PREHISTORIC POTTERY IN THE NORTHEASTERN GREAT BASIN: PROBLEMS IN THE CLASSIFICATION AND ARCHAEOLOGICAL INTERPRETATION OF UNDECORATED FREMONT AND SHOSHONI WARES

by

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The current interpretation of post-Archaic culture history in the northeastern Great Basin is that the Great Salt Lake regional variant of the Fremont culture arose from an Archaic base and is distinguished by two types of unpainted pottery, Great Salt Lake Gray and Promontory Gray. Seen as ethnically unrelated to the Fremont, the subsequent Shoshoni culture is marked by one type of unpainted pottery, Shoshoni Ware. These types are said to be characterized by distinct combinations of attributes, but close examination reveals that what these combinations are, and how they distinguish each type, has not been clearly described in the archaeological literature.

In this study, I re-analyze fragments of undecorated pottery previously classified as Great Salt Lake Gray,

Promontory Gray, and Shoshoni Ware. Through rigorous and replicable methods, five major attributes found in every sherd are examined: wall thickness, exterior surface color, temper material, temper size, and technique of vessel shaping.

This analysis showed that previous identifications of pottery attributes were partially or entirely erroneous. Every attribute measured demonstrated the same essential pattern: Great Salt Lake Gray had a wide range of variation, and Promontory Gray and Shoshoni Ware fell within this range. Further, except for one form of temper material, Promontory Gray and Shoshoni Ware shared the same attributes with one another. Ethnographic evidence is also presented that links late prehistoric pottery to that of the historic Shoshoni, confirming a single unbroken pottery tradition in the Great Salt Lake region.

I conclude that the evidence of this study does not support the concept of two unrelated pottery traditions (Fremont and Shoshoni) in the Great Salt Lake region. Based on this work, much of the traditionally conceived post-Archaic culture history of this region must be reevaluated.

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CHAPTER I

THE CLASSIFICATION AND INTERPRETATION OF UNDECORATED POTTERY FRAGMENTS IN THE GREAT SALT LAKE REGION

For over fifty years archaeologists in the northeastern Great Basin of western North America have used variation in pottery to distinguish post-Archaic cultural groups (Jennings 1978; D. Madsen 1975, 1986; Steward 1937). Current culture history in this region proposes that the Great Salt Lake variant of the Fremont culture arose from an Archaic base (Aikens 1970) and is distinguished by two kinds of unpainted pottery, Great Salt Lake Gray and Promontory Gray (R. Madsen 1977:19, 23). Seen as ethnically unrelated to the Fremont culture, the subsequent Shoshoni culture historically attested in the region is distinguished by a form of pottery thought to represent a tradition distinct from that of the Fremont (Jennings 1978:235-236; Rudy 1953:94-98).

Differing attributes are said to distinguish each of the Fremont types, both from one another and from Shoshoni Ware. However, in the archaeological literature, exactly which attributes are important and how they vary within types and between wares is not clearly specified. Many attributes are shared, and attributes are often misidentified or cannot be measured (cf., R. Madsen 1977; Rudy 1953; Steward 1936, 1937). Even when attributes are identified and measured correctly, there is difficulty in assessing their value in defining one ware or type over another, because individual attributes often are not exclusive to a ware or type. Furthermore, all individual attributes are weighted equally and no key (e.g., Hargrave 1932) is provided to organize pottery into separate wares or types based upon specified combinations of attributes. Hence, it appears that a closer examination of both the formal classificatory criteria and the regional pottery data is warranted.

The purpose of this research is fourfold: (1) to review traditional descriptions of major attributes said to define two types of Fremont Ware, Great Salt Lake Gray and Promontory Gray, and Shoshoni Ware; (2) to select clear, replicable methods of measuring these attributes; (3) to assess the reliability of measured attributes as discriminators by appropriate descriptive and comparative statistical analyses; and, (4) in light of these analyses, to determine whether the evidence supports the traditional separation of the two types of Fremont Ware from one another and from Shoshoni Ware. The broader culture-historical implications of the study's findings are also discussed.

The Study Area

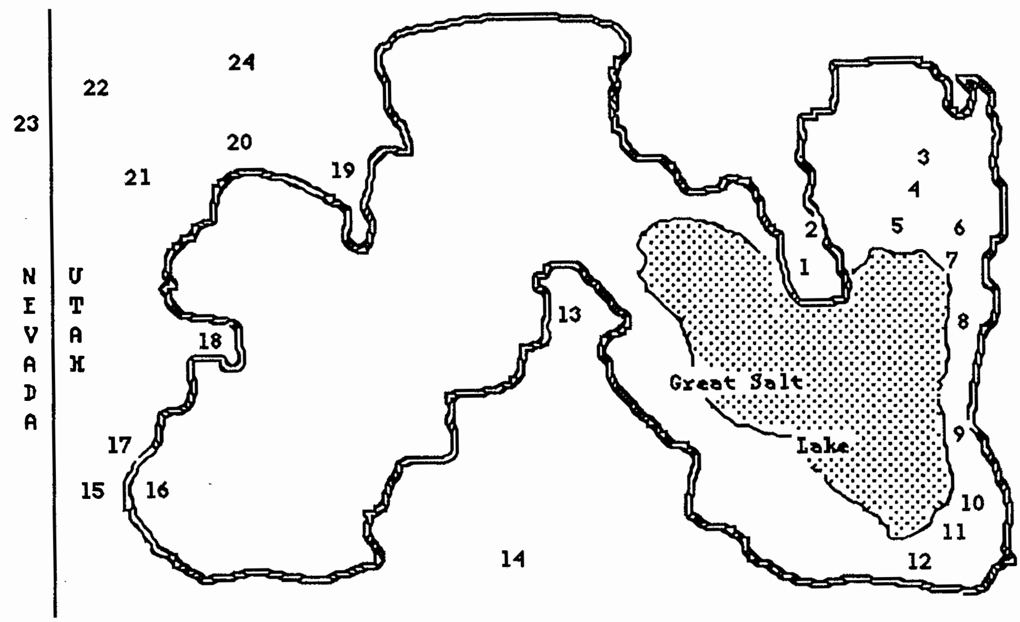
Pottery attributed to the Great Salt Lake variant of the

Fremont, or to Shoshoni culture, was first identified at archaeological sites along the shoreline of Gilbert Lake in northwest Utah (Rudy 1953; Steward 1937) (Map 1). Gilbert Lake represents the reduced Holocene extent of the once larger Pleistocene Lake Bonneville, and the Great Salt Lake is the modern remnant of both (Currey, Atwood, and Maeby 1984). Two main physiographic subareas are the Great Salt Lake or eastern subarea, and the Great Salt Lake Desert or western subarea (Stokes 1986:251-257).

The Eastern Subarea

The eastern subarea contains several permanent fresh water tributaries draining into the Great Salt Lake. The largest of these drainages in the north are the Weber and Bear rivers, while the major drainage in the south is the Jordan River (Korns 1951:136-137). Shallow, silty estuaries developed where the drainages and the Great Salt Lake met. The Great Salt Lake is fed by large amounts of stored winter water from the Wasatch Mountains to the east, and by prevalent summer rains, which combine to support a wide swath of productive lacustrine and riverine marshes along the eastern shore of the lake (D. Madsen 1982:208-210). Current data suggest considerable fluctuation in lake levels over the last two thousand years (the period of interest in this study), the lake at times falling below elevations of 4210

Map 1. Location of Archaeological Sites Containing Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware Examined in This Study



Legend:

1. 42BO1	13. 42BO385
2. 42BO5	14. 42TO504
3. 42BO109	15. 42TO13
4. 42BO107	16. 42TO457
5. 42BO110	17. 42TO20
6. 42BO55	18. 42TO106
7. 42BO120	19. 42BO36
8. 42WB34	20. 42BO365
9. 42WB297	21. 42BO301
10. 42SL1	22. 42BO268
11. 42TO64	23. 26EK8
12. 42TO5,6,10	24. 42BO559

Note: No Scale.

feet or above 4217 feet above sea level (Currey and James 1982:40-41).

Despite the size and productivity of the eastern subarea and the apparent antiquity of the lacustrine ecosystem (Currey and James 1982:39-46), no Archaic sites (or at least aceramic sites) with architectural features have been identified. However, a number of post-Archaic sites with architectural features (i.e. surface or semi-subterranean residential and/or storage structures) do occur and are generally referred to as mound sites.

The mound sites located along the eastern shoreline primarily occur below the 4215 foot elevation. According to early reports, such sites contained from 25 (Judd 1926:5) to 200 individual mounds (Steward 1933:9), with each mound presumably containing one or more structural features. The largest mounds are often described as permanent Fremont horticultural sites (Jennings 1978:173).

Smaller sites with architectural features are found at slightly higher elevations than the larger mound sites, though most are below elevations of 4220 feet. Often they occur on small knolls along fresh water creeks that drain into the marshy areas. Many of these smaller mound sites appear to have been seasonally occupied, marsh resource procurement areas (Simms et al. 1991).

Foothills overlooking the eastern portion of the Great Salt Lake contain a number of caves with evidence of human occupation. Most of these caves represent seasonally occupied camps associated with the procurement of a broad spectrum of plants and animals, including bison (Cummings 1913; D. Madsen 1983:99-101; Steward 1937:81, 118-19).

Historic Shoshoni groups are known to have occupied the entire eastern subarea (Steward 1938:Figure 12). Ethnographic data compiled from Native American informants described many material items, including pottery, which were related to bison, fishing, and waterfowl hunting (Steward 1943). However, published archaeological reports from this subarea rarely identify material items as Historic Shoshoni (Simms et al. 1991:14-19).

The Western Subarea

Today, the western subarea is distinguished by generally hyperarid conditions, as on the Bonneville Salt Flats. However, there is evidence that the Gilbert Lake levels varied considerably during the prehistoric period, resulting at times in shallow, brackish water extending over much of the study area (Currey, Atwood, and Mabey 1984). The presence of springs and bogs near many cave sites also suggests predictable water sources for the people and game who occupied the area.

Subsistence data from these caves indicate a fairly stable, mixed hunting-gathering economy (Aikens 1970; Dalley 1976; Jennings 1957). Several different species of indigenous plants occur naturally near the cave sites. According to ethnographic accounts (Chamberlain 1911; Steward 1938) and archaeological data, several of these species had economic importance, especially Allenrolfea occidentalis, which dominates the fill of Hogup and Danger caves (e.g., Aikens 1970; Jennings 1957).

Artifacts found at spring and bog sites in the uplands of the western subarea are related to short-term hunting and, perhaps, plant processing (Dalley 1976:159-161). Permanent creeks, including Grouse, Goose, and Dove creeks, flow along the valley floors and drain into the Great Salt Lake Desert (Stokes 1986:256). Historic Shoshoni villages reportedly occurred along permanent creeks in this region; however, their archaeological remains have not been identified (Dalley 1976:161; Steward 1938:Figure 12).

Certain variations in the archaeological record correspond to the two environmentally distinct subareas (Jennings 1957, 1978; Steward 1936, 1937). Such variation, especially differences in subsistence, architecture, and artifact classes, has been identified as the product of distinct cultural groups. Artifacts identified as Great Salt Lake Fremont or Promontory [Fremont] have been found at mound and cave sites in the well-watered eastern subarea, while artifacts identified as Great Salt Lake Fremont or Shoshoni co-occurred in the cave sites of the more arid western subarea. Pottery has been an especially crucial artifact class for distinguishing which cultural groups occupied the various types of sites in each subarea (summarized in Aikens 1966, 1970; Jennings 1957, 1978; Steward 1936, 1937). Therefore, it is important to understand how pottery in this region has been identified and classified.

The Role of Pottery in the Formation of Traditional Culture History

Pottery is an important artifact class, as it has been interpreted as an important marker of cultural group; however, the number of taxonomic categories of pottery, and the number of cultures perceived by archaeologists in the Great Salt Lake Region, and have changed through time (cf., Aikens 1966, 1970; Jennings 1957; Steward 1937).

Prior to 1970, three unrelated late prehistoric cultural groups were recognized: the Puebloid (as Steward named it; herein termed Fremont), the Promontory, and the Shoshoni. Each group was said to have made unrelated forms of pottery distinguished by separate taxonomic categories, termed "wares": thus, Great Salt Lake Gray [Fremont] Ware, Promontory Ware, and Shoshoni Ware (Aikens 1966; Rudy 1953; Steward:1936, 1937). After 1970, Promontory Culture was redefined as a variant of the Great Salt Lake Fremont (Aikens 1970), and the pottery reclassified as a type of Fremont Ware and renamed Promontory Gray (R. Madsen 1977:23-24). This left two cultural groups, the Fremont and the Shoshoni, and two taxonomic categories of pottery, Fremont Ware and Shoshoni ware.

The distribution of Promontory and Shoshoni wares corresponds largely to the two major physiographic subareas just described: Promontory Ware is spatially limited to the eastern subarea and Shoshoni Ware to the western. On the other hand, Great Salt Lake Gray is found throughout both subareas. The unique spatial separation of Promontory and Shoshoni pottery, but the association of both with Great Salt Lake Gray, can best be understood in an historical perspective.

The Eastern Subarea

The first excavations and surveys conducted in this region were along the Great Salt Lake shoreline. Both large mound sites (Judd 1926) and cave sites (Cummings 1913) were explored but detailed analyses of artifacts were not reported. Steward conducted the first extensive survey of the eastern subarea during the summers of 1930 and 1931. He reopened and expanded Judd's 1916 excavation of a large mound site, the Willard Mounds, and Cummings' 1912 excavation at Promontory 1 Cave. Steward also surveyed, and in some cases excavated, several other cave and mound sites around the Great Salt Lake, including the Grantsville and Plains City mounds and Black Rock and Lakeside caves.

At large mound sites, such as Grantville, Plains City, and Willard Mounds, Steward found evidence of horticulture, house styles, and pottery which he thought were related to Southwestern cultures (1933; 1936). Specifically, painted pottery from Grantsville Mounds appeared stylistically similar to the Basketmaker and Pueblo I designs of the San Juan area, and the accompanying plain gray pottery, with its generally smooth surfaces and fine-grained clay and temper materials, was also seen as related to the Southwest (Steward 1936:16). Steward named this plain pottery Great Salt Lake Gray and argued that it was related to a common grayware tradition found at all large mound sites throughout western Utah (1936:5-6).

Steward found the material remains at cave sites to be quite different from those of the large mound sites. Subsistence at cave sites was related to hunting, especially bison, and of particular importance was the absence of painted pottery. Pottery found in the caves was described as mostly black in color, with coarse calcite or quartz temper (Steward 1937:42).

Based upon differences at cave versus large mound sites, Steward distinguished two unrelated cultures: the Fremont and the Promontory (Steward 1936; 1937). He used the term "ware" to denote overall differences in the two forms of pottery; thus, Fremont Ware and Promontory Ware (Steward 1936, 1937). Steward proposed the Promontory to be either early Shoshoni or derived from another non-Fremont group, possibly a northern Plains people (Steward 1937:42, 44). Lacking a comparative collection, Steward relied on published descriptions of Woodland/Plains and Shoshoni pottery. From these descriptions, Steward concluded that pottery from cave sites along the Great Salt Lake was not early Shoshoni (1938:5), but probably an introduction from the Plains or perhaps even by the Navajo on their way south from a Canadian homeland (1937:44).

Promontory Gray and Great Salt Lake Gray are both reported at small mound sites, many of which were excavated after 1970 (Fry and Dalley 1979; Shields and Dalley 1978; Simms et al. 1991). Small mound sites are generally located in what were once marsh settings, and subsistence activities are the same as Steward found at cave sites: hunting of bison and large waterfowl and marsh plant procurement, with agriculture missing or appearing as only a minor component (Aikens 1966, 1967; Fry and Dalley 1979; Shields and Dalley 1978; Simms et al. 1991). Great Salt Lake Gray and Promontory Gray are always found at small mound sites, and Promontory Gray always occurs in association with Great Salt Lake Gray (Aikens 1966:Tables 3, 8; Fry and Dalley 1979:Tables 2, 3; Shields and Dalley 1978:Table 2).

The Western Subarea

Archaeological investigations in the western subarea have emphasized survey and excavations of caves and sites near bogs and springs. Evidence indicates that subsistence activities at these sites were similar to those at cave sites in the eastern subarea: hunting and gathering, not agriculture (Jennings 1957). Noting this similarity in both subareas, Jennings observed that artifacts (except pottery) elsewhere classified as the Promontory, especially those from the Promontory and Black Rock caves, were not only similar to those found at Danger Cave but occurred in the same sequence and were probably manifestations of the same culture (1957:180-181, 270). Even though other artifacts from Danger Cave were seen as similar to those of the Promontory culture, the pottery from Danger Cave lacked the calcite tempering material and the rim shapes characteristic of Promontory Ware. Thus, only types of Fremont Ware and Shoshoni Ware were identified at Danger Cave (Jennings 1957:180-181).

In 1970, stratigraphic evidence that the Promontory culture was probably a variant of the Great Salt Lake Fremont was reported from the excavations at Hogup Cave (Aikens 1970). Projectile point types overlapped in a continuous fashion throughout all four sequent cultural units (or phases) represented in the cave. Also, two important artifact classes diagnostic of Fremont culture--three-piece moccasins and one-rod-coiled basketry--were present in lower, aceramic Unit One. Pottery occurred with the same types of points, moccasins, and basketry in the later Unit Three. Also present in Unit Three were artifacts identified in the eastern subarea with the Promontory culture, particularly basketry, incised stones, and pottery. Aikens concluded that the occurrence of Fremont and Promontory artifact assemblages from Unit III supported the identification of the Promontory Culture as a distinct variation of the Fremont. However, he did not revise the formal pottery taxonomy and continued to employ the taxon of Promontory Ware in the report (Aikens 1970).

Hogup Cave marks the westernmost limit of sherds identified as Promontory Gray and, except for a few sherds (N = 10, not currently available for analysis) from Bear River 3 (Shields and Dalley 1978:Table 2), the easternmost limit of sherds identified as Shoshoni Ware. In both subareas, Promontory Gray and Shoshoni Ware are found in association with Great Salt Lake Gray: at small mound sites in the eastern subarea, Great Salt Lake Gray always occurs--in the same features--with Promontory Gray. In the western subarea, except for 9 sherds, Shoshoni Ware always occurs in the same features with Fremont types, mostly Great Salt Lake Gray (Aikens 1970:Table 3; Berry 1976:Table 24; Dalley 1976:Tables 9, 18; Jennings 1957:Table 16). The spatial delimitation of Promontory Gray to the eastern subarea and

Shoshoni Ware to the western has not been abrogated in subsequent reports (e.g., D. Madsen 1986:206-214).

Development of Pottery Wares and Types

Pottery is grouped into two levels of classificatory categories: wares and types. Wares correspond to cultural divisions: Fremont Ware and Shoshoni Ware (Steward 1936:5-6). Variations within wares are termed "types", and thus represent subpopulations of each culture. All wares and types are defined by individual attributes, such as temper, color, and decoration, which are detailed in several summary sources (cf., R. Madsen 1977; Rudy 1953; Steward 1936, 1937). This section will review major pottery typologies and the attributes said to distinguish Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware in the Great Salt Lake region.

Julian Steward

Steward (1936) was the first to attempt both a description and a classification of undecorated pottery in western Utah. While not designed to be a comprehensive statement, his account purported to reflect unrelated cultural groups occupying this area, who made distinctive pottery. These cultures occurred in a generalized temporal sequence: the Fremont were the first group to make pottery in the region and were either earlier than (Steward 1936:18) or contemporaneous with (Steward 1937:49) the Promontory culture. Fremont and Promontory groups were both earlier than Shoshonean groups (Steward 1937:43-4).

Steward described the earliest Fremont pottery as a uniform, Basket Maker III-like pottery tradition. He referred to it as Utility Ware. Utility Ware was distributed throughout western Utah, from the Sevier Desert in the south to the Great Salt Lake Desert in the north. He noted a similarity throughout the area in style, and said that such pottery was "uniformly dark gray, differing more in shape and finish than in paste or color" (Steward 1936:5,6). He noted that variations in Utility Ware corresponded to two discrete spatial locations: Sevier Gray came from the Sevier Desert region, and Great Salt Lake Gray came from the Great Salt Lake region (Steward 1936:5-6). Steward emphasized the taxonomic relatedness of all Fremont pottery in western Utah but did not separate the pottery into further taxonomic divisions, such as series or types (e.g., Hargrave 1932 or Gladwin 1930). He referred to all Great Salt Lake Gray as "a ware within Utility Ware" (Steward:1936:5-6, 10).

Steward also identified two other forms of pottery in the Great Salt Lake region, which he thought were unrelated to Great Salt Lake Gray Ware (1936:18). He first termed one group of pottery Promontory Black (Steward 1936:18), but later renamed it Promontory Ware (Steward 1937:42). A third ware in the Great Salt Lake region, unrelated either to Great

Salt Lake Gray Ware or Promontory Ware, was classified by Steward as Shoshoni Ware (1937:43). He did not divide Promontory Ware and Shoshoni Ware into types.

Steward described attributes distinguishing Great Salt Lake Gray Ware from the other two wares. Attributes considered distinctive of Great Salt Lake Gray were medium fine, sandy, friable clay and fine quartz temper and an undulating surface finish "as if the paddle and anvil had been used though there is nothing to prove this" (Steward 1936:6). Incised, punched, and coffee-bean appliqued exterior decoration was seen as distinctive, as was blackened bottoms of vessels, which were frequently burned and somewhat disintegrated from use in cooking (Steward 1936:6-7). Steward (1936:8) based this description of Great Salt Lake Gray on sherds collected at two large mound sites in the study area, the Willard and Grantsville mounds.

Steward described attributes distinguishing Promontory Ware as its coarse white temper material and a stick-smoothed surface finish. In the initial description, Steward (1936:18) noted that Promontory pottery had rough and irregular surfaces, but he did not note this attribute in later publications (e.g., 1937:42-48). Fingernail-incised and punched exterior decorations were distinctive, while the blackened exteriors, the great preponderance of which are soot-encrusted, Steward interpreted as the result of use in cooking (1937:42,44). Rims were distinctive, as they had thickened and incised decoration on the lips.

While thickened lips in Promontory Ware and coffee-bean applique in Great Salt Lake Gray Ware are distinctive, it is difficult to differentiate undecorated body sherds using Steward's attribute list because most attributes are shared by both Great Salt Lake Gray Ware and Promontory Ware. For example, Steward identified the "coarse white temper material" in Promontory Ware pottery as quartz (1936:18), but Great Salt Lake Gray Ware was also described as having fine quartz temper (1936:6). Thus, both wares shared the same form, though different size, of temper materials. Other attributes shared by Promontory Ware and Great Salt Lake Gray Ware were decorative elements, undulating surface finish (Steward 1936:6,18), and the function of cooking (Steward 1936:6; 1937:44).

Steward also noted that Shoshoni pottery sherds collected and typed by Harrington (1927:271) from southern Nevada "resemble the Promontory Ware in general texture of paste, type of temper, somewhat in finish, and having 'fingernail' decoration, but are different in their failure to have the characteristically widened lip with punched or incised decoration and lack the coarse quartz temper" (Steward 1937:43-44). Thus, based upon Steward's description of specific attributes, body sherds of Great Salt Lake Gray Ware could be distinguished from Promontory Ware mostly by temper size. Shoshoni Ware could be distinguished from Promontory Ware and Great Salt Lake Gray Ware by its lack of quartz temper.

Three points weaken Steward's argument for separating Great Salt Lake Gray, Promontory, and Shoshoni wares. First, Steward relied on published descriptions of Shoshoni pottery (e.g., Harrington 1927; Schellbach 1930). Second, Steward did not study historic Shoshonean pottery until after many of his archaeological reports were published. The archaeological field work was conducted in 1930-31 and published in 1936 and 1937, while the ethnographic field work was conducted in 1936 and published in 1943. He never published a re-evaluation of his 1936-37 attribute lists, which distinguished prehistoric Promontory Ware from historic Shoshoni pottery. Finally, Steward listed all attributes but did not weight attributes one over another. As some attributes were shared by all three kinds of pottery, it is unclear what criteria were employed to classify any particular sherd.

Jack Rudy

Rudy (1953) continued Steward's tripartite terminology of Fremont, Promontory and Shoshoni cultures and continued Steward's term "ware" to denote that the pottery produced by each cultural group was distinctive and unrelated to any other group. Further, Rudy continued Steward's method of weighting all attributes equally, though he expanded attribute identification. For example, Rudy was the first to have temper materials in Shoshoni Ware and Great Salt Lake Gray identified mineralogically.

Unfortunately, the report submitted by geologist Charles Hunt was not always evaluated completely by Rudy (1953:100-102). The temper material in Great Salt Lake Gray sherds, identified by Hunt as rhyolite, was reported by Rudy as "volcanic glass and small amounts of quartz" (1953:81). The temper material in Promontory Ware was not mineralogically identified, though Rudy stated that the "coarse, white temper" material identified by Steward was calcite. Rudy also stated that both calcite and quartz sand were used as tempering material (1953:93-94), apparently meaning that within a single sherd, Promontory Ware contained both these rock types.

Temper material in one sherd of Shoshoni Ware was identified by Hunt as a coarse granitic rock (Rudy 1953:101). It is important to note that R.F. Heizer identified and supplied the studied sherd, which was collected near Pilot Springs in eastern Nevada (Utah Museum of Natural History Accession Number 14901). Rudy accepted Heizer's typing of the pottery as Shoshoni and never questioned whether Heizer's identification was correct. Rudy, therefore, simply described characteristics of a pottery which had already been categorized as Shoshoni.

Rudy said that Promontory Ware, Great Salt Lake Gray, and Shoshoni Ware all had undulating surfaces, and that other evidence indicated Great Salt Lake Gray and Shoshoni Ware were shaped by coiling (1953:81,93-94). Though unsure of the method of construction for Promontory Ware (1953:94), he discounted a paddle-and-anvil method of construction because the depressions on the interior of Promontory sherds were not very uniform. To Rudy, the undulating surfaces appeared to be the "result of the hand held inside the vessel while the exterior was scraped with a stick" (1953:94). He identified Great Salt Lake Gray sherds as coil-constructed, but did not describe his criteria for determining this technique. The undulating surfaces of Great Salt Lake Gray were accounted for as being the result of "careless handling during scraping while the vessel was still in a plastic state" (Rudy 1953:80). Shoshoni Ware was described as having two methods of construction, coiling and hand molding, though Rudy noted that some sherds suggested the use of paddle-and-anvil shaping. Rudy further noted that Promontory Ware, Great Salt Lake Gray, and Shoshonean Ware are indistinguishable by decoration, as all three share punching and incising (1953:80-83, 93-94). However, exclusive use of temper material for each pottery group was noted: granitic rock is found in Shoshonean Ware, calcite and quartz in Promontory Ware, and rhyolitic rock in Great Salt Lake Gray (Rudy 1953:93, 100-102). Because Rudy offered no criteria to determine which technique of construction was used on any specific sherd, temper material appears to be the key attribute in separating Great Salt Lake Gray, Promontory Ware, and Shoshonean Ware.

Analysis of Individual Attributes

To further investigate what distinguishes Promontory Gray from Great Salt Lake Gray, two attributes may be examined in detail: the technique of vessel shaping and firing temperatures. Aikens (1966:33) examined the technique of shaping in Promontory Gray and concluded that the undulating surfaces were not the result of coiling but of paddle-and-anvil construction, reminiscent of a Plains-Woodland pottery tradition. Even when other attributes were shared, the technique of shaping could thus distinguish the two pottery groups. Aikens did not describe how this attribute was identified, however, other than noting that the undulating surface of Promontory Ware was "similar in appearance to that of other wares known to have been made by the paddle-and-anvil technique" (1966:33). All subsequent reports have continued to identify Promontory pottery as shaped by paddle-and-anvil (Forsyth 1986; D. Madsen 1979:98; Shields and Dalley 1978:76).

D. Madsen (1979:97) agreed with Aikens that the separation of Great Salt Lake Gray and Promontory Gray was justified, by examining another attribute, the difference in firing temperatures. Specifically, the firing temperatures of quartz-tempered Great Salt Lake Gray differed significantly from those of calcite-tempered Promontory Gray. Calcite-tempered sherds had lower firing temperatures than quartz-tempered sherds, and D. Madsen concluded that lower firing temperatures, along with the paddle-and-anvil method of shaping, were evidence that Promontory Gray was derived from a separate ceramic tradition than Great Salt Lake Gray (1979:98).

Rex Madsen

The most recent classification of Fremont pottery was made by R. Madsen. No doubt because of Aikens' conclusion about the relationship of Promontory and Fremont artifact classes at Hogup Cave, R. Madsen eliminated the separate ware category for Promontory pottery and renamed it Promontory Gray. Though he reclassified Promontory Gray as one of ten Fremont pottery types, he still considered it to be from a different pottery tradition than Great Salt Lake Gray, because the technique of paddle-and-anvil construction may have originated in the Northwest Plains. Promontory Gray was distinguished from Great Salt Lake Gray by the presence of calcite _or_ quartz temper, apparently meaning that within a single sherd, Promontory Gray contained only one of these rock types. Other major attributes of Promontory Gray were medium gray to black coloring and the unique paddle-and-anvil shaping method (R. Madsen 1977:v-vi, 19-26).

The criteria distinguishing Great Salt Lake Gray from Promontory Gray are difficult to determine because the listed attributes are weighted equally, and because some attributes are shared between the two types. For example, the range of temper size overlaps. Also, both types share quartz temper material and have the same ancillary minerals of feldspar, horneblende, mica, and rounded sand particles. Decorative elements which are incised or punched are also shared (R. Madsen 1977:19-26). In R. Madsen's descriptions, it is only calcite temper and paddle-and-anvil shaping that distinguish Promontory Gray from Great Salt Lake Gray.

Assessing the Efficacy of Traditional Descriptions

In northwestern Utah, attributes said to be distinctive are used to separate pottery into the Fremont Ware types, Great Salt Lake Gray and Promontory Gray. These are said to be unrelated to Shoshoni Ware. But what the attributes are and how they vary is mostly unclear in the three typologies discussed in this chapter.

Some attributes described in formal descriptions as distinctive of Fremont or Shoshoni Ware were not considered in this study for reasons outlined below. In particular, rim shapes and some forms of decoration are said to be unique, but how these distinctions were used to classify pottery at individual sites is unclear as the attributes are either not present, or actual numbers are not listed, or they are too poorly described in the site reports to assess their classificatory value. For example, formal descriptions say that both Shoshoni Ware and Promontory Gray have either straight or out-curved rims (Rudy 1953:93-4), but Great Salt Lake Gray is said to have only out-curved rims (Rudy 1953:85). Thus, straight rims could distinguish Shoshoni Ware from Great Salt Lake Gray but not from Promontory Gray. However, the actual number of straight rims found in the study area is difficult to assess. Straight rims are recorded for Shoshoni Ware at Hogup Cave, but the frequency of occurrence is not listed (Aikens 1970:32). Two rim sherds are classified as Shoshoni Ware at Swallow Shelter but it is unclear if these are straight rims, as they are described only as "lacking a shoulder" (Dalley 1976:56). The remaining three sites either had no Shoshoni Ware rims identified (Berry 1976:119; Dalley 1976:88) or lack a description of rim shape altogether (Jennings 1957:180-1).

Similarly, formal descriptions say the two wares shared stylistic decoration by incising, but Shoshoni Ware lacks the coffee-bean applique found in Great Salt Lake Gray and Promontory Gray (R. Madsen 1977:19-24; Rudy 1953:94). However, among the six cave sites containing Shoshoni Ware and Fremont types, only one sherd with coffee-bean applique was found (Aikens 1970:32). Further, coffee-bean applique occurs with fingernail impressions on Great Salt Lake Gray (D. Madsen 1979:90). Thus, these attributes appear to be of little value as taxonomic devices.

In the end, it is unclear how individual excavators resolved the issue of separating pottery into wares and types based upon formal descriptions; many of the attributes are shared and other attributes, though distinctive, are either too few in numbers or are missing altogether. However, many individual excavators noted that pottery from their sites conformed closely to the formal descriptions, and all citeed formal descriptions as having formed the basis for how they separated pottery into wares and types (Aikens 1966:26, 1970:31; Berry 1976:119; Dalley 1976:54, 56, 88; Jennings 1957:181; D. Madsen 1979:80-81).

Summary

Pottery is an important artifact class in the study area and is used to define temporal and significant cultural changes (cf., Aikens 1970; Jennings 1957, 1978; D. Madsen 1986; Steward 1937). However, the three existing pottery typologies share two major flaws which limit their usefulness: first, individual attributes said to distinguish wares or types are often shared, are unclear or are even misidentified. Second, and more important, the format for the three typologies is the same: a list of equally-weighted attributes with no taxonomic key provided to determine which attributes are diagnostic criteria in typological separation. Thus, it is difficult to assess the value of these typologies and this difficulty suggests that such classificatory separation may be unjustified because it is unreplicable. To determine whether previous type assignment can be replicated by criteria listed in previous typologies, the following chapter will independently identify and measure major attributes said to distinguish Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware.

CHAPTER II

DESCRIBING AND DEFINING ATTRIBUTES OF FREMONT AND SHOSHONI POTTERY

In this chapter I analyze major attributes described in formal typologies as important in separating pottery into wares and types. The aim of this analysis is to assess differences and similarities within and between pottery previously classified as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware. Only attributes found in every sherd at every site will be analyzed; thus, such attributes as base and rim form are not considered. (Doran and Hodson 1975:42-43). I examine vessel wall thickness and exterior surface color from a total of 1,923 sherds found at 10 archaeological sites throughout the eastern and western subareas. Additional attributes of temper material, temper size, and technique of shaping are identified and measured from petrographic analysis of 106 sherds, obtained from a total of 24 archaeological sites in the eastern and western subareas (Map 1). Provenience of all studied materials is given in Appendix B.

Methods of analysis and procedures developed to clarify and correctly identify each attribute are presented and the results compared with both formal descriptions and variations found by individual excavators. Appropriate descriptive and statistical analyses are then performed on measured attributes to determine whether knowing any correctly identified attribute, or combination of attributes, explains how the sherd was classified.

Attributes and Analysis

While many attributes are listed in formal typologies and other published discussions, the actual separation of pottery into types and wares appears to be based upon only a few attributes. The five attributes most commonly used to separate pottery into wares and types in formal descriptions are wall thickness, exterior surface color, type of temper materials, size of temper particles, and technique of shaping (cf., R. Madsen 1977; Rudy 1953). Formal descriptions of the range of variation in each of the five attributes will emphasize those of Rudy (1953) and R. Madsen (1977).

In the following section I present replicable methods of identifying and measuring each of these five attributes and compare the results with formal typological descriptions. I then use appropriate univariate descriptive and comparative statistical tests to determine the relationship between individual attributes and previous type assignment. Finally, I examine several attributes together and use appropriate multivariate descriptive and comparative statistical tests to ascertain the relationship of combined attributes to previous type assignment.

