



19005 Coast Highway One, Jenner, CA 95450 ■ 707.847.3437 ■ info@fortross.org ■ www.fortross.org

Title: Bricks and Fragments from Fort Ross Officials' Quarters

Author (s): Carol Hulquist

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JAN 22 1981

(916) 322-8578

January 8, 1981

Dr. Ty Dilliplane, Archeologist
Alaska Division of Parks
619 Warehouse Drive, Suite 210
Anchorage, Alaska 99501

Dear Dr. Dilliplane:

Your letter of November 17, 1980 regarding Russian brickmaking was forwarded to me by Mr. Nick Del Cioppo, Archeologist, California Office of Historic Preservation.

The California Department of Parks and Recreation has conducted a number of archeological excavations at Fort Ross State Historic Park in conjunction with the ongoing reconstruction program there. While we have recovered a number of bricks presumed to be of Russian origin, no kiln sites have been located. It is believed that the Russian brickyard was located in the Bodega Bay area, some 18 miles south of Fort Ross (see Hulquist Report, p. 10-11, enclosed).

The enclosed report discusses the brick recovered during the 1976 excavations on the site of the "Officials Quarters", under the direction of Bryn Thomas. This was a long, narrow sill-on-post structure built prior to 1817 and finally demolished about 1915. Most of the brick recovered had been used as post hole fill. To date, no intact mortared brick features have been found in the vicinity of Fort Ross. The Hulquist Report compares size and composition of the presumed Russian and American bricks. She found that the oversized Russian bricks averaged about 5-1/2 inches in width, compared with the 4-inch average for the "standard" American brick. Unfortunately, most were fragmentary, preventing comparison of total lengths. There was a considerable and overlapping variation in the thickness of the two samples. (Hulquist 1977:4)

More bricks were recovered from other post holes during construction phase mitigation in 1979 and 1980. These features apparently supported the north side of the building demolished about 1915, as well as a western extension that may have been removed in the 1840s. The dimensions of selected examples are given below.

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Dr. Ty Dilliplane
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<u>Catalog Number</u>	<u>Length (mm/inches)</u>	<u>Width</u>	<u>Thickness</u>	<u>Comments</u>
P302 - 15	250+ (9-7/8"+)	131 (5-3/16")	73 (2-7/8")	yellow earth mortar
P302 - 18	160+ (6-5/16"+)	145 (5-3/4")	65 (2-9/16")	yellow earth mortar
P302 - 34	74+ (2-3/4"+)	151 (5-15/16")	63 (2-1/2")	one end vitrified
P302 - 44	150+ (5-15/16"+)	141 (5-9/16")	65 (2-9/16")	
P302 - 45	172+ (6-3/4"+)	120 (4-3/4")	56 (2-3/16")	marked with an "X"
Park specimen	245 (9-11/16")	132 (5-3/16")	57 (2-1/4")	complete; in Park Office

(+ indicates incomplete length)

One specimen (p. 302-45) is marked with a large "X"; it is somewhat smaller than the other presumed Russian bricks, but wider than the American bricks listed in the 1977 report. A sketch of this brick is enclosed, as is a table comparing the 1976 and 1979-80 bricks (p. 302-15), is almost complete, although its full length still cannot be measured. I have also included the dimensions of the only intact "Russian" brick I know of. Its original provenience is unknown; it is housed in the Park Office at Fort Ross. I suspect that we will find that these bricks are approximately twice as long as their width.

The end of another oversized brick fragment (p. 302-34) is heavily vitrified. This specimen was found in association with much slag, crucible fragments, and riveted, sheered, and melted brass fragments scattered on a clay floor to the west of the building site. A foundry is documented in this general area. Two small pits partially filled with charcoal were the only features recorded that could be construed to represent furnaces, although this area has not been completely investigated. While I suspect that this example may have been vitrified through use in a metal-working furnace, the possibility of melting in the kiln itself cannot be ruled out.

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We would be very interested to learn the size range of the bricks comprising the feature described in your letter. While our assumption that the oversized bricks at Fort Ross are of Russian origin seems to be confirmed by the archeological contexts from which they have been recovered, corroborating evidence from Alaska would be comforting. I am also interested in your final interpretation of the feature you are studying. Is there any chance it was associated with metal working activities?

Sincerely,

Larry Felton
State Archeologist II

B-6655D

Enclosure

bcc: Mr. Nick Del Cioppo
Mr. Lloyd Geissinger, Russian River Area

LF

P.S. You should also contact Karl Curico, Department of Sociology/Anthropology, University of Idaho, Moscow, Idaho. He directed archeological excavations at Fort Ross in 1975 and subsequently has been very active in brick research.

