steel hard	16.0	3.9	2.52
2100	Dark red-brown	Steel hard	19.5	0.7	2.47
2200	Dark brown	———	(Expanded)	17.6	2.14
2300	Dark brown	———	(Expanded)	16.3	2.04
2400		(Melted)			

Bloating Test: Negative

Potential Use: Brick.

SAMPLE: R-1676 *County:* Page

Date: April 1961, Norris Metallurgy Research Laboratory

Locality: Large opencut of the abandoned Stanley manganese mine located 1.0 mile (1.6 km) south of Stanley at the north end of Roundhead Mountain.

Description: A 12-foot (4-m) exposure of reddish-brown, grayish-orange, and white clay is overlain by up to 10 feet (3 m) of sand and gravel. The clay is cut by fractures cemented by manganese and iron oxide; some fragments of chalcedonic chert, dolomite, sandstone, and manganese minerals occur in the clay, which becomes increasingly sandy toward the top of the cut.

Formation or Age: Residual clay

Sampled Interval: Composite sample from exposure 12 feet (4 m) in height.

Raw Properties:

Working properties: plastic, fairly long working, smooth, gritty, slightly fatty
Water of plasticity: 32.0%
Drying defects: none
Drying shrinkage: 4.0%
pH: 5.5

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Light red-buff	Crumbly, hard	7.5	16.2	2.70
2000	Light reddish brown	Hard	14.0	10.2	2.64
2100	Dark red-brown	Steel hard	16.0	3.1	2.53
2200	Very dark red-brown	Steel hard	17.5	2.2	2.51
2300	Very dark brown		(Slightly expanded)	6.0	2.30
2400	Black-brown		(Expanded)	9.9	2.20

Bloating Test: Negative

Potential Use: Quarry tile.

SAMPLE: R-1677 *County:* Page

Date: April 1961, Norris Metallurgy Research Laboratory

Locality: Opencut (65 x 64 feet or 20 x 19 m) on the Western manganese tract, located in a saddle on the west slope of Grindstone Mountain, 0.75 mile (1.21 km) north of Furnace.

Description: A 12-foot (4-m) exposure of dark yellowish-orange clay is overlain by up to 7 feet (2 m) of sand and gravel.

Formation or Age: Residual clay (weathered Shady Formation)

Sampled Interval: Sample from exposure 12 feet (4 m) in height.

Raw Properties:

Working properties: plastic, long working, fatty, smooth, slightly sticky

Water of plasticity: 39.0%

Drying defects: none

Drying shrinkage: 4.5%

pH: 5.4

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Light red	Crumbly, hard	10.0	21.2	2.79
2000	Red-brown	Steel hard	20.0	1.9	2.69
2100	Dark red-brown	Steel hard	20.0	0.1	2.65
2200	Dark brown	——	(Expanded)	11.7	2.30
2300	Black-brown	——	(Expanded)	12.6	1.79
2400		(Melted)			

Bloating Test: Negative

Potential Use: Quarry tile.

SAMPLE: R-1678 *County:* Page

Date: April 1961, Norris Metallurgy Research Laboratory

Locality: Opencut (200 x 70 feet or 61 x 21 m) at the abandoned Bolan workings south of Wolf Run, about 2.5 miles (4.0 km) east of Shenandoah.

Description: A 20-foot (6-m) thick exposure of white, grayish-yellow, pink, and yellowish-brown clay is overlain by up to 5 feet (2 m) of sand and gravel. Some of the clay contains chert fragments and nodules of manganese minerals.

Formation or Age: Residual clay (weathered Shady Formation)

Sampled Interval: Composite sample from exposure 20 feet (6 m) in height.

Raw Properties:

Working properties: plastic, fairly long working, slightly fatty, smooth
Water of plasticity: 32.0%
Drying defects: none
Drying shrinkage: 3.5%
pH: 5.2

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Light buff	Crumbly, soft	5.0	21.2	2.67
2000	Very light brown mottled	Hard	11.5	11.5	2.57
2100	Medium brown mottled	Very hard	15.0	4.4	2.46
2200	Brown, mottled	Steel hard	15.5	2.3	2.44
2300	Medium gray, mottled	Steel hard	14.5	3.0	2.32
2400	Light gray, mottled	——	(Expanded)	7.8	2.20

Bloating Test: Negative

Potential Use: Decorative brick and tile.

