# CHAPTER 3

# ARTIFACT ANALYSIS
# DEFINITIONS AND PROCEDURES

## INTRODUCTION

The data assemblage recovered from the four sites during the Southeastern Columbia Beltway Project included large and diverse quantities of lithic and ceramic artifacts, as well as a number of soil, charcoal, flotation, and bone samples. The lithic artifacts were sorted first by raw material and then by functional category. Ceramic artifacts were sorted by both paste and surface finish. Definitions for all lithic and ceramic categories employed in this report are included in this section. Detailed measurements of all hafted bifaces and other formal stone tools were then recorded, employing definitions found in Ahler (1971) and House and Wogaman (1978). Charcoal and flotation sample data were submitted for ethnobotanical analysis, and for absolute dating. The results of these analyses form separate sections in the text.

Summaries of all artifactual and specialized data are included in this volume, which is general and synthetic in orientation. Detailed provenience, sequence and distributional information for all lithic and ceramic artifacts are contained in a separate data appendix volume, together with detailed measurements for all of the formal stone tools recovered. The appendix volume also contains the primary data from the soils analysis, together with a listing of all proveniences with charcoal and bone remains. Copies of the appendix volume are on file with the field notes at the University of South Carolina and with the South Carolina Department of Highways and Public Transportation.

## LITHIC RAW MATERIAL IDENTIFICATION

Lithic artifacts were sorted into ten raw material categories prior to subsequent analysis: chert, ferruginous sandstone, quartz, quartzite, rhyolite, sandstone, schist, slate, steatite, and other (unidentifiable). Use of these categories was designed to generally complement identifications and classificatory terminology employed by other archeologists working in the central South Carolina area (e.g. House and Wogaman 1978:53-57, Anderson, Lee, and Parker 1979:10, Wogaman, House, and Goodyear 1976, House and Ballenger 1976:126-127). The use and application of lithic raw material terms by local archeologists, however, tend to vary somewhat, rendering

comparison difficult (Novick 1978). In order to begin developing a standardized terminology, 15 raw material samples were submitted for thin-sectioning, encompassing specimens classified in the present study as chert, slate, rhyolite, quartzite, ferruginous sandstone, and schist. Several samples each of chert and rhyolite were submitted for analysis, in an effort to determine whether significant variation occurred within apparently similar or identical raw materials. Several raw material categories were not examined, including quartz, steatite, sandstone, and other (unknown), primarily because of their readily identifiable nature or, in the case of the unknown materials, the small and largely nonartifactual nature of the sample. The identifications reported here are based on, and complement, recent archeological and petrographic analyses reported by Novick (1979) from the Fall Line along the Upper Lynches River, South Carolina, and by Weisenfluh (1978:135-139) from the central South Carolina Piedmont, as adopted by House and Wogaman (1978:53-57).

## LITHIC THIN SECTION ANALYSIS RESULTS

The 15 lithic specimens submitted for analysis included 14 artifacts recovered from aboriginal quarry areas or Fall Line sites, together with an apparently unworked sample of chert from an outcrop along the Wateree River in Sumter County. The examination included microscopic inspection of all specimens, with relevant petrologic descriptions prepared as necessary to identify each material. All megascopic and microscopic identifications were made by Dr. Gerald R. Baum of the Department of Geology at the College of Charleston, Charleston, South Carolina.

Chips of each raw material were taken and mounted on glass slides. The samples were prepared by cutting chips slightly smaller than the glass slide (25 x 45 mm). One face of the chip was polished by hand lapping on a glass plate using progressively finer grits (240 to 600). The polished chip was mounted on a glass slide using Hillquist thin section epoxy. The chip was ground to a thickness of 0.03 mm using an Ingram saw and grinder followed by hand lapping on a glass plate.

All of the color names and symbols are from the National Research Council Rock Color Chart. The appropriate geological terminology characterizing each raw material is underlined in the following section. The more concise, non-technical terms are used throughout this report, however, "quartzite" is employed rather than the more accurate "chalcedony cemented quartz arenite." Reference should be

made to the proper geological descriptions, however, in any comparative analyses with materials or assemblages from other sites or localities.