Methods of Attribute Analyses

Wall thickness was measured for 1,923 sherds from 16 sites. Because walls are generally thicker at the base of a vessel than at the rim (Rice 1987:227), only body sherds were measured in this study. Measurements were taken at several points on each sherd: edges were measured with a straight ruler and interior points with calipers. A mean wall thickness value for each sherd was calculated from these several measurements.

The color described in this study is always the exterior surface color of the vessel. I presume all other analysts have used the same convention, though this is not clearly stated in any typology. I assume that the exterior surface color is the one commonly described because whenever other parts of a sherd were discussed, such as the core or interior surface, analysts explicitly specified these areas (cf., R. Madsen 1977:19, 23; Rudy 1953:81, 93, 94). In my study, exterior sherd color was measured by comparison with the Geological Society of America Rock Color Chart, which is based on the Munsell Soil Color Chart (1975). Where surface colors were variable, the single dominant color was recorded.

Attributes of temper type, temper size, and technique of shaping have also been used to distinguish Great Salt Lake Gray, Promontory Gray and Shoshoni Ware. However, when I macroscopically examined the 1,923 sherds for these attributes I was often unable to distinguish such differences, especially in the geologic nature of the temper. In most cases I was also unable to determine evidence of shaping techniques, particularly whether coiling or paddle-and-anvil technique was used. I concluded that either there were no systematic differences, or that such differences could be ascertained only through microscopic study. Therefore, I selected 106 sherds from these 24 archaeological sites (Appendix C) for detailed petrographic analysis in order to identify temper materials, size of temper particles, and technique of shaping.

Standard petrographic analysis (Kerr 1977) was used to determine the geological form of temper material for each of the 106 selected pottery sherds. First, a thin slice of each sherd was taken and fixed to a glass slide. Second, the petrogenesis of the temper material was determined. Finally, accessory minerals and their relationship to the clay and temper materials were noted (Appendix C).

The size of the temper particles was measured in each of the 106 sherds examined by petrographic analysis. Because the range of particle size has been said to be important in distinguishing types and wares, the length (i.e., the maximum dimension) of both the largest and the smallest temper particles in each thin section slide was measured.

Finally, this study uses the criterion developed by Shepard (1956) and Rye (1981) for identifying techniques of vessel shaping. They proposed that vessels shaped by coiling will have a specific orientation of temper and clay particles which can be seen on the thin section slide. This criteria is used to distinguish the technique of paddle-and-anvil construction, said to differentiate Promontory Gray (R. Madsen 1977:23), from Great Salt Lake Gray and Shoshoni Ware, both said to be coil-constructed (R. Madsen 1977:19; Rudy 1953:94).

Statistical Analyses

Of the five attributes examined in this chapter, three yield nominal scale data: exterior surface color, temper material, and technique of shaping. Two attributes provide interval scale data: wall thickness and temper size. Formal descriptions for each of the five attributes are summarized and procedures described for how each attributes was to be measured. Finally, the frequency and dispersion of each measured attribute are graphically represented.

Descriptive statistical analyses (StatView 512+ 1986) are then preformed on the measured data to ascertain whether typological separation is statistically defensible from the descriptions presented in formal typologies. Measurements of distribution of central tendencies for each attribute include calculations of the mean and mode. Measurements of dispersion of these tendencies include calculating the standard deviation, and the skewness and kurtosis of the distribution.

Finally, a logistic regression statistical analysis (BMDP Statistical Software 1990) is performed on each attribute to ascertain the coefficient of determination (R^2), which measures the relationship between each correctly measured attribute and previous type assignment. A logistic regression analysis records the data in binary or dichotomous values and thus permits examining both qualitative and quantitative data (Hosmer and Lemeshow 1989:1). This program also performs polynomial multivariate analysis where the relationship between several attributes and previous type assignment can be examined. Individual attributes are, therefore, combined into multivariate groupings in the final section of this chapter. The first group of attributes includes wall thickness and exterior color from the large data set (N = 1,923) and the second includes temper material and temper size from selected data in the small set (N = 106). Because this study addresses attributes specifically in sherds previously typed as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware, only those sherds (N = 93) in the small data set thus classified will be examined. Descriptive and comparative multivariate analyses are then preformed on each pottery group to ascertain the relationship between the combined attributes and previous type assignment (BMDP Statistical Software 1990; StatView 512+ 1986).

Univariate Analysis of Attributes

Wall Thickness

Variation in vessel wall thickness is commonly used to distinguish between Shoshoni Ware, Great Salt Lake Gray, and Promontory Gray (D. Madsen 1986:208; R. Madsen 1977:19, 23; Rudy 1953:81, 93-94). Table 1 presents the ranges and average wall thicknesses for the three pottery groups as described in formal typologies. The term "average" apparently was used by Rudy (1953) and R. Madsen (1977) to represent actual mean values of measurements on an unspecified sample of pottery.

In this study, a total of 1,923 previously typed sherds from 16 archaeological were examined for wall thickness (Table 2). Some 95% (N = 1,822) of the sherds varied in thickness 1 mm or more across any given individual sherd, and each sherd was therefore assigned a thickness value that was an average of several measurements (Table 3). These measurements showed that vessel wall thickness in most Great Salt Lake Gray pottery ranges between 3 and 6mm. Wall thickness in Promontory Gray, however, is asymmetric; it forms two main groups with peaks at 3 and 6mm, and a

TABLE 1. Range of Wall Thickness of Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware According to Rudy (1953) and R. Madsen (1977)

Type Name	Wall Thickness	Citation
Great Salt Lake Gray	Average 4.9mm Range 3-6.5mm	Rudy 1953:81
	Average 5.0mm Range 3-7mm	R. Madsen 1977:19
Promontory Gray	Average 4.5mm; Range 3-9mm.	Rudy 1953:93
	Average 5mm; Range 3-14mm	R. Madsen 1977:23
Shoshoni Ware	Average 7mm; Range 4-8.5mm	Rudy 1953:94

subsidiary group at 9mm. Clearly the distribution of wall thickness for Promontory Gray is at least bimodal. The same bimodality appears in Shoshoni Ware as well, with peaks at 6 and 8mm. Histograms (Figure 1) display the shape and distribution of wall thickness in each type, as summarized in Table 3. The lack of unimodality in Promontory Gray and Shoshoni Ware is evident, and Great Salt Lake Gray is strongly lacking in symmetry as well.

The use of the mean is valid in defining what is typical of measurements in each type when (and only when) there is a normal, or unimodal and symmetrical, shape to the distribution of wall thickness values in each type (Sheenan

Table 2. Archaeological Sites from which the Average Wall Thickness (in mm.) is Measured in Each Sherd from the Large Data Set

					Great Salt Lake Gray					
Site	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm	>10mm
42BO1	0	0	0	0	1	0	0	0	0	0
42BO36	0	0	89	138	27	0	0	0	0	0
42BO107	0	0	36	7	2	1	0	0	2	0
42BO109	0	1	8	252	232	0	0	0	0	0
42BO110	0	1	2	1	44	2	0	0	1	1
42BO268	0	0	128	4	1	1	1	0	0	0
42BO365	0	0	0	5	17	1	0	0	0	0
42TO10	0	170	0	0	185	0	0	0	0	0
42WB297	0	4	0	0	2	0	0	0	0	5
26EK8	0	0	3	2	20	0	0	0	0	0
	0	176	266	409	531	5	1	0	3	6

Total (N = 1,397)

Table 2. (Continued)

Promontory Gray

Site	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm	>10mm
42BO1	0	26	0	0	29	0	0	25	0	0
42BO2	0	10	0	0	7	0	0	0	0	0
42BO3	0	45	0	0	46	0	0	0	0	0
42BO4	0	1	0	0	1	0	0	0	0	0
42BO5	0	0	0	0	4	0	0	0	0	0
42BO6	0	2	0	0	3	0	0	0	0	0
42BO36	0	0	0	11	3	0	0	0	0	0
42BO107	0	0	0	8	0	24	1	0	0	0
42BO109	0	1	3	18	9	2	0	0	0	0
42BO385	0	70	0	0	37	0	0	0	0	0
	0	155	3	37	139	26	1	25	0	0
Total (N = 386)										

Shoshoni Ware

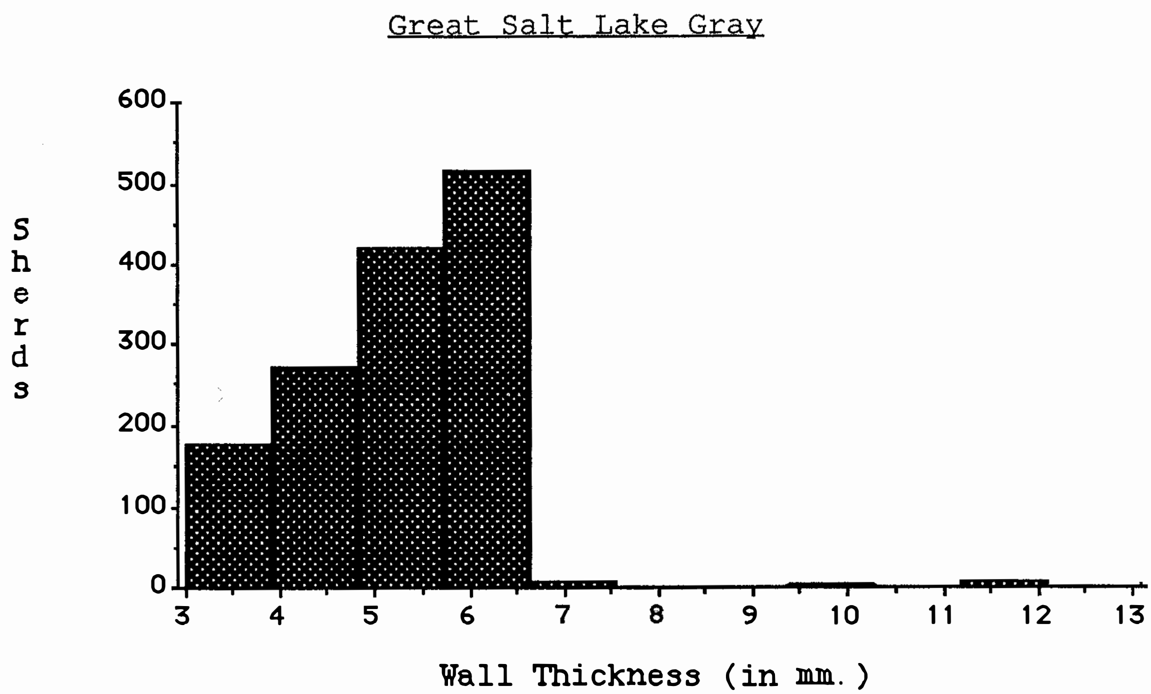
Site	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm	>10mm
42BO36	0	1	2	13	8	13	27	2	2	1
42BO268	1	4	4	0	0	0	0	0	0	0
42BO365	0	0	4	0	0	0	0	0	0	0
26EK8	0	0	0	24	33	1	0	0	0	0
	1	5	10	37	41	14	27	2	2	1
Total (N = 140)										

TABLE 3. Observed Average Wall Thickness for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware in Large Data Set

Wall Thickness	Great Salt Lake Gray	Promontory Gray	Shoshoni Ware
2mm	0	0	1
3mm	176	155	5
4mm	273	3	10
5mm	421	37	37
6mm	514	139	41
7mm	5	26	14
8mm	1	1	27
9mm	0	25	2
10mm	1	0	2
>10mm	6	0	1
	1,397	386	140
Total (N = 1,923)			

1988:35-36, 44). But the histograms of the observed frequencies (Figure 1), derived from the data in Table 3, show that wall thickness is not normally distributed within the three types. As a check on the visual representations, skewness and kurtosis values, measures of the shape and dispersion of the distributions, were determined for each type.

Ideally, skewness and kurtosis coefficient values should be close to zero if the observed distribution is normal. However, Table 4 confirms that distributions of wall thickness measurements in all three types are not normally distributed. The lack of normal patterns shown in Table 3



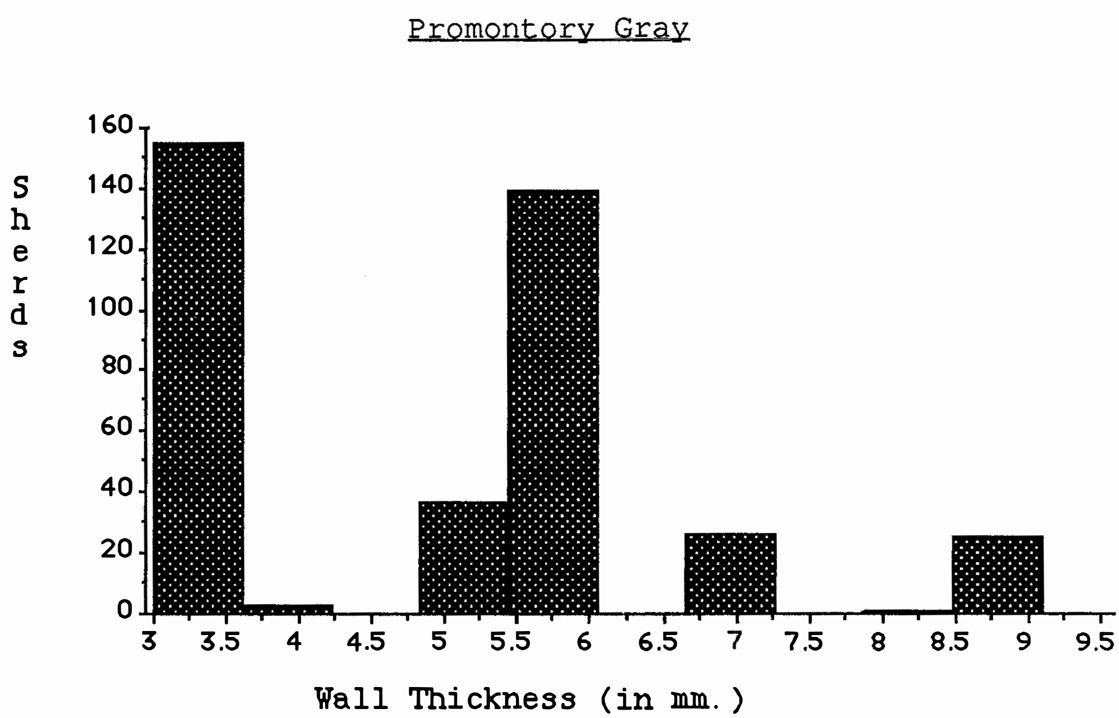


Figure 1. Histograms of Observed Average Wall Thickness Measurements from Large Data Set.

Shoshoni Ware

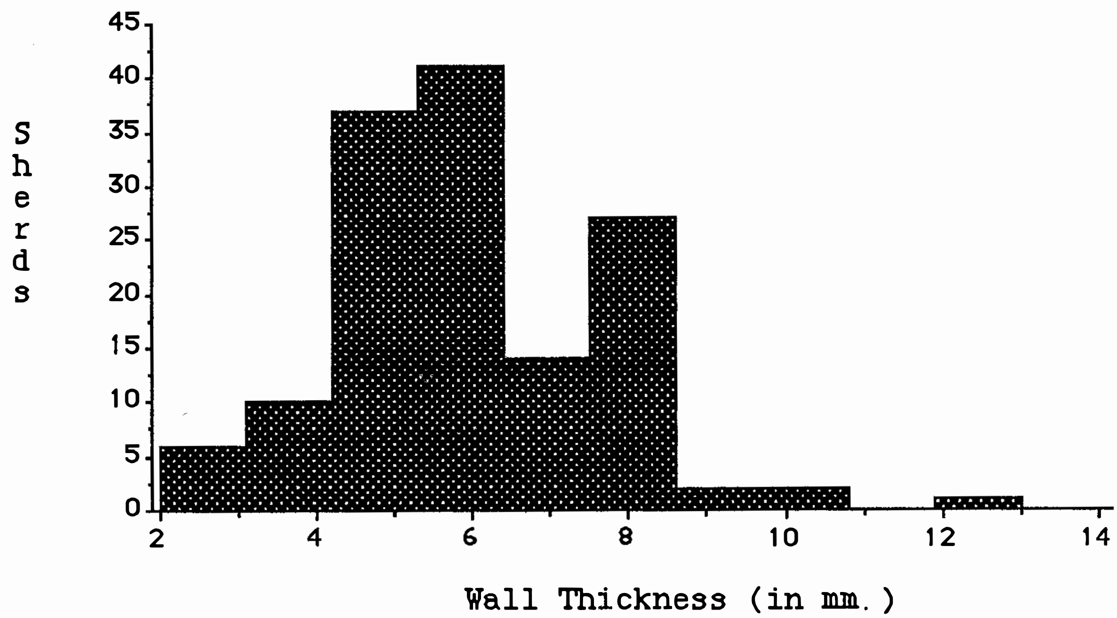


Figure 1. (Continued).

and Figure 1 may stem from the fact that although individual excavators have cited formal descriptions, wall thickness measurements were used to separate wares and types at individual sites in a variety of ways. For example, Shoshoni Ware from Hogup Cave was distinguished as thicker than Promontory Gray or Great Salt Lake Gray (Aikens 1970:32). However, at Swallow Shelter Shoshoni Ware was distinguished as thinner than Great Salt Lake Gray (Dalley 1976:56). Similarly, wall thickness was important for separating Great Salt Lake Gray from Promontory Gray at the Levee and Knoll sites (D. Madsen 1979:81), but was not found to be useful for separating these two types at Hogup

TABLE 4. Descriptive Statistics of Wall Thickness for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware in Large Data Set

Type	Mean	Standard Deviation	Mode	Kurtosis	Skewness
Great Salt Lake Gray	4.972	1.162	6	4.935	.681
Promontory Gray	4.951	1.819	3	-.698	-.397
Shoshoni	6.086	1.575	6	.744	.412

Note: N = 1,397.

Cave (Aikens 1970:31).

In short, the use of "average" wall thickness measurements cited in the above formal descriptions is not appropriate as classificatory criteria. Actual observed measurements indicate considerable overlap of wall thickness values between the three pottery groups, and all three groups lack the normally distributed measurements that would be expected from three distinct natural populations. Thus, it is unclear how this attribute could be used to explain how a sherd was classified. In my data, Promontory Gray and Shoshoni Ware share the same wall thickness measurements with sherds previously typed as Great Salt Lake Gray.

The question that is being asked throughout this chapter is whether knowing actual measurements of a correctly identified attribute, or combination of attributes, explains how a sherd was classified. As Table 3 demonstrates, there is more variability within one type, Great Salt Lake Gray, than between Promontory Gray and Shoshoni Ware. Indeed, wall thickness measurements from the large data base explain previous type assignment only 21% of the time (R^2 = 0.2099). Either wall thickness is not, by itself, a very important attribute in how a sherd is classified, that it covaries with some other attribute(s), or, most likely, individual excavators and analysts simply did not use the attribute of wall thickness in a comparable manner.

An area graph (Figure 2) of the observed data presented in Table 3 illustrates that wall thickness measurements for both Promontory Gray and Shoshoni Ware fall within those for Great Salt Lake Gray. Further, Promontory Gray shares the same basic pattern of distribution as Great Salt Lake Gray, as both peak at 3mm and 6mm. Thus, the data show that separate and distinct measurements in wall thickness are not present and, therefore, do not support the separation of three distinct pottery types.

Exterior Surface Color

The second attribute examined in sherds from the large data set is exterior surface color. Shoshoni Ware is described as ranging from reddish brown to medium gray or black (Rudy 1953:94). Great Salt Lake Gray ranges from light gray to black (Rudy 1953:81), but is occasionally buff (R.

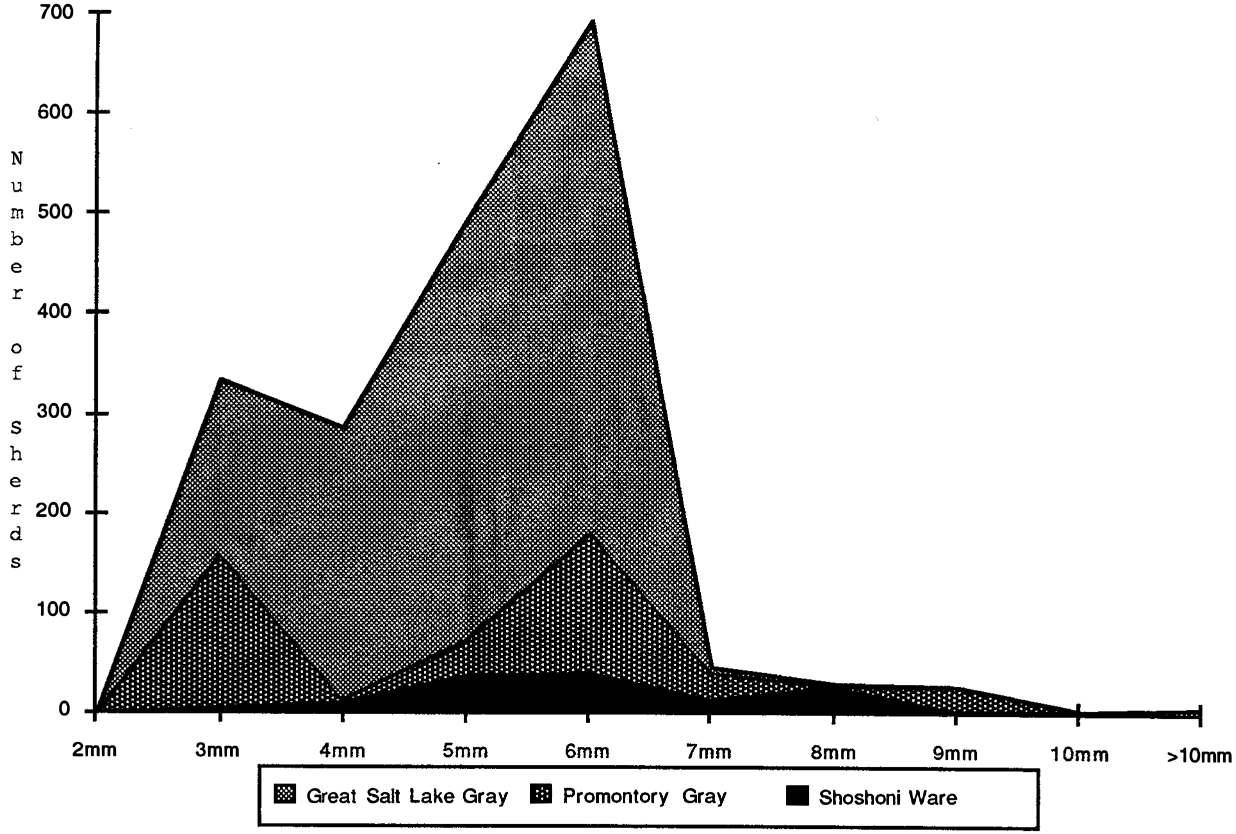


FIGURE 2. Area Graph of All Wall Thickness Measurements in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware (N = 1,923).

Madsen 1977:19). Promontory Gray was distinguished by its predominantly black surface color (Rudy 1953:93; Steward 1937:44), but a later description also noted medium to dark gray, and occasionally brown colors (R. Madsen 1977:23). It is unclear how exterior color was used to separate the three forms of pottery, as they share the same descriptive categories of color.

Nevertheless, if formal descriptions are correct (Table 5), it is expected that Shoshoni Ware will have a wider range of brown-to-gray-to-black exterior surface colors than either Great Salt Lake Gray or Promontory Gray (D. Madsen 1986:209). Further, Great Salt Lake Gray will have a wider range of gray-to-black colors than the mostly black Promontory Gray (cf., R. Madsen 1977 and Steward 1937).

Problems arise in comparing the surface colors determined for sherds analyzed in this study to those named in the formal descriptions. Rudy (1953) did not use a standardized color chart to record colors in Shoshoni Ware and his results cannot be precisely compared with color variation determined by R. Madsen for Fremont types.

R. Madsen (1977) recorded surface color in a notation which appears to be that from the Munsell Soil Color Charts, though this is not clearly stated. Nomenclature in the Munsell Soil Color Charts (1975) consists of descriptive terms and a notation of color. However, there appears to be some internal inconsistency in how R. Madsen applied the

TABLE 5. Range of Exterior Color by Type in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware Described by Rudy (1953) and R. Madsen (1977)

Type Name	Range of Color	Citation
Great Salt Lake Gray	Mostly dark gray (10YR 3/1; 7.5YR 3/0); occasionally buff (10YR 5/3) or light gray (10YR 5-6/1)	R. Madsen 1977:19
Promontory Gray	Predominantly black, occasionally brownish-black to dark buff or tan	Rudy 1953:93
	Medium gray (7.5YR 5/0) to dark gray (7.5YR 3-4/0, occasionally brown (19[sic]YR 5/3)	R. Madsen 1977:23
Shoshoni Ware	Red-brown to medium gray or black	Rudy 1953:94

nomenclature. For example, he identified the same overall color notation, 10YR 5/3, as "buff" in Great Salt Lake Gray and "brown" in Promontory Gray (R. Madsen 1977:19, 23). Likewise, the same value notation of "5" is interpreted by R. Madsen as indicating "light" in Great Salt Lake Gray (1977:19) and "medium" in Promontory Gray (1977:23).

Exterior surface colors and type assignment have also varied considerably at individual sites (Tables 6 and 7), and color appears to have been completely omitted in recent publications (e.g., D. Madsen 1986:208-209; Metcalfe and

TABLE 6. Variation in Exterior Color in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware at Seven Sites in the Great Salt Lake Area

Type Name	Exterior Color	Citation
Great Salt Lake Gray	Wide variation. Mostly dark gray, occasionally buff and red-brown	Levee (early and late components) and Knoll sites (D.Madsen 1979:80)
	Range from light gray to black, some buff	Bear River 1 (Aikens 1966:63)
	Black or dark gray	Hogup Cave (Aikens 1970:31)
	Black	Swallow Shelter (Dalley 1976:56)
	Dark gray, occasionally buff and red-brown	Remnant Cave (Berry 1976:96)
Promontory Gray	Resembles Great Salt Lake Gray	Hogup Cave (Aikens 1970:31)
	Usually black, variant buff	Bear River 1 (Aikens 1966:65)
	Black, rarely dark buff or dark gray	Levee (early and late components), Knoll sites (D.Madsen 1979:81)
Shoshoni Ware	Predominantly black, a few tan	Hogup Cave (Aikens 1970:32)
	Variety I: most buff, some black Variety II: buff	Thomas Shelter (Dalley 1976:88-9)
	Tan	Remnant Cave (Berry 1976:96)

Table 7. Archaeological Sites from which Exterior Color is Observed in Each Sherd from the Large Data Set

	Great Salt Lake Gray						
Site	Light Gray	Gray	Dark Gray	Black	Dark Brown	Brown	Light Brown
42BO1	1	0	0	0	0	0	0
42BO36	9	14	18	202	0	1	10
42BO107	1	0	1	9	13	10	14
42BO109	80	2	2	261	1	0	147
42BO110	2	0	4	7	39	0	0
42BO268	9	2	23	100	1	0	0
42BO365	1	0	0	17	5	0	0
42TO10	0	0	0	340	15	0	0
42WB297	6	0	5	0	0	0	0
26EK8	3	0	0	2	20	0	0
	112	18	53	938	94	11	171

Total (N = 1,397)

Table 7. (Continued)

Site	Light Gray	Gray	Dark Gray	Black	Dark Brown	Brown	Light Brown
				Promontory Gray			
42BO1	3	0	0	77	0	0	0
42BO2	0	0	0	17	0	0	0
42BO3	0	0	0	91	0	0	0
42BO4	0	0	0	2	0	0	0
42BO5	0	0	0	4	0	0	0
42BO6	0	0	0	5	0	0	0
42BO36	0	1	1	11	1	0	0
42BO107	1	0	1	11	20	0	0
42BO109	15	0	0	12	5	0	1
42BO385	23	0	76	0	8	0	0
	42	1	78	230	34	0	1
Total (N = 386)							
				Shoshoni Ware			
42BO36	2	3	18	44	2	0	0
42BO268	0	0	7	2	0	0	0
42BO365	0	0	4	0	0	0	0
26EK8	0	12	46	0	0	0	0
	2	15	75	46	2	0	0
Total (N = 140)							

Shearin 1989:8-10). Nevertheless, to test which of the above observations, if any, are correct, color of exterior surfaces from the large data set was determined.

In subsequent tables and text where the exterior color of sherds is discussed, the following color names are employed for Munsell color codes:

Munsell Color Code (1975)	Color Name
5YR6-7/1; 10YR6-7/1	Light Gray
5YR5/1; 10YR5/1	Gray
5YR3-4/1; 10YR3-4/1	Dark Gray
5YR2/1 and 10YR2/1	Black
5YR2-4/2+; 10YR2-4/2+	Dark Brown
5YR5/2+; 10YR5/2+	Brown
5YR6-7/2+; 10YR6-7/2+	Light Brown

As Table 8 illustrates, sherds previously classified as Great Salt Lake Gray are found in all color categories. Also, sherds identified as Promontory Gray or Shoshoni Ware share some of these color categories, especially the darker hues of black, dark brown and dark gray, with Great Salt Lake Gray and with one another.

As seen with the attribute of wall thickness, formal descriptions of exterior color are not exclusive in any one type and actual observed color categories also indicate considerable overlap between the three pottery groups. When observed frequencies for each type are compared, it is clear that color cannot be used to explain how a sherd was classified in the collections I have studied: Promontory Gray and Shoshoni Ware share the same exterior colors with

TABLE 8. Observed Exterior Color for Great Salt Lake Gray, Promontory Gray and Shoshoni Ware in Large Data Set

	Great Salt Lake Gray	Promontory Gray	Shoshoni Ware
Light Gray	112	42	2
Gray	18	1	15
Dark Gray	53	78	75
Black	938	230	45
Dark Brown	94	34	2
Brown	11	0	0
Light Brown	171	1	1
	1,397	386	140
Total (N = 1,923)			

sherds previously typed as Great Salt Lake Gray. Further, there is great variability in exterior color within one type, Great Salt Lake Gray, and sherds classified as Promontory Gray and Shoshoni Ware share the same color categories. Indeed, exterior color explained type assignment only 15% of the time ($R^2 = 0.1492$). This indicates that either the attribute of exterior color is not, by itself, a very important attribute in how a sherd is classified; that it covaries with some other attribute(s); or, most likely, that individual excavators and analysts simply did not use the attribute of exterior sherd color to classify pottery in a comparable manner.

An area graph (Figure 3) of the data presented in Table

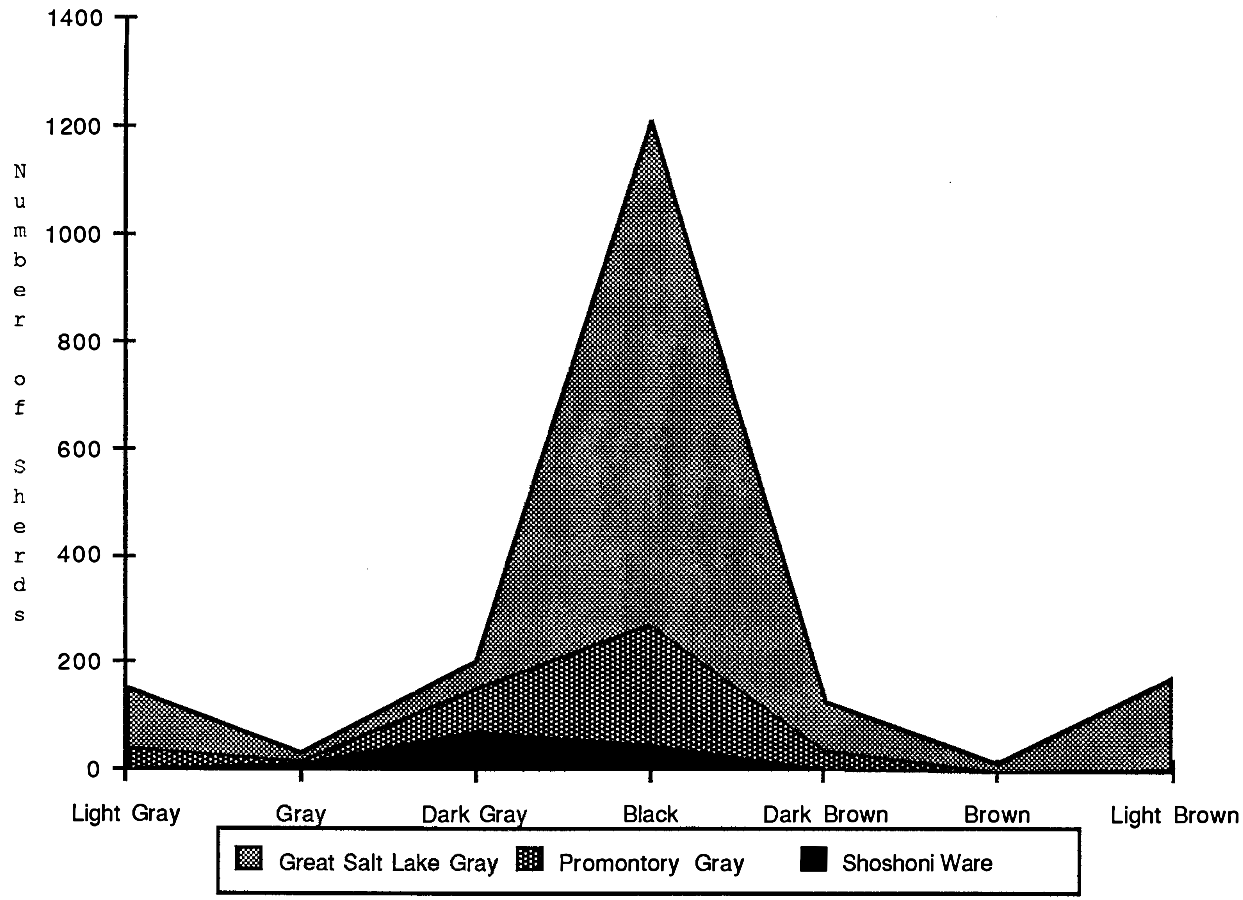


FIGURE 3. Area Graph of All Exterior Color Categories in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware (N = 1,923).

8 illustrates that color categories for both Promontory Gray and Shoshoni Ware fall within those for Great Salt Lake Gray. As seen in the attribute of wall thickness, Promontory Gray also shares the same pattern of distribution with Great Salt Lake Gray, as both are mostly black in color. Thus, the data show that separate and distinct color categories are not present in either Promontory Gray or Shoshoni Ware and, therefore, do not support the existence of three separate and distinct pottery types.