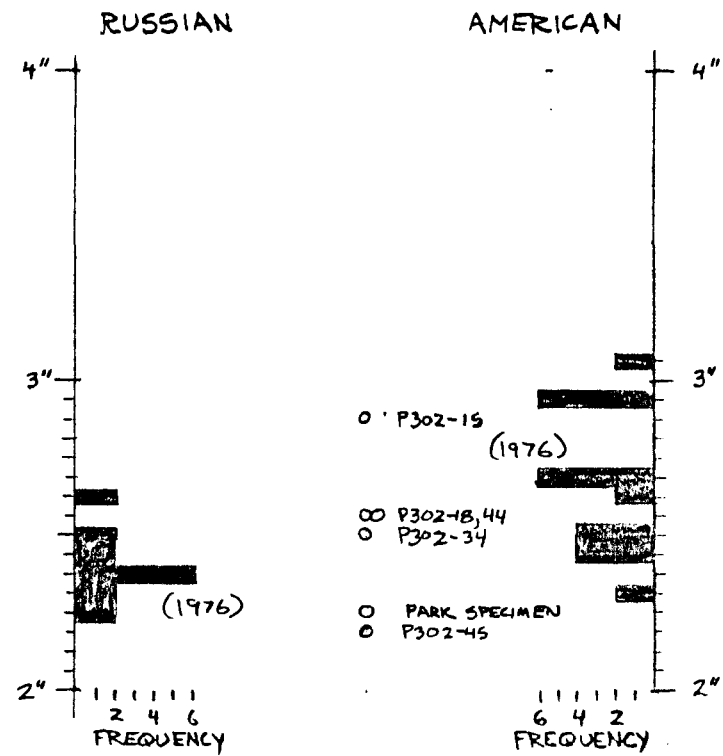
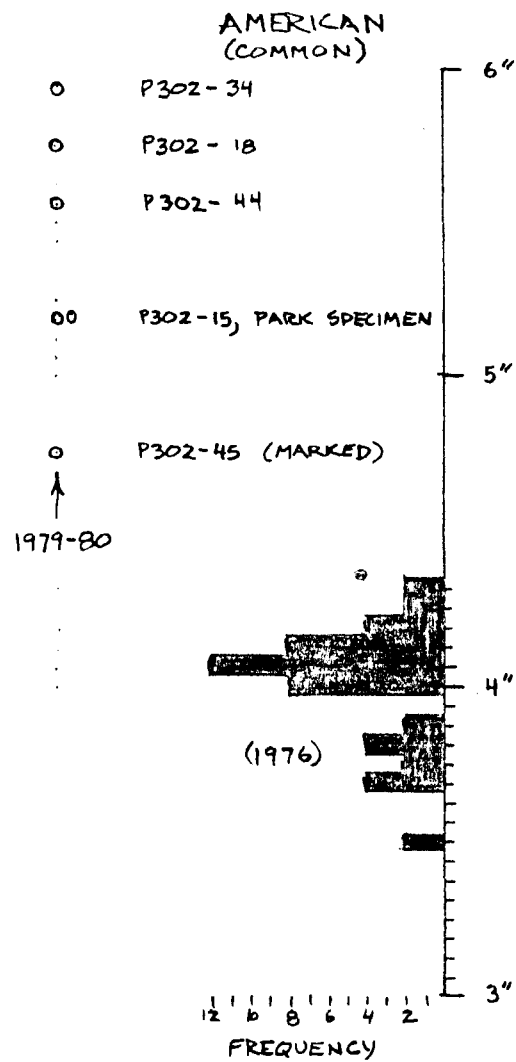
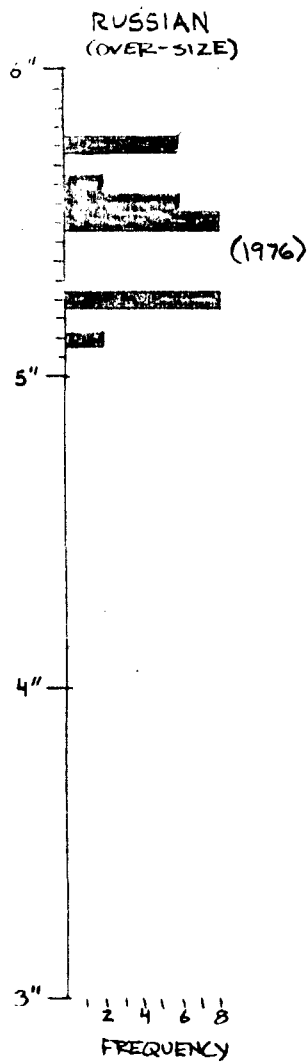
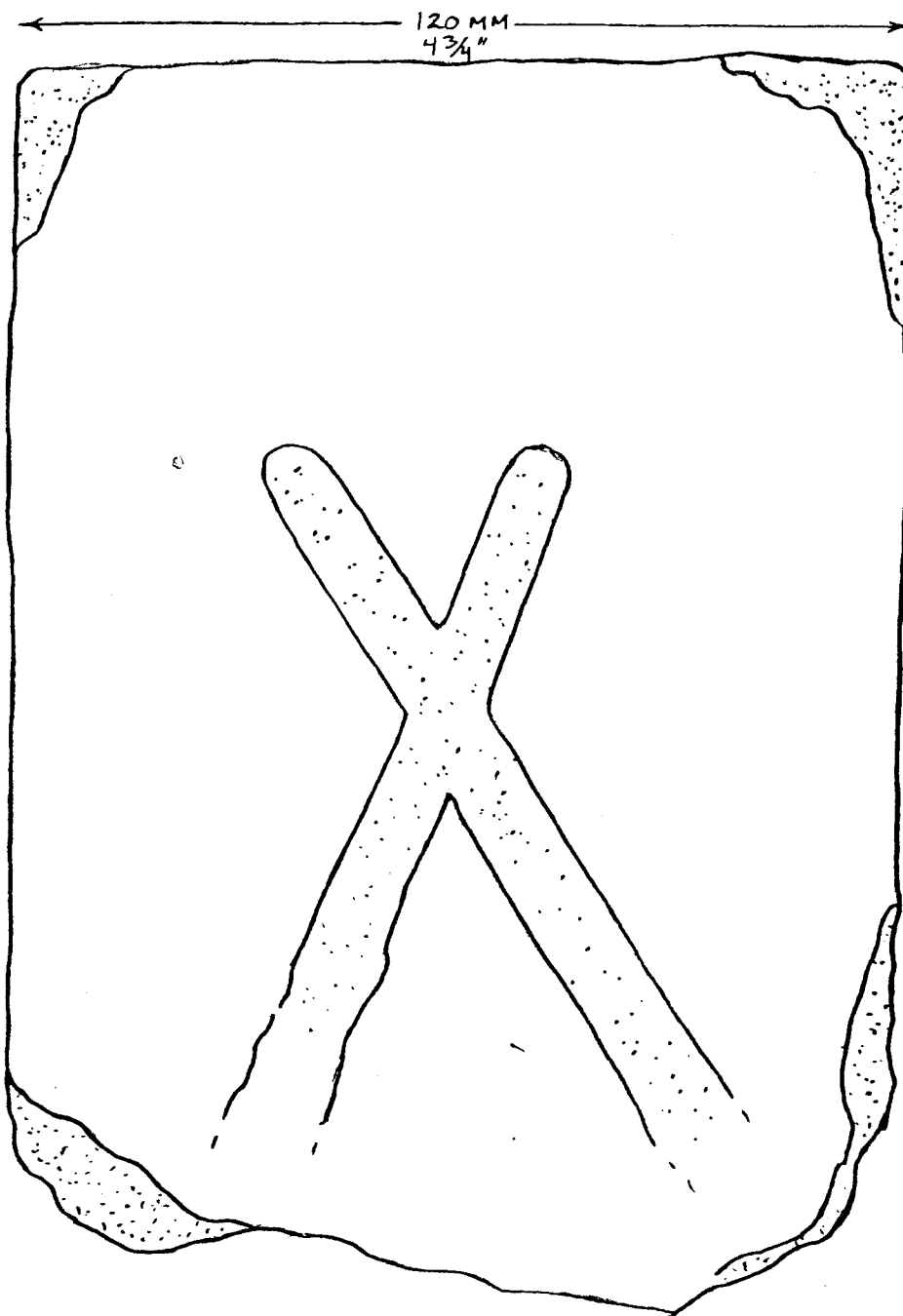


TABLE 1 - WIDTH

TABLE 2 - THICKNESS

TABLES 1 AND 2 - COMPARISON OF DIMENSIONS OF PRESUMED RUSSIAN (OVER-SIZED) AND AMERICAN (COMMON) BRICK FROM THE "OFFICIALS QUARTERS" SITE, FORT ROSS STATE HISTORIC PARK, CALIFORNIA
(1979-80 DATA ADDED TO ORIGINAL 1976 TABLES (HULQUIST 1977)
(LENGTHS NOT AVAILABLE - MOST INCOMPLETE)



MARK - SQUARE SIDED IMPRESSION
~ 3-5 MM DEEP

P302 - 45

BRICK - OFFICIALS QUARTERS
FORT ROSS SHP

77-1307
Carol Rolan
West Sac
Archaeological
lab

BRICKS AND FRAGMENTS FROM FORT ROSS OFFICIALS' QUARTERS

Carol Hulquist

1977

PRELIMINARY DRAFT

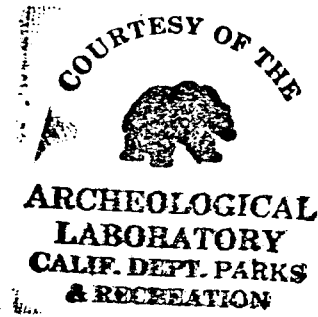


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A total of 838 bricks and brick fragments were recovered during the 1976 excavation of the Officials' Quarters. Almost all of these (834) were manufactured by the sand-mold method--this entailed a rectangular wooden mold filled with clay which has been sprinkled with sand to prevent the clay from adhering to the sides. The excess clay was removed with a scraper, or "struck off", and the brick was then removed from the mold for drying (McKee 1973:43). All of the bricks have a sandy, outer layer bearing evidence to this manufacturing process. Twenty-two specimens display strike marks from the scraper tool, and four specimens have lipping around the top edge where excess clay had adhered to the molded brick.