CHERT

Six samples of chert from five separate source areas were examined, including the Allendale quarry (38AL14), the Buyck's Bluff site (38CL17), an outcrop on the Lower Santee near Lake Marion (38CR33), and an outcrop on the Wateree in Sumter County. One piece of "black chert" from the Manning site, 38LX50, was also examined, and proved to be an igneous flow banded material. The diversity of samples investigated reflect the range in cherts encountered in the general Fall Line area, and similar materials were recovered from the Beltway sites. A primary research goal of the project was to more accurately identify these raw materials, and to determine if macro and microscopic criteria might be developed to separate artifacts from differing source areas.

Specimen 1 - Unheated Allendale County/Rice Quarry Chert Flake (38AL14)

Megascopic

Forams (?) in a very pale orange (10YR8/2) chert matrix. Presence of some chalcedony.

Microscopic

Fine to very fine crystalline, mostly very fine, chert replaced bryozoans, ostracods, foraminifera, ? echinoids, sponges and abraded pelecypods. Chalcedony infilling vug and interparticle porosity. Chalcedony bearing, chert replaced linestone (chalcedony bearing, chert replaced ? biosparrudite).

Specimen 2 - Thermally Altered Allendale County/Rice Quarry Chert Flake (38AL14)

(Same material as Specimen 1, heated for 20 hours at 360°C)

Megascopic

Fossils, principally pelecypods, in a grayish orange pink (5YR7/2) chert matrix. Chalcedony infilling vuggy porosity.

Microscopic

Very fine to fine crystalline, mostly very fine, chert replaced foraminifera, bryozoans, ?red algae, and abraded and bored pelecypods. Chalcedony principally infilling vug and interparticle porosity. Chalcedony bearing, chert replaced limestone (chalcedony bearing, chert replaced ?biosparrudite).

Specimen 3 - Chert Flake From an Outcrop Near Lake Marion, Clarendon County (38CR33)

Megascopic

Fossils, principally bryozoans, in a dark yellowish orange (10YR6/6) chert matrix. ?Oil in interparticle porosity.

Microscopic

Very fine to fine crystalline, mostly very fine, chert replaced bryozoans, foraminifera, abraded pelecypods and foraminifera. Chalcedony principally infilling vug and interparticle porosity. Some oil lining periphery of allochems and filling reduced interparticle porosity. Chalcedony bearing, chert replaced limestone (chalcedony bearing, chert replaced ?biosparrudite).

Specimen 4 - Chert Flake From an Outcrop (Buyck's Bluff) on the Congaree River, Calhoun County (38CL17)

Megascopic

Abraded molluscs, principally pelecypods, in a pale yellowish orange (10YR8/6) chert matrix.

Microscopic

Very fine to fine crystalline, mostly very fine, chert replaced gastropods, ?barnacles and abraded pelecypods. Chalcedony and mega-quartz infilling interparticle porosity. Very fine to coarse, detrital monocrystalline quartz. Chalcedony bearing, chert replaced limestone (chalcedony bearing, chert replaced ?biosparrudite).

Specimen 5 - Chert Nodule From an Outcrop on the Wateree River, Sumter County

Microscopic

Pelecypod, chert and chalcedony replaced limestone (pelecypod, chert, and chalcedony replaced biosparrudite).

Specimen 6 - "Black Chert" Retouched Flake, 38LX50.
Material Hypothesized as Originating in the
Ridge and Valley Physiographic Region, Tennessee

Megascopic

Black (N1) ?obsidian with vugs.

Microscopic

Calcite infilling vugs, Igneous flow banding.
Partially devitrified, felsic obsidian.

Discussion: Five of six chert samples examined (Specimens 1-5) exhibited roughly similar mega and microscopic composition, in spite of origins in different areas within the Coastal Plain. Alteration (heat treatment) did not produce a marked change in composition observable under visual light magnification (up to 200x). Separation of coastal South Carolina chert sources on an other than intuitive basis will require close examination of constituant fossil assemblages for marker species. As an aside, it should be noted that the "red" algae included in Specimen 2 does not refer to the oxidized reddish color of the sample produced by heating. Red refers to a group of reefal or intertidal algae belonging to Rhodophycophyta. Chert Specimens 1 through 5 are all characteristic of the Thanetian (upper Paleocene) Black Mingo Formation, which outcrops in an arcuate belt extending from Allendale to Georgetown Counties. Some of these specimens may obtain from the middle Eocene Santee Limestone; careful examination of the outcrop areas would be necessary to differentiate the two formations.