SAMPLE: R-2007 *County:* Franklin
Date: October 1962, Norris Metallurgy Research Laboratory
Locality: Turkey Cock Mountain.
Description: Tan white kaolin, mica, and quartz from weathered pegmatite.
Formation or Age: Residuum from pegmatite
Sampled Interval: Unknown.
Raw Properties:

Working properties: fair plasticity, smooth and fatty
Water of plasticity: 42.0%
Drying defects: none
Drying shrinkage: 1.0%
Dry strength: low
pH: 6.8 (unwashed)

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	App. Sp. Gr.
1800	Cream	Soft, crumbly	1.0	59.6	2.57
1900		Soft, crumbly			
2000	Faint ivory	Soft, crumbly	1.0	59.5	2.57
2100	Off-white	Soft, crumbly	1.0	56.9	2.62
2200	Off-white	Soft, crumbly	4.5	49.6	2.61
2300	White	Soft, crumbly	5.0	44.0	2.64
2400	White	Soft, crumbly	5.5	44.7	2.66

Remarks: Low fired shrinkage and high absorption, probably due to fine mica, although the fusion point point does not seem to be affected (mica is generally a fluxing material at temperatures above cone 20).

X-ray and Petrographic Analyses:

	Beneficiated Sample
Quartz	3-5%
Mica	2-3%
Kaolin	60+ or —%
Feldspar	3-5%
Zeolites	1-2%
Mont. chlorite	1-2%
Glass (isotropic)	5-8%

Microscopic: clear glassy grains apparently from a pneumatolitic deposit or slightly altered granitic (pegmatitic) deposit.

Pyrometric Cone Equivalent: 35 1785°C (3245°F)
Potential Use: Paint and plastic filler, ceramic whiteware (if beneficiated).

SAMPLE: R-4911 *County:* Alleghany

Date: July 1972, Tuscaloosa Metallurgy Research Laboratory

Locality: On the property of Westvaco just northwest of the plant in Covington.

Description: Dark-gray to black, fissile shale with rusty brown bedding planes stained by iron oxide is present in the hillside. The shale has a northeasterly strike and a northwest and southeast dip on opposite sides of a syncline.

Formation or Age: Needmore Formation and Millboro Shale

Sampled Interval: Composite of representative sample taken across the exposure.

Quick Firing Test: (Particle size—$^3/_4$", retention time 15 min.)

Temp °F	% Abs.	Bulk Density gm/cc	Bulk Density lb./ft.^{3}	Remarks
1800	4.3	2.18	136.0	No expansion
1900	6.7	1.91	119.2	Slightly laminar expansion
2000	7.8	1.47	91.7	Slightly porous
2100	8.6	0.84	52.4	Very good pore structure
2200	7.8	0.74	46.2	Good pore structure, sticky
2300	—	—	—	

Potential Use: Lightweight aggregate

Rotary Kiln Test

Date: November 1972—Tuscaloosa Metallurgy Research Laboratory

RAW MATERIAL

Screen Analysis: Sizes	Weight, Percent Retained
−¾" + ½"	27.6
−½" + ⅜"	11.6
−⅜" + 4 mesh	23.7
−4 mesh + 8 mesh	30.6
−8 mesh Pan	6.5
	100.0

Comments: Fragments tabular; crushing loss (—4 mesh) 37.1%

SAMPLE: R-4911 (Continued)

Firing Data:

Pour weight of feed: 92.0 pcf.

Size range of feed: ¾"+4 mesh

Bloating temperature: 2020°F

Logging temperature (nodules sticking together): 2070°F

FIRED MATERIAL

Screen Analysis: (Percentages by weight passing sieves)

Size	¾"	½"	⅜"	No. 4	No. 8	No. 16	No. 50	No. 100
Fine	—	—	—	100.0	78.6	57.5	32.0	24.2
Coarse	100	54.4	30.3	9.4	5.2	—	—	—

Loose pour weights: Fine: 46.2 pcf.
Coarse: 38.0 pcf.

Comments: This appears to be a promising raw material for lightweight aggregate.

SAMPLE: R-4912 *County:* Alleghany

Date: July 1972, Tuscaloosa Metallurgy Research Laboratory

Locality: On the property of Westvaco just northwest of the plant in Covington.

Description: Green to olive-gray, micaceous shale with interbedded layers of fine-grained, olive-gray sandstone. The shale has a northeasterly strike and a variable dip to the northwest and southeast in a syncline.