The remaining four bricks were firebricks manufactured by a process which molds and compresses the clay in one operation. Machine-made firebricks post-date sand-molded bricks, being manufactured no earlier than 1914 (Carnes 1977, personal communication).

The objectives in analyzing the bricks recovered from the Officials' Quarters are three-fold: 1) to note the varieties of bricks recovered, 2) to isolate those used in the construction of Russian Period architecture, and 3) to attempt a determination of the style of stove which reportedly existed in the Officials' Quarters during the Russian Period of occupation.

Bricks recovered from several Russian Period sites occupied in the early nineteenth century (Farallon Islands, Bodega Head, Russian Gulch, Old Sitka) reveal that Russian bricks tended to be larger than those bricks made during the American Period. Although both length and thickness measurements tend to be somewhat greater in Russian bricks, it is the width measurement which is

the most diagnostic feature; there is a difference of one to two inches between Russian and American bricks, with no overlap.

The way the bricks are laid is generally a better guide to period than are the bricks themselves (Hume 1970:83). However, Fort Ross bricks were recovered individually. Both the smaller 'common' American bricks and the larger, 'over-sized common' Russian bricks were recovered from the Officials' Quarters. Comparing their widths, American bricks average 4 in and Russian specimens average 5-1/2 in., an average difference of 1-1/2 in. (Fig. 1). Unfortunately only one brick is complete enough to be measurable by length; this is an American brick 8-1/2 in. long. Thickness of the two brick types overlaps, but the Russian type tends to be thicker by an average difference of 1/4 in. (Fig. 2). Dimensions of molded bricks generally vary by as much as 1/2 in. due to wearing of the mold (Davis 1884:65) and differing shrinkage of clay depending on composition, amount of firing, and heat of fire. This is especially true of early kilns, where the heat generally was not uniform throughout (McKee 1973:44), as those bricks used in the early days of Fort Ross were probably burned with a wood fire (Carnes 1977, personal communication).

Bricks of special shapes and sizes were also made for special functions, such as arches, chimney shafts, and lintels. From the Officials' Quarters area seven arch bricks were recovered as well as two "roman" bricks, two "roman arch" bricks, and one keystone brick (See Figure 5). Undoubtedly some of these ^{were} ~~were~~ used in the construction of the Russian stove.

Besides the varieties of sizes and shapes of bricks recovered, a third variable considered ^{is} of composition of clay used in manufacturing. The

majority of the bricks in the present collection were made from common clay. This is a broad classification that includes many types of impure clay materials. Raw materials come principally from shales and alluvium and are composed of various portions of clay minerals and silt, weathered rock, mineral fragments, and organic matter. These bricks can be distinguished by those particular impurities or 'inclusions' which are visible to the unaided eye. These various inclusions represent different clay sources, i.e., either from completely different localities or from different areas within the same deposit, since the same deposit may contain clay from varied sources (McKee 1973:41).

Sand-molded brick

Of the sand-molded bricks recovered, there are six different clay sources represented based on predominant inclusions (Table 3). Those specimens composed of limestone and organic materials (223 specimens) (Fig. 1), those composed of sandstone and shell (6 specimens) (Fig. 2), and those composed of sandstone and quartz (17 specimens) (Fig. 3) are assigned to the American Period. Among these bricks are 17 'common' bricks (which are shaped like arch bricks but are only half as thick, as is the case of roman bricks), one arch brick, and one roman brick. The remaining 225 specimens are too fragmentary for shape to be determined. These bricks have been tentatively assigned to the American Period since those specimens which are measurable fall within the acceptable size range for American-made bricks. Those specimens which were associated with a feature were all recovered from American Period features only, and none of these specimens have evidence of the anomalies which are

displayed on Russian Period bricks, i.e., coring and vitrification-disintegration.

Those specimens made of clay with macro-silicates (quartz, mica, and decomposed granite) as predominant inclusions have been assigned to the Russian Period (Fig. 4). Only two of the total 101 bricks are complete enough to determine their size and shape; they are both 'common' bricks. The other 99 specimens are fragmentary and unmeasurable. These bricks have been assigned to the Russian Period because of their size, because they were recovered from both Russian and American features, and because, although also used during the American Period, they were manufactured during the Russian Period. This type of brick was also recovered from the Bodega Head (Bay) area where a brick kiln was in operation at an unknown date and where the Russians set-up a station prior to the construction of Fort Ross (Haase 1952:57, 219).

Another type of clay represented has sandstone inclusions and a marbled appearance caused by the mixture of two different clay types. One probably contains more iron oxide than the other. This clay probably came from different layers in the same deposit. Eighty-six specimens ^{will} recovered with four shapes being represented: six Russian (Fig. 5-a), three arch (Fig. 5-b), one roman (Fig. 5-c), and one keystone (Fig. 5-d^o). The remaining 75 specimens are fragments. These bricks were recovered from both Russian and American Period features, probably being reused as were the previous type.

Bricks with sandstone inclusions represent the final type (Fig. 6). Because both Russian (^{eight}eight) and American (~~eighteen~~) size bricks are made of this clay it appears both groups used the same clay type. It is possible that the same

clay source was exploited by both groups, but this does not necessarily have to be the case. Sandstone is the underlying geologic deposit of the Fort Ross plateau so this clay type was certainly quite common in the area, and sandstone is a very common temper material.

Arch bricks and unmeasurable specimens exhibiting sandstone inclusions were also recovered. The arch bricks are of two different widths: one measures 4 in, the other 5-1/4 in. The wider specimen was recovered from a ^{space} Russian feature, so it probably dates from that period. The narrower specimen was without feature association but, ^{b+} width, probably dates from the American Period. The common bricks were recovered from American Period features only while the oversized bricks were recovered from both period features, as were the unmeasurable specimens.

Russian and American Manufacturing Methods

Although the exact method of manufacture or type of kiln and clamp used cannot be determined from these brick remains, a number of observations can be made.

The color of a fired brick depends on the composition of the material and the manner in which it is treated in the kiln (Searle 1936:12). The chief colorant is the iron oxide and the clay will burn to different shades depending on the amount of this and other substances (Searle 1936:13). However, with a given constitution of clay, the final color of the burned brick depends upon a large number of conditions in the firing process (Searle 1936:13). Therefore, by observing the color variation of bricks made of a single type of clay, some conclusions can be drawn about brickmaking conditions.