The most surprising result of the analysis was the identification of what has locally been called "black chert" as an igneous, partially devitrified felsic obsidian (Specimen 6). The sample displays igneous flow banding, as well as lacking sedimentary textures; it essentially consists of opal (amorphous, isotropic silica) which has been partially devitrified to quartz. A similar, usually greenish colored fine grained material from the Fall Line/Piedmont area of South Carolina has recently been identified by Novick (1978, 1979) as welded, vitric tuff. The present analysis, and that by Novick, indicates that at least some of the fine textured isotropic materials recovered from the Fall Line area and classified as extralocal cherts may actually be raw materials originating in the Piedmont. This is of considerable archeological

importance, since at least some specimens similar to the sample thin sectioned have been identified as of possible extralocal, Ridge and Valley Province origin (House and Ballenger 1976:127, Wogaman, House, and Goodyear 1976:24). Specific source areas for the black devitrified obsidians and welded tuffs remain to be determined.

FERRUGINOUS SANDSTONE

A single specimen of ferruginous sandstone was examined, from excavation Unit 33, Level 3 (40-60 cm), at Site 38LX5. The material was observed in moderate quantities at each of the four sites during the 1978 data recovery program, and a number of obvious feature/concentrations of the material were recognized. While aboriginal use of the material is virtually certain, specific functions remain to be determined. Probable use included hearth stones, abraders, and pigment (Anderson, Lee, and Parler 1979:68-69).

Specimen 7 - Ferruginous Sandstone Nodule (38LX5, EU33, Level 3).

Megascopic

Hematite cemented, poorly sorted, very coarse sand size to fine rudite size (mean very coarse sand size) quartz sand. Appears matrix supported. No observable fossils or sedimentary structures. Dark reddish brown (10R3/4).

Microscopic

Poorly sorted, angular to subangular, very coarse to coarse sand size, monocrystalline quartz. A few polycrystalline quartz grains. Hematite as cement. No textures indicating normal depositional processes (?formed in soil horizon). Hematite cemented quartz arenite.

Discussion: The specimen appears to reflect in situ cementation in a soil horizon, since it lacks sedimentary structures indicative of normal depositional processes. In the general project area two archeological sites, 38LX54 and 38LX62, are located on Fuguay loamy sand, a soil type that is characterized by numerous plinthite (ferruginous sandstone) nodules at depths of from 37 to 60 inches (Lawrence 1976:19). A local origin for this material, on or near one or more of the project sites appears probable. Aboriginal use may have been opportunistic and casual in nature, because of fairly

QUARTZITE

A flake of what is locally described as quartzite (cf Anderson, Lee, and Parker 1979:64, Wogaman, House and Goodyear 1976:30) was examined, from excavation Unit 7, Level 2 at 38LX64. The material was a distinct minority item on the project sites, suggesting possible importation from a considerable distance. Identification was particularly desired since this material is described by a variety of terms in the general region, including quartzite, sandstone (Brockington 1979:4), and orthoquartzite (House and Wogaman 1978:57).

Specimen 8 - Quartzite Flake (38LX64, EU7, Level 2)

Megascopic

Noncalcareous, fairly well sorted, chalcedony cemented monocrystalline quartz. Light brown (5YR6/4). No observable fossils or sedimentary structures.

Microscopic

Subangular to subrounded, coarse to very coarse, monocrystalline quartz. Partially cemented by chalcedony. Chalcedony cemented quartz arenite.

Discussion: The sample is characteristic of both the Upper Cretaceous Black Creek formation, as well as the Thanetian (upper Paleocene) Black Mingo Formation. The material is reported from the lower Santee River, in Berkeley and Georgetown Counties, where it is characterized by a considerable range in texture and fossiliferous inclusions. Its presence on the Beltway project sites may reflect the movement of peoples and/or materials up and down the Congaree-Santee river system.

RHYOLITE

Four samples of a material locally classified as rhyolite were submitted for thin-sectioning analysis, in an effort to produce a more specific identification. The material was recovered in moderate quantities in three of the four project sites; it was absent at 38LX106. The material is light gray or light green to grayish-pink in coloration, and was uniformly fine grained, with only occasional banded specimens. It may be confused, during

sorting, with argillite. The diversity in color was believed to represent a number of sources and possibly materials; limited experiments suggest that some of the pinkish gray material may be caused by accidental heating of other-colored material. Two fragments thin sectioned were from the Beltway project sites (Specimens 9 and 10), and two similar appearing fragments (Specimens 11 and 12) were materials identified as rhyolite from Chesterfield County. The latter two specimens were examined in an effort to see if a recent typology for Fall Line lithics developed for that area (Novick 1979) might have applicability to the Beltway assemblages.

