APPENDIX A

Anthropometrics (Darwent et al. 2014).

Appendix A: Inventory of human skeletal remains recovered from the Franklin Point Cemetery site (following Buikstra and Ubelaker 1994).

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
Cranium	Frontal	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
	Parietal	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	25-75%	>75%	>75%	>75%	—
	Occipital	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	<25%	>75%	>75%	>75%	—
	Temporal	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	<25%	>75%	>75%	>75%	—
	Sphenoid	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
	Zygomatic	left	—	>75%	25-75%	25-75%	—	25-75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
	Maxilla	left	—	>75%	<25%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
	Palatine	left	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	>75%	>75%	—	>75%	>75%	>75%	>75%	—
Mandible		left	>75%	>75%	—	—	—	>75%	>75%	>75%	>75%	—
		right	25-75%	>75%	—	—	—	>75%	>75%	>75%	>75%	—
Clavicle		left	—	>75%	25-75%	—	—	>75%	>75%	>75%	>75%	—
		right	—	>75%	—	>75%	—	>75%	>75%	>75%	—	—
Scapula	Body	left	25-75%	<25%	—	—	—	<25%	25-75%	<25%	—	—
		right	25-75%	—	—	—	—	<25%	25-75%	<25%	—	—
	Glenoid fossa	left	>75%	>75%	—	—	—	>75%	>75%	>75%	—	—
		right	>75%	—	—	25-75%	—	>75%	>75%	>75%	—	—
Sternum	Manubrium		—	—	—	25-75%	—		25-75%	>75%	>75%	—
	Body		>75%	—	—	—	—	>75%	25-75%	>75%	—	—
Os coxae	Ilium	left	>75%	<25%	—	>75%	—	25-75%	>75%	>75%	—	—
		right	25-75%	—	<25%	—	—	25-75%	>75%	>75%	—	—
	Ischium	left	—	—	<25%	>75%	—	>75%	>75%	>75%	—	—
		right	—	—	—	—	—	<25%	>75%	>75%	—	—
	Pubis	left	—	—	<25%	>75%	25-75%	25-75%	>75%	<25%	—	—
		right	—	—	—	—	—	25-75%	>75%	<25%	—	—
	Acetabulum	left	—	25-75%	25-75%	>75%	—	>75%	>75%	>75%	—	—

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
		right	—	—	<25%	—	—	>75%	>75%	>75%	—	—
	Auricular surface	left	—	<25%	<25%	>75%	—	>75%	>75%	>75%	—	—
		right	—	—	<25%	—	—	<25%	>75%	>75%	—	—
	Sacrum	left	<25%	—	—	25-75%	—	<25%	>75%	>75%	—	—
		right	<25%	—	—	25-75%	—	25-75%	>75%	>75%	—	—
Cervical vertebrae	C1: centrum		—	>75%	—	—	—	>75%	>75%	>75%	>75%	—
	C1: neural arch		—	>75%	25-75%	25-75%	—	>75%	25-75%	>75%	>75%	—
	C2: centrum		—	>75%	—	—	—	>75%	>75%	>75%	—	—
	C2: neural arch		>75%	>75%	—	25-75%	—	>75%	>75%	>75%	—	—
	C3-6: centra		—	4 pres./ 2 compl.	—	1 pres./ 0 compl.	—	5 pres./ 3 compl.	4 pres./ 3 compl.	5 pres./ 5 compl.	—	—
	C3-6: neural arches		1 pres./ 1 compl.	4 pres./ 4 compl.	1 pres./ 0 compl.	1 pres./ 1 compl.	—	5 pres./ 5 compl.	4 pres./ 4 compl.	5 pres./ 4 compl.	—	—
	C7: centrum		25-75%	25-75%	—	—	—	25-75%	<25%	>75%	—	—
	C7: neural arch		25-75%	>75%	—	—	—	>75%	<25%	>75%	—	—
Thoracic vertebrae	T1-9: centra		—	8 pres./ 6 compl.	2 pres./ 1 compl.	5 pres./ 1 compl.	—	9 pres./ 9 compl.	9 pres./ 7 compl.	9 pres./ 7 compl.	—	—
	T1-9: neural arches		8 pres./ 4 compl.	8 pres./ 8 comp.	2 pres./ 0 compl.	6 pres./ 3 compl.	—	9 pres./ 9 compl.	9 pres./ 9 compl.	9 pres./ 9 compl.	—	—
	T10: centrum		—	—	—	>75%	—	>75%	>75%	>75%	—	—
	T10: neural arch		—	—	—	—	—	>75%	>75%	>75%	—	—
	T11: centrum		—	—	—	25-75%	—	>75%	>75%	>75%	—	—
	T11: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
	T12: centrum		—	—	—	25-75%	—	25-75%	25-75%	>75%	—	—
	T12: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
Lumbar vertebrae	L1: centrum		—	—	—	25-75%	—	>75%	>75%	>75%	—	—
	L1: neural arch		—	—	—	>75	—	>75%	>75%	>75%	—	—

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
	L2: centrum		—	—	—	25-75%	—	>75%	>75%	>75%	—	—
	L2: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
	L3: centrum		—	—	—	25-75%	—	>75%	>75%	>75%	—	—
	L3: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
	L4: centrum		—	—	—	25-75%	—	25-75%	>75%	>75%	—	—
	L4: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
	L5: centrum		—	—	—	25-75%	—	>75%	>75%	>75%	—	—
	L5: neural arch		—	—	—	>75%	—	>75%	>75%	>75%	—	—
Ribs	1st	left	—	>75%	—	<25%	<25%	>75%	>75%	>75%	—	—
		right	>75%	25-75%	—	25-75%	—	>75%	>75%	>75%	—	—
	2nd	left	25-75%		—	—	—	—	—	—	—	—
		right	>75%		—	—	—	—	<25%	>75%	—	—
	3-10	left	8 pres./ 3 compl.	5 pres./ 0 compl.	—	2 pres./ 0 compl.	—	7 pres./ 4 compl.	4 pres./ 4 compl.	6 pres./ 6 compl	—	—
		right	6 pres./ 3 compl.	4 pres./ 0 compl.	—	3 pres./ 0 compl.	—	7 pres./ 1 compl.	8 pres./ 8 compl	8 pres./ 2 compl.	—	—
		indet.	4 pres./ 0 compl.	—	—	—	—	—	—	—	—	—
	11th	left	—	—	—	—	—	—	—	>75%	—	—
		right	—	—	—	—	—	—	—	—	—	—
	12th	left	—	—	—	—	—	—	—	25-75%	—	—
		right	—	—	—	—	—	—	—	—	—	—
Humerus	proximal epiphysis	left	—	25-75%	—	—	—	>75%	>75%	>75%	—	—
	proximal third		—	25-75%	25-75%	—	—	>75%	>75%	>75%	—	—
	middle third		—	25-75%	>75%	—	—	>75%	>75%	>75%	—	—
	distal third		—	25-75%	25-75%	—	—	>75%	>75%	>75%	—	—
	distal epiphysis		—	>75%	>75%	—	—	>75%	>75%	>75%	—	—
Humerus	proximal epiphysis	right	>75%	—		—	—	>75%	>75%	>75%	—	—
	proximal		>75%	—	25-75%	—	—	>75%	>75%	>75%	—	—

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
	third											
	middle third		>75%	—	>75%	—	—	>75%	>75%	>75%	—	—
	distal third		>75%	—	25-75%	—	—	>75%	>75%	>75%	—	—
	distal epiphysis		>75%	—	<25%	—	—	>75%	>75%	>75%	—	—
Radius	proximal epiphysis	left	>75%	—	—	>75%	>75%	>75%	>75%	>75%	>75%	—
	proximal third		>75%	—	—	>75%	>75%	>75%	>75%	>75%	>75%	—
	middle third		>75%	—	—	>75%	25-75%	>75%	>75%	>75%	>75%	—
	distal third		>75%	—	—	>75%	—	>75%	>75%	>75%	>75%	—
	distal epiphysis		>75%	—	—	>75%	—	>75%	>75%	>75%	>75%	—
Radius	proximal epiphysis	right	>75%	—	—	—	—	>75%	>75%	>75%	—	—
	proximal third		>75%	—	—	25-75%	—	>75%	>75%	>75%	—	—
	middle third		>75%	—	—	>75%	—	>75%	>75%	>75%	—	—
	distal third		<25%	—	—	>75%	—	25-75%	>75%	>75%	—	—
	distal epiphysis		—	—	—	>75%	—	<25%	>75%	>75%	—	—
Ulna	proximal epiphysis	left	>75%	—	—	>75%	>75%	>75%	>75%	>75%	>75%	—
	proximal third		>75%	—	—	>75%	>75%	>75%	>75%	>75%	>75%	—
	middle third		>75%	—	—	>75%	>75%	>75%	>75%	>75%	>75%	—
	distal third		25-75%	—	—	25-75%	—	>75%	>75%	25-75%	>75%	—
	distal epiphysis		—	—	—	—	—	25-75%	>75%	—	>75%	—
Ulna	proximal epiphysis	right	>75%	—	25-75%	—	<25%	>75%	>75%	>75%	—	—
	proximal third		25-75%	—	25-75%	25-75%	>75%	>75%	>75%	>75%	—	—
	middle third		—	—	>75%	>75%	>75%	>75%	>75%	>75%	—	—
	distal third		—	—	—	>75%	—	25-75%	<25%	>75%	—	—
	distal epiphysis		—	—	—	25-75%	—	—	—	25-75%	—	—

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
Femur	proximal epiphysis	left	—	>75%	>75%	—	25-75%	>75%	>75%	>75%	—	—
	proximal third		—	>75%	25-75%	—	>75%	>75%	>75%	>75%	—	—
	middle third		—	>75%	>75%	—	25-75%	>75%	>75%	>75%	—	
	distal third		—	>75%	>75%	—	—	>75%	>75%	>75%	—	
	distal epiphysis		—	>75%	25-75%	—	—	>75%	>75%	>75%	—	
Femur	proximal epiphysis	right	>75%	—	25-75%	>75%	—	>75%	>75%	>75%	—	>75%
	proximal third		>75%	—	>75%	>75%	—	>75%	>75%	>75%	—	
	middle third		>75%	—	>75%	>75%	—	>75%	>75%	>75%	—	
	distal third		>75%	—	25-75%	>75%	—	>75%	>75%	>75%	—	
	distal epiphysis		>75%	—	>75%	>75%	—	>75%	>75%	>75%	—	
Patella		left	—	25-75%	25-75%	>75%	—	25-75%	>75%		—	
		right	>75%	—		>75%	25-75%	>75%	>75%	>75%	—	>75%
Tibia	proximal epiphysis	left	25-75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	>75%
	proximal third		25-75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	>75%
	middle third		>75%	>75%	>75%	>75%	—	>75%	>75%	>75%	—	>75%
	distal third		>75%	>75%	>75%	>75%	—	>75%	>75%	>75%	—	>75%
	distal epiphysis		>75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	>75%
	proximal epiphysis	right	25-75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	—
	proximal third		>75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	—
	middle third		>75%	>75%	>75%	>75%	—	>75%	>75%	>75%	—	>75%
	distal third		>75%	>75%	>75%	>75%	—	>75%	>75%	>75%	—	>75%
	distal epiphysis		>75%	>75%	<25%	>75%	—	>75%	>75%	>75%	—	>75%
Fibula	proximal epiphysis	left	—	—	—	—	—	—	>75%	25-75%	—	—
	proximal		—	25-75%	—	25-75%	—	<25%	>75%	>75%	—	—

Element	**Portion**	**Side**	**Burial 1**	**Burial 2**	**Burial 3**	**Burial 4**	**Burial 4A**	**Burial 5**	**Burial 6**	**Burial 7**	**Burial 8**	**Burial 8A**
	third											
	middle third		—	>75%	—	25-75%	—	<25%	>75%	>75%	—	
	distal third		—	>75%	—	>75%	—	<25%	>75%	>75%	—	>75%
	distal epiphysis		—	>75%	—	25-75%	—	—	>75%	>75%	—	>75%
Fibula	proximal epiphysis	right	—	—	—	25-75%	—	—	>75%	—	—	—
	proximal third		—	25-75%	—	>75%	—	<25%	>75%	>75%	—	—
	middle third		<25%	>75%	>75%	>75%	—	25-75%	>75%	>75%	—	—
	distal third		25-75%	>75%	25-75%	>75%	—	>75%	>75%	>75%	—	—
	distal epiphysis		25-75%	>75%	<25%	25-75%	—	—	>75%	>75%	—	>75%
Carpals		left	—	1 pres./ 1 compl.	—	2 pres./ 2 compl.	—	5 pres./ 4 compl.	8 pres./ 8 compl.	—	2 pres./ 2 compl.	—
		right	1 pres./ 0 compl.	—	—	1 pres./ 1 compl.	—	—	7 pres./ 7 compl.	—	—	—
		indet.	—	1 pres./ 0 compl.	—	—	—	—	—	—	—	—
Metacarpals		left	1 pres./ 1 compl.	—	—	—	—	—	5 pres./ 5 compl.	—	—	—
		right	1 pres./ 1 compl.	—	—	—	—	—	5 pres./ 5 compl.	—	—	—
		indet.	3 pres./ 1 compl.	7 pres./ 0 compl.	6 pres./ 3 compl.	6 pres./ 4 compl.	4 pres./ 3 compl.	5 pres./ 2 compl.	—	—	3 pres./ 3 compl.	—
Phalanges (manus)		left	—	—	—	1 pres./ 1 compl.	—	—	10 pres./ 10 ompl.	—	—	—
		right	—	—	—	—	—	—	13 pres./ 13 compl.	—	—	—
		indet.	7 pres./ 5 compl.	7 pres./ 4 compl.	—	16 pres./ 6 compl.	—	6 pres./ 3 compl.	—	—	3 pres./ 3 compl.	1 pres./ 1 compl.
Talus		left	>75%	>75%	25-75%	>75%	—	>75%	>75%	—	—	
		right	>75%	>75%	>75%	>75%	2 pres./ 2 compl.	>75%	>75%	>75%	—	2 pres./ 2 compl.
Calcaneus		left	<25%	>75%	>75%	25-75%	—	>75%	>75%		—	1 pres./ 1 compl.
		right	25-75%	>75%	>75%	25-75%	—	>75%	>75%	>75%	—	2 pres./

Element	Portion	Side	Burial 1	Burial 2	Burial 3	Burial 4	Burial 4A	Burial 5	Burial 6	Burial 7	Burial 8	Burial 8A
												2 compl.
Tarsals		left	3 pres./ 2 compl.	5 pres./ 4 compl.	1 pres./ 1 compl.	3 pres./ 3 compl.	7 pres./ 3 compl.	1 pres./ 1 compl.	7 pres./ 7 compl.	—	—	—
		right	3 pres./ 2 compl.	4 pres./ 4 compl.	3 pres./ 1 compl.	2 pres./ 2 compl.	—	3 pres./ 2 compl.	7 pres./ 7 compl.	1 pres./ 1 compl.	—	5 pres./ 5 compl.
		indet.	—	—	1 pres./ 0 compl.	1 pres./ 0 compl.	—	1 pres./ 0 compl.	—	—	—	9 pres./ 9 compl.
Metatarsals		left	2 pres./ 0 compl.	3 pres./ 3 compl.		1 pres./ 1 compl.	1 pres./ 1 compl.	2 pres./ 1 compl.	5 pres./ 5 compl.	—	—	—
		right	—	3 pres./ 3 compl.	1 pres./ 1 compl.	1 pres./ 1 compl.	—	1 pres./ 1 compl.	5 pres./ 5 compl.	5 pres./ 3 compl.	—	3 pres./ 3 compl.
		indet.	3 pres./ 0 compl.	5 pres./ 3 compl.	—	7 pres./ 3 compl.	—	4 pres./ 0 compl.	—	—	—	—
Phalanges (pes)		left	—	—	—	—	—	—	5 pres./ 5 compl.	—	—	—
		right	—	—	1 pres./ 1 compl.	—	—	1 pres./ 1 compl.	7 pres./ 7 compl.	5 pres./ 5 compl.	—	—
		indet.	—	—	—	—	1 pres./ 1 compl.	3 pres./ 3 compl.	—	—	—	—
Misc.			4 rib frags		1 rib frag.	1 vert. centrum frag.	14 rib frags	11 rib frags	26 rib frags	10 rib frags		1 rib frag
			8 vert. frags		4 vert. frags	1 sesamoid frag.	4 vert. frags		4 sesamoid frags	1 hyoid frag.		1 fibula frag
			1 pubis frag.				1 sacral frag.			4 sesamoid frags		5 uniden. manus or pes frags.
			1 uniden. frags				4 uniden. frags			8 uniden. frags		

APPENDIX B

Histomorphic and Cross-sectional Geometry Analysis (Ramsey 2002).

Appendix B

Histomorphometric and Cross-sectional Geometry Analysis:

By Heather Ramsey. Department of Anthropology, University of Missouri-Columbia
(August 12, 2002)

Histomorphometric and biomechanical analyses were conducted on a skeletal sample excavated from Año Nuevo State Park, California. The sample consisted of eight exposed burials that were the subject of a multi-discipline research project prior to reinterment. The California Department of Parks and Recreation contracted this researcher, as part of the research project, to determine an estimate of age-at-death, bone health, and biomechanical loading patterns of the skeletal material. The proposed study consisted of three parts:

- Rib and clavicle samples were taken and histomorphometrically analyzed to estimate the age-at-death of each burial, as well as to calculate the activation frequency and bone formation rates, where possible, for comparison to published values.
- Femurs were sectioned and scanned at their mechanical midpoint for cross-sectional geometry analysis. Biomechanical loading patterns were assessed for each femur and compared to published values.
- Wedge sections were taken from each available iliac crest and histologically prepared. The iliac crest sections were scanned and analyzed to determine trabecular bone volume.

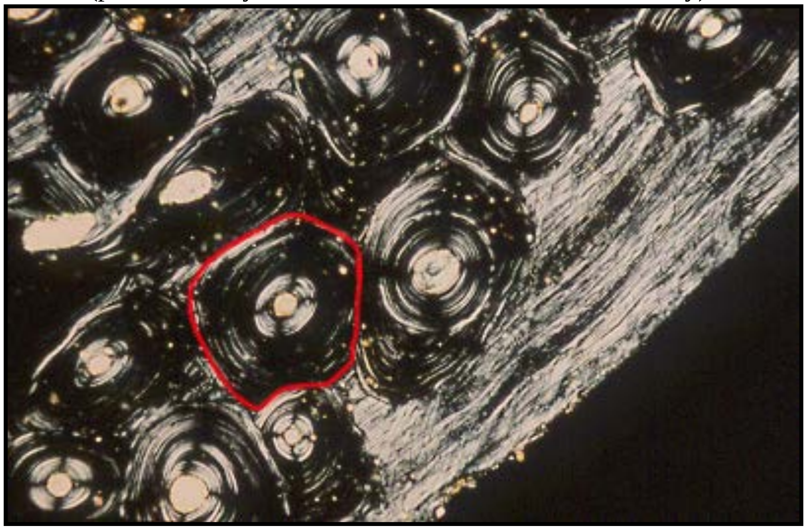
The measured values were compared to published bone mass data. Each stage of analysis is presented below.

Histomorphometric Analysis

Bone tissue, both cortical and cancellous, is in a constant state of flux, with new bone continuously replacing old bone through a process called remodeling. Bone remodeling units (BRUs), representing different stages of bone replacement, exist throughout bone tissue at all times. In cortical bone, BRUs core through and replace the hard tissue, digging out and refilling tunnels approximately 150 μm in diameter. These BRUs, when viewed in a histological cross-section under light microscopy, appear as structures known as osteons, or Haversian systems. An osteon consists of a series of concentric rings of lamellar bone, which is comprised of collagen and hard tissue matrix, around a central Haversian canal that contains blood vessels and nerves. Because of their orientation pattern within the bone matrix, collagen fibrils appear to light up when viewed under polarized light, increasing the visibility of the lamellar pattern in the osteon (Martin et al., 1998) (see Figure B1).

Because osteon formation is continuous, the osteon population density (OPD) per unit area increases with age. Based on this relationship, several age estimating formulas have been developed from bone histomorphometry of known-age cadaver samples (Ahlquist and Damsten, 1969; Kerley, 1965; Singh and Gunberg, 1970; Stout and Paine, 1992; Thompson, 1979). An age estimate for an individual is calculated using the number of osteons and osteon fragments, and cortical bone area for a histological cross-section, from which OPD is derived. This OPD is then used in a formula to estimate the age of the individual. For this study the Stout and Paine (1992) formula was used, with consideration to corrections made by Stout et al. (1996).

Figure B1: Bone corss-section under polarizsed light. An osteon is outlined in red (photo courtesy of DR. Sam Stout, Ohio State University).



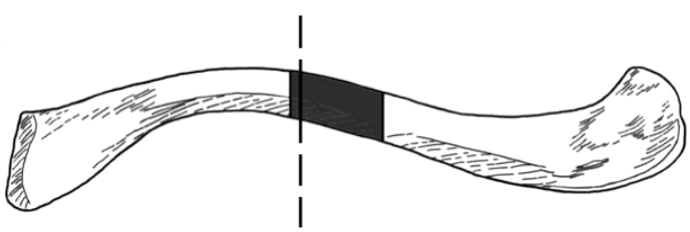
In addition to calculating age estimates, OPDs, supplemented with mean osteon areas, can be used to derive individual activation frequencies and bone formation rates in cortical bone (Abbott et al., 1996). An activation frequency is the "rate at which new remodeling cycles are initiated" (Eriksen et al., 1994). Combined with the bone formation rate, this value can indicate the overall metabolic rate for bone remodeling (Abbott et al., 1996).

Lower activation frequencies and bone formation rates, relative to modern populations, may be interpreted as decreased bone remodeling activity levels. However, lower activation frequencies and bone formation rates may in fact represent a delay in skeletal maturity. Individuals in a study of early agricultural populations exhibited lower bone remodeling activity levels, relative to modern populations. These lower levels were attributed to a delayed age of skeletal maturity (the age when active skeletal growth ceases), possibly resulting from increased biomechanical stress and inadequate nutrition (Stout and Lueck, 1995). Therefore, activation frequency and bone formation data from the Franklin Point Cemetery sample were interpreted in conjunction with the cross-sectional geometry and bone mass results to assess the possible influence biomechanical and nutritional stress had on bone remodeling activity.

Methods

Bone cross-sections, measuring approximately 2.5 cm in length, were removed from the mid-point of each rib and clavicle (see Figure B2).

Figure B2: Cross-sectional sample removed from a clavicle.



The midsections were embedded in EPO-THIN plastic to maintain their integrity during processing. The plastic was cured overnight and then thick sections of the embedded tissues were cut to approximately 200µm in thickness using an Isomet (Buehler Ltd., 41 Waukegan Road, Lake Bluff, IL. USA 60044) diamond blade saw. The thick sections were mounted with Permount onto microscope slides and hand-ground using 250 grit silicon carbide sandpaper. The thick sections were then finely polished on a metal bonded (9µm) grinding disc to a final thickness of approximately 50µm. For each rib and clavicle, two sections were cover slipped, a third section was reserved for future research, and a fourth archived.

The cover slipped histological slides were analyzed using an Olympus BX50 microscope equipped with 2X, 4X, 10X, 20X and 40X objectives and paired 10X eyepieces. The sampling field perimeter, outlined by a Zeiss grid integrated in the eyepiece, was measured using a stage micrometer, and the area determined. The cross-sections were read in a rectilinear fashion (Kimmel and Jee, 1983) and histological measurements recorded. Osteon population densities (OPD) and osteon areas were measured and used to calculate age estimations in the ribs and clavicles, as well as bone formation rates and activation frequencies in the ribs, using the methods developed by Stout and Paine (1992) and modified by Stout et al. (1996).

Osteon areas were measured in the rib and clavicle slides using the point count method outlined in Kimmel and Jee (1983). Polarized light was used, as needed, to help elucidate the cement lines of the osteons. For each sample, fifty osteon areas (twenty-five from each slide) were measured and recorded to ensure a representative sample. The mean osteon area was calculated for each rib sample and, with the OPD data, was used to derive individual activation frequencies and bone formation rates in cortical bone using a method suggested by Frost (1987) and applied by Stout and Lueck (1995).

The activation frequency and bone formation rate means were compared to three archaeological populations and a modern population from the literature (Stout and Lueck, 1995). Statistical differences between the populations were determined using an independent t-test (Sokal and Rohlf, 1995).

Activation frequencies and bone formation rates were not calculated for the clavicle samples. These calculations are not possible without an analysis of an independent cadaver sample, necessary for deriving the required formula, which has not been conducted at this time. The osteon areas were recorded for each clavicle slide to be used in future calculations.

Data Analysis

Measured osteon and osteon fragment counts and osteon area were utilized in a series of calculations to derive activation frequency and bone formation rates in the Franklin Point Cemetery sample. In the calculations, outlined in Stout and Lueck (Stout and Paine, 1992), the osteon and osteon fragment counts were summed (OPD) and added to the number of osteons missing due to subsequent remodeling to find the number of accumulated osteon creations (AOC). The actual number of missing osteons, or osteons that have been completely obliterated by continuous remodeling activity, is unknown, but can be estimated using an algorithm suggested by Frost (1987).

An asymptotic value for visible osteons (OPD) is reached when remodeled bone occupies the entire bone cortex. For example, if a given microscopic field contains evidence of 90 osteon creations, both complete and fragmentary, and no lamellar bone, any further remodeling would entirely remove evidence of a previous osteonal event. Therefore, the asymptote is 90 osteon creations. The number of missing osteons increases exponentially as the asymptote is approached. A scaling operator β, from the algorithm defining the exponential increase, was multiplied by the OPD to find the corresponding AOC.

In the equation for β, $\beta = (1 - \alpha^x)^{-1}$, x is 3.5 and α is "an OPD normalized to its predicted asymptote" (Stout and Lueck, 1995).

To find α: α = OPD (OPD asymptote)$^{-1}$, the OPD asymptote has to be found. The OPD asymptote is calculated using a value k, which is a packing factor that "accounts for the fact that a unit area of bone can actually contain more intact osteons and their fragments than predicted by a theoretical orthogonal distribution" (Stout and Lueck, 1995). The value for k is found using an independent sample of older individuals whose primary lamellar bone has been completely remodeled. A value for k has been calculated for the sixth rib (Stout and Lueck, 1995). [A value for k for the clavicle is currently being developed using data from an independent sample.]

The OPD asymptote is then found using the formula, OPD asymptote = $k((D_h)^2)^{-1}$, where D_h is the mean cross sectional diameter of the measured osteons. The mean cross sectional diameter can be found using the mean cross sectional area (A_h), which is measured istomorphometrically and inserted into the equation: $2\sqrt{A_h/\pi}$.

After the AOC is calculated the value is inserted into the equation for the net bone formation (${}_{net}V_{f,r,t}$), ${}_{net}V_{f,r,t}$ = AOC$\cdot$ A_h , which is the total bone formation that has occurred in the individual's lifetime (Stout and Lueck, 1995).

To calculate the mean activation frequency (μ_{rc}) in bone tissue, or the mean number of osteons created per mm^2 annually, the AOC is divided by the mean tissue age of the bone. Mean tissue age for an adult bone is the chronological age minus the age of adult compacta. The age of adult compacta is the chronological age at which natal bone has been completely remodeled, through growth and cortical drift, leaving tissue that consists only of remodeled bone and for the 6th rib has been determined to be 12.5 years of age. The OPD in bone tissue after the age of adult compacta represents osteon creations formed after the period of active cortical drift (Frost, 1987; Stout and Lueck, 1995).

The mean annual bone formation rate ($V_{f,r,t}$) is calculated by multiplying the mean activation frequency by the mean osteonal cross sectional area. The resulting value is the mean area of bone laid down per mm^2 annually.

Results

The histological age estimates calculated for the eight Franklin Point Cemetery burials are presented in the table below (see Table B1).

Rib and clavicle age estimates were calculated and, when both bones were available, a combined rib + clavicle formula was also used (Stout and Paine, 1992; Stout et al., 1996). The measured histological data from which the OPDs, activation frequencies, and bone formation rates were calculated are presented in **Appendix B1** (rib) and **Appendix B2** (clavicle). The calculated values for each step of the OPD, activation frequency, and bone formation rate determinations are presented in **Appendix B3** (rib) and **Appendix B4** (clavicle).

Activation frequencies and bone formation rates were calculated for those burials with an available rib, and are presented in the table below (see Table B2). The mean histomorphometric values and standard errors were calculated for the Franklin Point Cemetery sample for comparison to published values (Stout and Lueck, 1995).

Mean histomorphometric values for three archaeological populations and a modern sample (Stout and Lueck, 1995) were compared to the Franklin Point Cemetery sample means and the data presented in the table below (see Table B3). The gray shaded boxes are the published values which are statistically different ($t_{.05}$) from the Franklin Point Cemetery mean values.

Discussion and Conclusions

The estimated histological ages for the Franklin Point Cemetery sample are calculated from a regression formula developed by Stout and Paine (1992) and modified by Stout et al. (1996). Because an estimated histological age is a single point on a predictive line, only a single age estimate can be given as opposed to an age range. While it is possible to calculate 95% confidence intervals for a single predicted value, the statistical information necessary for the computations was not available for the regression formulas used. Single histological age estimates for the eight burials are given (see Table B1).

Of the three regression formulas developed for the rib and clavicle, the rib + clavicle combined age estimate has the highest standard error and yields the most representative age estimate for the Franklin Point Cemetery burials. The use of both the clavicle and rib also provides increased reliability and accuracy in age estimation (Stout and Paine, 1992). In burials where histological age estimates are calculated for the rib, clavicle, and the rib + clavicle the rib + clavicle age estimate should be used.

Table B1: Franklin Point Cemetery Histological Age Estimates

Burial	Rib	Clavicle	Rib + Clavicle	Histological Age
Burial 1	28.0			28.0
Burial 2	31.1	32.6	31.3	31.3
Burial 3		19.2		19.2
Burial 4	29.7	44.6	34.7	34.7
Burial 5	19.3	28.8	22.4	22.4
Burial 6	34.0	39.3	35.6	35.6
Burial 7	24.8	30.2	26.5	26.5
Burial 8		28.0		28.0

Table B2: Rib Histomorphometry

Burial #	OPD	Rib Age	Ah	Dh	AOC	Net $V_{f,r,t}$	Activation Frequency (#/mm^2/yr)	Bone Formation Rate (mm^2/mm^2/yr)
Burial 1	19.459	28.023	0.043	0.234	24.208	1.043	1.560	0.067
Burial 2	21.498	31.086	0.031	0.199	23.560	0.730	1.268	0.039
Burial 4	20.572	29.655	0.035	0.211	23.241	0.813	1.355	0.047
Burial 5	12.134	19.304	0.044	0.238	12.663	0.563	1.861	0.083
Burial 6	23.258	33.997	0.039	0.223	31.529	1.235	1.467	0.057
Burial 7	17.036	24.772	0.039	0.223	18.649	0.726	1.520	0.059
Mean	18.993	27.806	0.039	0.221	22.308	0.852	1.505	0.059
Standard Error	3.951	5.177	0.005	0.015	6.285	0.245	0.205	0.015

In individuals with both rib and clavicle bones available for study, the differences between rib and clavicle age estimates are minimal, with one exception, burial 4. There is a 15 year difference between the two age estimates. A possible explanation for this difference may be an increased activity level. Burial 4 experienced higher rates of specialized activity in the lower limbs relative to the other

Franklin Point Cemetery individuals, as indicated by the cross sectional geometry analysis (see the next section). The same may also have been true for burial 4's upper limbs. Repeated biomechanical stress on the upper limbs can result in higher activation frequencies and bone formation rates in the clavicle, relative to the rib, which experiences minimal biomechanical stress. A higher rate of bone remodeling in the clavicle can result in an inflated age estimate.

The activation frequency and bone formation rate means calculated from the available ribs (Burials 1, 2, and 4 - 7) were compared to published values for three archaeological populations and a modern cadaver sample (Stout and Lueck, 1995). The Franklin Point Cemetery sample was not statistically different from the other four samples in the majority of the parameters, with the exception of rib age, osteon area (Ledders), activation frequency, and bone formation rates (see Table B3). The Franklin Point Cemetery sample is most comparable to the Ledders population, having statistically similar activation frequency and bone formation rates, regardless of its statistically higher mean osteon area (and thereby osteon diameter). The activation frequency and bone formation rate of the burials were statistically lower than the modern sample and statistically higher than both the Gibson and Windover populations.

The lower bone remodeling rates in the archaeological populations, relative to the modern sample, is attributed to a later age of skeletal maturity (a higher age of adult compacta). Skeletal growth may have been delayed in these populations by mechanical loading, disease or nutritional stress. The three archaeological populations utilized different modes of subsistence; Gibson and Windover were intensive foragers and Ledders were harvest collectors and maize agriculturalist (Stout and Lueck, 1995). Each of these modes of subsistence is associated with different biomechanical and nutritional stresses. The Franklin Point Cemetery sample's similarity to the Ledders population indicates that the individuals may have been subjected to similar stresses, such as heavy lifting and carrying (Bridges, 1989). With little evidence of nutritional stress (see the Bone Density section), mechanical loading is the most likely cause for the delayed skeletal maturity and reduced bone remodeling, relative to the modern sample, in the Franklin Point Cemetery individuals.

Main Points

1. The histological age estimates for the Franklin Point Cemetery burials were:

Burial 1	28.0 years	**Burial 5**	22.4 years
Burial 2	31.3 years	**Burial 6**	35.6 years
Burial 3	19.2 years	**Burial 7**	26.5 years
Burial 4	34.7 years	**Burial 8**	28.0 years

2. Burial 4 has a 15 year difference between its rib histological age estimate and the clavicle histological age estimate. This discrepancy may be attributable to higher levels of biomechanical stress in the upper limbs, relative to the other 7 burials. The activation frequency and bone formation rates for burial 4's clavicle will need to be calculated at a future date to evaluate this hypothesis.

3. The activation frequency and bone formation rate means for the Franklin Point Cemetery sample indicate that the individuals were experiencing biomechanical stress levels on par with that found in an early agriculture population (Ledders). Franklin Point Cemetery individuals may have been subjected to higher levels of pulling, carrying and heavy lifting than modern populations.

Table B3: Franklin Point Cemetery Histomorphometry Comparisons

	Franklin Point Cemetery	Modern	Ledders	Gibson	Windover
Rib Age	27.8 ± 5.18	34.9 ± 3.09	32.5 ± 3.067	39.0 ± 2.76	40.4 ± 2.33
OPD	19.0 ± 3.95	19.2 ± .64	19.5 ± 1.04	17.1 ± .89	16.2 ± .71
Ah	.039 ± .005	.039 ± .001	.033 ± .0016	.035 ± .0013	.036 ± .001
Dh	.221 ± .015	.223 ± .004	.205 ± .003	.210 ± .004	.210 ± .003
AOC	22.3 ± 6.29	25.3 ± 1.47	22.7 ± 2.38	19.0 ± 2.03	18.6 ± 1.63
Net $V_{f,r,t}$	.852 ± .245	.950 ± .063	.753 ± .1019	.653 ± .0872	.677 ± .07
Mean Activation Frequency (#/mm^2/yr)	1.5 ± .21	2.3 ± .29	1.5 ± .47	1.1 ± .4	1.2 ± .32
Bone Formation Rate (mm^2/mm^2/yr)	.059 ± .015	.096 ± .0133	.05 ± .0214	.041 ± .0183	.044 ± .0146
Gray shading = Statistically different ($t_{.05}$) from Franklin Point Cemetery mean					

Cross-Sectional Geometry Analysis

Throughout life, biomechanical forces, such as gravity, resistance to movement, and muscle action, act on the skeletal system and change its shape. The femur, in particular, is subject to axial, bending, and torsional forces during normal movement (Ruff and Hayes, 1983a). Axial loading, force applied to the bone from either end, results in compressive stress, if the forces are directed toward the bone, and tensile stress, if they are directed away from the bone. To withstand and resist greater axial loading, the long bone cross-sectional area increases (Ruff, 2000). To evaluate the extent of axial loading on the Franklin Point Cemetery sample's long bones, the cortical bone cross-sectional area of their femurs was measured and compared to published values (Ruff and Hayes, 1983a).

The resistance to anterior-posterior bending forces, which create tensile stress on one side of the bone and simultaneous compressive stress on the opposite side, is evaluated by measuring the distribution of the bone cross-sectional area around the bending axis (Ruff and Hayes, 1983a). To determine resistance to bending forces, or bending rigidity, the maximum and minimum second moments of area (Imax and Imin), representing the greatest and least magnitudes of bending rigidity, respectively, are measured using the SLICE computer macro (written by Matthew Warfel from Cornell University and modified by Stanley Serafin from Johns Hopkins University – the macro is available on-line). The Imax/Imin ratio, an index that indicates the strength of directional bending rigidity, is then calculated from the measured values (Ruff and Hayes, 1983a). The further the index is from 1.0, the greater the bending rigidity of the long bone.

The polar moment of area, J, is the sum of Imax and Imin and indicates torsional rigidity. Torsional rigidity is resistance to twisting forces, and thereby sheering, in the long bone (Ruff and Hayes, 1983a). In the Franklin Point Cemetery sample, the bending rigidity index and the polar moment of area, in addition to the percent cortical area, were used to interpret biomechanical stresses in the femur.

Methods and Data Analysis

The cross-sectional geometry measurement procedures employed in this project are an abbreviated and simplified version of the procedures outlined in Ruff and Hayes (1983a). Each femur was placed on a piece of graph paper long enough to encompass the full length of the femur. The mid-point between the distal ends of the medial and lateral condyles was determined and marked on the graph paper. The femur was then propped up using clay until the shaft was level (determined using a level). The lowest point between the greater trochanter and the femoral neck was determined. The distance between this point and the mid-point between the distal ends was measured. This is the mechanical length of the femur. The mid-point of this distance was calculated and marked on the femur. Using a hacksaw, the femur was sectioned at the mechanical length midpoint and the dorsal, ventral, medial and lateral directions were marked on the sectioned femur to ensure proper orientation during analysis.

The newly sectioned ends of the proximal halves of the femurs were scanned on an Epson Perfection 1240U scanner at 1200 dpi with a plastic ruler beneath them for scale. The digital images were edited in Adobe Photoshop 5 to provide a matte background for the femur cross-section. Edited images were then analyzed using the PC version of NIH Image (Scion Image at http://www.scioncorp.com), which was Set Scale to the ruler imaged with each slide. The Density Slice option was used to highlight the bone tissue. Geometric properties of each cross-section were then determined using the SLICE macro. From the measured values, the Imax/Imin ratio, the polar moment of area (J), which is the sum of Imax and Imin, the adjusted polar moment of area (J*), which takes into account body proportion differences between populations, and percent cortical area ((cortical area/periosteal area) · 100) were calculated. Comparisons were made between the calculated Franklin Point Cemetery values and published values for the Pecos Pueblo skeletal sample (Ruff and Hayes, 1983a). Statistical differences between the two populations were determined using an independent t-test (Sokal and Rohlf, 1995).

Results

Because the destructive nature of the cross-sectional geometry analysis, gross anatomical measurements of the femurs were taken according to standard procedure prior to sectioning (Buikstra and Ubelaker, 1994). The results are listed below in Table B4. Sex estimations were made for each femur based on the gross anatomical measurements recorded (see Table B5). Previously published functions for determining sex based on femoral midshaft circumference (Black, 1978) and femoral head diameter (Stewart, 1979) were used.

Table B4: Gross Femur Measurements.

Measurement	Burial 1	Burial 2	Burial 3	Burial 4	Burial 5	Burial 6 left	Burial 6 right	Burial 7
Maximum Length	45.7	46.0	41.0	42.95	45.45	43.0	42.7	44.7
Bicondylar length	45.2	45.8	40.55	42.75	44.75	42.8	42.3	44.5
Epicondylar breadth	7.1	6.8	5.6	6.6	7.3	7.3	7.1	7.7
Maximum diameter of femur head	4.8	4.92	4.2	4.25	4.7	4.3	4.72	4.7

Table B4: Cont'd.:

Anterio-posterior subtrochanteric diameter	NP	2.9	2.5	2.45	2.85	2.6	2.3	2.35
Transverse subtrochanteric diameter	NP	3.05	2.7	2.65	3.12	3.0	2.95	2.85
Anterio-posterior diameter of femur at midshaft	2.7	2.7	2.5	2.5	2.8	2.62	2.4	2.7
Transverse diameter at midshaft	2.5	2.7	2.35	2.3	2.65	2.65	2.48	2.42
Circumference of the femur at midshaft	8.45	8.65	7.7	7.8	8.7	8.4	7.8	8.0
Mechanical length	42.8	42.0	37.8	39.5	42.0	40.6	40.1	41.4
**All measurements in cm*				*NP = Measurement not possible due to diagenesis*				

Table B5: Sex Determination.