Both Russian and American bricks range in color from buff to purple, with specimens falling within the orange to red-orange range (which is the usual result of a firing in a single kiln). Russian bricks, however, suggest a greater amount of variability of conditions. A number of the macro-silicate Russian bricks are vitrified on at least one surface. This vitrification is caused by exposure to intense heat which runs and glazes the brick surface. These bricks tend to last longer than those lying away from the fire (Hume 1969:174). Of course, vitrification could have occurred in the kiln or from constant exposure to flames if used in the interior of a stove or fireplace.

A number of both Russian marbled bricks and sandstone inclusion bricks disintegrate when exposed to dampness. This is a characteristic of underburning. These bricks either were set on the most distant area from the kiln fire, or the kiln temperature was not sufficiently high to allow bricks to harden. These are called samel or sandal-bricks (Hume 1969:174). They would have been used on interior construction where exposure to dampness would be minimal.

Another attribute displayed exclusively by Russian Bricks is coring (Fig. 7). When the temperature in the kiln rises too rapidly the interior of the brick becomes discolored, frequently showing a black "core" when broken (Scarle 1936:19).

It is suggested that the Russians used only a single size mold for all of their bricks. So, by filling the mold to different levels they could form specially shaped bricks. For example, the tops of the arch, keystone, and

Roman bricks were shaped by hand rather than struck off like the American varieties, indicating only a partially fitted mold.

Another interesting attribute of the Russian-shaped bricks is a layer of very sandy-clay applied to the surfaces before firing. This suggests a need to furnish a rougher surface for the mortar to adhere to, for extra strength would be needed around the arch area.

Russian vs. American Mortar

Two types (eight pieces) of mortar have been recovered from the Officials' Quarters, either still attached to bricks or as separate pieces. One type is a yellow 'mud' mortar, probably produced from the C horizon soils found 1/2 m below ground surface at the fort (Fig. 8). Of the 60 having mortar still adhering to their surfaces, 51 had this type mortar, and are exclusively Russian bricks.

The other type of mortar contained portland cement. Portland cement was used in Europe throughout the nineteenth century, and was introduced to California sometime around 1850 (Reinoehl 1977, personal communication). This mortar is made of cement, limestone, or gypsum plaster and is mixed with sand and water. It was found adhering to two American Period bricks (Fig. 9), and seven Russian bricks. Two Russian bricks recovered with yellow mortar on one side and portland cement mortar on the other were associated with Russian features. Those specimens with both mortars adhering to their surfaces were probably bricks which were used initially by Russians (yellow mud) and then reused by Americans (portland mortar).

Firebricks

Four firebrick specimens were recovered from the Officials' Quarters, all manufactured after 1914. One of the bricks recovered is pressed and has an impressed manufacturer's ^{mark} ~~mark~~ (Fig. 9). One arch brick (Fig. 10), either pressed or hand molded, was also recovered along with two unmeasurable fragments.

Only one specimen has mortar adhering to its surface. This is the impressed brick; ~~and~~ the mortar contains portland cement.

Tile

One tile fragment was recovered. This specimen is the corrugated type made of the same type clay as are the firebricks. Length and width are unmeasurable; thickness measures one inch.

Conclusions

Bricks of both Russian and American manufacture were recovered from the Officials' Quarters. Of the Russian bricks five shapes are represented: 'common' (16 specimens), arch (4 specimens), keystone (1 specimen), and roman (1 specimen). Also, about one hundred and seventy four brick fragments were recovered which were unmeasurable. There is documentary evidence to support the assumption that Russians manufactured bricks in the Fort Ross vicinity. In 1830, Khlebnikov mentions that "From excellent clay a considerable number

of bricks are made and are often delivered to Sitka. The clay is of different qualities" (Khlebnikov 1861:156).

Since Russian bricks were recovered from Russian building postholes, bricks had to be available while Fort Ross was being constructed. This raises the question of whether the Russians could have brought bricks with them from the northern colonies as ballast, as happened in the American colonies in the East (Hume 1970:82). However, it is also true that poor quality bricks were liable to absorb water which could affect the stability of the ship. As previously mentioned, a number of Russian bricks are underfired so that they disintegrate readily when dampened. This certainly would have hindered the use of these bricks as ballast. Haase (1952:219) states that from archeological and documentary evidence, their brickyard seems to have been situated on Bodega Head, eighteen miles south of Fort Ross. ^{The distance at Fort Ross} gives added support to this conclusion. Perhaps the Russians established a brickyard soon after arrival, thus making brick available during the initial construction of the fort.

Certainly Fort Ross inhabitants had access to bricks. Haase states that approximately 12,000 bricks were shipped ^{from Fort Ross} to Sitka in 1830 (Haase 1952:90). For mortar, Russians evidently used the soil in the area mixed with sand and water.

Bricks were also made during the American Period at the fort. Whether they were made in the immediate vicinity is not determinable unless trace element studies are conducted. Evidently by the American Period the brickmaking industry was quite productive in California (Kelley n.d.:129). The American Period bricks recovered from the Officials' Quarters consist of 35 common bricks, two arch bricks, two roman arch bricks, and one roman brick, as well as 225 segments. Not only were they using these bricks, but they were also

missing Russian Period bricks after Russian structures had been disassembled. This is evidenced by the fact that a number of Russian bricks were found with yellow mortar (used by the Russians^s), but also portland mortar cement (used during the American Period).

Table 1.