Specimen 9 - Flow Banded Rhyolite Flake (38LX5 Grab Surface Collection, Unit 7)

Megascopic

Medium light gray (N6). Banded, dense.

Microscopic

Metamorphosed, devitrified, flow banded, chlorite and biotite bearing felsic flow.

Specimen 10 - Rhyolite(?) Flake (38LX5, EU6, Level 2)

Microscopic

Metamorphosed, silicified, chlorite, sericite and quartz bearing tuff.

Specimen 11 - Rhyolite Flake (38CT88, Surface)

Microscopic

Fine grained, hornfeld meta-volcanic.

Specimen 12 - Rhyolite (?) (38CT88, Surface)

Microscopic

Chlorite bearing quartz meta-siltite.

Discussion: The analysis confirmed the general impression that the various fine grained materials subsumed under the term rhyolite included a diversity of minerals, probably deriving from a number of source areas. All of the specimens were found to be metamorphic in nature, supporting an origin in either the Piedmont or the Blue Ridge Provinces. Some error may obtain when sorting rhyolite from slate, tuff, or argillite, unless obvious flow banding is present. The analysis



importance, since at least some specimens similar to the sample thin sectioned have been identified as of possible extralocal, Ridge and Valley Province origin (House and Ballenger 1976:127, Wogaman, House, and Goodyear 1976:24). Specific source areas for the black devitrified obsidians and welded tuffs remain to be determined.

FERRUGINOUS SANDSTONE

generally supports macroscopic sorting criteria developed by Novick (1979) for the Upper Lynches River area. The minerological diversity encountered suggests that resolving aboriginal Piedmont lithic resource procurement behavior may be extremely difficult because of a probable large number of sources. Furthermore, the analysis suggests that extensive, additional thin-sectioning and other forms of petrologic analysis will be necessary to help resolve current typological and terminological generalities or ambiguities.

GNEISS

A small lump of gneiss, described in the present report as schist, was submitted for analysis from 38LX64. The material was observed in an apparently unmodified state on all four of the project sites (including 38LX106), suggesting possible aboriginal procurement and use.

Megascopic

Quartz bearing. Gneissic texture.

Microscopic

Medium grained, quartz/hornblende/plagioclase gneiss.

Discussion: The possible function of this material is currently unknown; its occurrence in artifact concentrations argues for a cultural explanation for its presence on the sites.

SLATE

One flake of slate, also known locally as argillite (cf. House and Ballenger 1976:126-127) was submitted for analysis. Identification for this material was due, in part, to the interchangeable usage of the two terms. A specimen of the material from Chesterfield County was used because slate artifacts from the Beltway Project were either too small or weathered to thin section effectively, or else were formed into tools which were not selected for destruction by this sectioning. The material formed a small, minority item in the Beltway assemblage.

Specimen 14 - Slate (38CT88, Surface)

Microscopic

Epidote, sericite bearing meta-siltite.

Discussion: Use of the terms "slate" or "argillite" to describe local materials would appear justified, provided consistent sorting criteria are used and technical descriptions appended as necessary to accommodate observed variation.

Lithic Artifact Sorting Criteria

Lithic artifacts were sorted employing a functional typology identical in most respects to that developed by John House (1975; House and Ballenger 1976:89-93; House and Wogaman 1978:58-61). The emphasis in this typology is perceived artifact function, that is, categories were chosen that attempt to measure prehistoric site-use patterns. The lithic assemblage was sorted first by raw material and then by evidence for modification or use as a tool. Unmodified debitage was sorted by reduction stage in an effort to delimit manufacturing sequences and resource procurement systems. The relative proportion of initial to later stage reduction debris, for example, might suggest manufacture as opposed to maintenance or upkeep of tools, or alternatively, the relative proximity of raw material sources. The occurrence of one or a few tool types on a site or during a specific occupation might argue for a more specialized site use than if a diversity of forms were present. Examination of the probable function of tools found on a site, together with the nature of the associated debitage assemblage, should, it is assumed here, permit moderately reliable inferences as to how the area was used in the past.