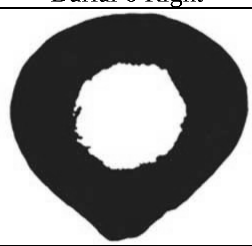
Measurement	Burial 1	Burial 2	Burial 3	Burial 4	Burial 5	Burial 6 left	Burial 6 right	Burial 7
Circumference of the femur at midshaft	M	M	F	F	M	M	F	F
Maximum diameter of femur head	M	M	F	F?	M?	Ideterm.	M?	M?
Sex	**M**	**M**	**F**	**F?**	**M**	**M**	**?**	**?**

The silhouettes of the scanned femoral midsections used in the cross-sectional geometry analysis are presented to the left of the measured and calculated values for each femur. The values for Ix (second moment of area about x axis) and Iy (second moment of area about y axis) are given in Table B6 below for possible future research.

Table B6: Cross-section geometric analysis.

Burial 1	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	530	400	75.5	22,693	19,629	1.156	42,322	21,980	20,342
Burial 2	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	525	391	74.5	23,140	17,436	1.327	40,575	19,422	21,153
Burial 3	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	394	292	74.1	13,636	11,476	1.188	25,112	13,221	11,891
Burial 4	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	454	345	76.0	18,884	12,755	1.481	31,639	17,818	13,821
Burial 5	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	548	437	79.8	24,820	21,956	1.130	46,776	24,469	22,307
Burial 6 Left	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy

Table B6: Cont'd.:

	550	439	79.8	24,581	22,463	1.094	47,044	24,579	22,465
Burial 6 Right	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	455	347	76.3	16,897	14,321	1.180	31,218	14,549	16,669
Burial 7	TA	CA	%CA	Imax	Imin	Imax/ Imin	J	Ix	Iy
	493	417	84.6	21,298	17,702	1.238	38,500	20,751	17,748

From the measured cross-sectional geometry values, I_{max}/I_{min} ratio, polar moment of area (J), adjusted polar moment of area (J*), and percent cortical area were calculated (Table B7). Because I_{max}/I_{min} and percent cortical area are ratios, there is less of a need to correct for body size when comparing populations. However, the polar moment of area must be corrected for body size by dividing J by the femoral length$^{5.33}$ and multiplying that by 10^{12} (Ruff et al., 1993), yielding the adjusted polar moment of area (J*). The mean of each of these values was found for the Franklin Point Cemetery data and compared to published values for the Pecos Pueblo sample, which has been analyzed extensively (Ruff and Hayes, 1983a; Ruff and Hayes, 1983b; Ruff et al., 1993). The Pecos Pueblos cross-sectional geometry values (with the exception of the adjusted polar moment of area, for which a standard error was unavailable) were statistically different ($t_{.05}$) from the Franklin Point Cemetery values.

Discussion and Conclusions

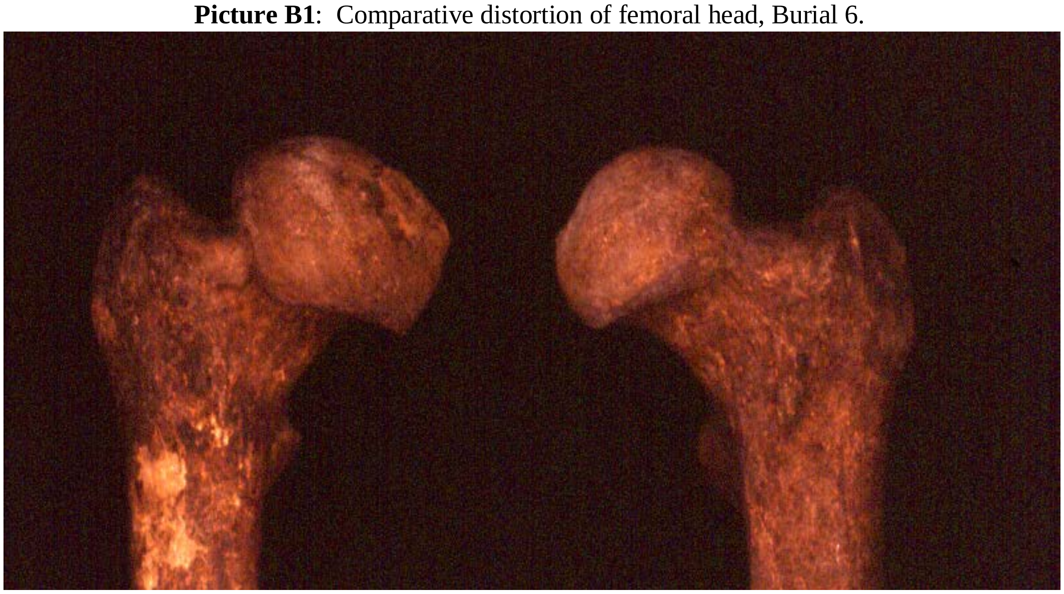
Based on gross anatomical measurements, Burials 1, 2, 5, and 6 were determined to be male and Burial 3 female. The questionable sex determinations made for Burials 4 and 7 (Table B5) should be used with caution. Diagenesis of the bone tissue may have distorted some of the anatomical markers on the femurs. Youth and race may also be factors in conflicting sex estimation. Where possible, sex determinations should be made using all available skeletal material and, in the case of conflicting results, the investigator should defer to the determination made using more complete bones.

Table B7: Calculated Cross-Sectional Geometry Values.

Burial #	I_{max}/I_{min}	$J = I_{max} + I_{min}$	J*	% Cortical Area
Burial 1	1.16	42,322	281.3	75.5
Burial 2	1.33	40,575	260.5	74.5
Burial 3	1.19	25,112	297.7	74.1
Burial 4	1.48	31,639	292.8	76.0
Burial 5	1.13	46,776	320.2	79.8
Burial 6 (left)	1.09	47,044	432.6	79.8
Burial 6 (right)	1.18	31,218	298.0	76.3
Burial 7	1.24	38,500	288.0	84.6
Franklin Point Cemetery Mean	1.22	37,898	308.9	77.6
Standard Error	0.13	7,900	53	3.6
Pecos Pueblo Mean	1.38	31,598	370.2	71.3
Standard Error	0.02	805	NA	0.4

The indeterminate sex estimation for the right femur of Burial 6 is believed to be a result of its pathological condition. Distortion of the femoral head (see Picture B1) and the probable subsequent shift in the individual's gait would have altered the structure of the femur, affecting the sex estimation. Sexing of Burial 6 should be performed using the remaining skeletal material.

Picture B1: Comparative distortion of femoral head, Burial 6.



The cross-sectional geometry calculations for the Franklin Point Cemetery individuals (Table B7) yielded a lower I_{max}/I_{min} ratio mean (1.22) than that reported for the Pecos Pueblo individuals (1.38). The further I_{max}/I_{min} ratio values are from 1.0 the greater the anterior-posterior bending stresses exerted on the long bone (Ruff and Hayes, 1983a). Habitual running is one activity associated with higher I_{max}/I_{min} ratios. Repeated anterior-posterior bending stresses in a runner's long bones result in increased bending rigidity for support. Walking, on the other hand, is associated with more cylindrical long bone shafts (Ruff and Hayes, 1983b). Pecos Pueblo, an early agriculture site in New Mexico (occupied from 1300 to 1828 AD) was a mountainous area bordered by plains (Ruff, 2000). Individuals frequently engaged in long distance running and walking over rough terrain (Ruff and Hayes, 1983b). Relative to the Pecos Pueblo sample (Ruff and Hayes, 1983a), the Franklin Point Cemetery individuals were subjected to fewer anterior-posterior bending stresses. It should be noted, however, that burial 4 has a much higher index of bending rigidity, indicating, perhaps, that this individual was subjected to different biomechanical requirements than the other individuals.

The mean adjusted polar moments of area (J*) calculated for the Franklin Point Cemetery sample (mean J* = 308.9) indicate a lower torsional rigidity than found in the Pecos Pueblo sample (mean J* = 370.2) (Ruff and Hayes, 1983a). As with the higher I_{max}/I_{min} ratio, higher torsional rigidity is associated with individuals from more mountainous regions (Ruff, 2000). Increased torsional stress is the result of trying to maintain balance on such rough terrain. The adjusted polar moments of area calculated for the Franklin Point Cemetery individuals indicate that they were not exposed to high torsional stresses, relative to Pecos Pueblo.

The mean percent cortical area calculated for the Franklin Point Cemetery individuals was higher (77.6%) than that reported for the Pecos Pueblo sample (71.3%) (Ruff and Hayes, 1983a). A higher percent cortical area yields a more robust long bone, able to withstand more axial loading and strenuous activity (Ruff and Hayes, 1983a). The agricultural subsistence practiced by Pecos Pueblo individuals is regarded as a demanding lifestyle, yet Franklin Point Cemetery individuals engaged in even more strenuous activity. The lower levels of bending and torsional stress, coupled with the higher level of compressive stress, suggest that the Franklin Point Cemetery individuals were performing tasks that involved weight bearing activity, such as pushing or transporting heavy objects. Particular attention should be paid to Burial 7. This burial exhibits marked robustness in the femoral diaphyses (%CA = 84.6%), indicating, perhaps, higher levels of weight bearing activity than the other Franklin Point Cemetery individuals.

Finally, the unique nature of Burial 6 should be addressed. As discussed previously, a pathological condition in the right femoral joint affected the shape of the right femoral head and diaphyses. Comparisons of the cross-sectional geometry measurements between the left and right femurs indicate that the pathological femur was subjected to lower torsional (J* = 298.0) and compressive stresses (%CA = 7.3) and higher bending stress (ratio = 1.18). The left (non-pathological) femur, in turn, was subjected to lower bending stress (ratio = 1.09) and higher torsional (J* = 432.6) and compressive stresses (%CA = 79.8). Most notable is the substantial torsional rigidity (resistance to torsional stress) in the left femur, which is markedly higher than even the reported mean for the Pecos Pueblo population. These measurements indicate that the movement of the right femur was restricted. The individual probably used his left femur as a pivot, shifting his weight to his left side and twisting his entire body for placement of the right leg. His gait would have been significantly altered by this pathology.

Main Points

1) Overall, Franklin Point Cemetery individuals did not engage in much long distance running or walking over rough terrain. The calculated Imax/Imin ratio mean and mean adjusted polar moments of area (J*) indicate exposure to lower bending and torsional stresses, relative to Pecos Pueblo.

2) Burial 4's Imax/Imin ratio values exceed those found for the remaining burials and may be indicative of performing specialized tasks that involved running or rough terrain negotiation.

3) Percent cortical area measurements indicate that the Franklin Point Cemetery individuals engaged in more strenuous weight bearing activities, such as pushing or transporting heavy objects, relative to the Pecos Pueblos sample.

4) Burial 7 had a more robust femur (%CA = 84.6%), possibly indicating a higher level of strenuous activity than the other Franklin Point Cemetery individuals.

5) Comparisons between the cross-sectional geometry of Burial 6's left and right femurs indicate that the pathological condition in the right femoral joint altered his gait significantly. The individual would have had increased reliance on the more mobile left leg.

Bone Density Analysis

Bone tissue is accumulated from birth until approximately 18 years of age, at which point the skeleton has attained 95% of its total peak bone mass. The remaining 5% of the skeletal peak bone mass is acquired from age 18 to 25-30 years of age (Marcus, 1996). Once bone growth ceases, an individuals' bone mass is stable for a couple of years, but subsequently begins to decline with age (Parfitt, 1997). In clinical research, using necropsy samples and bone biopsies from volunteers, individual total bone mass for decade-grouped age categories has been determined for modern populations (Martin et al., 1998). Significant deviations from these age-associated total bone mass values are regarded as pathological and may be indices of nutritional deficiencies or disease.

Dietary deficiencies can deprive the skeleton of the basic materials needed for bone formation and maintenance. A deficiency of dietary calcium, for example, will lower blood calcium levels. To compensate, calcium will be pulled from the skeleton and released in the bloodstream, reducing the total bone mass of the skeleton (Marcus, 1996). Similarly, chronic disease can diminish skeletal tissue. Hyperthyroidism, for instance, increases bone remodeling, resulting in increased porosity in cortical bone and increased perforation in trabecular bone (Melson et al., 1983). The overall affect is a decrease in total bone mass with time.

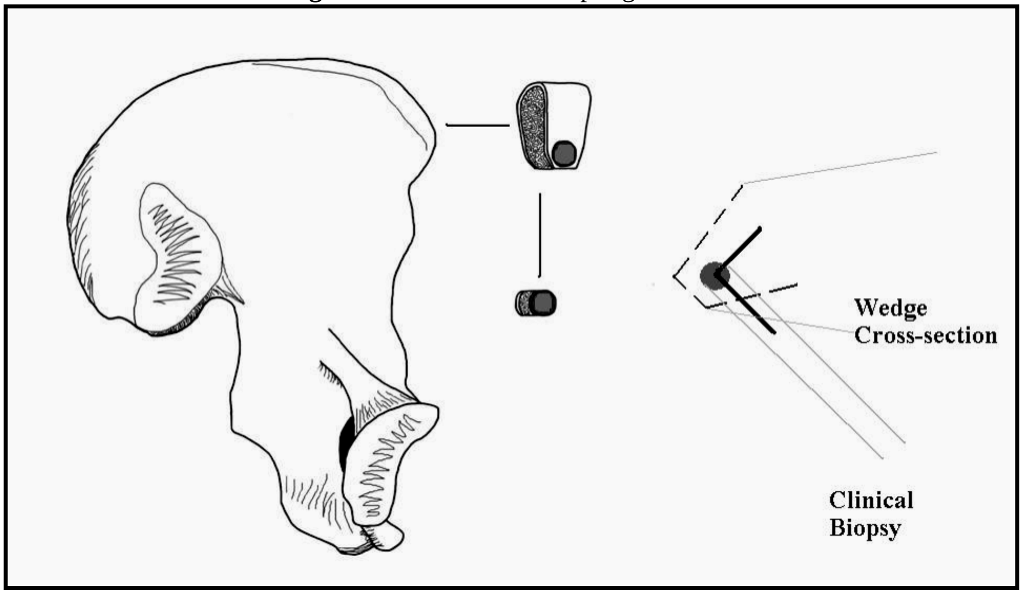
To detect the presence of disease or nutritional deficiencies in the Franklin Point Cemetery sample, the bone mass levels of three individuals (Burials 1, 6, and 7) were measured. Bone mass is clinically determined by histomorphometrically analyzing transiliac crest core biopsies (Rao, 1983). To compare the bone mass data from the Franklin Point Cemetery individuals, sampling and histomorphometric measurements were taken from the same region as the clinical samples. The results of the bone mass analysis were compared to published clinical data (Schnitzler et al., 1990).

Methods and Data Analysis

Trans iliac crest wedges were sectioned from each of the three iliac crests. The sectioned area included the standard clinical site for bone biopsy, 2 cm behind the anterior superior iliac spine and 2 cm below the iliac crest, the center of what is called Bourdier's triangle. In clinical biopsies, an 8 mm diameter core is removed, including both inner and outer cortices (Recker, 1994). Because of the friable nature of the Franklin Point Cemetery remains, an entire cross section, not just a core, was removed and embedded (see Figure B3).

The iliac crest wedges were embedded and thick-sectioned in the same manner as the rib and clavicle sections (as described in the Histomorphometric Analysis section). The cover slipped slides were scanned in the same manner as the femur cross-sections (as described in the Cross-Sectional Geometry Analysis section). The only portion of the iliac crest wedge analyzed was the region corresponding to the 8 mm diameter biopsy core. The digital images were edited in Adobe Photoshop 5 to remove any debris or discoloration and then converted to grayscale. Edited images were then analyzed using NIH Image, which was Set Scale to the ruler imaged with each slide.

Figure B3: Iliac Crest sampling location.



Histomorphometric measurements of trabecular and cortical bone area were taken. To measure area, the Density Slice option was used to highlight the bone tissue. The threshold bar was adjusted to only fill in bone tissue and omit any debris missed during editing. The Measure command in the Analyze menu provided the total area (in mm2) of bone tissue. Using the erase bar, the cancellous bone was then removed from each image and Measure was used to provide the cortical bone area. Subtracting the cortical bone area from the total bone area yielded the cancellous bone area. The cortical bone area was also subtracted from the core area, yielding the medullary area. To calculate the trabecular bone volume, the trabecular bone area is divided by the medullary area and multiplied by 100 (Vigorita, 1984). Trabecular bone volume, or bone volume (BV/TV), is a bone measurement used in bone pathology and bone histology to assess bone deficiencies (Parfitt, 1988). The bone volumes measured in the Franklin Point Cemetery sample were compared to clinical values provided in the literature (Schnitzler et al., 1990).

Results

The measured and derived values for the Franklin Point Cemetery iliac crests are presented in Table B8 below, accompanied by the silhouette of the iliac crest core used in the analysis.

Discussion and Conclusions

The bone volumes calculated for the Franklin Point Cemetery sample range from 35.10% – 38.46%. These values represent the percentage of the medullary space occupied by trabecular bone. Clinical values of bone volume for normal (non-pathological) individuals are categorized by decade age groups and, in Schnitzler et al. (1990), by race and sex (see Table B9). Each of the burial bone volumes was compared to the clinical bone volume in their respective age category, for both black and white, since race was unknown to this researcher, and both male and female for burial 7, which was of indeterminate sex.

Table B8: Trans iliac crest wedge sectioning results.

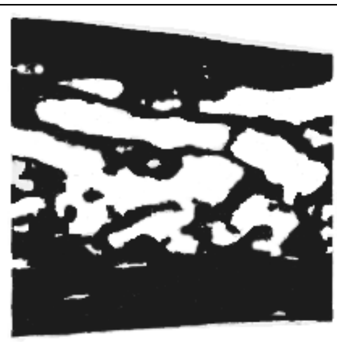
Burial 1, Left Iliac Crest	BV/TV %	Core Area (mm^2)	Total Bone Area (mm^2)	Cortical Bone Area (mm^2)	Trabercular Bone Area (mm^2)
	35.10	63.88	34.82	19.10	15.72
Burial 6, Left Iliac Crest	BV/TV %	Core Area (mm^2)	Total Bone Area (mm^2)	Cortical Bone Area (mm^2)	Trabercular Bone Area (mm^2)
	37.51	53.22	37.18	27.55	9.63
Burial 7, Left Iliac Crest	BV/TV %	Core Area (mm^2)	Total Bone Area (mm^2)	Cortical Bone Area (mm^2)	Trabercular Bone Area (mm^2)
	38.46	69.02	47.16	33.50	13.66

Table B9: Bone volume values (Schnitzler et al., 1990).

Sex	Race	Age 21-30	Age 31-40
Male	Black	22.7 ± 6.4	21.7 ± 6.6
Male	White	18.2 ± 7.0	17.8 ± 6.0
Female	Black	22.1 ± 8.0	18.9 ± 5.5
Female	White	20.2 ± 7.1	18.6 ± 5.9

The Franklin Point Cemetery bone volumes exceed the bone volumes published in Schnitzler et al. (1990) and indicate that the burial skeletons were not affected by either disease or significant nutritional deficiencies. However, the bone volume values for the Franklin Point Cemetery sample are nearly double what is considered normal bone volume (approximately 20%) (Vigorita, 1984). One possible explanation for this difference is section thickness. Archaeological sections, because of their friable nature, are cut thicker (~10 – 20 µm) than clinical sections (~5 – 8 µm). The thicker sections may allow more trabecular bone tissue to be more visible than the thinner sections. Even with consideration to the possible increase in trabecular bone tissue due to sectioning, the Franklin Point Cemetery sample bone volumes are sufficient to be regarded as non-pathological.

Main Point

1) The Franklin Point Cemetery sample bone volumes (BV/TV) indicate that the burial skeletons were not adversely affected by either disease or significant nutritional deficiencies.

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Appendix B1: Measured Rib Histomorphometry

Burial #	Section	Total Hits	Total Fields	Intacts	Frags.	Total Osteon Hits	Number of Osteons	Mean Osteon Hits
Burial 1	L. Rib # 1	9737	123	272	147	466	25	18.64
	L. Rib # 3	10414	131	272	156	536	25	21.44
Burial 1	R. Rib # 4	5011	62	145	79	452	25	18.08
	R. Rib # 5	5089	63	153	104	416	25	16.64
Burial 2	Rib # 1	3541	46	122	66	325	25	13.00
	Rib # 4	4677	67	139	76	347	25	13.88
Burial 4	Rib # 2	3900	50	115	73	349	25	13.96
	Rib # 3	3928	54	107	76	410	25	16.4
Burial 5	L. Rib # 2	3569	62	70	29	429	23	18.65
	L. Rib # 3	3832	62	83	46	463	27	17.15
Burial 5	R. Rib # 2	4381	64	78	29	494	25	19.76
	R. Rib # 3	4577	65	80	39	539	25	21.56
Burial 6	L. Rib # 2	4277	62	168	55	472	25	18.88
	L. Rib # 3	4271	65	169	57	401	25	16.04
Burial 6	R. Rib # 2	2600	43	99	35	428	25	17.12
	R. Rib # 4	2355	40	99	37	399	25	15.96
Burial 7	Rib # 2	1339	15	42	8	379	23	16.48
	Rib # 3	1403	16	44	14	458	27	16.96
Burial 7	R. Rib # 2	3065	35	90	32	532	30	17.73
	R. Rib # 3	2778	32	75	32	329	20	16.45

Appendix B2: Measured Clavicle Histomorphometry

Burial #	Section	Total Hits	Total Fields	Intacts	Frags.	Total Osteon Hits	Number of Osteons	Mean Osteon Hits
Burial 2	L. Clav. # 2	13130	150	312	235	381	25	15.24
	L. Clav. # 3	13080	155	312	281	418	25	16.72
Burial 2	R. Clav. # 2	7218	87	156	85	362	25	14.48
	R. Clav. # 3	7350	89	163	108	381	25	15.24
Burial 3	L. Clav. # 1	8673	102	135	78	466	25	18.64
	L. Clav. # 3	8454	95	146	68	435	25	17.4
Burial 4	L. Clav. # 2	6927	83	173	167	347	25	13.88
	L. Clav. # 3	6534	78	147	157	363	25	14.52
Burial 5	L. Clav. # 1	12238	144	251	193	532	25	21.28
	L. Clav. # 3	11937	136	265	198	546	25	21.84
Burial 5	R. Clav. # 2	10934	133	184	181	492	25	19.68

Appendix B2: Cont'd.

Burial #	**Section**	**Total Hits**	**Total Fields**	**Intacts**	**Frags.**	**Total Osteon Hits**	**Number of Osteons**	**Mean Osteon Hits**
	R. Clav. # 3	10907	132	218	165	572	27	21.18
Burial 6	L. Clav. # 2	11403	139	372	158	552	25	22.08
	L. Clav. # 3	11661	141	344	152	486	25	19.44
Burial 6	R. Clav. # 2	8554	118	239	142	647	25	25.88
	R. Clav. # 3	8778	102	242	145	599	25	23.96
Burial 7	L. Clav. # 2	5092	60	120	67	364	25	14.56
	L. Clav. # 4	5153	63	126	68	422	25	16.88
Burial 7	R. Clav. # 1	4629	50	114	57	507	25	20.28
	R. Clav. # 2	4686	51	116	60	422	25	16.88
Burial 8	L. Clav. # 2	15972	190	338	214	665	25	26.60
	L. Clav. # 5	15642	180	346	215	610	25	24.4

Appendix B3: Rib Histomorphometry calculations

Burial	**Section**	**Total Hits**	**Total Field**	**Poss. Hits**	**Possible Area**	**Actual Area**	**Intac**	**Frags**	**OPD**	**Combined OPD**
B1	L. Rib # 1	9737	123	12300	28.3392	22.434048	272	147	18.67696815	
	L. Rib # 3	10414	131	13100	30.1824	23.993856	272	156	17.83789984	
B1	R. Rib # 4	5011	62	6200	14.2848	11.545344	145	79	19.40176057	
	R. Rib # 5	5089	63	6300	14.5152	11.725056	153	104	21.91887186	19.4588751
B2	Rib # 1	3541	46	4600	10.5984	8.158464	122	66	23.0435533	
	Rib # 4	4677	67	6700	15.4368	10.775808	139	76	19.95210011	21.4978267
B4	Rib # 2	3900	50	5000	11.52	8.9856	115	73	20.92236467	
	Rib # 3	3928	54	5400	12.4416	9.050112	107	76	20.22074423	20.57155445
B5	L. Rib # 2	3569	62	6200	14.2848	8.222976	70	29	12.03943682	
	L. Rib # 3	3832	62	6200	14.2848	8.828928	83	46	14.61106037	
B5	R. Rib # 2	4381	64	6400	14.7456	10.093824	78	29	10.60054148	
	R. Rib # 3	4577	65	6500	14.976	10.545408	80	39	11.28453257	12.13389281
B6	L. Rib # 2	4277	62	6200	14.2848	9.854208	168	55	22.62992622	
	L. Rib # 3	4271	65	6500	14.976	9.840384	169	57	22.96658342	
B6	R. Rib # 2	2600	43	4300	9.9072	5.9904	99	35	22.36912393	
	R. Rib # 4	2355	40	4000	9.216	5.42592	99	37	25.06487379	23.25762684
B7	Rib # 2	1339	15	1500	3.456	3.085056	42	8	16.20716123	
	Rib # 3	1403	16	1600	3.6864	3.232512	44	14	17.94270215	
B7	R. Rib # 2	3065	35	3500	8.064	7.06176	90	32	17.27614646	
	R. Rib # 3	2778	32	3200	7.3728	6.400512	75	32	16.71741261	17.03585561

Appendix B3: Cont'd. (Rib Histomorphometry Calculations)

Burial #	Log Rib Age	Rib Age	Total Osteon Hits	Number of Osteons	Mean Osteon Hits	Combined Mean Osteon Hits	Mean Ah	Dh	DhSquared
			466	25	18.64				
			536	25	21.44				
			452	25	18.08				
Burial 1	3.333009189	28.0225404	416	25	16.64	18.7	0.04308	0.2342168	0.05486
			325	25	13.00				
Burial 2	3.436744929	31.0856066	347	25	13.88	13.44	0.03097	0.1985627	0.03943
			349	25	13.96				
Burial 4	3.389618976	29.6546517	410	25	16.4	15.18	0.03497	0.211025	0.04453
			429	23	18.65				
			463	27	17.15				
			494	25	19.76				
Burial 5	2.960336064	19.3044589	539	25	21.56	19.28	0.04442	0.2378205	0.05656
			472	25	18.88				
			401	25	16.04				
			428	25	17.12				
Burial 6	3.526278281	33.9972045	399	25	15.96	17.0	0.03917	0.2233165	0.04987
			379	23	16.48				
			458	27	16.96				
			532	30	17.73				
Burial 7	3.209733226	24.7724761	329	20	16.45	16.905	0.03895	0.2226913	0.04959

Appendix B3 cont'd.: (Rib Histomorphometry Calculations)

Burial #	OPD Asymptote	Alpha		Beta	AOC	Net Vfrt	Mean Activation Frequency (#/mm^2/yr)	Bone Formation Rate (mm^2/mm^2/yr)
Burial 1	30.9893763	0.62792	0.80381	1.24407	24.2082	1.043	1.560	0.067
Burial 2	43.117501	0.49859	0.91248	1.09591	23.5597	0.730	1.268	0.039
Burial 4	38.1751809	0.53887	0.88513	1.12978	23.2412	0.813	1.355	0.047
Burial 5	30.0573263	0.40369	0.9582	1.04362	12.6632	0.563	1.861	0.083
Burial 6	34.0884533	0.68227	0.73767	1.35563	31.5286	1.235	1.467	0.057
Burial 7	34.2801268	0.49696	0.91348	1.09472	18.6494	0.726	1.520	0.059

Appendix B4: Clavicle Histomorphometry Calculations.

Burial #	Section	Total Hits	Total Fields	Poss. Hits	Possible Area	Actual Area	Intacts	Frags.
Burial 2	L. Clav. # 2	13130	150	15000	34.56	30.25152	312	235
	L. Clav. # 3	13080	155	15500	35.712	30.13632	312	281
Burial 2	R. Clav. # 2	7218	87	8700	20.0448	16.630272	156	85
	R. Clav. # 3	7350	89	8900	20.5056	16.9344	163	108
Burial 3	L. Clav. # 1	8673	102	10200	23.5008	19.982592	135	78
	L. Clav. # 3	8454	95	9500	21.888	19.478016	146	68
Burial 4	L. Clav. # 2	6927	83	8300	19.1232	15.959808	173	167
	L. Clav. # 3	6534	78	7800	17.9712	15.054336	147	157
Burial 5	L. Clav. # 1	12238	144	14400	33.1776	28.196352	251	193
	L. Clav. # 3	11937	136	13600	31.3344	27.502848	265	198
Burial 5	R. Clav. # 2	10934	133	13300	30.6432	25.191936	184	181
	R. Clav. # 3	10907	132	13200	30.4128	25.129728	218	165
Burial 6	L. Clav. # 2	11403	139	13900	32.0256	26.272512	372	158
	L. Clav. # 3	11661	141	14100	32.4864	26.866944	344	152
Burial 6	R. Clav. # 2	8554	118	11800	27.1872	19.708416	239	142
	R. Clav. # 3	8778	102	10200	23.5008	20.224512	242	145
Burial 7	L. Clav. # 2	5092	60	6000	13.824	11.731968	120	67
	L. Clav. # 4	5153	63	6300	14.5152	11.872512	126	68
Burial 7	R. Clav. # 1	4629	50	5000	11.52	10.665216	114	57
	R. Clav. # 2	4686	51	5100	11.7504	10.796544	116	60
Burial 8	L. Clav. # 2	15972	190	19000	43.776	36.799488	338	214
	L. Clav. # 5	15642	180	18000	41.472	36.039168	346	215

Appendix B4 Cont'd.: (Clavicle Histomorphometry Calculations)

Burial #	OPD	Combined OPD	Log Clavicle Age	Clavicle Age	Total Osteon Hits	Number of Osteons	Mean Osteon Hits
Burial 2	18.08173606				381	25	15.24
	19.67725323				418	25	16.72
Burial 2	14.49164512				362	25	14.48
	16.00292895	17.06339084	3.483388221	32.5698886	381	25	15.24
Burial 3	10.65927784				466	25	18.64
	10.98674526	10.82301155	2.952955982	19.1625145	435	25	17.4
Burial 4	21.30351443				347	25	13.88
	20.19351767	20.74851605	3.796623864	44.5505233	363	25	14.52
Burial 5	15.74671787				532	25	21.28
	16.83462018				546	25	21.84
Burial 5	14.48876339				492	25	19.68
	15.24091307	15.57775363	3.357109058	28.7060844	572	27	21.18
Burial 6	20.17317568				552	25	22.08
	18.46134789				486	25	19.44
Burial 6	19.3318428				647	25	25.88
	19.13519594	19.27539058	3.671408199	39.3072193	599	25	23.96
Burial 7	15.93935476				364	25	14.56
	16.34026565				422	25	16.88
Burial 7	16.03343055				507	25	20.28
	16.30151278	16.15364093	3.406059479	30.1462187	422	25	16.88
Burial 8	15.0002087				665	25	26.60
	15.56639709	15.2833029	3.332080746	27.9965335	610	25	24.4

APPENDIX C

Stable Isotope Analysis of Human Bone Collagen and Tooth Enamel Apatite (Kennedy and Newsome 2002).

Appendix C

Stable Isotope Analyses of Human Bone Collagen and Tooth Enamel Apatite.

By Michael A. Kennedy University of California Davis Department of Anthropology Davis.
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(October 12, 2002)

This section presents the results of stable isotope analyses conducted on human remains from eight burials recovered at Franklin Point Cemetery (CA-SMA-207/H), and was done in order to evaluate each individual's diet and place of origin using the record of stable isotopes in their bone collagen and tooth enamel apatite.

We evaluated carbon and nitrogen isotope ratios using bone collagen to determine the relative contribution of marine and terrestrial foods to their adult diet. In addition, carbon isotope ratios in tooth enamel apatite were used to investigate aspects of each individual's childhood diet. Stable oxygen isotope ratios in tooth enamel apatite were used to determine each individual's latitude of origin.

Background

Each chemical element exists in multiple forms called isotopes. Isotopes of a given element have the same number of protons in their nuclei but differ in the number of neutrons and thus differ in mass (Hoefs 1987). For example, carbon has three isotopes that differ in mass, the naturally abundant stable ^{12}C and ^{13}C forms, and the rare unstable ^{14}C form that decays over time. The ratios of these isotopes in organic materials, such as bone or shell, can be measured using a mass spectrometer to gain information on an organism's diet, its migration behavior, or about the environment in which it lived.

Isotopic Fractionation

The elemental isotopes in compounds react at different rates depending on their mass. Differences in reaction rates can lead to a phenomenon called isotope fractionation (Hoefs 1987). The magnitude of this fractionation effect is more pronounced with the lighter isotope of a given element. For example, ^{12}C breaks more easily than ^{13}C during the transfer of carbon from the ocean surface to the atmosphere (Schoeninger and Moore 1992). Consequently, the atmosphere is depleted in ^{13}C relative to the surface oceans. Therefore, isotopic fractionation occurs when the isotope ratios of the products differ from the ratios of the parent material (DeNiro 1987).

The majority of isotopic fractionation that occurs in organisms is relatively small. Since we are concerned with measuring small changes, isotope ratios are measured relative to an arbitrary standard. The accepted unit of isotopic ratio measurement is the delta-value (8), expressed in parts per thousand or per mil (%o). The conversion into delta notation is expressed as (Hoefs 1987):

$$[(R_{(sample)} - R_{(standard)}) \ / \ R_{(standard)}] \times 1000‰$$

Carbon Isotopes

Importantly, different elemental species have different reaction rates, and different organisms, plant or animal, have characteristic stable isotope signatures. In dietary studies, stable carbon isotopes are most commonly used. Since few reactions determine the distribution of carbon isotopes in different food sources, foods can be grouped into a small number of isotopically distinct groups (DeNiro and Epstein 1978; DeNiro and Epstein 1981; Schoeninger and DeNiro 1984).

For example, terrestrial plants can be separated into three distinct groups based on the $\delta^{13}C$ isotope values of their tissue. Plants have a C3, C4 or CAM isotope signature depending on the photosynthetic pathway they use to fix atmospheric $C0_2$ (Bender1968). C3 plants have $O^{13}C$ values around -26% o and range between -34% o to -20% o (Deines 1980; Schoeninger and Moore 1992). C3 plants that serve as potential food sources include all trees and shrubs, temperate grasses, wheat, rice, beans, tubers, nuts, and fruit. C4 plant food sources, such as the tropical grasses, maize, sugar cane, sorghum, and millet, have $\delta^{13}C$ isotope values of approximately -13% o and range between -16% o and -9%o (Deines 1980; Schoeninger and Moore 1992). Therefore, an approximately 13% o difference exists between C3 and C4 plants. Since the difference between C3 and C4 plants is a bimodal distribution, the relative amount of C3 versus C4 food sources in an organisms diet can be estimated. CAM plants, such as cacti and succulents, have isotopic compositions that cover the range between C3 and C4 plants depending on environmental conditions (Deines 1980).

A similar technique can be used to determine the relative contribution of marine and terrestrial foods in an organism's diet. Isotopic values of consumers are determined by the isotope values of the primary producer at the base of the food chain and the reservoir of $C0_2$ used by that fixer during photosynthesis. Whereas terrestrial primary producers such as plants use atmospheric $C0_2$, marine primary producers use bicarbonate dissolved in seawater. The $\delta^{13}C$ of these two sources differs by approximately 8.5%0 (DeNiro and Epstein 1978; Rau 1983), with dissolved bicarbonate having heavier (more positive) $\delta^{13}C$ values than atmospheric $C0_2$ (Emrich et al. 1970). This difference is also present at the top of the food chain; such that a terrestrial top consumer has a $\delta^{13}C$ value between -22% o and -20% o while a marine top consumer has a $\delta^{13}C$ value between -12% o and -10% o (DeNiro 1987). These $\delta^{13}C$ differences also exist between trophic levels within food chains such that the $\delta^{13}C$ value increases by around 1.0% o with each trophic level increase when comparing the same type of tissue.

Perhaps the most common human tissue used in stable carbon (and nitrogen) isotope analyses is bone, since other organic remains, such as skin and hair, typically do not preserve in the fossil record. Approximately 30% of bone, by weight, is organic and primarily consists of collagen, a protein matrix that gives it flexibility. The other 70% of bone consists of an inorganic mineral matrix of carbonated hydroxyapatite, a compound composed of calcium and phosphorous that gives bones their rigidity. Stable carbon isotopes can also be rendered from bone carbonate and other biological apatites, such as tooth enamel, to evaluate diet since the mineral $^{13}C/^{12}C$ ratios also reflect ingested food sources (see Krueger and Sullivan 1984; Lee-Thorp and van der Merwe 1991; Sullivan and Krueger 1981; Wright and Schwarcz 1998). Carbon isotope ratios gleaned from mineral sources are expressed relative to the universal standard PDB (Pee Dee Belemnite) as a $8^{13}C$ value. Carbon used to manufacture bone collagen is derived from dietary proteins, whereas carbon incorporated into bone mineral represents the bulk average of all dietary macronutrients (Ambrose and Norr 1993; Tieszen and Fagre 1993).

Nitrogen Isotopes

Stable nitrogen isotopes work in a similar fashion, with $^{15}N/\ ^{14}N$ ratios of a sample expressed relative to the universal standard AIR (Ambient Inhalable Reservoir) as a $8^{15}N$ value. Like carbon isotopes, nitrogen isotopes reflect diet since there are distinct isotopic differences between plants that live in oceanic, freshwater aquatic or terrestrial ecosystems (Keegan 1989). In addition, nitrogen isotopes also reflect trophic levels within food chains (see DeNiro and Epstein 1981; Minagawa and Wada 1984; Schoeninger and DeNiro 1984; Schoeninger et al. 1983; Sealy et al. 1987). There is an enrichment of -3.0% o in $8^{15}N$ as nitrogen passes from producer to consumer or from one trophic level to the next. Since inherent differences exist between the nitrogen and carbon isotope compositions of food sources, it is possible to use both $8^{15}N$ and $8^{13}C$ values to distinguish the relative proportion of marine versus terrestrial food protein in the diets of past and present humans.

What accounts for the difference between the various isotopic values of primary producers and those of top consumers in a given food web is isotopic fractionation. Organisms are complex biochemical machines, run by a multitude of reactions involving thousands of compounds. When one compound gets converted into another, via metabolic pathways, there is a good chance isotopes will be fractionated during that process. Research has established appropriate fractionation factors, or the change in isotope value of product to reactant or from producer to consumer, so that we can estimate, without observation, who is consuming whom in a food web.

Oxygen Isotopes

In order to determine stable oxygen isotope ratios for a given species, a biological apatite with a mineral substrate such as tooth enamel is used since organic materials do not contain a lot of oxygen. Oxygen isotopes are expressed as the ratio of ^{18}O /^{16}O isotopes in a sample relative to the universal standard SMOW (Standard Mean Ocean Water) and are denoted as a $\delta^{18}O$ value. Research has shown that $\delta^{18}O$ values of animal tooth enamel apatite can be converted to body water $\delta^{18}O$ values using a simple fractionation factor (Luz and Kolodny 1989). Body water $\delta^{18}O$ values are largely controlled by the isotope composition of local meteoric precipitation and relative humidity, which varies with latitude and altitude due to Rayleigh distillation in the global rainfall cycle (Dansgaard 1964). Therefore, $\delta^{18}O$ values differ from region to region depending on local meteoric conditions, and can be used to trace the source of ingested drinking water in animals since their body tissues reflect the origin of water consumed as liquid (Wright and Schwarcz 1998).

For example, $\delta^{18}O$ values of meteoric water at the equator are around 0%o, and decrease with increasing latitude and altitude (Dansgaard 1964; Lawrence and White 1991). These values change from season to season, depending on the degree of temperature change throughout the year. For instance, $\delta^{18}O$ values between -6% o and -2%o are typical of precipitation in the northeast United States during the summer months, while values of -12% o to -6% o are common during the winter months. A similar effect is present in Western Europe, where values vary from -12% o to -2%o depending on the season. This range in $\delta^{18}O$ values is typical of mid-to-high latitudes (30-50°N) in the Western Hemisphere. Consequently, $\delta^{18}O$ signatures in animals permit the determination of latitude of residence (Katzenberg and Krouse 1989; Longinelli 1984).

Stable Isotopes and Human Behavior

The record of stable isotopes is an established proxy for evaluating the relative proportions of food types used by human populations (for reviews see Katzenberg 1992; Price 1989; Schoeninger and Moore 1992; van der Merwe 1982). The use of carbon and nitrogen isotopes in human bone collagen has been successfully applied to assess the relative amount of marine and terrestrial foods in the diets of prehistoric, historic, and modem peoples (e.g., Chisholm et al. 1982; Katzenberg et al. 1993; Minagawa and Akazawa 1992; Schoeninger et al. 1983; van der Merwe et al. 1981; van der Merwe and Vogel 1977; Walker and DeNiro 1986).