Formation or Age: Brallier Formation.

Sampled Interval: Composite of representative samples taken across exposure.

Quick Firing Test: (Particle size—¾", retention time 15 min.)

Temp. °F	% Abs.	Bulk Density gm/cc	Bulk Density lb./ft.^{3}	Remarks
1800	4.5	2.32	144.8	No expansion
1900	4.2	2.14	133.5	No expansion
2000	2.9	2.10	131.0	No expansion
2100	3.5	1.60	99.8	Slightly porous
2200	5.0	1.08	67.4	Good pore structure, sticky

Remarks: heavy, flakes badly in a fast fire

Potential Use: Marginal raw material for lightweight aggregate.

SAMPLE: R-5006 *County:* Henrico

Date: August 1973, Tuscaloosa Metallurgy Research Laboratory

Locality: On the northwest bank of Stony Run valley along East Richmond Road about 1.5 miles (2.4 km) west of the intersection of Interstate Highway 64 with Laburnum Ave.

Description: Light gray clay with red mottlings.

Formation or Age: Calvert Formation (?)

Sampled Interval: Representative sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 26.3%
Drying defects: none
Drying shrinkage: 5.0%
Dry strength: good
pH: 5.0

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Tan	3	10.0	14.5	29.1	2.00
1900	Tan	3	10.0	11.6	24.1	2.06
2000	Orange-tan	4	12.5	8.0	18.0	2.24
2100	Orange-tan	4	12.5	6.9	15.7	2.27
2200	Light brown	5	15.0	4.4	10.6	2.38
2300	Red-brown	6	15.0	2.7	6.4	2.40

Remarks: good color (2300°F). High shrinkage. Not effervescent with HCl.

Bloating Test: Negative.

Potential Use: Quarry tile, building brick, "antique" face brick.

SAMPLE: R-5007 *County:* Henrico

Date: August 1973, Tuscaloosa Metallurgy Research Laboratory

Locality: In the base of the trench of Interstate Highway 195 underpass of U. S. Highway 250 (Broad Street) just southeast of the intersection of Laburnum Avenue with Broad Street in Richmond.

Description: Variegated tan clay (saprolite) overlain by approximately 20 feet (6m) of fluvial sands, gravels, and clays.

Formation or Age: Residual clay from underlying Petersburg granite(?)

Sampled Interval: Representative sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 26.0%
Drying defects: none
Drying shrinkage: 5.0%
Dry strength: good
pH: 4.8

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Tan	3	5.0	20.3	37.3	1.84
1900	Tan	3	7.5	17.4	32.8	1.89
2000	Dark tan	3	10.0	13.7	27.9	2.03
2100	Orange-tan	4	12.5	11.2	23.2	2.07
2200	Red-brown	5	12.5	8.2	17.9	2.17
2300	Gray-brown	5	15.0	6.7	15.1	2.24

Remarks: good color, (2000°F), not effervescent with HCl.

Bloating Test: Negative.

Potential Use: Face brick.

SAMPLE: R-5338 *County:* Halifax

Date: January 1973, Tuscaloosa Metallurgy Research Laboratory

Locality: Approximate 2-acre site near the intersection of the N. F. and D. Railway and State Road 740 in Christie.

Description: Very pale orange residuum (possibly from Hyco Formation).

Formation or Age: Residual clay.

Sampled Interval: Augered clay.

Raw Properties:

Working properties: plastic, gritty
Water of plasticity: 22.5%
Drying defects: none
Drying shrinkage: 0
Dry strength: poor
pH: 6.9

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Tan	poor bond	0.0	22.1	36.3	1.64
1900	Tan	3	0.0	17.0	30.7	1.81
2000	Orange-tan	4	5.0	13.9	26.4	1.90
2100	Red-brown	7	5.0	6.2	13.5	2.18
2200	Dark brown	7	5.0	1.2	2.7	2.16
2300	————	(Melted)	—	—	—	—

Remarks: fair color (2100°F), not effervescent with HCl.

Bloating Test: Negative.

Potential Use: Face brick, sewer pipe.

SAMPLE: R-5339 *County:* Halifax

Date: January 1973, Tuscaloosa Metallurgy Research Laboratory

Locality: Approximate 2-acre site near the intersection of the N. F. and D. Railway and State Road 740 in Christie.

Description: Dark yellowish-orange to grayish-yellow clay.