Temper Material, Temper Size, and Technique of Shaping

Forms and sizes of temper materials and techniques of shaping could not be macroscopically distinguished. Therefore, I selected 106 sherds from twenty-four archaeological sites for a petrographic analysis of these three variables. However, 13 of the 106 sherds selected are classified other than as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware, so only the remaining 93 sherds were included in the statistical analyses.

To ascertain whether the small data set of previously classified sherds was representative of the large data set, probability values were obtained for wall thickness and exterior color categories in 93 sherds. Of the 93 sherds, only 26% had wall thickness measurements that explained type assignment ($R^2 = 0.2615$). Similarly, only 29% had categories of exterior color that explained type assignment

(R^2 = 0.2933). The probability level of the small data set is slightly higher than that found in the large data set. It is probably the effect of fewer categories of both wall thickness and exterior colors in the smaller data set that contribute to a better statistical fit (Hosmer and Lemeshow 1989:135-149). However, the similarity in probability levels of the large and small data sets is good evidence that wall thickness and other attributes obtained from the small data set are representative of the overall variation within the three pottery types.

Temper Material

One of the attributes most commonly used to separate pottery into types and wares is temper material. However, in discussions of pottery from the study area, temper materials are either described only as specific minerals (the assignment of which overlaps greatly between types and wares); are lumped into generalized terms, such as "volcanic glasses"; or are of a disparate category altogether, such as the grain-size category of "sand". The result is that these dissimilar categories make previous temper identification of little practical use in understanding how types and wares were separated (Table 9). Formal pottery typologies do not usually describe specific rock types except that some Shoshoni Ware reportedly has granite temper material (Rudy

TABLE 9. Range of Temper Material Reported in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type Name	Range of Temper Material	Citation
Great Salt Lake Gray	Fine Quartz	Steward 1936:6
	Quartz, mica, rounded sand	R. Madsen 1977:19
	One sherd, rhyolite rock	Rudy 1953:199
	Quartz, mica, rounded sand	D. Madsen 1986:208
Promontory Gray	Calcite or Quartz, some with a mixture of feldspar, hornblende, mica, rounded sand	R. Madsen 1977:23
	Calcite	D. Madsen 1986:208
Shoshoni Ware	Quartz sand, opaques, mica One sherd, granite rock	Rudy 1953:94, 101

1953:101), some Promontory Gray pottery has calcite temper (R. Madsen 1977:23), and some Great Salt Lake Gray has rhyolite temper (Rudy 1953:100). Other materials, including quartz and mica, are shared between types and wares. D. Madsen (1986:209) noted that Shoshoni Ware is highly variable in the type of temper material used, but he did not mention specific rock types.

Using standard petrographic analysis (Kerr:1977), I determined from the analysis of 106 selected pottery sherds that eleven geologically distinct forms of raw material were used to make pottery throughout the study area (Table 10).

TABLE 10. Archaeological Sites from which Temper Material is Observed in Each Sherd from The Small Data Set

Great Salt Lake Gray

Site	Andesite	Quartzite	Granite	Mixed	Schist	Calcite	Obsidian	Andesite Basalt	Tuff	Ash	Rhyolite
42BO36	4	3	1	1	1	0	0	0	0	0	0
42BO55	1	1	0	0	0	0	1	0	0	0	0
42BO107	2	0	0	0	0	0	3	0	0	0	0
42BO109	1	1	2	0	0	0	0	0	0	0	0
42BO110	0	0	0	0	0	0	1	0	0	0	2
42BO268	0	1	0	0	1	0	0	0	0	0	0
42BO365	0	0	0	0	1	0	0	0	0	0	0
42SL1	0	0	0	2	0	0	0	0	0	0	0
42TO5	0	0	0	0	0	0	0	0	0	1	0
42TO6	0	0	0	0	0	0	0	1	0	0	0
42TO10	2	0	0	0	0	0	0	0	0	0	0
42TO13	3	1	1	0	2	0	0	0	1	1	0
42WB34	4	0	1	0	0	0	0	0	0	0	1
42WB297	0	0	0	0	0	0	0	0	2	0	0
26EK8	0	1	0	0	0	0	0	0	0	0	0
	17	8	5	3	5	0	5	1	3	2	3

Total (N = 52)

TABLE 10. (Continued)

Promontory Gray

Site	Andesite	Quartzite	Granite	Mixed	Schist	Calcite	Obsidian	Andesite Basalt	Tuff	Ash	Rhyolite
42BO1	0	0	0	0	2	3	0	0	0	0	0
42BO5	0	0	0	0	0	1	0	0	0	0	0
42BO120	0	3	0	0	0	3	0	0	0	0	0
42BO385	5	3	0	0	0	0	0	2	0	0	0
42TO64	0	0	1	1	0	0	0	0	0	1	0
	5	6	1	1	2	7	0	2	0	1	0

Total (N = 25)

Shoshoni Ware

Site	Andesite	Quartzite	Granite	Mixed	Schist	Calcite	Obsidian	Andesite Basalt	Tuff	Ash	Rhyolite
42BO36	0	5	1	1	0	0	0	0	0	0	0
42BO268	0	0	1	0	0	0	0	0	0	0	0
42BO365	1	0	0	0	0	0	0	0	0	0	0
42TO13	1	1	1	1	0	0	0	0	0	0	0
42TO20	0	0	1	0	0	0	0	0	0	0	0
26EK8	0	1	0	1	0	0	0	0	0	0	0
	2	7	4	3	0	0	0	0	0	0	0

Total (N = 16)

TABLE 10. (Continued)

"Fremont", Snake Valley Gray, and No Previous Identification

Site	Andesite	Quartzite	Granite	Mixed	Schist	Calcite	Obsidian	Andesite Basalt	Tuff	Ash	Rhyolite
"Fremont"											
42BO301	0	0	0	1	0	0	0	0	0	0	0
42BO559	0	0	0	1	0	0	0	0	0	0	0
Snake Valley Gray											
42BO36	1	1	0	0	0	0	0	0	0	0	0
42TO20	0	1	0	0	0	0	0	0	0	0	0
No ID											
42TO13	0	1	0	0	0	0	0	0	1	0	0
42TO106	0	0	0	0	0	0	0	1	0	1	0
42TO457	0	0	0	1	0	0	0	0	0	0	0
42TO504	3	0	0	0	0	0	0	0	0	0	0
	4	3	0	3	0	0	0	1	1	1	0
Total (N = 13)											

Note: (N = 106).

Seven rock types are clearly igneous and three are metamorphic in origin. One pottery group contains temper of mixed rock types, a combination of andesite or basalt with quartzite. Within the seven igneous rock groups, six are extrusive rocks. Of these, four are flow rocks: andesite, andesite-basalt, rhyolite, and obsidian. The fifth extrusive igneous rock group is a volcanic ash, the result of a pyroclastic eruption. The sixth is a welded tuff, produced by consolidation of pyroclastic material. The seventh igneous rock group is the result of intrusive formation. It is granodiorite, a distinctive plutonic rock, falling somewhere between a quartz-rich granite and diorite (the intrusive equivalent of andesite). Herein, this material is informally termed granite.

The three metamorphic rock groups identified are quartzite, schist, and a calcitic material. The calcitic material is distinctive as it has metamorphosed almost to a marble stage, but herein the traditional term of "calcite" is retained. The final pottery group includes as temper a mixture of extrusive igneous rocks, in the form of andesite or andesitic-basaltic rocks, and a metamorphic rock, quartzite.

The expected large variation in temper material that has been described for Shoshoni Ware is not found in my data, as illustrated in Table 11. Unexpectedly, there is a much widerrange of temper used to make types of Fremont Ware: 10

TABLE 11. Observed Temper Material for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware in Each Sherd From the Small Data Set

Temper	Great Salt Lake Gray	Promontory Gray	Shoshoni Ware
Andesite	17	5	2
Quartzite	8	6	7
Granite	5	1	4
Mix	3	1	3
Schist	5	2	0
Calcite	0	7	0
Obsidian	5	0	0
Andesite/Basalt	1	2	0
Tuff	3	0	0
Ash	2	1	0
Rhyolite	3	0	0
	52	25	16
Total (N = 93)			

of the 11 types of raw materials are found in sherds previously identified as Great Salt Lake Gray. Calcite is restricted to sherds classified as Promontory Gray, but other sherds previously classified as Promontory Gray are made with more temper materials than just calcite or quartzite.

Furthermore, granite, named as an attribute of Shoshoni Ware by Rudy (1953:101), is also found in sherds previously assigned to several types of Fremont pottery. A significant finding shown in Table 11 is that there are no temper materials used in Shoshoni pottery which are not also found in Great Salt Lake Gray or Promontory Gray.

An area graph (Figure 4) indicates that, except for calcite, Promontory Gray and Shoshoni Ware share the same temper materials as do sherds classified as Great Salt Lake Gray. Only 28% of previously type assignment can be explained by variation in temper material (R^2 = 0.2757). This indicates that either the attribute of distinct temper material is not, by itself, a very important attribute in how a sherd is classified; that it covaries with some other attribute(s); or most likely, individual excavators and analysts simply did not identify their temper materials in a systematic manner.

This graph also illustrates that Promontory Gray and Shoshoni Ware exhibit fewer temper categories, though both share the same general pattern of temper use as Great Salt Lake Gray. All three pottery types use mostly andesite, quartzite, or granite temper. Thus, the data show that, except for calcite, separate and distinct categories of temper materials are not present and, therefore, do not support recognition of three separate and distinct pottery types.

Size of Temper Particle

How the size of temper particles was used in defining each pottery type is not clearly presented in the formal typologies (Table 12). For example, Rudy measured the range

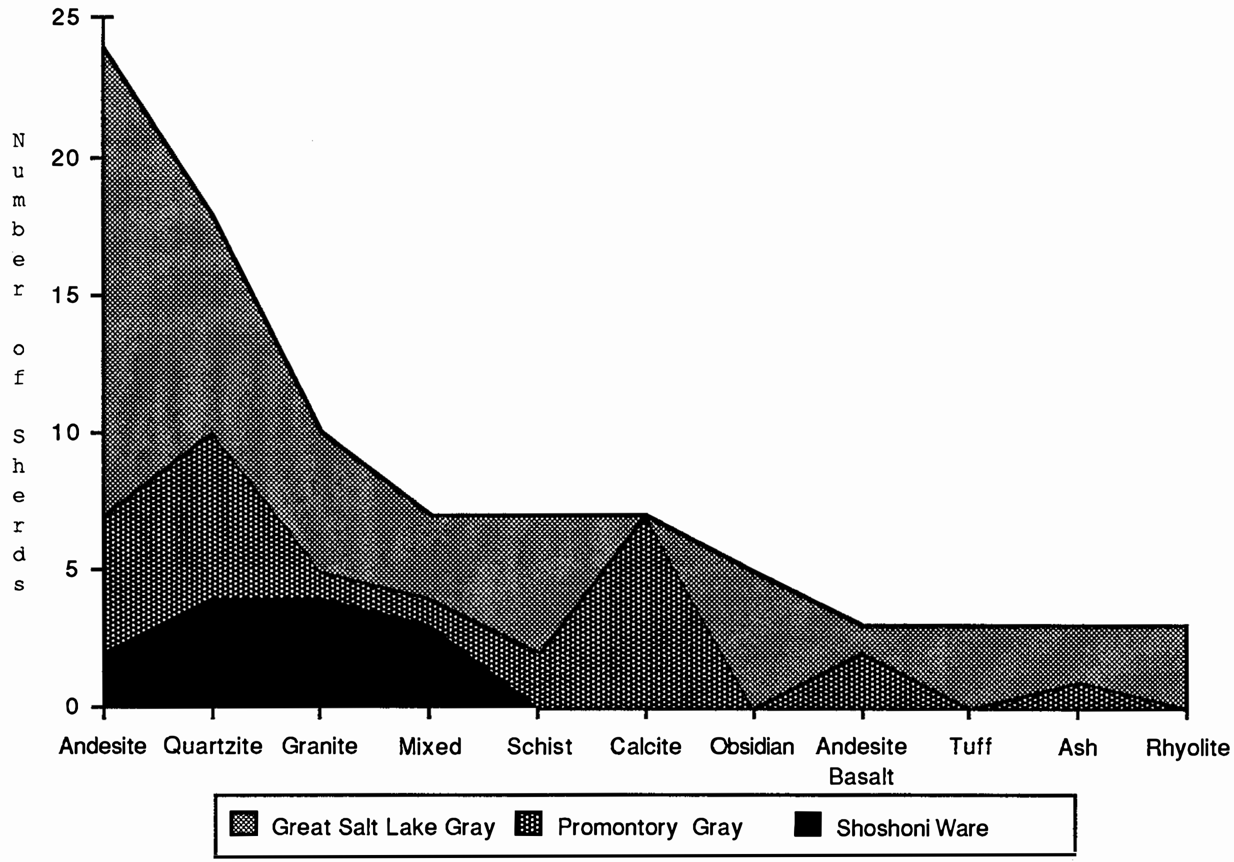


FIGURE 4. Area Graph of Temper Material in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware (N = 93).

of temper particle sizes in Great Salt Lake Gray, but used only qualitative terms for Promontory Gray and Shoshoni Ware (1953:81, 93-94). R. Madsen measured the range and average temper particle size in Great Salt Lake Gray, but recorded only the largest size for Promontory Gray (1977:19, 23). However, R. Madsen also noted a range between 0.3 and 0.6mm in the "average" particle size. It is unclear whether he refers to a mean in a finite range of particle sizes in Great Salt Lake Gray at each archaeological site, or, whether he intended to say that the mean of particle size is a continuous variable in the pottery type as a whole.

In general, variably coarse inclusions are said to be important in distinguishing Shoshoni Ware from Fremont types (D. Madsen 1986:209), and Promontory Gray is said to be coarser than Great Salt Lake Gray. Presumably the term "coarser" refers to the largest particle size, because R. Madsen distinguishes "medium" temper size as less than 1.0mm and "coarse" as over 1.0mm (R. Madsen 1977:19, 23). Rudy (1953:81, 100) defines "fine" temper size as 0.1mm. As Table 12 demonstrates, there is considerable overlap in the expected range of temper size within and between types and wares. More important, it is unclear whether the term "range" indicates that within a single sherd particle sizes vary, or, that there is an overall range of particle size within each pottery type.

To understand how the attribute of temper size varies in

TABLE 12. Expected Temper Sizes Described in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type Name	Temper size	Citation
Great Salt Lake Gray	Fine to medium, ranges from 0.1 to 3.0mm	Rudy 1953:81, 100
	Medium, ranges from 0.1 to 1.0mm, averaging 0.3 to 0.6mm	R. Madsen 1977:19
Promontory Gray	Coarse	Rudy 1953:93
	Predominantly coarse (over 1.0mm); greater variation in temper size than other Fremont ceramics	R. Madsen 1977: 23-24
Shoshoni Ware	Ranges from fine to coarse, predominantly coarse	Rudy 1953:94

sherds previously classified as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware, the length (i.e., the maximum axis or dimension) of all temper inclusions in each of the 93 thin section slides from my small data set was measured (Tables 13 and 14). Because formal descriptions note the "range" of particle size as important in defining each type, the length of both the largest and the smallest particles for each sherd is presented. Descriptive and comparative statistics are performed on the observed data to ascertain whether the largest, the smallest, or a combination of both temper size categories might explain how a sherd was

Table 13. Archaeological Sites from which the Largest Size of Temper Material is Measured in Each Sherd from the Small Data Set

	Great Salt Lake Gray						
Site	<1.0mm	1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm
42BO36	0	7	3	0	0	0	0
42BO55	0	0	1	1	1	0	0
42BO107	0	2	3	0	0	0	0
42BO109	0	3	0	0	1	0	0
42BO110	0	0	2	0	1	0	0
42BO268	0	1	1	0	0	0	0
42BO365	0	0	1	0	0	0	0
42SL1	0	2	0	0	0	0	0
42TO5	0	0	1	0	0	0	0
42TO6	0	1	0	0	0	0	0
42TO10	0	1	1	0	0	0	0
42TO13	0	3	5	1	0	0	0
42WB34	1	3	1	1	0	0	0
42WB297	0	0	2	0	0	0	0
26EK8	0	0	0	1	0	0	0
	1	23	21	4	3	0	0

Total (N = 52)

Table 13. (Continued)

Promontory Gray

Site	<1.0mm	1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm
42BO1	0	1	4	0	0	0	0
42BO5	0	0	1	0	0	0	0
42BO120	0	0	1	3	2	0	0
42BO385	0	4	4	0	0	0	2
42TO64	0	0	3	0	0	0	0
	0	5	13	3	2	0	2
Total (N = 25)							

Shoshoni Ware

Site	<1.0mm	1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm
42BO36	0	0	4	3	0	0	0
42BO268	0	1	0	0	0	0	0
42BO365	0	1	0	0	0	0	0
42TO13	0	0	3	1	0	0	0
42TO20	0	0	1	0	0	0	0
26EK8	0	0	1	1	0	0	0
	0	2	9	5	0	0	0
Total (N = 16)							

Table 14. Archaeological Sites from which the Smallest Temper Size is Measured in Each Sherd from the Small Data Set

	Great Salt Lake Gray							
Site	.1mm	.2mm	.3mm	.4mm	.5mm	.6mm	.7mm	.8mm
42BO36	5	1	1	0	3	0	0	0
42BO55	2	1	0	0	0	0	0	0
42BO107	0	5	0	0	0	0	0	0
42BO109	2	2	0	0	0	0	0	0
42BO110	1	2	0	0	0	0	0	0
42BO268	1	0	0	0	1	0	0	0
42BO365	0	0	1	0	0	0	0	0
42SL1	1	1	0	0	0	0	0	0
42TO5	0	1	0	0	0	0	0	0
42TO6	0	0	1	0	0	0	0	0
42TO10	0	2	0	0	0	0	0	0
42TO13	2	3	0	2	1	1	0	0
42WB34	4	2	0	0	0	0	0	0
42WB297	0	0	0	0	2	0	0	0
26EK8	0	1	0	0	0	0	0	0
	18	21	3	2	7	1	0	0

Total (N = 52)

Table 14. (Continued)

Promontory Gray

Site	.1mm	.2mm	.3mm	.4mm	.5mm	.6mm	.7mm	.8mm
42BO1	1	2	0	0	1	0	0	0
42BO5	1	0	0	0	0	0	0	0
42BO120	6	0	0	0	0	0	0	0
42BO385	5	2	2	0	1	0	0	0
42TO64	0	2	2	0	0	0	0	0
	13	6	4	0	2	0	0	0
Total (N = 25)								

Shoshoni Ware

Site	.1mm	.2mm	.3mm	.4mm	.5mm	.6mm	.7mm	.8mm
42BO36	7	0	0	0	0	0	0	0
42BO268	0	0	0	0	0	0	0	1
42BO365	0	0	1	0	0	0	0	0
42TO13	1	0	2	0	0	0	0	1
42TO20	0	0	0	0	0	0	1	0
26EK8	0	0	1	0	0	0	0	1
	8	0	4	0	0	0	1	3
Total (N = 16)								

classified.

Largest Temper Size

Measurements in this study demonstrate that both Great Salt Lake Gray and Promontory Gray have larger, i.e. "coarser", temper particles than does Shoshoni Ware (Table 15). Further, both Fremont types have a wider range of large temper particles than stated in formal descriptions. Finally, sherds previously classified as Shoshoni Ware have a narrower range of large temper particles than either Great Salt Lake Gray or Promontory Gray.

To test whether R. Madsen's use of the term "average" temper size to define Great Salt Lake Gray is an appropriate measurement, descriptive statistics were calculated to determine whether there is a normal distribution of largest temper size within each pottery type. Skewness and kurtosis coefficient values in normally distributed data should be close to zero, but as Table 16 illustrates, largest temper sizes are not normally distributed in the data set under analysis. Therefore, the term "average" cannot be used to describe the central tendency of largest temper size, especially in Great Salt Lake Gray or Promontory Gray. Finally, of the 93 sherds measured, only 11% of type assignment can be explained by the variation in largest size of temper material ($R^2 = 0.1147$). This indicates that either the attribute of largest temper size is not, by

Table 15. Observed Largest Size (in mm.) of Temper Material in Small Data Set for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type	<1	1	2	3	4	5	6
Great Salt Lake Gray	2	22	21	4	3	0	0
Promontory Gray	0	5	13	3	2	0	2
Shoshoni Ware	0	2	9	5	0	0	0
Total (N = 93)	2	29	43	12	5	0	2

TABLE 16. Descriptive Statistics for Largest Temper Size (in mm.) in Small Data Set for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type	Mean	Standard Deviation	Mode	Kurtosis	Skewness
Great Salt Lake Gray	1.712	.865	1	.69	1.025
Promontory Gray	2.496	1.354	2	1.764	1.501
Shoshoni Ware	2.1889	.655	2	-.619	-.178

Note: N = 93.

itself, a very important attribute in how a sherd is classified; that it covaries with some other attribute(s); or, most likely, that individual excavators and analysts simply did not use this attribute in a comparable manner when classifying pottery.

Figure 5 displays in an area graph the data presented in Table 15. This graph illustrates that except for two sherds, all large temper sizes in Promontory Gray and Shoshoni Ware are also found within Great Salt Lake Gray. Promontory Gray and Shoshoni Ware also share the same pattern of temper size distribution as Great Salt Lake Gray, as all peak at 2mm. Thus, the data show that except for two sherds, separate and distinct categories of large temper sizes are not present and, therefore, do not support the recognition of three separate and distinct pottery types.

Smallest Temper Size

Formal descriptions of Great Salt Lake Gray and Shoshoni Ware note both as having fine particles of temper material. Formal descriptions note 0.1 mm as the smallest temper particle size for both types and presumably this is the measurement which defines "fine" (Table 12). To test whether Great Salt Lake Gray and Shoshoni Ware have "finer" temper particles than Promontory Gray, the smallest or minimum size of temper materials was measured (Table 17).

As Table 17 shows, temper inclusions in all three types

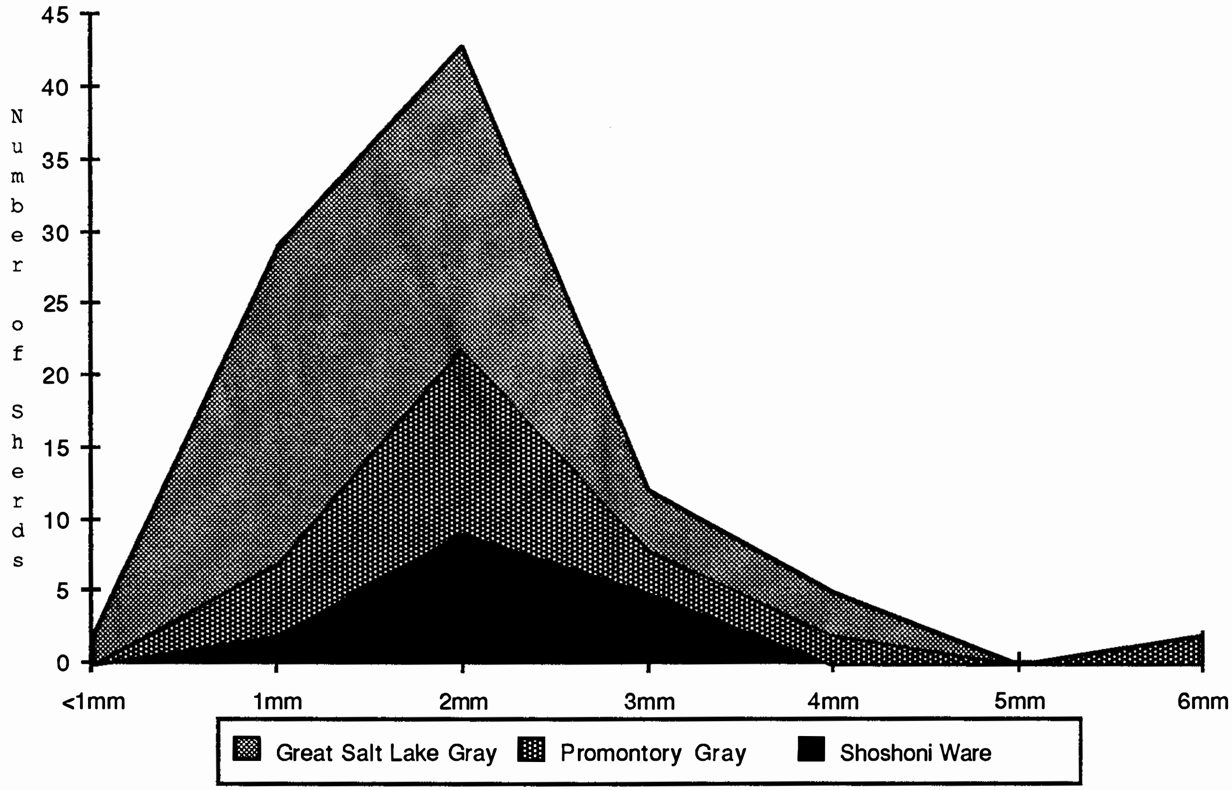


FIGURE 5. Area Graph of Largest Temper Size in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware (N = 93).

Table 17. Observed Smallest Size (in mm.) of Temper Material in Small Data Set for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type	.1	.2	.3	.4	.5	.6	.7	.8
Great Salt Lake Gray	18	21	3	2	7	1	0	0
Promontory Gray	13	6	4	0	2	0	0	0
Shoshoni Ware	8	0	4	0	0	0	1	2
	39	27	11	2	9	1	1	2
Total (N = 93)								

share small temper size categories. Great Salt Lake Gray has a wide variation of smaller sizes and these sizes are continuous in their range. All Promontory Gray and most Shoshoni Ware occur within the same range as Great Salt Lake Gray.

The shape and distribution of smallest temper sizes are calculated to determine whether there is a normal distribution within each pottery type (Table 18). Skewness and kurtosis coefficient values indicate that distribution curves of smallest temper sizes in all three types are asymmetric, and as seen in the cases of wall thickness and largest temper sizes, the term "average" or "mean" does not describe a central tendency of the attribute in any of the types being examined in this study. Of the 93 sherds examined, only 16% had smallest sizes of temper material that

TABLE 18. Descriptive Statistics of Smallest Temper Sizes (in mm.) in Small Data Set for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type	Mean	Standard Deviation	Mode	Kurtosis	Skewness
Great Salt Lake Gray	.227	.143	.2	.105	1.144
Promontory Gray	.188	.12	.1	1.242	1.411
Shoshoni Ware	.319	.286	.1	-.861	.904

Note: N = 93.

explained how a sherd was classified (R^2 = 0.1588). This indicates that either the attribute of smallest temper size is not, by itself, a very important attribute in how a sherd is classified; that it covaries with some other attribute(s); or, most likely, that individual excavators and analysts simply did not use this attribute in a comparable manner when classifying pottery.

Figure 6 displays in an area graph the data presented in Table 17. This graph illustrates that except for four sherds, all small temper sizes in Promontory Gray and Shoshoni Ware are shared with measurements found within Great Salt Lake Gray. Thus, the data show that separate and distinct categories of smallest temper size are not present

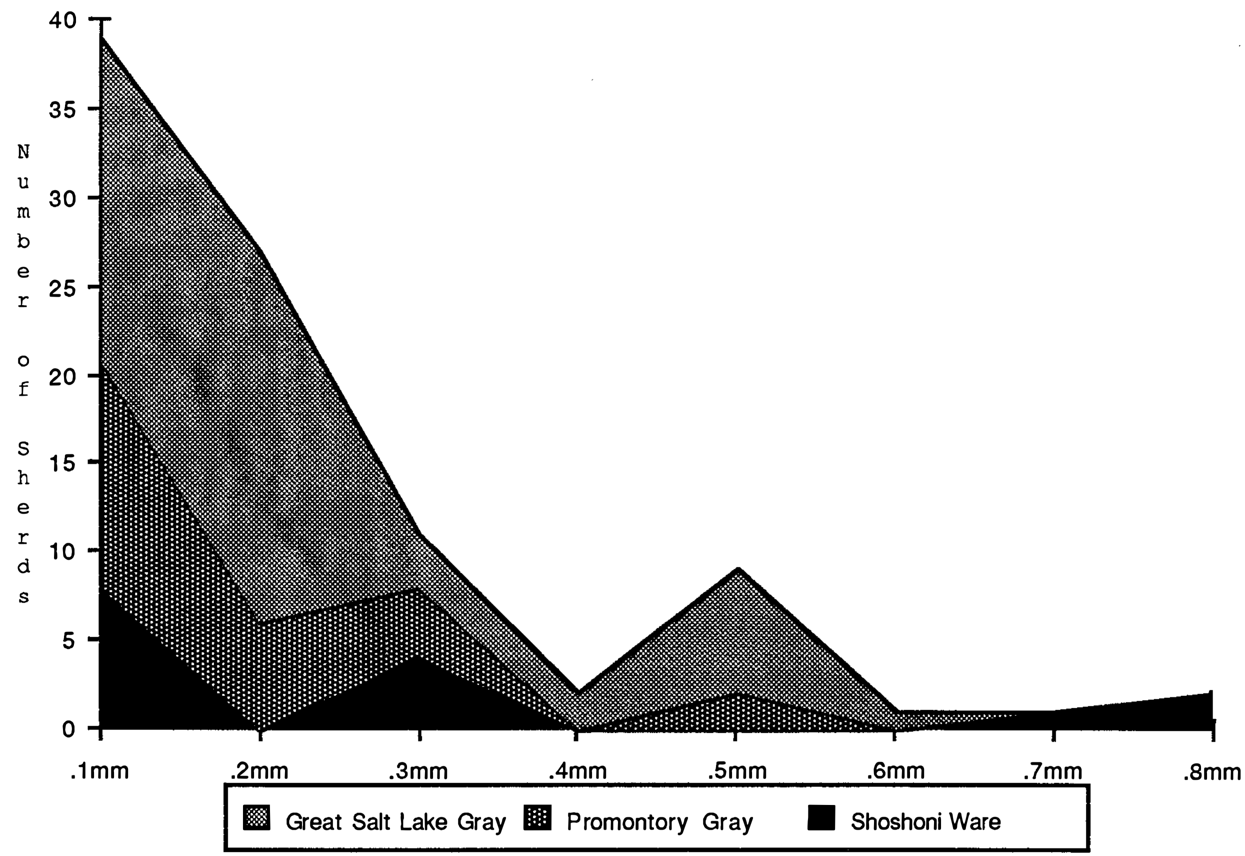


FIGURE 6. Area Graph of Smallest Temper Size in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware (N = 93).

and, therefore, do not support the recognition of three separate and distinct pottery types.

Range of Temper Sizes

Formal descriptions note a wide range of temper sizes in all three pottery types (Table 12). From these descriptions, it is unclear how the range of temper size was calculated for the three types. The common method is merely the difference between the smallest and largest particle size (Doran and Hodson 1975:30), and I assume it to be the method employed in the formal descriptions. Therefore, in this study I, too, will measure the "range" of temper particles in previously classified sherds by calculating the difference between the largest particle size and the smallest found in each sherd examined by thin section. These size categories are detailed for each sherd in Appendix C. When both the smallest and largest lengths of temper material are measured, only 33% of previous type assignment is explained ($R^2 = 0.3277$). This indicates that the attribute of the range of temper sizes is either not important in defining a type; that it covaries with other attributes; or that individual excavators and analysts simply used particle size in a incomparable manner when classifying the pottery into groups.

On the other hand, as Appendix C of this study details, all sherds contain clay and temper particles in the form of free minerals and rock fragments, and except for those sherds with calcite temper, clays are derived from the same geologic sources as temper materials. Notably, when the smallest and largest temper sizes are combined (from Tables 15 and 17) and the frequency distribution is displayed (Figure 7), a continuous distribution of particle size ranging from small to large is produced. This distribution undoubtedly represents the continuum of particle size which naturally results from procuring clay and temper material from a common source.

Techniques of Shaping

How raw materials are shaped into a vessel is said to be critical in separating Promontory Gray from Great Salt Lake Gray and Shoshoni Ware (Table 19). It has been commonly asserted that Promontory Gray can be distinguished from Great Salt Lake Gray by the paddle-and-anvil shaping technique (Aikens 1966:29; R. Madsen 1977:23). Two techniques of shaping have been identified for historic Shoshoni pottery. In the eastern subarea, the Historic Promontory Shoshoni are described as molding the lower part of the vessel by hand, presumably before coiling the sides. In the western subarea, vessels were shaped only by coiling (Steward 1943:319, 375). My observations led me to question earlier statements about paddle-and-anvil shaping of pottery in the Great Salt Lake region, and I set out to test this assertion.

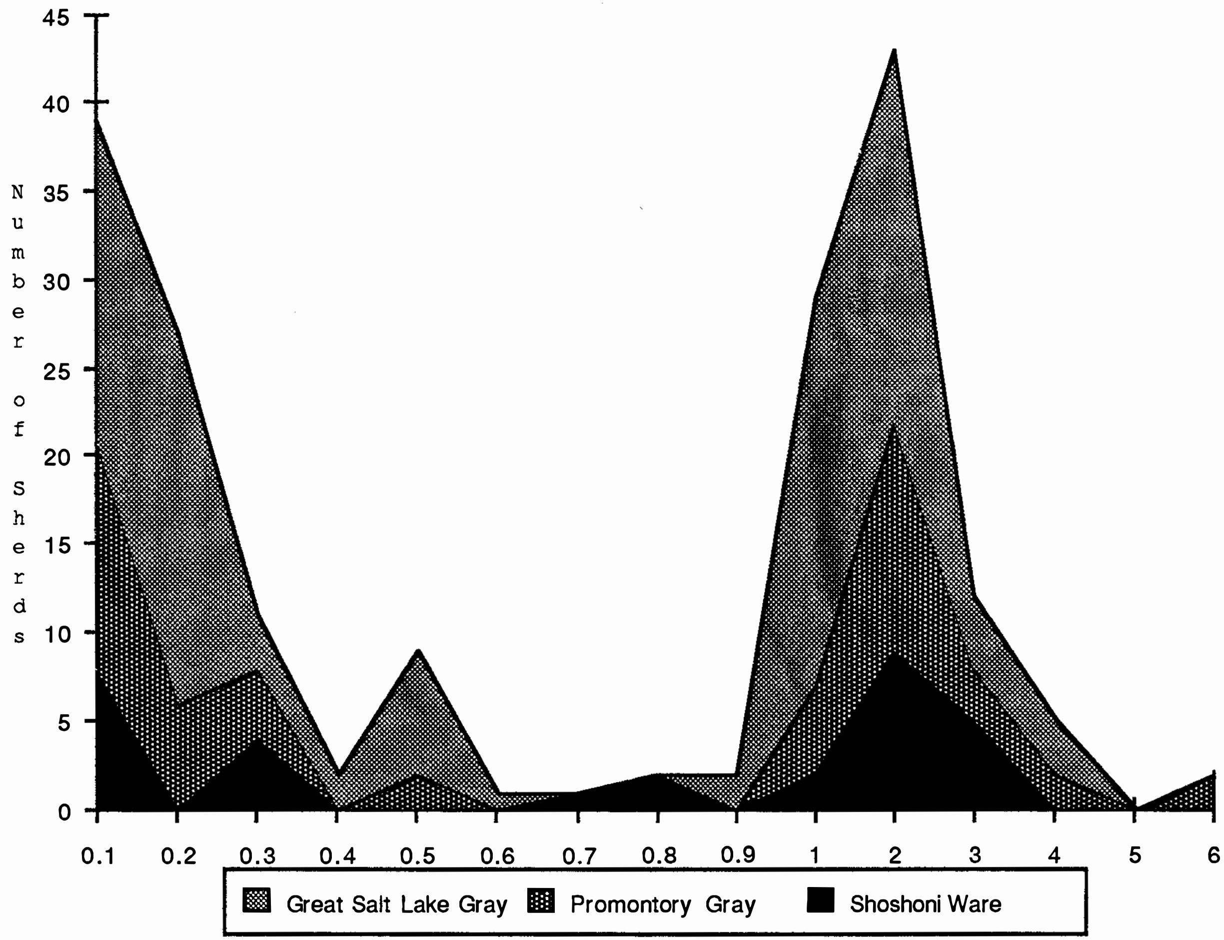


FIGURE 7. Frequency of Smallest and Largest Temper Size Measured (in mm.) in Each Sherd of Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware in Small Data Set (N = 93).