Stable carbon isotopes in biological apatites have also been successfully analyzed to obtain dietary information in humans (e.g., Krueger and Sullivan 1984; Lee-Thorp et al. 1989; Sealy et al. 1993; Sullivan and Krueger 1981; Wright and Schwarcz 1998). Stable oxygen isotopes in human biological apatites have been fruitfully used to determine latitude ofresidence (e.g., Levinson et al. 1987; Longinelli 1984), to examine prehistoric migrations (e.g., Stuart-Williams et al. 1996), and to determine prehistoric weaning patterns (e.g., Wright and Schwarcz 1998).

Methods and Materials

$\delta^{13}C$ and $\delta^{15}N$ Bone Collagen Analyses

We measured the $\delta^{13}C$ and $\delta^{15}N$ values of bone collagen from the remains of eight individuals from Franklin Point Cemetery (FPC). Bone-collagen turnover rates are on the order of up to several decades,depending on the age and health of the individual (Stenhouse and Baxter 1977). Thus, we analyzed the average contribution of different protein sources in the diet of each individual during the adult years before death.

The $\delta^{13}C$ and $\delta^{15}N$ values from the FPC skeletal materials were compared to values of potential food sources from the Monterey Bay, California, region to assess dietary dependence on marine and terrestrial resources (see Table C1). Five end-member food source $\delta^{13}C$ and $\delta^{15}N$ values were obtained from the published literature and corrected to make a direct comparison with the human bone collagen values. We corrected these values to account for isotopic fractionation of ingested food during the metabolic production of collagen. The published food source isotope values were converted into 'diet-space' using the fractionation factors listed in Table C1.

Table C1: Stable isotope ratios for food sources from Monterey Bay, California.

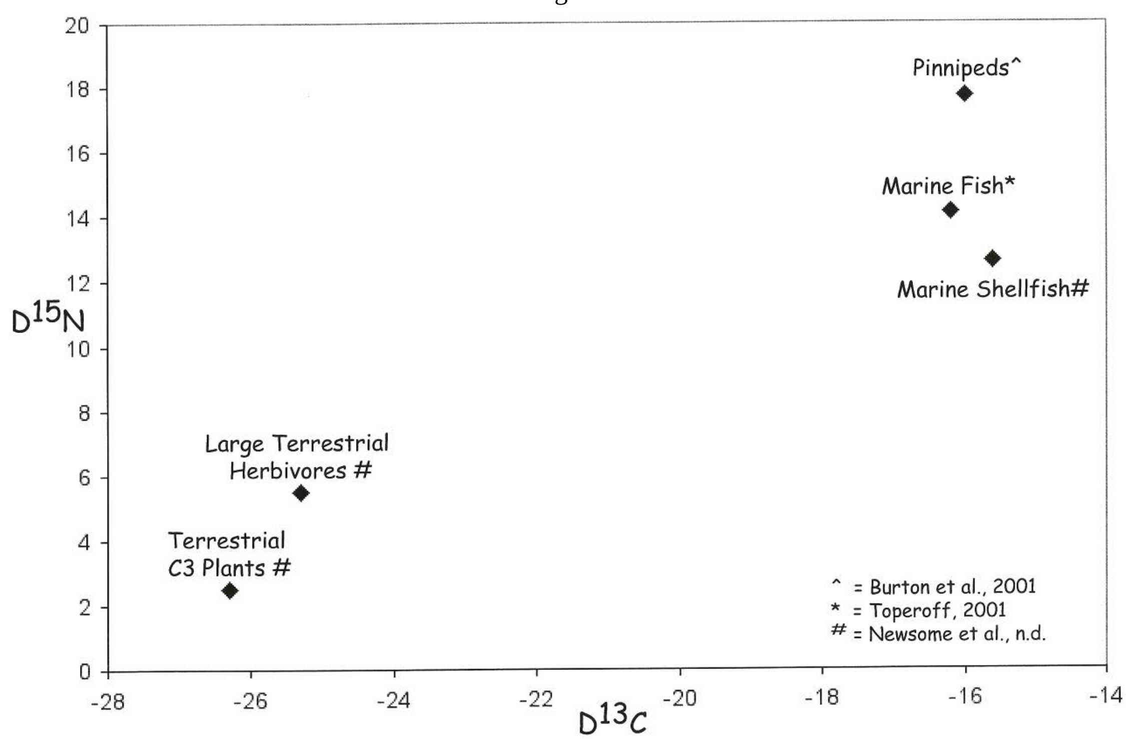
Food Sources*	$\delta^{13}C$ (%o)	$\delta^{15}N$ (%o)	Reference Sample	Reference Tissue	Citation
Marine Shellfish 1,2	-15.6	12.6	prehistoric sea otter (n=2)	bone collagen	Newsome et al. 2002
Marine Fish 3,4	-16.2	14.1	modem nearshore fish (n=8)	muscle	Toperoff 2001
Pinnipeds s,6	-16.0	17.7	prehistoric pinnipeds (n=l3)	bone collagen	Burton et al. 2001
Terrestrial C_3 Plants 1,2	-26.3	2.5	prehistoric elk (n=3)	bone collagen	Newsome et al. 2002
Large Terrestrial Herbivores s6	-25.3	5.5	prehistoric elk (n=3)	bone collagen	Newsome et al. 2002

* (1) $\delta^{13}C_{diet} = \delta^{13}C_{collagen} - 5\%o$;
(2) $\delta^{15}N_{diet} = \delta^{15}N_{collagen} - 3\%o$;
(3) $\delta^{13}{}_{prehistoric} = \delta^{13}C_{modern} + 1\%o$;
(4) $\delta^{15}N_{diet} = \delta^{15}N_{muscle}$;
(5) $\delta^{13}C_{muscle} = \delta^{13}C_{collagen}$ -4%o
(6) $\delta^{15}N_{muscle} = \delta^{15}N_{collagen}$

For marine shellfish and terrestrial C^3 plants, the $\delta^{13}C$ values were calculated by subtracting 5%o from the $\delta^{13}C$ values of bone collagen (i.e., reference tissue) measured in sea otters and elk (i.e., reference samples), respectively (Newsome et al. 2002). Likewise, marine shellfish and C^3 plants $\delta^{15}N$ values were calculated by subtracting 3%o from the $\delta^{15}N$ values of the same reference samples (Newsome et al. 2002). These conversions account conversions account for trophic level effects because sea otters consume shellfish, and elk consume plants, thus these prey are isotopically lighter. In addition, the $\delta^{13}C$ values of muscle for the top consumers (large terrestrial herbivores and pinnipeds) were estimated by subtracting 4%o both from the $\delta^{13}C$ values measured in elk collagen (Newsome et al. 2002), and the mean $\delta^{13}C$ value of pinniped collagen reported by Burton and colleagues (2001). This accounts for isotopic differences between edible muscle (i.e. diet) and bone collagen. $\delta^{15}N$ values of muscle for top consumers are quite similar to bone collagen values of muscle for top consumers are quite similar to bone collagen values and are reliable proxies for values of muscle in the diet. Lastly, the $\delta^{13}C$ value for marine fish muscle was calculated by adding 1%o to the mean $\delta^{13}C$ value of modem near shore fish as reported by Toperoff (2001). Since the FPC individuals and the other food source isotope values were derived from carbon sources prior to the burning of fossil fuels, this correction accounts for the depletion of carbon in the modem marine fish δC^{13} values (Quay et al. 1992; Sonnerup et al. 1999). The $\delta^{15}N$ value for marine fish muscle is a reliable proxy for fish in the diet.

Figure C1 illustrates the difference in $\delta^{13}C$ and $\delta^{15}N$ values between marine and terrestrial foods from Monterey Bay, with marine foods having heavier $\delta^{13}C$ and $\delta^{15}N$ values than terrestrial foods. Also, note the difference between trophic levels within a given ecosystem. For example, pinnipeds principally feed on marine fish and have $\delta^{15}N$ values 3%o heavier than nearshore fish species. Likewise, large terrestrial herbivores, such as elk and deer, have $\delta^{15}N$ values 3%o heavier than the values of their principal forage, C^3 terrestrial plants. In addition, we compared the $\delta^{13}C$ and $\delta^{15}N$ values of the Franklin Point shipwreck burials with isotope ratios of two prehistoric Native American populations from the central California region to evaluate the dietary differences between human populations that consume foods from different ecosystems.

Figure C1: Mean $D^{13}C$ and $D^{15}N$ values for marine and terrestrial food sources from the Monterey Bay, California Region.



δ^{18}O and δ^{13}C Enamel Apatite Analyses

To trace the latitude of origin for the eight individuals from FPC we measured the $\delta^{18}O$ value in the enamel apatite from either the first, second, or third molar of each individual. Since we measured the $\delta^{18}O$ value of enamel apatite, an inorganic mineral that forms in these teeth during infancy and childhood (Massler et al. 1941; Moorrees et al. 1963), we essentially tracked the average oxygen isotope value of the drinking water each individual ingested as an infant or child.

Since mammals, including humans, maintain a constant body temperature, $\delta^{18}O$ is recorded in bone mineral at a predictable offset, or fractionation factor, from body water (Longinelli 1984). In order to make a direct comparison between global meteoric 8180 water values and those obtained from the tooth enamel of the FPC individuals, we applied an apatite carbonate-body water :fractionation factor of -26.3%o to the enamel apatite $\delta^{18}O$ values (after Bryant et al. 1996). This fractionation factor corrects for the equilibrium fractionation process during enamel synthesis. It also calculates approximate values of an individual's body water, whose isotopic composition is a combination of the $\delta^{18}O$ values of metabolic water produced by oxidation of food and the drinking water a person ingests (Luz et al. 1984).

In addition, we determined the $\delta^{13}C$ isotope value of each individual's molar enamel apatite to obtain childhood dietary information. To compare each individual's childhood and adult diet we converted the apatite values into 'collagen-space' using a pre- determined spacing factor to compare with each individual's bone collagen $\delta^{13}C$ value. The spacing between apatite carbon and collagen carbon is estimated to be - 7%o for omnivorous humans (Koch 1998; Koch et al. 1990; Krueger and Sullivan 1984). Thus, we converted enamel apatite $\delta^{13}C$ values into collagen-space by subtracting 7%o from the apatite $\delta^{13}C$ values. Since tooth enamel apatite retains childhood isotopic signals into adulthood, $\delta^{18}O$ and $\delta^{13}C$ values from molar enamel apatite preserve a record of water and diet use from childhood (Levinson et al. 1987; Wright and Schwarcz 1998).

Skeletal Samples

A total of sixteen human skeletal samples from eight individuals buried at FPC were analyzed for their isotopic composition. Bone collagen and tooth enamel apatite samples were extracted from each of the eight individuals. The individuals, presumably maritime sailors once aboard the *Sir John Franklin*, *Coya* and *Hellespont* were originally interred at the shipwreck cemetery during the Historic Period (mid-nineteenth century). The burials were recently exposed by erosion and recovered as part of a salvage excavation. Table C2 lists the skeletal elements from each individual used in the analyses. Collagen samples (-50 milligrams) were collected from hand bones (phalanges and metacarpals) to reduce the effects of isotopic variation across different types of skeletal tissue (see DeNiro and Schoeninger 1983; Tieszen et al. 1983). Tooth enamel apatite (-10 milligrams) was extracted from either the first (Ml), second (M2), or third (M3) molar to evaluate diet and water intake during infancy and childhood.

Analytical Methods and Results

The collagen samples were prepared and analyzed for carbon and nitrogen ratios according to the methods described by Burton and colleagues (2001). The enamel apatite samples were prepared and analyzed for oxygen and carbon isotopes following the methods outlined by Clementz and Koch (2001). All the samples were prepared and analyzed at the Stable Isotope Laboratory, Department of Earth Sciences, University of California, Santa Cruz, California.

Tables C3 and C4 document the results of the isotope analyses conducted on the eight individuals from FPC. Table 3 summarizes the bone collagen $\delta^{13}C$ and $\delta^{15}N$ individual values, standard deviations, and group means. The mean $\delta^{13}C$ value is -18.7 ± l.4%o and values range between -20.6%o (Burial 2) and -16.4%o (Burial 4). The mean $\delta^{15}N$ value is 12.3 ± 0.8%o and values range from 11.2%o (Burials 3 and 5) to 13.1%o (Burial 6). Laboratory analytical errors were 0.2%o for $\delta^{13}C$ and 0.3%o $\delta^{15}N$. Individuals 2 and 5 exhibited lighter $\delta^{13}C$ values (-20.6%0 and -20.3%0, respectively) than the $\delta^{13}C$ group mean (-18.7%0) and lighter $\delta^{15}N$ values (12.1%0 and 11.2%0, respectively) than the $\delta^{15}N$ group mean (12.3%0). Individual 3 also exhibits a $\delta^{15}N$ value (11.2%0) lighter than the group mean. All $\delta^{13}C$ and $\delta^{15}N$ values are within the range of values for past and present humans.

Table 4 presents the molar enamel apatite $\delta^{13}C$ and $\delta^{18}O$ individual values, standard deviations, and group means. The mean $\delta^{13}C$ value is -12.9 ± 0.7%o and values range between -13.9%o (Burial 6) and -12.1%o (Burial 3). Collagen samples from individuals 4, 6, and 8 exhibited lighter $\delta^{13}C$ values (-13.2%o, -13.9%o, and -13.8%o, respectively) than the group mean. The mean $\delta^{18}O$ value is 25.2 ± 1.6%o and values range from 22.0%o (Burial 6) to 26.6%o (Burials 1 and 4).

Table C2: List of skeletal elements analyzed in this study.

Sample ID#	Lab ID#	Analysis ID#	Skeletal Element
Burial 1	207-1 207-1A	FPC-1 FPC-1A	M2, left mandible. 1st phalanx, right.
Burial 2	207-2 207-2A	FPC-2 FPC-2A	M3, right mandible. 2nd phalanx.
Burial 3	207-3 207-3A	FPC-3 FPC-3A	M2, right maxilla. Metacarpal 3,left.
Burial 4	207-4 207-4A	FPC-4 FPC-4A	M1, right maxilla. 1st phalanx.
Burial 5	207-5 207-5A	FPC-5 FPC-5A	M2, right mandible. Metacarpal 4 (?), right.
Burial 6	207-6 207-6A	FPC-6 FPC-6A	M2 right mandible. Metacarpal 3, left.
Burial 7	207-7 207-7A	FPC-7 FPC-7A	M1 left mandible. 1st phalanx.
Burial 8	208 208A	FPC-8 FPC-8A	M3, right mandible. 1st phalanx.

Table C3: δ^{13}C (%o) and δ15N (%o) values of human bone collagen

Sample ID#	Lab ID#	Analysis ID#	δ^{13}C (%o)	s.d. (%o)	δ^{15}N	s.d. (%o)
Burial I	207-lA	FPC-lA	-18.5	0.2	12.6	0.3
Burial 2	207-2A	FPC-2A	-20.6	0.2	12.1	0.3
Burial 3	207-3A	FPC-3A	-19.0	0.2	11.2	0.3
Burial 4	207-4A	FPC-4A	-16.4	0.2	13.0	0.3
Burial 5	207-5A	FPC-5A	-20.3	0.2	11.2	0.3
Burial 6	207-6A	FPC-6A	-17.6	0.2	13.1	0.3
Burial 7	207-7A	FPC-7A	-18.2	0.2	12.5	0.3
Burial 8	207-8A	FPC-8A	-19.1	0.2	12.9	0.3
Mean (n=8)			-18.7	1.4	12.3	0.8

Table C4: δ^{13}C (%o) and δ^{18}0 (%o) values of human molar enamel apatite. δ^{18}0 values are reported relative to standard mean ocean water (SMOW).

Sample ID #	Laboratory ID #	Analysis ID #	δ^{13}C (%o)	s.d. (%o)	δ^{18}0 (%o)	s.d. (%o)
Burial 1	207-1	FPC-1	-12.2	.007	26.6	.004
Burial 2	207-2	FPC-2	-12.9	.004	25.3	.004
Burial 3	207-3	FPC-3	-12.l	.006	.25.4	.009
Burial 4	207-4	FPC-4	-13.2	.007	26.6	.013
Burial 5	207-5	FPC-5	-12.7	.008	26.5	.004
Burial 6	207-6	FPC-6	-13.9	.004	22.0	.005
Burial 7	207-7	FPC-7	-12.3	.005	23.6	.002
Burial 8	207-8	FPC-8	-13.8	.003	25.2	.004
Mean (n=8)			-12.9	0.7	25.2	1.6

Only molars from individuals 6 and 7 exhibit lighter $\delta^{13}C$ values (22.0%o and 23.6%o, respectively) than the group mean.

Postmortem alteration of the skeletons' isotopic compositions is highly unlikely since: 1) the remains are relatively young (~150 years); 2) only well preserved bones were selected for analyses; 3) bone collagen atomic carbon-to-nitrogen (C/N) ratios are within the range that characterizes fresh bone collagen (after DeNiro 1985); and 4) tooth enamel apatite is essentially diagenetically resistant (see Koch et al. 1990; Lee-Thorp and van der Merwe 1987, 1991).

Discussion: The Franklin Point Cemetery Diet

As illustrated in Figure C2, the mean $\delta^{13}C$ and $\delta^{15}N$ values from the eight FPC individuals reveal they consumed a mixed diet of terrestrial and marine foods during their adult lives (note that the mean human bone collagen values in Figures C2 and C3 have been converted from bone collagen values to diet values in order to make a direct comparison between the food sources and the assumed diet of these individuals). A simple linear mixing model that uses the food source isotope values from Monterey Bay (Figure C1, Table C1) suggests the FPC individuals had a diet that consisted of relatively similar proportions of terrestrial (55-65%) and marine (35-45%) food proteins. Although a single diet combination cannot be determined, we propose (within error) that this combination of food sources would produce $\delta^{13}C$ and $\delta^{15}N$ values in bone collagen similar to those measured in the bone collagen of the FPC individuals. In this calculation, we assumed that the terrestrial component of their diet is C^3-based.

Figure C2: Mean $D^{13}C$ and $D^{15}N$ values for the Franklin Point Cemetery burials and central California coastal food sources. Franklin Point values have been converted in to 'diet-space" by subtracting 5%o for carbon and 3%o for nitrogen off the mean $D^{13}C$ and $D^{15}N$ collagen based isotope values.

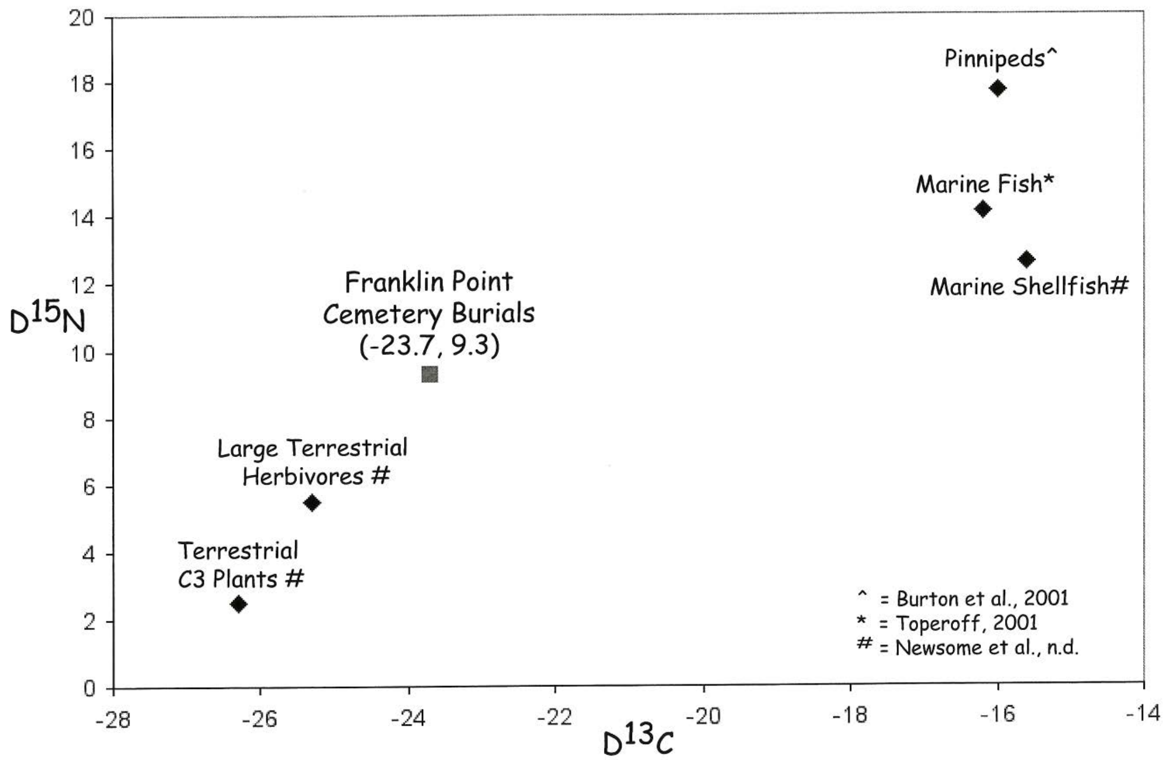
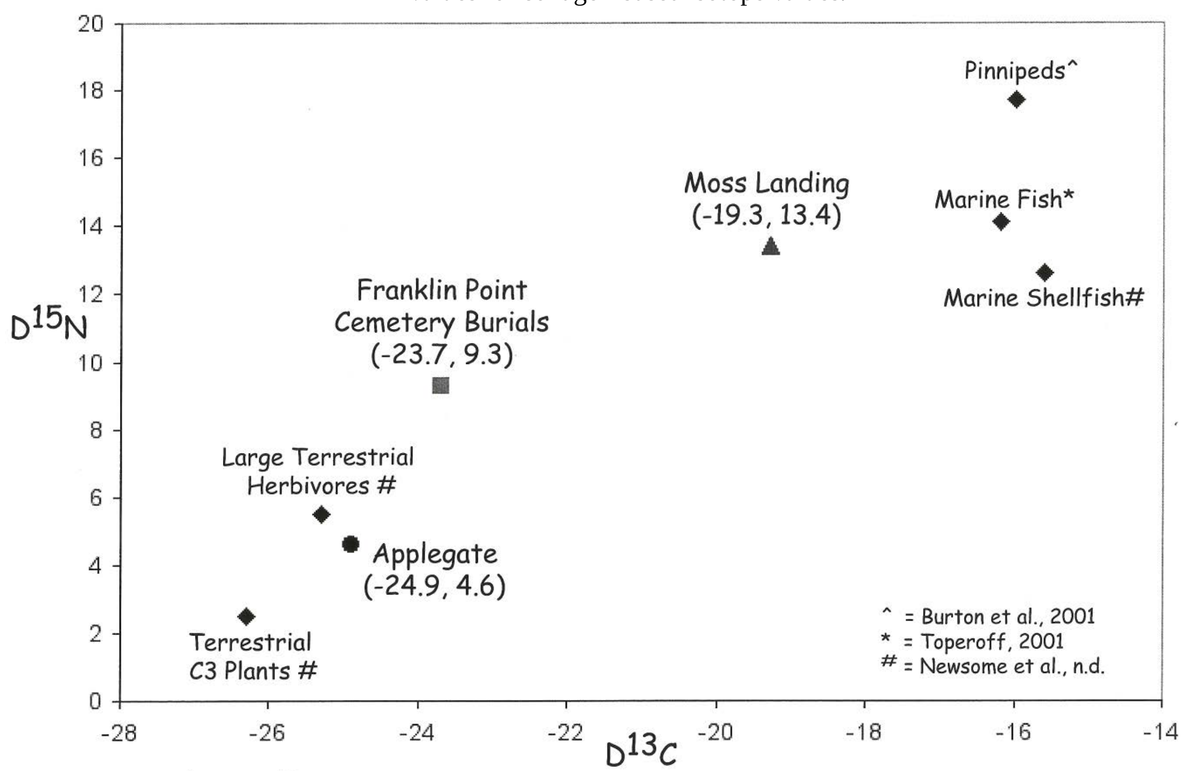


Figure C3 compares the mean $\delta^{13}C$ and $\delta^{15}N$ values between the FPC burials and two central California prehistoric Native American groups to lend perspective on the dietary differences between human populations that consume foods from different ecosystems. The Moss Landing site (CA-SCR-60), occupied between 6500-3500 B.P (Newsome et al. 2002), is located along the central California coast near Monterey Bay. The mean $\delta^{13}C$ (-19.3%0) and $\delta^{15}N$ (13.4%0) corrected values from individuals (n=8) recovered at Moss Landing suggest the group's diet was heavily composed of marine resources (Newsome et al. 2002). A simple linear mixing model indicates that approximately 65% of their diet consisted of marine foods, such as marine mammals, nearshore fish, and shellfish. These individuals represent one end of the marine versus terrestrial food spectrum.

Figure C3: Mean $D^{13}C$ and $D^{15}N$ values for different human groups with marine and terrestrial food sources. Applegate and Moss Landing are prehistoric groups from central California. Franklin Point Cemetery burials values have been converted into 'diet-space' by subtracting 5%o for carbon and 3%o for nitrogen off the mean $D^{13}C$ and $D^{15}N$ values for collagen-based isotope values.



In contrast, individuals from the Applegate site, CA-AMA-56, which was occupied ca. 2000 B.P. in the Sierra Nevada foothills (Johnson 1970; Kennedy et al. n.d.) illustrate the signature of an inland terrestrial diet. The corrected mean $\delta^{13}C$ (-24.9%o) and $\delta^{15}N$ (14.6%o) values from 27 individuals indicate the group had a diet heavily composed of terrestrial foods, with intermediate values between large terrestrial herbivore (elk or deer) meat and terrestrial C^3 vegetation (grassland plants and upland grasses) (Newsome et al. n.d.). In both cases, we assume that the carbon and nitrogen isotope values of C^3 plants in the Monterey Bay region are similar to those in the Sierra Nevada foothills. This is a fair assumption, as we expect carbon and nitrogen values of C^3 plants to vary little between ecosystems that are relatively close in proximity. Overall, the FPC individual's diets are intermediate between these two dietary extremes, although the carbon and nitrogen isotope mean values are more skewed toward the terrestrial realm (55-65% of the diet).

Comparison of $\delta^{13}C$ values from Bone Collagen and Molar Enamel Apatite

As shown in Table C5, the application of an apatite-collagen spacing factor of 7%o to the enamel apatite $\delta^{13}C$ values of each individual converts the childhood mean to -19.8 ± 0.6%o. This value is lighter than the mean $\delta^{13}C$ value of -18.7 ±1.4%o derived from bone collagen synthesized during adulthood. The average 1.1 ±1.8%o enrichment from childhood to adulthood is logical if one assumes that their diets naturally took on more of a marine component when they became maritime sailors as adults. Interestingly, Burials 4 and 6 exhibit $\delta^{13}C$ values that were enriched by 3.8%o and 3.3%o, respectively, suggesting their diets changed more than the other individuals. Unfortunately, this cannot be confirmed using nitrogen isotopes since there is very little organic material in enamel; thus there is no childhood record of $\delta^{15}N$ values. However, bone also consists of a mineral matrix of hydroxyapatite that contains carbon in the form of calcium carbonate, thus future studies of similar nature may wish to make a direct $\delta^{13}C$ comparison between each individual's bone apatite and molar apatite. This would eliminate the need to use a predetermined spacing factor to assess diachronic changes in diet since the comparison would be among like tissues.

Table C5: Comparison between bone collagen and converted molar enamel apatite $\delta^{13}C$ (%o) values.

Sample ID #	$\delta^{13}C$ (%o) Bone Collagen	$\delta^{13}C$ (%o) Tooth Enamel	Converted $\delta^{13}C$ (%o) Tooth Enamel	$\Delta\ \delta^{13}C$ (%o) from childhood to adulthood
Burial 1	-18.5	-12.2	-19.2	0.7
Burial 2	-20.6	-12.9	-19.9	-0.7
Burial 3	-19.0	-12.1	-19.1	0.1
Burial 4	-16.4	-13.2	-20.2	3.8
Burial 5	-20.3	-12.7	-19.7	-0.6
Burial 6	-17.6	-13.9	-20.9	3.3
Burial 7	-18.2	-12.3	-19.3	1.1
Burial 8	-19.1	-13.8	-20.8	1.7
Mean (n=8)	-18.7 ±1.4	-12.9 ±0.7	-19.8 ±0.6	1.1 ±1.8

Latitude of Origin

We determined latitude of origin by converting each individual's mean $\delta^{18}O$ enamel apatite value into a $\delta^{18}O$ standard mean ocean water (SMOW) value (Table C6). As discussed above, we subtracted a fractionation factor of 26.3%o from each $\delta^{18}O$ enamel apatite value to account for isotopic fractionation during the biogenic production of tooth enamel. The mean converted $\delta^{18}O$ enamel apatite value is -1.2 ±1.8%o and is indicative of low-latitude tropical climates around the world. However, because the annual range of $\delta^{18}O$ values overlaps at the local level, and the enamel results represent a multi-year average of ingested drinking water during infancy and childhood, it is difficult to reduce the possibilities beyond latitude of origin. Interestingly, Burial 6 has a converted $\delta^{18}O$ value of -4.3%o. This value is 3.1%o lighter than the group's mean and suggests this individual possibly originated from a higher latitude or altitude.

Table C6: Molar enamel and converted molar enamel apatite $\delta^{18}0$ (%o) values (after Bryant et al. 1996) from Franklin Point Cemetery individuals. δ18 values are reported relative to standard mean ocean water (SMOW).

Sample ID #	$\delta^{18}O$ (%o) Tooth Enamel	Converted $\delta^{18}O$ (%o) Tooth Enamel
Burial 1	26.6	0.3
Burial 2	25.3	-1.0
Burial 3	25.4	-0.9
Burial 4	26.6	0.3
Burial 5	26.5	.02
Burial 6	22.0	-4.3
Burial 7	23.6	-2.7
Burial 8	25.2	-1.1
Mean (n=8)	25.2 ±1.6	-1.2 ±1.8

Summary of Findings

1) Mean bone collagen $\delta^{13}C$ and $\delta^{15}N$ values reveal that the eight individuals recovered from FPC consumed both terrestrial and marine foods for protein as adults. A simple linear mixing model using potential food source isotope values indicates the individuals' diet consisted of foods from both terrestrial (55-65%) and marine (35-45%) ecosystems. This combination of food sources lies somewhere in the intermediate area along the terrestrial versus marine food spectrum when compared to the primarily marine based diet of the prehistoric coastal population at Moss Landing, and the largely terrestrial based diet of the Sierra Nevada foothill population from Applegate. These results suggest that the crew members of the *Sir John Franklin*, *Coya* and *Hellespont* were likely subsisting both on canned or preserved terrestrial proteins, and on fish and other marine proteins.
2) All eight FPC individuals exhibit a transition from a more terrestrial based diet (lighter $\delta^{13}C$ corrected molar enamel apatite values) as children to a more mixed diet with the addition of more marine foods (heavier $\delta^{13}C$ bone collagen values) as adults. The mean enrichment from childhood to adulthood is logical if one assumes that their diets naturally took on more of a marine component when they presumably became maritime sailors. This conclusion cannot be confirmed with nitrogen isotopes. Stable carbon isotope studies of each individual's bone apatite would eliminate the need to use a predetermined spacing factor and allow for a more direct comparison with the enamel apatite in the case of future studies like this one.
3) The mean $\delta^{18}O$ molar enamel apatite values suggest the eight FPC individuals ingested drinking water from low-latitude tropical regions during infancy and childhood. This result suggests the individuals spent their infancy and childhood years in the low-latitude tropics, and may suggest that at least some of these individuals were brought on board the *Sir John Franklin, Coya* and *Hellespont* in the tropics.

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APPENDIX D

Laser Ablation-ICP-MS Analysis of Teeth (Speakman et al. 2002).

Appendix D

Laser Ablation-ICP-MS Analysis of Teeth from Franklin Point Cemetery (CA-SMA-207/H), Año Nuevo State Park, California.

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(May 2002)

Compositional analysis of dentine and enamel on 12 teeth representing six individual's was conducted at the University of Missouri Research Reactor (MURR) using laser ablation- inductively coupled plasma-mass spectrometry (LA-ICP-MS). The samples originate from an historic period (mid 1800's) maritime cemetery located at Año Nuevo State Park, California. Prior to the reinterment of the burials, State Parks contracted with several agencies to conduct various physical and chemical analyses, including the Archaeometry Laboratory at MURR. MURR was contracted specifically to conduct elemental analyses of teeth from the burials with special emphasis on determining lead and other heavy metal concentrations.

Numerous studies have documented that high lead concentrations in the human body are indicative of an individual's health and environment. Individual's with high exposure to lead are more likely to have developmental problems, shorter attention spans, neurological disorders, hypertension, kidney problems, and exhibit deviant behavior. Some scientists believe that low- level chronic lead exposure in childhood can alter secretion of human growth hormones, stunting growth and promoting obesity. Higher levels of lead in the human body can also hamper absorption of Vitamin C and individual's exposed to high levels of lead are more likely to have higher occurrences of cavities.

Analysis of teeth by LA-ICP-MS is ideally suited for lead analysis because different features of the tooth such as dentine and enamel can be targeted for analysis. Furthermore, lead in tooth enamel does not remodel as it does in other bones of the body. Results obtained from analyses of dentine permits the individual's exposure to lead prior to death to be assessed. Likewise, since enamel is formed in infancy and remains relatively fixed through life it is possible to learn something of environmental conditions the individual was exposed to as an infant. Ultimately, given an adequate database, it may one day be possible to discern an individual's origins based on compositional and isotopic data obtained from chemical and isotopic analyses of enamel.

Background

Inductively coupled plasma mass spectrometry, still a relatively new analytic technique, can determine the chemical composition for a wide variety of liquid and solid sample matrices with high precision and sensitivity. Over the last several years archaeologists have begun to use ICP-MS coupled with laser ablation to address archaeological questions (e.g., Gratuze 1999; Kennett et al. 2001; Mallory-Greenough et al. 1998; Tykot 1998). At MURR, we have used LA- ICP-MS to characterize a variety of archaeological materials (Speakman et al. 2002). Some of these projects include characterization of paints on pottery from the Mesa Verde region (Speakman and Neff 2002), Mexico (Rodriguez 2002), and Turkey (Diebold 2002); analysis of glazes on Mesoamerican Plumbate pottery (Neff 2002a) and historic Euroamerican pottery; characterization of glass beads (Glascock and Speakman 2002), Midwestern cherts (Speakman et al. 2001), obsidian (Sall et al. 2001), and turquoise (Zedei'io et al 2002); and determination of inclusions in pottery (Larson et al. 2002). These studies have consistently demonstrated the value of LA-ICP-MS for chemical characterization studies.

Unlike INAA, which produces a bulk analysis of the entire matrix, LA-ICP-MS is point specific, that is, only the area ablated is subject to analysis. Attempting to obtain bulk compositional data on heterogeneous samples such as pottery is challenging due to spatial variation in the sample (e.g., clay and temper particles). On the other hand, homogeneous samples such as obsidian and to a certain extent chert are ideally suited for this type of analysis because spatial variation is minimal in these materials. ICP-MS can provide compositional data for 50-60 elements, including rare earth elements, whereas INAA typically provides compositional data for about 30 different elements. Some elements, such as Pb and mercury, which cannot be measured by INAA but can be measured by LA-ICP-MS, may prove important for separating materials into different compositional groups. For certain elements LA-ICP-MS has lower detection limits than INAA (e.g., Sr, Sb, Ba, Zr).

In LA-ICP-MS a laser is used to ablate a small area on the surface of a sample. At MURR, the area ablated is usually along a line or small raster and the laser usually ablates less than 30 microns into the sample. The ablated material is transported from the laser cell and introduced into the ICP-MS torch where argon gas plasma capable of sustaining electron temperatures between 8000 and 10000 K is used to ionize the injected sample. The resulting ions are then accelerated by a high voltage and passed through a series of focusing lenses, an electrostatic analyzer, and finally a magnet. By varying the strength of the magnet, ions are separated according to mass/charge ratio and passed through a slit into the detector which records only a very small atomic mass range at a given time. By varying the instrument settings the entire mass range can be scanned within a short period of time.

The instrument used in the study reported here is a Thermo Elemental Axiom magnetic- sector inductively coupled plasma mass spectrometer that can resolve atomic masses as close as 0.001 atomic mass units apart, thus eliminating much polyatomic interference that pose problems for quadropole ICP-MS instruments. The ICP-MS is coupled to a Merchantek Nd:YAG 213-nanometer wavelength laser ablation unit, which permits the introduction of solid samples into the ICP-MS. The laser can be targeted on spots as small as five microns in diameter. With this small spot size and the very high sensitivity of magnetic sector ICP-MS to a wide range of major, minor, and trace elements, LA-ICP-MS is a very powerful microprobe. Moreover it is virtually non-destructive to most samples, considering that the ablated areas often are indistinguishable with the naked eye.

Sample Preparation

The sample preparation process involved cutting each tooth along the lateral axis using a small rock saw. Each tooth was then washed in deionized water and permitted to dry in an oven at 102 °c for twelve hours to remove excess water. After drying, each sample was placed into a clean ziplock bag labeled with the sample ID.

Analytic Parameters

Prior to data acquisition, the instrument is turned-on and permitted to warm-up for a minimum of one hour. Warming up the instrument permits internal components to reach their optimum operating temperature, greatly reducing instrument noise and drift. After an hour or so, a glass standard (NIST SRM-612, a glass wafer spiked with 60+ elements) was placed in the laser chamber and continuously ablated to produce a signal that permits the instrument settings to be adjusted so that sensitivity is maximized while noise is minimized. After tuning the instrument, data for a blank and two standards are collected, NIST SRM-612 and NIST SRM- 610. Following collection of the standard data, the teeth were placed in the laser cell and analyzed using LA-ICP-MS. Data for second sets of standards was collected at the conclusion of the analysis.

Ablation parameters were identical for all unknowns and standards analyzed. The laser was rastered over a line placed over the enamel and dentine of each sample. The laser was operated at

60% power using a 200 micron wide beam, firing 20 shots per second, scanning across the raster at a speed of 70 microns per second. The laser beam was permitted to pass over the ablation area one time prior to data acquisition in order to remove contamination from the surface of the teeth, to permit time for sample uptake, and to permit time for the argon gas plasma to stabilize after the introduction of the ablated material. Our experiments at MURR have demonstrated that pre-ablation permits the laser to couple better with the sample matrix. Analytes of interest were scanned three times and averaged.

Normalization and Standardization of Data

A basic problem in LA-ICP-MS is that it is difficult to monitor the amount of material removed by the laser and transported to the ICP. Conditions such as hardness of the material, position of the sample in the laser chamber, whether or not the surface of the artifact is flat, and other conditions clearly affect how much material reaches the ICP torch and thus the intensity of the signal monitored for the various atomic masses of interest. In addition, instrumental drift in the ICP-MS over several hours or days affects count rates.

With liquid samples internal samples are typically used to counteract instrument drift, but this approach is not available when material for the analysis is ablated from an intact solid sample. If one or more elements can be determined or assumed independently, then these can serve as quasi-internal standards. In the case of rhyolitic obsidian which has relatively consistent silicon concentrations (ca. 36%), we have determined that silicon count rates can be normalized to a common value. This value divided by the actual number of counts produces a normalization factor from which all the other elements in that sample can be multiplied. However with most sample matrices, we have determined that the best data calibration method is to use an approach suggested by Gratuze (Gratuze et al. 2001; but also see Neff 2002a). Experiments with a wide range of materials types (primarily obsidian, glass, and ceramics) demonstrate the superiority of this approach.

The Gratuze method (Gratuze et al. 2001; Neff 2002a) involves correcting blank- subtracted raw counts for isotopic abundance. The signal for every element is then standardized by calculating a ratio to the counts for a single element, the "internal standard":

$$std\ signal_y = \frac{counts_y}{counts_{\text{internal standard}}} . \qquad (1)$$

The standardized signals are also related to the response of coefficients, K_y.

$$std\ signal_y = K_y \left(\frac{conc_y}{conc_{\textit{internal standard}}} \right) . \qquad (2)$$

The K_y's can then be obtained from the multielement standards by:

$$K_y = std\ signal_y \text{ in ref. material} \left(\frac{conc_{\textit{internal standard}} \text{ in ref material}}{conc_y \text{ in ref. material}} \right) \qquad (3)$$

Total oxide composition of each specimen can then be calculated by:

$$oxide\ conc_y = \left(\frac{O_y\ (std\ signal_y)\ /\ K_y}{\sum_{i=i}^{m} O_i\ (std\ signal_i)\ /\ K_i} \right) 100 , \qquad (4)$$

The basic assumption of the Gratuze approach is that the 40+ elements being measured represent essentially all of the material, other than oxygen, that is ablated :from the sample. Oxygen is then taken into consideration by converting the elemental signals to signals of their oxides. Phosphorous and calcium were converted to the mineral apatite rather than their elemental oxides. Some error may be introduced at this point for elements that occur in more than one oxidation state, particularly iron, which may be present as FeO as well as Fe_2O_3. Additionally, any water in the material is unaccounted for in the summation to 100%, as are some elements, such as chlorine or sulfur which may be present but are not measured. These missing measurements may contribute to a slight overestimation of the various measured oxides.