Formation or Age: Residual clay.

Sampled Interval: Four feet (one meter) of augered clay.

Raw Properties:

Working properties: plastic, smooth
Water of plasticity: 26.5%
Drying defects: none
Drying shrinkage: 7.5%
Dry strength: good
pH: 6.9

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Orange-tan	4	10.0	17.2	31.8	1.85
1900	Orange-tan	4	10.0	12.1	23.8	1.97
2000	Orange-tan	6	15.0	7.3	15.5	2.14
2100	Red-tan	6	15.0	5.7	12.5	2.20
2200	Light red	6	17.5	4.9	10.9	2.24
2300	Red-brown	7	17.5	2.5	5.8	2.31

Remarks: Good color, would require non-plastic addition to control shrinkage; not effervescent with HCl.

Bloating Test: Negative

Potential Use: Face brick, sewer pipe, quarry tile.

SAMPLE: R-5731 *County:* Henrico

Date: October 1974, Tuscaloosa Metallurgy Research Laboratory

Locality: On the property of West Sand and Gravel Co., Inc. about 1.55 miles (2.50 km) south-southwest of Varina, 0.75 mile (1.21 km) off the southwest side of Strath Road approximately 0.95 mile (1.53 km) by road south of its intersection with State Highway 5,

Description: Light-gray clay.

Formation or Age: Miocene.

Sampled Interval: Grab sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 30.7%
Drying defects: none
Drying shrinkage: 7.5%
Dry strength: good
pH: 3.5

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Tan	5	10.0	15.6	28.4	1.82
1900	Tan	5	10.0	13.0	24.3	1.88
2000	Light brown	5	10.0	9.0	18.0	1.99
2100	Light brown	6	12.5	4.2	9.1	2.16
2200	Brown	7	15.0	3.2	7.2	2.33
2300	————	—	(Expanded)	—	—	—

Remarks: poor color; no effervescence with HCl.

Bloating Test: Negative

Potential Use: Building brick.

SAMPLE: R-5732 *County:* Henrico

Date: October 1974, Tuscaloosa Metallurgy Research Laboratory

Locality: On the property of West Sand and Gravel Co., Inc. about 1.55 miles (2.50 km) south-southwest of Varina, 0.75 mile (1.21 km) off the southwest side of Strath Road approximately 0.95 mile (1.53 km) by road south of its intersection with State Highway 5.

Description: Tan to yellowish-orange clay.

Formation or Age: Miocene.

Sampled Interval: Grab sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 32.1%
Drying defects: none
Drying shrinkage: 7.5%
Dry strength: good
pH: 5.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Orange	3	7.5	15.5	29.2	1.88
1900	Orange	5	10.0	14.8	28.1	1.89
2000	Orange	5	12.5	9.8	20.0	2.03
2100	Light brown	6.5	15.0	4.4	9.8	2.20
2200	Brown	6.5	15.0	3.1	6.9	2.27
2300	Red-brown	8	15.0	1.9	4.4	2.30

Remarks: good color at 2300°F; no effervescence with HCl.

Bloating Test: Negative

Potential Use: Face brick, sewer pipe, tile.

SAMPLE: R-6189 *County:* Hanover

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: Along the west bank of Beaverdam Creek, about 0.6 mile (1.0 km) east of the intersection of U. S. Highway 360 with State Highway 156 on the south side of U. S. Highway 360.

Description: Dark brownish-gray clayey silt.

Formation or Age: Calvert Formation.

Sampled Interval: One-half foot of clay core.

Raw Properties:

Working properties: plastic
Water of plasticity: 36.2%
Drying defects: none
Drying shrinkage: 7.5%
Dry strength: good
pH: 4.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	3	10.0	20.2	34.4	1.70
1900	Brown-red	3	10.0	15.5	28.7	1.86
2000	Brown-red	4	15.0	12.3	24.6	2.00
2100	Med. orange-brown	8	15.0	7.2	14.8	2.04
2200	———	—	(Expanded)	—	—	—

Remarks: abrupt vitrification (2100°-2200°F), high shrinkage at maturity, no effervescence with HCl.

Preliminary Bloating Test: (Particle size—3/4" lumps, crushing characteristics—angular, retention time 15 minutes.)