LITHIC ARTIFACT CATEGORIES

FIRE-CRACKED ROCK (FCR)

Fragments of rock, usually quartz, which show evidence of having been fired and broken by heat. They are recognized by one or more of the following characteristics: angular chunks with jagged, irregular fractures (striking platforms and bulbs of percussion not present), reddened or blackened discoloration, and pot lids. Their presence is believed to indicate habitation; also the use of "hot rocks"

for cooking in earth ovens, stone boiling, or some similar practice. House (1975:69) suggests that at least some fire-cracked rock may represent the recycling of quarry waste and broken cobble tools for use in cooking activity. Much of the fire-cracked rock in this study is small (< 1.5 cm), fragmentary, and is sometimes difficult to separate from the unmodified "chunk" debitage category.

FERRUGINOUS SANDSTONE

Unmodified fragments of silicified sandstone, identified in the thin-sectioning analysis as hematite cemented quartz arenite. These specimens are typically dark red to reddish gray in color, have a high iron content, very coarse sand inclusions (up to 3 mm), and are nearly all pebble-sized (under 20 grams). Some may represent unrecognizable weathered abrader fragments. Ferruginous sandstone concretions exhibiting apparent intentional modification were categorized separately, under ferruginous sandstone abraders. The material may have served as an abrader in stone (core/tool edge preparation), bone (needle, and/or other tool) or wood (sanding or smoothing) working functions.

UNMODIFIED GRAVEL

Any unmodified, naturally occurring gravel. Most specimens average 10 to 20 mm in diameter and are waterworn. They are believed to be alluvial deposits, and are unlikely to reflect aboriginal behavior. Their presence in the floodplain sites in quantity suggests moderately heavy flooding of this zone in the past.

SPLIT GRAVEL

Any transversely split gravel or pebble fragment. These usually average 30 mm in diameter, and weigh under 10 grams. Cultural origin and association is questionable. They may represent discards from unsuccessful attempts to produce flakes by bipolar technique.

QUARRY WASTE

Large cortex-covered cobbles with (usually) poor conchoidal fracture and evidence for the removal of one to three flakes. They are believed to represent rejected raw materials found unsuitable for chipping, or material found acceptable but not utilized or reduced prior to loss or discard.

CORES

Masses of material, with (usually) good conchoidal fracture, from which a number of flakes have been detached. Included in this category are specimens with both prepared and unprepared striking platforms. Cores lack a prepared tool edge, or edge damage resulting from use as a tool.

CHUNKS

Small angular fragments believed to be produced during early reduction/manufacturing stages. Chunks "are distinguishable from cores by lack of scars of detached flakes...(and) from flakes by the lack of observable striking platforms, dorsal and ventral forces, and other characteristics of flakes" (House and Ballenger 1978:59).

PRIMARY DECORTICATION FLAKES

Primary decortication flakes exhibit cortical material over their entire dorsal surface, with no evidence for post-detachment flaking or previous flake removal. They are assumed to represent flakes struck during initial core reduction.

SECONDARY DECORTICATION FLAKES

Cortical flakes exhibiting one or more scars from previous flake removal on their dorsal surface, and no evidence for post-detachment flaking. Like primary decortication flakes, this debitage category is assumed to result during early raw material reduction/manufacturing activity.

INTERIOR FLAKES

Debitage with recognizable flake attributes and no adhering cortex, exclusive of flakes of bifacial retouch. These are assumed to reflect later stages of raw material reduction and stone tool manufacture.

FLAKES OF BIFACIAL RETOUCH (FBRs)

Flakes of bifacial retouch, or FBRs, are flat to slightly curved, thin, with (usually) feathered edges and steep platform angles commonly characterized by crushing

or grinding. The dorsal face is characterized by two or more flake scars running roughly parallel to the major axis, reflecting previous flake or FBR detachment. In the present study, only intact and proximal ends were employed to sort FBRs from other flakes; it is probable that a moderate percentage of distal fragments may have also come from FBRs. These artifacts, sometimes referred to as biface thinning flakes (House and Ballenger 1976:89-90), are believed to have been produced during the thinning or resharpening of bifaces (White 1963:23-27), although similar flake morphologies can obtain from unifacial retouch/reduction. The category is assumed to reflect late or final reduction/manufacturing activity.