Quantitative Analysis of the Chemical Data

Data were collected for 49 elements, but 28 of these were below instrument detection limits (low parts per million -parts per trillion) or contained multiple missing values. The missing elements, which were primarily lanthanides and transition metals, were removed from consideration for this analysis. Data analysis was therefore carried out using data from the remaining 21 elements. Pattern-recognition in the present study involved projection of these data in various elemental bivariate plots. The small sample size and lack of comparative material limit possible interpretations for this dataset, but offer tremendous potential for future comparative studies.

Results

Table 1 presents compositional data for the 24 dentine and enamel analyses, and shows the elemental concentrations determined for these samples. Figures 1 and 2 present the basic subgroup structure identified through analysis of the data. Based on lead and magnesium concentrations, at least four compositional subgroups (and possibly a fifth) are present in the sample. Teeth from Burials 1, 6, and 7 exhibit higher lead concentrations in both the enamel and the dentine. Conversely, teeth from Burials 2, 5, and 8 have lower lead concentration in the enamel and the dentine. An exception is sample AN06E (Burial 5) which has higher lead in the enamel than a tooth from the same burial-AN05E. Both samples analyzed from Burial 5 also have higher enamel magnesium concentrations. Burials 2 and 6 generally have higher mercury concentrations in the enamel.

Discussion and Conclusions

LA-ICP-MS analysis of tooth dentine and enamel from six individuals demonstrates that the individuals were exposed to different levels of lead during their lifetimes. Enamel on adult teeth which is formed in the human body as a child is remodeled only slightly during an individual's lifetime and thus reflects childhood exposure to lead. Lead levels determined in the enamel of these individual's fall into three groups, A higher (>10 ppm) and lower (<10 ppm) lead group. Analyses of enamel from a third individual (Burial 5) appear to contradict each, other with one tooth having higher lead and the other having lower levels of lead. As teeth from Burial 5 were quite eroded and the tooth analyzed appears to have a cavity on the surface it is possible that there was some amount lead introduced to the enamel during the person's lifetime or after burial.

Analysis of the dentine indicates that most of these individual had significant lead exposure as adults. Lead concentrations in the dentine indicate two groups can be discriminated. The higher lead dentine group has a range of 70-133 ppm lead oxide. Lead levels in the lower lead group range from 1.8-43 ppm oxide. In all cases, lead exposure significantly exceeds what we consider today to be safe levels of lead (<10 μg/dl or .1 ppm).

Currently there is little data available on lead levels in 19th century populations. Future research in this area might be directed towards analysis of portions of long bones from other individual's to compare the results obtained from the dentine to other parts of the body. It would also be interesting to compare the results of this study to another segment of the population. For example, sailors did not routinely have access to high calcium foods which would inhibit lead uptake by the body and certain alcohols, medicines, and containers had high lead concentrations. How might a population comprised of females, children, farmers, and businessmen compare to the sailors? Comparative studies such as this may ultimately permit data obtained from these individual's to be placed into a better interpretive context.

Acknowledgements

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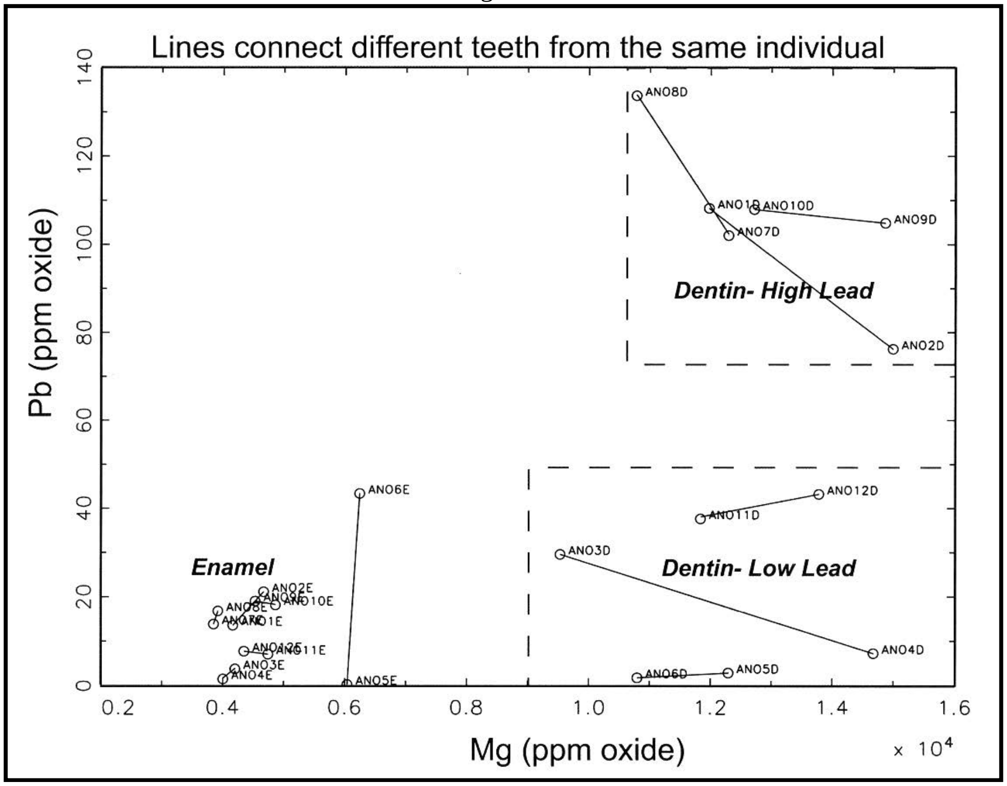
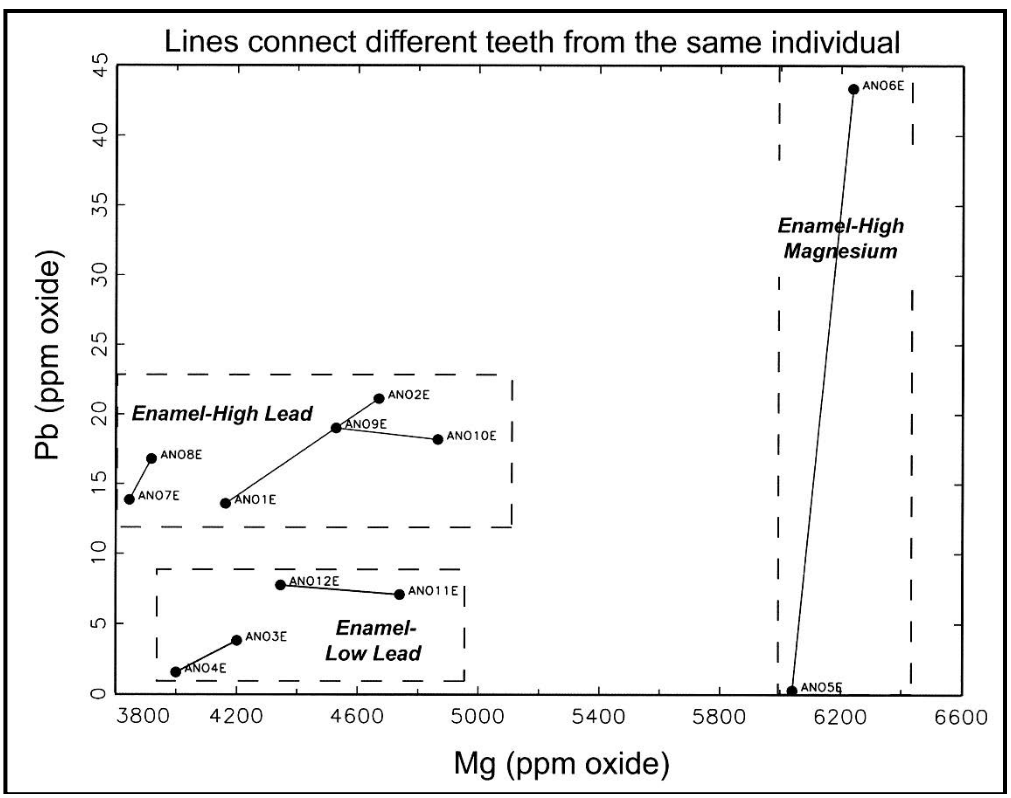
Table.

anid	bu	tooth	Li	Na	Mg	Si	P	K	Ca	Sc	V	Cr	Fe	Mn	Zn	As	Sr	Y	Mo	Sn	Ba	Hg	Pb
ANO1E	Bu 1	Mand I2	0.9253	11973.36	4161.75	394.4647	146833.19	333.2380	835298.17	0.0000	0.0000	5.4323	1.0786	0.7471	790.07	1.1993	130.85	0.0109	0.3091	1.9562	2.1036	0.8442	13.5708
ANO1D	Bu 1	Mand I2	2.2198	12681.44	11973.77	100.1640	164429.19	127.0349	809621.87	0.1047	0.4072	20.9662	1.3567	0.4123	832.97	0.5388	70.64	0.0288	0.0000	0.5639	3.2491	0.5131	108.1759
ANO2E	Bu 1	Mand C	0.0000	12125.13	4668.09	0.0000	121368.98	368.0907	860604.96	0.0215	0.0000	5.8776	0.6333	0.7442	571.14	2.7298	240.65	0.0000	0.0323	1.2756	3.1352	1.2980	21.1164
ANO2D	Bu 1	Mand C	0.5589	11199.92	14991.30	13.2468	130961.56	71.4020	841118.86	0.0277	0.2190	9.8129	2.3243	0.2960	1215.11	0.9848	322.61	0.0006	0.1183	0.3132	6.9566	1.7152	76.1883
ANO3E	Bu 2	Mand I2-L	0.0000	8840.84	4200.20	290.4025	106815.77	128.8679	875258.92	0.4725	2.7768	397.0728	16.6216	2.0010	2969.96	3.6393	208.92	1.5716	0.1281	2.7974	15.8446	14.2811	3.7950
ANO3D	Bu 2	Mand I2-L	6.3478	9655.66	9525.17	49.4986	139347.46	45.3410	839620.97	0.0147	0.0019	8.0757	2.4172	0.5657	1036.79	2.1122	624.26	0.0070	0.2544	0.3440	35.2693	2.9413	29.5627
ANO4E	Bu 2	Mand I2-R	0.0000	10477.10	3999.81	0.0000	113108.09	81.3100	871591.70	0.1226	0.0960	6.0639	1.4949	0.0000	446.96	0.2555	97.04	0.0000	0.1432	0.4933	5.6320	4.0328	1.5421
ANO4D	Bu 2	Mand I2-R	5.4012	7974.08	14672.41	15.9330	138062.08	63.1006	836508.75	0.0219	8.0793	33.3760	83.5478	6.4057	1537.88	0.8951	939.15	0.0471	1.3151	0.6554	36.9852	3.2331	7.2438
ANO5E	Bu 5	Max C-L	0.0000	12972.52	6039.90	189.6936	152123.06	66.1824	828073.51	0.0691	0.0000	0.1388	0.4495	0.0000	387.83	2.1342	138.15	0.0057	0.0912	0.7022	2.4704	1.4764	0.2514
ANO5D	Bu 5	Max C-L	1.9495	12012.33	12292.62	30.7996	137838.37	17.7578	836264.59	0.0662	0.0000	10.9395	0.6059	0.1850	1324.42	3.8003	186.79	0.0005	0.0834	0.4196	4.1018	0.7900	2.8778
ANO6E	Bu 5	Max C-R	0.0000	10597.74	6238.44	0.0000	126915.50	0.0000	853866.12	0.4089	0.3044	101.6565	36.6842	0.0000	1908.15	0.0000	192.68	0.1181	0.0717	0.8328	14.7780	3.3950	43.3634
ANO6D	Bu 5	Max C-R	3.5018	10286.56	10794.11	104.0790	140329.76	0.0000	836920.56	0.0000	0.0000	1.0423	0.7207	0.0001	1264.61	3.9339	184.49	0.0000	0.0424	0.8309	3.9627	1.2860	1.7866
ANO7E	Bu 6	Mand I2-L	0.0000	8661.43	3843.33	220.3072	113604.78	0.0000	871269.31	0.5186	0.0000	7.5111	1.0737	6.3606	1935.02	1.8825	373.07	0.1478	0.0000	0.5515	5.2994	13.4437	13.8453
ANO7D	Bu 6	Mand I2-L	0.3948	9726.38	12294.32	30.4088	104742.00	5.5844	871912.87	0.0655	1.2025	15.5787	1.8309	0.0946	830.49	0.0697	318.85	0.0242	0.0914	0.2678	8.8433	1.3427	101.9967
ANO8E	Bu 6	Mand I2-R	0.0000	9393.52	3916.98	0.0000	96121.53	0.0000	889408.97	0.1425	0.0295	2.8224	1.1399	0.0000	768.00	0.0000	360.94	0.0257	0.0000	0.4640	4.6238	3.8649	16.7881
ANO8D	Bu 6	Mand I2-R	0.6002	10653.08	10778.43	78.8604	129210.34	16.5619	847088.42	0.0517	0.0229	6.6517	0.8137	0.0896	1617.63	1.0209	402.88	0.0005	0.0926	0.7977	8.1353	1.2148	133.6755
ANO9E	Bu 7	Max I1-L?	0.0000	13473.17	4527.37	134.5052	140429.25	27.6549	840720.88	0.1928	0.0000	12.2907	0.7645	0.0000	321.91	0.0000	323.56	0.0144	0.0000	0.2482	6.4379	2.1467	19.0058
ANO9D	Bu 7	Max I1-L?	1.2894	10348.13	14862.35	45.0960	132140.64	3.0546	840903.79	0.0350	0.0106	6.3992	0.6097	0.0310	1357.12	0.0000	217.09	0.0005	0.1139	0.3745	7.2302	1.0084	104.7907
ANO10E	Bu 7	Max I1-R?	0.0000	11569.97	4863.70	146.2284	148067.28	0.0000	834766.14	0.0216	0.0000	0.1477	0.5483	0.0000	304.50	0.0000	253.72	0.0061	0.3496	0.2271	4.5040	4.4540	18.1806
ANO10D	Bu 7	Max I1-R?	3.7357	9051.81	12713.94	14.8077	132009.08	0.0000	842768.06	0.0509	0.0456	10.8423	1.1004	0.0001	2430.14	0.3065	840.67	0.0042	0.1024	0.6107	44.5843	2.0429	107.8836
ANO11E	Bu 8	Max I1-R	0.0000	9971.74	4738.33	0.0000	159051.41	0.0000	825093.87	0.2703	0.0947	13.6090	1.1414	0.0000	886.88	0.0000	228.95	0.0000	0.0000	0.2215	2.5363	3.3697	7.0833
ANO11D	Bu 8	Max I1-R	1.4701	8716.72	11838.76	46.0284	135640.58	4.6593	841802.40	0.0925	1.3193	30.0804	5.4636	0.0000	1563.55	0.1536	303.89	0.0000	0.0062	0.3829	5.3178	1.3561	37.6418
ANO12E	Bu 8	Max I2-L	0.0000	10776.58	4344.52	113.9959	111995.00	0.0000	871495.60	0.0221	0.0000	3.9410	5.0898	0.0000	1025.08	0.0000	192.90	0.0232	0.2384	0.3425	2.3155	4.4916	7.7480
ANO12D	Bu 8	Max I2-L	1.0236	10625.64	13778.77	48.0098	127116.16	19.3241	846803.28	0.0438	0.0239	2.4951	0.7664	0.0000	1246.53	0.4641	307.70	0.0000	0.0655	0.4088	4.6794	1.3847	43.1878

Figures.



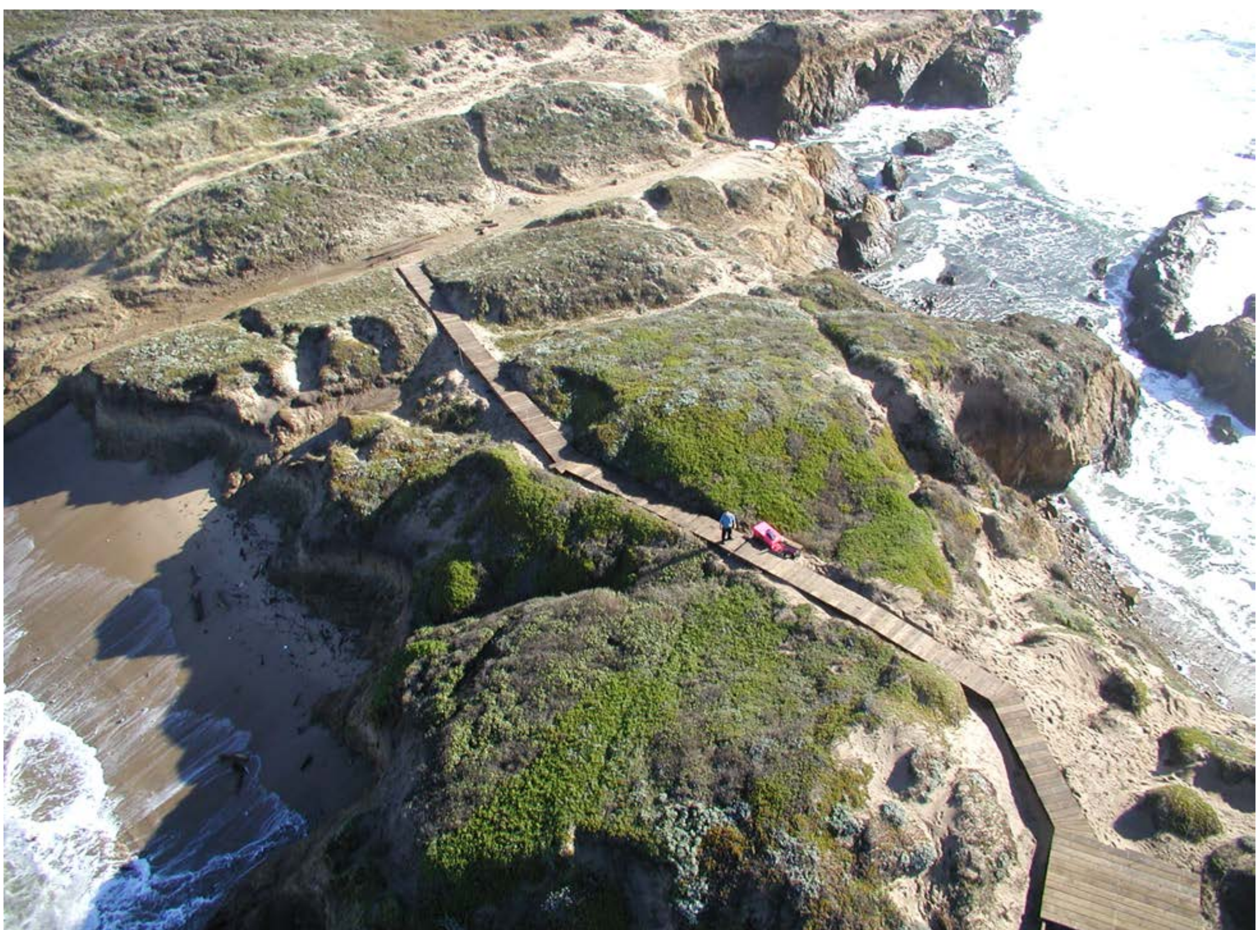
Lines connect different teeth from the same individual
Pb (ppm oxide)
Mg (ppm oxide)
× 10^4
Enamel
Dentin- High Lead
Dentin- Low Lead
AN08D
AN01D
AN010D
AN09D
AN07D
AN02D
AN06E
AN012D
AN011D
AN03D
AN04D
AN06D
AN05D
AN02E
AN09E
AN010E
AN08E
AN07E
AN01E
AN012E
AN011E
AN03E
AN04E
AN05E



Lines connect different teeth from the same individual
Pb (ppm oxide)
Mg (ppm oxide)
Enamel-High Lead
Enamel-High Magnesium
Enamel-Low Lead
AN06E
AN02E
AN09E
AN010E
AN08E
AN07E
AN01E
AN012E
AN011E
AN03E
AN04E
AN05E

APPENDIX E

Miscellaneous Photographs and Documents.




N3609N


N3609N


N3609N


N3609N

Appendix E. Airlift at Franklin Point 2003-01-08

Appendix E. Reburial and Trail Grading.


United
Rentals
bobcat
331


United
Rentals
211955
331
bobcat


bobcat
United
Rentals
X-CHANGE


United
Rentals
bobcat


bobcat
United
Rentals


bobcat
United Rentals
331

Appendix E. Reburial and Trail Grading.

THE EXCAVATION OF TWO COFFIN BURIALS AT CA-SMa-207H FRANKLIN POINT, ANO NUEVO STATE RESERVE SAN MATEO COUNTY, CALIFORNIA

JUNE 14, 1999

Lee Motz, Associate State Archeologist

Richard Hastings, Associate State Archeologist

Cristi Assad Hunter, Archeological Project Lead

Peter Schulz, Senior State Archeologist

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION
RESOURCE MANAGEMENT DIVISION
CULTURAL HERITAGE SECTION
ARCHEOLOGY LAB

EXCAVATION OF TWO COFFINS
BURIALS AT CA-SMa-207H
FRANKLIN POINT, ANO NUEVO STATE RESERVE
SAN MATEO COUNTY, CALIFORNIA

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION
RESOURCE MANAGEMENT DIVISION
CULTURAL HERITAGE SECTION
ARCHEOLOGY LAB

CONTENTS

INTRODUCTION

Franklin Point is located in the Ano Nuevo State Reserve, San Mateo County, California. It is named after the clipper ship the Sir John Franklin. The ship was bound for San Francisco and in heavy fog struck rocks off of the point on January 17, 1865. The ship was destroyed, killing the Captain and eleven men. The bodies of only six of the victims were recovered, four seamen and two officers. The seaman were buried on the point; the officers in San Francisco. The Franklin Point site is designated a cemetery on the 1955, U.S.G.S. Franklin Point, 7.5 quadrangle (Fig. 1). A monument, now missing, to the memory of Edward J. Church (a sixteen-year-old crewman of the Franklin) and the other seamen lost on the Franklin was placed on the point (Fig. 2). Prior to the wreck of the Franklin, the clipper ship Carrier Pigeon ran aground west of the Point (without fatalities) on June 6, 1853. Following the wreck of the Sir John Franklin, the Coya went aground near Ano Nuevo Island on November 24, 1866, killing twenty seven individuals, including the Captain's wife and child. Thirteen of the bodies were recovered and buried on Franklin point. On November 21,1868, the Hellespont, ran aground killing eleven men.The Columbia became stranded on the rocks in 1897 (Alta California, January 19, 1865:1; Le Boeuf and Kaza 1981:37-39; Morrall 1978:54-57).

Dune erosion, in 1980, exposed human remains that were collected by a park visitor and turned into to the ranger office at the reserve. In 1982, a project to excavate the exposed burials was authorized by the Department of Parks and Recreation (DPR). A contract was awarded to the Department of Anthropology, San Jose State University to remove the human remains. Four burials were encountered and archeologically removed (Leventhal and Jermain 1987). In 1993, DPR awarded a contract to Sonoma State University (Meyer 1993) to conduct a sub-surface survey to determine the locations of additional burials. In 1997, further dune erosion exposed additional human remains on the Point and a project to excavate the burials was authorized by DPR and funded by the 1998/99 Statewide Resource Management Program. Associate State Archeologists Lee Motz and Richard Hastings, and Peter Schulz, Senior State Archeologist conducted the excavation during the week of April 26, 1999.

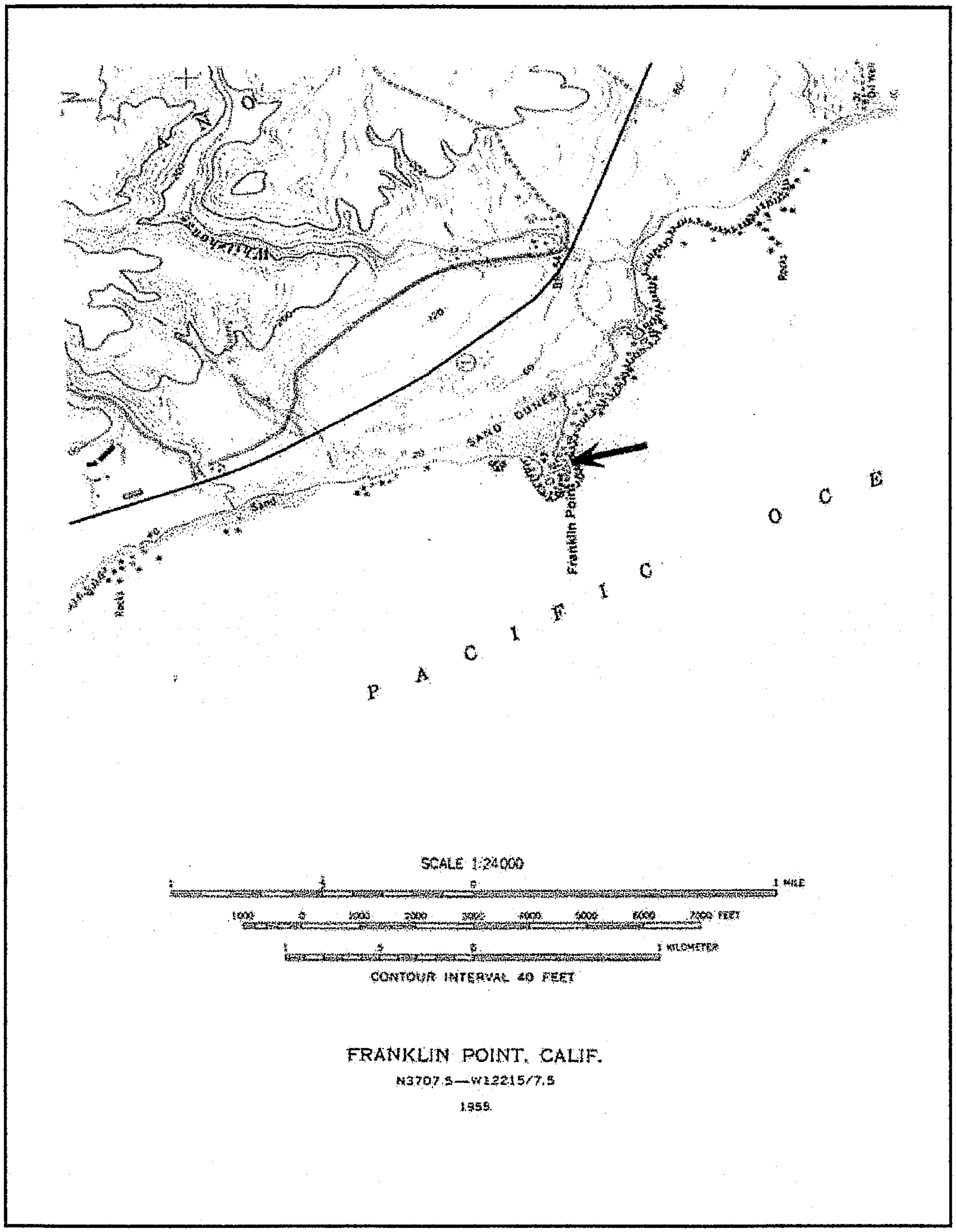


Figure 1. Location (arrow) of CA-SMa-207H.

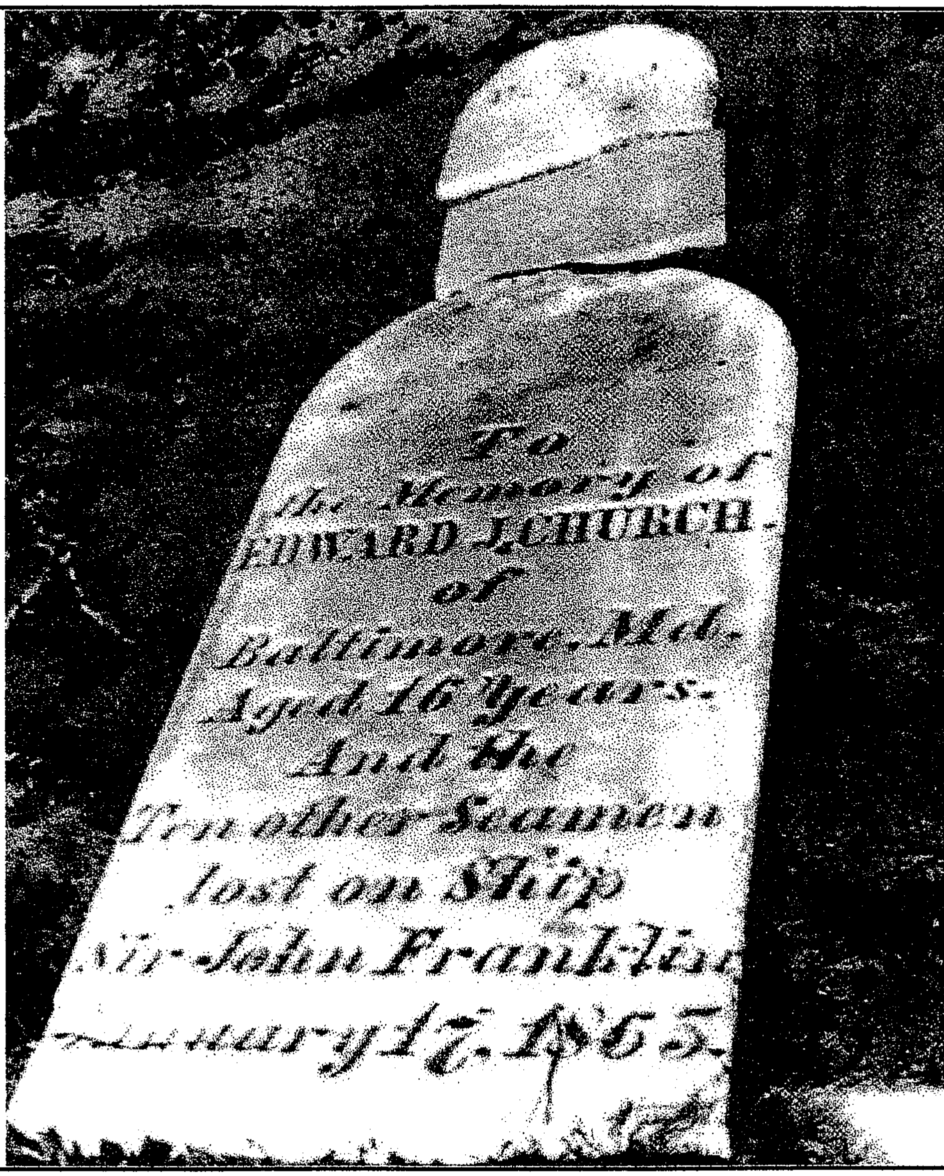


Figure 2. Monument to Edward J. Church and the other seamen lost from the wreck of the Sir John Franklin. Courtesy San Mateo County Historical Society.

FIELD METHODS

CA-SMa-207 is located on a sand dune overlooking the Pacific Ocean, at an elevation of 40 ft. above sea level. The cofffins were partially exposed in a depression eroded in the dune by strong winds. The sides and foot of one coffin (burial 199) and a segment of the south sidewall of the coffin for burial 299 were visible on the surface prior to excavation. (Fig. 3). Excavation began by exposing the upper surfaces of the foot, sidewalls, and head of burial 199 coffin. During this work, the north sidewall of burial 299s coffin was exposed contiguous to the south sidewall of burial 199.
The sand fill in the coffins was excavated with trowels and brushes. Due to wind driven sand, it was necessary to wear safety goggles while excavating. The progress of the excavation was recorded on color print film and detailed drawings were made prior to the removal of the remains. The excavated material was cleaned, cataloged, analyzed, and is curated at the Department of Parks and Recreation, Archeology Lab, West Sacramento.

RESULTS OF EXCAVATION

The archeological work uncovered nearly complete skeletons of two adult males in redwood coffins (1'11" wide x 5'10" long x 10" high. The wood of the coffins was severely decomposed and fragmented when touched. No evidence of a coffin lid remained of Burial 199 and only a remnant of a lid remained of Burial 299.

Artifacts recovered (Fig. 7) consist of a 3-1/2" long pocket knife remnant found on the coffin floor adjacent to the distal end of the left femur of Burial 199, and an iron ring located on the coffin floor next to the cranium of Burial 299.

SKELETAL ANALYSIS

Nearly complete skeletons of two individuals were recovered. Both represent adult males of middle to old age. Time constraints allowed a limited analysis to be performed, which was concentrated on cranial, dental, and post-cranial characteristics most useful in the assessment of age, sex, and health of the individuals. This analysis follows *Standards For Data Collection From Human Skeletal Remains* (1994), edited by J. E. Buikstra and D. H. Ubelaker, whenever possible.

Arbitrary burial numbers were assigned to these skeletons because other human remains have been previously removed from the vicinity (Leventhal and Jurmain 1987). The numbers used consist of Burial 199 for the first skeleton and Burial 299 for the second skeleton that was recovered.

Prior to analysis, the skeletons were carefully cleaned of sand and plant roots. Portions of some of the bones are in a fragile and decomposing condition due to contact with the redwood used for the caskets. This same condition affecting the skeletons was also noted by Leventhal and Jurmain (1987), on previously recovered skeletons. The plant roots have also contributed to damage of the skeletal material.

Analysis Results:

Burial 199:

Sex: Male

Age: 45-55 years old. Age based primarily on the advanced closure of the cranial sutures.

Dentition: The maxilla has caries and a tooth which was lost, antemortem. The caries are located on the right M^1, M^3, and left M^2. The left M^3 was lost antemortem and its alveolus is completely reabsorbed. The right and left first incisors (I^1) had been broken off close to the tooth root with little enamel remaining. These are sharp breaks with no wear and it is not clear if this tooth breakage occurred before or during the event that was the cause of death. No other trauma is evident on the skull or skeleton of this individual.

No caries are present on the mandibular teeth; however, there is a moderate to large amount of dental calculus formation, especially on the lingual face of the incisors. There is some thinning of enamel due to wear on some of the maxillary and mandibular teeth, including the upper and lower incisors, canines, and first molars. None of this wear has completely broken through the enamel layer, however. Evidence of dental hypoplasias is present on the incisors, premolars, and canines indicating that the individual suffered poor nutrition or some type of sickness during childhood which affected the development of the permanent teeth.

Skeletal completeness: Nearly all or portions of most bones were recovered. Some smaller bones of the feet and hands, portions of vertebrae, portions of ribs, portions of the two scapulae, and the distal right ulna are missing or severely damaged and decomposing.

Skeletal damage: The majority of this skeleton was recovered in good to fair condition. The most obvious damage is due to the contact of the redwood casket with bone, resulting in partial and occasionally complete decomposition of some skeletal bone, especially in areas where the cortex is thin. Plant roots caused less damage to the bone, however, fine root hairs growing under the bone surface on some elements has probably contributed to future deterioration and decomposition of the skeleton. As mentioned above, the missing and/or heavily damaged bones or portions of skeletal elements tend to be small and/or are comprised of thin cortex over cancellous or spongy bone.

The cranium is moderately damaged on its left side on the parietal and temporal bones due to contact with the casket wood, resulting in an unstable, flaky surface. The left side of the gonial area of the mandible is similarly damaged.

Burial 299:

Sex: Male

Age: 35-50 years old. Age based primarily on cranial suture closure.

Dentition: The teeth of this individual are in very good condition. Moderate wear of the enamel is present, however, little dentin is exposed. No caries, abscesses, or other dental pathologies or calculus deposit was observed. This individual, also, appears to have evidence of dental hypoplasia, on the incisors, premolars, and canines indicating poor nutrition or illness during childhood.

Skeletal completeness: This skeleton is similar to Burial 199 where usually small bones of the hands and feet, some ribs and vertebrae, and the two scapulae are either missing or damaged. The left patella is completely missing, as is the distal portion of the left ulna.

Skeletal damage: The same type of damage that was observed on Burial 199 is present on this skeleton. Additionally, the occipital area of the cranium has more root damage, including two holes through the bone caused by decomposition. Burial 199 was the older of the two individuals, and with the exception of dental caries, appeared to be in relatively good health. Burial 299 probably was closer to 35 than 50 years in age, with healthy teeth and in relatively good health at time of death. Both individuals have evidence of dental hypoplasias, indicating that the formation of their teeth was affected by poor nutrition or sickness during childhood.

CONCLUSIONS

The coffin of burial 199 was buried contiguous and north of coffin 299, suggesting the burials were contemporaneous and represent victims of the same shipwreck, although it could not be determined to what ship the sailors belonged. The four coffin burials recovered from the site in 1982, most likely represent the four ordinary seamen buried on the point from the wreck of the Sir John Franklin (Levanthal and Jurmain 1987). It is suggested that the two burials excavated during the 1999 project represent victims from the wrecks of the Coya on November 24, 1866, that killed twenty-seven individuals, of which thirteen were recovered and buried on the point, or the Hellspont that grounded on November 21, 1868 killing eleven men.

PROJECT PHOTOGRAPHS

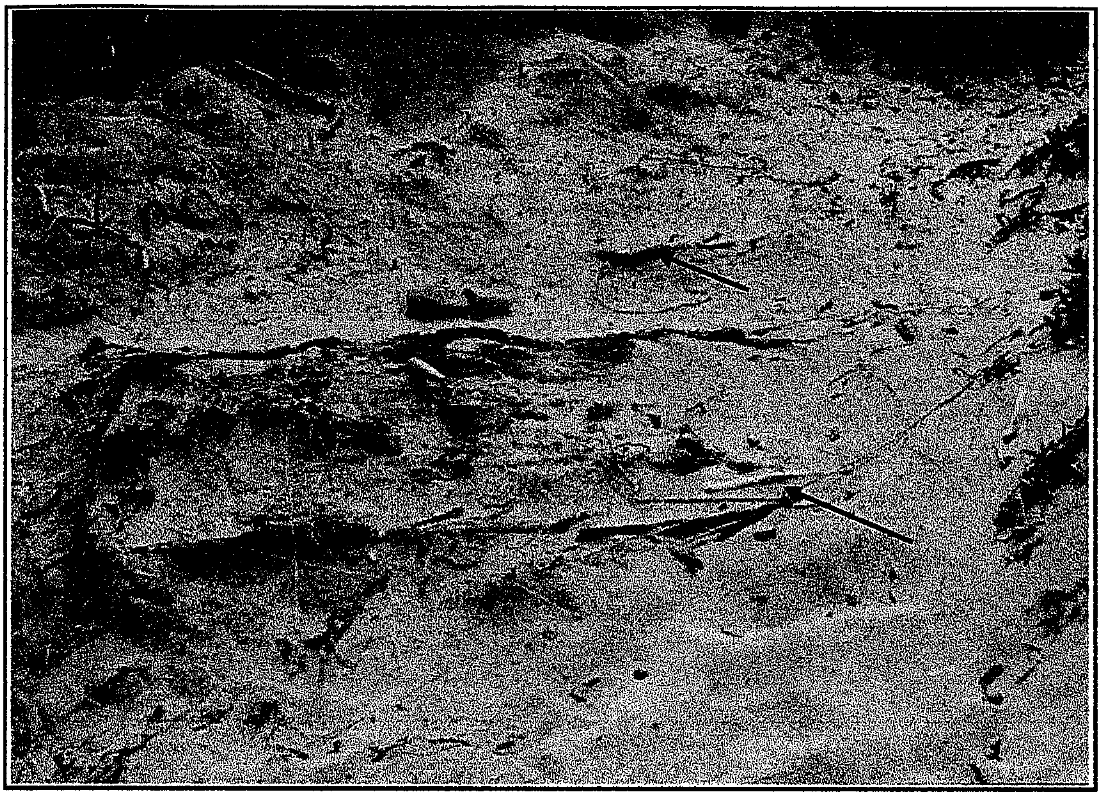


Figure 3. Coffin No. 199 in foreground, note radius (arrow) on surface, and sidewall (smaller arrow) of coffin 299 (DPR Negative 60762).

Figure 4. Burial No. 199 (right) and burial No. 2 being excavated. Note remnant of coffin lid (arrow) of burial No. 299 (DPR Negative 60777).

Figure 5. Burial No. 199 (right) and burial No. 299. Note iron ring (arrow) on coffin floor of burial No. 299 (DPR Negative 60779).

Figure 6. Burial No. 199 (right) and burial No. 299 prior to removal. Blowing sand prevented the removal of all overburden (DPR Negative 60790).