Temp. °F	% Absorption	Bulk Density gm/cc	Bulk Density lb./ft.^{3}	Remarks
1800	20.6	1.54	96.1	No expansion
1900	16.9	1.56	97.3	No expansion
2000	13.0	1.47	91.7	Slight expansion
2100	9.5	1.14	71.1	Slight expansion
2200	19.4	0.64	39.9	Large pores

Comments: test positive, mixture of clays, short firing range.

Potential Use: Marginal raw material for lightweight aggregate.

SAMPLE: R-6190 *County:* Henrico

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: In an old meander scar 0.1 mile (0.2 km) west of Turkey Island Road and 0.4 mile (0.7 km) north of the James River.

Description: Dull, medium-gray clayey silt with fine sand and root mottlings.

Formation or Age: Pleistocene(?)

Sampled Interval: Grab sample.

Working properties: plastic

Water of plasticity: 19.5%

Drying defects: none

Drying shrinkage: 2.5%

Drying strength: good

pH: 6.2

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Orange-brown	3	2.5	17.1	30.9	1.81
1900	Orange-brown	3	5.0	16.6	30.3	1.83
2000	Orange-brown	3	5.0	14.7	28.0	1.90
2100	Dark orange	4	7.5	10.7	21.4	2.00
2200	Med. red-brown	6	10.0	8.9	18.8	2.11
2300	Dark red-brown	7	10.0	5.8	12.6	2.16

Remarks: good firing range, no effervescence with HCl.

Bloating Test: Negative

Potential Use: Severe-weather building brick.

SAMPLE: R-6191 *City:* Richmond

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: In the north bank of General Shale Products Corporation's No. 1 pit about 0.5 mile (0.8 km) due west of Interstate Highway 95 toll road interchange No. 8.

Description: Medium-gray clayey silt with fine sand and root mottlings.

Formation or Age: Pleistocene(?)

Sampled Interval: Representative grab sample.

Working properties: plastic

Water of plasticity: 23.5%

Drying defects: none

Drying shrinkage: 2.5%

Dry strength: good

pH: 4.5

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	3	5.0	21.2	36.3	1.71
1900	Dark orange	3	5.0	20.2	35.0	1.73
2000	Dark orange	3	7.5	16.9	31.4	1.85
2100	Med. red-brown	4	10.0	12.6	25.1	1.99
2200	Med. red-brown	5	10.0	9.9	20.8	2.10
2300	Dark red-brown	7	12.5	4.8	10.8	2.24

Remarks: good color, good firing range, no effervescence with HCL.

Bloating Test: Negative

Potential Use: Severe-weather building brick.

SAMPLE: R-6193 *County:* Chesterfield

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: On the grounds of the Spruance works of E. I. Du Pont de Nemours & Co., Inc. along and approximately 150 feet (46 m) east of the Seaboard Coastline Railroad and 0.2 mile (0.3 km) south of the Richmond city limits.

Description: Medium-gray clayey silt with fine sand.

Formation or Age: Pleistocene (?)

Sampled Interval: Grab sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 25.1%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: good
pH 4.7

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	3	2.5	23.4	39.0	1.67
1900	Dark orange	3	5.0	21.9	37.2	1.70
2000	Dark orange	3	5.0	18.6	33.3	1.79
2100	Med. red-brown	4	7.5	14.1	27.6	1.96
2200	Med. red-brown	4	10.0	11.0	22.6	2.06
2300	Dull red	6	12.5	6.7	14.7	2.20

Remarks: good color range, good firing range, no effervescence with HCl.

Bloating Test: Negative

Potential Use: Severe-weather building brick, sewer pipe.

SAMPLE: R-6195 *County:* Chesterfield

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: In a drainage ditch about 0.1 mile (0.2 km) west of Interstate Highway 95 and about 0.25 mile (0.40 km) north of Willis Road.

Description: Light-gray sandy clay.

Formation or Age: Miocene(?)

Sampled Interval: Grab sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 19.8%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: good
pH: 4.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Yellow-red	4	5.0	18.0	32.7	1.81
1900	Yellow-red	4	5.0	17.8	32.4	1.82
2000	Yellow-red	4	5.0	17.4	31.8	1.83
2100	Dark yellow-red	4	5.0	15.5	29.3	1.89
2200	Dark yellow-red	4	7.5	13.5	26.2	1.94
2300	Dark yellow-red	4	7.5	12.3	24.4	1.98

Remarks: excellent firing range, good color, no effervescence with HCl.

Bloating Test: Negative

Potential Use: Severe-weather building brick, structural tile.