RETOUCHED FLAKES

Flakes exhibiting evidence for unifacial tool use in the form of intentional or assumed functionally related wear retouch. Intentional retouch is characterized by deliberate flake removal along the artifact margin; wear retouch is characterized by a jagged, crushed, polished, or otherwise damaged margin. The category is exclusive of the formal tool categories described below. It is assumed that edge damage (wear retouch) occurred through use as a tool, such as in cutting functions, or the modification of bone, wood, or other materials (cf Tringham et al. 1974). Some wear damage may be accidentally or unintentionally produced, however, and some identification error is probable. The number of flakes and the number of tool edges were both recorded, by provenience, to better control for the extent of tool use. It is assumed that the category reflects somewhat more opportunistic and casual tool manufacture and use than the presence of elaborate (formal) unifacial tools.

DART POINTS

Symmetrical (typically, unless unevenly resharpened) pointed bifaces over 5 mm in thickness, with distinct basal modification for hafting. Darts were apparently multifunctional, primarily heavy-duty cutting and sawing tools (House 1975:60). Relatively few seem to have functioned solely as projectile points (Ahler 1971). In the South Carolina area the category is assumed to occur from the Paleo-Indian through the Early Woodland era, prior to the introduction of the bow and arrow. Evidence for resharpening in the form of asymmetrical blades, beveled edges, or serrations (cf Goodyear 1974) is frequently

distinct. The presence of these artifacts is assumed to reflect multitask operations, particularly those associated with hunting and subsequent kill reduction (butchering, hide preparation).

ARROW POINTS

Symmetrical pointed bifaces under 5 mm in maximum thickness, with (typically) distinct basal hafting modification, sharp tips, and low functional angles ( $< 45°$) on blade edges (cf House 1975:60). It is assumed that these actually functioned as projectile points, possibly associated with the use of the bow and arrow. In the South Carolina area a later Woodland, Mississippian, or Protohistoric temporal distribution is assumed. Some use in piercing and cutting functions may have occurred, although evidence for resharpening is typically absent.

ARROW AND DART TIPS AND BASES

Recognizable tips and bases of the categories described above. Thickness and edge angle are the only reliable sorting criteria in the case of tip fragments, and even these are of little use if only a small portion of the specimen is present. It is generally assumed that tips were lost or discarded at or near locations of tool use (assuming functionally related breakage), whereas basal fragments may occur in greater relative proportion at rehafting loci, which may be or include base camps. The ratio of tips to bases, therefore, may be a significant measure of site use. A high tip to base ratio at a site or component suggests an extractive (hunting/butchering) station, while a low tip to base ratio may indicate removal of basal fragments from the haft at a base camp (House 1975:60, Griffin 1974).

PREFORMS

Thick bifacially-worked ovates. These are asymmetrical unfinished biface tools which lack careful edge preparation. They were either discarded because of their unsuitability for further reduction, or they represent the unfinished, roughed-out blanks which would later have been completed. These specimens do not appear to have been used as cutting or multitask tools prior to discard.

OTHER BIFACES

Crude bifaces or biface fragments that do not appear to exhibit much more than irregular bifacial workmanship. These may include bifacial core fragments, crude preform fragments, or bifacial tools exclusive of the other formal categories as defined. The category is designed to accommodate all bifacial specimens not readily subsumed into other categories.

CHOPPERS

Large ( > 75 grams) bifacial or unifacial tools characterized by a moderately steep working edge angle (c 50-70°) and evidence for use in the form of battering or crushing. These are assumed to have functioned in heavy-duty cutting/butchering/ shredding operations.

STEEPLY CHIPPED UNIFACES

These artifacts have steep beveled working edges with a zone of retouch on one or more margins. The working edge usually ranges from 50 to 19° and is characterized by long narrow flake scars indicative of intentional retouch. It is assumed that these tools were used in the processing of bone or wood (cf Wilmsen 1970:71-72). This category includes hafted and unhafted end and side scrapers and hafted end scrapers with graver spurs.

BLADES

Systematically produced flakes which have a length to width ratio of at least two to one and, on the dorsal surface, the scars of two or more flakes previously removed parallel to the main axis (cf Bordes and Crabtree 1969). These tools are assumed to have been used in cutting functions, usually without further modification.