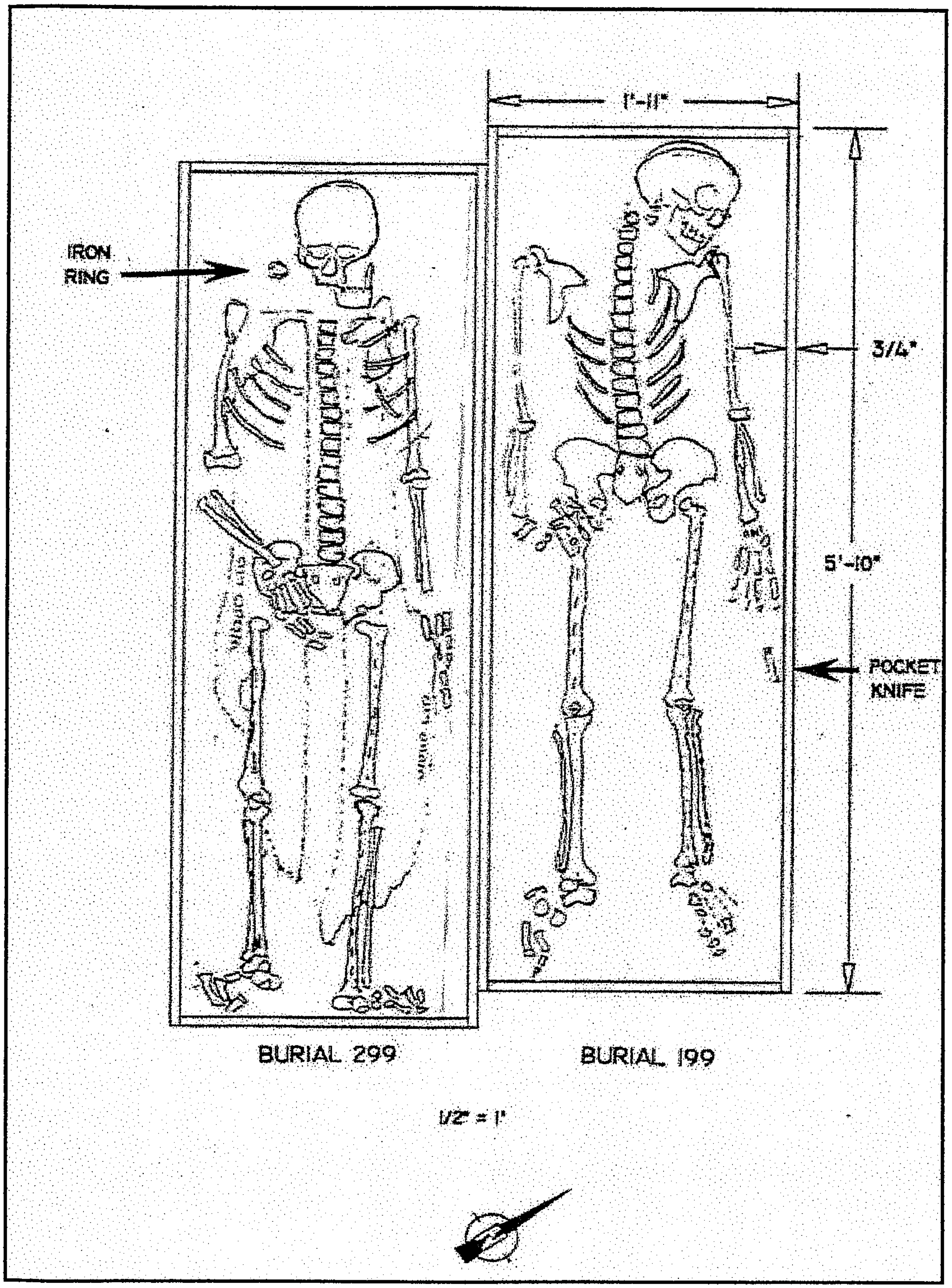


Figure 7. Field drawing of burials prior to removal.

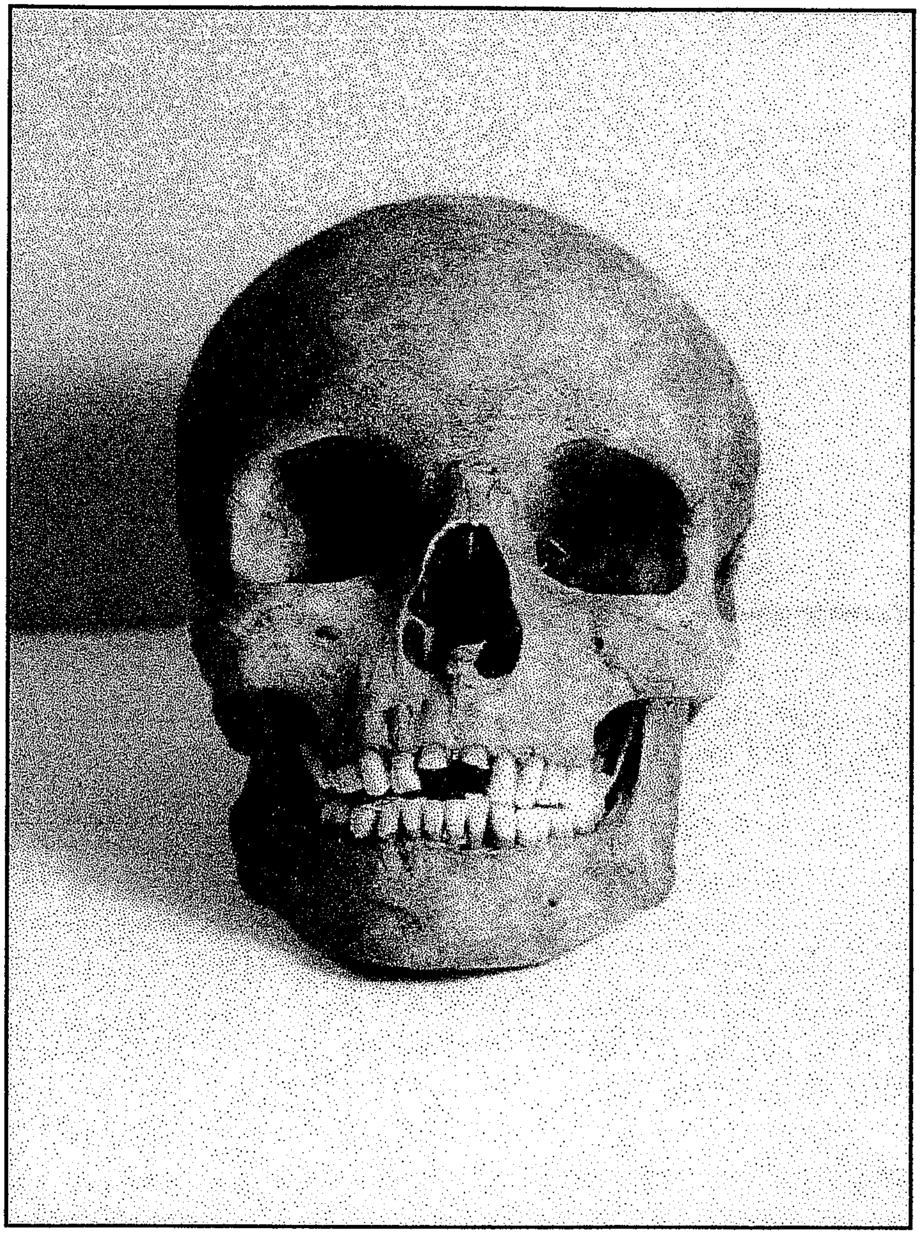


Figure 8. Cranium and mandible of burial 199 (DPR Negative 63526).

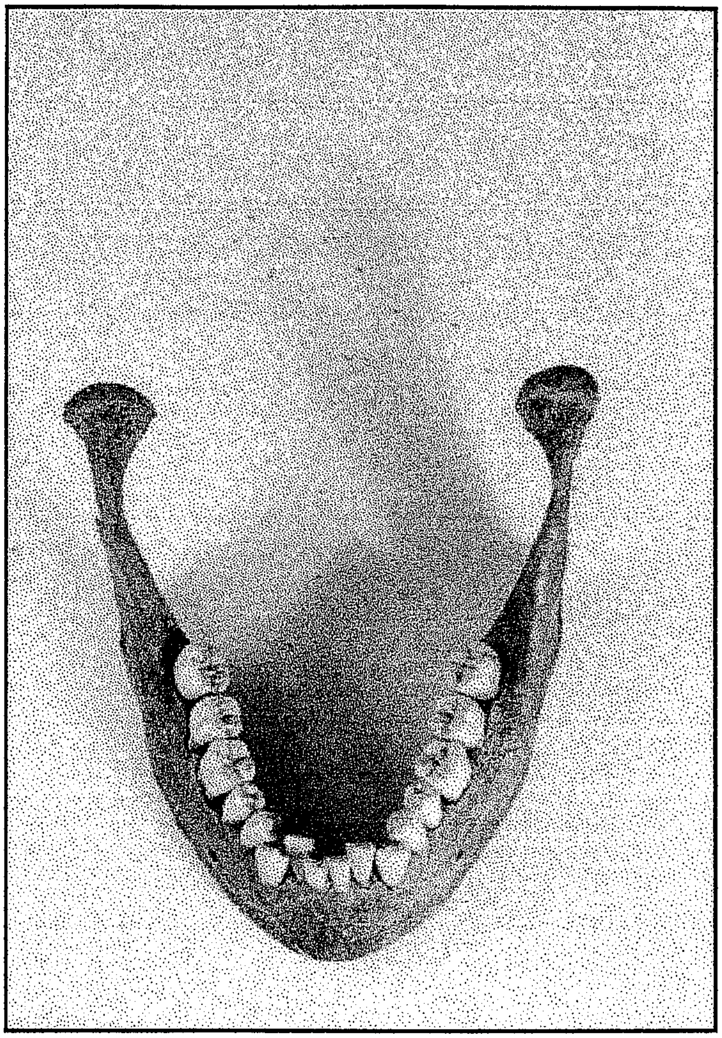


Figure 9. Mandible of burial 199.

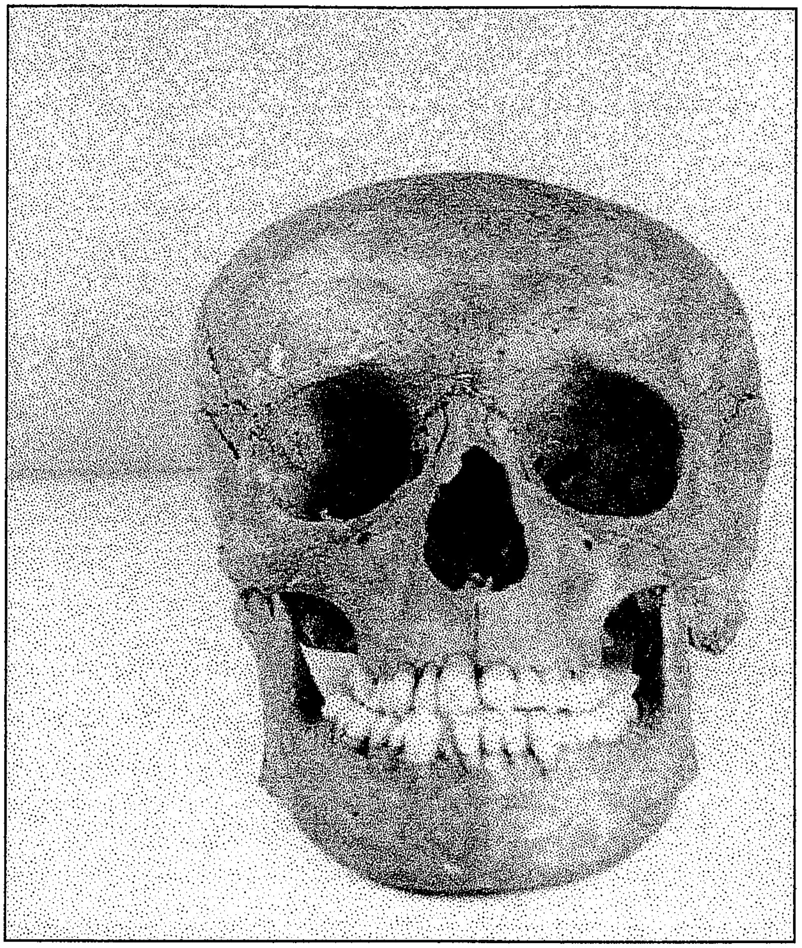


Figure 10. Cranium and mandible of burial 299.

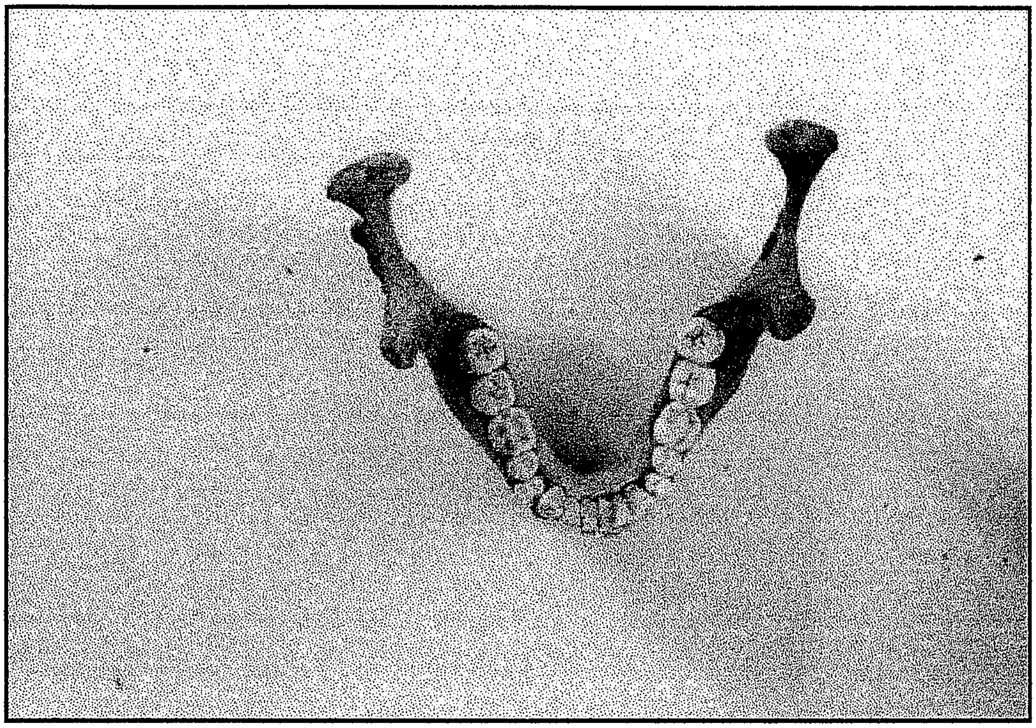


Figure 11. Mandible of burial 299.

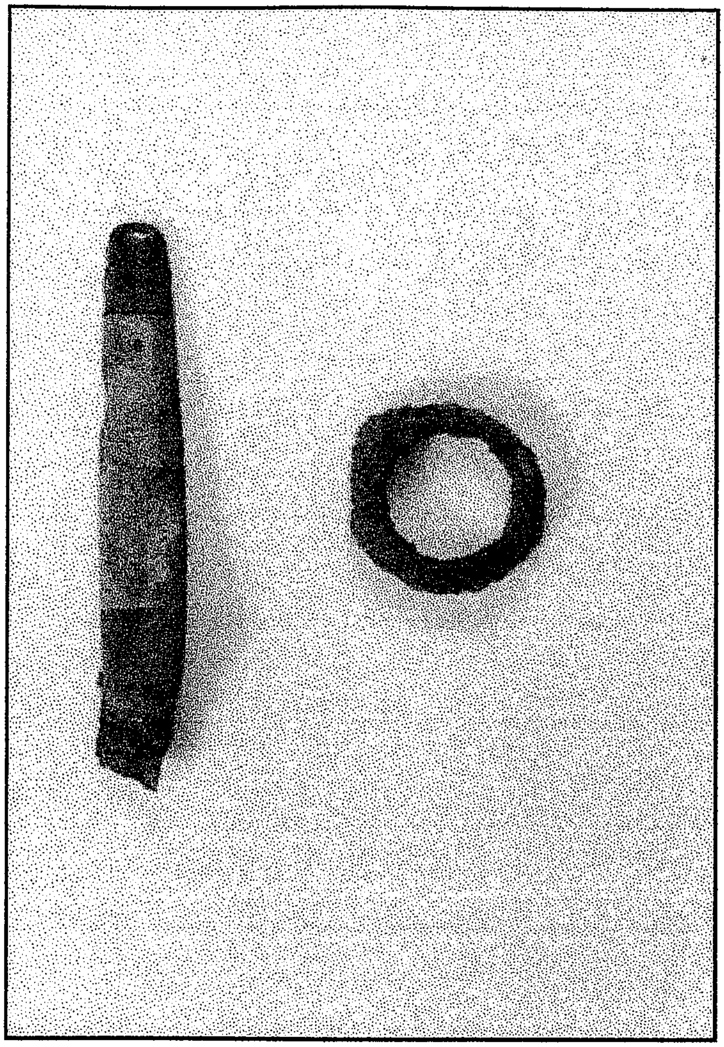


Figure 12. Pocket knife found in burial 199; iron ring found in burial 299.

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FRANKLIN POINT, CA-SMA-207H:

HISTORICAL BACKGROUND AND ANALYSIS OF HUMAN SKELETAL REMAINS OF FOUR SAILORS FROM THE WRECK OF THE *SIR JOHN FRANKLIN*

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HISTORICAL BACKGROUND AND ANALYSIS OF HUMAN SKELETAL REMAINS OF FOUR SAILORS FROM THE WRECK OF THE SIR JOHN FRANKLIN

By Alan Leventhal, Gail Smallwood and Robert Jurmain

INTRODUCTION

On a dark and foggy night, approximately 50 miles south of San Francisco, a large cargo-carrying clipper ship wrecked upon the rocky shore now called Franklin Point. Indeed, the Point is named after the Sir John Franklin which went down on January 17, 1865. Of the original crew of 21 men, only eight survived; the other thirteen men, including the captain, drowned that night in heavy seas. Of those who drowned only six bodies were recovered. Four of the recovered sailors were buried on a sandy bluff overlooking the site of the wreck and a gravestone, which is no longer standing, was erected over the gravesite. The other two bodies were those of officers and were buried in San Francisco. This was the tragedy that befell the 170 foot long Sir John Franklin and its crew.

HISTORICAL BACKGROUND

> The Sir John Franklin was built and launched 5 December 1853 from the yard of John J. Abrahams in the Fells Point District of Baltimore, Md.. Abrahams was a very well known shipbuilder at Baltimore in business from about 1841 until about 1867 with several changes of partners. Sir John Franklin was built for James Frazier of Baltimore who owned a number of ships about the same time. Although built for him he may not have owned her for long or may have had a number of co-owners in partnership with him. (F.E. Chartard, Maryland Hist. Soc.)

In fact, at the time of the wreck, the Sir John Franklin was owned by Lambert Gittings, also from Balitmore. Gittings'

> ...firm conducted an extensive shipping commission business in the West Indies, South America and the Mediterranean. (House Flags at Harborplace, Maryland Hist. Soc.)

The house flag of Lambert Gittings can be seen flying from the mast of the Sir John Franklin in a lithograph taken from an original painting by Pierre Roux (this lithograph is available for viewing at the San Mateo Historical Museum).

The Sir John Franklin was constructed of oak and lignum vitae (a hard, water resistant wood) with fastenings of copper and iron. When complete she measured 170' 8" in length, 35' 8" in breadth, and 17' 10" in depth. She was classified as an A-1 class ship, which pertains to the type of cargo she was capable of transporting. Considered a medium-sized clipper for her time (999 tons), she sported two decks and carried more sail than most merchantmen of her day (Lloyds Registry, 1864).

> According to "Queens of the Western Ocean" by Cultler, she was one of the Mankin Line of packets in 1859, under command of H. Galt, Master. The Mankin Line had many vessels in the twenty years or so that they were operating, sailing from Baltimore to Liverpool. (F.E. Chatard, Maryland Hist. Soc.)

At some time after 1859, command of the ship was taken over by John J. Despeau, who captained the Sir John Franklin until her sinking in 1865.

The Sir John Franklin left New York sometime around October 7, 1864. Heading south on the first leg of the journey to San Francisco, the Franklin made a stop at Rio de Janerio. There she took on the cargo of another ship, the Sir Charles Pennel, also bound for San Francisco, which had put into Rio in distress and was subsequently condemned (Daily Alta California, Jan. 19, 1865). It is possible that at this time Captain Despeau took on an extra hand, known as a supercargo, typically a seaman wishing to exchange work for free passage to another port. Although the Daily Alta California (dated January 23, 1865) lists the supercargo aboard the Franklin as a seaman, he was more than likely a representative of the firm handling the sale and deposition of the cargo from the Sir Charles Pennel. Unlike the ordinary seaman whose bodies were buried at Franklin Point, the supercargo was buried in a cemetery in San Francisco with the captain.

As the Franklin made her way north, she became lost in a heavy fog while still some distance (perhaps as much as 100-150 miles) south of San Francisco.

> Owing to the prevailing fog no observation had been taken for twenty-four hours, and it was supposed that the vessel was about seventy miles off land (Daily Alta California, Jan. 19, 1865).

Sometime between nine and ten o'clock on the night of Janurary 17, 1865 the first officer aroused the captain from his sleep,

> ...and told him he feared they were entering beakers, but the captain replied no; that they were, according to his reckoning, sixty miles from land... (San Mateo County Gazette, Feb. 11, 1865).

The first indication of trouble came when the lookout cried "breakers ahead", which was followed immediately by the order to "wear ship" (Daily Alta California, Jan. 24, 1865), an extremely dangerous manuever whereby the ship is turned suddenly and quickly with as little advance as possible. Before the order could carried out, however, she struck the sand.

> The order was then given to cut away the masts, and while cutting the head-stays, she broke in two forward of the poop and then abaft the forecastle. The officers and men being in the forechannels, excepting one who was in the forecastle, were left on one-half of the deck. At this time the fog cleared so that they could see the shore, but very soon thickened so that all was darkness again. In this condition they drifted close in when this part of the ship capsized and all was terror and confusion (Daily Alta California, Jan. 24, 1865).

A combination of heavy seas, a strong undertow, and large rocks hampered the men in their attempts to reach the shore. Of the original crew of 21 men, only eight survived. Thirteen men, including the captain drowned. The survivors, First Officer Boyd, Second Officer Ball, Third Officer Jefferson Welch, and five unnamed seamen, wandered about for several hours until they came upon a farmhouse where they were taken in and cared for.

> In the morning the neighbors came to their relief with clothing, and kindly furnished Mr. Boyd with means and conveyance (horse and carriage) to your city, and would have sent the rest of the survivors had they desired it (Daily Alta California, Jan. 24, 1865).

On Janurary 19, 1865, six policemen and Mr. Artemis Fletcher, an agent for the New York Board of Underwriters with whom the ship and cargo were insured, were dispatched from San Francisco to take charge of the cleanup operations. Mr. Fletcher was to,

> ...remain on the ground until all that can be saved of the cargo [which consisted of pianos, lumber, men's underclothing, paper, coal oil and whiskey] is recovered (Daily Alta California, Jan. 20. 1865).

Clean-up operations also included the recovery, identification, and interment of the dead.

The majority of the cargo was retrieved, although in a damaged condition, with the notable exception of one hundred barrels of whiskey (originally there had been 300 barrels taken on as cargo from the Pennel). In a letter to the New York Board of Underwriters, Fletcher wrote,

> ...aside from what is already saved, a more perfect mass of ground-up matter I never saw (Daily Alta California, Jan. 22, 1865).

The missing barrels were never found, and the sherriff of Santa Cruz commented that he had obtained a barrel of the "original stuff" (Santa Cruz Sentinel, Jan. 21. 1865) and,

> ...though great quantities of liquor were in reach, everybody was sober, save one or two men sent down from San Francisco (Daily Alta California, Jan. 23, 1865).

The salvaged cargo and the remains of the Franklin were sold at an auction Janurary 21, 1865 in Santa Cruz. The Steele Brothers, Santa Cruz lumber magnates, purchased the remains of the ship (presumably for its wood) for $975 (Santa Cruz Sentinel, Jan. 21, 1865).

Of the thirteen men who drowned, only six were ever recovered. Seamen John Devine of Liverpool, Charles Martin of Norway, and John Sooltine and Jacob Staten, both of Finland, were buried on a sandy bluff at the site of the wreck (Daily Alta California, Jan. 23, 1865). A gravestone (Fig. 1) was erected at the spot by the family of Edward Church, one of the lost seamen, but it has since disappeared. Fig 1 (was Fig 12)

The bodies of Captain Despeau and Supercargo Robert Dawson Owens were taken to San Francisco and buried at Lone Mountain Cemetery on Janurary 24, 1865 (Daily Alta California, Jan. 24, 1865). This cemetery was later moved to the Cypress Lawn Cemetery in San Francisco, the bodies being deposited in a mass grave.

The tragedy of the Sir John Franklin and that of the vessel, Carrier Pigeon, in the same area twelve years before, led to the building of a lighthouse at Pigeon Point in 1872 to protect future ships from a similar fate. Since that time, the land around Ano Nuevo, Franklin and Pigeon Points has been acquired by the California Department of State Parks and Recreation, the last parcel of land being obtained in 1978.

On May 18, 1980 two beach strollers discovered a human cranium and two cervical vertebrae protruding from the sand near the very tip of Franklin Point, now part of the Ano Nuevo State Reserve. Officials from the Sheriff's office, the county coroner and a state park ranger were contacted and reviewed the area of erosion. Dr. Rodger Heglar, a forensic Anthropologist from San Francisco State University, and Miley Holman, Matthew Clark and Randy Wiberg, representing Holman and Associates, also became involved in the review and evaluation process. At first, due to context and location, the cranium was tentatively identifed by the coroner's office as "probably Indian". Later, Dr. Heglar identified it as a historic non-Indian skull. It was then suggested by Holman and Associates to rebury the cranium and associated skeletal elements on site.

Clark (1980), offered an evaluation of the resources at Franklin Point.

It was his opinion that, "The archaeological site at Franklin Point presents several problems in cultural resource management, in areas of site definition, resource preservation...and significance evaluation". The cultural resources observed by Clark and Wiberg when they recorded the site were both historic and prehistoric in nature. It was the opinion of Clark (1980) that, "In all likelyhood the site is contiguous with the huge sites at Point Ano Nuevo". Several prehistoric hearth features, shell concentrations, burnt and unburnt faunal remains, and abundant lithics were observed at this site. Clark (1980) goes on to say, "The archaeological site at Franklin Point is of such extent and so obvious that I was amazed to find that it had never been registered, even though it was on State Beaches property...". The historic resources were also fairly apparent. Fragments of redwood coffins, metal nails and hoops were found. Even the USGS Franklin Point Quad. map displays a cross indicating a gravesite. Park Ranger, Walter Ward, was interviewed at the site by Clark. Ranger Ward had fairly extensive knowledge of the history of the Point and knew that it was named after the clippership Sir John Franklin. He knew that the dead crewmen were buried there, but no one knew how many or how extensive was the cemetery (Clark 1980).

In April 1982, the site was again inspected by state archaeologists, and further exposure of human bones was noted (Foster 1982). Immediate recommendations were made in order to minimize negative impact on the gravesite by visitors and wind erosion. Arrangements were then made with the Department of Anthropology, San Jose State University, to excavate and remove all the human remains with a volunteer crew. Fieldwork began on June 2, 1982 and was completed on the following day. Under the direction of two of the authors (Jurmain and Leventhal), a field crew comprised of eight students carefully excavated and removed the remains of four buried individuals and associated historic materials including the remnant coffins. Laboratory analysis of the skeletal and historical materials began shortly thereafter.

In April 1984, after the analysis was completed, we were again contacted by Dr. Peter Schulz of the Department of Parks and Recreation, who informed us that they had located the cranium originally collected in 1980. We received a package of materials including the cranium, several vertebral and other skeletal elements, and three buttons as well as shroud and shoe fragments.

FIELD METHODS

During the last week in May 1982, Dr. Robert Jurmain, Dr. William Hildebrandt and Mr. Alan Leventhal first visited the site (Ca-SMa-207H) in order to assess the situation and develop a field strategy. At least one burial was then eroding out of a swale area on the windward side of a large sand dune, and many sun bleached skeletal elements were observed scattered down slope of this main burial locus. The wide scatter of elements presented an additional problem for the recovery program. In order to expedite excavation and impose control over a large area, we set up two north-south and east-west baselines, thus dividing the site into four quadrants. Each quadrant was given a general reference number for subsurface recovery control: Southwest Ref. 11, Northwest Ref. 12, Northeast Ref. 13, Southeast Ref. 14. All surface skeletal elements were carefully collected and mapped to the nearest centimeter and assigned a reference number 10 (e.g. 10-1, 10-2, etc.). Each of these elements was then assigned a field-specimen number. A total of 47 elements were collected and mapped (Fig. 2). After each quadrant was surface collected the area was then subjected to a subsurface recovery process.

Fig 2 (was Fig 1)

Fig 3 (was Fig 2)

Excavation was accomplished by shoveling the dune deposit (to a depth of approximately 15 cm) through a one-eigth-inch mesh screen. All specimens recovered were collected into unit level bags to be sorted and catalogued in the laboratory.

A main site datum, as well as several surveyed points of reference were established for control of orientation and elevation of the burials. All bone (human and non-human) historic wood, metal and prehistoric lithic debris were given equal treatment, mapped in place and saved.

Once the surface scatter of osseous elements had been mapped and collected, the main phase of the excavation began -- i.e., the recovery of the interred individuals. Initially, the full scope of the work was unknown, as various accounts reported anywhere from four to twelve sailors buried at this site.

From surface inspection, it was readily apparent that the main burial locus lay on the highest aspect of the dune in a slight swale. All surface elements were found to the west of, and downslope from, this locus (Fig. 2). In addition, to the extreme south of the swale, the decaying remnants of a redwood coffin lid were visible. Fig 4 (WAS Fig 3)

Accordingly, excavation was begun with this burial (designated Burial 1). Another crew began subsurface testing approximately two meters to the north in order to allow ample workspace.

Before Burial 1 could be exposed, the coffin lid was carefully removed. Most of the original lid was present, but the wood was extremely fragile and fragmented upon handling. The lid had caved-in (particularly at the north end of the coffin) under the weight of the sand above, but we were able to expose most of it reasonably intact and take photograhs before removal (Fig. 5). Fig 5 (WAS Fig 4)

We then began to expose the burial by pedestalling all elements <u>in situ</u> wherever possible. Soil conditions, however, presented some difficulties; as soon as an area was cleared, the sand tended to cave-in from the side. Moreover, severe winds blew sand back into the gravepit (and also made record keeping difficult).

The burial was mostly present (except the cranium). However, preservation varied dramatically. Some elements were intact while others were completely decomposed. It was clear immediately that any elements in direct contact with what had been the redwood coffin floor (vertebrae, posterior proximal and distal femora, calcanei, etc.) were those most deteriorated. Indeed, the left femur was missing altogether (Fig. 6). Fig. 6 (WAS Fig 5)

This burial — as well as the others — was oriented in an east-west direction (N 65 W, magnetic north) with the head to the west. Once all elements had been exposed, the burials was removed for transport to the Laboratory. Shovel testing was done below and to the south of Burial 1.

Curiously, and in obvious secondary context in the dune immediately adjacent to the south, a human mandible was found. Subsequent testing revealed several other elements, including a partial scapula, carpal phalanges, two partial vertebrae, and two rib fragments.

It would be more than a year later -- only after another cranium (presumably the one retrieved previously in 1980) was delivered to us by the Department of Parks and Recreation that we were able to determine to which burial these remains most likely belong. While in close proximity to Burial 1, some of these remains could not be derived from the same individual (there was an extra left scapula); therefore, a separate reference number (1A) was assigned.

Meanwhile, the excavation crew working immediately to the north had uncovered the upper part of another coffin. As with Burial 1, the coffin lid was removed (although it was considerably less well preserved) before Burial 2 was exposed. The mixed pattern of preservation seen in Burial 1 was again observed — elements in contact with the coffin were uniformly the most deteriorated. Both upper appendages were completely missing. It was thus concluded that the acid soil environment within the decomposing coffins created conditions most unfavorable for bone preservation. The legs were present, but many bone surfaces were deteriorated. Around the legs fragments of a woolen weave fabric (a garment, probably pants or a blanket/shroud) were observed. Fig 7 (was Fig 6)

Fig 8 (was 7)

Following removal of Burial 2, shovel testing was undertaken, and approximately 1 meter to the west of the truncated coffin and buried under approximately 80 cm of sand a nearly complete cranium (with mandible) was discovered. Apparently, following interment, the front of the coffin collapsed pushing the cranium and other elements out. The much better preserved state of this cranium further confirmed our hypothesis concerning the detrimental effects upon preservation within the redwood coffins.

Immediately between Burials 1 and 2 (in fact, in contact on both sides) another burial (Burial #3) was found. Unlike Burials 1 and 2, however, no coffin remains were observed on the surface, and this grave was discovered only after subsurface testing. The skeletal remains presented the same pattern of preservation noted above. The only elements present were the caudal end of the vertebral column, the pelvis, and the lower appendages. The feet were reflexed medially with the toes pushed flat against the floor of the coffin. This position of the feet was most likely the result of binding the burial at the time it was interred. The upper body was completely missing, reflecting disturbance by erosion. Many of the elements scattered downslope (discussed above) may have been from this individual.

Fig 9 (was 8)

Fig 10 (was 9)

Fig 11 (was 10)

Shovel testing to the north of Burial 2 revealed yet another grave. As in Burial 3, the upper part of the body was not present, most likely reflecting erosional disturbance. And, similar to Burial 2, shovel testing following removal of the skeleton, exposed a calvarium approximately 1 meter to the west of the end of the coffin. In this case, however, the mandible was not found.

Fig 12 (was 11)

As we noted above, another calvarium and a few other fragmented elements were delivered to San Jose State in April 1984. From matching according to size, occlusal surfaces, and degree of attrition, it was concluded that this calvarium was not associated with the isolated mandible (1A), the former most probably belonging to Burial 3 and the latter most probably with Burial 1.

FRANKLIN POINT BURIALS: A SKELETAL ANALYSIS

By Carol Vierke and Leslie Knott, M.D.

This paper is an analysis of the osteological remains of four shipwrecked sailors from Franklin Point, north of Ano Nuevo State Reserve, California. The analysis included aging, stature determination, basic osteometrics, and determination of osseous pathological lesions.

LABORATORY METHODOLOGY

All materials recovered from the Franklin Point site were brought back to the San Jose State University Anthropology Laboratory for cleaning cataloging, and curation. The tools used to clean the osteological material were: Dental pick, toothbrush, 1 1/2" soft-bristled paint brush, and scalpel. The bones were cleaned of sand and left to air dry on trays overnight. In some cases, it was necessary to remove the bone adhering to shroud material with a scalpel. The osteological material, excluding the crania, were stored in wooden drawers lined with bubblepack and temporarily labeled. The crania were stored in small cardboard boxes lined with styrofoam and housed in a glass cabinet.

An experiment was performed on some of the historic artifactual remains to test the effectiveness of two different preservatives, Tetraethyl Orthosilicate and Amlguard. These were applied with a 3" paint brush to shroud, coffin, and fragments of leather. A comparison of these two preservatives revealed that the Tetraethyl made the shroud more brittle, and the coffinwood became distinctly more soft and crumbly. When applied to the shroud, however, the Amlguard maintained the shroud's structure without losing its texture. Moreover, wood and leather also became less fragile following application of Amlguard.

Sexing, Aging, and Population Ascertainment of Skeletal Material

Sexing the four skeletons independently of historical information would pose serious obstacles. The pelvis, generally recognized as the most reliable area for sex determination, is missing or severely damaged in every individual (see below). The crania, in three cases are well preserved, but sex determination from this part of the skeleton is only accurate when comparison is made with a reliable reference population (as we are dealing with 19th Century individuals from Finland, Norway, and England, this is not possible). In any case, no evidence from the crania or other skeletal elements contradicts the historical evidence that these are indeed males. Population ("racial") determination from skeletal material is an even more hazardous venture based primarily on statistical analyses that allow discrimation between a narrow range of choices (e.g., White or Black). As the historical documentation provides a much less ambiguous population determination, specifiic as it is for the four individuals' country of origin, this evidence is assumed to be accurate.

Aging of osteological material is usually derived from three major indicators of the skeleton: The pubic symphysis, the stages of epiphyseal union, and dental eruption (Bass 1971; Brothwell 1981). Aging the Franklin Point sailors proved difficult due to the fragmentary and decomposed state of the skeletal remains. In reviewing the pubic symphysis, the following observations were noted:

Burial 1 has both right and left innominates, but the pubic symphysis on both sides has deteriorated due to contact with the redwood coffin.

Burial 2 has both right and left innominates with no pubic symphysis on either side.

Burial 3 has right and left innominates, but lacks so much of the pubes, that they again offer no help in aging this individual.

Burial 4 has no innominates present.

These pelves, then, could not be used in making successful age determinations.

The second criterion for age determination is epiphyseal union. From careful examination, all epiphyses were fused in all individuals, suggesting their minimum age was at least 16 years (Brothwell 1981).

The last means of ascertaining age is tooth eruption as well as degree of dental attrition. Of course, for adults, this means of analysis is only approximate at best. In any case, of the four burials that were recovered, only one cranium, one calvarium, and one mandible were found in association with the skeletal remains. The cranium in association with Burial 2 has both upper and lower teeth with only minimum wear to the molars (the third molars are completely erupted). A calvarium (skull without a mandible) is associated with Burial 4 and displays poor-looking teeth. Some of the back teeth have only roots remaining, some have caries, and still others are missing due to post-mortem loosening of teeth which eventually fell out. The upper third molar is erupted on the right side but remains unerupted on the left side.

In addition, there is the isolated mandible (1A) which is most probably associated with Burial 1. It has recently erupted third molars, as evidenced by a minimum amount of tooth wear. Finally, the additional cranium supplied to us is now provisionally assigned to Burial 3. It too shows only slight dental attrition to the upper right second molar (the only tooth present). In estimating the age of these indiviudals using dental criteria, the following was concluded:

Fig 13

Burial 1 — indeterminate (no dental data); Burial 1A (associated with Burial 1?) — young adult, 18-21 years.

Burial 2 — approximate age, 21 years.

Burial 3 — approximate age 21 years.

Burial 4 — approximate age, 25-35 years.

Osteometrics

All measurable long bones as well as the three preserved crania are measured. The femora from each burial are measured according to standard techniques (see Bass 1971) on an osteometric board. From the length of the femur a stature estimate (providing high and low ranges) is derived using regression formulae developed by Trotter and Gleser (1952). The results are listed in Table 1.

After the high and low ranges are obtained, the two figures are added together and divided by two in order to yield an "average" (i.e., midrange) estimate for each individual. The centimeter score is then converted into feet and inches. By modern standards these sailors are within the range of 5´5" to 5´10".

Table 2 tabulates metric determinations from all measurable long bones on which a total of ten different measurements were possible (4 on the humerus, 1 on the radius, 2 on the femur and 3 on the tibia).

The final set of metric analyses involve the crania. These include six standard measurements that follow those most commonly used by anthropologists doing metric analysis (Bass 1971) These measurments are also applied to five standard indices in order to provide some indication of overall shape.

There is a large degree of variation among these three adult crania, particularly in size. Burial 2 is distinctly more robust than either 3 or 4. Overall, cranial distances are significantly larger in the cranium from Burial 2, but most shape dimensions correspond fairly closely among all three crania. For example, although the maximum cranial length of Burial 2 is 10% larger than Burial 4 and 7% larger than Burial 3, the cranial indices are remarkably similar (Burial 2: 76.9; Burial 3: 74.7; Burial 4: 76.3). Fig 14

Indeed, the only notable difference in shape seen among these three crania is the degree of flatness of the cranial base; Burial 2 displays a flatter cranial base than either 3 or 4 (Flatness index: Burial 2: 11.8; Burial 3: 14.6; Burial 4: 15.5).

INDICATIONS OF PATHOLOGICAL CHANGES

In spite of post-mortem loss of teeth from all crania and mandibles, dental caries are the most prominent antemortem defect found in the materials . Caries are present in the left lower first molar (where it is so severe that the crown was destroyed) and second molar of the mandible, 1A. In addition, caries are also found in the calvarium of Burial 4, affecting seven different teeth: The left lateral incisor, first and second molars, and the right lateral incisor, two premolars and first molar (in all cases the carious lesions are severe destroying most of the crown). No caries are seen in the mandible or maxillary dentition of Burial 2 or in the one tooth present in the cranium from Burial 3. Fig 15

As a result of the severe dental caries, particularly in Burial 4, other complications arise. In this individual partial socket resorption is seen in both the upper lateral incisors; indeed, antemortally these two teeth were probably held primarily by soft tissue anchors. In addition, in this same individual slight periodontal disease is manifested in the form of mild periostotic reaction around the left upper first molar and slight loss of bone volume around the upper right second and third molars. No evidence of abscesses, calculus, or (as is sorely demonstrated by Burial 4) dentistry is evident.

In addition, dental attrition is scored for all teeth following the 8-grade ordinal sytem developed by Molnar (1971). In most cases, tooth wear is not appreciable; however, one interesting exception is seen in Burial 2. In the first premolars, especially on the left side, distinctive polished concave wear facets are seen -- looking very much as though something were consistently pulled through this specific area. Curiously, no other elements are affected.

Other than these dental changes, pathological lesions of other elements are noted in only a few instances, some questionable. A left rib from Burial 1 shows a deformity in curvature and a slight enlargement of the cortex near the head. X-ray analysis revealed an increased density of the underlying cancellous portion and only slight thickening of the cortex. Fig 16

The most likely etiology of this lesion is a healed fracture.