Comparison of US American Widths ~~with~~

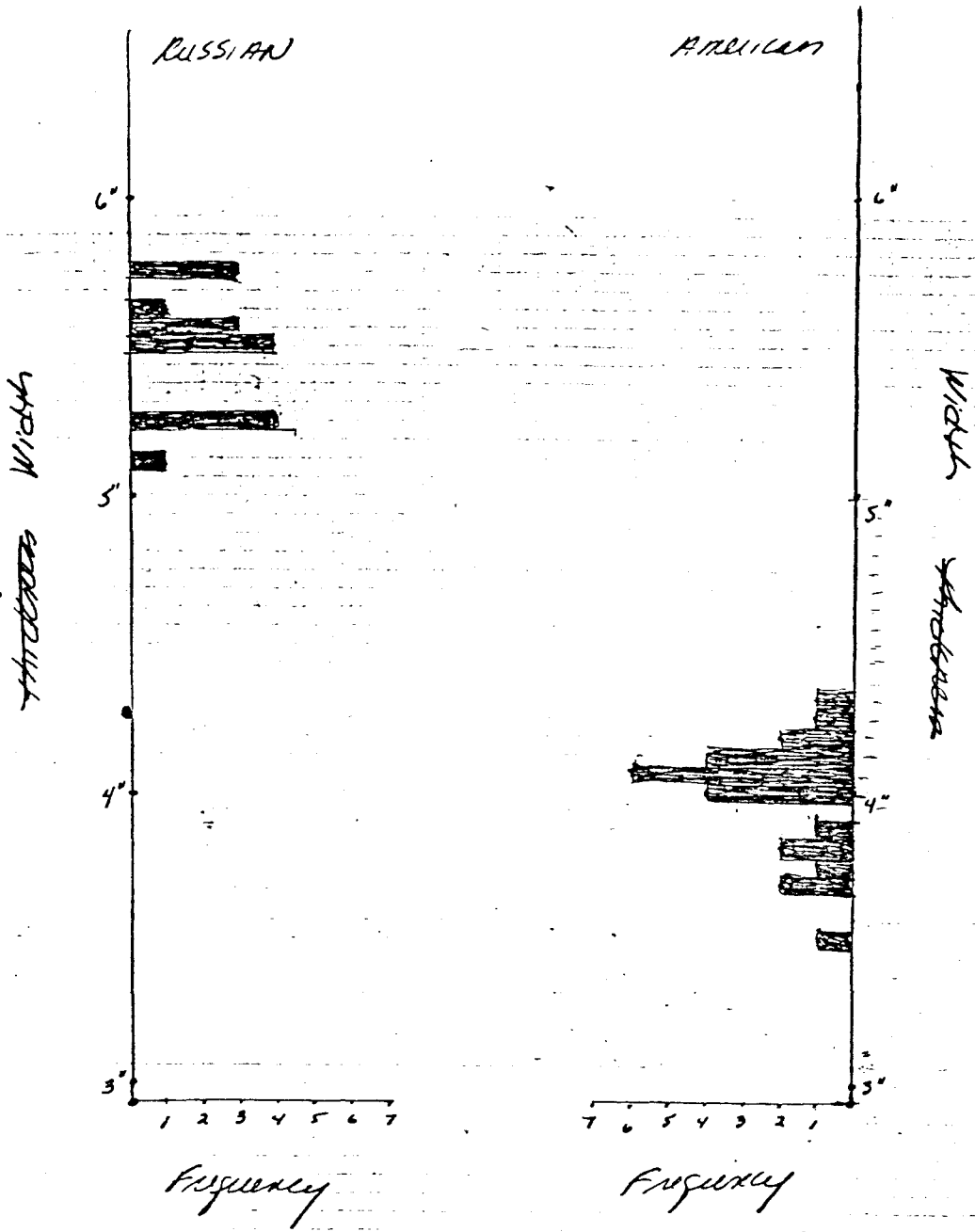


Table 2. *Ruminant vs. ~~Amel.~~ Amel. - thickness - ~~Table 2~~*

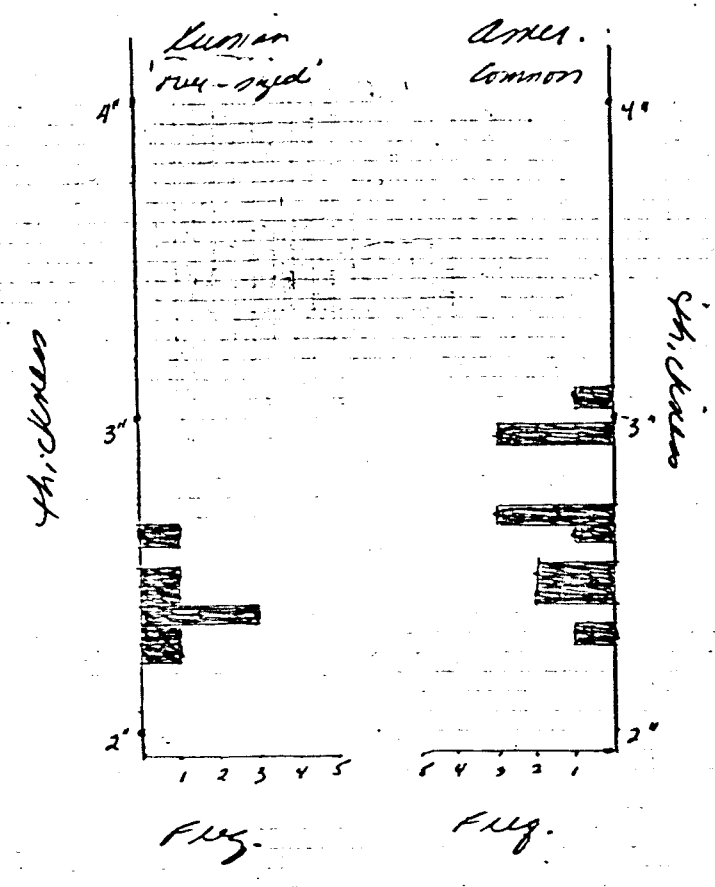


Table 3. RUSSIAN VS AMERICAN CLAY

Inclusions	Period	Total Specimens
Limestone and Organic	American	223
Sandstone and Shell	American	6
Sandstone and Quartz	American	17
Macro-silicates	American <i>Russian</i>	101
Sandstone and Marbled Clay	Russian	86
Sandstone	Russian and American	401
Firebrick	American	<u>4</u>
		838

List of Figures

Sand-molded bricks from the American Period.

Fig. 1. Limestone and organic inclusions.

Fig. 2. Sandstone and shell inclusions.

Fig. 3. Sandstone and quartz inclusions.

Fig. 4. Sand molded bricks from the Russian Period with macro-silicate inclusions (quartz, mica, and decomposed granite).

American and Russian bricks made from two types of clay.

Fig. 5-a. Russian.

Fig. 5-b Arch.

Fig. 5-c Roman.

Fig. 5-d Keystone.

Fig. 6. Bricks with sandstone inclusions.

Example is representative of both American and Russian.

Fig. 7. Russian bricks with coring.

Mortar types.

Fig. 8. Yellow 'mud' mortar (Russian).

Fig. 9. Portland cement (American).

Fig. 10. Firebrick.

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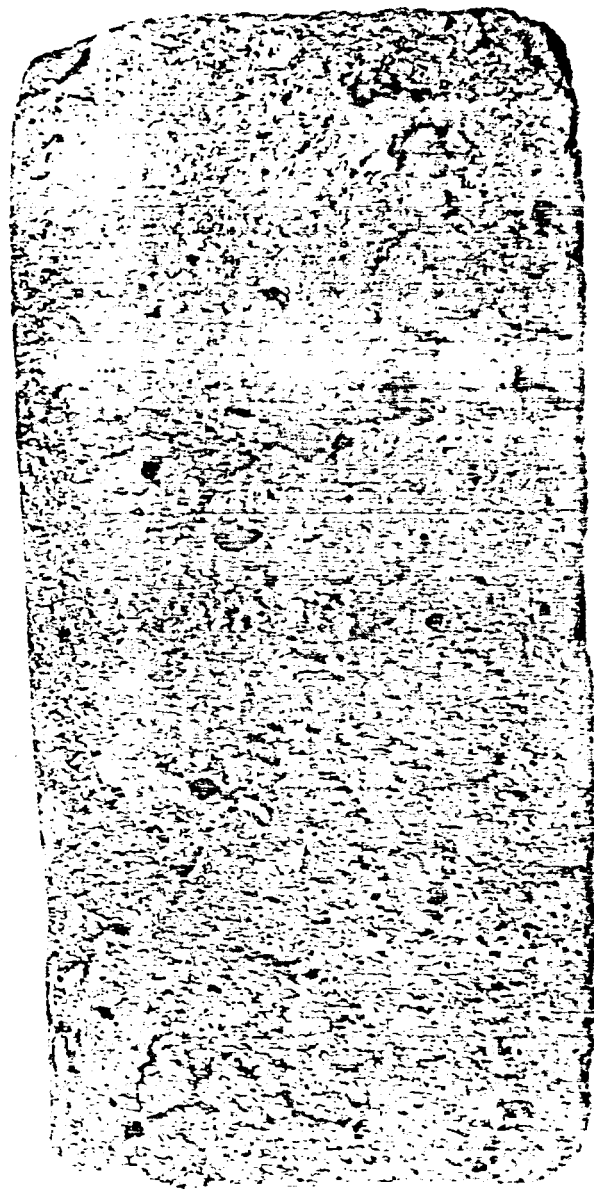


