Steatite-tempered Early Woodland Period (1200 – 500 BCE) ceramics of Virginia: A question of steatite identity and nomenclature

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INTRODUCTION

65 sherds were recovered from Woodland Period sites (44WR0232 and 44WR0446) in Front Royal (Warren County), Virginia for petrographic analysis to define the variability of aplastic component assemblage. An INAA study of similar sherds from these sites found that several of the sherds that were described as having steatite tempering did not exhibit a chemical compositional profile consistent with ultramafic rock lithologies. This study found that 17 sherds contained either steatite, soapstone or mafic schist rocks fragments as a primary (>25 modal %) aplastic component.

Cross-disciplinary investigations often hinge on the nuances of terminology and nomenclature. The terms steatite and soapstone are used interchangeably, but the term steatite is used when the mineral composition is dominated by talc and soapstone when the mineral composition is talc + chlorite + mica ± opaque minerals. These rock fragments often represent the metamorphism of an ultramafic igneous source rock (i.e., peridotite, etc.). The variability of the rock fragment temper, including pyroxene- or olivine-bearing rock fragments found in these ceramics, probably represents a range of ultramafic rock protoliths. This may either suggest different source locations or represent the continuum of mineral assemblages (and relict protolith assemblages) found in a zoned metamorphosed ultramafic rock. However it also indicates that determining the geographic constraints on these sherds may be difficult.

ARCHEOLOGICAL LOCATION

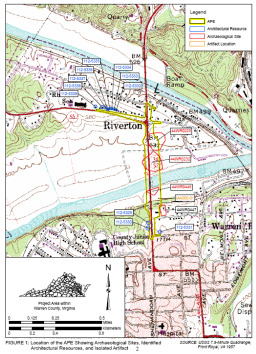


FIGURE 1. Location of the APE Showing Archaeological Sites, Identified Architectural Resources, and Isolated Artifact 2 SOURCE: 2012 7.5-minute Quadrangle Front Royal, VA 1970

Site 44WR0232 is located on the floodplain north of the South Fork of the Shenandoah River (Figure 1) and had an artifact-rich buried A-horizon on an old levee. Site 44WR0446 is located on the summit of a low knoll on the rivers south bank, with artifact and a large stone hearth beneath a buried A-horizon resembling that found at site 44WR0232 (Louis Berger Group, 2012).

Interestingly, the archaeological study sites in Warren County are quite removed from the locations of pre-historic (or historic) quarry locations for steatite and soapstone in Virginia (Figure 2). The distribution of steatite-tempered ceramics seems to be more closely related to the Piedmont sources of soapstone (Figure 2) rather than the distribution of carved steatite vessels of the Late Archaic. Steatite bowls were widely traded throughout the Northeast and Mid-Atlantic regions from 1700 to 1300 BCE.

The variability of the mineralogy in these rock fragments may suggest either different source locations or removal from different portions of a zoned metamorphosed ultramafic rock body.

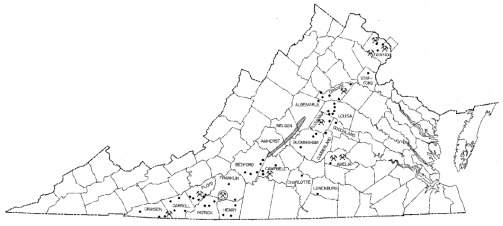


Figure 2. Location of soapstone deposits in Virginia that were utilized in historic times. From Talc, Soapstone, and Related Stone Deposits of Virginia (Virginia Department of Mines, Minerals and Energy).