Also in Burial 1, the right tibia displays localized elevations of the periosteum at a point 150 mm from the distal end where the lesion extends 18 mm horizontally and 8 mm vertically. A further raised area is also seen 105 mm from the distal end (extending 13 mm horizontally and 10.4 mm vertically) as well as much smaller hyperostotic reactions 82 and 130 mm from the distal end. An x-ray of this tibia revealed no underlying cortical disturbance and was, in general, non-diagnostic. The cause of these elevations was perhaps repeated traumata — such as striking the shin against a sharp object. The possibility of scurvy was also considered, but this individual (or the others, for that matter) showed none of the diagnostic lesions of this disease. It must be pointed out, however, that differential diagnosis of scurvy even with the best-preserved of materials is no easy task (Ortner and Putschar 1981). Fig 17

In the cranium associated with Burial 3 a slight (healed) cribra orbitalia is seen in the left orbit. Commonly associated with metabolic/dietary stress (most notably, iron deficiency anemia) (El-Najaar et al. 1976), this condition perhaps bespeaks of the poor diet among common sailors in the Nineteeth Century — especially among those who shipped on long voyages.

Among those human elements recovered from the surface scatter, only two show any evidence of pathological changes. One — a lumbar vertebra — reveals on its superior body an erosion measuring 18 X 6 mm; an x-ray of this lesion indicates a depth of approximate 4 mm. Other than stregthening of the cancellous structure around the perforation, no evidence of cancellous disintegration is seen. This lesion thus represents what is referred to as a "Schmorl's node" and was probably asymptomatic during life. The other surface element displaying pathology is an unassociated Fig 18 upper canine with a small carious lesion.

In summary, dental caries is the most notable pathological change found; they occur in two separate individuals involving two teeth in a mandible and seven teeth in a cranium. All caries except two extend extend deep into the roots and were probably symptomatic. A carious lesion is also noted on a disassociated canine lying on the surface. One individual represented by a cranium and mandible is free of any caries in the teeth most vulnerable to attack; a number of incisors and canines are missing, but the pre- molars and molars are present and are unaffected. As to other pathologies, slight socket resorption and periodontal involvement are seen in the maxilla of the individual with the most severe caries (and probably result from them), an unusual pattern of wear is seen in the premolars of another individual (proably occupationally induced), a suspected healed rib fracture and possible antemortem traumata to a tibia are seen in another individual, a slight healed cribra orbitaliais noted in the last burial, and an asymptomatic Schmorl's node is observed on a disassociated lumbar vertebra.

It is probable that dental caries were a very common problem among seamen of the last century who, owing to long absences from land and low wages, had difficulty obtaining dental care.

OVERVIEW OF HUMAN REMAINS*

Burial 1 consists of 86 human elements. These are in a very poor state of preservation with much of the bone deteriorated and fragmented. This is probably due to several factors: The acidic action of the redwood coffin, the ocean climate, as well as wind and sand erosion. The upper and lower limbs are mostly complete, except for one radius and ulna which were missing. The vertebrae are fragile and fragmentary. Most of the cervical and lumbar vertebrae have either deteriorated away or are missing. The carpal bones appear wood-like (taking on the composition of the redwood with which they were in contact).

Burial 1 (A) consists of a mandible, two partial vertebrae, two rib fragments a partial scapula, and a hand phalanx. All these elements were found in the sand dune, outside the southwest corner of the coffin of Burial 1. This osteological material is in general in better condition than that found within the coffin and did not display the dark brown color and decomposed state of the other burials. While found in close proximity to Burial 1, these elements are almost certainly in a secondary context to it — located as they are at a higher level than the coffin remains. It seems most likely that the mandible belongs to Burial 1, but this cannot be demonstrated unambiguously. On the other hand, the partial left scapula (including a glenoid and part of the acromion process) cannot belong to Burial 1 — which already has most of a left scapula present. Accordingly, a separate reference number is assigned to this mandible and other elements.

Burial 2 has 44 human elements which are in good condition, except for the fibulae and innominmates which are more deteriorated. The tarsals — both left and right — are fairly well preserved. The foot phalanges and upper limbs are missing.

Burial 2 (A) is composed of 31 elements. The left humerus has a post-mortem fracture and is in extremely poor condition. Most of the cervical and thoracic vertebrae are in a good state, displaying only slight decomposition. The cranium has a large opening in the left frontal area above the eye orbit which is probably due to deterioration. The rest of the cranium, however, has good preservation. From their location it is quite Fig 19 clear that these bones are associated with Burial 2.

Burial 3 consist of 39 elements. The vertebrae are greatly deteriorated with only a few spinous processes intact. Most of this material is fragmentary, except for the lower limbs and tarsals. In addition, there was a radius and ulna in the side wall between Burials 1 and 3 (referenced as 3A).

Burial 4 is the least complete burial, consisting of only 35 osseous elements. The preservation of this individual is poor with some elements resembling wood in composition.

Burial 4 (A) contains a calvarium and is thought to be associated with Burial 4. This calvarium is in a good state of preservation, except for the teeth. As with Burial 2, this better state of preservation is most likely due to the provenience of the crania outside the coffins under several feet of sand. Fig 20

Extra Cranium In April 1984 we received an additional calvarium from the State Department of Parks and Recreation. Presumably, this is the same calvarium which was recovered in 1980 and was later transferred to the San Mateo County Coroner. When we were given this calvarium, however, the only information available was that, "It derived from Franklin Point".

Overall morphology of the calvarium, state of preservation, and degree of dental attrition matched quite closely with cranial remains already excavated at Franklin Point. Thus it was clear that this calvarium shared the same context as the other Ninetheenth Century historic burials.

It then became a matter of trying to match this calvarium with the other human remains from the site. The skull (lacking a mandible) was quite complete, with a broken section in the right parietal and temporal measuring 40.3 mm X 42.7 mm. This breakage appears to have been caused by a puncture — perhaps, at the time of death, or post-mortem. In addition, the right zygomatic is slightly damaged, and the left side of the maxilla and left zygomatic arch are very eroded. Finally, the top of the cranium is somewhat crushed (also at the time of death?) partly obscuring the position of glabella. The only tooth present is the second right molar.

Age determination from this calvarium is open to question. Certainly, it is from an adult: The spheno-occipital suture is fused, and the vault sutures are mostly obliterated (90% exocranially and 100% endocranially). Overall, an age estimate of "young adult" did not disagree with the post-cranial remains from Burial 3 (18-25 years). However, the admittedly imprecise criterion of cranial suture closure would argue here for an unusually advanced stage for a young adult.

The morphology of this cranium was checked against the only non-associated mandible available (1A). The size of the upper and lower jaws matched quite well. However, the attritional pattern and occlusal planes of the upper and lower molars did not match. It was thus concluded that the jaw (1A) and the calvarium were not from the same individual. As a result, we were left with an ambiguous situation including a disassociated mandible and calvarium. Clearly, neither belonged to Burials 2 or 4. Primarily on the basis of proximity, we tentatively assume that the mandible belongs with Burial 1 and, therefore, the calvarium must belong to the only remaining individiudal, Burial 3. However, since both Burials 1 and 3 are fairly gracile, these associations must be regarded as provisional.

Surface Material The surface osteological material — not in clear association with any of the coffins -- consists of 94 human elements. The bone appears bleached and weathered (some elements are fragmentary). They do not show the dark brown color of the bones derived from the coffins. It remains unknown to which of the four individuals these disassociated elements belong.

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Table 1 Estimation of Stature

Burial No.	Femur Length *	High Range	Low Range	Average
1	455 mm	175.0 cm	167.2 cm	171.4 (67.5")
2	460	176.2	168.3	172.2 (67.5")
3	410	164.6	156.7	160.6 (63.5")
4	430	169.2	161.4	165.3 (65.5")

* Maximum length to nearest mm, as determined on osteometric board.

Table 2 Osteometrics from the Postcranial Skeleton

	HUMERUS				RADIUS	FEMUR		TIBIA		
Bur #	Max Lg	Max Hd	Circum	Max Di	Max Lg	Max Lg	Circum	Max Lg	Ap Di	Ml Di
1	336(R)		66	30.60	236	455(R)	87			
2						460	89	384	44.20	20.65
2								379(R)	43.35	27.30
3						410(R)	79			
4								356	42.70	23.80
4						430(R)	78	351(R)	42.25	24.20
Surface					223					

Max Lg = Maximum length (humerus, radius, femur, tibia) -- osteometric board
Max Hd (humerus) = Maximum head diameter -- sliding calipers
Circum (humerus) = Least circumeference of shaft 1mm below nutrient foramen -- osteometric tape
Max Di (humerus) = Maximum diameter of the shaft at midpoint of shaft -- sl. calipers
Circum (femur) = Maximum circumeference at midpoint of shaft -- osteometric tape
Ap Di (humerus) = Anterior-posterior diameter at level of nutrient foramen --sl. calipers
Ml Di (humerus) = Medio-lateral maximum tranverse diameter at level of nutrient foramen

All meaurements in millimeters; Left side, unless otherwise indicated.

Table 3 Craniometrics

Bur #	Max Lg	Max Br	Bas-Brg	Bas-Por	Bizygo	UpFacHt
2	190	145	129	20	115.5	75.9
3	178	133	130	19		59.7
4	173	133	136	16	92.2	68.8

Max Lg = Maximum length from glabella to opistocranion — spreading calipers
Max Br = Maximum breadth from euryon to euryon — spreading calipers
Bas-Brg = Basion - Bregma height — spreading calipers
Bas-Por = Basion - Porion height — coordinate calipers
Bizygo = Bizygomatic Breadth -- sliding calipers
UpFacHt = Upper Facial Height from nasion to alveolare — sliding calipers

All measurements in millimeters.

Indexes:

Bur #	C I	CL-HT	BAS-HT	CBAS	UFHT
2	76.3	67.9	77.0	15.5	65.7
3	74.7	73.0	83.6	14.6	
4	76.9	78.6	88.9	11.8	74.6

C I = Cranial Index: Max Br/Max Lg X 100
CL-HT = Cranial Length-Height Index: Bas-Brg/Max Lg X 100
BAS-HT = Mean Basion Height Index: Bas-Brg/Max Lg + Max Br X 100
CBAS = Flatness of Cranial Base: Bas-Por/Bas-Brg X 100
UFHT = Upper Facial Height Index: UpFacHt/Bizygo X 100

Table 4. Dental Attrition (after Molnar 1971)

	BURIAL			
	1A	2	3	4
URM3		1		*
URM2		1	2	*
URM1		1		3
URP2		2		*
URP1		3		2
URC				
URI2		2		*
URI1				
ULI1				
ULI2				*
ULC		2		
ULP1		4		
ULP2		2		2
ULM1		2		*
ULM2		1		*
ULM3		1		U
LRM3	1	1		
LRM2	1	1		
LRM1	3	1		
LRP2	1	1		
LRP1	2	1		
LRC	1			
LRI2	2	1		
LRI1		1		
LLI1				
LLI2		2		
LLC		2		
LLP1	1	4		
LLP2	2	1		
LLM1	*	1		
LLM2	1	1		
LLM3	U	1		

* Crown destroyed by severe caries

U = unerupted (not in full occlusion)

TABLE 1. SUMMARY OF HUMAN SKELETAL REMAINS *

ELEMENTS		BURIAL 1	BURIAL 2	BURIAL 3	BURIAL 4
CRANIUM		---	c with teeth=rt I PM1,2 M1,2,3/lt canine PM 1,2, M1,2,3	c with slight damage to face and vault; RM2 (Ref. # 3B)	c p=Teeth
MANDIBLE		---	c with I, canine, $PM_{1}, {}_{2}$, $M_{1,2,3}$	c except for rt condyle rt I_2, C, PM_2, $M_{1,2,3}$ lt $PM_{1,2}$ $M_{1,2,3}$	---
VERTEBRAE	C1	---	c	---	---
	C2	---	c	---	---
	C3-7	---	c=5	---	---
	T1	---	c		---
	T2-9	c=2 p=6 spinous processes F=4 spinous processes	--- p=7 no spinous and transverse processes	p=3 bodies p=2 spinous processes F=7	--- ---
	T10	---	---	---	---
	T11	---	---	---	---
	T12	---	---	---	---
	L1-4	---	---	p=vertebral arch	---
	L5	---	---	---	---
SACRUM		F=2 small pieces	---	---	---
INNOMINATE	RT	c= pubic symphysis deteriorated	---	p=acetabulum and ilium	
	LT	c=pubis found in screen, deteriorated	p=missing ilium	p=acetabulum and upper pubis, no ischium and ilium	---
CLAVICLE	RT	---	c	p=no proximal end	---
	LT	---	c	---	---
SCAPULA	RT	c	---	---	---
	LT	c	p=no body	---	---
STERNUM		p=body only	---	---	---
RIBS		p=13 vertebral ends p=5 midsections F=3 vertebral ends F=2 midsections	c=1st rib p=4 midsections F=5 vertebral ends	F=1	---
HUMERUS	RT	c	---	p=no distal end	---
RADIUS	RT	p=no distal end	---	---	p
ULNA	RT	p=no distal end	---	p=no distal end	---

C= complete; P= partial or incomplete, F= fragmentary; I= indeterminate; ---= absent

*See Appendix D For Complete Inventory

EMENTS		BURIAL 1	BURIAL 2	BURIAL 3	BURIAL 4
MERUS	LT	---	c	---	---
DIUS	LT	c	---	---	---
NA	LT	p=no distal end	---	---	---
RPALS	RT	p=navicular + 6 carpal decomposed	---	---	p=hamate found west of B4
ETACARPALS RT		p=deteriorated 1st mc I=mc 5th	---	---	F=2, I-to side=3, I-to side=2
HALANGES		I=hand or foot=5	---	---	---
RPALS	LT	p=navicular	---	---	---
ETACARPALS LT		c=3rd and 4th p=5th no distal end	---	---	---
EMUR	RT	c	---	c	c
IBIA	RT	c	c	c	c
IBULA	RT	c-deteriorated	p=no proximal end decomposed	---	c
EMUR	LT	---	c	c	---
IBIA	LT	c	c	c	c
IBULA	LT	---	p=proximal end gone decomposed	---	c
ATELLA	RT	---	---	p=deteriorated	---
	LT	c	c=deteriorated	---	c
ARSALS	RT	c-except for 1st cuneiform	c=5 tarsals p=1st cuneiform ---=2nd cuneiform I=1 in shroud deteriorated	p=5	p=5
ETATARSALS RT		I-to side=2nd mt I- to side+3rd and 4th proximal end I=2 mt	c=4 mt; I=3 mt	p=2 mt no distal or poximal ends	p=1st mt I-to side=8
HALANGES		---	c=1st rt, 1 in shroud c=1st lt I=6 to hand or foot	p=1	p=foot I to hand or foot=14
ARSALS	LT	c-except for 1st cuneiform	c	p=4	p=5
ETATARSALS LT		---	c=1st, 3rd mt p=2nd, 4th no distal end. I=1 mt	I=1st, 5th to side I=3 mt to side	p=1st mt

APPENDIX

CATALOGUE OF SKELETAL REMAINS AND ARTIFACTS

BURIAL 1

SKELETAL ELEMENT	REMARKS
THORACIC	
THORACIC	
THORACIC	SPINOUS PROCESS
THORACIC	SPINOUS PROCESS
THORACIC	SPINOUS PROCESS
THORACIC	SPINOUS PROCESS
VERTEBRAE	SPINOUS PROCESS
VERTEBRAE	SPINOUS PROCESS
VERTEBRAE	SPINOUS PROCESS FRAGMENT
VERTEBRAE	SPINOUS PROCESS FRAGMENT
VERTEBRAE	SPINOUS PROCESS FRAGMENT
VERTEBRAE	SPINOUS PROCESS FRAGMENT
VERTEBRAE	SPINOUS PROCESS FRAGMENT
SCAPULA RT	
SCAPULA LT	
STERNUM	BODY SECTION
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END

BURIAL 1

SKELETAL ELEMENT	REMARKS
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END
RIB	VERTEBRAL END FRAGMENT
RIB	MIDSECTION
RIB	MIDSECTION
RIB	MIDSECTION
RIB	VERTEBRAL END FRAGMENT
RIB	VERTEBRAL END FRAGMENT
RIB	MIDSECTION
RIB	VERTEBRAL END FRAGMENT
RIB	MIDSECTION
RIB	VERTEBRAL END
RIB	MIDSECTION FRAGMENT
HUMERUS RT	
ULNA RT	DISTAL END MISSING
RADIUS RT	DISTAL END MISSING
ULNA LT	DISTAL END MISSING
RADIUS	
3rd MC LT	
4th MC LT	
5th MC LT	DISTAL END MISSING
PHALANGES	5 DIGITS
NAVICULAR	IN SMALL BAG WITH HAND FRAGMENTS
1st MC RT	
HAND	BONE FRAGMENTS IN BAG

BURIAL 1

SKELETAL ELEMENT	REMARKS
INNOMINATE RT	
INNOMINATE LT	
TIBIA RT	
TIBIA LT	
FEMUR RT	
PATELLA LT	
FIBULA RT	DETERIORATED
SACRUM	FRAGMENTARY
CALCANEUS LT	PARTIAL
TALUS LT	
CUBOID LT	
2nd CUNEIFORM LT	
3rd CUNEIFORM LT	
NAVICULAR LT	
CALCANEUS RT	
TALUS RT	
CUBOID RT	
2nd CUNEIFORM RT	
3rd CUNEIFORM RT	
NAVICULAR RT	
1st MT RT	
2nd MT	INDETERMINATE TO SIDE
3rd MT	PROXIMAL END
4th MT	PROXIMAL END
MT?	
MT?	PROXIMAL END
RIB	FRAGMENTS IN PLASTIC BAGS

BURIAL 1

SKELETAL ELEMENT	REMARKS
PUBIS LT	FOUND IN SCREENED COFFIN PIECES
BONE FRAGMENTS	IN BAG_INDETERMINATE
NON-HUMAN BONE	FOUND IN BURIAL 1 IN COFFIN
NON-HUMAN BONE	FOUND IN BURIAL 1 IN COFFIN
NON-HUMAN BONE	INDETERMINATE
BONE FRAGMENT	HUMAN-INDETERMINATE-IN SHROUD
BONE FRAGMENT	HUMAN-INDETERMINATE-IN SHROUD
BONE FRAGMENT	HUMAN-INDETERMINATE-IN SHROUD
NAVICULAR LT	HAND-IN PLASTIC BAG
VERTEBRAE	FRAGMENTS IN PLASTIC BAG

BURIAL 1A FOUND IN SIDEWALL NEAR BURIAL 1

MANDIBLE	RT-I_2,C, PM_2,$M_{1,2,3}$ LT-$PM_{1,2}$,$M_{1,2,3}$
CERVICAL VERTEBRAE	NO SPINOUS OR TRANSVERSE PROCESS
CERVICAL VERTEBRAE	NO BODY
RIB	MIDSECTION FRAGMENT
RIB	FRAGMENTARY
SCAPULA LT	GLENOID, NO BODY
PHALANGES	HAND

BURIAL 1 HISTORIC ARTIFACTS

COFFIN	ALL PIECES
SHROUD	
METAL	COFFIN NAILS, MISC METAL
PEGS	WOODEN WITH METAL NAILS
BUTTONS	4

BURIAL 2

SKELETAL ELEMENT	REMARKS
LT INNOMINATE	MISSING ILIUM
FEMUR LT	
PATELLA LT	DETERIORATED
TIBIA LT	
FIBULA LT	PROXIMAL END MISSING
TIBIA RT	
FIBULA RT	PROXIMAL END MISSING
CALCANEUS LT	
TALUS LT	
CUBOID LT	
1st CUNEIFORM LT	
2nd CUNEIFORM LT	
3rd CUNEIFORM LT	
NAVICULAR LT	
1st MT LT	
2nd MT LT	DISTAL END MISSING
3rd MT LT	
4th MT LT	DISTAL END MISSING
MT LT	
CALCANEUS RT	
TALUS RT	
CUBOID RT	
1st CUNEIFORM RT	PARTIALLY COMPLETE
3rd CUNEIFORM RT	
NAVICULAR RT	
1st MT RT	

BURIAL 2

SKELETAL ELEMENT	REMARKS
2nd MT RT	
3rd MT RT	
4th MT RT	
MT RT	POSSIBLY 5th MT
MT?	INDETERMINATE
MT?	FRAGMENT/INDETERMINATE
PHALANX	1st RT
PHALANGES	6
BONE FRAGMENT	HUMAN-INDETERMINATE
1st RIB RT	VERTEBRAL END
BONE FRAGMENT	HUMAN-INDETERMINATE-FROM SHROUD
MC OR MT?	FOUND IN SHROUD
TARSAL?	FOUND IN SHROUD
PHALANX	FOUND IN SHROUD
MC 5th?	FOUND IN SHROUD
PHALANX (HAND)	FOUND IN SHROUD
NON-HUMAN BONE FRAGMENT	FOUND IN ASSOCIATION WITH BURIAL
PHALANX 1st	HAND

BURIAL 2A-IN ASSOCIATION WITH BURIAL 2

SKELETAL ELEMENT	REMARKS
CRANIUM	RT-I^2, $PM^{1,2}$, $M^{1,2,3}$ LT-CANINE, $PM^{1,2}$, $M^{1,2,3}$
MANDIBLE	COMPLETE WITH-I, CANINES $PM_{1,2}$, $M_{1,2,3}$
C1	COMPLETE
C2	COMPLETE
C3-7	COMPLETE
C3-7	COMPLETE
C3-7	COMPLETE
C3-7	COMPLETE
C3-7	COMPLETE
T1	COMPLETE
T2-9	NO SPINOUS &TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
T2-9	NO SPINOUS & TRANSVERSE PROCESS
CLAVICLE LT	
CLAVICLE RT	
RIB	1st RIB

BURIAL 2A

SKELETAL ELEMENT	REMARKS
RIB	VERTEBRAL END FRAGMENT
RIB	VERTEBRAL END FRAGMENT
RIB	VERTEBRAL END FRAGMENT
RIB	MIDSECTION
RIB	MIDSECTION
RIB	MIDSECTION
RIB	MIDSECTION
RIB	VERTEBRAL END FRAGMENT
SCAPULA LT	MISSING BODY
HUMERUS LT	
RIB	VERTEBRAL END FRAGMENT

BURIAL 2 HISTORIC ARTIFACTS

COFFIN PIECES	
SHROUD	
METAL	NAILS & MISC METAL PIECES FROM COFFIN
LEATHER BELT	
PEGS	

BURIAL 3

SKELETAL ELEMENT	REMARKS
THORACIC	BODY
THORACIC	BODY
THORACIC	BODY
THORACIC	SPINOUS PROCESS
THORACIC	SPINOUS PROCESS
LUMBAR	VERTEBRAL ARCH
VERTEBRAE	FRAGMENT
VERTEBRAE	FRAGMENT 5 PIECES
VERTEBRAE	FRAGMENT TRANSVERSE PROCESS
CLAVICLE RT	NO PROXIMAL END
ULNA RT	DISRAL END MISSING
INNOMINATE LT	ACETABULUM AND UPPER PUBIS-NO ISCHIUM & ILIUM
INNOMINATE RT	ACETABULUM AND PARTIAL ILIUM
FEMUR LT	
TIBIA LT	
HUMERUS RT	DISTAL END MISSING
FEMUR RT	
TIBIA RT	
PATELLA RT	DETERIORATED
CALCANEOUS LT	
TALUS LT	
MT	NO DISTAL END, INDETERMINATE

BURIAL 3

SKELETAL ELEMENT	REMARKS
MT	PROXIMAL END MISSING, INDETERMINATE
NAVICULAR LT	
CALCANEOUS RT	
TALUS RT	
CUBOID	POSSIBLY RT
1st CUNEIFORM RT	
2nd CUNEIFORM LT	
NAVICULAR	INDETERMINATE TO SIDE
1st MT	INDETERMINATE TO SIDE
5th MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
PHALANX	INDETERMINATE TO HAND OR FOOT
RIB?	INDETERMINATE FRAGMENT

BURIAL 3A

HUMERUS LT	NO DISTAL END-FOUND IN SIDEWALL OF BURIAL PROTRUDING FROM BURIAL 3
RADIUS LT	SHAFT, NO DISTAL & PROXIMAL ENDS. SAME AS ABOVE

BURIAL 4

SKELETAL ELEMENT	REMARKS
RADIUS RT	
FEMUR RT	
TIBIA LT	
FIBULA LT	
TIBIA RT	
FIBULA RT	
PATELLA LT	
CALCANEUS LT	
TALUS LT	
CUBOID LT	
1st CUNEIFORM	
NAVICULAR	
CALCANEUS RT	
TALUS RT	
CUBOID RT	
1st CUNEIFORM RT	
1st MT RT	
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
MT	INDETERMINATE TO SIDE
PHALANGES	FOOT

BURIAL 4

SKELETAL ELEMENT	REMARKS
PHALANGES	14-INDETERMINATE TO HAND OR FOOT
PHALANGE 1st	HAND
MC	FRAGMENTARY
MC	FRAGMENTARY
TRIQUETRAL	INDETERMINATE TO SIDE
MC	FOUND WEST OF BURIAL 4
HAMATE	FOUND WEST OF BURIAL 4

BURIAL 4A IN ASSOCIATION WITH BURIAL 4

CRANIUM	RT-$PM^{1,2}$, $M^{1,2}$, M^3 missing LT $PM^{1,2}$, $M^{1,2}$, M^3 not erupted. PARTIAL SHROUD ON MALAR.

BURIAL 4 HISTORICAL ARTIFACTS

COFFIN	
METAL	COFFIN NAILS, MISC METAL
SHROUD	
PEGS	

SURFACE MATERIAL UNIT 10

SKELETAL ELEMENT	REMARKS
INNOMINATE LT	530E 140S
SACRUM	260E 140S
LUMBAR VERTEBRAE	UPPER
THORACIC	FRAGMENT
LUMBAR	1-4
THORACIC	
LUMBAR	
LUMBAR	1-4
LUMBAR	1-4
ULNA LT	
LUMBAR	255E 145S
SACRUM	FRAGMENT
PATELLA LT	
ULNA LT	
RADIUS LT	
ULNA RT	
1st RIB LT	245E 111S
MC?	INDETERMINATE: FOOT, HAND
THORACIC	192E 95S
PHALANX HAND	210E 120S
TRIQUETRAL RT	HAND
L5	259E 102S
RIB FRAGMENT	200E 130S
RIB	
RIB FRAGMENT	175E 88S
VERTEBRAE FRAGMENT	145E 165S

SURFACE MATERIAL UNIT 10

SKELETAL ELEMENT	REMARKS
RIB FRAGMENT	143E 178S
RIB FRAGMENT	120E 120S
RIB FRAGMENT	160E 230S
RIB FRAGMENT 1st	158E 225S
BONE FRAGMENT RIB?	50W 180S
TEMPORAL FRAGMENT? HUMAN	0 125S
CERVICAL VERTEBRAE	11W 127S
CARPAL?	
THORACIC	
THORACIC	
SCAPULA-GLENOID RT	
THORACIC	
C2	1.6S 2E
CERVICAL	2.5E .81S
RADIUS LT	1.2E 1.41S
INNOMINATE	1W .93S
INNOMINATE	.75W .55S
ULNA RT	1.55E 1.2S
RIB	1.4E 1.3S
ULNA	2.3E 1.35S
SACRUM	2.3E 1.45S

SURFACE MATERIAL UNIT 11

SKELETAL ELEMENT	REMARKS
THORACIC	SPINOUS PROCESS
VERTEBRAE NON-HUMAN	BODY
VERTEBRAE NON-HUMAN	BODY
NON-HUMAN BONE	INDETERMINATE
BONE FRAGMENT	INDETERMINATE
CERVICAL	BODY
BONE FRAGMENT	INDETERMINATE
TARSAL	
MC OR MT?	
MC	
MC OR MT?	PROXIMAL END MISSING
RIB	FRAGMENT
RIB	VERTEBRAL END
RIB?	FRAGMENT
BONE FRAGMENT	INDETERMINATE POSSIBLE CRANIAL
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	
INCISOR LT	LOWER 2nd
INCISOR LT	POSSIBLE UPPER 2nd
CANINE RT	UPPER
BONE FRAGMENT	INDETERMINATE
STERNUM	

SURFACE MATERIAL UNIT 11

HISTORIC ARTIFACTS-SCREENED	
METAL	NAILS, SHELL CARTRIDGE, MISC METAL PIECES
SHELL	5 PIECES
LITHIC PREHISTORIC	4 PIECES MONTEREY CHERT REDUCTION FLAKES
LITHIC PREHISTORIC	2 PIECES PORPHYRY-GREEN RHYOLITE, REDUCTION FLAKES

SURFACE MATERIAL UNIT 12

SKELETAL ELEMENT	REMARKS
PHALANX	HAND
INDETERMINATE	POSSIBLE HUMAN LT 5th MT
INDETERMINATE	POSSIBLE CRANIAL
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	
NON-HUMAN	

UNIT 12 ARTIFACTS

METAL-HISTORIC	COMMON TACK NAIL, COFFIN NAILS, SHELL CARTRIDGES, MISC METAL PIECES
GLASS-HISTORIC	CLEAR-ONE PEICE
LITHIC-PREHISTORIC	MONTEREY CHERT FLAKE

SURFACE MATERIAL UNIT 14

SKELETAL ELEMENT	REMARKS
THORACIC	
VERTEBRAE	SPINOUS PROCESS
VERTEBRAE	BODY
VERTEBRAE	BODY
VERTEBRAE	BODY FRAGMENT
RIB 1st	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
RIB	FRAGMENT
CLAVICLE LT	
NAVICULAR LT	HAND
LUNATE LT	
TRIQUETRAL LT	
CAPITATE LT	
CARPAL	
PHALANGES	6
INDETERMINATE	SHAFT PROBABLY MC
PATELLA RT	
INCISOR	PROBABLY LT LOWER 1st
INDETERMINATE	BONE FRAGMENT SACRAL?
NON-HUMAN	
NON-HUMAN	

SURFACE MATERIAL UNIT 14

SKELETAL ELEMENT	REMARKS
NON-HUMAN	
NON-HUMAN	
LUMBAR VERTEBRAE	
ULNA	

UNIT 14 ARTIFACTS

METAL-HISTORIC	COFFIN NAILS, SHELL CARTRIDGE, MISC METAL PIECES
PEGS-HISTORIC	PART OF COFFIN WITH NAILS
SHROUD-HISTORIC	FOUND IN SCREEN
LITHIC-PREHISTORIC	LARGE REDUCTION FLAKE WITH CORTEX-PORPHYRE

ARCHAEOLOGICAL INVESTIGATIONS

AT

FRANKLIN POINT, ANO NUEVO STATE PARK

CA - SMA - 207/H

by

Michael D. Meyer

under the supervision of
Adrian Praetzellis, Ph.D.

Prepared for:

California Department of Parks & Recreation
Sacramento, California

Prepared by:

Anthropological Studies Center
Sonoma State University Academic Foundation, Inc.
Rohnert Park, California 94928

October 1993

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SCOPE OF WORK

In June of 1993 the Anthropological Studies Center at Sonoma State University (ASC) was requested by the Department of Parks & Recreation (DPR) to conduct an assessment of the cultural resources at Franklin Point, Ano Nuevo State Park. Specifically, ASC was asked to determine if historic burials in the area were endangered due to erosion and shifting sands, by locating and mapping the position of the burials.

The site's existence was determined in 1980 when a park visitor discovered a human skull at Franklin Point (Holman 1980). Archaeologists surmised at that time the skull came from a victim of the wreck of the ship *Sir John Franklin*, which went down on January 17th, 1865 (Morrall 1979:53). In 1982 archaeologists from San Jose State University (SJSU) excavated the remains of four individuals buried at Franklin Point (Leventhal & Jurmain 1987). These remains and those previously recovered are believed to be from the *Sir John Franklin*.

DPR requested the present archaeological investigation program over concern that the remains of 13 other individuals from the wreck of the *Coya*, who were also said to have been buried at Franklin Point, were endangered by erosion and shifting sands. The *Coya* wrecked on November 24th 1866 and the remains of 13 individuals were buried "near" the victims of the *Franklin*, as cited in the Alta California December 1, 1866 (Leventhal & Jurmain 1987:42).

LOCATION

Franklin Point is located on the Central California coast in San Mateo County (USGS Franklin Point Quad:1958/66). It is a small peninsula located south of Pigeon Point and north of Point Ano Nuevo. Franklin Point can be reached on foot by trail. The trail begins at Highway 1 about three miles south of Pigeon Point. The path winds for approximately one-half mile over sand dunes to the west. A fence currently crosses the peninsula to protect dune restorations on Franklin Point from visitors.

HISTORICAL BACKGROUND

During the 19th century the fog shrouded rocky coast of Ano Nuevo was a formidable obstacle for sailors searching for the San Francisco Bay. North of Franklin Point lies Pigeon Point named after the *Carrier Pigeon* which wrecked in May of 1853 (Morrall 1979:53).

As previously mentioned, the *Sir John Franklin* wrecked in 1865. Thirteen of the 21 crewmen were drowned and six bodies recovered. Of these, four seamen were buried on Franklin Point and two officers buried in San Francisco. The *Coya* followed in 1866 taking 27 lives. Thirteen bodies were recovered, including women and children, which were buried "near" the Franklin victims (Alta California 12-1-1866). In 1868 the wreck of the *Hellespont* took another 11 lives.

After the *Hellespont* wrecked, a lighthouse was built at Pigeon

Point. Despite the lighthouse, the steamer *Colombia* managed to run aground in 1897. The lighthouse still operates at Pigeon Point as does a lighthouse at Ano Nuevo.

June Morrall's book Half Moon Bay Memories (1979) contains a photograph of a grave marker inscribed:

> To the Memory of EDWARD J. CHURCH of Baltimore, Md. Aged 16 years. And Her Ten other Seamen Lost on Ship Sir John Franklin January 17. 1865.

According to Colonel Albert S. Evans, "On the sandy bluff at Point Ano Nuevo is an inclosure with which lie buried, side by side, forty [shipwreck victims.] Others were removed by their friends, and one, the mate of the Hellespont, sleeps beside one of the whaler's houses at Pigeon Point..." (Morrall 1979:57). The total mentioned above may reflect victims of wrecked whaling boats. Pigeon Point was an important whaling center in the 1870's (Morrall 1979:59).

PREVIOUS EXCAVATION

A records search at the Northwest Information Center of the California Archaeological Inventory located only a copy of the original site form and correspondence from the initial find. From verbal communication with Lee Motz of DPR, it was determined that SJSU had conducted excavations at Franklin Point in the early 1980's.

After conclusion of the testing program, Matthew Clark, who had originally recorded the site in 1980, was contacted. Mr. Clark had filed the original site form for Holman & Associates as a volunteer effort and included the prehistoric component of the site. Mr. Clark remembered that the hikers who made the initial find had recovered the skull from the bottom of the cliff. Upon investigation of the Point, the vertebrae were located as well as the outline of a coffin in the sand.

Also after the conclusion of the testing program, the author received from DPR a copy of a first draft of the SJSU report (Leventhal & Jurmain 1987). From this report it appears that the four skeletons that SJSU removed were those of the *Franklin* crew. The recovered remains of four males correspond with the known victims from the *Sir John Franklin*.

The SJSU report does not indicate that a permanent datum was placed at the site. The location of the excavation is evidenced by a large depression in the dunes leeward of three sections of plastic fencing. The fencing was reportedly placed after excavation to prevent further erosion after backfilling. Due to the extreme weather conditions at the Point, this effort has failed.

ARCHAEOLOGICAL INVESTIGATION

Although ground penetrating radar and other remote sensing methods have been used to locate graves, these methods could not have been used due to the irregular topography of Franklin Point. The site testing program at Franklin Point was conducted using 3.5

foot steel probes on a two foot grid. The grid was established beginning at the westernmost section of the point. A base line was established at 310 degrees true north. The grid was extended at right angles and parallel to the base line to include all potential burial locations on Franklin Point. Parallel lines were located 20 to 60 feet from the base lines. Tapes were placed on these parallel lines and a third tape was strung between to indicate the spacing. The tape was placed at six foot intervals and probing was conducted every two feet along the line and to each side of the line to achieve the two foot pattern.

Due to high winds and the irregular shape of the dunes, it was often impossible to leave the tapes extended. In some areas the tapes were weighted to follow the contour of the dunes. This resulted in closer coverage than the two foot interval. The cross tape was occasionally abandoned and pipe was placed to mark the transect points. When required due to visual obstruction, a third pipe was placed at the top of dunes to ensure proper coverage along the transects.

The probe was carefully inserted as far as possible. In some areas shallow bedrock or hard compacted sands and midden prevented the probe from reaching a depth of three feet.

Areas that were either too dangerous or where vegetation appeared too fragile to recover from foot traffic were avoided. Where dunes were steep and provided vertical faces, probing was conducted both vertically and horizontally. Since the primary goal of the project was to locate subsurface burials, any positive contact was investigated with further probing in the immediate area. Wherever possible subsurface contact was inspected visually. Visual inspection also provided a higher degree of accuracy for determining the nature of subsurface contact.

Several datum points were left in place on Franklin Point. It was anticipated that remains would be found and datums needed as control points for mapping. There are few convenient topographic references on Franklin Point. The datums of two-foot-long sections of PVC pipe were driven into the sand. An attempt to drive a nail into the sandstone met with no success. Due to erosion and site conditions it also appeared to present a trip hazard. Despite warning signs, during our three days of fieldwork there were several visitors to Franklin Point.

One datum (B) is located south of the dune sectioned by the SJSU excavation in a path. Pathways across the site are open sand not covered by vegetation. From datum (B), datum (A) is located 120' grid north (310^0) 20'west. From datum (B), datum (C) is located 80' grid east (see Appendix A).

RESULTS

HISTORIC RESOURCES

No material that could be unequivocally associated with the historic burials was discovered during the probe survey. One possible piece of bone or wood was located under succulents, and could not be visually inspected. Two small cut nail fragments were found at the top of the large depression south of the plastic fencing. This is reported to be the location of previous excavation units. The large depression appears to be large enough to have once contained the four coffins. The site map provided in SJSU report (Leventhal & Jurmain 1987) does not indicate the location of the site other than being between sand dunes (Appendix B) which describes most of the Franklin Point area.

PREHISTORIC RESOURCES

Franklin Point is covered by a layer of dark midden. This compact soil can be seen in the profile of eroded areas. In some exposed areas it appears to have of depth of about six feet. There are numerous hearth remnants, fire affected rock and Monterey chert lithic debitage. No chert tools were found in the project area although a chert core with cortex and a sandstone net weight were found eroding from the midden (see Appendix A:3&4). As expected on a coastal site, there was evidence of shell, and also of bird and fish bone.

A supplemental site record was filed as part of this investigation. The original site record indicated that the site extended several hundred yards. The supplement indicates a boundary at the "wash out" at the eastern edge of Franklin Point. It was unclear whether the midden was contiguous through this area or whether the point was separate from deposits along the rest of the shoreline. The thick organic layer that appeared to be similar to midden on the Point did not contain artifacts in some areas of dune terrace north of the point that were inspected.

The original site form also noted numerous chert tools and other artifacts throughout the dune terrace adjacent to Franklin Point. During the author's visit to the site, the wind was constantly blowing sand across the site. Footprints on the beach were filled in a few hours. Under these conditions it is unlikely that many lithics could be seen. Regardless, the midden did not appear to be consistent away from the Point and this larger area may represent distinct site areas. Determination of actual site boundaries cannot be determined without further archaeological investigation.

RECOMMENDATIONS

The cultural resources of Franklin Point are endangered. Although the four burials, presumably from the *Sir John Franklin*, have been removed, there is the potential for other remains to be exposed. The prehistoric component is under constant threat of erosion, as evidenced by the noted features and artifacts. The major threats to the cultural resources at Franklin Point are erosion and shifting sands. These factors create complications for preserving the cultural resources of Franklin Point. This report suggest four options for managing the cultural resources of Franklin Point.

A. Employ different testing or remote sensing methods.

There are several types of remote sensing that have successfully been used in archaeological research, such as ground penetrating radar, infra red photography, as well as magnetic and resistance survey. Unfortunately, these methods work best on stable, level terrain. The undulating and shifting terrain of Franklin Point makes these methods impractical.

B. Further field and/or historical research regarding the *Coya* graves.

It is unlikely that a map of the cemetery will emerge from research. Further information may become available regarding victims of the *Coya*, such as a diary, but this is unlikely. Since many primary documents have been previously reviewed, additional research might be costly and provide inconsequential new information.

C. Excavation program for data recovery.

Although artifacts are eroding from Franklin Point, any excavation may seriously damage the natural, biological resources of the Point. The large depression from the SJSU excavation provides evidence of this danger. From visual inspection, the organic midden may be the stabilizing force on the Point. The potential value of information to be gained by excavation must be weighed against the potential loss of natural resources.