GRAVERS

Flakes with a small tip or spur formed either by chipping the edges away from either side or by the wearing of a corner into a projection. Several functions have been suggested. MacDonald (1968:100) states that gravers would

be suited for etching designs on bone and antler, or for the manufacture of eyed-needles as reported by Roberts (1941:79). Goodyear (1974:55) also suggests they would be useful in cutting animal skins.

SPOKESHAVES

Flakes with steep unifacial retouch forming a working edge which is markedly concave and may be considered suitable for the scraping or shaving of narrow convex surfaces (Goodyear 1974). Specimens may or may not be modified for hafting.

PIÈCES ESQUILLÉES

Rectangular flakes exhibiting "bipolar flaking from paired crushed and battered surfaces. Primary flakes driven from both faces by direct hard percussion exhibit extreme concentric ripples emanating from the point of percussion: on the edge opposite the primary platform, multiple short flakes are driven back on both faces, the result of the force reflected by a hard anvil. The irregularly battered, or primary, edge tends to become concave with extreme use while the evenly crushed or secondary edge usually maintains a receding straight profile determined by the shape of the surface which is acting as the anvil" (MacDonald 1968: 85-86). These objects are assumed to have functioned as wedges for splitting wood or bone; some accidental or unintentional formation may accrue from bipolar cobble splitting activity.

DENTICULATES

Flakes exhibiting two or more intentionally placed projections or serrations which may or may not be evenly spaced along the margin. These tools may have functioned as shredding tools.

HAMMERSTONES AND HAMMERSTONE FRAGMENTS

Rounded cobbles exhibiting one or more areas of battering or crushing, or fragments of cobbles with battered areas visible. Intact specimens usually weigh from 50 to several hundred grams. These tools are believed to have functioned primarily in stone reduction/manufacturing activity, with some specimens possibly used as plant processing crushing/mauling tools, or to splinter bone for marrow extraction or subsequent processing/bone working.

FERRUGINOUS SANDSTONE ABRADERS

Cobbles or fragments of ferruginous sandstone exhibiting one or more zones of apparent abrading. These areas may include grooves, circular depressions, or flat to slightly concave surfaces. Formation through use as an abrader, or by abrasion with some other, more resistant material, is inferred. Due to the weathered nature of most specimens, positive identifications cannot be made. These specimens are assumed to have been used in wood and bone smoothing operations, or may have been abraded for red pigment.

ABRADER FACETED COBBLES

Cobbles or fragments exhibiting one or more flattened or crushed areas indicative of intentional abrasion. This category includes all raw materials exclusive of ferruginous sandstone, with most specimens of igneous or metamorphic origin. These objects are assumed to have been used in abrading, smoothing, or polishing operations. Some identification error is possible, particularly with naturally flattened or smoothed specimens.

PITTED COBBLES

Cobbles or fragments with one or more battered or pecked concave depressions, usually centered on a flat or nearly flat face. These objects are assumed to have functioned in nut cracking or bipolar lithic reduction operations. Close examination of the pit areas may permit functional interpretations for individual specimens (cf Spears 1975, 1977.

GRINDING BASINS

Large cobbles or fragments with one or more flattened or slightly convave surfaces extending over appreicable proportions of one or more faces. These working surfaces may exhibit pecking, striations, or extreme smoothing when conpared with the remainder of the specimen. Grinding basins are assumed to have functioned in plant (seed or nut) processing operations, with possible alternative functions including pigment preparation and mixing .

## CERAMIC ARTIFACT SORTING PROCEDURES

Ceramic artifacts recovered from the Beltway sites included fragments of vessels, as well as fired clays possibly originating from aboriginal hearths or burned structures. Fired clay fragments were recovered from all four sites and were weighed by provenience unit. While some of the fired clay is unquestionably a byproduct of aboriginal site use, natural origin due to fire or possibly lightning cannot be ruled out for at least some of the assemblage. The incidence and distribution of fired clay was examined over each of the four sites, following the assumption that concentrations of this material might indicate former hearth or structure areas. The weight of fired clay recovered from each provenience is given, for each site, in the appendix volume.

Pottery fragments were common at 38LX5, rare at 38LX64 and 38LX82, and absent from 38LX106. Sherds were sorted first by paste and then by surface finish, in an effort to delimit manufacturing variability within the assemblages. Weight data were recorded for the entire pottery assemblage by provenience, with frequencies recorded for specific paste/finish combinations. This information, recorded over all proveniences from the project sites, is included in the separate appendix volume. Specific temporal categories described here are discussed with the artifact asemblages from each site.