FIG. 1. LIMESTONE AND ORGANIC INCLUSIONS.

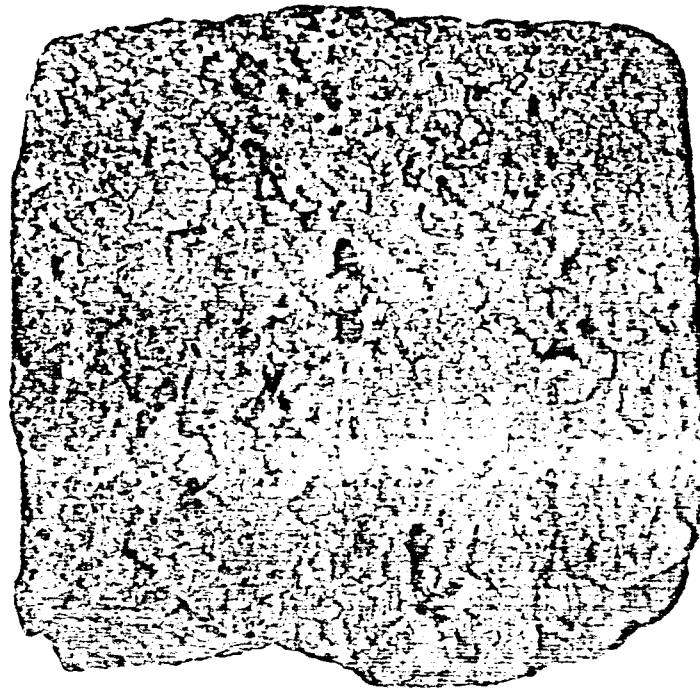


FIG. 2. SANDSTONE AND SHELL INCLUSIONS.

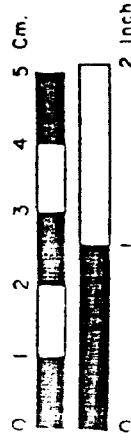


FIG. 3. SANDSTONE AND QUARTZ INCLUSIONS.



FIG. 4. SAND-MOLDED BRICKS FROM THE RUSSIAN PERIOD.
MACRO-SILICATE INCLUSIONS (QUARTZ, MICA,
AND DECOMPOSED GRANITE).

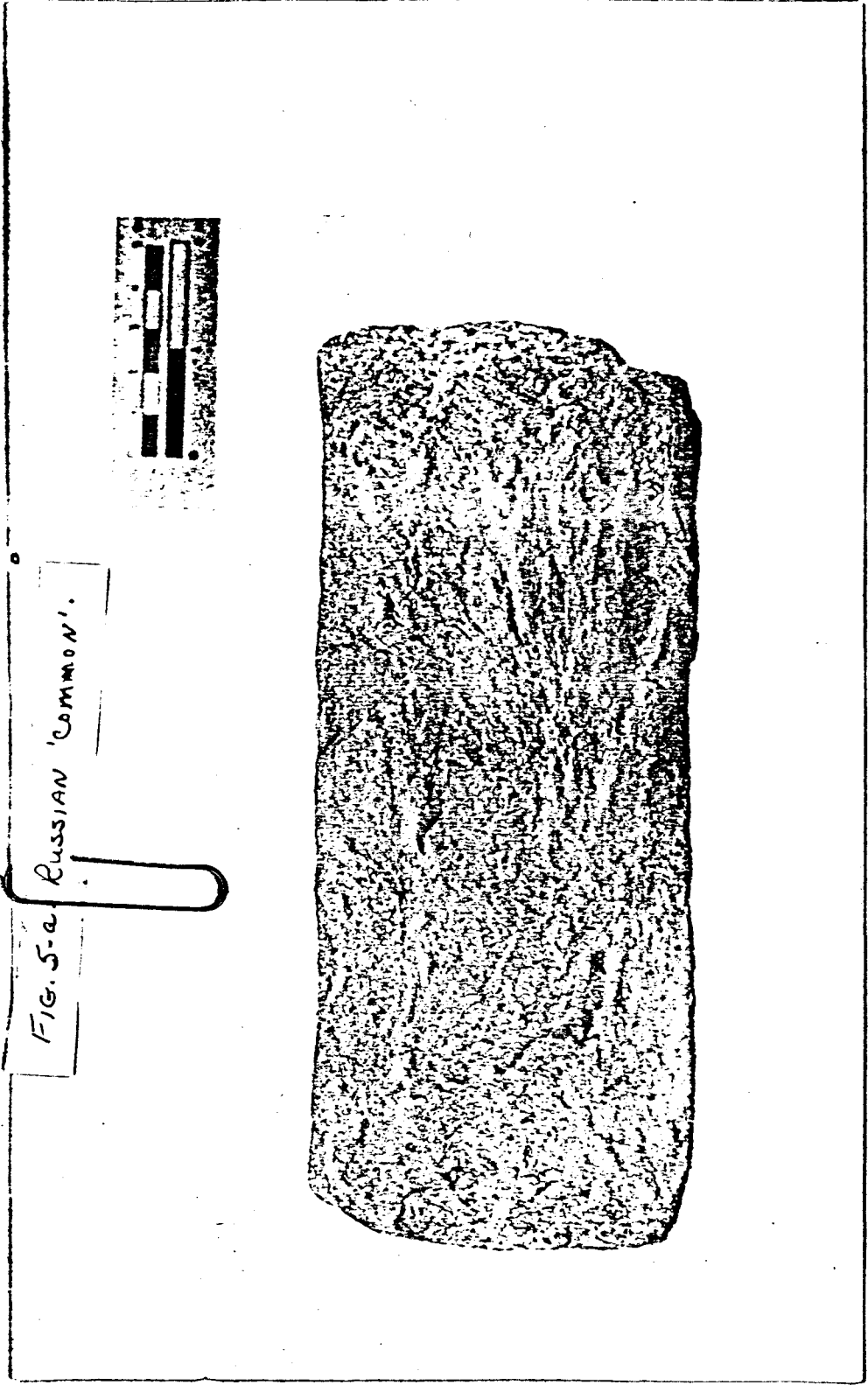


FIG. 5-a. RUSSIAN 'COMMON'.