D. Regular monitoring visits to the site.

This seems to be the best option. Regular site visits after large storms or the end of the storm season, should be sufficient to evaluate the site's condition. Exposed areas of the site could be recorded and any artifacts mapped and possibly collected. If significant or substantial cultural remains were to be exposed, a mitigation plan could be developed at that time. This strategy should also prevent incidents such as the initial discovery of human remains in 1980.

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APPENDIX: A

SUPPLEMENTAL SITE RECORD

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
ARCHEOLOGICAL SITE RECORD

Permanent Trinomial: CA-SMA-207/H **Supplement** [X]

Other Designations: Franklin Point

1. **County:** San Mateo

2. **USGS Quad:** Franklin Point 7.5' 1955 15' **Photorevised** 1968

3. **UTM Coordinates:** Zone 10 556890 m Easting 4111480 m Northing

4. **Township** 9S **Range** 4W 1/4 of 1/4 of Punta Ano Nuevo 1/4 of 1/4 of Sec. **Base Mer.** MD

5. **Map Coordinates:** 462 mm S 58 mm E (from NW corner of map) 6. **Elevation:** 30'

7. **Location:** On Franklin Point, Ano Nuevo St. Park. Access by foot. Trail head located on St. Hwy. 1, 3 miles south of the Pigeon Point Lighthouse. Head due west ca. 0.5 mile to beach. Follow shoreline south 150 yds. to Franklin Point. Graves removed from area of plastic fencing on top of point.

8. **Prehistoric:** [X] **Historic:** [X] **Protohistoric:** [ ]

9. **Site Description:** Point is covered with layer of prehistoric midden. Hearth features, groundstone & chert artifacts present on surface. Four historic burials from wreck of "Sir John Franklin", 1-17-1865. Potentially graves from "Coya", wrecked 11-24-1866. Vegetation covers most of the sand dunes on site.

10. **Area:** 100m N/S x 80m E/W 6280 **Square meters**

Method of Determination: Taping

11. **Depth:** circa 2m **Method of Determination:** Visual inspection

12. **Features:** Prehistoric hearth features. Four burials excavated by San Jose St. U. in 1982. Possibly other historic burials.

13. **Artifacts:** Groundstone net sinker and chert core noted. [X]

14. **Non-Artifactual Constituents and Faunal Remains:** Shell and faunal remains of indeterminate age noted.

15. **Date Recorded:** 7-1-93 16. **Recorded By:** Michael Meyer & Conrad Praetzel

17. **Affiliation and Address:** Anthro. Studies Center, Sonoma St. U., Rohnert Park, CA 94928

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
ARCHEOLOGICAL SITE RECORD

Permanent Trinomial: CA-SMA-207/H

Mo.	Yr.
7	93

Other Designations: Franklin Point

18. Human Remains: Four seamen from wreck of "Sir John Franklin" possibly others from wreck of "Coya" and prehistoric context.

19. Site Disturbances: Erosion due to weather and park visitors. Shifting sands expose & cover site regularly.

20. Nearest Water: 4,000' east Whitehouse Creek.

21. Vegetation Community (site vicinity): Coastal Strand. **Plant List**

22. Vegetation (on site): Fragaria chiloensis, Abronia maritima, A. umbellata, Poa Douglasii, Mesembryanthemum nodiflorum, M. crystallium.

23. Site Soil: Sand over organic midden.

24. Surrounding Soil: Sand and same.

25. Geology: Upper Cretaceous Marine, Pigeon Point Formation.

26. Landform: Penninsula Dune Terrace.

27. Slope: Irregular **28. Exposure:** Open

29. Landowner(s) (and/or tenants) and Address: CA Dept. of Parks & Rec., San Mateo Coast District, 95 Kelly Ave., Half Moon Bay 94019.

30. Remarks: Grave marker on USGS map. Change of site boundary due to lack of contiguous midden along dune terrace east of washout at east edge of penninsula.

31. References: Munz & Keck, 1968, Cal. Flora & Suppl.; CA Div. Mines,n.d., Geol. Atlas of Cal.; Clark, 1980, Site Record CA-SMA-207 on file CA Arch. Inventory, Rohnert Park.; Leventhal & Jurmain, 1987,(Draft) Franklin Point Site:Ca-SMa-207, Historical Background and Excavation of Four Sailors from the wreck of Sir John Franklin.

32. Name of Project: Archaeological Investigation of Franklin Point, Ano Nuevo State Park.

33. Type of Investigation: Probe Testing

34. Site Accession Number: **Curated At:**

35. Photographs: See attached sheet

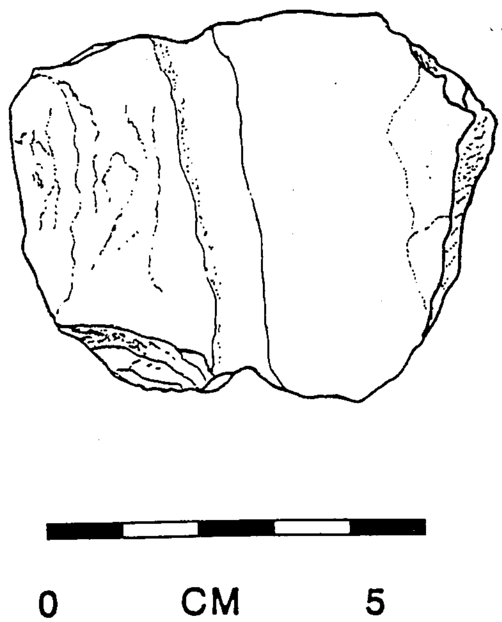
State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
ARCHEOLOGICAL SITE RECORD
Continuation Sheet

Permanent Trinomial: CA-SMA-207/H

7	93
Mo.	Yr.

Other Designations: Franklin POint

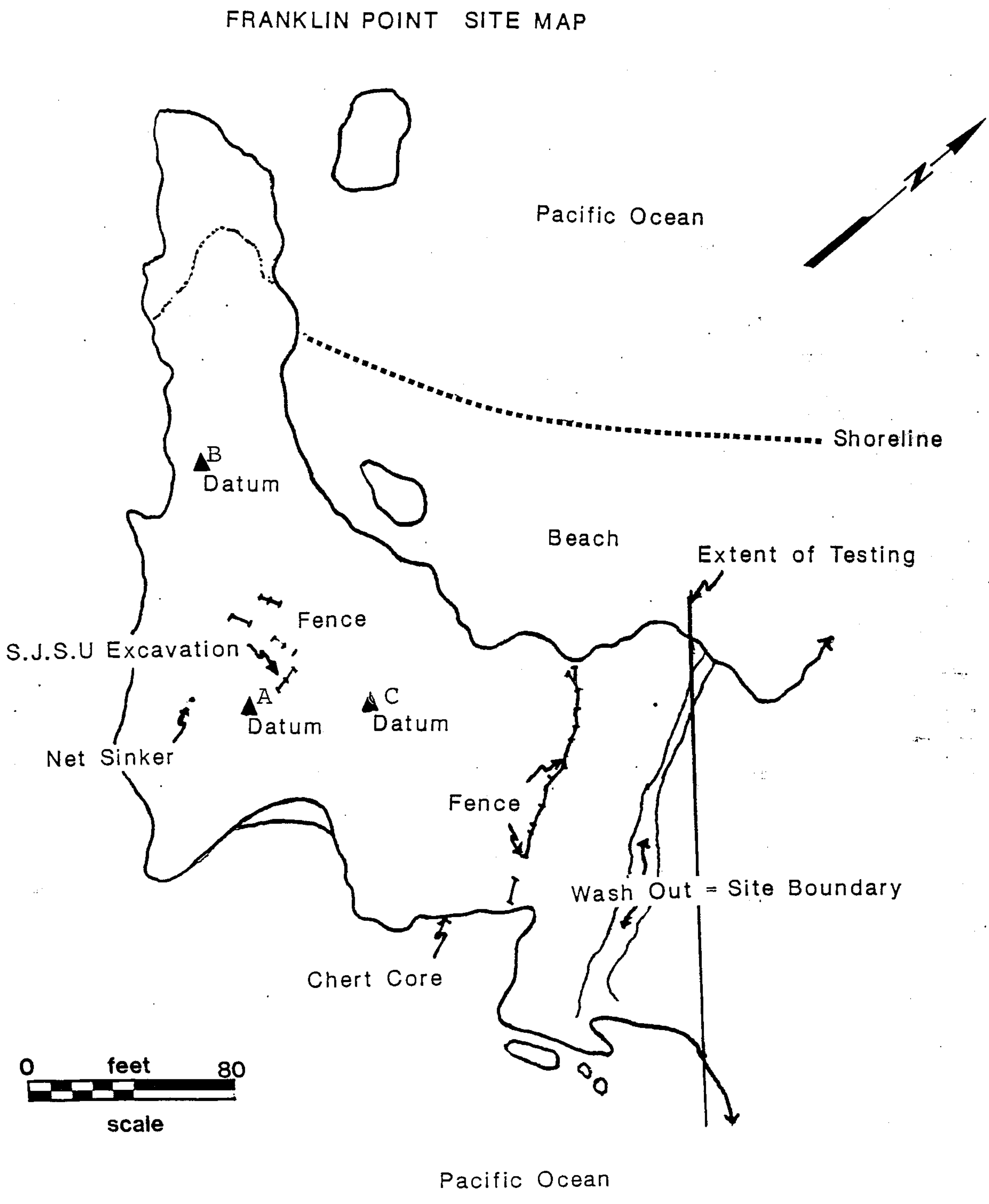
Item No.	Continuation
13.	SANDSTONE NET SINKER



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
ARCHEOLOGICAL SITE MAP

Permanent Trinomial: CA-SMA-207/H 7 / 93 (Mo. Yr.)

Other Designations: Franklin Point



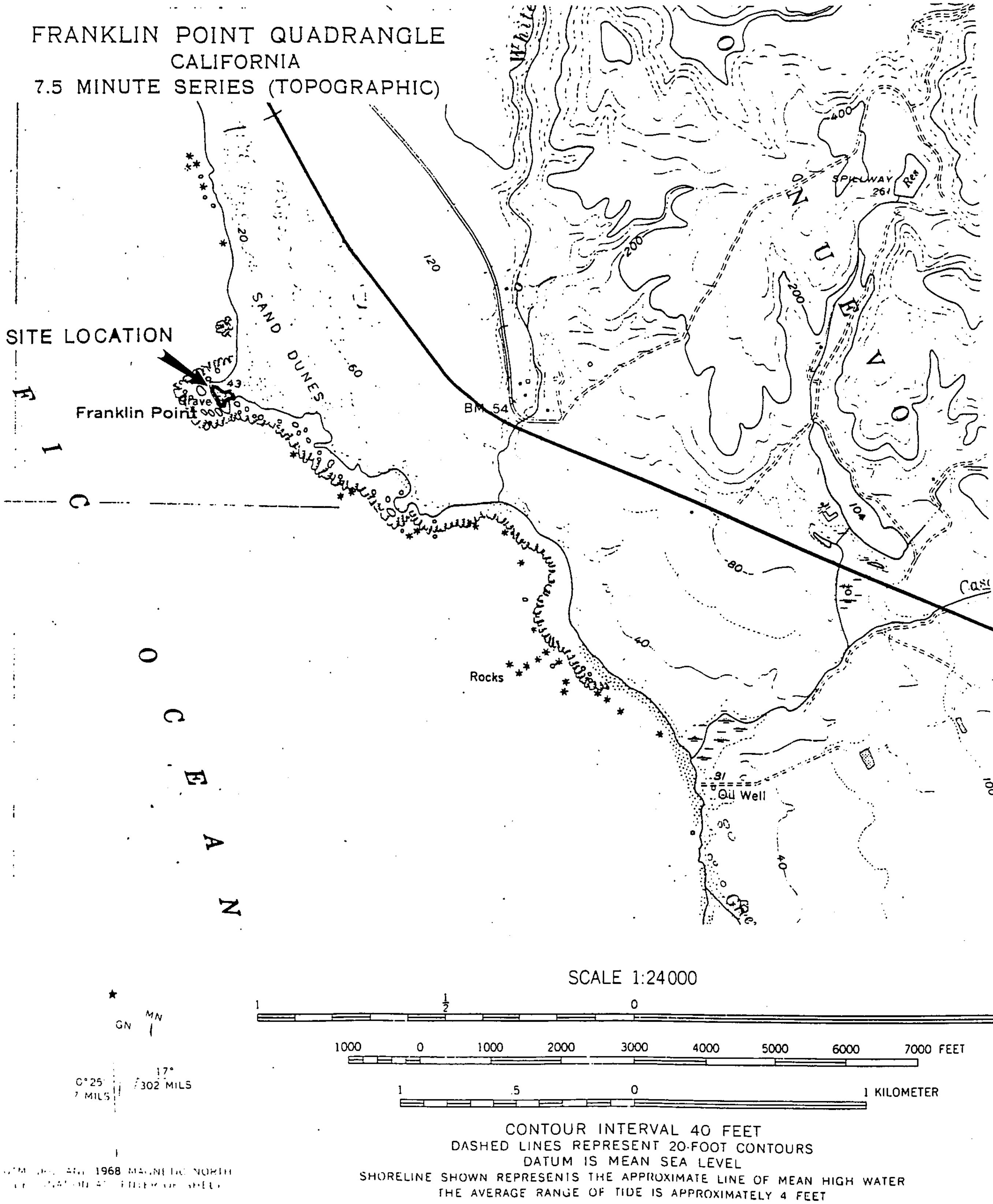
State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

ARCHEOLOGICAL SITE LOCATION MAP

Permanent Trinomial: CA-SMA-207/H

7 / 93
Mo. Yr.

Other Designations: Franklin Point



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

ARCHEOLOGICAL PHOTOGRAPHIC RECORD

Page 6 of 9.

Permanent Trinomial: CA-SMA-207/H 7 / 93 (Mo. / Yr.)

Other Designations: Franklin Point

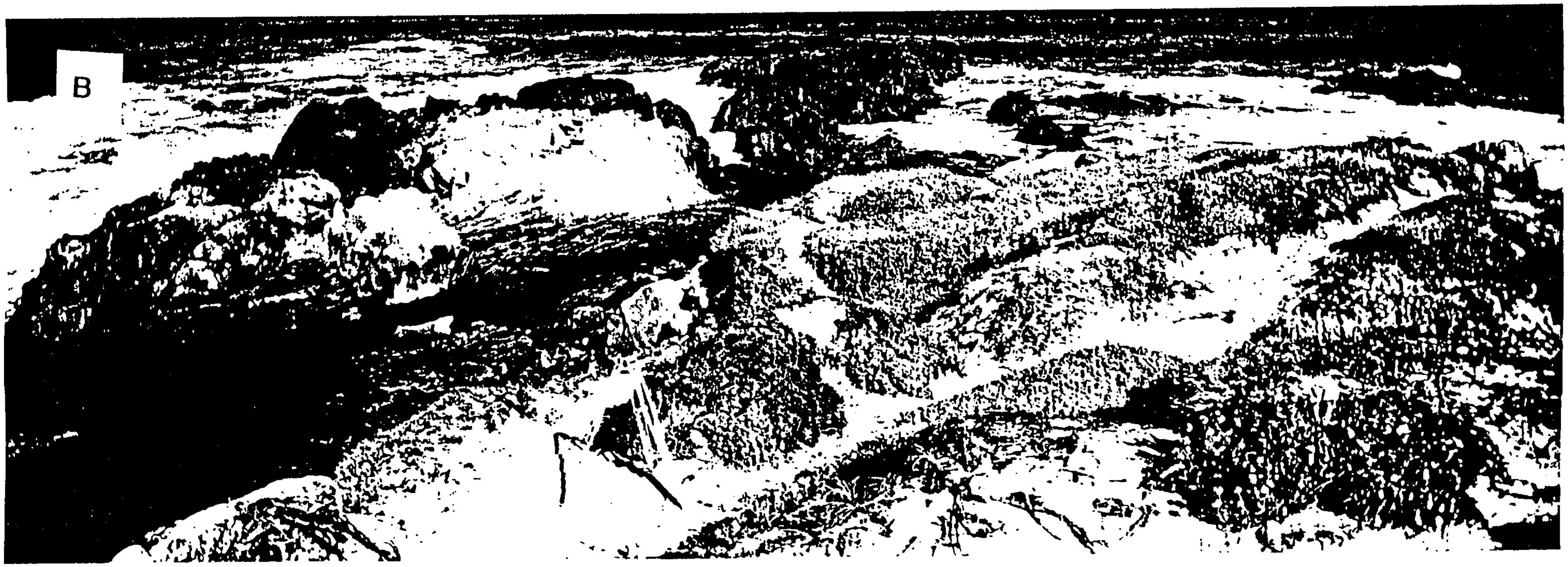
Camera and Lens Types: Kodak Panoramic

Film Type and Speed:

On File at: Anthro Studies Center
Sonoma State U., Rohnert Park

Mo.	Day	Time	Exposure/ Frame	Subject/Description	View Toward	Accession Number
7	1		10	A. Transit over datum A. S of SJSU excavation area (rt.).	West	ON FILE ARCHEOLOGY LAB WEST SACRAMENTO
7	1		12	B. Transit over datum B. Tip of point to right.	West	
7	1		11	C. From tip of point on sandstone facing toward datum B (lf. of knoll).	South	
7	1		9	D. From datum C.	South	
7	2		5	E. From knoll facing east edge of site.	East	
7	2		6	F. From knoll facing east edge of site.	NEast	

A



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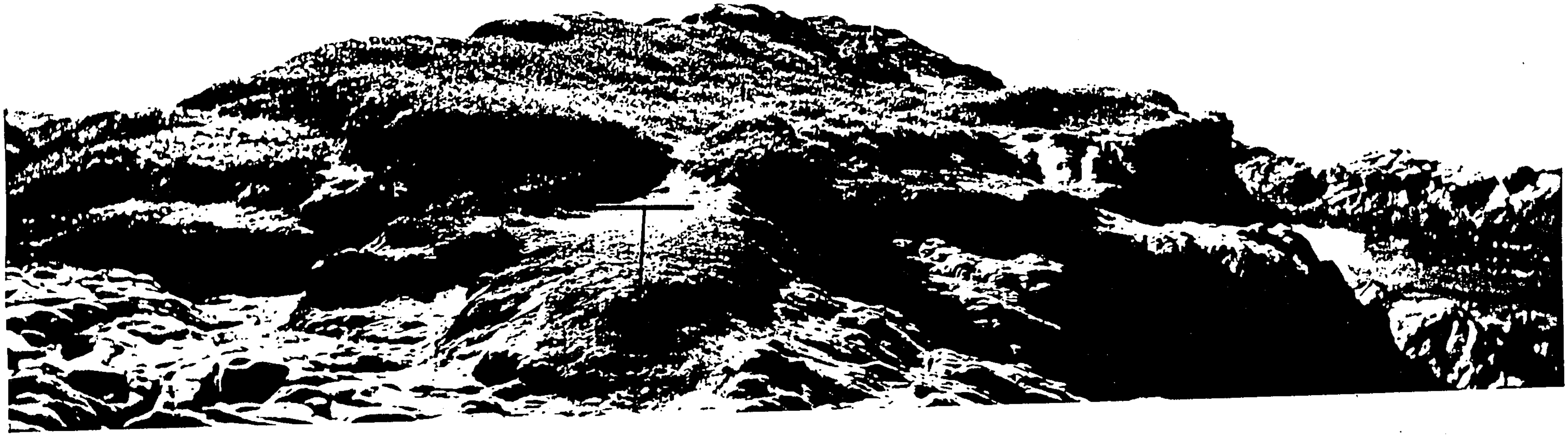

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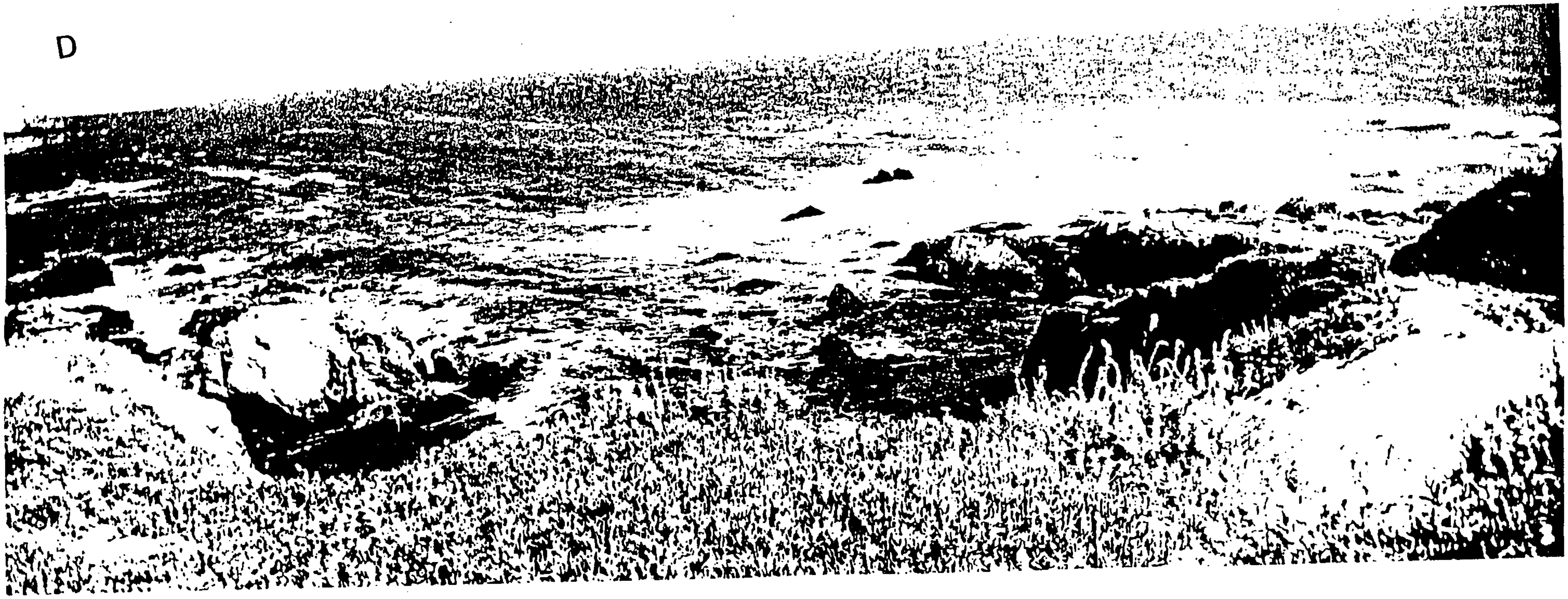

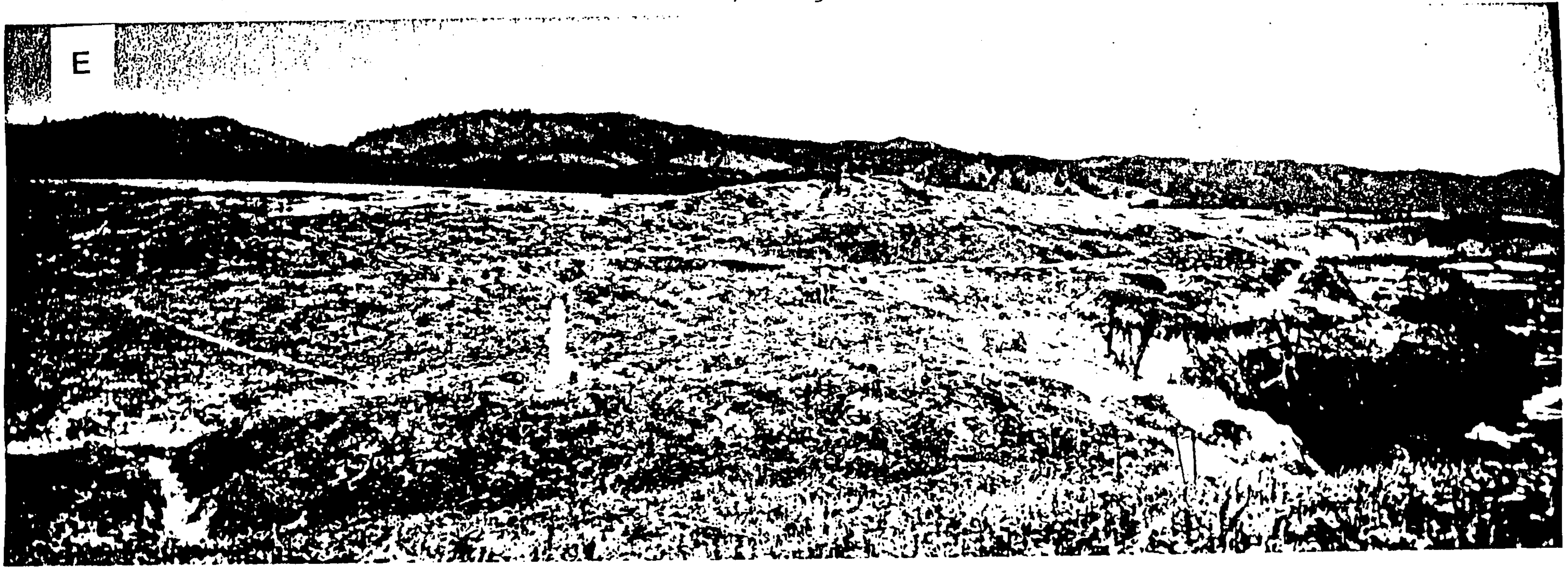
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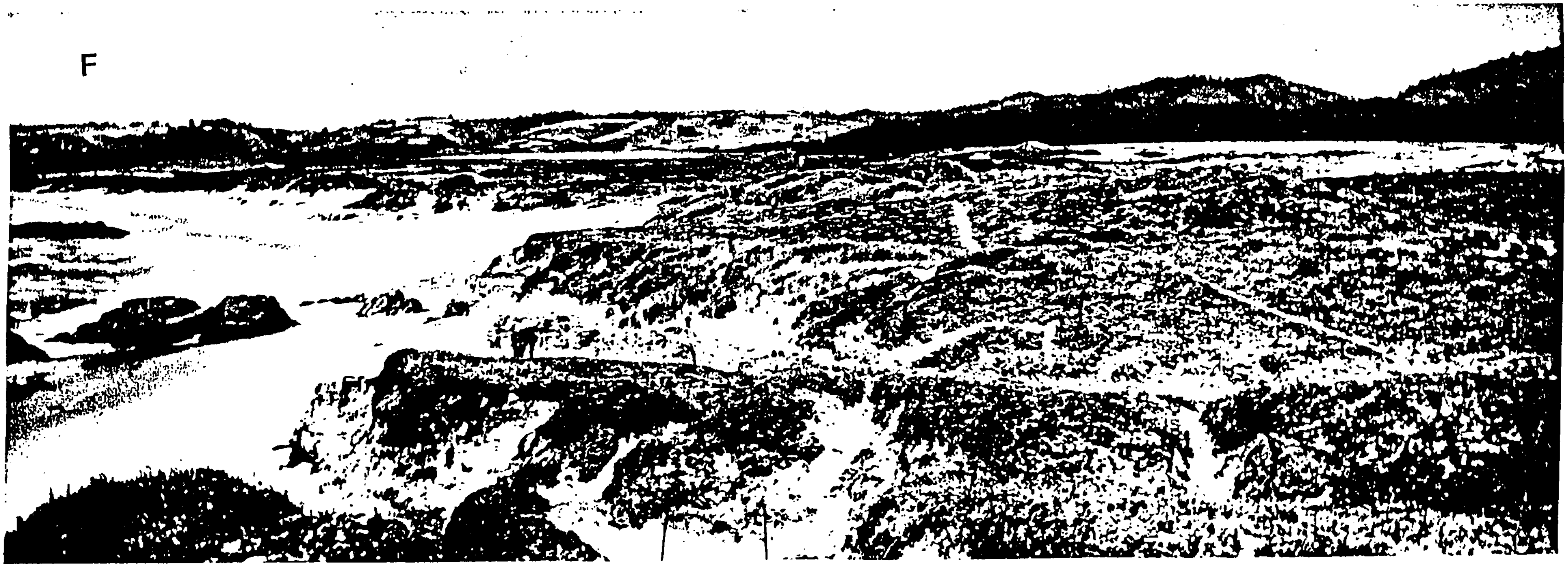
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APPENDIX: B

SJSU SITE MAP 1982

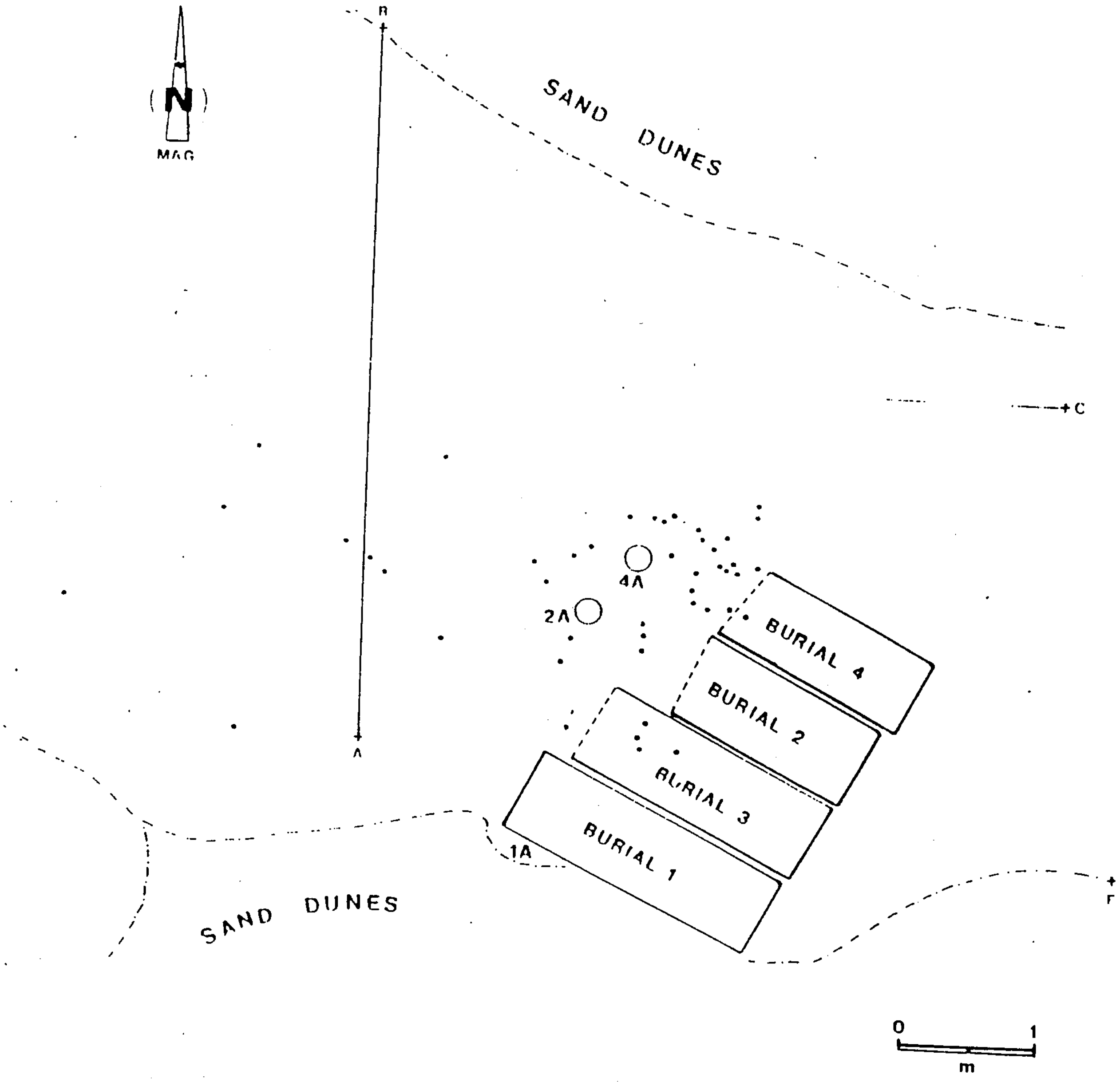

Figure 2. Location of surface elements and burials.

APPENDIX F

Nail Statistics from the Adams Creek Lime Kilns Site.

APPENDIX F

Nail Statistics from the Adams Creek Lime Kilns Site

Andrew Kindon, modified from Tinoco 2011

New	Cut	Wire	Count	% Cut	% wire
1	69	8	77	0.90	0.10
2	41	9	50	0.82	0.18
3	162	1	163	0.99	0.01
4	122	9	131	0.93	0.07
5	20	3	23	0.87	0.13
6	312	104	416	0.75	0.25
7	30	5	35	0.86	0.14
8	0	30	30	0.00	1.00
10	69	30	99	0.70	0.30
11	640	187	827	0.77	0.23
12	3	1	4	0.75	0.25
13	396	36	432	0.92	0.08
15	2	0	2	1.00	0.00
16	113	6	119	0.95	0.05
17	4	1	5	0.80	0.20
18	29	2	31	0.94	0.06
19	86	10	96	0.90	0.10
20	1	0	1	1.00	0.00
21	86	1	87	0.99	0.01
22	76	0	76	1.00	0.00
23	884	34	918	0.96	0.04
24	6	6	12	0.50	0.50
25	128	4	132	0.97	0.03
Total	**3,279**	**487**	**3,766**	**0.87**	**0.13**
Total %	**0.87**	**0.13**			

APPENDIX G

FWVAS Artifact Catalog from CA-SCR-339H.

APPENDIX G

FWVAS Artifact Catalog from CA-SCR-339H

Adams Creek Lime Kilns Site

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
A	8	1 x 2	1	0-10	8 May 2008	18	92	Glass	Fragmentary			Several fragments of bottle glass and pane glass
A	8	1 x 2	1	0-10	5/8/2009	6	1	Carbon	Diagnostic	Blank		
A	8	1 x 2	2	10-20	10 May 2008	30	199	Metal	Non-Diagnostic	Nail		Round headed nails - 5 large (10cm), 21 medium (7.5cm), 4 small (3.5cm)
A	11	1 x 2	1	0-10	23 July 2009	89	287.3	Metal	Non-Diagnostic	nails		40 square nails: longest: 4.5 inches, smallest: 1 inch. 49 square nails: Longest 4.5 inches, shortest 1 inch
A	11	1 x 2	1	0-10	23 July 2009	1	0.02	Bone	Fragmentary			Small rib bone Length: 2cm
A	11	1 x 2	2	0-10	07/10/09	approx. 30	133	Metal	Diagnostic	Nail	60% square nails, 40% round head nails, miscellaneous rusted metal	
A	11	1 x 2	2	10-20	12 June 2009	+/- 50	135.2	Metal	non-diagnostic	nails		square and wire nails and nail fragments; 11 wire steel nails, 35 square nails; and 23 unidentifiable nail fragments
A	11	1 x 2	2	10-20	12 June 2009	39	269.4	Metal	non-diagnostic	nails		39 square cut iron nails. Longest 5 inches, shortest 3/4 inch
A	11	1 x 2	2	10-20	12 June 2009	59	115.5	Metal	non-diagnostic	nails		wire and square cut nails. 33 wire round nails; 26 cut squre nails.
A	11	1 x 2	2	10-20	7/10/2009	10	9	Metal	Complete	Blank	nail/wire metal	there are 10 thin nails in a small plastic bag, they are fragile and curvy they almost look like wire because of their thinness.
A	11	1 x 2	2	43028	10/7/2009	22	239	Metal	Diagnostic	Nail		Fragile nails, there is amix of small thin nails and thick chunky nails.
A	11	1 x 2	3	20-30	7/17/2009	1	0.2	Bone	Non-Diagnostic	Post-cranial	small rodent maybe	super light, possibly hollow, leg/arm
A	11	1 x 2	3	20-30	7/17/2009	29	85	Metal	Non-Diagnostic	Other	bundle of wire	most single strand, 2mm diameter, some wire is twisted, multistranded
A	11	1 x 2	3	20-30	7/17/2009	1	0.4	Metal	Non-Diagnostic	Other	brass	22 caliber shell, length 10 mm, "HI" on top, "U" middle, "speed" bottom half, firing pin obliterated part of the "d"
A	11	1 x 2	3	20-30	7/11/2009	5	3	Metal	Non-Diagnostic	Other	flat metal	flat scrap
A	11	1 x 2	3	20-30	7/11/2009	33	64	Metal	Non-Diagnostic	Nail	various sizes	
A	11	1 x 2	3	20-30	7/11/2009	21	38	Metal	Non-Diagnostic	Nail	various sizes	