## PASTE SORTING CRITERIA

The analysis of the ceramic fabric, or paste, has long been recognized as an extremely useful and productive tool in both classificatory and processual studies. The role of constituent paste elements in the development of taxonomic frameworks is hardly unknown in the Southeastern United States, where some of the most intensively studied ceramic materials have been delimited largely on the basis of criteria such as "fiber tempering" or "sherd tempering." Paste categories were delimited by the presence or absence of tempering material, and were established to permit rapid macroscopic sorting.

Five distinct pastes were recognized in the pottery assemblage from the Southeastern Columbia Beltway Project, including sand, coarse sand/grit, sand/red clay, micaceous, and white clay/grog tempered categories. The assemblage was sorted by these categories in an effort to delimit possible paste/finish and/or temporal (cultural) associations. No examples of fiber or shell-tempered pottery were observed, and no true "sherd" tempered ware, characterized by lumps of

ground up pottery, was noted. One paste category was caracterized by white clay/grog inclusions, although these do not appear to derive from reduced sherds.

SAND

Paste characterized by particles of medium sand, using the modified Atterberg grade scale (Butzer 1971:164) in which medium sand equals .06 - .2 mm. The particles are frequently so small that the paste may appear "temperless" to macroscopic visual examination, although a sizable proportion of sand may be present and even felt when rubbing the surface of the sherd. Fine sand (.002 - .02 mm) may be present in the paste, although the actual size range includes medium grade sand. The occasional occurrence of a larger sized inclusion in an otherwise temperless, or visually temperless, paste was considered accidental and not sufficient for the placement of a sherd in another paste category. Although described as a "sand tempered" paste, many of the inclusions may be natural, occurring in the exploited clay sources. South (1973) has established the term "nontempered" to describe pastes where the deliberate admixture of tempering elements is not apprent. This category was not employed in the present study, since recognizable "nontempered" sherds were not evident, and separation of the sand paste wares along tempered-nontempered lines was considered a highly subjective exercise, barring control for the nature of local clay sources (cf Trinkley 1973). The sand paste category includes all medium sand pastes exclusive of those characterized by micaceous inclusions or a pronounced red clay matrix.

COARSE SAND/GRIT

Paste characterized by the presence of numerous macroscopically visible inclusions of sand. Using the modified Atterberg grade scale as a reference, this would refer to pastes with coarse sand (.2 - 2.0 mm) and occasionally fine pebbles (2.0 - 6.0 mm) present. Unlike the sand paste category, very little fine sand was present in the matrix, which was nearly pure clay with a seemingly deliberate admixture of coarse sand. No evidence for intentional crushing of the inclusions was noted. The absence of fine sand makes this category easily separable from the sand tempered paste described above.

MICACEOUS INCLUSIONS

Sand or sand/red clay paste pottery with an unusually high incidence of small (.2 to 1.0 mm) micaceous inclusions. Other than the presence of the mica flakes, the paste is indistinguishable from the two sand tempered wares. The mica does not exhibit milling and appears to be a natural inclusion in the paste material.

SAND/RED CLAY

This paste is similar to the sand category described above, with the exception that the clay matrix is characterized by a pronounced light to dark reddish brown color (5YR5/3). Separation of this and the sand paste category was made to test for the possibility of different finish or cultural associations, suggesting the exploration of different clay sources.

WHITE CLAY/GROG INCLUSIONS

Paste characterized by the presence of lumps of white fired clay (grog). These lumps occasionally produce a rough lumpy appearance on one or both surfaces of a sherd, and are considerably different in color and texture than the surrounding paste. Other inclusions may be present, such as sand, but the presence of white clay lumps places a sherd in this category. The relationship of this paste category to South's (1973) Wilmington and Hanover "sherd tempered" wares remains uncertain; it is suggested that local "sherd" tempers may include nonsherd fired clay fragments, a common phenomenon elsewhere in the southeast (cf. Phillips 1970).

SURFACE FINISH SORTING CRITERIA

Twelve specific surface finish categories, and a category for nondiagnostic or unrecognizably finished sherds, were observed in the ceramic assemblages from the Beltway sites. The term finish refers to the condition of the sherd's exterior surface and includes treatment that might be regarded as either decorative or functional. The terminology used generally follows that established by Ford and Griffin (1939) and Shepard (1956).