TABLE 19. Range of Shaping Techniques in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware According to Rudy (1953) and R. Madsen (1977)

Type Name	Technique of Shaping	Citation
Great Salt Lake Gray	Coiled	Rudy 1953:81
	Coiled	R. Madsen 1977:19
Promontory Gray	(?)	Rudy 1953:93
	Paddle and anvil	R. Madsen 1977:23
Shoshoni Ware	Coiled and molded	Rudy 1953:94

Quantifiable evidence of primary vessel shaping is verydifficult to obtain macroscopically because secondary forming or thinning techniques often obscure it (Rudy 1953:93-94; Rye 1981; Shepard 1956:183). However, in analyzing paddle-and-anvil made pottery, distinguishing the concave impressions of the round-rock anvil on one surface and the flattened region produced on the opposite surface by the paddle is generally easy, even in well-smoothed pottery (Rice 1987:136-137). No such characteristic combination of impressions was noted on any sherd surfaces I studied from the Great Salt Lake region.

A further test was conducted by examining pottery from the study area (Table 20) for evidence that it may have been shaped by coiling as compared to a paddle-and-anvil technique. Shepard suggested that evidence of coil forming might be discerned microscopically, as clay and temper particles probably would manually be aligned to the direction the coil was being rolled (1956:184). Rye (1981:68-86) confirmed Shepard's thought and noted that evidence of several other different shaping techniques could be found in the orientation of temper inclusions. He found that the orientation varied, however, with the direction of the thin section cut. For example, if a vessel is shaped by coiling but the thin section sample is cut perpendicular to the direction of the coil, orientation of the inclusions will appear random. If the cut is taken parallel to the coil lines, inclusions will be parallel. Evidence for hand-molded pottery is less clear in thin section. Rye suggests that hand-molding, like the paddle-and-anvil technique, probably results in little or no orientation of inclusions (1981:70).

In my study, the direction of the thin section slice to the coil is difficult to determine, as body sherds lack the obvious directional markers found on rim or bottom fragments. But as Tables 20 and 21 indicate, most sherds examined in this study had distinct parallel orientation of the clay and temper particles. This is considered to be evidence of coiling. Five sherds classified as Great Salt Lake Gray, and four Shoshoni sherds, show no orientation of their inclusions (Table 21). This is either because these sherds

Table 20. Archaeological Sites from which Orientation of Temper Inclusions is Observed in Each Sherd from Small Data Set

Site	Oriented Inclusions	Random Inclusions
	Great Salt Lake Gray	
42BO36	9	1
42BO55	3	0
42BO107	5	0
42BO109	4	0
42BO110	2	1
42BO268	2	0
42BO265	1	0
42SL1	2	0
42TO5	1	0
42TO6	1	0
42TO10	2	0
42TO13	7	2
42WB34	5	1
42WB297	2	0
26EK8	1	0
	47	5
	Promontory Gray	
42BO1	5	0
42BO5	1	0
42BO120	5	1
42BO385	10	0
42TO64	3	0
	24	1
	Shoshoni Ware	
42BO36	5	2
42BO268	1	0
42BO365	1	0
42TO13	2	2
42TO20	1	0
26EK8	2	0
	12	4
Total (N = 93)		

TABLE 21. Orientation of Temper Inclusions from Small Data Set in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Type	Oriented Inclusion	Random Inclusions
Great Salt Lake Gray	47	5
Promontory Gray	24	1
Shoshoni Ware	12	4
Total (N = 93)	83	10

were not shaped by coiling or because the thin section slice was cut perpendicular to the direction of the coil. However, the central importance of these tables is to illustrate that shaping techniques are the same for Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware. In particular, there is no replicable, quantifiable evidence to indicate that Promontory Gray is shaped by any other technique than coiling.

Conclusions of Univariate Analyses

Few of the expectations derived from traditional typologies for type assignment based on individual attributes have been met by the data presented here. First, there is a wider range of temper materials used to make sherds previously identified as Great Salt Lake Gray and Promontory Gray than to make those identified as Shoshoni Ware, in contrast to statements that temper materials are more variable in Shoshoni Ware (e.g., D. Madsen 1986:209). Also, no forms of temper were used to make Shoshoni Ware that were not also used in Great Salt Lake Gray, contrary to statements that Great Salt Lake Gray had only volcanic glasses, quartz, and "sand" particles (R. Madsen 1977:19; Rudy 1953:81). Finally, Promontory Gray is not manufactured by paddle-and-anvil shaping but, like Great Salt Lake Gray and Shoshoni Ware, was shaped by coiling.

In short, systematic identification and descriptive and comparative statistics indicate that temper and shaping attributes simply do not explain previous pottery type assignments at all well. However, since most of the formal typologies do not specifically weight one attribute over another, it may be that some combination of attributes could have served as the basis for separation (cf., D. Madsen 1986; Rudy 1953). The following section will examine whether traditional type and ware assignments can be explained consistently by using combinations of the individual attributes identified and measured in the previous section of this chapter.

Multivariate Analysis of Attributes

The preceding section demonstrated that type assignments could be explained only 11% to 29% of the time on the basis of various single attributes, even when the major attributes were correctly identified and systematically measured. This low relationship is due to the fact that most attributes are shared between the three groups of pottery. Although the formal descriptions do not specifically weight one attribute over another, it may be that some unspecified combination of certain attributes served _de facto_ as the basis for classification.

The following section examines whether combining several attributes leads to improved estimates of previous type assignment. I cannot, however, conclude from the formal descriptions what these combinations may have been, as the attributes are weighted equally. Further, individual excavators and analysts have not always consistently used the same criteria at any given archaeological site. For example, attributes of thicker walls and predominantly black exterior color separated Shoshoni Ware from Fremont types at Hogup Cave (Aikens 1970:32). On the other hand, Shoshoni pottery from Swallow and Thomas shelters is set apart from Fremont types by thinner vessel walls and tan to "dark" exterior colors (Dalley 1976:56, 88).

Similarly, the geological origin and size of temper particles have not always been used consistently by individual excavators and analysts. For example, D. Madsen noted that at the Levee and Knoll sites, quartz temper was found to occur in both Great Salt Lake Gray and Promontory Gray, and temper size was "ungraded" in both Fremont types

(1979:96). However, Great Salt Lake Gray at Swallow Shelter is described as having quartz temper ranging from fine to medium size. Likewise, Shoshoni Ware at Swallow Shelter was characterized by mostly medium-sized quartz temper (Dalley 1976:54, 56).

The following section examines two combinations of attributes. From measurements in the large data set, exterior surface color and wall thickness are together compared against previous type assignment. From measurements in the small data set, temper material, wall thickness, and type assignment are examined. Also from measurements in the small data set, temper material and three categories of temper size are examined in relation to previous type assignment. I chose to test these combinations because they are described as important criteria in classifying pottery at individual archaeological sites (e.g., Aikens 1966:33, 1970:31-32; Berry 1976:119; Dalley 1976:55-56, 88-90; D. Madsen 1979:80-81), and because these elements are objectively determined in my data base.

Exterior Surface Color and Wall Thickness

Attributes of wall thickness and exterior surface color from the large data set (N = 1,923) are presented in Figures 8,9, and 10. In Figure 8, lines are drawn around the largest concentrations of sherds to illustrate that there is a wide range of variation in these two attributes among sherds

Walls (mm)	Light Gray	Gray	Dark Gray	Black	Dark Brown	Brown	Light Brown
2	0	0	0	0	0	0	0
3	4	0	1	171	0	0	0
4	28	15	20	173	13	11	11
5	8	3	18	375	4	0	13
6	70	0	3	218	76	0	147
7	1	0	2	1	1	0	0
8	0	0	1	0	0	0	0
9	0	0	0	0	0	0	0
10	1	0	2	0	0	0	0
11	0	0	0	0	0	0	0
12	0	0	6	0	0	0	0

FIGURE 8. Exterior Color Categories and Vessel Wall Thickness in Great Salt Lake Gray (N = 1,397).

Walls mm)	Light Gray	Gray	Dark Gray	Black	Dark Brown	Brown	Light Brown
2	0	0	0	0	0	0	0
3	17	0	45	84	8	0	1
4	3	0	0	0	0	0	0
5	9	0	1	14	13	0	0
6	10	1	32	96	0	0	0
7	2	0	0	11	13	0	0
8	1	0	0	0	0	0	0
9	0	0	0	25	0	0	0
10	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0

FIGURE 9. Exterior Color and Vessel Wall Thickness in Promontory Gray (N = 386).

Walls (mm)	Light Gray	Gray	Dark Gray	Black	Dark Brown	Brown	Light Brown
2	0	0	1	0	0	0	0
3	0	0	4	1	0	0	0
4	0	0	7	3	0	0	0
5	1	13	13	9	1	0	0
6	0	0	34	6	1	0	0
7	0	1	13	0	0	0	0
8	0	1	1	25	0	0	0
9	0	0	2	0	0	0	0
10	1	0	0	1	0	0	0
11	0	0	0	0	0	0	0
12	0	0	0	1	0	0	0

FIGURE 10. Exterior Color and Vessel Wall Thickness in Shoshoni Ware (N = 140).

previously classified as Great Salt Lake Gray. Also, note that concentrations of these two attributes in Promontory Gray (Figure 9) and Shoshoni Ware (Figure 10) are similar to the concentration found in Great Salt Lake Gray.

Figure 8 illustrates that all wall thickness measurements and exterior color categories examined are found in sherds previously classified as Great Salt Lake Gray. Of all Great Salt Lake Gray sherds (N = 1,373), 98% have wall thickness measurements between 3 to 6 millimeters, described as typical of the Great Salt Lake Gray type (R. Madsen 1977:19). However, 68% of all Great Salt Lake Gray sherds have black exterior surface color, described by Rudy (1953:93) as the typical color of Promontory Gray.

Similarly, Figure 9 depicts exterior color categories and wall thickness measurements of sherds in the large data set which were previously typed as Promontory Gray (N = 386). This figure shows that of all Promontory Gray sherds, 87% share the same range of wall thickness measurements, between 3 and 6 millimeters, with those wall thickness measurements found in sherds classified as Great Salt Lake Gray (Figure 4). Further, of the 334 sherds which are 3.0 to 6.0 mm thick, 69% are also black. Thus, almost 70% of Promontory Gray and Great Salt Lake Gray examined in this study share the same wall thickness measurements and the exterior color category of black. Similarly, 36% of all Promontory Gray sherds share wall thickness measurements between 3.0mm and

6.0mm and color categories of browns or grays with sherds classified as Great Salt Lake Gray.

Finally, Figure 10 combines wall thickness and exterior color in sherds previously identified as Shoshoni Ware (N = 140). A line drawn around areas of numerical concentration indicates that, as seen in Promontory Gray and Great Salt Lake Gray, 66% of all sherds classified as Shoshoni Ware (N = 140) have wall thickness measurements between 3 and 6 millimeters. Among the 93 sherds, 47% are black. Also, Shoshoni Ware shares the same color categories and wall thickness measurements with sherds previously classified as Great Salt Lake Gray and Promontory Gray.

As noted earlier, individual excavators have used vessel wall thickness and exterior surface color in incomparable ways to distinguish wares and types (cf., Aikens 1970:32; Dalley 1976:56, 88). To quantitatively measure to what degree these attributes together might explain previous type assignment, a coefficient of determination (R^2) was performed by means of a polynomial, multivariate logistic regression analysis (BMDP Software 1990). Vessel wall thickness for each color category was examined and measured against previous type assignment (Table 2).

As Table 22 illustrates, previous type assignment of the 1,923 sherds in the large data set can be predicted better in exterior color categories when vessel wall thickness measurements are considered. For example, regardless of wall thickness, all (N = 182) medium and light brown sherds but one have previously been classified as one type, Great Salt Lake Gray. Wall thickness and dark brown-colored sherds explain 74% of previous type assignment ($R^2 = 0.7385$). However, as Figures 8,9, and 10 show, only 2 dark brown sherds are classified as Shoshoni Ware. The remaining 128 are either Great Salt Lake Gray (N = 94) or Promontory Gray (N = 34). Thus, wall thickness measurements in dark brown sherds distinguishes Shoshoni Ware from Great Salt Lake Gray and Promontory Gray, but does not distinguish Great Salt Lake Gray from Promontory Gray.

Similarly, wall thickness and medium gray exterior color together explain 72% of previous type assignment ($R^2 = 0.7166$). However, as Figures 8,9, and 10 show, only 1 sherd was classified as Promontory Gray. The remaining 33 are either Great Salt Lake Gray (N = 18) or Promontory Gray (N = 15). Thus, wall thickness measurements in medium gray sherds distinguishes Promontory Gray from Great Salt Lake Gray and Shoshoni Ware, but do not distinguish Great Salt Lake Gray from Shoshoni Ware.

Light gray color and wall thickness measurements together explain previous type assignment only 23% ($R^2 = 0.2335$). Similarly, black exterior color and wall thickness measurements together explain previous type assignment only 34% of the time ($R^2 = 0.3380$). These low values occur because sherds from all three pottery groups share both color

Table 22. Coefficients of Determination of Vessel Wall Thickness and Individual Exterior Color Categories in Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware

Exterior Color	R^2	N
Light Gray and Wall Thickness	0.2335	156
Medium Gray and Wall Thickness	0.7166	34
Dark Gray and Wall Thickness	0.5332	206
Black and Wall Thickness	0.3734	1,212
Dark Brown and Wall Thickness	0.7385	130
Medium Brown and Wall Thickness	1.0000	13
Light Brown and Wall Thickness	1.0000	172

Note: N = 1,923.

categories and the same range of wall thickness measurements, between 3.0 and 6.0mm.

In sum, combining the two attributes of vessel wall thickness and exterior color better explains previous type assignment in several instances. Yet in no instance does vessel wall thickness and exterior color give evidence of three distinct pottery types, because they have either been classified as Great Salt Lake Gray or cannot be distinguished from Great Salt Lake Gray.

Temper Material, Wall Thickness, and Temper Size

Except for calcite temper, all categories of temper material found in sherds identified as Promontory Gray or Shoshoni Ware fall within the range for sherds identified as

Great Salt Lake Gray. Several of the eleven categories of temper material, however, have too few sherds in them to be of use statistically. In the following discussion, I first present individual categories of temper material and then reduce them to three temper categories. One category is composed of forms of temper that are dominated by feldspar minerals and rock fragments (i.e., andesite, andesite/basalt, granite, welded tuff, volcanic ash, rhyolite, obsidian). A second category includes sherds dominated by quartz minerals and rock fragments (i.e., quartzite, mixture of quartzite and andesite/basalt, and schist). A third category is composed of sherds with calcite temper.

Previous type assignments are compared against two combinations of attributes from measurements in the small data set. First, temper material and wall thickness measurements are examined; then, temper material and three size categories (largest, smallest, and the range of both sizes) are detailed.

Temper Material and Wall Thickness

Forms of temper material and wall thickness measurements were combined for the 93 sherds examined in the small data set and examined against previous type assignment (Table 23). As this table details, regardless of temper material, most sherds previously classified as Great Salt Lake Gray have wall thickness measurements which are between 3 and 6 millimeters, and most sherds classified as Promontory Gray or Shoshoni Ware also fall within this pattern. In this analysis, combining attributes of wall thickness and temper fails to provide any apparent discrimination among the three pottery categories

The temper categories shown in Table 23 were then collapsed to produce Table 24: one category is composed of tempers which are mostly feldspar, one is tempers which are mostly quartz, and the third category is calcite temper. From the three categories in Table 24, the coefficient of determination (R^2) was calculated to examine whether knowing the two attributes of wall thickness and temper material explains previous type assignment (Table 25).

As Table 25 illustrates, previous type assignment can be explained only 45% of the time when wall thickness measurements are combined with sherds made mostly of feldspar temper (R^2 = 0.4506). But in sherds that are made of mostly quartz temper, type assignment is explained only 20% of the time when the two attributes are combined (R^2 = 0.1991). Thus, the data show that separate and distinct categories of temper material and vessel wall thickness measurements are not present and, therefore, do not support the recognition of three separate and distinct pottery types.

Table 23. Wall Thickness Measurements (in mm.) and Temper Material Observed in Small Data Set

				Great Salt Lake Gray					
Temper	2	3	4	5	6	7	8	9	10
Andesite	0	2	6	7	2	0	0	0	0
Quartzite	0	1	2	3	0	2	0	0	0
Granite	0	0	1	2	2	0	0	0	0
Mixed	0	0	0	2	1	0	0	0	0
Schist	0	1	4	0	0	0	0	0	0
Andesite/Bas.	0	0	0	1	0	0	0	0	0
Volcanic Ash	0	0	0	2	0	0	0	0	0
Rhyolite	0	0	1	2	0	0	0	0	0
Obsidian	0	1	2	0	2	0	0	0	0
Welded Tuff	0	0	0	1	1	0	0	0	1
	0	5	16	20	8	2	0	0	1
				Promontory Gray					
Andesite	0	1	1	3	0	0	0	0	0
Quartzite	0	0	1	3	1	0	0	1	0
Granite	0	0	0	1	0	0	0	0	0
Mixed	0	0	0	1	0	0	0	0	0
Schist	0	0	1	1	0	0	0	0	0
Andesite/Bas.	0	1	0	1	0	0	0	0	0
Volcanic Ash	0	0	0	1	0	0	0	0	0
Calcite	0	0	2	4	1	0	0	0	0
	0	2	5	15	2	0	0	1	0
				Shoshoni Ware					
Andesite	0	0	0	1	1	0	0	0	0
Quartzite	0	0	2	2	1	1	0	1	0
Granite	0	0	0	1	1	0	1	1	0
Mixed	0	0	1	2	0	0	0	0	0
	0	0	3	6	3	1	1	2	0
Total (N = 93)									

Table 24. Wall Thickness Measurements (in mm.) and Quartz, Feldspar, or Calcite Temper in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper	2	3	4	5	6	7	8	9	10
				Great Salt Lake Gray					
Quartz	0	2	6	5	1	2	0	0	0
Feldspar	0	3	10	15	7	0	0	0	1
Calcite	0	0	0	0	0	0	0	0	0
	0	5	16	20	8	2	0	0	1
				Promontory Gray					
Quartz	0	0	2	5	1	0	0	1	0
Feldspar	0	2	1	6	0	0	0	0	0
Calcite	0	0	2	4	1	0	0	0	0
	0	2	5	15	2	0	0	1	0
				Shoshoni Ware					
Quartz	0	0	3	4	1	1	0	1	0
Feldspar	0	0	0	2	2	0	1	1	0
Calcite	0	0	0	0	0	0	0	0	0
	0	0	3	6	2	1	1	2	0
Total (N = 93)									

Table 25. Coefficient of Determination of Temper Material and Wall Thickness Measurements in Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware

Temper Material	R^2	N
Andesite	0.4506	51
Quartzite	0.1991	35
Marble	1.000	7

Note: N = 93.

Temper Material and Temper Sizes

The final combination of attributes examines previous type assignment when temper material and temper sizes are combined. However, as noted earlier in this chapter, how temper size was calculated for each pottery type is unclear. Does "coarse", "medium", or "fine" temper size refer to the largest size in each sherd, or within each type? Similarly, does "range" refer to the difference between the largest and smallest temper particle in each sherd, or is it the difference between the largest and smallest particle sizes in the type as a whole? Finally, is "variability" and "ungraded" the same as "range"?

Because I am unsure how the size of temper material was determined and how it was used to separate sherds into types when other attributes were combined, I separated temper size into three categories and examined each with the various forms of temper material and previous type assignment. The first size category is the length of the largest particle size in each sherd; the second size category is the length of the smallest particle size in each sherd; finally, a third size category is composed of both the smallest and the largest temper size categories.

Each of the three temper size categories is examined as separate calculations in the following discussion. First, the largest temper size, temper material, and type assignment is recorded for each of the 93 sherds. Then the eleven distinct forms of temper are reduced to three larger temper categories: those that are mostly feldspar, quartz, or calcite. From this, a coefficient of determination (R^2) is calculated to ascertain whether knowing temper material and the largest temper size in a sherd explains how the sherd was classified. Similar procedures are then performed for the category of smallest temper size, and finally for the range--the difference between the largest and the smallest temper particle.

Largest Temper Size and Temper Material

Table 26 combines the attributes of maximum dimension of the largest temper particle, form of temper material, and previous type assignment in each sherd from the small data set (N = 93). This table details that regardless of temper material, the largest size of temper material in most Great Salt Lake Gray pottery is 1 to 3 mm in maximum length.

Table 26. Temper Material and Largest Temper Size (in mm.) in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper	<1	1	2	3	4	5	6
			Great Salt Lake Gray				
Andesite	1	13	2	0	1	0	0
Quartzite	0	0	5	2	1	0	0
Granite	0	3	1	1	0	0	0
Mixed	1	2	0	0	0	0	0
Schist	0	2	3	0	0	0	0
Andesite/Bas.	0	1	0	0	0	0	0
Volcanic Ash	0	0	2	0	0	0	0
Rhyolite	0	0	1	1	1	0	0
Obsidian	0	0	5	0	0	0	0
Welded Tuff	0	1	2	0	0	0	0
	2	22	21	4	3	0	0
			Promontory Gray				
Andesite	0	2	3	0	0	0	0
Quartzite	0	0	2	1	1	0	2
Granite	0	0	1	0	0	0	0
Mixed	0	0	1	0	0	0	0
Schist	0	1	1	0	0	0	0
Andesite/Bas.	0	2	0	0	0	0	0
Volcanic Ash	0	0	1	0	0	0	0
Calcite	0	0	4	2	1	0	0
	0	5	13	3	2	0	2
			Shoshoni Ware				
Andesite	0	1	1	0	0	0	0
Quartzite	0	0	3	4	0	0	0
Granite	0	1	3	0	0	0	0
Mixed	0	0	2	1	0	0	0
	0	2	9	5	0	0	0
Total (N = 93)							

Similarly, the largest temper sizes in Promontory Gray and Shoshoni Ware are mostly 2 to 3 mm.

The eleven distinct forms of temper material were then reduced to three categories: those that are mostly feldspar, mostly quartz, or calcite (Table 27). From data derived in

Table 27. Largest Temper Size (in mm.) and Quartz, Feldspar, or Calcite Temper in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper	<1	1	2	3	4	5	6
Great Salt Lake Gray							
Quartz	1	4	8	2	1	0	0
Feldspar	1	18	13	2	2	0	0
Calcite	0	0	0	0	0	0	0
	2	22	21	4	3	0	0
Promontory Gray							
Quartz	0	1	4	1	1	0	2
Feldspar	0	4	5	0	0	0	0
Calcite	0	0	4	2	1	0	0
	0	5	13	3	2	0	2
Shoshoni Ware							
Quartz	0	0	5	5	0	0	0
Feldspar	0	2	4	0	0	0	0
Calcite	0	0	0	0	0	0	0
	0	2	9	5	0	0	0
Total (N = 93)							

Table 27, the coefficient of determination (R^2) was calculated to examine whether knowing the largest temper size and the temper material in any sherd explains previous type assignment (Table 28).

Table 28. Coefficient of Determination Levels of Temper Material, Largest Temper Size Measurements in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper Material	R^2	N
Andesite	0.2988	51
Quartzite	0.1749	35
Marble	1.000	7

Note: N = 93.

As Table 28 details, previous type assignment can be explained only 30% of the time when the largest temper size measurements are combined with feldspar temper (R^2 = 0.2988). In sherds that are made of mostly quartz temper, type assignment is explained only 17% of the time (R^2 = 0.1749). Thus, the data show that separate and distinct categories of temper material and measurements of the largest temper size do not support the recognition of three separate and distinct pottery types.

Smallest Temper Size and Temper Material

Table 29 combines the two attributes of the maximum length of the smallest temper particle, form of temper material, and previous type assignment in each sherd from the small data set (N = 93). Regardless of temper material, the smallest temper material in most Great Salt Lake Gray pottery cluster around .1 to .2 mm in maximum length. Smallest temper size in Promontory Gray is also between .1 and .2mm. The smallest temper size in Shoshoni Ware is mostly .1 or .3mm.

The eleven distinct forms of temper material were then reduced to three categories: those that are mostly feldspar, quartz, or calcite (Table 30). From data derived from Table 30, the coefficient of determination was calculated to examine whether knowing the two attributes of small temper sizes and temper materials explains previous type assignment (Table 31).

As Table 31 details, previous type assignment can be explained only 24% of the time when the largest temper size measurements are combined with feldspar temper ($R^2 = 0.2357$). But in sherds that are made of mostly quartz temper, type assignment is explained only 17% of the time ($R^2 = 0.1732$). These coefficients are remarkably similar to those which examine the largest temper sizes (Table 28). Thus, the data show that separate and distinct categories of temper material

Table 29. Temper Material and Smallest Temper Size (in mm.) in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper	.1	.2	.3	.4	.5	.6	.7	.8
Great Salt Lake Gray								
Andesite	8	8	0	1	0	0	0	0
Quartzite	6	1	1	0	0	0	0	0
Granite	1	2	0	0	1	1	0	0
Mixed	1	1	0	0	1	0	0	0
Schist	0	1	1	1	2	0	0	0
Andesite/Bas	0	0	1	0	0	0	0	0
Volcanic Ash	0	1	0	0	1	0	0	0
Rhyolite	2	1	0	0	0	0	0	0
Obsidian	0	5	0	0	0	0	0	0
Welded Tuff	0	1	0	0	2	0	0	0
	18	21	3	2	7	1	0	0
Promontory Gray								
Andesite	1	2	2	0	0	0	0	0
Quartzite	6	0	0	0	0	0	0	0
Granite	0	0	1	0	0	0	0	0
Mixed	0	1	0	0	0	0	0	0
Schist	0	1	0	0	1	0	0	0
Andesite/Bas	1	0	0	0	1	0	0	0
Volcanic Ash	0	1	0	0	0	0	0	0
Calcite	5	1	1	0	0	0	0	0
	13	6	4	0	2	0	0	0
Shoshoni Ware								
Andesite	0	0	2	0	0	0	0	0
Quartzite	5	0	2	0	0	0	0	0
Granite	1	0	0	0	0	0	1	2
Mixed	2	0	0	0	0	0	0	1
	8	0	4	0	0	0	1	3
Total (N = 93)								

Table 30. Smallest Temper Size (in mm.) and Quartz, Feldspar, or Calcite Temper in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper	.1	.2	.3	.4	.5	.6	.7	.8
Great Salt Lake Gray								
Quartz	7	3	2	1	3	0	0	0
Feldspar	11	18	1	1	4	1	0	0
Calcite	0	0	0	0	0	0	0	0
	18	21	3	2	7	1	0	0
Promontory Gray								
Quartz	6	2	0	0	1	0	0	0
Feldspar	2	3	3	0	1	0	0	0
Calcite	5	1	1	0	0	0	0	0
	13	6	4	0	2	0	0	0
Shoshoni Ware								
Quartz	7	0	2	0	0	0	0	1
Feldspar	1	0	2	0	0	0	1	2
Calcite	0	0	0	0	0	0	0	0
	8	0	4	0	0	0	1	3
Total (N = 93)								

Table 31. Coefficient of Determination Levels of Reduced Categories of Temper Material and Smallest Temper Sizes in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper Material	R^2	N
Andesite	0.2357	51
Quartzite	0.1732	35
Calcite	1.000	7

Note: N = 93.

and measurements of small temper sizes do not support the recognition of three separate and distinct pottery types.

Range of Temper Sizes and Temper Material

Because the range of temper sizes are described in formal descriptions as being important in separating pottery into wares and types, the difference between the largest and the smallest temper sizes was calculated. The range of temper size was combined with one of the three reduced categories of temper materials, and together were examined with previous type assignment in each sherd from the small data set (N = 93). These measurements are detailed for each sherd in Appendix C. The coefficient of determination was calculated to examine whether knowing both the largest and smallest temper size plus the temper material in each sherd explains previous type assignment (Table 32).

Table 32. Coefficient of Determination Levels of Reduced Categories of Temper Material and the Range of Temper Sizes in Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware

Temper Material	R^2	N
Andesite	0.4586	51
Quartzite	0.4072	35
Marble	1.000	7

Note: N = 93.

As Table 32 demonstrates, when the range of temper sizes are combined with sherds made of mostly feldspar temper, type assignment can be explained only 46% of the time (R^2 = 0.4586). This is a level similar to knowing only the largest temper size (Table 28). The coefficient is higher in sherds that are mostly quartz-tempered, as type assignment can be explained 41% of the time when the range of temper size is combined with temper material (R^2 = 0.4072). However, the data show that separate and distinct categories of temper material and the range of temper sizes do not support the recognition of three separate and distinct pottery types. Obviously type assignment can be made 100% of the time in sherds tempered with calcite regardless of temper size, as calcite temper has never been classified as present in any pottery type other than Promontory Gray.

Summary

This chapter demonstrates that neither individual attributes nor combinations of attributes explain how pottery sherds were classified in collections from the Great Salt Lake region under examination in this study. The conclusion that repeatedly emerges from this analysis is that sherds previously classified as Promontory Gray or Shoshoni Ware fit well within the range of attributes and measurements of those sherds previously classified as Great Salt Lake Gray.

Formal typologies do not weight one attribute over another, and no taxonomic key is provided to form exclusive classes; it appears that, in practice, individual excavators and analysts initiated group separation by selecting, *ad hoc*, one or more attributes as distinguishing features. But different attributes were apparently given decisive weights at different sites. Precisely what was done in in individual cases cannot now be deduced. The discrepancy between formal descriptions and detailed observations that is documented in this study comes about seemingly because no systematic attempt was made by previous investigators to incorporate their *ad hoc* weighted attributes back into the formal descriptions in a systematic manner.

From data described and discussed in Chapter Two, I reject the earlier notion that more than one pottery tradition is represented in the sherds I have studied. Chapter Three will examine this conclusion in further detail.

CHAPTER III

CONTINUITY AND VARIATION IN MEASURED ATTRIBUTES: DISCUSSION AND CONCLUSION OF THIS STUDY

In the preceding chapters I demonstrated that neither formal typologies nor descriptions of pottery from individual sites explained how pottery of the Great Salt Lake region has been classified into Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware. Formal descriptions do not provide taxonomic rules to deal with the equally-weighted attributes. The result has been a weighting of attributes *ad hoc*, formulated on a site-to-site basis by individual excavators, and many of the results are contradictory. Further, the conflicting weighting schemes have not been systematically incorporated back into the formal descriptions, and over time it has become unclear exactly what distinguishes, and thus justifies, separating pottery into types and wares.

Pottery has been and continues to be the preeminent marker for defining later culture history in this region (Forsyth 1986:180-203; Jennings 1978:235; D. Madsen 1986:208-211; Metcalfe and Shearin 1989:9; though see Simms 1990:3). Yet insistence on classifying the pottery into traditional types and wares has led to some historical enigmas.

First, the apparent limitation of Shoshoni Ware to only the western subarea of the Great Salt Lake region seems odd when it is considered that the entire region was occupied by the pottery-making historic Shoshoni (Steward 1943:273-274; 319). A similar problem is the spatial localization of a Promontory Gray tradition in only the eastern subarea, when at least one site in the western subarea, Danger Cave, yielded essentially the same artifacts [except pottery] in about the same sequences as found at sites in the eastern subarea (Jennings 1957:181, 270). Finally, Promontory Gray does not occur by itself at small mound sites in the eastern subarea. Rather, it is always found in association with Great Salt Lake Gray. Similarly, Shoshoni Ware is always associated with Fremont types at cave sites in the western subarea. These circumstances have not been explained, or indeed even seriously addressed.

When individual attributes or combinations of attributes from pottery collections selected for reanalysis were identified correctly, as was done in the previous chapter, those formerly considered distinctive of Shoshoni Ware or Promontory Gray actually fell within the overall range of variation for only one pottery group, Great Salt Lake Gray. Therefore, I concluded that there was inadequate evidence to support separate classifications. I now argue that the evidence suggests a single pottery tradition, with minor local variation in pottery conditioned mostly by functional variables.

To support this argument, I first demonstrate spatial and temporal continuity in several attributes specific to the pottery analyzed in this study (and in the larger archaeological record), linking the historic and prehistoric periods. I then offer interpretations and speculations derived from the data to explain variation in the remaining attributes.

Continuity of Attributes

Some pottery attributes detailed in Chapter Two have considerable time depth and are widely distributed spatially. Further, other material items described in the ethnographic literature are widely found in the prehistoric record as well (cf., Jennings 1957 and Steward 1943). The common-sense method of linking the material assemblages of historic cultures with stylistically similar, but prehistoric, assemblages from the same area is termed the direct historical approach. The first step in this approach is to define artifacts from historically identified groups (Strong 1935; Wedel 1938). Fortunately, Steward (1943) systematically recorded many material items of the historic Shoshoni groups who occupied the Great Salt Lake region. Specifically, he recorded that all historic Shoshoni groups in this region made an undecorated pottery. He described some attributes which were common to all groups, particularly the technique of vessel construction by coiling. Other attributes, such as varieties of raw materials, were less clearly defined and may have varied between groups, but they are detailed for the pottery made by one group, the historic Shoshoni who occupied the Promontory Point region in the eastern subarea (Steward 1943:273, 319, 375). To examine the relationship between Shoshoni Ware and the Fremont types, Great Salt Lake Gray and Promontory Gray, the following section discusses the temporal continuity of several important attributes from the historic to the prehistoric periods.