TERMINOLOGY ISSUES: STEATITE vs. SOAPSTONE vs. MAFIC SCHIST

The archaeological literature uses the term steatite in describing the talc dominated Archaic carved stone pots (Figure 3) as well as the talc-dominated rock fragment found in Early Woodland pottery (e.g., Marcey Creek, Selden Island, and Accokeek wares) that resembles the carved steatite pots in shape. Steatite-tempered pottery is represented by the Marcey Creek Plain wares with rough and unevenly smoothed exterior and interior surfaces (~1250 BCE; Early Woodlands) and Selden Island steatite-tempered wares with a cord-marked exterior (~1000 BCE). However, the description of steatite used by the archaeologist is poorly defined from a mineralogical viewpoint (i.e., Moore, 2002, pp. 264-265).

Steatite, by mineralogical definition is a compact, massive, fine-grained metamorphic rock consisting mainly of the mineral talc, but also variable amounts of carbonate minerals, chlorite, amphibole minerals (i.e., tremolite, anthophyllite, etc.), mica, and iron-chromium oxide minerals (Smith, 1961; Bates and Jackson, 1987). Alternatively, the term steatite is used simply to refer to talc, often restricted to gray-green or brown massive talc that can be easily carved into ornamental objects (Bates and Jackson, 1987).

The names steatite and soapstone are used interchangeably, but often steatite is used when the mineral composition is dominated by talc and soapstone when the mineral composition is talc + varying amounts of chlorite, amphibole (actinolite to tremolite), pyroxene, mica and opaque minerals (Bates and Jackson, 1987). This somewhat imprecise terminology has been modified in this study to provide a more quantitative evaluation of the talc abundance. In this study, steatite is used when the mineral composition is dominated by talc (>90 %) and soapstone when the mineral composition is talc (30 to 90%) + varying amounts of chlorite, amphibole (actinolite to tremolite), pyroxene, mica and opaque minerals.

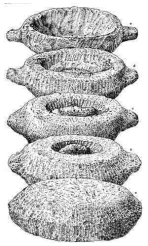


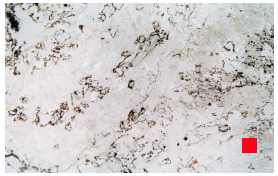
Figure 3. Diagram of steatite bowl construction. From Holmes (1897) Fifteenth Annual Report of the Bureau of Ethnology.

The texture of soapstone ranges from massive (like steatite) to schistose to interlaced fibrous or flaky (Bates and Jackson, 1987). This variation in texture is often controlled by the mineral composition (percentage of talc and other fibrous to platy minerals versus coarse-grained mineral components such as amphibole, pyroxene, or carbonate minerals.

Because steatite and soapstone are formed by the metamorphism of ultramafic igneous rocks (i.e., olivine, pyroxene or amphibole dominated), often soapstone is found in association with either the metamorphosed equivalents of these ultramafic rocks or fragments of the ultramafic protolith. These equivalents are often olivine (altered heavily)-, pyroxene- and amphibole-rich, but have low concentration of talc. The fibrous and platy minerals associated with them are often chlorite and actinolite, which can be misidentified as talc in hand sample. In addition, the more mafic of these ultramafic rocks should have plagioclase feldspar rather than alkali feldspar.

CERAMIC PETROLOGY – RESULTS AND OBSERVATIONS

A steatite vessel fragment (CXE4781-2470) from the site was used for comparison purposes for the aplastic inclusions found in proposed steatite-tempered ceramics. As can be observed in Figure 4B, this 'steatite' vessel would, by mineralogical definition, be more appropriately defined as 'soapstone' due to the proportional abundance of talc (< 90 modal %) and the larger amount of chlorite.



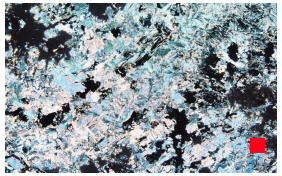


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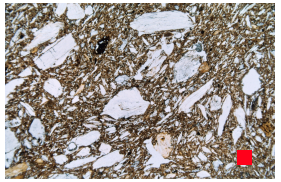
Figure 4A. **Steatite vessel CXE-2470**. 2.5 X magnification. Plane polarized (PP). In PP the talc (clear), chlorite (pale green) and actinolite (slightly higher relief) are difficult to separate. The intergrown mass of fine-grained, acicular and radiating crystals of talc and actinolite surrounds coarser chlorite crystals.