SAMPLE: R-6196 *County:* Henrico

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: Along Mill Creek, approximately 0.3 mile (0.5 km) west of Osborne Turnpike.

Description: Light bluish-gray, fine-grained clayey and silty sand.

Formation or Age: Miocene

Sampled Interval: Grab sample.

Raw Properties:

Working properties: plastic
Water of plasticity: 29.9%
Drying defects: none
Drying shrinkage: 5.0%
Dry strength: good
pH: 4.1

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dk. orange	3	7.5	21.4	36.3	1.70
1900	Dk. orange	3	7.5	19.0	33.3	1.75
2000	Very dk. orange	4	10.0	15.1	28.3	1.88
2100	Very dk. orange	4	12.5	8.6	18.0	2.09
2200	Brown-red	6	12.5	4.8	10.5	2.20
2300	————	—	(Expanded)	—	—	—

Remarks: marginal, slightly high shrinkage, no effervescence with HCl.

Bloating Test: Negative

Potential Use: Moderate-weather building brick.

SAMPLE: R-6205 *County:* Washington

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: In a drainage valley 1.1 mile (1.8 km) south of the intersection of Interstate Highway 81 and State Road 658, 0.25 mile (0.40 km) southeast of the Bristol, Virginia Department of Highways and Transportation headquarters.

Description: Gray shale.

Formation or Age: Athens shale.

Sampled Interval: Composite of samples across 120 feet (37 m) of shale.

Raw Properties:

Working properties: short
Water of plasticity: 16.7%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: fair
pH: 6.8

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	3	2.5	15.8	29.2	1.85
1900	Dark orange	4	5.0	13.4	25.3	1.89
2000	Dk. brown-red	4	5.0	10.6	21.1	1.99
2100	———	—	(Expanded)	—	—	—

Remarks: abrupt vitrification (2000°-2100°F), no effervescence with HCl.

Preliminary Bloating Test: (Particle size—¾″ lumps, crushing characteristics—platy, retention time 15 minutes.)

Temp. °F	% Absorption	Bulk Density gm/cc	Bulk Density lb./ft.³	Remarks
1800	6.2	2.12	132.3	No expansion
1900	6.8	2.00	124.8	No expansion
2000	9.9	1.46	91.1	Slight expansion
2100	5.8	1.50	93.6	Slight expansion
2200	12.3	0.80	49.9	Good pore structure
2300	14.6	0.56	34.9	Overfired; large pores

Comments: test positive, mixture of clays.

Potential Use: Marginal raw material for lightweight aggregate.

SAMPLE: R-6206 *County:* Washington

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: Along the west side of State Road 670, 250 feet (76 m) southeast of its intersection with State Road 674 in the northwest side of Denton Valley.

Description: Light-brown shale.

Formation or Age: Athens shale.

Sampled Interval: Composite of samples across approximately 180 feet (55 m) of shale.

Raw Properties:

Working properties: short
Water of plasticity: 17.1%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: fair
pH: 6.8

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark brown-red	3	2.5	15.8	30.1	1.90
1900	Dark brown-red	3	5.0	12.5	25.1	2.00
2000	Med. brown-red	4	7.5	8.9	18.8	2.11
2100	Brown-red	6	7.5	5.7	12.6	2.21
2200	———	—	(Expanded)	—	—	—

Remarks: abrupt vitrification (2100°-2200°F), short firing range, no effervescence with HCl.

Preliminary Bloating Test: (Particle size, ¾" lumps; crushing characteristics, platy; retention time 15 minutes)

Temp. °F	% Absorption	Bulk Density gm/cc	Bulk Density lb./ft.^{3}	Remarks
1800	platy	—	—	—
1900	platy	—	—	—
2000	6.0	1.80	112.3	No expansion
2100	8.9	0.96	59.9	Good pore structure
2200	9.5	0.79	49.3	Overfired; sticky

Comments: test positive, platy material—may have to be pelletized.

Potential Use: Marginal raw material for lightweight aggregate; severe-weather building brick.

SAMPLES: R-6207A and R-6207B *County:* Washington

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: Upper part of unit along Norfolk and Western Railway cut on the southeast side of the River Knobs just northwest of the Middle Fork of the Holston River.

Description: Brown shale.

Formation or Age: Athens shale.

R-6207A

Sampled Interval: Composite of samples across 200 feet (61 m) of shale.