Temper Material

Steward recorded that the historic Shoshoni at Promontory Point added temper to their pottery clay, which was crushed rock "like lime" (1943:319, 375). Calcite, which is a rock "like lime", is also found in pottery from prehistoric sites in and around Promontory Point. Two prehistoric sites, Promontory Point Cave No. 1 (42BO1) and Cave No. 5 (42BO5), contained calcite-tempered pottery, in the form of a very distinctive calcite (FS# 10580-4, 10484-5, 9724-48). Cave No. 1 has a radiocarbon date of 840 ±75 B.P. (Aikens 1966:9).

Calcite temper is also found in pottery from a late prehistoric site at Orbit Inn (42BO120, FS# 553-1, 450-5, 328-30), located on the northeastern shore of the Great Salt Lake, opposite the Promontory Point Caves. Orbit Inn was identified as a late prehistoric residential camp, with radiocarbon dates between 570 ±60 B.P. and 300 ±70 B.P. (Simms and Heath 1990:798). The calcite is mineralogically identical to the calcite in sherds from Promontory Caves No. 1 and 5 (Appendix 2). Thus, given that Steward's temper "like lime" is almost certainly calcite, there is evidence for a continuous use, over a long period of time, of calcite temper in pottery from the historic to the prehistoric period around Promontory Point in the Great Salt Lake region.

Also possessing temporal depth, and also spatially limited to the eastern subarea, are rhyolite and obsidian tempers (Table 33). Both raw materials are found at the Grantsville Mounds (Rudy 1953:100) and sites along the Bear and Weber Rivers: the Early Levee (42BO110, FS#13-3, 24-4, 37-4); Bear River 1 (42BO55, FS#46-86); Late Levee (42BO107, FS#80-14, 132-10, 204-88); and Injun Creek sites (42WB34, FS#396-36).

Other temper materials also are both temporally (Figure 11) and spatially widely distributed in both the eastern and western subareas. Andesite is found at 12 of the 23 archaeological sites examined in this study, quartzite at 10, and granite at 7 (Table 10). Interestingly, the widely occurring forms of temper co-occur with less common temper materials. For example, quartzite is always found with calcite-tempered pottery at Promontory Cave No. 1 and Orbit Inn. Similarly, andesite, quartzite, or granite is always

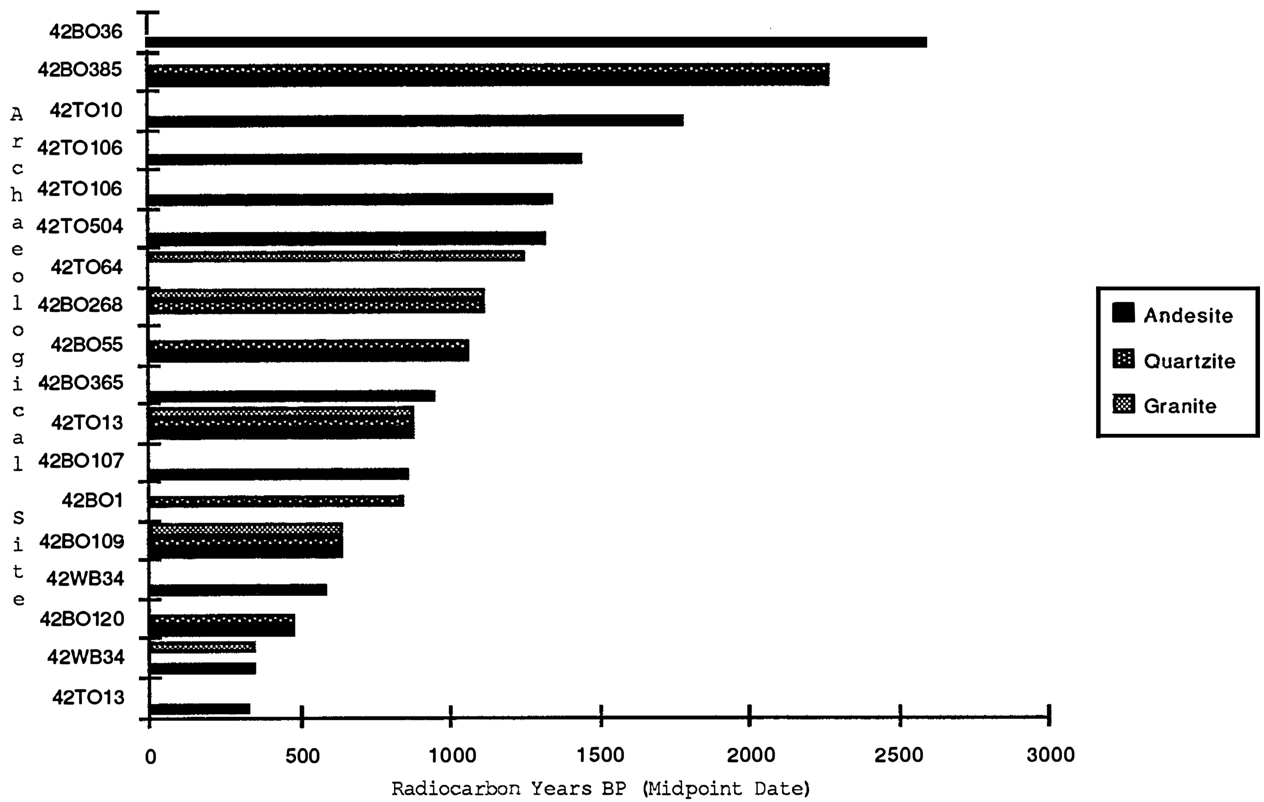


FIGURE 11. Temporal and Spatial Distribution of Andesite, Quartzite, and Granite Temper Materials in the Great Salt Lake Region.

Table 33. Temporal Distribution of Temper Materials in Pottery from Sites Which are Spatially Limited to the Eastern Subarea

Temper Material	C14 Date B.P.	Site	Citation
Calcite	840 ±75	42BO1	Aikens 1966:9
	570 ±60 to 300 ±70	42BO120	Simms and Heath 1990:798
Rhyolite	1250 ±140 to 1170 ±140	42BO110	Fry and Dalley 1979:5
	585 ±90 to 345 ±100	42WB34	Aikens 1966:14
Obsidian	1170 ±140	42BO110	Fry and Dalley 1979:5
	1065 ±120	42BO55	Aikens 1966:59
	860 ±110 to 710 ±100	42BO107	Fry and Dalley 1979:5

found with rhyolite or obsidian-tempered sherds in Weber and Bear River marsh sites.

The remaining temper types, schist, welded tuff, andesite/basalt, volcanic ash, and a mix of quartzite and basalt, occur in pottery at sites which are spatially widespread. However, these temper types are either too few in number to assess actual spatial distribution or are from sites lacking temporal control.

Thus, calcite, rhyolite, and obsidian temper are spatially limited to the eastern subarea and have considerable time depth. Andesite, quartzite, and granite temper are spatially widespread in both the eastern and western subareas and also have considerable time depth and these widely- distributed temper forms occur with those that are spatially restricted (Table 10). The temporal endurance of all six forms of temper material is evidence of a single tradition that persisted throughout the time that aboriginal pottery was made in the region.

Vessel Shaping

Steward describes all ethnographic Shoshoni groups of the Great Salt Lake region, except the Promontory Shoshoni, as shaping the entire vessel by coiling (1943:319, 375). The Shoshoni at Promontory Point constructed the lower part of the vessel by molding and employed coiling to construct the rest of the vessel. All groups smoothed vessel walls with fingers and/or sticks dipped in water, and Steward specifically notes that all ethnographic groups denied finishing a vessel with a cobble and paddle (1943:356). As detailed in Chapter Two of the current study, there is no petrographic evidence that any technique of shaping other than coiling was ever used in pottery from the Promontory Point region, either from the Late Prehistoric (e.g., Orbit Inn) or the Prehistoric (e.g., Promontory Point Caves No. 1 and 2) periods.

Similarly, Chapter Two established that evidence of coiling was found in 89% of sherds (N = 93) previously classified as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware (Table 21). Spatially, coiling is evident in pottery from all 23 sites examined in this study, regardless of what form of temper materials are used. Temporally, coiling is found to occur continuously throughout the archaeological record, from the earliest pottery-bearing stratum at Hogup Cave (Aikens 1970:28-29) to sites with later radiocarbon dates, such as Injun Creek (Aikens 1966:14) and Orbit Inn (Simms and Heath 1990:798).

Exterior Color, Temper Size, Wall Thickness

Continuity as evidence of a single pottery tradition is perhaps best illustrated in the attributes of exterior surface color, temper size, and vessel wall thickness. Attributes of these three kinds are shared by all pottery types and wares at most archaeological sites. For example, 63% of all sherds in the large data set (N = 1,923) have black exterior color. Black-colored sherds were excavated from 22 of the 23 archaeological sites examined in this study (Table 7) Similarly, 94% of all sherds have wall thickness between 3mm and 6mm, and were found in pottery at every site (Table 2).

In the small data set (N = 93), temper size, especially the largest size in each sherd, cross-cuts all previously identified types and wares: indeed, 92% have largest sizes of temper between 1.0 and 4.0mm, and this is found in pottery from all 23 archaeological sites.

Continuity in the Non-Pottery Archaeological Record

Besides pottery, Steward also described other items of historic Shoshoni material culture from the Promontory Point region (Table 34). Most of these items were also known to the Shoshoni throughout the northeastern Great Basin, including the Grouse Creek and Gosiute people, and were not limited to the historic Promontory Shoshoni. The similarities shared by these groups in material and social culture were considered by Steward to be evidence of a shared Western Shoshoni tradition (1943:263). Presence or absence of specific items, and variation in shared items, was seen as the result of the exploitation of specific, locally available resources (Steward 1938:230).

Table 34 compares artifacts which Steward considered diagnostic of the prehistoric Promontory Culture with those he published in 1943 for the historic Shoshoni at Promontory Point. Though Steward studied the prehistoric materials (1930-31) before he studied the historic material (1936), he published a general comparison of the archaeological materials from Promontory Point with ethnographic materials gleaned from earlier field work among Nevada, Idaho and Utah Shoshoni (Steward 1937:84-86) He concluded that the prehistoric Promontory culture was not Shoshoni but he did

TABLE 34. Comparison Between Diagnostic Artifacts of the Promontory Culture and the Historic Promontory Shoshoni

Prehistoric Promontory Culture (Steward 1937:122)	Historic Promontory Shoshoni (Steward 1943)
1. self and sinew-back bow bow	1. self and sinew back (pg. 313)
2. cane arrows with hardwood foreshafts	2. cane arrows with hardwood foreshafts (pg. 314)
3. longitudinally grooved stone arrow polishers	3. longitudinally grooved stone arrow polishers (pg. 315)
4. "fingernail" and rim decorated pottery	4. "fingernail" and rim decorated pottery were denied (pg. 319), though Promontory Shoshoni used a "white rock" temper material "like lime" (pg. 375)
5. cedar bark-pot rests	5. not listed
6. 3 and 4 piece moccasins	6. 3 and 4 piece moccasins (pg. 325)
7. extensive use of hide	7. extensive use of hide (pg. 321-326, and throughout list)
8. single-rod or rod-and-and-bundle coiled basketry	8. single-rod or rod-bundle coiled basketry (pg. 316)
9. tule and rush matting with cord twine	9. aquatic plant and rush matting with cord twine (probably Spirogyrae, pg. 374)
10. fur and feather cloth	10. fur cloth, in the form of blankets (pg. 317)
11. triangular flint knives set the ends of long wooden handles	11. triangular flint knives set in the ends of long wooden handles (attributed only to Gosiute groups, pg. 311)
12. incised slate slabs	12. not listed

not resolve why a number of diagnostic items were shared by the two assertedly unrelated groups. From his 1943 data, it is clear that the similarities between the two material complexes are farther-reaching than he recognized in his 1937 comparisons, and a new comparison is appropriate.

The occurrence of such specifically detailed traits of the prehistoric Promontory Culture in the historic Promontory Shoshoni culture, as summarized in Table 34, is clear evidence of continuity in the general archaeological record within the Great Salt Lake region. Not only are general categories of artifacts shared, but specific characteristics in the artifacts. For example, cane arrows and stone arrow polishers are shared and both groups use hardwood foreshafts for the cane arrows. Similarly, both groups have longitudinally-grooved stone arrow polishers. Further, cordage is made by both groups and both make the cordage out of aquatic plant fibers.

Items diagnostic of the Great Salt Lake Fremont culture are also recorded for the historic Promontory Shoshoni. Twined and one-rod, coiled basketry of the Fremont culture (Adovasio 1986:45-88) is also described for the historic Promontory Shoshoni (Steward 1943:316). Similarly, two Fremont moccasin styles, one-piece and Promontory moccasins of the prehistoric period (Aikens 1970:102-105), also are recorded for the historic Promontory Shoshoni (Steward

1943:325-6, 380). Thus, there is evidence of continuity in the general archaeological record, as well as in some attributes specific to pottery, which implies the continuance of a single cultural tradition in the study area. Outside of the study area, Frison et al. (1986:163, 167) have reported coiled basketry virtually identical to that produced by the Fremont: during the late prehistoric times in western Wyoming, which was also ethnographic Shoshoni territory.

To sum up, in addition to the above non-pottery evidence, calcite temper is recorded for historic and prehistoric pottery at Promontory Point, and quartzite tempered sherds are always found to co-occur with calcite-tempered sherds (Table 10). Other pottery attributes also demonstrate continuity: six forms of temper, the technique of vessel shaping by coiling, and the presence of black exterior surface color. All of this, I conclude, is evidence for a single tradition that combines the historic Shoshoni at Promontory Point, the Promontory Culture, and the Great Salt Lake variant of the Fremont into a single pottery (and cultural) tradition.

A final issue that must be addressed in closing this discussion is functional variation in pottery. From evidence presented below, I conclude that some of the variability in attributes observed in regional pottery by previous analysts may be due to differing intended uses of pottery vessels rather than factors of cultural identity.

Properties of Raw Materials and Functional Variation in the Pottery Attributes

The selection by individual potters of different clays and tempers for constructing vessels made for different functions is widely known ethnographically (e.g., Arnold 1985; DeBoer and Lathrap 1979; Rye and Evans 1976; Stone 1950). This may account for variation in some of the raw materials examined in the current study, as detailed below. Dean and Heath (1990) specifically address the function of pottery in the study area in a preliminary effort that seeks to define vessel function by identifying forms of residue adhering to vessel walls. Temper material was found to be correlated with the presence and type of residues. In the present treatment, evidence of vessel function and physical properties of raw materials are discussed; the variables are then combined to show that raw material type correlates with vessel function.

Vessel Function

Vessel function was approached by identification of the matter adhering to the interior of some sherds. These sherds were obtained from 12 archaeological sites throughout the study region (Table 35). Residue found on the interior walls of sherds was identifiable as seeds or plant parts. In the western subarea, seed residues are only of a single species

Table 35. Archaeological Sites from Which Seed, Plant, and Unknown Residues are Observed on Pottery With Identified Temper Materials

Site Name/FS#	Identified Residue	Temper
Promontory 1 Cave (42BO1)		
FS# 9667	Cheno-Am, *Juniperus* spp., budscales	Calcite
FS# 9761	*Amaranthus* spp., *Poa secunda*, bracts	Calcite
FS# 9762	*Amaranthus* spp. Poaceae bracts	Calcite
FS# 10580-4	*Amaranthus* spp. Poaceae bracts	Calcite
FS# 9724-48	*Oryzopsis hymenodies* Cheno-Am *Poa secunda*, *Juniperus* spp., budscales	Calcite
Lakeside Cave (42BO385)		
FS# 2-131	*Chenopodium* spp.	Andesite
FS# 2-10	Plant Parts	Quartzite
Danger Cave (42TO13)		
FS# 86.67	*Allenrolfea occ*.	Andesite
FS# 86.69	*Allenrolfea occ*.	Andesite
FS# 17913-13	*Allenrolfea occ*.	Basalt & Quartzite
FS# 19472-6	*Allenrolfea occ*.	Andesite
FS# 17932-3	Unknown	Granodiorite
Jukebox Cave (42TO20)		
FS#21841-1	Unknown	Granodiorite

Table 35. (Continued)

Site Name/FS#	Identified Residue	Temper
Floating Island Cave (42TO106)		
FS# 86.57	*Allenrolfea occ.*	Andesite
Hogup Cave (42BO36)		
FS# 463-129	Plant Parts	Quartzite
FS# 609-35	Plant Parts	Granodiorite
FS# 609-41	Unknown	Granodiorite
Remnant Cave (42BO365)		
FS# 72-4	Plant Parts	Andesite
Swallow Shelter (42BO268)		
FS# 217-53	Plant Parts	Quartzite
FS# 105-20	Plant Parts	Granodiorite
Thomas Shelter (26EK8)		
FS# 20-78	Plant Parts	Basalt & Quartzite
FS# 25-86	Plant Parts	Basalt & Quartzite
Bear River 1 (42BO55)		
FS# 88-146	Plant Parts	Andesite
FS# 46-86	Plant Parts	Obsidian
Injun Creek (42WB34)		
FS# 351-16	Plant Parts	Andesite
Grantsville Mounds (42TO10)		
FS#11505-1	Unknown	Andesite
FS#11505-2	Unknown	Andesite

Note: N = 27.

per sherd, most often either iodinebush (Allenrolfea occidentalis) or goosefoot (Chenopodium ssp.). These sherds are often tempered with andesite. In the eastern subarea, particularly at sites near marshes, calcite-tempered sherds have residues of seeds from either single or multiple plant sources.

Vessel Function and Thermal Expansion Properties of Raw Materials

Table 35 also shows that sherds having carbonaceous residues are made with a variety of temper materials. But many are mineralogically similar, in that they are dominated by a feldspar component and a small amount of quartz. Granite, particularly the granodioritic forms, naturally contains mostly feldspars with lesser amounts of quartz. Sherds tempered with feldspar-rich andesites, obsidian, and andesite/basalt also have a small amount of quartz, which appears to have been deliberately added.

Winkler (1973:47) noted that, in general, more basic rocks such as basalts, calcites, and granodiorites have much lower thermal expansion rates than more acidic rocks, such as those that contain quartz minerals. Also, igneous rocks tend to have more predictable thermal expansion rates than sedimentary or low-grade metamorphic rocks. While feldspar-rich raw materials are petrographically distinct, all have very similar physical characteristics of superior dry strength and thermal shock absorption (Bronitsky 1986; Rice 1987:361).

The similarity in physical properties of feldspar-rich raw materials brings together pottery with a wide variety of petrographically distinctive temper materials: in the characteristic that really matters--thermal expansion--all the tempers are essentially identical.

Regardless of the nature of the residues, the temper materials listed in Table 35 are mostly calcite, andesite, granite, obsidian, or a mixture of basalt and quartzite (N = 24). They are only rarely quartzite (N = 3). Except for quartzite, all of these raw materials share the property of low to medium rates of thermal expansion (Winkler 1973).

Rye (1976:106-37) examined the preference of Melanesian potters for certain raw materials and correlated the raw materials with vessel function. Using Winkler's calculations, Rye predicted that basalts and calcites would be more suitable in avoiding stresses during repeated heatings and coolings than quartz, which is unsuitable because of its relatively high rate of thermal expansion. Rye was thus able to predict which vessels would be used for cooking, and which would not, primarily by the thermal expansion rates of the raw materials.

Based upon Rye's work, I categorized the 11 forms of temper material identified from the Great Salt Lake region pottery into those with high, medium, or low rates of thermal expansion (Deer, Howie and Zussman 1966) (Table 36). Two temper material types, quartzite and schist, which account for 29% of petrographically identified sherds (N = 93), are considered to have high rates of thermal expansion. Two are considered to have medium rates of thermal expansion: granite and a mixture of basalt and quartzite. Sherds with these tempers account for 19% of the sample. The remaining 52% of the sherds have tempers composed of seven feldspar-rich materials which all have low rates of thermal expansion: andesite, andesite/basalt, rhyolite, obsidian, welded tuff, volcanic ash, and calcite. Thus, over 70% of the raw materials identified in this study have similarly low rates of thermal expansion, and would probably be suitable for functions such as cooking, which would result in carbonaceous residues.

Table 36 illustrates a striking correlation between thermal expansion rates and vessel function. Residue of plant parts are found on only a very few sherds made with temper materials, i.e., quartz-rich, with high rates of thermal expansion (N = 3). By far, the majority of sherds exhibiting residues are made with calcite or feldspar-rich tempers (N = 24). Therefore, temper materials with lower rates of thermal expansion correlate closely with vessels demonstrably used for cooking, and temper with higher rates are used for purposes which are generally not detectable through analysis used in this study.

Table 36. Archaeological Sites from which Temper Materials, Thermal Expansion Rates, and Residue Categories are Detailed

Temper	Plant Residue	Unidentified Residue	Seed Residue	Site/FS# of Sherds with Residue
High Expansion				
Quartzite	X			42BO268/217-53
	X			42BO36/463-129
	X			42BO385/2-10
Medium Expansion				
Granodiorite,	X			42BO268/105-20
Mixed [Basalt	X			42BO36/609-35
& Quartzite]	X			26EK8/20-78
(Medium)	X			26EK8/25-86
		X		42TO13/17932-3
		X		42TO20/21841-1
		X		42BO36/609-41
			X	42TO13/17913-13
Low Expansion				
Andesite,	X			42BO365/72-4
Marble,	X			42BO55/46-86
Obsidian	X			42BO55/88-146
(low)	X			42WB34/351-16
		X		42TO10/11505-1
		X		42TO10/11505-2
			X	42TO106/86.57
			X	42TO13/86.67
			X	42TO13/86.69
			X	42TO13/19472-6
			X	42BO385/2-131
			X	42BO1/9667
			X	42BO1/9761
			X	42BO1/9762
			X	42BO1/10580-4
			X	42BO1/9724-48

Note: N = 27; X = one sherd.

Conclusions

The aim of my study has been to assess the validity of traditional taxonomic criteria and the defining attributes of types and wares within existing formal typologies for the undecorated pottery of the Great Salt Lake region. Specifically, this study has sought to determine whether empirical evidence supports the earlier classifications of prehistoric pottery into two unrelated pottery traditions: Fremont and Shoshoni. Each chapter in this study addresses major problems encountered in answering this question.

Chapter One details the history of the formal descriptions of Great Salt Lake Gray, Promontory Gray, and Shoshoni Ware. This chapter emphasizes the difficulties encountered in using published formal descriptions to distinguish kinds of undecorated pottery. It concluded that the described types and wares were characterized by individual attributes that were often unclear, misidentified, or noncomparable between the collections of pottery under study. Further, it is shown that formal descriptions weighted all attributes equally and provided no taxonomic key to separate pottery which shared some attributes. The result is that pottery from allegedly unrelated traditions has the same attributes, and it is unclear how these shared attributes could be used to classify a given sherd.

Confronted with this situation, I explored the possibility that separation of Fremont and Shoshoni pottery into unrelated traditions was based *de facto* on criteria that were not formally stated. For this exploration, I selected five major attributes that could be found in every sherd from every archaeological site in the Great Salt Lake Region. These attributes are vessel wall thickness, exterior surface color, temper material, temper size, and technique of vessel construction.

In Chapter Two I present the formal descriptions for each attribute and the variations noted by individual excavators and analysts. I describe the methods which I used to independently measure each attribute, and subjected sherds which had previously been classified as Great Salt Lake Gray, Promontory Gray, or Shoshoni Ware to these measurements. Every attribute measured demonstrated the same pattern: Great Salt Lake Gray had a wide range of variation, and Promontory Gray and Shoshoni Ware both fell within this range. Moreover, except for the calcite temper of Promontory Gray, Shoshoni Ware and Promontory Gray shared the same attributes with one another. Finally, contrary to earlier assertions, there was no evidence of paddle-and-anvil construction in Promontory Gray, nor was there a wide range of variability in attributes of sherds previously classified as Shoshoni Ware. I concluded that there was no empirical evidence to support separating undecorated pottery of the Great Salt Lake region into different traditions.

To further analyze these findings, in Chapter Three I examined both the spatial and temporal continuity of attributes, and offered explanations for the variation found. Some traits linked the general archaeological record of the historic period to that of the prehistoric period. A few traits were specific to pottery, particularly the use of calcite temper in the eastern subarea. Finally, analysis demonstrated that the technique of coiling was used to construct vessels throughout the late prehistoric and historic periods.

Furthermore, comparison of traits from archaeological contexts with ethnographic traits of the historic Shoshoni at Promontory Point revealed that a number traits which Steward (1937:122) considered distinctive of the prehistoric period were in fact recorded for the historic period in the same area. This is evidence of a direct link between the historic and late prehistoric periods.

Functional variation in tempering agents was also examined in Chapter Three. Temper formed 11 exclusive categories and 9 of the 11 temper categories had low to medium thermal expansion rates. Further, vessel function could be determined in some cases, as identifiable cooking residues adhered to the interior walls of some sherds. Twenty-four of the 27 sherds containing identifiable residues were made with temper materials having low to medium thermal expansion rates. Sherds made with temper materials having high rates of thermal expansion rarely had residue. I concluded that the wide variety of raw materials used to make pottery in the Great Salt Lake region did not correspond well to cultural divisions of Shoshoni and Fremont, and was probably better explained by vessel function.

In sum, I have established that existing formal descriptions for the pottery of the Great Salt Lake region simply cannot be used to validly separate undecorated body sherds into various wares and types. Except for calcite temper, both Promontory Gray and Shoshoni Ware share the same attributes with one another, and both fall within the range of variation of Great Salt Lake Gray. I conclude, therefore, that only a single pottery tradition is represented in the Great Salt Lake region.

This research raised major questions about earlier pottery classifications in the Great Salt Lake region, and I close with another set of questions that now demand further examination. Does not the sharing of many pottery attributes among them mean that both Promontory Gray and Shoshoni Ware must be taxonomically related to Great Salt Lake Gray? And if, as radiocarbon dates now seem to indicate, there is a temporal continuity from the prehistoric to the historic periods in the Great Salt Lake region, is not the prehistoric Promontory Gray pottery a marker for the culture that became the historic Promontory Shoshoni? Further, if Shoshoni Ware shares all its attributes with Great Salt Lake Gray, is not Shoshoni Ware simply a late Fremont pottery and not an intrusive, unrelated Shoshoni pottery? Finally, if the Fremont culture arose from a Desert Archaic base, and if the Fremont and historic Shoshoni are continuous with one another, is not the ethnographic Shoshoni culture a lineal and direct descendant of the ancient desert tradition?

As observed in Chapter One, variation in pottery has been important in developing previous conceptions of the culture history of the Great Salt Lake region. Such variations were seen to be the result of culturally unrelated people making unrelated pottery. But as this study demonstrates, there is good evidence for only one pottery tradition. Whether this is proof of a single cultural tradition of course requires more investigation. This study takes an initial step in a new direction; however, culture history is best constructed not by concentrating on only one artifact class, but by examining all artifact classes within an overall environmental context.

APPENDIX A

METHOD OF SAMPLE SELECTION

Archaeological sites containing only Great Salt Lake Gray (such as at the Early Levee site, Grantsville or Plains City Mounds, and Owl Springs) or only Promontory Gray (such as Orbit Inn, Lakeside Cave, Black Rock Cave, and Promontory Caves) were first selected to determine the overall range of variation within each Fremont pottery type. No site contained only Shoshoni Ware. To determine how these types and wares were distinguished from one another within the same site, sites containing Shoshoni Ware and Great Salt Lake Gray or Promontory Gray and Great Salt Lake Gray pottery were then selected. In all, twenty-four archaeological sites containing pottery previously classified as Promontory Gray, Great Salt Lake Gray, and Shoshonean Ware were examined in this study. One site, Grantsville Mounds, is composed of three site numbers: 42TO5, 42TO6, and 42TO10.

The University of Utah Museum of Natural History (Salt Lake City) is the major curator of the artifacts used in this study. Sherds from several on-going archaeological projects were also obtained from Utah State University (Logan), the Salt Lake City District Office of the Bureau of Land

Management, and the Antiquities Section of the Utah State Historical Society (Salt Lake City).

Before sherds were selected for examination, field notes and data analysis worksheets for each site selected were examined. If the site was dug prior to the development of radiocarbon dating, sherds from the bottom-most pottery-bearing stratum of sites were selected for analyses. In sites with radiocarbon dates, pottery having direct association with the materials used for radiocarbon dating were selected. Because some sherds were not currently available for analysis, those associated with burials and/or house floors were selected. If these were not available, sherds from midden deposits were selected. Several sites either had only had surface deposits or stratigraphic locations which could not be determined from excavation or published reports. In discussions of temporal distribution, greater weight will be put upon sherds from sites with stratigraphic separation and/or known archaeological features than those without.

APPENDIX B

PROVENIENCE OF POTTERY ANALYZED BY PETROGRAPHY

Site#	FS#	Proveniece
1. 26EK8 (Thomas Shelter)	20-78	Unknown
	23-14	Unknown
	25-86	Unknown
2. 42BO1 (Promontory Cave No. 1)	9510-5	Steward Expedition, miscellaneous
	9724-23	Steward Expedition, South side, Surface to one foot
	9724-48	Steward Expedition, South Side, Surface to one foot
	10484-5	Steward Expedition, "under 2 ft."
	10580-4	Steward 1931 Expedition, South Side
3. 42BO5 (Promontory Cave No. 5)	11513-6	Steward 1931 Expedition, East Side
4. 42BO36 (Hogup Cave)	116-223	Stratum 12, F13, 95L80
	141-83	Stratum 8, F34, 110L95
	421-61	Stratum 12, F13, 100L75
	452-233	Stratum 16, F13,F31, 90L90
	456-45	Stratum 16, F25, 90L85
	458-54	Stratum 16, F25, 90L80
	463-127	Stratum 12, F13, 90L85
	463-129	Stratum 12, F13, 90L85
	463-133	Stratum 12, F13, 90L85
	518-28	Stratum 8, F62, Square 6, 0-6"
	566-2	Stratum 15, F5, 110L,90
	567-101	Stratum 14, F6, 110L90
	606-120	Stratum 13, F9, 110L120
	609-35	Stratum 13, F9, 100L115
	609-40	Stratum 13, F9, 110L115
	609-41	Stratum 13, F9, 100L115
	628-36	Stratum 16, F3, 110L110
	628-39	Stratum 16, F3 110L110
	651-42	Stratum 8, F34a, 110L85

5. 42BO55 (Bear River 1)	14-13	Depression 1 Trench
	46-86	Midden
	98-1	Occupation Surface, F15
6. 42BO107 (Late Levee)	80-14	Dwelling 2, Floor
	93-5	Dwelling 2, Floor
	93-14	Dwelling 2, Floor
	132-10	Dwelling 1, Pit in Floor
	204-83	Dwelling 3, Floor
7. 42BO109 (Knoll)	31-35	Structure, Fill
	50-1	Burial Pit in Structure Floor
	61-2	Structure, Fill
	65-102	Structure, Fill
8. 42BO110 (Early Levee)	13-3	Dwelling 1, Fill
	24-2	Dwelling 1, Floor
	37-4	Dwelling 3, Floor
9. 42BO120 (Orbit Inn)	328-30	116E131, F5, Fill Over House
	450-1	112-113E127, F5, Fill Over House
	450-5	112-113E127, F5, Fill Over House
	514-6	112-113E125, F5, Fill Over House
	533-1	119E132, F16, Pit in Floor
	553-3	119E132, F16, Pit in Floor
10. 42BO268 (Swallow Shelter)	105-20	Unknown
	217-41	Unknown
	217-53	Unknown
11. 42BO301 (Owl Springs)	8-8	Surface
12. 42BO365 (Remnant Cave)	17-27	Hearth 1, Straum 6
	72-41	Stratum 6
13. 42BO385 (Lakeside Cave)	1-23	F4, Unit IX
	1-25	F4, Unit IX
	1-26	F4, Unit IX
	2-1(a)	Unknown
	2-1(b)	Unknown
	2-10	Unknown
	2-12	Unknown
	2-131	Unknown
	14-90	F20, Unit VIII
	131-13	Unknown
14. 42BO559	1	Surface

15. 42SL1 (Deadman Cave)	18636-4	24-59"
	18646-5	24-59"
16. 42TO5 (Grantsville Mounds)	14427-4	Unknown
17. 42TO6 (Grantsville Mounds)	14421-4	Unknown
18. 42TO10 (Grantsville Mounds)	11505-1	Steward 1932,"Grantsville #7"
	11505-2	Steward 1932,"Grantsville #7"
19. 42TO13 (Danger Cave)	3	D. Madsen, Unknown
	17706-5	Heizer Excavation. Trench I, Surface-8"
	17745-1	Heizer Excavation, Trench 1, Level 3, 15-18"
	17773	Heizer Excavation, Trench I, 0-8"
	17791-8	Heizer Excavation, Trench II, Level I, 0-8"
	17794-13	Heizer Excavation. Trench II, Level I, 0-8"
	17823-6	Heizer, Excavation, Trench II, Level II
	17834	Heizer, Excavation, Trench II, Level III, 13-16"
	17913-11	Heizer, Trench 2A, Level III, 13-21"
	17921-2	Heizer, Excavation, Trench 2A, Level 4, 22-25"
	17932-3	Heizer Excavation, Trench 2A, 22-26"
	18868-12	Smith Excavation, Surface
	19468-1	Smith Excavation. Trench 3, 0-6"
	19472-6	Smith Excavation. Trench 3, 7-17"
	AR1868	Smith Excavation, Surface
20. 42TO20 (Jukebox Cave)	21841-1	Level JBII
	21907-1	Level JBII
21. 42TO64 (Black Rock Cave)	3-10	Unknown
	3-11	Unknown
	10932	Trench A, 4-8"

22. 42TO106 (Floating Island Cave)	10	Stratum 27
	30	104N104E, F23
23. 42TO457 (Danger Cave Bog)	13	Surface
24. 42TO504 (Dan Freed)	3	"Excavation Area"
	19	Unknown
	21	Unknown
25. 42WB34 (Injun Creek)	48-6	Mound 8, Square 34, 0-6" depth
	376-3	Mound 13, Fill
	396-96	Mound 13, fill
	670-13	Mound 8, Fill above floor, Square 8, 0-6"
	721-3	Mound 8, Fill above floor,18-24"
	724-10	Burial (F64)
26. 42WB297 (Plains City Mound)	11527-9	Surface Collection
	11528	Surface Collection

APPENDIX C

PETROGRAPHIC ANALYSIS OF INDIVIDUAL SHERDS

Site: 26EK8 (Thomas Shelter)
Sample: FS#20-78
Type: Shoshoni Ware, Variety II (Dalley 1976)

Clay: 70% of this sample consists light to golden brown to red brown silty clay with some biotite and a minor amount of organic debris. Clay is probably derived from decomposed mafics.