Figure 4B. **Steatite vessel CXE-2470**. 2.5 X magnification. Cross-polarized (XP). Talc (pastel color), chlorite (black to gray) and actinolite (greenish blue). Note the appearance is reasonably pristine and except for the small amount of iron oxide mineralization, there is little alteration.



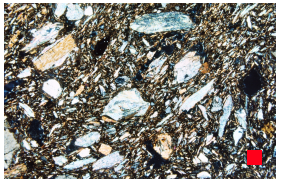


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Figure 5A. **Sherd 3373**. 2.5 X magnification. Plane polarized (PP). Numerous elongate to blocky steatite (talc + chlorite) rock fragments ranging from very coarse to medium particle size, as well as coarse-grained amphibole and muscovite mineral crystals.

Figure 5B. **Sherd 3373**. 2.5 X magnification. Cross-polarized (XP). Numerous elongate to blocky steatite (talc + chlorite) rock fragments ranging from very coarse to medium particle size (slightly bluish in this image), as well as coarse-grained amphibole (yellow elongate blocky mineral to left) and muscovite mineral (lathes in paste).

These sherds are characterized by very coarse-grained, angular rock fragments dominated by talc with chlorite and actinolite in subordinate amounts (Figures 5 and 6). Opaque minerals (iron oxides such as magnetite) are common. However, there are some variations within this group. Some of these steatite- or soapstone- tempered ceramics have very coarse fragment sizes and the proportion of paste to aplastic components is lower than in other sherds. All of the ceramic sherds have quartz and feldspar mineral and a quartz and quartz + feldspar rock fragment component that exists in a coarse to medium particle size. The feldspar in the mineral and rock fragments is predominately alkali feldspar. As would be expected, a small amount of opaque mineral fragments (blocky to subangular; ranging from 1 to 5% modal abundance) are found. Old mine/drilling reports for the Albemarle – Nelson counties 'soapstone' district designate a "rotten" or "decayed" soapstone in many of these bodies that is a result of chemical weathering. The mineral assemblage has a fair amount (~ 5 to 10%) of iron-oxide (magnetite, hematite) or iron-sulphide (pyrite) minerals. These would react more readily and result in some of the reddish-brown staining observed as well as produce weak acids that would react with the talc-bearing rock.

In addition, you would expect that the more easily weathered ultramafic rocks (these 'decomposed' zone) would produce a soil/clay material that would be utilized more readily than the harder (less resistant to erosion or weathering) zones (the mining literature differentiates among the 'soapstone' based upon hardness – providing different grades ranging from hard (serpentinite) to medium hard (regular grade) to soft).

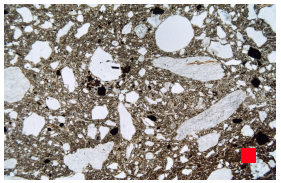

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Figure 6A. **Marcey Creek Sherd 2188**. 2.5 X magnification. Plane polarized (PP). Elongate to subangular steatite (talc + chlorite) rock fragments (right of center) with quartz and alkali feldspar mineral fragments, quartz and quartz + feldspar (alkali) rock fragments. Black, blocky particles are opaque minerals, probably magnetite.

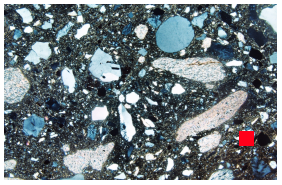

Figure 6B. **Marcey Creek Sherd 2188**. 2.5 X magnification. Cross-polarized (XP). Elongate to subangular steatite (talc + chlorite) rock fragments (right of center and left margin) have high interference colors (pastel) and the quartz and alkali feldspar mineral fragments reveal their polygranular texture (blocky fragment center).