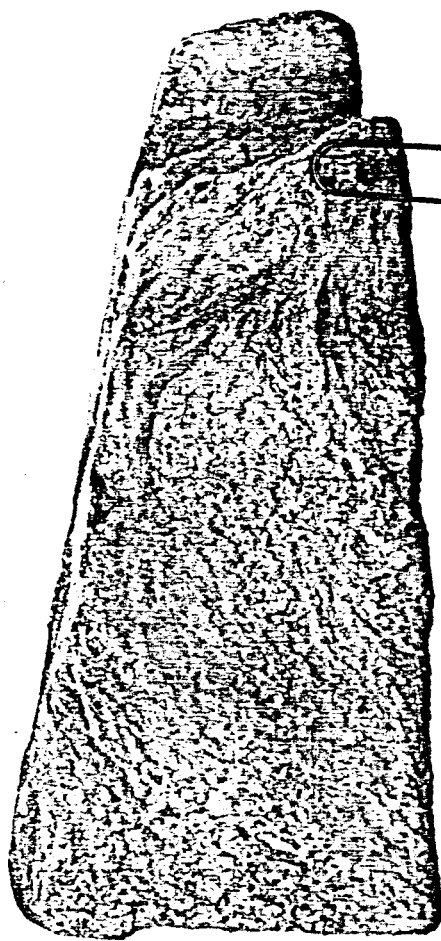
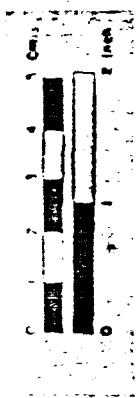


FIG. 5-b ARCH.

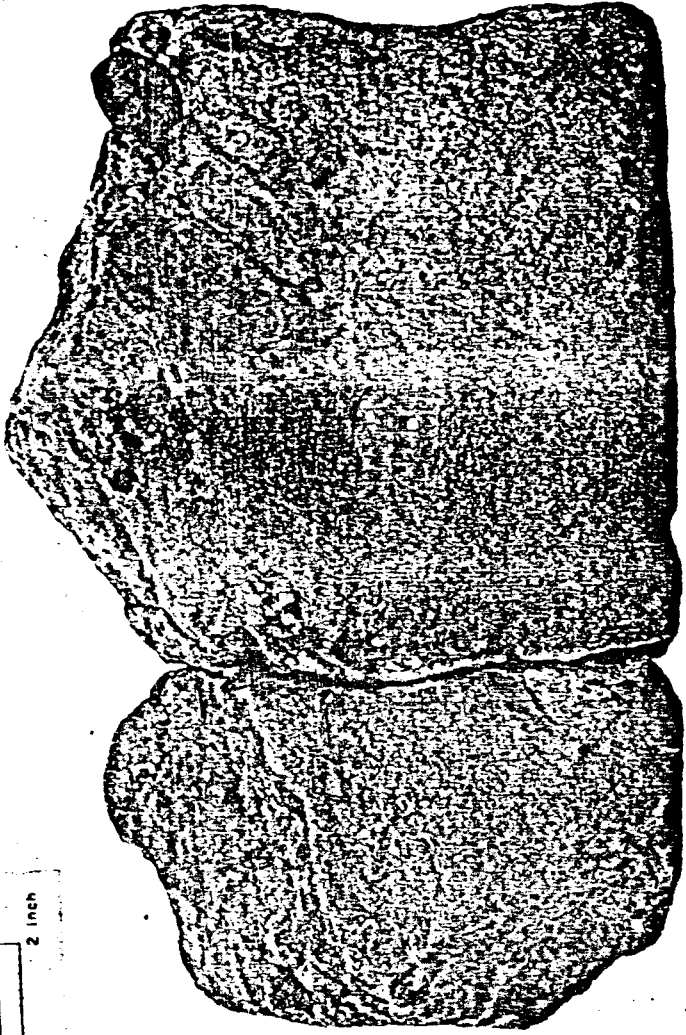


FIG. 5-c. ROMAN

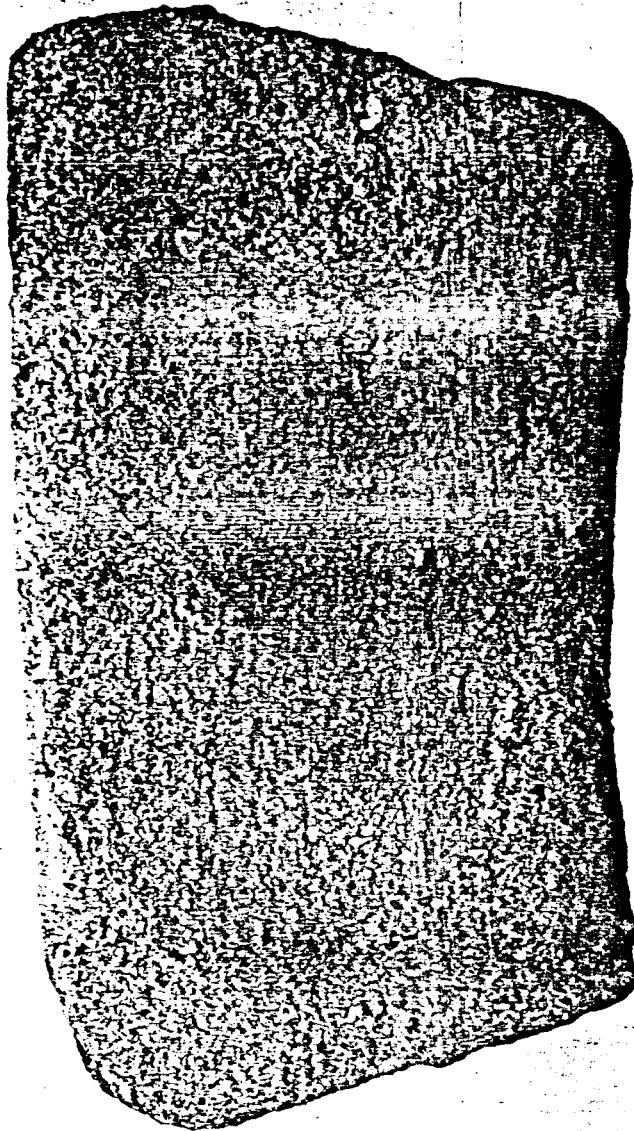


FIG. 5-C KEYSTONE

FIG. 6. BRICKS WITH SANDSTONE INCLUSIONS.

EXAMPLE IS REPRESENTATIVE OF BOTH RUSSIAN AND AMERICAN.