Temper: 30% of this sample consists of temper material, 29% of which is in the form of individual minerals and 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	25%	≤1.5mm	angular	plagioclase, untwinned
Quartz	<3%	≤0.75mm	angular	monocrystalline
Mica				
biotite	2%	≤2.0mm	flakes	some altered some fresh

Rock Fragments: 1% of this sample consists of two sources of rock fragments. One source is a quartzite with polycrystalline quartz grains with highly sutured contacts and a minor amount of mica, ≤1.mm in maximum dimension. The other source is basaltic, ≤1.5mm in maximum dimension. Some rocks and minerals are fresh, but there are many grains showing considerable alteration to sericite and replacement by calcite.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Mixed, Quartzite and Basalt; 4) Temper Size: 0.75mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 26EK8 (Thomas Shelter)
Sample: FS# 23-14
Type: Shoshoni, Variety I (Dalley 1976)

Clay: 70% of this sample consists of small (<0.1 mm), rounded quartz grains which have been altered to a golden brown clay. The clay was probably obtained from a sedimentary environment. The clays are in the form of talc and chlorite, as well as muscovite altered to sericite.

Temper: 30% of this sample consists of temper material, 18% of which is in the form of individual minerals and 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	<0.3mm	subrounded	andesine and labrodorite
Quartz	5%	≤0.3mm	rounded	monocrystalline some strained?
Amphibole	<1%	≤1.0mm	elongate	altered hornblende
Mica				
Muscovite	8%	≤0.8mm	elongate	some fresh, some altered to sericite
Biotite	4%	≤1.0mm	1:4 ratio	very altered
Talc	trace			

Rock Fragments: 12% of this sample consists of metamorphic rocks, 3mm in maximum dimension. Two types are present, a quartzite, and a fine-grained type with chlorite alteration and muscovite.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.3mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 26EK8 (Thomas Shelter)
Sample: FS#25-86
Type: Great Salt Lake Gray (Dalley 1976)

Clay: 74% of this sample consists light to golden brown in color, probably obtained from a sedimentary environment and possibly related to same source as the quartzite temper material.

Temper: 26% of this sample consists of temper material, 15% of which is in the form of individual minerals and 11% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2mm	subangular	plagioclase, twinned (An35) andesine
Quartz	4%	≤0.4mm	subrounded	
Pyroxene	trace	≤0.6mm	rounded diopside	1 crystal
Mica				
muscovite	7%	≤2.0mm	elongated	mostly fresh
biotite	3%	≤0.6mm		most altered
Andalusite	trace	≤2.0mm		1 large grain

Rock Fragments: A little over 11% of this sample consists of metamorphic rocks, ≤2.5mm in maximum dimension. Two types are present,quartzite and a fine grained type, altering to chlorite.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Quartzite; 4) Temper Size: 0.2mm minimum, 2.5mm maximum; 5) Shaping: Coiled

Site: 42BO1 (Promontory Cave No. 1)
Sample: FS#9510-5
Type: Promontory Gray (Steward 1937)

Clay: 70% of this sample is composed of a yellow-brown, very micaceous clay with a small amount of silt. Clays is derived from the same source as temper material.

Temper Material: 30% of this sample is composed of temper material, 27% of which is in the form of free minerals and 3% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	7%	<0.5mm	subrounded, subangular	plagioclase?
Quartz	6%	≤0.5mm	subrounded, subangular	mono- and polycrystalline
Magnetite	trace?			
Mica				
muscovite	12%	≤0.1mm	flakes	
biotite	2%	≤0.05mm	books	altered

Rock Fragments: 3% of this sample is composed of metamorphic mica-quartz schist subangular rock fragments, probably the parent type for temper and clay. Schist is ≤1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Schist; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO1 (Promontory Cave No. 1)
Sample: FS#9724-23
Type: Promontory Gray (Steward 1937)

Clay: 66% of this sample is composed of a dark brown micaceous clay with a small amount of silt. Clays is derived from the same source as temper material.

Temper Material: 34% of this sample is composed of temper material, 31% of which is in the form of free minerals and 3% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	<0.17mm	subhedral	plagioclase?, untwinned and microcline
Quartz	19%	≤0.5mm	angular, subangular	mono- and polycrystalline
Magnetite	trace?			
Mica				
muscovite	10%	≤0.22mm	subhedral	
biotite	2%	≤0.32mm	books	

Rock Fragments: 3% of this sample is composed of metamorphic mica-quartz schist rounded to subrounded rock fragments, probably a metamorphosed sandstone and parent type for temper and clay. Schist is ≤2.2mm in maximum dimension. Rock fragments and minerals are angular and fresh, showing little alteration or transport.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Schist; 4) Temper Size: 0.2mm minimum, 2.2mm maximum; 5) Shaping: Coiled

Site: 42BO1 (Promontory Cave No. 1)
Sample: FS#9724-48
Type: Promontory Gray (Steward 1937)

Clay: 75% of this sample is composed of a fine, black clay not derived from the the same source as temper material.

Temper Material: 25% of this sample is composed of temper material, 21% of which is in the form of free minerals and 4% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Quartz	4%	≤2.0mm	subangular, subrounded	monocrystalline
Magnetite	trace	≤0.1mm	rounded	
Calcite	17%	≤2.1mm	euhedral, anhedral	rhombohedral

Rock Fragments: 4% of this sample is composed of small rounded fragments of recrystallized limestone, ≤ 0.35mm in maximum dimension. The calcitic material has undergone metamorphoses to marble, and appears to have some thermal alteration as well.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Calcite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO1 (Promontory Cave No. 1)
Sample: FS#10484-5
Type: Promontory Gray (Steward 1937)

Clay: 72% of this sample is composed of a fine, black clay not derived from the the same source as temper material.

Temper Material: 28% of this sample is composed of temper material, 27% of which is in the form of free minerals and 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Quartz	3%	≤0.3mm	subangular, rounded	monocrystalline
Calcite	24%	≤2.4mm	euhedral	rhombohedral

Rock Fragments: Only about 1% of this sample is composed of small rounded fragments of recrystallized limestone, ≤ 0.35mm in maximum dimension. The calcitic material has undergone metamorphoses to marble, and appears to have some thermal alteration as well.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Calcite; 4) Temper Size: 0.3mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO1 (Promontory Cave No. 1)
Sample: FS#10580-4
Type: Promontory Gray (Steward 1937)

Clay: 77% of this sample is composed of a fine, black clay not derived from the the same source as temper material.

Temper Material: 23% of this sample is composed of temper material, 20% of which is in the form of free minerals and 3% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	trace	≤0.08mm	euhedral	andesine or albite
Quartz	2%	≤0.15mm	angular to subrounded	monocrystalline and poly-crystalline
Pyroxene	trace	≤0.03mm	subhedral	diopside
Amphibole	trace	≤0.03mm	subhedral	tremolite
Magnetite	<1%	≤0.03mm	subrounded	opaque
Calcite	20%	≤2.0mm	euhedral to rounded	rhombohedral

Rock Fragments: 3% of this sample is composed of large rounded fragments of recrystallized limestone, ≤ 0.6mm in maximum dimension. The calcitic material has undergone metamorphoses to marble, and appears to have some thermal alteration as well.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Calcite; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO5 (Promontory Cave No. 5)
Sample: FS#11513-6
Type: Promontory Gray (Steward 1937)

Clay: 78% of this sample is composed of a dark brown clay not derived from the the same source as temper material. Outer edges of slide are golden light brown in color.

Temper Material: 22% of this sample is composed of temper material, 16% of which is in the form of free minerals and 6% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	trace	<0.05mm	anhedral	Plagioclase?
Quartz	4%	≤0.15mm	subrounded	monocrystalline
Amphibole	trace	<0.08mm	subhedral	brown hornblende
Mica				
muscovite	trace	≤0.05mm	euhedral	
biotite	trace	≤0.08mm	books	
Calcite	12%	≤2.2mm	euhedral to anhedral	rhombohedral

Rock Fragments: 6% of this sample is composed of small rounded fragments of recrystallized limestone, ≤ 0.5mm in maximum dimension. The calcitic material has undergone metamorphoses to marble, and appears to have some thermal alteration as well. One grain of subangular, sutured quartz, 2.6mm in long axis, is present. Appears to be from a mature sandstone which has undergone slight metamorphoses.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Calcite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
FS#: FS#116-223
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 73% of this sample consists of light brown clay with black rinds on both the interior and exterior surface of the sherd. Clay appears to be derived from decomposition of both basalt and quartzite rocks and minerals, possibly from a streambed.

Temper: 27% of this sample consists of temper material, 15% of which is in the form of individual minerals and 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	3%	≤0.5mm	subhedral	from basalts
Quartz	7%	≤0.45mm	angular, rounded	monocrystalline
Magnetite	<1%	≤0.2mm	rounded	
Mica	<1%	≤0.2mm	subhedral	muscovite
	<4%	≤0.5mm	books	biotite
Calcite	trace			spar

Rock Fragments: 12% of this sample consists of mixture of three distinct types: 1) About 10% are soft, rounded, possibly calcareous rock fragment, ≤0.7mm in maximum dimension; 1% are subangular to subrounded basalt fragments with plagioclase laths in matrix, <0.9mm in maximum dimension; and, 3) 1% are rounded metamorphic rock fragments, possibly chert, ≤0.4mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Mixed; 4) Temper Size: 0.5mm minimum, 0.9mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#141-83
Type: Great Salt Lake Gray, Knolls Gray (Aikens 1970)

Clay: 60% of this sample is composed of grainy light tan to coffee clay derived from decomposed mafics. Sample is light tan in center to darker brown on both edges, and darkest along convex side. Smeared curved clay blebs may be decomposed micas or mafics and are oriented parallel to long axis of sample. Random, poorly developed shrinkage cracks account for up to 3% of sample.

Temper Material: 40% of this sample is composed of temper material, all of which is in the form of free minerals. Virtually no rock fragments are present in this sample.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	25%	≤0.45mm	euhedral, broken	plagioclase, trace of K and albite feldspar
Quartz	8%	≤0.4mm	angular, broken	not from andesite
Pyroxene	5%	≤0.3mm	anhedral	decomposed
Amphibole	2%	≤0.35mm	rounded	decomposed
Magnetite	trace	≤0.15mm	euhedral	
Mica	trace	≤0.3mm		weathered

Rock Fragments: No identifiable rock fragments, though there is one possible fragment of decomposed welded tuff. Too far decomposed to discern further.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 0.45mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
FS#: 421-61
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 70% of this sample is composed of clays which varies from golden to deep red-brown in color. The clays are silty, strongly laminated, and are derived from the same metamorphic source as schist rock fragments.

Temper: 30% of this sample consists of temper material, 15% of which is in the form of free minerals and 15% in the form of rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	3%	≤1.0mm	subangular	unknown but untwinned
Quartz	8%	≤0.75mm	angular, subangular	mono- and poly-crystalline, strained
Mica	4%	≤0.4mm		muscovite

Rock fragments: 15% of sample consists of angular to subangular metamorphic rock fragments, probably a quartz-rich micaceous schist. Quartz in rock fragments is generally strained and polycrystalline. Rocks are 1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Schist; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#452-233
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 45% of this sample is composed of black clay and silt, with a red-brown rind on both edges of the sample. Of the 45%, almost 25% appears to be mudstones. The clays appear to have been derived from the sample source as the temper material.

Temper: 55% of this sample consists of temper material, and all but 1% are in the form of free minerals. The size sorting of the free mineral grains is very poor but angularity is high. Feldspars show some alteration and straining, suggesting a metamorphic event. The feldspar, quartz, and mudstones appear to have undergone a slight hydrothermal treatment in situ prior to rock disintegration. The mineralogy in this sample is similar to another sherd from the same site, FS#458-54. FS#458-54 contains rock fragments which are quartzite and schist. Thus, the most probably source of the clay and temper is a soil horizon above a decomposing low grade quartzite rock.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	40%	≤1.7mm		weathered plagioclase?
Quartz	10%	≤1.2mm		strained
Pyroxene and Amphibole	4%	≤0.8mm		
Magnetite	1%	≤0.2mm		

Rock Fragments: Less than 1% of this sample are rock fragments, probably a low-grade quartzite/schist, up to 1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.08mm minimum, 1.7mm maximum; 5) Shaping: Not Coiled

Site: 42BO36 (Hogup Cave)
FS#: FS#456-45
Type: Shoshoni Ware (Aikens 1970)

Clay: 65% of this sample consists of red brown clay which appears to be derived from decomposition of both basalt and quartzite rocks and minerals, possibly from a streambed.

Temper: 35% of this sample consists of temper material, 15% of which is in the form of individual minerals and 20% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	10%	≤1.5mm	subrounded, broken	from basalts
Quartz	4%	≤0.5mm	angular, rounded	polycrystalline, strained
Pyroxene	<1%	≤0.3mm		
Magnetite	trace			

Rock Fragments: 20% of this sample consists of mixture of two distinct types. Almost 20% are metamorphic rocks of quartzite and less than 1% are chips of altered basalt.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Mixed; 4) Temper Size: 0.1mm minimum, 2.5mm maximum; 5) Shaping: Not Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#458-54
Type: Shoshoni Ware (Aikens 1970)

Clay: 45% of this sample is composed of light and dark brown to black clay, slightly mottled in appearance due to areas of opaque minerals and patches of lighter brown clay. Almost half of this slide consists of mudstone fragments. Clay was probably procured from a stream bed very near the decomposing source metamorphic rock.

Temper: 55% of this sample consists of temper material, 40% of which are in the form of free minerals and 15% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	30%	≤2.5mm	broken	weathered plagioclase
Quartz	10%	≤1.0mm	round, broken	strained
Pyroxene	trace	≤0.3mm		
Magnetite?	trace	≤0.2mm		
Mica	trace			

Rock Fragments: About 15% of the sample consists of poorly sorted quartzite and schist rock fragments which show slight roundness suggesting some transport. Rock fragments are as large as 3.0mm in maximum dimension. Feldspars are regarded as derived dominantly from the metamorphic rock fragments at the source. All mica in the sample appears to be confined to the metamorphic rock fragments except for some possible very small altered micas in the matrix.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.5mm maximum; 5) Shaping: Not Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#463-127
Type: Shoshoni Ware (Aikens 1970)

Clay: 50% of this sample is composed of dark black clay derived from the same source as temper material. What appears to be color variation on one edge is due to section thickness and not pigment.

Temper Material: 50% of this sample is composed of temper material, 30% of which are in the form of free minerals and 20% of which are rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	17%	≤1.0mm	rounded	plagioclase, untwinned
Quartz	10%	≤0.8mm	rounded	strained
Pyroxene	<1%	1.0mm	rounded	
Amphibole	<2%	≤1.0mm	rounded	
Mica	<1%	≤0.2mm		weathered

Rock Fragments: 20% of this sample is composed of rock fragments, up to 2.5mm in maximum dimension, which are derived from a metamorphic source. Quartzite and mica schist are present in large grains with some degree of angularity. The fresh condition and angularity of the rock fragments suggest that the source for this metamorphic component is in situ; however, the free minerals have been transported a distance to achieve the roundness of grains but also appear to be metamorphic in origin. Thus, the clay was probably taken from a streambed whose petrography is metamorphic in origin.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.5mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#463-129
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 66% of this sample consists of a golden brown clay, no doubt related to the same source as the temper material. About 2% is in the form of round clay agglomerates which appear to be weathered remnants of some earlier phase, but no relic material was evident in the balls.

Temper: 34% of this sample is composed of temper material, 22% of which is in the form of free minerals and 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤1.0mm	subrounded	plagioclase, untwinned
Quartz	11%	≤0.7mm	rounded to subrounded	?sedimentary source
Mica				
Muscovite	8%	≤0.8mm	elongate	
Biotite	<2%	≤0.3mm	books	altered

Rock Fragments: About 12% of this sample is composed of possibly two forms of quartz-rich metamorphic rock fragments, 2.0mm in maximum dimension. One group has muscovite and biotite in a strong preferred orientation; a second group contains random clumps of muscovite.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 7.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.3mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#463-133
Type: Snake Valley Gray (Aikens 1970)

Clay: 50% of this sample consists of black clay, which is slightly lighter on one edge of the sherd. About half of the clay appears in the form of mudstones. Clay appears to have been derived from a streambed near to source of the temper material.

Temper Material: 50% of this sample is composed of temper material, 30% of which is in the form of free minerals and 20% in the form of rock fragments.

Free Minerals: Many free minerals display a high degree of rounded, some approaching sphericity. This suggests transport but the grains display only minimal alteration by weathering.

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	$\leq$1.2mm	subrounded, broken	plagioclase, a few twinned
Quartz	10%	$\leq$1.0mm	rounded	Some strained
Pyroxene and Amphibole	<4%	$\leq$1.2mm	rounded	
Mica	<1%	$\leq$.2mm		

Rock Fragments: About 20% of this sample is in the form of metamorphic rock fragments, 3.0mm in maximum dimension, which have a varied history. Some rocks include quartzite and schist, the latter is well-foliated and mica makes up a portion of the very fine matrix. Though many individual minerals are round, larger quartzite rocks do not display this rounding and tend to be very angular.

Small Data Set Attribute Summary: Type: Snake Valley Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.2mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#518-28
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 60% of this sample is composed of a very dark brown to black clay. What appears to be a weathering rind of lighter (brown) material on two ends of the slide is in fact thinner regions of the section itself and not tone variation in pigment. The clay is derived from andesite, probably from a soil profile rather than a stream bed.

Temper Material: 40% of this sample is composed of temper material, all of which is in the form of free minerals and lack any component of rock fragments.

Mineral	Amount	Size	Shape	Remarks
Feldspar	30%	≤1.3mm	euhedral, broken	plagioclase trace albite
Quartz	5%	≤1.0mm	broken, angular	not from andesite
Pyroxene	3%	≤0.8mm	euhedral	
Amphibole	<1%	≤0.8mm		horneblende
Magnetite	2%	≤0.25mm		

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 1.3mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#566-2
Type: Shoshoni Ware (Aikens 1970)

Clay: 20% of this sample is composed of very dark brown clay, probably derived from decomposition of pyroxenes and amphiboles out of the schists. Clays looks color banded and has definite thin black rind on convex margin. Up to 5% of this sample are void spaces, no doubt from shrinkage as the cracks display no clear orientation.

Temper Material: 80% of this sample consists of temper material, 35% of which is in the form of free minerals and 45% are rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	5%	≤0.2mm	subhedral, broken	plagioclase, K-feldspar, a few albite, all twinned.
Quartz	25%	≤0.35mm	angular	from quartzite
Pyroxene	1%	≤0.2mm	anhedral	from schist
Amphibole	<1%	≤0.1mm	linear	from schist
Mica				
Muscovite	<1%	≤0.25mm	ragged	from schists

Rock Fragments: 45% of this sample are large and small rock fragments of quartzite and schist set in a mineral rich matrix of fragments derived from the same rocks. Maximum dimension is 2mm. Quartzite is white to grey; schist is tan.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 7.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#567-101
Type: Shoshoni Ware (Aikens 1970)

Clay: 20% of sample is composed of very fine dark brown to black clays. Thin black rind on convex sides of sample. Possibly some free carbon mixed into clays. About 5% to 7% void space in sample and cavities are parallel to crystal/rock fragments. These do not appear to be from shrinkage and may be related to vessel forming techniques. Clays appear to be derived from amphiboles and pyroxenes in schist.

Temper Material: 80% of this sample is composed of temper material, only 10% of which are in the form of free minerals. The remaining 70% are poorly sorted rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	1%	≤0.25mm	subhedral, broken	Plagioclase, K-feldspar, albite, from quartzite
Quartz	4%	≤0.15mm	angular, broken	from schists
Pyroxene	2%	≤0.15mm	angular broken	from schists
Amphibole	2%	≤0.25mm	linear	sticks
Magnetite	trace			
Mica	<1%	≤0.4mm	anhedral	muscovite

Rock Fragments: 70% of sample is composed of large and small fragments, .03mm to 2mm in maximum dimension, of schist and quartzite. Rock fragments are angular and look freshly broken. Quartzite grey, schist is grey to tan.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#606-120
Type: Great Salt Lake Gray, Knolls Gray (Aikens 1970)

Clay: About 75% of this sample is composed of uniform dark chocolate brown clay derived from decomposition of pyroxenes and amphiboles in the andesite. Random shrinkage cracks up to 5% of sample volume. Clays display crude lamination parallel to long axis of sample.

Temper Material: About 25% of this sample consists of temper material, all of which are in the form of free minerals. There are virtually no detectable rock fragments:

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	16%	≤0.3mm	anhedral, euhedral, broken	plagioclase trace albite, K-feldspar
Quartz	6%	≤0.5mm	angular	decomposed
Pyroxene	<1%	≤0.2mm	anhedral	decomposed
Amphibole	<1%	0.1mm	anhedral	decomposed
Magnetite	trace			
Mica	<1%	≤0.4mm	laths	decomposed

Rock Fragments: No detectable rock fragments that can be identified. One possible fragment of badly weathered Andesite, but it is too decomposed to tell.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 0.5mm maximum; 5) Shaping: Coiled

Site: 42BO36
Sample: FS#609-35
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 60% of the sample is composed of a brown to black silty clay, with black layers of oxidizing organic material. Clay is weakly laminated and very micaceous.

Temper: 40% of this sample consists of very poorly sorted temper material in the form of angular to subangular quartz and feldspar grains. There are no discernable rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	10%	<0.5mm	subangular	untwinned, unaltered, unknown type
Quartz	21%	<1.0mm	subangular, angular	mono-crystalline
Mica	9%	<0.75mm	highly altered	muscovite, <biotite

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Granite; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#609-40
Type: Shoshoni Ware (Aikens 1970)

Clay: 20% of this sample is composed of dark brown to coffee colored clays derived from weathered amphiboles and pyroxenes in schist. Clear dark, thin rind on both convex and concave sides of sample. Void space <2% with random orientation of small shrinkage cracks, probably the result of shrinkage.

Temper Material: 80% of this sample is composed of temper material, 28% of which is in the form of free minerals and 52% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	5%	≤1.0mm	subhedral broken	K-feldspar, from quartzite
Quartz	20%	≤1.0mm	angular, broken	from quartzite
Pyroxene	1%	≤ 0.2mm	anhedral, broken	from schist
Amphibole	1%	≤0.25mm	anhedral, broken	from schist
Mica	<1%	≤0.1mm	ragged	muscovite

Rock Fragments: 52% of this sample is composed of large angular fragments of quartzite and schist, up to 2 mm. in maximum dimension. Fragments are very angular and look fresh and unweathered. Quartzite is white to tan, schist is tan.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 9.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#609-41
Type: Shoshoni Ware (Aikens 1970)

Clay: 68% of this sample is composed of dark to red brown, silty clay. Moderate lamination is present. Clay is probably derived from same source as temper material

Temper: 32% of this sample consists of temper material, 26% of which is in the form of free minerals and 6% in the form of rock fragments. Temper material is very poorly sorted and are generally unaltered, suggesting little transport.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	18%	≤1.75mm	angular to subangular	plagioclase, untwinned
Quartz	8%	≤1.0mm	angular	strained
Mica	trace	≤0.5mm		muscovite

Rock Fragments: 6.0% of this sample consists of subrounded to subangular plutonic rock fragments, ranging from 0.5mm to approx. 2.0mm in maximum dimension. Probably source of temper is granodioritic rock.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 8.0mm; 2) Exterior Surface Color: Black; 3) Temper: Granite; 4) Temper Size: 0.05mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#628-36
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 20% of this sample is composed of a uniform black colored clay derived from the decomposition of mafics in metamorphic rock fragments. Shrinkage cracks, up to 5%, account for void spaces in sample.

Temper Material: 80% of this sample is composed of temper material, 45% of which are in the form of free minerals and 35% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	2%	≤0.75mm	subhedral, broken	K-feldspar, very little plagioclase
Quartz	40%	≤1.5mm	angular, broken	from quartzite
Pyroxene	1%	≤0.5mm	subhedral broken	? from schist
Amphibole	3%	≤0.45mm	linear, broken	? from schist
Mica	<1%	≤0.3mm	flakes	muscovite

Rock Fragments: 35% of this sample are rock fragments, almost all are quartzite, up to 1.75mm. in maximum dimension. Quartzite is light grey in color and most fragments very angular and fresh looking.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 7.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 1.75mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#628-39
Type: Snake Valley Gray (Aikens 1970)

Clay: 50% of this sample is very grainy chocolate brown clays derived directly from its enclosed minerals. Slightly darker rinds are present on both convex and concave edges of sample. Very few shrinkage cracks despite high clay content, voids are <1% of pottery volume. Crude lamination of clays parallel to long axis of sample.

Temper Material: 50% of this sample consists of temper material, all of which are in the form of freshly broken mineral fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	30%	≤.8mm	euhedral, broken	plagioclase, trace albite and K-feldspar
Quartz	5%	≤.25mm	rounded, broken	not from feldspar
Pyroxene	4%	≤.6mm	broken	decomposed slightly
Amphibole	6%	≤.5mm	sticks	decomposed slightly
Magnetite	2%	≤.2mm	euhedral	
Mica	3%	≤.4mm		biotite

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Snake Valley Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 0.8mm maximum; 5) Shaping: Coiled

Site: 42BO36 (Hogup Cave)
Sample: FS#651-42
Type: Great Salt Lake Gray (Aikens 1970)

Clay: 90% of this sample is composed of a wormy looking corroded clay derived from decomposed mafics and plagioclase in andesite. Random ragged shrinkage cracks up to 6% void space in sample. Distinctive "wormy" texture due to in situ weathering of feldspars.

Temper Material: Only 10% of this sample is composed of temper material, all in the form of free minerals. There are no detectable rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	6%	≤0.75mm	euhedral to anhedral	plagioclase, some albite
Quartz	3%	≤0.8mm	subrounded, well rounded	not from feldspars
Pyroxene	<1%	≤0.2mm	anhedral	decomposed
Amphibole	<1%	≤0.2mm	anhedral	decomposed
Magnetite	?trace			

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 0.8mm maximum; 5) Shaping: Coiled

Site: 42BO55 (Bear River 1)
Sample: FS#14-13
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 40% of this sample is composed of clay derived from the decomposition of mafics in schists. Sherd is color-banded half and half along the long axis: there is dark black clays on convex side and coffee colored clay on concave side. Extensive shrinkage cracks around rock fragments of quartzite with cracks up to .5mm across. Shrinkage cracks throughout sample up to 10% by volume and overlap in a step-like arrangement.

Temper Material: 60% of this sample is composed of of poorly sorted temper material, 30% of which is in the form of free minerals and 30% in the form of quartzite rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<5%	≤0.1mm	anhedral to broken	plagioclase, K-feldspar and albite, from quartzite
Quartz	25%	≤1.0mm	angular, broken	from quartzite
Pyroxene	<1%	≤0.1mm	anhedral, broken	from schist?
Amphibole	<1%	≤0.1mm	decomposed, broken	from schist?
Mica	trace	≤0.2mm		biotite and muscovite

Rock Fragments: 30% of sample is composed of poorly sorted, fresh quartzite fragments, some as as large as 3.0mm in maximum dimension. Quartzite is white to tan in color.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42BO55 (Bear River 1)
Sample: FS#46-86
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 40% of this sample is composed of very dark coffee-colored to jet black clay derived from the decomposition of mafics in the obsidian matrix. Shrinkage occurs away from larger rock fragments and mineral grains. Ragged, star-shaped voids, up to 5% of volume, which occur randomly and without apparent orientation. Slight orientation of needle-like minerals to clay but no evidence of lamination.

Temper Material: 60% of this sample is composed of of poorly sorted temper material, 10% of which is in the form of free minerals and 50% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<4%	≤0.4mm	euhedral, broken, rounded	plagioclase, K-feldspar and albite twinned
Quartz	<4%	≤0.5mm	angular, broken	
Pyroxene	<1%	≤0.2mm	anhedral	decomposed
Amphibole	<1%	≤0.1mm	anhedral needles	decomposed
Magnetite	1%	≤0.1mm	euhedral	imbedded in obsidian
Mica	trace	≤0.4mm	flakes	decomposed biotite

Rock Fragments: 50% of sample is composed of angular to subrounded, and well-rounded, fragments of porphyritic obsidian, up to 1.5mm in maximum dimension. Phenocrysts, up to 0.4mm, of feldspar and quartz are euhedral to subhedral. Some fragments are well-rounded and some are angular, indicating different sources or different grinding of some of the material.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Obsidian; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled (very crude)

Site: 42BO55 (Bear River 1)
Sample: FS#98-1
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 50% of this sample is composed of a grainy, chocolate brown clay matrix derived from weathered basalt and mafic minerals. There is a thin, dark brown rind on the convex margin of the sample. Shrinkage cracks around most rock fragment, up to 5% void space due to shrinkage. Cracks up to 3.0mm long, parallel to long axis of sample, and are ragged and irregular. Opaque blebs in shrinkage cracks may be free carbon.

Temper Material: 50% of this sample is composed of temper material, 20% of which is the the form of free minerals and 30% in the form of mostly andesite rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	8%	≤0.55mm	subrounded, broken	plagioclase, some albite
Quartz	3%	≤0.3mm	angular	from tuff?
Pyroxene	4%	≤0.35mm	subrounded	from andesite
Amphibole	3%	≤0.3mm	anhedral, subrounded	from andesite
Magnetite	trace		euhedral	from andesite
Mica	2%		decomposed laths	biotite

Rock Fragments: About 30% of sample is composed of porphyritic andesite rock fragments, some of which are vesicular with secondary zeolite minerals in the vugs. Most of the rocks are small, rounded to subrounded pebbles set in the clay matrix but some are up to 4.0mm in maximum dimension and bear euhedral crystals of plagioclase, pyroxenes and amphiboles as well as a mica (biotite). Also present is a possible fragment of welded tuff. Andesite is gray to tan and badly corroded to clay at its edges.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 4.0mm maximum; 5) Shaping: Coiled

Site: 42BO107 (Late Levee)
FS#: FS#80-14
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 35% of this sample consists of chocolate to coffee colored clay derived from decomposed mafics. There is a thin black rind on the convex side of the sample. Needle-like crystals of mafics and plagioclase particles impart a poor lamination texture to the clays by wrapping around large rock and mineral grains. Shrinkage cracks, up to 0.6mm wide, appear to be filled with free carbon. Ragged cracks run up to 1.0 cm. in length, parallel to the long axis of the sample.

Temper: 65% of this sample consists of temper material, 10% of which is in the form of individual minerals and 55% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	5%	≤1.0mm	subhedral, broken	plagioclase, K-feldspar, albite
Quartz	<4%	≤0.8mm	euhedral to subhedral	from obsidian?
Pyroxene	<1%	≤0.2mm	anhedral	decomposed
Amphibole	trace	≤0.2mm	anhedral	decomposed
Magnetite	trace			
Mica	trace	≤0.5mm	flakes	decomposed

Rock Fragments: 55% of this sample consists of angular to subrounded fragments of porphyritic obsidian, up to 2.0mm in maximum dimension. Phenocrysts of quartz and feldspars in the obsidian are up to 1.0mm in maximum dimension. Obsidian is gray to clear. Fractures in obsidian are sealed and filled with calcitic cement, suggesting the raw materials may have been derived from a caliche zone in a soil profile.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Black; 3) Temper: Obsidian; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO107 (Late Levee)
FS#: FS#93-5
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: About 45% of this sample consists of a grainy, laminated paste light brown to coffee colored. Clays are derived directly from andesite rock chips and mafics. 4% shrinkage cracks of clay in this sample. Cracks are random to subparallel to long axis of sample. Sample has a light tan core and slightly darker tan coloring on convex edge.

Temper: 55% of this sample consists of temper material, 30% of which is in the form of individual minerals and 25% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	<0.8mm	euhedral, angular	plagioclase
Quartz	4%	<0.4mm	angular, broken	not from andesite
Pyroxene	5%	<0.3mm	euhedral, subhedral	from andesite
Amphibole	5%	<0.3mm	euhedral subhedral	from andesite
Magnetite	trace	<0.2mm	euhedral	
Mica	1%		flakes	decomposed biotite

Rock Fragments: About 25% of this sample consists of a massive, nonvesicular, andesite porphyry. Phenocrysts of amphiboles and pyroxenes and twinned plagioclases are euhedral set in a very fine matrix of smaller plagioclase crystalline needles. Very small rock fragments of andesite and some volcanic tuffs are also present. Gray rock fragments, up to 1 mm in maximum dimension, are rounded and look stream worn.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 0.8mm maximum; 5) Shaping: Coiled

Site: 42BO107 (Late Levee)
Sample: FS#93-14
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 50% of this sample consists of thick, dark brown clay derived from decomposition of minerals in the matrix. Up to 5% void space due to shrinkage cracks which develop as elongate cracks parallel to long axis of sample. Clays appear to laminate and "wrap" around large mineral and rock fragments.

Temper: 50% of this sample consists of temper material, 25% of which is in the form of free minerals and 25% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	10%	<0.75mm	subhedral, angular	plagioclase
Quartz	5%	<0.55mm	angular, broken	not from andesite
Pyroxene	5%	<0.35mm	euhedral, broken	from andesite
Amphibole	4%	<0.40mm	euhedral, broken	from andesite
Magnetite	trace	.10mm	euhedral	in basalt
Mica				
Biotite	trace		flakes	decomposed

Rock Fragments: About 25% of this sample consists of rock fragments dominated by massive, non-vesicular, gray to tan andesite porphyry. Also present are small fragments of andesite and a tuff which is possibly welded. Phenocrysts in basalt of plagioclase, pyroxenes and amphiboles are euhedral but rock fragments themselves are rounded to subrounded and look stream worn.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 0.75mm maximum; 5) Shaping: Coiled

Site: 42BO107 (Late Levee)
FS#: FS#132-10
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 25% of this sample consists of brown to black clay derived from decomposed mafics. Grainy appearance due to very small decomposed mafics. Minimal but definite shrinkage cracks around large crystals and rock fragments. Larger ragged voids in sample up to 5% in volume without apparent orientation are scattered throughout sample.

Temper: 75% of this sample consists of temper material, 40% of which is in the form of individual minerals and 35% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	≤1.0mm	euhedral, subhedral	plagioclase, K-feldspar, albite
Quartz	17%	≤1.2mm	angular, broken	from obsidian
Pyroxene	3%	≤0.6mm	anhedral to subhedral	decomposed
Amphibole	4%	≤0.8mm	sticks	decomposed
Mica	1%	≤0.5mm	flakes	decomposed muscovite

Rock Fragments: 35% of this sample consists of angular fragments of porphyritic, flow banded obsidian, up to 1.5mm in maximum dimension. Phenocrysts in obsidian include euhedral quartz and twinned plagioclase in the obsidian. Obsidian is gray to clear.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Obsidian; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42BO107 (Late Levee)
FS#: FS#204-83
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 25% of this sample consists of brown to black clay derived from decomposed mafics. There is a thin black rind on the convex side of the sample. Small shrinkage cracks are evident around larger mineral and rock fragments. Ragged cracks without apparent orientation are scattered throughout sample.