Raw Properties:

Working properties: short
Water of plasticity: 17.6%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: fair
pH: 7.2

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	2	2.5	19.0	33.5	1.77
1900	Dark orange	3	2.5	18.1	32.1	1.77
2000	Dk. brown-red	3	5.0	14.4	26.5	1.84
2100	Brown-red	6	5.0	8.0	15.7	1.97
2200	————	—	(Expanded)	—	—	—

Remarks: abrupt vitrification (2100°-2200°F), may be limy, slight effervescence with HCl.

Preliminary Bloating Test: (Particle size—¾" lumps, crushing characteristics—platy, retention time 15 minutes)

Temp. °F	% Absorption	Bulk Density gm/cc	Bulk Density lb./ft.³	Remarks
1800	—	—	—	Platy
1900	—	—	—	Platy
2000	—	—	—	Platy
2100	—	—	—	Platy
2200	20.4	0.52	32.5	Overfired; sticky

Comments: test positive, platy material—may have to be pelletized.

Potential Use: Marginal raw material for lightweight aggregate.

R-6207B

Sampled Interval: Composite of samples across 30 feet (9m) of shale.

Raw Properties:

Working properties: plastic
Water of plasticity: 17.5%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: fair
pH: 7.7

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Dark orange	3	2.5	17.5	32.0	1.83
1900	Dark orange	3	5.0	15.7	29.5	1.88
2000	Dk. brown-red	3	5.0	13.3	26.1	1.96
2100	Brown-red	4	10.0	7.5	16.2	2.17
2200	Dark brown	7	10.0	4.1	9.1	2.21
2300	————	—	(Expanded)	—	—	—

Remarks: abrupt vitrification (2200°-2399°F), short firing range, no effervescence with HCl.

Preliminary Bloating Test: (Particle size—¾″ lumps, crushing characteristics—platy, retention time 15 minutes)

Temp. °F	% Absorption	Bulk Density gm/cc	Bulk Density lb./ft.³	Remarks
1800	—	—	—	Platy
1900	7.7	2.11	131.7	No expansion
2000	5.5	2.16	134.8	No expansion
2100	4.7	1.92	119.8	No expansion
2200	4.7	1.58	98.6	Slight expansion
2300	7.4	1.20	74.9	Partial expansion

Comments: test positive, mixture of clays.

Potential Use: Severe-weather building brick, marginal raw material for lightweight aggregate.

SAMPLE: R-6209 *County:* Washington

Date: August 1975, Tuscaloosa Metallurgy Research Laboratory

Locality: On the northwest side of the Great Knobs 0.1 mile (0.2 km) southeast of State Road 670 and 0.15 mile (0.24 km) southwest of Wolf Creek.

Description: Brown shale.

Formation or Age: Athens shale

Sampled Interval: Composite of samples across 90 feet (27 m) of shale.

Raw Properties:

Working properties: plastic
Water of plasticity: 23.8%
Drying defects: none
Drying shrinkage: 2.5%
Dry strength: good
pH: 4.8

Slow Firing Test:

Temp. °F	Color	Hardness	% Total Lin. Shk.	% Abs.	% App. Por.	Bulk Density gm/cc
1800	Med. orange brown	2	5.0	20.2	34.7	1.72
1900	Med. orange brown	3	7.5	17.3	30.8	1.78
2000	Med. orange brown	3	7.5	14.0	26.2	1.87
2100	Dk. orange	7	10.0	7.7	15.9	2.07
2200	Med. brown	8	10.0	4.6	9.8	2.12
2300	———	—	(Expanded)	—	—	—

Remarks: Abrupt virtrification (2200°-2300°F), short firing range, no effervescence with HCl.

Bloating Test: Negative

Potential Use: Severe-weather building brick.

CLAY-MATERIAL RESOURCES OF VIRGINIA

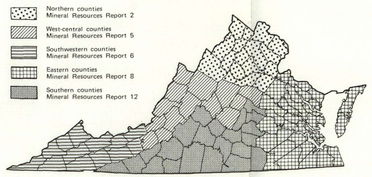
by Palmer C. Sweet

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
Marvin M. Sutherland, Director
DIVISION OF MINERAL RESOURCES
James L. Calver, State Geologist
Charlottesville, Virginia

Scale 1:1,000,000

1976

INDEX MAP



Williams & Heintz Map Corporation, Washington, D.C. 20027