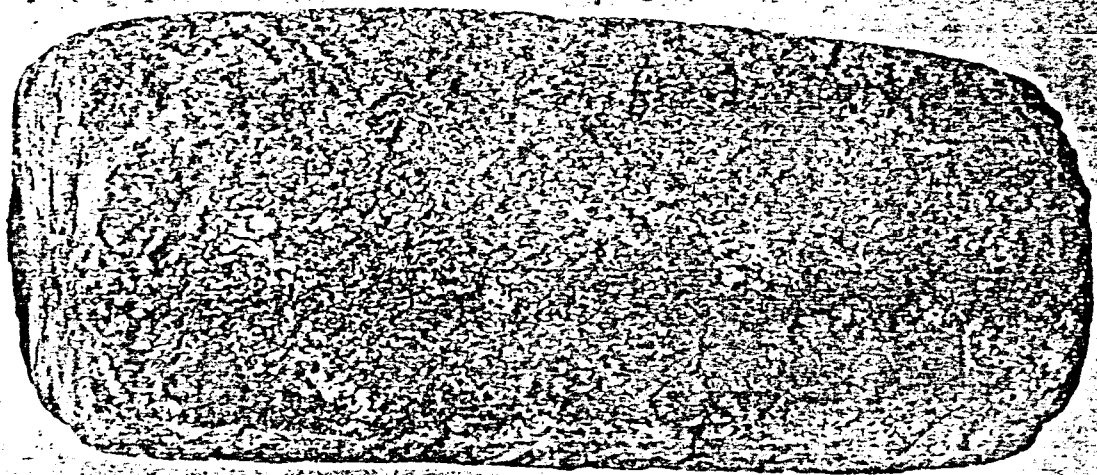
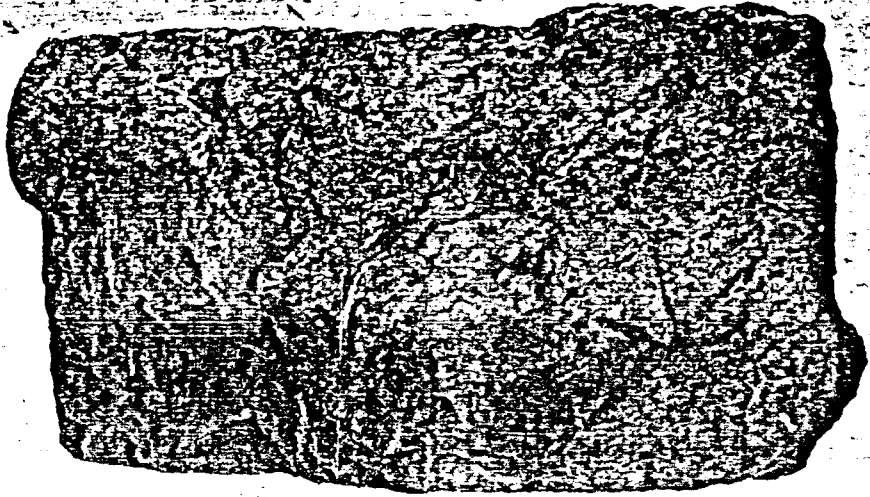
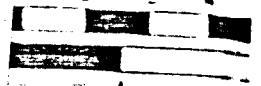


FIG. 7. RUSSIAN BRICKS WITH CORE.

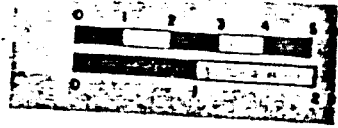
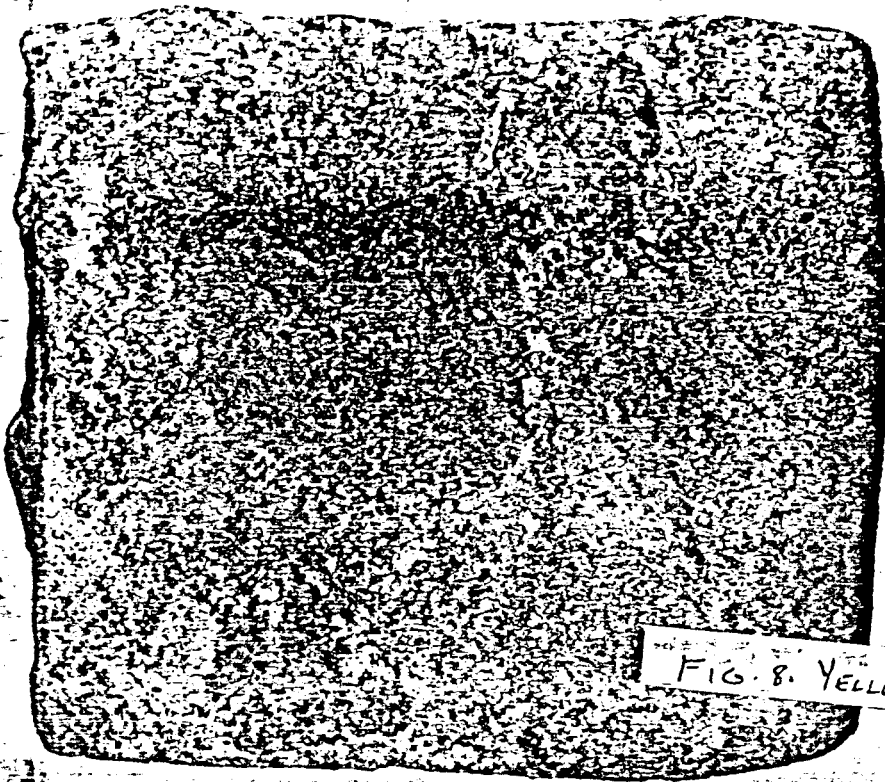


FIG. 8. YELLOW 'MUD' MORTAR (RUSSIAN).

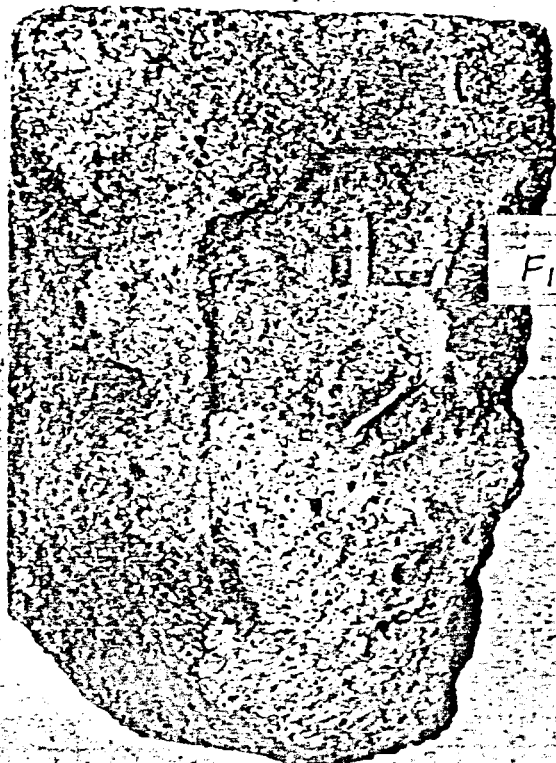


FIG. 9. PORTLAND MORTAR (AMERICAN).



FIG. 10. FIREBRICK WITH
PORTLAND MORTAR.