Temper: 75% of this sample consists of temper material, 30% of which is in the form of individual minerals and 45% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	$\leq$0.8mm	euhedral, angular	plagioclase, K-feldspar, albite
Quartz	10%	$\leq$0.6mm	angular, broken	from obsidian
Pyroxene	<2%	$\leq$0.2mm	anhedral	decomposed
Amphibole	<3%	$\leq$0.1mm	anhedral	decomposed
Magnetite	<1%	$\leq$0.1mm	euhedral	
Mica	<1%	$\leq$0.5mm	flakes	decomposed

Rock Fragments: 45% of this sample consists of angular to sharp fragments of porphyritic, flow banded obsidian, up to 3.0mm in maximum dimension. Phenocrysts of subhedral quartz and euhedral feldspars in the obsidian. Obsidian is gray to clear.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Obsidian; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO109 (Knoll Site)
Sample: FS#31-35
Type: Great Salt Lake Gray, Knolls Variety (D. Madsen 1979)

Clay: 45% of this sample consists of grainy clays which is very nearly grain-supported in some parts. Light tan color uniform throughout core but slightly darker along the convex edge of sample. No apparent shrinkage cracks. Difficult to assess source of clay. Linear aligned clays from needle-like amphibole crystals suggest a possibly decomposed schist.

Temper: 55% of this sample consists of temper material, all of which are in the form of free minerals. There are no discernable rock fragments present in this sample.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	12%	<0.3mm	broken	plagioclase
Quartz	30%	<0.75mm	rounded, broken	
Pyroxene	5%	<0.25mm	anhedral	decomposed
Amphibole	5%	<0.3mm	anhedral needles	decomposed
magnetite	1%	<0.1mm	euhedral	
Mica	2%	<0.2mm	laths	muscovite and biotite

Rock Fragments: No detectable rock fragments. Possibly a few badly decomposed rock fragments with imbedded crystals of decomposed pyroxenes and amphiboles which, combined with mineral evidence, suggests a granite or diorite source.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Granite; 4) Temper Size: 0.1mm minimum, 0.75mm maximum; 5) Shaping: Coiled

Site: 42BO109 (Knoll Site)
Sample: FS#50-1
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: About 25% of this sample consists of mottled brown to opaque clays. Opaques are carbon fragments. Clays are derived from weathered amphibole and pyroxenes in the schist. Definite thin dark rind on convex side of sample. Void space in pottery up to 5% in linear cracks like schist foliations, 0.2 mm by 2.0 mm in dimension, and parallel to rock and mineral lineation. This orientation does not appear to be shrinkage cracks and may be related to the technique of vessel shaping.

Temper: 75% of this sample consists of temper material, only 10% of which is in the form of free minerals. The remaining 65% are a rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	1%	≤0.1 mm	broken, angular	plagioclase, K-feldspar
Quartz	4%	≤0.3mm	angular, broken	from quartzite
Pyroxene	2%	≤0.2mm	anhedral, angular	from schist
Amphibole	2%	≤0.3mm	anhedral needles	decomposed from schist
Magnetite	trace	≤0.1mm	broken	from schist
Mica				
muscovite	1%	≤0.3mm	broken	from schist

Rock Fragments: About 65% of sample consists of a mixture of large and small fragments of quartzite and schist, 0.02mm to 3.5mm in maximum dimension. Rock fragments are remarkably angular and fresh looking, suggesting an in situ source or freshly ground sample. Quartzite is grey in color and schist, tan to grey.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 3.5mm maximum; 5) Shaping: Coiled

Site: 42BO109 (Knoll Site)
FS#: 61-2
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 65% of this sample consists of thick, brown, grainy clay derived from basalt and mafic minerals. Considerable shrinkage cracks up to 6% of sample volume. Shrinkage voids are free of any carbon. Sample has a light chocolate brown core and slightly darker brown color on the concave side.

Temper: About 35% of this sample consists of temper material, 25% of which is in the form of free minerals and 10% in the form of rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	11%	≤0.8mm	broken, subrounded	plagioclase
Quartz	2%	≤0.35mm	angular, broken	from tuff?
Pyroxene	7%	≤0.50mm	euhedral, subhedral	from andesite
Amphibole	6%	≤0.50mm	euhedral, subhedral	from andesite
Magnetite	trace	≤0.2mm	subhedral	in andesite
Mica				
Biotite	1%	≤0.2mm	decomposed flakes	

Rock fragments: 10% of sample consists of two forms of basalt rock fragments: (1) a porphyritic massive basalt with large well formed euhedral crystals, up to 1.2mm, set in a very fine, twinned plagioclase groundmass; and (2) a uniform basalt to basaltic andesite of needle-like crystals of plagioclase and very large euhedral crystals of pyroxene and amphiboles. Both basalts badly decomposed. Basalts are gray to light brown or tan. A few badly decomposed fragments of pinkish tuff are also present and may be the source of the quartz minerals.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.1mm maximum; 5) Shaping: Coiled

Site: 42BO109 (Knoll Site)
Sample: FS#65-102
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 35% of this sample consists of silty, grainy chocolate brown to tan clay, rich in amphiboles and pyroxenes with even fresher particles of quartz and potassium feldspar, derived from granodioritic source. Dark brown rinds on both concave and convex surfaces. Some irregular to star- shaped shrinkage cracks with a random orientation.

Temper: 65% of this sample consists of temper material, all of which are in the form of free minerals. There are no discernable rock fragments present in this sample.

Mineral	Amount	Size	Shape	Remarks
Feldspar	25%	<0.3mm	euhedral, broken	K-feldspar
Quartz	9%	<0.3mm	angular	fresh
Pyroxene	10%	<0.4mm	broken	decomposed
Amphibole	15%	<0.5mm	angular	sticks
Magnetite	<1%			
Mica	5%		laths	weathered

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Granite; 4) Temper Size: 0.2mm minimum, 0.5mm maximum; 5) Shaping: Coiled

Site: 42BO110 (Early Levee)
FS#: FS#13-3
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 20% of this sample consists of a grainy light brown to chocolate clay derived from decomposed mafics. Dark brown rind on convex margin of sample. Random shrinkage cracks up to 5% of sample. Clay is non-laminated and is random in orientation.

Temper: 80% of this sample consists of temper material, 55% of which is in the form of individual minerals and 25% in the form of rock fragments. The richness in rock and mineral pieces makes this a near grain-supported matrix.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	40%	≤1.5mm	euhedral to subhedral, broken	plagioclase
Quartz	<10%	≤0.3mm	angular, broken	from obsidian
Pyroxene	2%	≤0.1mm	anhedral	decomposed
Amphibole	3%	≤0.2mm	anhedral needles	decomposed
Magnetite	trace			
Mica	<1%	≤0.5mm	decomposed	biotite

Rock Fragments: 25% of this sample consists of angular to subrounded fragments of porphyritic obsidian, up to 1.5mm in maximum dimension. Obsidian is partially devitrified with phenocrysts of euhedral plagioclase feldspars in the obsidian. Obsidian is gray to black.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Obsidian; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Not Coiled

Site: 42BO110 (Early Levee)
FS#: FS#24-2
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 50% of this sample consists of a uniform thick, jet black clay derived from decomposed rhyolite. Shrinkage cracks throughout sample, both around rock fragments and as elongate cracks parallel to long axis of sample, accounts for 5% of void spaces in sample.

Temper: 50% of this sample consists of temper material, less than 5% of which is in the form of individual minerals and 45% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2mm	broken	plagioclase, twinned
Quartz	3%	≤0.2mm	broken	from rhyolite
Pyroxene	<1%	≤0.2mm	anhedral	from rhyolite
Amphibole	<1%	≤0.2mm	anhedral	from rhyolite
Magnetite	trace			
Mica	<1%	≤0.5mm	laths	biotite

Rock Fragments: 45% of this sample consists of well rounded fragments of rhyolite, up to 2.0mm in maximum dimension. Rhyolite is imbedded with quartz and plagioclase feldspars and mafic mineral components. Much of the mineral content of the rhyolite is rounded and appears to have been reworked by fluvial agents prior to lithification. Rhyolite is tan to gray and thoroughly lithified, but not welded.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Rhyolite; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO110 (Early Levee)
FS#: FS#37-4
Type: Great Salt Lake Gray (D. Madsen 1979)

Clay: 40% of this sample consists of a rich, uniform coffee colored clay derived from decomposed rhyolite. Shrinkage cracks throughout sample, both around rock fragments and as elongate cracks parallel to long axis of sample, accounts for 10% of void spaces in sample.

Temper: 60% of this sample consists of temper material, less than 5% of which is in the form of individual minerals and 55% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	2%	≤0.3mm	broken	K-feldspar only
Quartz	2%	≤1.0mm	broken	from rhyolite
Pyroxene	trace	≤0.1mm	broken	from rhyolite
Amphibole	trace	≤0.1mm	broken	from rhyolite
Magnetite	trace	≤0.1mm	euhedral	
Mica	trace			muscovite

Rock Fragments: 55% of this sample consists of well rounded fragments of rhyolite, up to 4.0mm in maximum dimension. Rhyolite is light tan to brown and well-lithified. Only a few fragments appear heat welded.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Rhyolite; 4) Temper Size: 0.1mm minimum, 4.0mm maximum; 5) Shaping: Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#328-30
Type: Promontory Gray (Simms 1990, personal communication)

Clay: 60% of this sample is composed of a laminated, uniform brownish black clay not derived from the metamorphosed calcite. The presence of feldspar, pyroxene, and amphibole may indicate the source of the clay. Shrinkage cracks account for 2% of the sample and are oriented along the laminations.

Temper Material: 40% of this sample is composed of temper material, 5% of which is in the form of free minerals and 35% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	1%	≤0.2mm	subrounded	decomposed
Quartz	<2%	≤0.3mm	rounded to angular	from quartzite
Pyroxene	<1%	≤0.1mm	rounded to angular	decomposed
Amphibole	<1%	≤0.1mm	anhedral	decomposed

Rock Fragments: About 34% of this sample is composed of a poorly sorted marble, probably a recrystallized limestone which has undergone metamorphose. The rock fragments are decomposed but angular and sharp. The marble ranges in size from less than 0.1mm to 3.0mm in maximum dimension. About 1% of the rock fragments are a badly decomposed quartzite, one piece in the slide is 4.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Calcite; 4) Temper Size: 0.1mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#450-1
Type: Promontory Gray (Simms 1990, personal communication)

Clay: 50% of this sample consists of a light chocolate brown to reddish clay decomposed from quartzite. The clays are well-laminated with defined shrinkage cracks running parallel to the long axis of the sample. These cracks account for up to 5% of the sample volume. The clay is fairly uniform in color, with a dark black rind on the interior of the sherd. Some clay around larger rock fragments display shrinkage cracks, probably the result of thermal expansion of the temper during firing.

Temper Material: 50% of this sample consists of temper material, only about 4% of which is in the form of individual minerals. The remaining 46% consists of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.1 mm	anhedral	decomposed
Quartz	3%	≤0.5mm	angular	from quartzite
Pyroxene	possibly present; too decomposed			
Amphibole	possibly present; too decomposed			

Rock Fragments: Almost 47% of this sample is composed of quartzite rock fragments, up to 3.5mm in maximum dimension, with a mean dimension of 3.0mm. Coarse grains of quartz, up to .5mm in maximum dimension, are also present. Most of the raw materials have rounded grains and show signs of decomposition, suggesting an old streambed procurement source.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 9.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 3.5mm maximum; 5) Shaping: Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#450-5
Type: Promontory Gray (Simms 1990, personal communication)

Clay: 50% of this sample is composed of a laminated, uniform brownish black clay not derived from the metamorphosed marble or quartzite. The presence of feldspar and pyroxene may indicate the source of the clay. Shrinkage cracks account for 3% of the sample and cracks are aligned parallel to the long axis of the sample in wavy, thin cracks.

Temper Material: 50% of this sample is composed of temper material, less than 7% of which is in the form of free minerals and 43% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.1mm	broken	albite?
Quartz	5%	≤0.3mm	rounded	from quartzite
Amphibole	<1%	≤0.1mm	angular	

Rock Fragments: About 43% of this sample is composed of marble which is probably a recrystallized limestone which has undergone metamorphoses. The rock fragments are angular and sharp and look fresh. The marble is poorly sorted and ranges in size from less than 0.1mm to 3.5mm in maximum dimension. About 2% of the rock fragments are a fine grained quartzite.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Calcite; 4) Temper Size: 0.1mm minimum, 3.5mm maximum; 5) Shaping: Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#514-6
Type: Promontory Gray (Simms 1990, personal communication)

Clay: About 30% of this sample is composed of a uniform chocolate brown-colored clay derived from the weathered quartzite. Considering the limited percentage of clay, there is a remarkable amount of shrinkage cracks in the sample. The cracks run parallel to the long axis of the sample and account for about 4% of the sample.

Temper Material: 70% of this sample consists of temper material, only about 10% of which is in the form of individual minerals. The remaining 60% consists of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2 mm	broken	decomposed orthoclase, from quartzite
Quartz	10%	≤0.3mm	broken	from quartzite

Rock Fragments: About 60% of the sample is composed of large and small fragments of quartzite, up to 2mm in maximum dimension, with a mean dimension of 1.5mm.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#533-1
Type: Promontory Gray (Simms 1990, personal communication)

Clay: 50% of this sample is composed of a poorly laminated, uniform brownish black clay not derived from the metamorphosed marble or quartzite. The presence of feldspar, pyroxene, and amphiboles may indicate the source of the clay. Shrinkage cracks account for less than 0.5% of the sample.

Temper Material: 50% of this sample is composed of temper material, less than 12% of which is in the form of free minerals and 38% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2mm	angular	albite?
Quartz	10%	≤0.5mm	angular	from quartzite
Pyroxene	<1%	≤0.1mm	angular	

Rock Fragments: About 35% of this sample is composed of marble which is probably a recrystallized limestone which has undergone metamorphoses. The rock fragments are angular and sharp and look fresh. The marble ranges in size from less than 0.1mm to 3.0mm in maximum dimension. About 3% of the rock fragments are a badly decomposed quartzite which originally had rounded edges prior to grinding.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Calcite; 4) Temper Size: 0.1mm minimum, 3.0mm maximum; 5) Shaping: Not Coiled

Site: 42BO120 (Orbit Inn)
Sample: FS#553-3
Type: Promontory Gray (Simms 1990, personal communication)

Clay: 60% of the sample is composed of a reddish-brown clay derived from a decomposed quartzite source. The color is uniform throughout the side and only slightly deeper in color on the edges. The clays are well-laminated with clear microshrinkage cracks running parallel to the long axis of the slide. Larger jagged cracks zig-zag are present throughout. Cracks make up about 5% of the sample. There are also shrinkage cracks around the larger temper particles, probably the result of thermal expansion of the temper during firing.

Temper Material: 40% of this sample consists of temper material, only about 3% of which is in the form of individual minerals. The remaining 37% consists of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2 mm	rounded	decomposed
Quartz	2%	≤0.3mm	angular	from quartzite

Rock Fragments: About 37% of this sample consists of quartzite rock fragments, up to 3mm in maximum dimension. A few coarse grains of quartz are also present, up to 0.5mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42BO268 (Swallow Shelter)
Sample: FS#105-20
Type: Shoshoni Ware (Dalley 1976)

Clay: 72% of this sample is composed of golden to dark brown, laminated, silty clay. Clay is probably derived from the same source as granite rock fragments.

Temper: 28% of this sample consists of temper material, 26% of which is in the form of free minerals and 2% in the form of rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	18%	≤0.8mm	angular, subangular	untwinned a few albite twins
Quartz	4%	≤0.75mm	subangular	mono-crystalline
Amphibole	<2%	≤0.8mm		green pleochroic hornblende
Mica	<4%	≤0.5mm	flakes	muscovite and biotite
Chert	trace			one grain
Schist	trace			one grain

Rock fragments: About 2% of the sample is composed of a feldspar and quartz-rich igneous rock, probably granitic in nature, or possibly a feldspar pod or dike. Rock fragments are ≤1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Granite; 4) Temper Size: 0.8mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO268 (Swallow Shelter)
Sample: FS#217-41
Type: Great Salt Lake Gray (Dalley 1976)

Clay: 75% of this sample is composed of dark brown, silty clays which are weakly laminated. Clay is probably derived from the same metamorphic source as schist rock fragments.

Temper: 25% of this sample consists of temper material, almost all of which is in the form of free minerals. There is only one schist rock fragment in this sample.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	7%	≤1.0mm	subangular, angular	unknown, a few albite twins
Quartz	13%	≤0.8mm	angular, subangular	mono-crystalline, strained
Amphibole	<1%	≤0.5mm		altered to iron and clay
Mica	4%	≤0.75mm	flakes	muscovite and biotite

Rock fragments: A single subrounded grain of quartz-rich micaceous schist is present, 1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Schist; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO268 (Swallow Shelter)
Sample: FS#217-53
Type: Great Salt Lake Gray (Dalley 1976)

Clay: 85% of the sample is composed of a brown and golden clay. Clay is moderately laminated and laminations appear distorted, possibly the result of rolling the clay to form coils. Paste has minor silt content.

Temper: About 15% of this sample consists of temper material, about 11% of which is in the form of free minerals and 4% in the form of rock fragments.

Free minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.2 mm	subhedral, angular	oligoclase twinned
Quartz	10%	≤0.4 mm	subrounded, angular	mono and poly-crystalline
Amphibole	<1%	≤0.5mm	euhedral to subhedral	green and brown hornblend
Magnetite	trace	≤0.6mm	rounded	opaque
Mica				
Biotite	trace	≤0.15mm	books	
Muscovite	<1%	≤0.3mm	subhedral	
Other				1 grain chert

Rock Fragments: About 4% of this sample consists of subrounded to block quartzite fragments which range to 2.0mm in maximum dimension. Some fragments are fused with minor amounts of muscovite, green hornblende, and biotite. Rock fragments are commonly subrounded and may be from a sedimentary source that contained chert and a moderate grade quartz rich metamorphic rock.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Gray; 3) Temper: Quartzite; 4) Temper Size: 0.06mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO301 (Owl Springs)
FS#: FS#8-8
Type: "Fremont" (Dalley 1976)

Clay: 70% of this sample consists of brown to golden brown silty clay. Clay contains some altered biotite and is laminated in appearance.

Temper: 30% of this sample consists of temper material, 10% of which is in the form of individual minerals and 20% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	8%	≤1.0mm	subrounded, subangular	plagioclase,
Quartz	2%	≤1.0mm	subangular, subrounded	monocrystalline
Mica	<1%	≤0.5mm	flakes	altered biotite

Rock Fragments: 20% of this sample consists of mixture of five distinct types of poorly sorted, angular to subrounded, rock fragments: 1) 11% of the rock fragments are in the form of a tuffaceous rock, <1.0mm in maximum dimension, and which is highly altered: zeolites are replacing glasses and clays are replacing feldspars; 2) 4% are very fine-grained, very altered basaltic rock fragments, subangular to subrounded in shape, <0.75mm in maximum dimension; 3) 3% are metamorphic rock fragments which are both quartz-mica schists and metashales (slaty rocks), <0.5mm in maximum dimension; 4) 1% are probably plutonic rocks (or perhaps part of metashale rock fragment component), possibly granodioritic type, <.75mm in maximum dimension; and, 5) 1% are subrounded monocrystalline chert rocks, <0.75mm in maximum dimension.

Small Data Set Attribute Summary: Type: "Fremont"; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Mixed; 4) Temper Size: 0.5mm minimum, 0.9mm maximum; 5) Shaping: Coiled

Site: 42BO365 (Remnant Cave)
Sample: FS#17-27
Type: Great Salt Lake Gray (Berry 1976)

Clay: 64% of this sample is composed of a reddish to golden-brown clay which is derived from the mafics in the schist.

Temper Material: 36% of this sample is composed of temper material, 20% of which is in the form of free minerals and less than 16% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Quartz	2%	≤0.3mm	rounded, broken	
Garnet	1%	≤0.2mm		some crystal formation
Mica				
Muscovite	12%	≤2.0mm	elongate	fresh, thick
Biotite	5%	≤2.0mm	often square	weathered books

Rock Fragments: About 16% of this sample is composed of metamorphic schist rock fragments, up to 2.0mm in maximum dimension. Fragments vary from large quartz-rich with mostly fresh micas to fine grained fragments with muscovite and garnet, which appears to have been altered somewhat to chlorite.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Schist; 4) Temper Size: 0.3mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO365 (Remnant Cave)
Sample: FS#72-41
Type: Shoshoni Ware (Berry 1976)

Clay: 70% of this sample is composed of a very fine, very dark clay derived from weathered andesite and mafic minerals.

Temper Material: 30% of this sample is composed of temper material, 29% of which is in the form of free minerals and less than 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	19%	≤0.8mm	subhedral, anhedral, rounded	plagioclase, most andesine, some labradorite
Quartz	8%	≤1.1mm	rounded, broken	monocrystalline embayed
Amphibole	<1%	≤0.3mm	subhedral	green horneblende
Mica	<2%	≤0.9mm	subhedral books	biotite

Rock Fragments: Less than 1% of this sample is composed of rounded andesite rock fragments, less than 0.5mm in maximum dimension. Some plagioclase laths are present in a glassy matrix.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 1.1mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#1-23
Type: Promontory Gray (Steward 1937)

Clay: 68% of this sample is composed of a very dark brown clay. Clay is derived from same andesite source as temper.

Temper: 32% of this sample consists of temper material, 30% of which is in the form of individual minerals and 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	≤1.2mm	euhedral, broken	plagioclase
Quartz	9%	≤0.4mm	anhedral, subangular	mono-crystalline
Pyroxene	<1%	≤0.4mm		diopside
Amphibole	4%	≤0.55mm	subhedral, angular	brown and green hornblende
Magnetite	<1%	≤0.2mm	rounded	opaque
Mica				
Biotite	1%	≤0.5mm	subhedral books	

Rock Fragments: 2% of this sample consists of subangular andesite rock fragments, ≤1.5mm in maximum dimension. All fragments in this sample are glass which are less altered to clays than in other andesite tempered sherds from this site.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#1-25
Type: Promontory Gray (Steward 1937)

Clay: 60% of this sample is composed of a medium to reddish brown clay, undoubtedly derived from the same source of andesite as the temper material.

Temper: 40% of this sample consists of temper material, all of which is in the form of individual minerals. Rock fragments are almost entirely lacking in this sample.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	34%	≤1.1mm	euhedral, broken	plagioclase
Quartz	3%	≤0.3mm		mono-crystalline
Pyroxene	1%	≤0.6mm		augite
Magnetite	2%	≤0.2mm	rounded, equant	opaque

Rock Fragments: No detectable rock fragments are present in this sample.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 1.1mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#1-26
Type: Promontory Gray (Steward 1937)

Clay: 68% of this sample is composed of golden to dark brown clay which is derived from the same andesitic source as temper material.

Temper: 32% of this sample consists of temper material, 28% of which is in the form of individual minerals and 4% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	13%	≤1.8mm	subhedral	plagioclase, oligoclase
Quartz	9%	≤0.7mm	angular to rounded	monocrystalline
Pyroxene	1%	≤0.5mm	subhedral, angular	diopside
Amphibole	1%	≤.45mm	euhedral, broken	brown hornblende
Magnetite	1%	≤.32mm	subrounded	opaque
Mica				
biotite	3%	≤.5mm	subhedral	books

Rock Fragments: 4% of this sample is composed of rounded andesitic rock fragments, up to 1.5mm in maximum dimension. One piece of volcanic glass, possibly obsidian, is also present.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 1.8mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#2-1A
Type: Promontory Gray (Steward 1937)

Clay: 60% of this sample is composed of a strongly laminated red-brown to yellow brown clay, undoubtedly derived from the same source of andesite/basalt as the temper material.

Temper: 40% of this sample consists of temper material, 36% of which is in the form of individual minerals and 4% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	30%	≤1.3mm	angular, subangular	andesine to labrodorite
Pyroxene	<1%	≤0.5mm	broken	augite?
Amphibole	<1%	≤1.0mm	broken	green hornblende
Magnetite	trace			
Mica	4%	≤1.0mm		weathered biotite
Organics	<1%		rounded	deep red to black in ppl

Rock Fragments: 4% of the sample are fine-grained, subangular volcanic rocks with mafic minerals altered to clays. Rocks are andesitic to basaltic in nature and ≤1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite/Basalt; 4) Temper Size: 0.1mm minimum, 1.3mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#2-1B
Type: Promontory Gray (Steward 1937)

Clay: 68% of this sample is composed of a strongly laminated golden brown clay, with a minor amount of silt and highly altered biotites. Undoubtedly the clay was derived from the same andesite/basalt as the temper material.

Temper: 32% of this sample consists of temper material, 28% of which is in the form of individual minerals and 4% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	23%	≤1.0mm	angular, broken	andesine to labrodorite
Pyroxene	trace			
Amphibole	3%	≤1.0mm	broken	hornblende
Mica	<2%	≤1.0mm	flakes	weathered biotite
Organics	<2%		rounded	deep red to black in ppl

Rock Fragments: 4% of the sample are fine-grained, subangular to subrounded volcanic rocks with mafic minerals altered to clays. Rocks are andesitic to basaltic in nature and are ≤0.5mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite/Basalt; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#2-10
Type: Promontory Gray (Steward 1937)

Clay: 62% of this sample is a very dark clay, although one edge is golden brown. Within the clay are thin muscovite laths as well as quartz (and feldspar?) grains.

Temper: 38% of this sample consists of temper material, 8% of which is in the form of individual minerals and 30% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	2%	≤.5mm	euhedral, subhedral subangular	twinning, microperthitic texture?
Quartz	3%	≤.3mm	subangular	polycrystalline undulatory extinction
Mica				
Muscovite	3%	≤1.5mm	subhedral, elongate	
Biotite	trace	≤.5mm	flakes	altered

Rock Fragments: 30% of this sample consists of quartzite fragments, up to 6.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 6.0mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#2-12
Type: Promontory Gray (Steward 1937)

Clay: 58% of this sample is composed of clay, 3% of which is mostly mudstones. The clay is a very dark brown to black color, which makes it difficult to distinguish mudstone clasts and opaques. As a result, the mudstones are probably underestimated, and are instead included in the clay matrix.

Temper: 42% of this sample consists of temper material, 7% of which is the in form of individual minerals and 35% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<5%	≤1.4mm	euhedral	plagioclase, K-feldspars
Pyroxene	<1%	≤0.4mm		
Magnetite?	1%			

Rock Fragments: 35% of this sample is composed of quartzite rock fragments, up to 6.0mm in maximum dimension. The elongate, recrystallized quartz crystals contain micas and feldspar fragments. The free feldspars are probably derived from the weathered quartzite.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 6.0mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#2-131
Type: Promontory Gray (Steward 1937)

Clay: 72% of this sample is composed of black clay from the same source as the andesite temper material.

Temper: 28% of this sample consists of temper material, 18% of which is in the form of individual minerals and 10% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	11%	≤1.2mm	subhedral broken	plagioclase
Quartz	4%	≤0.2mm	rounded, angular	monocrystalline
Pyroxene	<1%	≤0.5mm	subhedral, angular	diopside
Amphibole	1%	≤0.55mm	subhedral, euhedral	brown and green hornblende
Magnetite	<1%	≤0.35mm	angular	opaque
Mica				
Biotite	1%	≤0.40mm	subhedral	books

Rock Fragments: 10% of this sample is composed of rounded to subrounded andesite rock fragments, ≤1.1mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.2mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#14-90
Type: Promontory Gray (Steward 1937)

Clay: 65% of this sample is composed of dark brown clay, derived from the same volcanic source as the andesite temper material.

Temper: 35% of this sample consists of temper material, 33% of which is in the form of individual minerals and 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	≤1.5mm	subhedral, angular, rounded	plagioclase, labradorite
Quartz	11%	≤0.5mm	angular, very rounded	mono-crystalline
Pyroxene	<1%	≤2.0mm	subangular, subrounded	diopside
Amphibole	<2%	≤0.5mm	subhedral, angular	green, pale green, brown hornblende
Magnetite	<1%	≤0.3mm	rounded	opaque
Mica				
Biotite	4%	≤0.5mm	subhedral books	

Rock Fragments: 2% of this sample is composed of subrounded andesite rock fragments, ≤0.61mm in maximum dimension. Some mineral and rock fragments are so well rounded as to suggest transport from parent source.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42BO385 (Lakeside Cave)
Sample: FS#131-13
Type: Promontory Gray (Steward 1937)

Clay: 61% of this sample is composed of grayish-black clay with a light red-brown rind near both edges. 7% of the clay appears to be mudstones.

Temper: 39% of this sample consists of temper material, 15% of which is in the form of free minerals and 24% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	7%	≤.3mm		plagioclase and K-feldspars
Quartz	6%	≤1.0mm		strained
Pyroxene and Amphibole	<1%			
Magnetite?	1%	≤.1mm		

Rock Fragments: 24% of this sample is composed of quartzite, micaceous quartzite, and a minor amount of mica schist rock fragments, up to 2 mm in maximum dimension. The presence of the mica schist, a fragment very susceptible to weathering suggests very limited transport from the source area. This is consistent with the degree of sorting and angularity. The quartz is inclusion rich and much of it has probably weathered from the quartzite. Feldspar fragments (both potassium and plagioclase) are present and are moderately altered. These feldspars may have weathered from the quartzite as evidenced by their inclusion in quartzite fragments.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.1mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42BO559
FS#: FS#1
Type: "Fremont" (Smith 1990, personal communication)

Clay: 50% of this sample consists of light tan clay with darker rinds on both the interior and exterior surface of the sherd. Clay appears to be derived from decomposition of both andesite and quartzite rocks and minerals. No lamination of the clays nor orientation of temper in the clays is present. No evidence of grinding raw materials.

Temper: 50% of this sample consists of temper material, 25% of which is in the form of individual minerals and 25% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	8%	≤0.5mm	euhedral, subhedral	plagioclase from andesite
Quartz	5%	≤0.75mm	angular, rounded all anhedral	from quartzite
Pyroxene	7%	≤0.4mm	euhedral, subhedral	from basalt
Amphibole	4%	≤0.5mm	euhedral, subhedral	from basalt
Magnetite	<1%	≤0.1mm	euhdral	
Mica	<1%	≤0.5mm		mostly biotite

Rock Fragments: 25% of this sample consists of mixture of two distinct types: 1) About 15% are fine-grained, gray to dark black andesite rock fragments, up to 1.0mm in maximum dimension. Andesites show stream rounding and decomposition. Rocks are full of fine, needle-like plagioclase crystals. Some andesite rock fragments are vesicular with zeolite minerals in the amygdule (gas cavity); 2) About 13% are gray quartzite rock fragments, up to 1.2mm in maximum dimension.

Small Data Set Attribute Summary: Type: "Fremont"; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Mixed; 4) Temper Size: 0.2mm minimum, 1.2mm maximum; 5) Shaping: Not Coiled

Site: 42SL1 (Deadman Cave)
Sample: FS#18636-4
Type: Great Salt Lake Gray (Smith 1952)

Clay: 58% of this sample is composed of a laminated, medium gray-brown clay. The large amount of opaques give this sample a mottled appearance in plane polarized light. Much of the opaque material is organic matter.

Temper Material: 42% of this sample is composed of temper material, 30% of which is in the form of free minerals and 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	5%	≤0.2mm	rounded	plagioclase
Quartz	25%	≤1.2mm	rounded broken	strained

Rock Fragments: 12% of this sample is composed of two forms of rock fragments. About 8% are quartz rocks, up to 1.0mm in maximum dimension. Some grains are well-rounded and show secondary overgrowths suggesting the source may have been a very mature sedimentary rock. 2% are altered andesitic basalt fragments, up to 0.5mm in maximum dimension. Also, about 2% of this sample is composed of brown, fine-grained, well-rounded clay blebs, up to 0.4mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Gray; 3) Temper: Mixed; 4) Temper Size: 0.12mm minimum, 1.2mm maximum; 5) Shaping: Coiled

Site: 42SL1 (Deadman Cave)
Sample: FS#18646-5
Type: Great Salt Lake Gray (Smith 1952)

Clay: 41% of this sample is composed of a laminated, medium brown, very fine-grained clay.

Temper Material: 59% of this sample is composed of temper material, 18% of which is in the form of free minerals and 41% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	8%	≤0.2mm	subrounded, broken	plagioclase
Quartz	4%	≤0.15mm	subrounded, broken	poly-crystalline
Pyroxene	4%	≤0.1mm		augite
Amphibole	<1%	≤0.1mm		hornblende
Mica	<2%	≤0.1mm	flakes	biotite

Rock Fragments: 41% of this sample is composed of two types of rock fragments. 19% are unaltered, slightly rounded, fine-grained andesite rocks, <1.0mm in maximum dimension. Minute plagioclase laths are present in the rock and many laths are distinctively aligned. 14% are fine-grained, well-rounded clay blebs, some are light reddish-brown and some are dark gray in color. It is unclear if this is evidence of two distinct clay sources that may be related to the two distinct rock fragment sources. 8% are chert fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Mixed; 4) Temper Size: 0.1mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42TO5 (Grantsville Mounds)
Sample: FS#14427-4
Type: Great Salt Lake Gray (Steward 1936)

Clay: 67% of this sample is composed of tan to brown clay probably derived from feldspar and mafic material. Some patches of calcite clay is present in pores spaces throughout sherd. The concave surface is coated with calcitic material, probably the result of post-depositional processes.

Temper Material: 33 % of this sample is composed of temper material, less than 7% of which is in the form of free minerals and about 26% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	3%	≤0.2mm	subangular	plagioclase
Other:	3%			banded glass replaced by zeolites
	<1%			organic and material

Rock Fragments: About 26% of this sample is in the form of subangular to subrounded clasts of fine grained volcanic ash fragments, up to 1.7mm in maximum dimension. Most fragments contain plagioclase crystals.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Gray; 3) Temper: Volcanic Ash; 4) Temper Size: 0.2mm minimum, 1.7mm maximum; 5) Shaping: Coiled

Site: 42TO6 (Grantsville Mounds)
Sample: FS#14421-4
Type: Great Salt Lake Gray (Steward 1936)

Clay: 61% of this sample is composed of a light brown clay probably derived from an andesitic/basaltic source.

Temper Material: 39 % of this sample is composed of temper material, 36% of which is in the form of free minerals and 3% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	20%	≤0.77mm	subhedral	plagioclase, labradorite
Quartz	7%	≤1.1mm	angular to rounded	mono-crystalline
Pyroxene	<1%	≤0.3mm	euhedral	diopside
Amphibole	2%	≤1.0mm	euhedral	brown hornblende
Magnetite	<1%	≤0.35mm	rounded	
Mica	6%	≤0.9mm	subhedral books	biotite
Other:	trace	≤0.01mm		1 grain sparry

Rock Fragments: About 3% of this sample is in the form of subangular to subrounded andesitic-basaltic rock fragments, <0.62mm in maximum dimension. Fragments are zoned plagioclase in a glassy matrix with quartz, mica, and mafics.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Andesite/Basalt; 4) Temper Size: 0.3mm minimum, 1.1mm maximum; 5) Shaping: Coiled

Site: 42TO10 (Grantsville Mound #7)
Sample: FS#11505-1
Type: Great Salt Lake Gray (Steward 1936)

Clay: 67% of this sample is composed of medium brown clay probably derived from feldspar and mafic material. The concave surface is coated with calcitic material, probably the result of post-depositional processes.

Temper Material: 33 % of this sample is composed of temper material, 28% of which is in the form of free minerals and 5% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	11%	≤1.2mm	subhedral	plagioclase
Quartz	12%	≤0.5mm	angular to rounded	mono-crystalline
Pyroxene	<1%	≤0.45mm	subhedral	diopside
Amphibole	2%	≤0.5mm	subhedral	brown horn-blende
Magnetite	1%	≤0.2mm	rounded	
Mica	2%	≤0.9mm	subhedral books	biotite
	trace			muscovite
Other:	trace	≤0.01mm	sparry	calcite on exterior
	trace			olivine?

Rock Fragments: About 5% of this sample is in the form of rounded andesite rock fragments, <0.75mm in maximum dimension. Fragments are zoned plagioclase enclosed in glassy matrix with quartz, mica, and mafics.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.2mm maximum; 5) Shaping: Coiled

Site: 42TO10 (Grantsville Mound #7)
Sample: FS#11505-2
Type: Great Salt Lake Gray (Steward 1936)

Clay: 63% of this sample is composed of medium brown clay probably derived from feldspar and mafic material. The concave surface is coated with calcitic material, probably the result of post-depositional processes.

Temper Material: 37 % of this sample is composed of temper material, 30% of which is in the form of free minerals and 7% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	11%	$\leq$1.3mm	euhedral, subhedral	plagioclase
Quartz	12%	$\leq$0.6mm	angular, rounded	monocrystalline
Pyroxene	<1%	$\leq$.15mm	subhedral, anhedral, broken	diopside
Amphibole	<1%	$\leq$0.75mm	subhedral	brown horn-blende
Magnetite	2%	$\leq$0.45mm	rounded	
Mica	4%	$\leq$1.5mm	subhedral books	biotite
Other:	trace	$\leq$0.01mm	sparry	calcite on exterior

Rock Fragments: About 7% of this sample is in the form of rounded andesite rock fragments, <0.7mm in maximum dimension. Fragments are zoned plagioclase enclosed in glassy matrix with quartz, mica, and mafics.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#3
Type: Not Identified (D. Madsen 1986, personal communication)

Clay: 61% of this sample is composed of a light brown clay, some of which is derived from decomposed micaceous material.

Temper Material: 39% of this sample is composed of temper material, 38% of which is in the form of free minerals and less than 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	trace		subhedral	plagioclase
Quartz	36%	≤4.0mm	subangular	poly-crystalline
Pyroxene	trace	≤0.15mm		1 grain diopside
Mica				
Muscovite	<2%	≤0.2mm		
Biotite	<1%	≤0.4mm		

Rock Fragments: Less than 1% of this sample is composed of subangular quartzite rock fragments, ≤0.8mm in maximum dimension.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 7.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.2mm minimum, 4.0mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17706-5
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 65% of this sample is composed of a weakly laminated silty clay, golden tan to dark brown in color. Clays appear to be altered to glass, possibly the result of firing temperatures.

Temper Material: 35% of this sample is composed of temper material, 24% of which is in the form of free minerals and 11% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	16%	≤1.5mm	subhedral broken	plagioclase or oligoclase
Quartz	7%	≤0.75mm	angular to subrounded	mono-crystalline
Pyroxene	trace			1 grain
Magnetite	<1%	≤0.1mm	rounded	

Rock Fragments: About 11% of this sample is composed of rounded to subrounded, poorly sorted andesitic rock fragments which are angular and broken. Rock fragments are up to 1.8mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 1.8mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17745-1
Type: Shoshoni Ware (Jennings 1957)

Clay: 62% of this sample is composed of a silty clay, medium to dark brown in color, which is probably derived from the decomposition of the granitic rock source. There is no lamination of the clay or orientation of temper material. Clay appears to be somewhat recrystallized.

Temper Material: 38% of this sample is composed of temper material, 36% of which is in the form of free minerals and less than 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	35%	≤2.0mm	subangular, subrounded	plagioclase, K-feldspar
Quartz	<2%	≤1.0mm	subangular	mosaic
Mica	<1%	≤1.0mm	flakes	muscovite

Rock Fragments: About 2% of this sample is composed of granitic to dioritic plutonic rock fragments, subangular to subrounded in shape, ≤4.5mm in maximum dimension. Feldspars are untwinned. Quartz content is low.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.8mm minimum, 3.0mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17773
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 61% of this sample is composed of an unlaminated dark brown clay.

Temper Material: 39% of this sample is composed of temper material, 26% of which is in the form of free minerals and less than 13% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	14%	≤1.2mm	subhedral, angular	oligoclase
Quartz	11%	≤1.0mm	subrounded, subangular	mono-crystalline
Magnetite	<1%	≤0.6mm	rounded	
Mica	<1%	≤0.15mm	subhedral books	biotite

Rock Fragments: About 13% of this sample is composed of subangular to rounded volcanic rock fragments containing plagioclase, quartz, and devitrified glass. The free oligoclase does not appear to be related to the rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Welded Tuff; 4) Temper Size: 0.2mm minimum, 1.2mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17791-8
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 67% of this sample is composed of a well-laminated golden brown clay probably derived from decomposed quartzite and/or quartz-rich muscovite schist.

Temper Material: 33% of this sample is composed of temper material, 31% of which is in the form of free minerals and 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.5mm	subhedral, angular	plagioclase
Quartz	12%	≤1.1mm	subangular to rounded	poly-crystalline, some fused
Magnetite	<1%	≤0.06mm	rounded	
Mica				
Muscovite	14%	≤2.1mm	subhedral	
Biotite	4%	≤0.85mm	books	

Rock Fragments: About 2% of this sample is composed of subrounded to rounded, elongate rock fragments, ≤1.15mm in maximum dimension. The rock fragments are metamorphic quartzite and/or quartz-rich muscovite schist.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Quartzite; 4) Temper Size: 0.05mm minimum, 2.1mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17794-13
Type: Great Salt Lake Gray, Deep Creek Buff Variety (Jennings 1957)

Clay: 69% of this sample is composed of laminated, silty clay derived from decomposed andesite. Half the clay is re-brown in color and the other half is dark brown. The silt content remains the same throughout the sample and the difference in color is probably the result of differential firing atmospheres.

Temper Material: 31 % of this sample is composed of temper material, 19% of which is in the form of free minerals and less than 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	18%	≤0.5mm	subangular, subrounded	Plagioclase
Quartz	<1%	≤0.7mm	subangular subrounded	mono-crystalline
Mica	trace		flakes	very altered

Rock Fragments: About 10% of this sample is composed of fine grained, subrounded andesitic to dacitic volcanic flow rock fragments, up to 0.75mm in maximum dimension. Less than 2% of the rocks are rounded, deep red-brown claystones, less than 1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 0.75mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17823-6
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 67% of this sample is composed of a well-laminated golden brown clay, some of which is derived from decomposed biotite in schist.

Temper Material: 33% of this sample is composed of temper material, 18% of which is in the form of free minerals and 15% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Quartz	3%	≤0.25mm	subangular	monocrystalline
Mica				
Muscovite	12%	≤1.8mm	elongate	unaltered
Biotite	3%	≤0.5mm	square	altered

Rock Fragments: 12% of this sample is composed of well-aligned, subangular quartz-rich schist rock fragments, 1.5mm in maximum dimension. 3% of the rock fragments are subangular to subrounded fine-grained rock fragments which appear to be sedimentary in origin. These fragments are ≤1.0mm in maximum dimension and contain a few quartz grains.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Schist; 4) Temper Size: 0.2mm minimum, 1.8mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17834
Type: Shoshoni Ware (Jennings 1957)

Clay: 76% of this sample is composed of a well-laminated brown to dark brown clay, some of which is derived from decomposed micaceous material.

Temper Material: 24% of this sample is composed of temper material, 13% of which is in the form of free minerals and 11% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	trace	≤0.1mm	subrounded	plagioclase, altered
Quartz	2%	≤0.3mm	anhedral	polycrystalline, undulatory extinction
Garnet	trace	<0.7mm	rounded, elongate	free crystals
Mica				
Muscovite	9%	≤1.5mm	elongate	fresh
Biotite	1%	≤0.5mm	books	altering to chlorite

Rock Fragments: 11% of this sample is composed of fresh, polycrystalline quartzite rock fragments, up to 3.0mm in maximum dimension. Some quartzite rocks contain muscovite laths and garnet.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Quartzite; 4) Temper Size: 0.3mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17913-11
Type: Shoshoni Ware (Jennings 1957)

Clay: 80% of this sample is composed of a dark golden brown clay. Some clay is derived from decomposed biotite.

Temper Material: 20 % of this sample is composed of temper material, 10% of which is in the form of free minerals and 10% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	<1%	≤0.1mm	subrounded	plagioclase
Quartz	6%	≤0.2mm	angular to subangular	
Mica				
Muscovite	2%	≤1.3mm	elongate	unaltered
Biotite	<2%	≤0.3mm	books	altered

Rock Fragments: 10% of this sample is composed of rock fragments from a variety of sources. Less than 2% are subangular, fine grained sedimentary fragments which contain quartz clasts, up to 2.0mm in maximum dimension. Less than 1% of the rock fragments are subangular to subrounded basaltic fragments with plagioclase enclosed. These are less than 0.3mm in maximum dimension. The remaining 8% are subangular, quartz-rich metamorphic fragments with biotite and muscovite.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Mixed; 4) Temper Size: 0.1mm minimum, 2.0mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17921-2
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 70% of this sample is composed of a well-laminated light to golden brown clay, some of which is derived from decomposed biotite.

Temper Material: 30 % of this sample is composed of temper material, 19% of which is in the form of free minerals and 11% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Quartz	6%	≤0.5mm	subangular	mono-crystalline, strained
Magnetite	trace			
Mica				
Muscovite	9%	≤1.7mm	elongate	unaltered
Biotite	4%	≤0.4mm	square	altered

Rock Fragments: 11% of this sample is composed of well-aligned, angular to subangular, quartz rich schist rock fragments, 1.6mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Black; 3) Temper: Schist; 4) Temper Size: 0.4mm minimum, 1.7mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#17932-3
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 57% of this sample is composed of a weakly laminated silty clay, dark brown in color, which is probably derived from the decomposition of the granitic rock source.

Temper Material: 43% of this sample is composed of temper material, 35% of which is in the form of free minerals and less than 8% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	29%	≤5.0mm	euhedral, subangular, rounded	plagioclase, K-feldspar
Quartz	<4%	≤2.0mm	subangular, subrounded	mono-crystalline
Amphibole	trace			hornblende?
Mica	<1%			muscovite

Rock Fragments: About 8% of this sample is composed of granitic to dioritic plutonic rock fragments, subangular to subrounded in shape, ≤3.0mm in maximum dimension. Feldspars are untwinned. Quartz content is low.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Granite; 4) Temper Size: 0.6mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#18868-12
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 70% of this sample is composed of a silty, light micaceous golden brown clay derived from volcanic ash. Some clay particles show signs of recrystallization.

Temper Material: 30 % of this sample is composed of temper material, 15% of which is in the form of free minerals and 15% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	4%	≤.65mm	subhedral	labradorite
Quartz	7%	≤0.5mm	angular to rounded	mono-crystalline
Pyroxene	<1%	<0.03mm	subhedral	diopside, nonpleochronic
Amphibole	<3%	<0.5mm	euhedral, subhedral	green and brown horn-blende
Magnetite	<1%	<0.6mm	rounded	
Mica				
Muscovite	trace	≤0.08mm	subhedral	
Biotite	trace	≤0.15mm	books	
Other	trace	<0.4mm	rounded	zeolite, 1 grain, glassy

Rock Fragments: 15% of this sample is composed of poorly sorted subangular to rounded volcanic ash fragments, ≤1.5mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Gray; 3) Temper: Volcanic Ash; 4) Temper Size: 0.5mm minimum, 1.5mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#19468-1
Type: Great Salt Lake Gray (Jennings 1957)

Clay: 67% of this sample is composed of a medium brown clay probably derived from decomposed andesitic material.

Temper Material: 33% of this sample is composed of temper material, 32% of which is in the form of free minerals and less than 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	16%	≤1.1mm	subhedral, rounded	plagioclase
Quartz	10%	≤0.7mm	angular to rounded	mono-crystalline, some embayed
Pyroxene	<1%	≤.45mm	subhedral, anhedral	diopside
Amphibole	1%	≤0.5mm	subhedral	brown horn-blende
Magnetite	1%	≤0.35mm	rounded	
Mica				
Muscovite	<1%%	≤0.1mm	subhedral	
Biotite	<3%	≤0.1mm	books	

Rock Fragments: Less than 1% of this sample is composed of mostly rounded andesite rock fragments, ≤0.6mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.4mm minimum, 1.1mm maximum; 5) Shaping: Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#19472-6
Type: Shoshoni Ware (Jennings 1957)

Clay: 70% of this sample is composed of a reddish-golden brown clay speckled with black blebs. There is a trace of micaceous material. Clay is probably derived from andesite rock material.

Temper Material: 30% of this sample is composed of temper material, 18% of which is in the form of free minerals and 12% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	9%	$\leq$1.0mm	angular, subhedral	plagioclase
Quartz	9%	$\leq$1.0mm	angular to subrounded	mono-crystalline

Rock Fragments: About 12% of this sample is composed of subrounded to rounded, fine grained andesite rock fragments, up to 2.0mm in maximum dimension. Devitrified glass is present in several fragments. Free minerals appear to have been broken, possibly during the processing of raw materials; however, rock fragments are not broken. The lack of pyroxene, amphiboles, and micas in both rocks and minerals suggest they are from a common source but underwent different processing by potter.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 2.0mm maximum; 5) Shaping: Not Coiled

Site: 42TO13 (Danger Cave)
Sample: FS#AR1868
Type: Not Identified (Smith Excavation n.d.)

Clay: 72% of this sample is composed of a well-laminated gray-brown clay with a 15% silt content. A streak of black in the core appears to be organic material. Clay is derived from feldspars in welded tuff.

Temper Material: 28% of this sample is composed of temper material, 24% of which is in the form of free minerals and less than 4% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	18%	≤1.0mm	subangular, subrounded	plagioclase, albite
Quartz	1%	≤0.5mm	subrounded	mono-crystalline
Pyroxene	1%			altered to clay
Mica	4%	≤1.0mm	flakes	biotite

Rock Fragments: About 3% of this sample is composed of subrounded welded tuff rock fragments, <0.5mm in maximum dimension. 1% of the rock fragments appear to be dark brown, well rounded claystone.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Welded Tuff; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42TO20 (Jukebox Cave)
Sample: FS#21841-1
Type: Shoshoni Ware (Jennings 1957)

Clay: 65% of this sample is composed of a weakly laminated, light brown to dark red-brown clay derived from decomposed feldspars in granite. Half the sherd, along long axis, is light brown and other half is dark red-brown, no doubt the result of the firing atmosphere.

Temper Material: 35% of this sample is composed of temper material, 34% of which is in the form of free minerals and less than 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	32%	≤1.0mm	angular to subangular	plagioclase, K-feldspar
Quartz	<1%	≤1.0mm	subangular	mono-crystalline
Mica				
Muscovite	<1%		flakes	
Zircon	trace			

Rock Fragments: Less than 2% of this sample is composed of subangular to subrounded granitic rock fragments, ≤1.7mm in maximum dimension.

Small Data Set Attribute Summary: Type: Shoshoni Ware; 1) Wall thickness: 9.0mm; 2) Exterior Surface Color: Black; 3) Temper: Granite; 4) Temper Size: 0.7mm minimum, 1.7mm maximum; 5) Shaping: Coiled

Site: 42TO20 (Jukebox Cave)
Sample: FS#21907-1
Type: Snake Valley Gray (Jennings 1957)

Clay: 67% of this sample is composed of a strongly laminated, golden red-brown clay which is derived from decomposed schistose rocks and is mostly biotite, muscovite, and a minor amount of silt.

Temper Material: 33 % of this sample is composed of temper material, 14% of which is in the form of free minerals and 19% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	5%	≤2.0mm	subrounded, subangular	altered to sericite
Quartz	1%	≤1.5mm	subrounded, subangular	mono- and poly-crystalline
Mica				
Muscovite	8%		flakes	unaltered
Biotite	trace			

Rock Fragments: 19% of this sample is composed of aligned, angular to subrounded quartzite/schistose rock fragments, ≤2.0 in maximum dimension. The rock fragments are composed of strained polycrystalline quartz with sutured margins, muscovite, and a minor amount of feldspar.

Small Data Set Attribute Summary: Type: Snake Valley Gray; 1) Wall thickness: 7.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Quartzite; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42TO64 (Black Rock Cave)
Sample: FS#3-10
Type: Promontory Gray (Dean 1983)

Clay: 46% of this sample is composed of a very fine-grained, medium red-brown clay, probably derived from plagioclase and mafics.

Temper Material: 54% of this sample is composed of temper material, 27% of which is in the form of free minerals and 27% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	8%	≤1.5mm	subrounded	plagioclase
Quartz	14%	≤1.0mm	angular to rounded	poly-crystalline
Amphibole	3%	≤0.2mm	euhedral, broken	pale green and hornblende
Magnetite	<1%	≤0.15mm	rounded	
Mica	1%	≤0.4mm	subhedral books	muscovite biotite

Rock Fragments: About 27% of this sample is composed of two types of rock fragments: about 18% of the rocks are fine-grained, interlocking, unaltered andesite fragments, up to 2.0mm in maximum dimension. About 6% of the rocks are quartzite fragments, up to 1.0mm in maximum dimension. The remaining 3% are large, well-rounded, fine-grained dark brown fragments which are probably clay clasts, up to 1.2mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Mixed (Quartzite and Basalt); 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42TO64 (Black Rock Cave)
Sample: FS#3-11
Type: Promontory Gray (Dean 1983)

Clay: 52% of this sample is composed of medium reddish-brown, fine-grained clay, probably derived from plagioclase and mafics.

Temper Material: 48 % of this sample is composed of temper material, 43% of which is in the form of free minerals and 5% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	28%	≤2.0mm	euhedral, broken	plagioclase
Quartz	4%	≤0.5mm	angular to rounded	mono-crystalline
Pyroxene	2%	≤0.85mm		
Amphibole	6%	≤0.6mm	euhedral, broken	pale green and brown horn-blende
Magnetite	<1%	≤0.5mm	rounded	
Mica	2%	≤0.9mm	subhedral books	muscovite biotite

Rock Fragments: About 2% of this sample is composed of fine-grained, interlocked plagioclase laths which are unaltered and unrounded, up to 2.0mm in maximum dimension. This may have been derived from a pyroclastic event. Also, about 3% of the larger particles are fine-grained, light reddish-brown in color clasts of clay, up to 1.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Volcanic Ash; 4) Temper Size: 0.2mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42TO64 (Black Rock Cave)
Sample: FS#10932
Type: Promontory Gray (Steward 1937)

Clay: 52% of this sample is composed of a very fine-grained, very dark red-brown to black clay, probably derived from plagioclase and mafics. The darkness may be due, in part, to abundant organic matter disseminated throughout the matrix.

Temper Material: 48% of this sample is composed of temper material, 19% of which is in the form of free minerals and 29% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	≤1.5mm	subrounded. broken	plagioclase, altered to sericite K-feldspar
Quartz	2%	<0.2mm	subrounded	
Amphibole	1%	≤0.4mm	broken	pale green and hornblende
Magnetite	<1%	≤0.2mm	rounded	
Mica	<1%			muscovite

Rock Fragments: About 23% of this sample is composed of intrusive dioritic to granitic rock fragments, up to 4.1mm in maximum dimension. These are generally unrounded and exhibit jagged edges. 6% of this sample is composed of fine-grained, well-rounded, medium red-brown clay clasts, up to 2.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Promontory Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Granite; 4) Temper Size: 0.3mm minimum, 2.3mm maximum; 5) Shaping: Coiled

Site: 42TO106 (Floating Island Cave)
Sample: FS#10
Type: Not Identified (D. Madsen 1986, personal communication)

Clay: 74% of this sample is composed of a well-laminated clay, golden to dark brown in color, which exhibits some recrystallization. Clays are probably derived from decomposed feldspar from volcanic ash, as epidote is present in trace amounts in clay.

Temper Material: 26% of this sample is composed of temper material, all of which is in the form of free minerals.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	23%	≤1.5mm	angular to subangular	plagioclase labradorite
Quartz	3%	≤1.0mm	angular to subangular	mono-crystalline
Mica	trace			biotite

Rock Fragments: No detectable rock fragments are seen in this sample.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Volcanic Ash; 4) Temper Size: 0.05mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42TO106 (Floating Island Cave)
Sample: FS#30
Type: Not Identified (D. Madsen 1986, personal communication)

Clay: 67% of this sample is composed of a well-laminated clay, yellow-brown in color, which is probably derived from the decomposition of the andesitic/basalt rock source. Clays contain mica and a minor amount of silt and epidote.

Temper Material: 33% of this sample is composed of temper material, 30% of which is in the form of free minerals and less than 3% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	28%	≤1.0mm	angular to subangular	plagioclase, labradorite
Quartz	<1%	≤1.0mm	subangular	mono-crystalline
Pyroxene	trace	uncertain due to heavy alteration		
Amphibole	trace	≤1.0mm		pleochronic hornblende
Mica	<2%	≤0.75mm	flakes	biotite

Rock Fragments: About 3% of this sample is composed of fine-grained volcanic flow rock fragments, subangular to subrounded in shape, ≤0.5mm in maximum dimension. Feldspar is zoned plagioclase but further identification is difficult due to the scarcity of grains with proper orientation; the parent rock is probably andesite to basaltic in composition. Three grains of labradorite are seen and epidote is replacing some feldspar grains in the clay.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 3.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite/Basalt; 4) Temper Size: 0.5mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42TO457 (Danger Cave Bog)
Sample: FS#13
Type: Not Identified (D. Madsen 1986, personal communication)

Clay: 72% of this sample is composed of a grainy, golden brown clay which appears to have both a feldspar and quartzite component.

Temper Material: 28 % of this sample is composed of temper material, 8% of which is in the form of free minerals and 20% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	4%	$\leq$3.0mm	subhedral, euhedral	plagioclase
Quartz	3%	$\leq$0.75mm	subhedral, subrounded	poly-crystalline
Mica	1%	$\leq$0.5mm	flakes	biotite mostly altered to clay

Rock Fragments: About 14% of this sample is in the form of highly altered, subrounded volcanic, probably basaltic, rock fragments, <2.0mm in maximum dimension. Zoned plagioclase and both ortho- and clinopyroxenes in fragments. 6% of the rock fragments are metamorphic in nature, up to 2.0mm in maximum dimension. These are composed of polycrystalline quartz, strongly foliated micas, and epidote, probably derived from a quartzite material.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Mixed; 4) Temper Size: 0.5mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42TO504 (Dan Freed Site)
Sample: FS#3
Type: Not Identified (Smith 1990, personal communication)

Clay: Only 30% of this sample is composed of a thick chocolate brown clay derived directly from mafic minerals and plagioclase feldspars in andesite. There is a black rind on convex edge of sherd. Clays display definite orientation parallel and zig-zag to long axis of sample and are wrapped around mineral grains. Shrinkage cracks throughout sample , up to 6% of volume. Cracks appear both as long ragged cracks running length of sample and around mineral grains.

Temper Material: About 70% of this sample is composed of temper material, all of which is in the form of free minerals. There are no detectable rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	50%	≤1.0mm	rounded, broken	plagioclase, K-feldspar
Quartz	<1%	≤0.5mm	angular, broken	not from andesite
Pyroxene	8%	≤0.5mm	euhedral to rounded	from andesite
Amphibole	12%	≤0.4mm	euhedral to subhedral	from andesite
Magnetite	<1%	≤0.1mm	euhedral to subhedral	
Mica	trace			mostly altered to clay

Rock Fragments: No detectable rock fragments are present.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42TO504 (Dan Freed Site)
Sample: FS#19
Type: Not Identified (Smith 1990, personal communication)

Clay: About 30% of this sample is composed of a thick chocolate brown clay derived directly from mafic minerals and plagioclase feldspars in andesite. There is a black rind on convex edge of sherd. Clays display definite orientation parallel to long axis of sample and are wrapped around mineral grains. Shrinkage cracks throughout sample, up to 6% of volume. Cracks appear both as long ragged cracks running length of sample and around mineral grains.

Temper Material: About 70% of this sample is composed of temper material, all of which is in the form of free minerals. There are no detectable rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	50%	≤1.1mm	angular, broken	plagioclase, decomposed
Quartz	<1%	≤1.3mm	angular, broken	not from andesite
Pyroxene	8%	≤0.3mm	euhedral, subhedral, rounded	from andesite
Amphibole	11%	≤0.4mm	euhedral, subhedral	from andesite
Magnetite	<1%	≤0.1mm	euhedral	
Mica	trace			mostly altered to clay

Rock Fragments: No detectable rock fragments are present.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 1.3mm maximum; 5) Shaping: Coiled

Site: 42TO504 (Dan Freed Site)
Sample: FS#21
Type: Not Identified (Smith 1990, personal communication)

Clay: About 28% of this sample is composed of a thick chocolate brown clay derived directly from mafic minerals and plagioclase feldspars in andesite. There is a black rind on convex edge of sherd. Clays display definite orientation parallel and zig-zag to long axis of sample and are wrapped around mineral grains. Shrinkage cracks throughout sample , up to 7% of volume. Cracks appear both as long ragged cracks running length of sample and around mineral grains.

Temper Material: About 72% of this sample is composed of temper material, all of which is in the form of free minerals. There are no detectable rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	50%	≤1.2mm	broken	plagioclase, decomposed
Quartz	<1%	≤0.8mm	angular, broken	not from andesite
Pyroxene	9%	≤0.4mm	euhedral to subhedral, rounded	from andesite decomposed
Amphibole	11%	≤0.4mm	euhedral to subhedral	from andesite
Magnetite	<1%	≤0.1mm	euhedral	
Mica	trace			mostly altered to clay

Rock Fragments: No detectable rock fragments are present.

Small Data Set Attribute Summary: Type: Not Identified; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.3mm minimum, 1.2mm maximum; 5) Shaping: Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#48-6
Type: Great Salt Lake Gray (Aikens 1966)

Clay: About 58% of this sample is composed of a laminated uniform light tan to brown clay derived from decomposed mafics and plagioclase from what is probably an andesitic source. Few shrinkage cracks present. Thin rind of darker clay on convex edge of sample.

Temper Material: About 42% of this sample is composed of temper material, all of which is in the form of free minerals.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	25%	≤0.5mm	euhedral, broken	plagioclase, 1% K-feldspar
Quartz	4%	≤0.45mm	angular, broken	not from andesite
Pyroxene	7%	≤0.35mm	anhedral	decomposed
Amphibole	4%	≤0.2mm	anhedral	decomposed
Magnetite	trace	≤0.1	euhedral	
Mica	2%		laths	biotite?

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 0.5mm maximum; 5) Shaping: Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#376-2
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 80% of this sample is composed of uniform black to dark brown clay derived from decomposed pyroxenes and amphiboles in what is probably an andesitic source. No detectable laminations are present in clay. Shrinkage cracks run zigzag perpendicular to long axis of sample.

Temper Material: 20% of this sample is composed of temper material, all of which is in the form of free minerals.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	$\leq$0.45mm	anhedral, euhedral	plagioclase, 1% K-feldspar
Quartz	<3%	$\leq$0.4mm	angular, broken	not from andesite
Pyroxene	<1%	$\leq$0.35mm	anhedral	decomposed
Amphibole	<1%	$\leq$0.2mm	anhedral	decomposed
Magnetite	<1%	$\leq$0.15mm	subhedral to euhedral	
Mica	<2%	$\leq$0.3mm		biotite?

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Black; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 0.5mm maximum; 5) Shaping: Not Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#396-96
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 45% of this sample is composed of a laminated chocolate brown clay which has a quartz-rich component, derived from rhyolite. Sherd has a light tan rind on convex side. Shrinkage is minimal and void space is less than 5%

Temper Material: 55% of this sample is composed of temper material, 15% of which is in the form of free minerals and 40% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	2%	≤0.2mm	angular, broken	plagioclase, K-feldspar
Quartz	10%	≤0.35mm	angular, broken	from rhyolite
Pyroxene	1%	≤0.1mm	broken	from rhyolite
Amphibole	1%	≤0.1mm	broken needles	from rhyolite
Magnetite	trace			
Mica	1%	≤0.1mm	flakes	muscovite and biotite

Rock Fragments: About 40% of this sample is composed of stream rounded to subrounded fragments of quartz rhyolite tuff. Some welding is evident. Rocks are gray, tan, and brown, up to 3.0mm in maximum dimension.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Light Brown; 3) Temper: Rhyolite; 4) Temper Size: 0.1mm minimum, 3.0mm maximum; 5) Shaping: Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#670-13
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 80% of this sample is composed of a weakly laminated, brown and tan clay derived from decomposed mafics in what is probably an andesitic source. Small shrinkage cracks around large clay blebs and larger ragged shrinkage cracks run parallel to long axis of sample, all account for 3% of sherd volume.

Temper Material: 20% of this sample is composed of temper material, 15% of which is in the form of free minerals and 5% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	7%	≤0.65mm	anhedral	plagioclase, decomposed
Quartz	<1%	≤0.4mm	subrounded, angular	not from andesite
Pyroxene	<2%	≤0.35mm	anhedral	decomposed
Amphibole	<3%	≤0.25mm	anhedral	decomposed
Magnetite	<1%		subhedral, euhedral	
Mica	<2%			biotite?

Rock Fragments: About 5% of this sample is composed of a very fine-grained crystalline andesite which is badly decomposed. Rocks are ≤0.7mm in maximum dimension. Much of the andesite fragments have already been altered to angular blebs of brown clay. Fragments that are present are very angular with decomposed clay on edges. Two fragments of what appears to be decomposed tuff are also present.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 5.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite; 4) Temper Size: 0.2mm minimum, 0.7mm maximum; 5) Shaping: Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#721-3
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 50% of this sample is composed of a weakly laminated bands of black to brown clay weathered from pyroxenes and amphiboles, possibly from granodioritic source. Center core region is darker than edges of sherd. Random shrinkage cracks up to 3% of sample.

Temper Material: 50% of this sample is composed of temper material, all of which is in the form of free minerals.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	15%	≤1.5mm	angular, few euhedral	K-feldspar
Quartz	25%	≤1.0mm	angular, broken	decomposed
Pyroxene	4%	≤0.3mm	broken	decomposed
Amphibole	4%	≤0.2mm	broken sticks	
Magnetite	<1%	≤0.1mm	euhedral	
Mica	<2%			biotite and muscovite

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Dark Brown; 3) Temper: Granite; 4) Temper Size: 0.2mm minimum, 1.5mm maximum; 5) Shaping: Coiled

Site: 42WB34 (Injun Creek)
Sample: FS#724-10
Type: Great Salt Lake Gray (Aikens 1966)

Clay: 60% of this sample is composed of a weakly laminated brown clay weathered from mafics in andesite. Convex side is slightly darker than rest of clay. Ragged shrinkage cracks, without apparent orientation, account for 3% of sample.

Temper Material: 40% of this sample is composed of temper material, all of which is in the form of free minerals.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	22%	≤1.0mm	euhedral, broken	plagioclase
Quartz	8%	≤0.5mm	angular, rounded	not from andesite
Pyroxene	5%	≤0.35mm	anhedral	decomposed
Amphibole	5%	≤0.4mm	anhedral	
Magnetite	trace			
Mica	trace			biotite?

Rock Fragments: No detectable rock fragments.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 4.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Andesite; 4) Temper Size: 0.1mm minimum, 1.0mm maximum; 5) Shaping: Coiled

Site: 42WB297 (Plain City Mounds)
Sample: FS#11527-9
Type: Great Salt Lake Gray (Steward 1936)

Clay: 78% of this sample is composed of a laminated golden to red-brown clay derived from welded tuff. Plagioclase from welded tuff is so decomposed that some is replaced entirely by calcite.

Temper Material: 22% of this sample is composed of temper material, 20% of which is in the form of free minerals and 2% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	20.0%	≤2.0mm	angular to subangular	plagioclase
Mica	trace			muscovite

Rock Fragments: About 2% of this sample is composed of rounded grains of what appears to be a welded tuff, <0.5mm in maximum dimension. Feldspar identification is possibly only by presence of "ghost" twins and cleavage. As seen in free minerals, most feldspars are altered and many replaced by calcite.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 10.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Welded Tuff; 4) Temper Size: 0.5mm minimum, 2.0mm maximum; 5) Shaping: Coiled

Site: 42WB297 (Plain City Mounds)
Sample: FS#11528
Type: Great Salt Lake Gray (Steward 1936)

Clay: 61% of this sample is composed of a well-laminated, biotite-rich, tan clay with a deep red-brown center. Clay is derived from welded tuff.

Temper Material: 39% of this sample is composed of temper material, 38% of which is in the form of free minerals and less than 1% in the form of rock fragments.

Free Minerals:

Mineral	Amount	Size	Shape	Remarks
Feldspar	24%	≤1.75mm	angular, subangular, broken	plagioclase
Quartz	1%	≤1.0mm	subangular	monocrystalline
Pyroxene	trace			
Amphibole	trace			hornblende
Magnetite	trace			
Mica	13%	≤0.75mm	flakes	brown and green-brown biotite

Rock Fragments: Less than 1% of this sample is composed of oriented, subangular to subrounded grains of welded tuff, <0.5mm in maximum dimension. Feldspar identification is possibly only by presence of "ghost" twins and cleavage. As seen in free minerals, most feldspars are altered and many plagioclase is replaced by calcite.

Small Data Set Attribute Summary: Type: Great Salt Lake Gray; 1) Wall thickness: 6.0mm; 2) Exterior Surface Color: Brown; 3) Temper: Welded Tuff; 4) Temper Size: 0.5mm minimum, 1.75mm maximum; 5) Shaping: Coiled

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