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
A	11	1 x 2	3	20-30	7/11/2009	4	33	Metal	Non-Diagnostic	Nail	various sizes	all are bent
A	11	1 x 2	3	20-30	7/11/2009	29	68	Metal	Non-Diagnostic	Nail	various sizes	
A	11	1 x 2	3	20-30	7/11/2009	26	38	Metal	Non-Diagnostic	Nail	various sizes	
A	11	1 x 2	3	20-30	7/11/2009	26	95	Metal	Diagnostic	Nail	various sizes	
A	11	1 x 2	4	30-40	7/18/2009	2	0.5	Bone	Fragmentary	Limb		.5 weight b/c scale would not show valid weight for bone assemblage
A	11	1 x 2	4	30-40	7/18/2009	1	0.6	Metal	Complete	Other	bullet casing	rusted .22 bullet casing
A	11	1 x 2	4	30-40	7/18/2009	3	5.4	Metal	Diagnostic	Other	Wire	
A	11	1 x 2	4	30-40	7/18/2009	129	260.1	Metal	Diagnostic	Nail	Complete nails and fragments	
A	11	1 x 2	4	30-40	7/18/2009	1	40.3	Metal	Diagnostic	Nail	it's HUGE	Square-head nail. It really is huge. Between 5-6inches (:
A	11	1 x 2	5	40-50	7/24/2009	74	153	Metal	Diagnostic	Nail	Square Nails	
A	11	1 x 2	5	40-50	7/24/2009	92	229	Metal	Diagnostic	Nail	Fragments of Nail	
A	11	1 x 2	5	40-50	7/24/2009	20	59	Metal	Diagnostic	Nail	Round Nails	
A	11	1 x 2	5	40-50	7/24/2009	2	66	Metal	Diagnostic	Other	Railroad Ties	
A	11	1 x 2	5	40-50	7/18/2009	28	54	Metal	Diagnostic	Nail		24 square nails (one square nail is embedded in burnt wood)/ 4 round nails
A	11	1 x 2	5	40-50	7/24/2009	1	0.5	Bone	Diagnostic	Limb		Unknown Long Bone
A	11	1 x 2	5	40-50	7/24/2009	1	1	Metal	Diagnostic	Other	.22 Shellcase	
A	11	1 x 2	5	40-50	7/24/2009	13	15	Metal	Diagnostic	Other	wire fragments	
A	11	1 x 2	5	40-50	7/18/2009	1	0.5	Metal	Diagnostic	Other	.22 CALIBUR Small Arms Shell	Possibly never fired (no firing-hammer depression on bottom); Stapmed on bottom, "PETERS HV"
A	11	1 x 2	5	40-50	18/7/2009	2	2	Metal	Diagnostic	Blank		wire, staple.
A	11	1 x 2	6	50-60	7/24/2009	2	<1	Bone	Non-diagnostic	Two long bones	Femur or humerus of small animal	Long bone 1 is 2mm in diameter and 2.6 cm long. Long bone 2 is 5 mm in diameter and 2.8 cm long.
A	11	1 x 2	6	50-60	7/24/2009	39	120	Metal	Non-diagnostic	Nails		37 cut nails, 2 wire nails
A	11	1 x 2	6	50-60	7/24/2009	15	28	Metal	Fragmentary	Nail	few full nails and many fragments	there might be a rock in there
A	11	1 x 2	6	50-60	7/24/2009	3	3	Metal	Fragmentary	Flake	three metal fragments	flakes probably from a metal sheet
A	11	1 x 2	7	60-70	7/25/2009	1	0.5	Bone	Complete	Limb		Bone weight put in as .5 because it was too light to show weight. Bone looks to be a rodent femur.
A	11	1 x 2	7	60-70	7/25/2009	11	19	Metal	Fragmentary	Nail		rusted nails w/ varying lengths and thicknesses. Count includes full nails as well as fragmented nail heads.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
B	5	1 x 1	1	0-10	04/17/2009	1	> 200	Metal	Fragmentary	cast iron stove-corner piece		feature: B Dimensions: 30 cm in length; 8.8 cm in width;1.2 cm ridge thickness;0.5 cm middle thickness no embossed letters. Cast Iron is friable and not as strong as it looks.
B	5	1 x 1	1	0-10	4/17/09	4	25.5	Bone	Fragmentary			
B	5	1 x 1	1	surface	10/17/08	147	1360.8	Ceramic	Non-Diagnostic			White china ware - 2 big bags
B	5	1 x 1	1	surface	10/17/08	7	75.2	Ceramic	Diagnostic	Porcelain		Text and designs that are likely diagnostic
B	5	1 x 1	1	0-10	10/17/08	4	22.5	Ceramic	Diagnostic			structure b
B	5	1 x 1	1	0-10	10/17/08	1	5.89	Wood	Diagnostic			Polished Wood; Feature B
B	5	1 x 1	1	0-10		2	17.6	Ceramic	Diagnostic			
B	5	1 x 1	1	0-10		23	140.9	Glass	Diagnostic			
B	5	1 x 1	1	0-10		10	18.6	Lithic	Non-Diagnostic			
B	5	1 x 1	1	0-10		1	.5	Ceramic	Diagnostic			transfer print design
B	5	1 x 1	1	0-10		12	315	Metal	Diagnostic			structure B
B	5	1 x 1	1	0-10		1	315	Metal	Non-Diagnostic			
B	5	1 x 1	1	0-10		8	85.3	Metal	Non-Diagnostic			
B	5	1 x 1	1	0-10	10/17/08	169	147.9	Glass	Non-Diagnostic	Unidentified		Some could be identifiable but most are non-diagnostic
B	5	1 x 1	1	0-10	10/17/08	107	499.9	Glass	Fragmentary	Other		Few diagnostic glass sherds, including bottle bottoms.
B	5	1 x 1	1	0-10	10/17/08	7	111.7	Glass	Fragmentary	Unidentified		Structure B
B	5	1 x 1	1	0-10	10/24/08	114	483.6	Glass	Fragmentary	Unidentified		
B	5	1 x 1	1	0-10	10/17/08	4	78.8	Glass	Diagnostic	Other		1 bottle bottom, 1 bottle neck, 1 piece with compression marks, prob from being broken
B	5	1 x 1	1	0-10	10/22/08		27.4	Wood	Fragmentary	Nail		A mixture of stamped and wire nails
B	5	1 x 1	1	0-10	4/17/09	1	10.5	Glass	Fragmentary			Fragment, amaethyst colored glass. 46mm.
B	5	1 x 1	1	0-10	4/17/09	~80	97	Glass	Fragmentary			Clear-colored glass fragments. Some possible window glass, 1 large bottle bottom.
B	5	1 x 1	1	0-10	4/17/09	~30	87.2	Glass	Fragmentary			Brown colored glass. Several fragments of beer bottles. Includes 1 top/lip of bottle, and 1 bottle bottom.
B	5	1 x 1	1	0-10	4/17/09	~25	62.6	Glass	Fragmentary			Blue/teal colored glass. Severa; fragments of varying thickness. 1 bottle bottom.
B	5	1 x 1	1	0-10	4/17/09	~20	126.2	Glass	Fragmentary			Color of glass is unidentifiable on these fragments - some appear to have been painted.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
B	5	1 x 1	1	0-10	4/17/09	~20	25.9	Ceramic	Fragmentary			Glazeware fragments, dark brown in color. Some glazed only on exterior, some glazed on both exterior and interior.
B	5	1 x 1	1	0-10	4/17/09	~35	230.7	Glass	Fragmentary			Very thick amber colored glass. Appears to be fragments of large wine bottle.
B	5	1 x 1	1	0-10	4/17/09	150+	654.9	Glass	Fragmentary			Green colored glass, several fragmens. Includes 2 bottle tops/lips and 1 bottle bottom.
B	5	1 x 1	1	0-10	4/17/09	7	20.5	Glass	Fragmentary			Special Find. Pressed glass with scalloped design, clear, some curvature on pieces.
B	5	1 x 1	1	0-10	4/17/09	1		Glass	Fragmentary			Special Find. Embossed bottle fragment. Blue glass, letters "ISCO".
B	5	1 x 1	1	0-10	4/17/09	1	2.3	Glass	Fragmentary			Special Find. Embossed bottle bottom, letter 'B'. Small, thin bottle. BUCK GLASS COMPANY.
B	5	1 x 1	1	0-10	7/16	79	271	Glass	Non-Diagnostic			Various bags of glass of different colors. 11 dark green 7 light green 24 clear 7 tinted opal green 30 green bottle glass
B	5	1 x 1	1	0-10	N/A	209	too big	Ceramic				3 pieces looking related to a cylindrical piece 28 bottom of plates/bowls 72 edges of plates/bowls 6 brown pieces 100 misc. pieces of plates/bowls
B	5	1 x 1	1	0-10	4/17/09	32	67.7	Metal	Fragmentary			32 pcs. Metal fragments. Highly deteriorated/oxidized
B	5	1 x 1	1	0-10	4/17/09	1	1	Metal				Metal fastener. 5 cm length .5 cm width 1 mm thin
B	5	1 x 1	1	0-10	4/17/09	23	265.9	Metal	Fragmentary			22 Metal Fragments. Highly deteriorated/oxidized
B	5	1 x 1	1	0-10		1	30.9	Metal				metal stick 11.75 cm length 1.4 cm width 0.6 cm thick
B	5	1 x 1	1	0-10	4/17/09	1	0.7	Glass	Fragmentary			1 pc. Clear glass
B	5	1 x 1	1	0-10		4	8.1	Metal				4 pcs. Metal strips, various lengths
B	5	1 x 1	1	0-10	4/17/09	9	35.5	Metal				Nails - 9 pcs. Deteriorated / oxidized
B	5	1 x 1	1	0-10	4/17/09	5	369.8	Metal	Fragmentary			5 pcs metal. Fragmentary. Oxidized and deteriorating

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
B	5	1 x 1	1	0-10	4/17/09	6	33.7	Ceramic	Fragmentary			Some with pattern/styling, different thickness.
B	5	1 x 1	1	0-10	17 April 2009	1	> 200	Brick	Fragmentary			Red brick flaked fragment: 15x6x1 cm; no visible marks.
B	5	1 x 1	1	0-10	17 April 2009	1	12.6	unknown-leather/fabric?	Fragmentary			unknown possibly dessicated leather or crinkled fabric.
B	5	1 x 1	2	10-20	4/17/09	15	192	Metal	Fragmentary			Assorted fragments of Iron
B	5	1 x 1	2	10-20	7/11/09	6	5.1	Bone	Fragmentary			Six pieces of fragmented, porous bone
B	5	1 x 1	2	10-20	7/11/09	13	19.4	Glass	Fragmentary			13 fragmented pieces of glass: clear, blue, green
B	5	1 x 1	2	10-20	7/11/09	4	3.5	Metal	Fragmentary			4 Flat pieces of metal, highly deteriorated
B	5	1 x 1	2	10-20	7/23/09	2	3.6	Carbon	Fragmentary			Ceramic shard with the picture of silhouette of a lion. (1)
B	5	1 x 1	2	10-20		142	too heavy	Ceramic	Fragmentary			64 BODY pieces of plates/bowls 35 EDGE pieces of plates/bowls 22 BOTTOM pieces of plates/bowls 8 Brown coloured pieces 2 HANDLE pieces 1 piece w/ brand logo/name
B	5	1 x 1	2	10-20		8	21.7	Glass	Fragmentary			Clear glass, special texture
B	5	1 x 1	2	10-20		8	40.8	Glass	Fragmentary			Aquamarine counded glass
B	5	1 x 1	2	10-20		6	38	Glass	Fragmentary			Brown glass
B	5	1 x 1	2	10-20		1	26.3	Glass	Fragmentary			Mouthpiece of bottle
B	5	1 x 1	2	10-20		14	58.1	Glass	Fragmentary			Discoloured glass
B	5	1 x 1	2	10-20		55	too heavy	Glass	Fragmentary			Light green coloured glass
B	5	1 x 1	2	10-20		1	37	Fabric	Fragmentary			Top curve of the bottle's neck- clear glass
B	5	1 x 1	2	10-20		29	115	Glass	Fragmentary			Clear, rounded glass - SHARP too
B	5	1 x 1	2	10-20		33	too heavy	Glass	Fragmentary			Olive/Dark green coloured glass
B	5	1 x 1	2	10-20	04/17/09	17	49.3	Metal		Nail		
B	5	1 x 1	2	10-20	17 April 2009	4	18	Bone	Fragmentary			3 bone pieces from a long bone; articular faceted fragment
B	5	1 x 1	3	20-30	5/8/09	17	48.7	Metal	Fragmentary	Nail		
B	5	1 x 1	3	20-30	5/8/09	150	88.8	Glass	Fragmentary	Unidentified		Window-bottle
B	5	1 x 1	3	20-30	5/8/09	20	55.8	Glass	Fragmentary			Brown Glass
B	5	1 x 1	3	20-30	5/8/09	100	E over limit	Metal	Fragmentary	Other		Broken Metal Fragments
B	5	1 x 1	3	20-30	5/8/09	3	16.3	Unidentified				Rusty objects
B	5	1 x 1	3	20-30	5/8/09	10	13.4	Ceramic	Fragmentary			
B	5	1 x 1	3	20-30	5/8/09	13	48.9	Bone	Fragmentary			Various types of bone pieces (13)

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
B	5	1 x 1	3	20-30	5/8/09	5	1	Shell	Fragmentary			Small fragments of shell
B	5	1 x 1	3	20-30	7/10/09	3	20.9	Metal	Fragmentary			1 Large semi-cylindrical 2 small flat pieces
B	5	1 x 1	3	20-30	7/11/09	1	1.0	Wood	Fragmentary			1 Piece of wood
B	5	1 x 1	3	20-30	7/10/09	1	3.4	Charcoal	Fragmentary			
B	5	1 x 1	3	20-30	7/10/09	9	18.3	Ceramic	Fragmentary			8 pieces of white, 1 black
B	5	1 x 1	3	20-30	7/10/09	19	18.6	Glass	Fragmentary			7 pieces green glass 10 pieces clear glass one piece blue glass one piece thick oily glass
B	5	1 x 1	3	20-30	5/08/2009		too many	Ceramic	Complete			Several ceramic pieces, mostly white cookwear, some brown and black
B	5	1 x 1	3	20-30	05/08/2009	5	14.2	Porcelain	Fragmentary	Porcelain		white
B	5	1 x 1	3	20-30	05/08/09	2	20.6	Ceramic	Fragmentary			SPECIAL FIND
B	5	1 x 1	3	20-30	05/08/09	13	8.8	Metal	Non-Diagnostic			Includes 1 metal button
B	5	1 x 1	3	20-30	05/08/2009	160	806.8	Glass	Fragmentary			Green Glass
B	5	1 x 1	3	20-30	05/08/09	4	8.7	Glass	Fragmentary			Pressed clear glass
B	5	1 x 1	3	20-30	05/08/09	20	51	Glass	Fragmentary			Turquoise, fragmented glass pieces
B	5	1 x 1	3	20-30	5/8/2009	1		Button	Complete			
B	5	1 x 1	3	20-30	05/08/09	4	25	Glass	Fragmentary			Clear, rounded glass pieces
B	5	1 x 1	3	20-30		1		Carbon	Fragmentary			69.6 cm Below datum
B	5	1 x 1	4	30-40	7/10/09	1	1.4	Exotic	Fragmentary	Unidentified		Leather
B	5	1 x 1	4	30-40	7/10/09	3	0.6	Bone	Fragmentary			Land mammal bone both smaller than a dime.
B	5	1 x 1	5	40-50	4/17/09	1	26.9	Metal	Fragmentary	Unidentified		Possible Knife or File
B	5	1 x 1	surface collection		10/17/08	1	140.6	Metal	Non-Diagnostic	Unidentified		
C	2	1 x 2	1	0-10	11/3/07	19	29.1	Glass	Non-Diagnostic			multiple colors, mostly flat with one rounded piece.
C	2	1 x 2	1	0-10	11/3/07	25	100.2	Bone				various shards of bone, there is part of a humerous.
C	2	1 x 2	1	0-10	11/3/07	10	197.1	Ceramic	Diagnostic	Bottom		glazed ceramic pottery shards.
C	2	1 x 2	1	0-10	11/3/07	59	298.2	Metal	Fragmentary			there are many metal fragments and one flat piece that looks lilke it has bolts in it.
C	2	1 x 2	1	0-10		23	248	Ceramic	Diagnostic	Unidentified		Rims and Bottoms. Possible fragments of plates and cups
C	2	1 x 2	1	0-10	3/11/07	1	too heavy	Mortar	Diagnostic	Brick		Feature V
C	2	1 x 1	2	10-20	11/17/07	20	34.7	Bone	Fragmentary			

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
C	2	1 x 1	2	10-20	11/9/07	1	3.1	Unidentified				either carbonized bone or carbonized wood.
C	2	1 x 1	2	10-20	11/17/07	1	.4	Shell				small piece of fragmentary shell.
C	2	1 x 1	2	10-20	11/9/07		37.2	Metal	Non-Diagnostic			
C	2	1 x 1	2	10-20	11/9/07	6	16.3	Metal	Diagnostic	Nail		Square headed nails.
C	2	1 x 1	2	10-20	11/9/07	2	3.1	Metal				thin wirey metal, possibly very long nails or hooks.
C	2	1 x 1	2	10-20	11/9/07	1	11.1	Metal				possibly a hinge
C	2	1 x 1	2	10-20		23	60.8	Ceramic	Non-Diagnostic			
C	2	1 x 1	2	10-20	11/17/07	47	68.1	Glass	Non-Diagnostic			flat glass shards
C	2	1 x 1	2	10-20	11/9/07	21	89.5	Metal				
C	2	1 x 1	2	10-20	11/9/07	8	28.5	Metal	Diagnostic	Nail		
C	2	1 x 1	2	10-20	11/9/07	1	4.7	Metal	Non-Diagnostic	Unidentified		thin piece of metal twisted at the ends
C	2	1 x 2	2	10-20	11/09/07	0	200	Metal	Non-Diagnostic	Nail		Metal Fragments
C	2	1 x 2	2	10-20	11/17/07	1	too heavy	Metal	Non-Diagnostic	Unidentified		Bag 2 of 2 Metal container?
C	2	1 x 2	3	20-30	26 April 2008	7	229.6	Metal	Non-Diagnostic			Metal wire pieces, 1 large piece and 6 small
C	2	1 x 2	3	20-30	26 April 2008	1	69.3	Metal	Complete			Large metal spike, Length: 18cm Diameter: 2cm Width: .9cm
C	2	1 x 2	4	30-40	04/26/08	10	7	Metal	Non-Diagnostic			10 small flakes of metal along with melat powder and tiny splinters
C	2	1 x 2	4	30-40	04/26/08	45	80	Metal	Diagnostic	Nail		square and round heads.
C	2	1 x 2	4	30-40	04/26/08	1	1	Lithic	Diagnostic	Domestic		a bottom
C	2	1 x 2	4	30-40	04/26/08	1	1	Metal	Diagnostic	Other		weird wirey thing.
C	2	1 x 2	4	30-40	04/26/08	29	28	Glass	Non-Diagnostic			small multi-colored glass shards
C	2	1 x 2	4	30-40	04/26/08	1	0	Bone	Fragmentary			very small bone piece. 0.1grams
C	2	1 x 2	4	30-40	5/10/08	9	54.4	Glass	Diagnostic			bottleneck, bag 2 of 2 (goes with 296)
C	2	1 x 2	4	30-40	4/26/08	20	130.8	Metal	Diagnostic	Nail		Nails
C	2	1 x 2	4	30-40		25	30	Bone	Fragmentary			
C	2	1 x 2	4	30-40		42	22.5	Glass	Fragmentary			Bag 1 of 2 (goes with 261
C	2	1 x 2	4	30-40	5/10/08	1	522	Metal	Diagnostic			
C	2	1 x 2	4	30-40	4/26/08	20+	too heavy	Metal		Chunk		a mix of rusted metal stuff including: round pipe flat pieces nails
C	2	1 x 2	4	30-40	4/26/08	10	too heavy	Bone				chopped bone

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
C	2	1 x 2	4	30-40	4/26/08	4	18.4	Lithic	Non-Diagnostic			
C	2	1 x 2	4	30-40	4/19/08	72	69.4	Glass	Fragmentary			
C	2	1 x 2	4	30-40	4/26/08	9	24.6	Ceramic	Fragmentary			white ceramic fragments one fragment has a small fraction of the base.
C	2	1 x 2	4	30-40	7/10/09	5	21.5	Metal	Fragmentary	Nail		5 Nails (1) 3 1/4" square (1) 2 1/4" square (1) 2 1/4" square (no head) (1) 1 3/4" round (1) 1/2" square
C	2	1 x 2	5	40-50	10/24/08	2	96.2	Ceramic	Diagnostic			Special Find
C	2	1 x 2	5	40-50	10/24/08	1	147.4	Lithic	Diagnostic			Plaster?
C	2	1 x 2	5	40-50		3	249.4	Metal	Diagnostic			
C	2	1 x 2	5	40-50		15	25.3	Glass	Fragmentary			Structure C
C	2	1 x 2	Surface Collection	0	11/17/07	7	22	Ceramic	Fragmentary	Bottom		Fragments of white glazed ceramics, one fragment is part of the base. It is probably a serving vessle.
C	2	1 x 2	Surface Collection	0	11/17/07	6	7	Glass				fragments of opaque glass.
C	2	1 x 2	Surface Collection	0	11/17/07	3	1	Lithic	Fragmentary			Limestone chunks
D	6	1 x 2	1	0-10	5/8/09-5/22/09	195+	1136.9	Metal	Complete and Complete			mix of round and square nails (both complete and fragmentary), ranging in size from 1/2" to 6" and diameter ranging from 1/8" to 1/2." Also pieces of metal, staples and wire. Nails are from different years.
D	6	1 x 2	1	0-10	8 May 2009	> 500	386	Glass	Fragmentary			Fragments of clear glass: some pane glass, some bottle glass.
D	6	1 x 2	1	0-10	05/22/09	20+	33.5	Metal	Non-Diagnostic			FenCe wire and misCellaneous meTal pieCes
D	6	1 x 2	1	0-10	05/22/2009	20	55.9	Glass	Non-Diagnostic			Fragmentary pieces of clear and opalescent glass
D	6	1 x 2	1	0-10	05/08/2009	1	too heavy	Metal	Non-Diagnostic	Unidentified		Large piece of metal. Special Find.
D	6	1 x 2	1	0-10	05/2009	1	46.1	Glass	Non-Diagnostic	Container		Special Find. Glass bottle with cork, remnants may still be inside container.
D	6	1 x 2	2	10-20	7/10/2009	1	0	Bone	Fragmentary	Blank		Mammal Femur
D	6	1 x 2	2	10-20		1	0.3	Wood	Fragmentary	Blank		Burnt wood
D	6	1 x 2	2	10-20	7/10/2009	3	1.2	Wood	Fragmentary	Blank		
D	6	1 x 2	2	10-20	7/11/2009	1	1.3	Bone	Fragmentary	Blank		
D	6	1 x 2	2	10-20	7/10/2009	9	3.3	Glass	Fragmentary	Blank		

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
D	6	1 x 2	2	10-20	7/10/2009	54	106.6	Metal	Fragmentary	Blank		PERHAPS ROOF
D	6	1 x 2	2	10-20	7/10/2009	10	16.6	Metal	Complete	Nail		
D	6	1 x 2	2	10-20	7/10/2009	25	33.6	Wood	Fragmentary	Blank		CHARCOAL
D	6	1 x 2	2	10-20		82	118	Metal	Diagnostic	Nail		Whole nails as well as fragments. Opened new bag for metal fragments.
D	6	1 x 2	2	10-20		53	53	Metal	Fragmentary	Blank		Metal fragments originally combined with metal nails.
D	6	1 x 2	2	10-20	Unknown	194	322	Glass	Fragmentary	Blank		
D	6	1 x 2	2	10-20		42	100	Wood	Fragmentary	Other		weight is more than stated, missing a lot of information
D	6	1 x 2	2	10-20	05/15/2009	1	18.2	Glass	Complete	Container		Glass bottle/ vial. Special find. Cork in bottle. Remnants of remains may still be in bottle. Opalescent.
D	6	1 x 2	Surface		4/17/2009	1	9.7	Bone	Fragmentary	Blank		thought to be from a deer
D	6	1 x 2	Surface	0-10	4/17/2009	14	27.1	Glass	Fragmentary	Blank		
D	7	1 x 2	1	0-10	7/23/09	11	14.3	Glass	Fragmentary			9 Window, clear 1 thicker 1 coloured (green)
D	7	1 x 2	1	0-10	5/19/09	1	6.7	Metal	Fragmentary			Shot gun shell
D	7	1 x 2	1	0-10	7/23/09	4	17.3	Metal	Fragmentary	Nail		Square nails and one rounded nail
D	7	1 x 2	3	50-60	5/19/09	2	1.8	Metal	Fragmentary			-22 Shells (2)
D	7	1 x 2	3	50-60	5/16/09	1	4	Glass	Fragmentary			Flat glass
D	7	1 x 2	3	50-60	5/16/09	37	97.1	Metal	Fragmentary	Nail		NAILS + small buckel (1)
D	7	1 x 2	3	50-60	5/19/09	28	85.7	Metal	Fragmentary			Metal Sheet + Red paint on it
D	7	1 x 2	3	50-60	19 May2009	13	67	Carbon	Non-Diagnostic			Carbon/burnt wood 1 bag of carbon wrapped in foil, weighting 47.2g 12 pieces of burnt wood, 19.8g
D	7	1 x 2	3	50-60	5/16/2009	1	1888	Brick	Non-Diagnostic	Other	Limestone Brick	Broken Limestone Brick
D	13	2 x 2	1	0-15	July 17-18, 2009	1		Metal	Complete	Other		Special Find: Large Iron "U" shaped bolt with threaded ends. Length: 32.20 cm Width: 5.7 to 5.3cm
D	13	2 x 2	1	0-15	July 17-18, 2009	3	1.8	Metal	Diagnostic			Special Find: 3 .22 long rifle shells- all three shells were shot from different guns
D	13	2 x 2	1	0-15	July 17-18, 2009	1	9.9	Metal	Complete			Special Find: metal handle for a fork or spoon. Length: 8cm Width: 1.2 to 1.8cm
D	13	2 x 2	1	0-15	July 17-18, 2009	1	0.3	Metal	Complete			Special Find: metal buckle/loop for clothing like suspenders.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
D	13	2 x 2	1	0-15	July 17-18, 2009	1	4.8	Metal	Diagnostic			Special Find: shotgun shell head "1901 No.12 New Rival"
D	13	2 x 2	1	0-15	July 17-18, 2009	1	3.4	Glass	Fragmentary			Special Find: moulded clear glass- from a hurricane glass lamp or canning jar. Length:2.4-2.8cm Width:2.6
D	13	2 x 2	1	0-15	July 17-18, 2009	1	66.7	Metal	Complete			Special Find: long thin flat metal piece with a hole on one end. Length: 19cm Width"2.5cm
D	13	2 x 2	1	0-15	July 17-18, 2009	1	4	Metal	Complete			Special Find: metal key for sardine type can.
D	13	2 x 2	1	0-15	July 17-18, 2009	1	1.2	Metal	Diagnostic			Special Find: Metal rivet "L.S. &Co S.F" on both sides of rivet. Blue jean material still inside rivet. Diameter: 1cm
D	13	2 x 2	1	0-15	July 17-18, 2009	7	5.7	Metal	Complete			Special Find: metal grommets -possibly from a boot Diameter: 1.1cm
D	13	2 x 2	1	0-15	July 17-18, 2009	60	24.8	Metal	Fragmentary			Small thin metal bits
D	13	2 x 2	1	0-15	July 17-18, 2009	38	92.5	Metal	Non-Diagnostic	Nail		Wire nails Longest:3 1/8 in Shortest: 3/5 in
D	13	2 x 2	1	0-15	July 17-18, 2009	10	13.7	Metal	Non-Diagnostic			Metal wire
D	13	2 x 2	1	0-15	July 17-18, 2009	206	273.6	Glass	Fragmentary			Large pane glass
D	13	2 x 2	1	0-15	July 17-18, 2009	25	330	Metal	Fragmentary			Cast iron Metal- possibly from wood stove
D	13	2 x 2	1	0-15	July 17-18, 2009	1	0.7	Metal	Complete			Screw Length:1.25 Diameter: 0.5
D	13	2 x 2	1	0-15	July 17-18, 2009	395	832.9	Metal	Non-Diagnostic	Nail		Cut Nails Longest: 4 in Shortest: 1/2 in
D	13	2 x 2	1	0-15	July 17-18, 2009	75	127.5	Glass	Fragmentary			Fragments of brown bottle glass
D	13	2 x 2	1	0-15	July 17-18, 2009	610	215	Glass	Fragmentary			Small fragments of pane glass
D	13	2 x 2	1	0-15	July 17-18, 2009	4	5.2	Metal	Non-Diagnostic			Wire stapes Length: 3/5 in
D	13	2 x 2	1	0-15	July 17-18, 2009	1	1	Metal	Fragmentary			Metal shard- possibly lead? 1cm by 1cm
D	13	2 x 2	1	0-15	July 17-18, 2009	3	29.5	Bone	Fragmentary	Bone		2 carpal's/tarsal's- possibly from cow? 1 femuer- possibly from rat or mole
D	13	2 x 2	1	0-15	July 17-18, 2009	17	140.6	Metal	Fragmentary			Metal handle and fragments- possibly from a trowl
D	13	2 x 2	Suface	Suface	July 17-18, 2009	3	5.8	Glass	Fragmentary			Brown bottle glass
D	13	2 x 2	Suface	Suface	July 17-18, 2009	8	3.8	Glass	Fragmentary			Clear pane glass

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
D	13	2 x 2	Surface	Surface	July 17-18, 2009	1		Metal	Non-Diagnostic			Special Find: large metal piece with hinges- part of wood stove? Length:4.5-13cm Width:5.5-8.5cm
D	13	2 x 2	Surface	Surface	July 17-18, 2009	2	8.4	Metal	Non-Diagnostic			I metal shard and 1 metal square nail.
D	13	2 x 2	Surface	Surface	8/7/2009	1	996	Metal	Diagnostic	Wood stove lid fragment		Other parts of the stove were found nearby
D	13	2 x 2	surface	Surface	8/7/2009	1	996	Metal	Diagnostic	Other	Cast iron	Cast iron stove plate
E	20	1 x 1	1	0-10	7/30/2009	1	78	Metal	Fragmentary	Blank	has two bolts in it	Sheets of metal bolted together
E	20	1 x 1	1	0-10	7/31/2009	2	8	Metal	Diagnostic	Nail		Smaller piece is a nail fragment
E	20	1 x 1	1	0-10	7/31/2009	6	4	Lithic	Fragmentary	Blank	Quartz (possible)	Has smooth surfaces
E	20	1 x 1	1	0-10	7/31/2009	30	175.7	Metal	Fragmentary	Blank	rusted irregular pieces	
E	20	1 x 1	2	10-20	7/31/2009	75	258	Metal	Fragmentary	Blank	Largest piece is 5.4x3.7x5mm	
E	20	1 x 1	3	20-30	7/31/2009	25	61.6	Metal	Fragmentary	Blank	20 PIECES	one cut nail7.4cmx3.6cm
E	20	1 x 1	3	20-30	7/31/2009	1	8.2	Metal	Diagnostic	Nail		
E	20	1 x 1	3	20-30	7/31/2009	1	0.6	Lithic	Fragmentary	Blank		SINGLE SHARD
E	20	1 x 1	3	20-30	7/31/2009	1	1.3	Bone	Diagnostic	Blank		
E	26	1 x 1	1	0-10	8/1/2009	4	9.9	Glass	Fragmentary	Blank		
F	1	1 x 1	1	0-10	5/25/07	3	49	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	1	0-10	5/25/07	6	13	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	1	0-10	11/03/07	2	4	Lithic	Fragmentary	Chunk		LITHIC PIECES
F	1	1 x 1	1	0-10	11/03/07	48	96	Metal	Diagnostic	Nail		Nails of Various sizes, lengths and widths. They are all rusted and some heads are rectangular while others are round.
F	1	1 x 1	1	0-10	11/03/07	61	65	Glass	Non-Diagnostic			There are various sizes and colors of glass shards, green white and cloudy white.
F	1	1 x 1	1	0-10	11/03/07	5	1	Wood	Fragmentary			Very light like tanbark or tagboard
F	1	1 x 1	1	0-10	11/03/07		0	Plastic	Complete	Domestic		A red plastic piece that looks like a vial cap or some kind of small stopper.
F	1	1 x 1	1	0-10	11/03/07	3	2	Shell	Fragmentary	Clam		3 small shell fragments
F	1	1 x 1	1	0-10	11/03/07	17	22	Metal	Fragmentary	Other		small fragmentary chunks of rusted metal
F	1	1 x 1	1	0-10	11/03/07	2	106	Bone	Diagnostic	Other		Appears to be a ball joint of a large animal, possibly a cow
F	1	1 x 1	1	0-10	11/03/07	1	32	Glass	Diagnostic	Domestic		A clear rectangular glass container base, it could be a perfume or medicine bottle from the shape
F	1	1 x 1	1	0-10	11/03/07	1	40	Glass	Diagnostic			green glass that appears to be part of the mid-section of a bottle. The glass is very

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
												thick and maitains some of the bottles curve
F	1	1 x 1	1	0-10	11/03/07	3	50	Metal	Diagnostic			3 pieces of a broken chain, they are very rusted. One Piece is only a fragment while the other two loops are still intact and connected.
F	1	1 x 1	1	0-10	17/07/07	2	8.9	Ceramic	Complete	Bottom		Yellow ceramic base fragment with crackled glaze with bubbles in it.
F	1	1 x 1	2	10-20	5/25/07	1	1	Shell	Fragmentary	Unidentified		UNIDENTIFIED FRAGMENT
F	1	1 x 1	2	10-20	5/25/07	2	0	Lithic	Fragmentary	Flake		LITHIC FLAKES
F	1	1 x 1	2	10-20	5/25/07	1	1	Glass	Fragmentary	Unidentified		GLASS FRAGMENT
F	1	1 x 1	2	10-20	11/03/07	15	22	Glass	Fragmentary			opaque as well as colored glass shards
F	1	1 x 1	2	10-20		28	60	Metal	Non-Diagnostic			the fragments are a range of different sizes but don't seem to be diagnostic.
F	1	1 x 1	2	10-20		8	4	Carbon	Fragmentary			various small pieces of carbon
F	1	1 x 1	2	10-20		28	48	Metal	Diagnostic	Nail		many nails of relatively similar lengths and widths. They mostly have round heads but there is one with a rectangular head.
F	1	1 x 1	2	10-20		1	55	Metal	Diagnostic	Nail		Very large nail, about 6 inches long with around head. It is bent and rusted.
F	1	1 x 1	3	20-30	5/25/07	3	1	Lithic	Fragmentary	Flake		LITHIC FLAKES
F	1	1 x 1	3	20-30	5/25/07	3	2	Shell	Fragmentary	Unidentified		One of the pieces is shell, but the other two may be either bone or wood, it is hard to identify.
F	1	1 x 1	3	20-30		3	2	Metal	Non-Diagnostic	Other		thin flakes of grey-blue rusted metal
F	1	1 x 1	3	20-30		1	5	Metal	Diagnostic	Other		Fired shell casing from a small riffle. On the bottom there is a dent where the hammer hit it as well as an h imprinted on the bottom.
F	1	1 x 1	3	20-30		2	2	Carbon				carbonized wood
F	1	1 x 1	3	20-30		8	17	Glass	Fragmentary			multi-colored glass shards.
F	1	1 x 1	3	20-30		18	48	Metal	Diagnostic	Nail		Many nails of various sizes, most appear to have round heads.
F	1	1 x 1	4	30-40	11/17/07	8	39	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	4	30-40	11/17/07	9	8	Shell	Non-Diagnostic	Unidentified		UNIDENTIFIED FRAGMENTS
F	1	1 x 1	4	30-40	11/17/07	3	6	Bone	Fragmentary			Small chunk and fragents of unidentified animal bones.
F	1	1 x 1	4	30-40	11/17/07	21	3	Carbon				many very small fragments of charcoal
F	1	1 x 1	5	40-50	5/25/07	5	2	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	5	40-50	11/17/07	0	11	Carbon	Non-Diagnostic	Unidentified		CHARCOAL

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
F	1	1 x 1	5	40-50	11/17/07	3	0	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
F	1	1 x 1	5	40-50	11/17/07	1	0	Plastic	Non-Diagnostic	Unidentified		PLASTIC
F	1	1 x 1	5	40-50	11/17/17	3	2	Metal	Fragmentary	Unidentified		METAL PIECES
F	1	1 x 1	5	40-50	4/25/08	23	40	Metal	Diagnostic	Nail		multiple nails of various sizes, some with round and square heads.
F	1	1 x 1	5	40-50	4/25/08	3	23	Lithic	Non-Diagnostic			A piece of fired limestine and two brick colered pieces of rock
F	1	1 x 1	5	40-50	11/17/07	6	10	Glass	Non-Diagnostic			6 pieces of clear glass
F	1	1 x 1	5	40-50	11/17/07	4	5	Glass	Fragmentary			green glass
F	1	1 x 1	5	40-50	11/17/07	4	2	Bone	Fragmentary			four pieces fo small animal bones
F	1	1 x 1	5	40-50	11/17/07	3	1	Carbon	Fragmentary			three small pieces of carbon with tiny pieces of debutage weight .3
F	1	1 x 1	5	40-50	11/17/07	26	52	Mortar				
F	1	1 x 1	6	50-60	4/26/08	1	0.7	Glass	Non-Diagnostic			clear glass
F	1	1 x 1	6	50-60	4/26/08	1	10.5	Metal	Non-Diagnostic			nail, rusted
F	1	1 x 1	7	60-70	4/26/08	2	2.3	Glass	Non-Diagnostic			Clear glass
F	1	1 x 1	Surface	0	5/25/07	2	0	Shell	Fragmentary	Unidentified		UNIDENTIFIED FRAGMENTS
F	1	1 x 1	Surface	0	5/25/07	27	52	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	Surface	0	5/25/07	21	60	Shell	Fragmentary	Clam		CLAM FRAGMENTS, 3 PIECES FIT TOGETHER
F	1	1 x 1	Surface	0	5/25/07	1	1	Shell	Fragmentary	Mussel		MUSSEL FRAGMENTS
F	1	1 x 1	Surface	0	5/25/07	2	0	Shell	Fragmentary	Clam		CLAM FRAGMENTS
F	1	1 x 1	Surface	0		1	0	Lithic	Fragmentary	Flake		LITHIC FLAKE
F	1	1 x 1	Surface	0		1	0	Fabric	Fragmentary	Unidentified		FABRIC PIECE
F	1	1 x 1	Surface	0		1	1	Ceramic	Non-Diagnostic	Brick		BRICK/CLAY
F	1	1 x 1	Surface	0		2	2	Lithic	Fragmentary	Groundstone		LITHIC STONES
F	1	1 x 1	Surface	0		2	0	Bone		Unidentified		BONE FRAGMENTS
F	1	1 x 1	Surface	0		0	27	Carbon	Non-Diagnostic	Unidentified		CHARCOAL
F	1	1 x 1	Surface	0		4	13	Metal	Fragmentary	Nail		METAL PIECES
F	1	1 x 1	Surface	0		6	1	Carbon	Non-Diagnostic	Unidentified		CHARCOAL
F	1	1 x 1	Surface	0		1	1	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENT
F	1	1 x 1	Surface	0		2	1	Lithic	Fragmentary	Groundstone		LITHIC STONE PIECES
F	1	1 x 1	Surface	0		6	13	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
F	1	1 x 1	Surface	0		1	0	Bone	Fragmentary	Unidentified		BONE FRAGMENT
F	1	1 x 1	Surface	0		1	0	Glass	Fragmentary	Unidentified		GLASS FRAGMENT

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
F	1	1 x 1	Surface	0		9	5	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
F	1	1 x 1	Surface	0		1	3.4	Metal	Fragmentary	Nail		METAL PIECES
F	1	1 x 1	Surface	0		2	1	Plastic	Fragmentary	Other		PLASTIC PIECES
F	1	1 x 1	Surface	0		2	1	Carbon	Non-Diagnostic	Unidentified		CHARCOAL PIECES
F	1	1 x 1	Surface	0		7	148	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
F	1	1 x 1	Surface	0		8	101	Metal	Diagnostic	Nail		METAL BULLET AND NAILS
F	1	1 x 1	Surface	0		1	1	Ceramic	Fragmentary	Other		BLUE CHINA POTTERY PIECE
F	18	1 x 1	1	0-10	7/24/2009	2	4	Bone	Fragmentary	Blank		
F	18	1 x 1	1	0-10	BL, KW, SO	2	1	Plastic	Fragmentary	Blank	Button fragments	
F	18	1 x 1	1	0-10	7/24/2009	25	57	Glass	Fragmentary	Blank	Glass, colored, mixed	Green 7; blue 2; brown 2; clear 14, some opalescent
F	18	1 x 1	1	0-10	7/24/2009	32	85	Metal	Diagnostic	Nail		Nails, heads mixed round and square, w/ fragments
F	18	1 x 1	2	10-20	7/24/2009	1	0.5	Ceramic	Complete		Button	Small Button
F	18	1 x 1	2	10-20	7/24/2009	1	0.5	Metal	Complete		Shell casing	
F	18	1 x 1	2	10-20	7/24/2009	10	12	Metal	Fragmentary	Blank		Metal fragments, unknown
F	18	1 x 1	2	10-20	7/24/2009	1	23	Glass	Diagnostic	Blank	Bottle top portion	Glass bottle top portion, green, long necked
F	18	1 x 1	2	10-20	7/24/2009	29	59	Metal	Diagnostic	Nail	Nails, round headed	29 recognizable nail pieces plus fragments
F	18	1 x 1	2	10-20	7/24/2009	28	27	Glass	Fragmentary	Blank	Glass, colored, fragments	Glass, Colored, most probably bottle; 14 clear, 8 green, 6 brown
F	18	1 x 1	3	20-30	7/25/2009	1	58	Glass	Fragmentary	Container		Neck of green glass bottle
F	18	1 x 1	3	20-30	7/25/2009	12	38	Metal	Fragmentary	Nail		Nail fragments counted, plus misc. rust
F	18	1 x 1	3	20-30	7/25/2009	9	9	Glass	Fragmentary			6 Pc clear, 3 Pc brown, 1 Pc clear blue
F	18	1 x 1	4	30-40	7/25/2009	1	2	Lithic	Complete	Blank		Shaped stone
F	18	1 x 1	4	30-40	7/25/2009	4	48	Glass	Fragmentary	Blank		2 Pc clear glass, 2 Pc brown glass
F	18	1 x 1	4	30-40	7/25/2009	3	3	Metal	Fragmentary	Nail		
F	18	1 x 1	5	40-50	7/25/2009	2	3	Metal	Fragmentary	Blank		
F	18	1 x 1	5	40-50	7/25/2009	1	1	Metal	Complete	Nail		
F	18	1 x 1	5	40-50	7/25/2009	1	1	Metal	Complete	Blank		Levi rivet
F	18	1 x 1	5	40-50	7/25/2009	2	3	Glass	Fragmentary	Blank		
F	18	1 x 1	6	50-60	7/25/2009	2	2	Ceramic	Diagnostic	Other	glass button, gramet	none
F	18	1 x 1	6	50-60	7/25/2009	7	17	Bone	Diagnostic	Nail	nail fragments	none
G	3	1 x 2	1	0-10		1	30.8	Glass	Diagnostic	Unidentified		bottle neck, medicine
G	3	1 x 2	1	0-10	5/17/08	1	.4	Exotic	Diagnostic			button
G	3	1 x 2	1	0-10	4/26/08	10		Metal	Non-Diagnostic	Nail		

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	3	1 x 2	1	0-10		85	112.2	Glass	Fragmentary			
G	3	1 x 2	1	0-10	5/03/08	9	4.2	Bone	Diagnostic			
G	3	1 x 2	1	0-10	4/26/08	1	3.0	Metal	Diagnostic			Shotgun cartridge
G	3	1 x 2	1	0-10	4/26/08	2	1.0	Ceramic	Diagnostic			buttons
G	3	1 x 2	1	0-10	4/26/08	4	6.9	Lithic	Fragmentary			Possible obsidian
G	3	1 x 2	1	0-10	4/26/08	2	28.4	Glass	Diagnostic			Possible Use wear
G	3	1 x 2	1	0-10	4/26/08	25	113	Metal	Non-Diagnostic	Nail		Nails
G	3	1 x 2	2	10-20	5/10/08	2	4.8	Ceramic	Diagnostic	Other		pipe stem
G	3	1 x 2	2	10-20	5/10/08	74	97.3	Glass	Fragmentary			multi-colored glass.
G	3	1 x 2	2	10-20		7	20.9	Ceramic	Fragmentary			colored blue and green
G	3	1 x 2	2	10-20		1	1.3	Lithic	Non-Diagnostic			
G	3	1 x 2	2	10-20		1	22.8	Glass	Diagnostic			bottleneck
G	3	1 x 2	2	10-20	5/10/08	15	7.4	Bone	Diagnostic			Bone
G	3	1 x 2	2	10-20	5/10/08	103	309	Metal	Fragmentary	Nail		Nails
G	3	1 x 1	3	20-30	July 25, 2009	2	6.9	Glass	Non-Diagnostic			one piece green, one piece clear
G	3	1 x 2	3	20-30	5/17/08	17	37.1	Glass	Fragmentary			multi colored glass
G	3	1 x 2	3	20-30	5/17/08	6	4	Ceramic	Diagnostic	Unidentified		Does not exist
G	3	1 x 2	3	20-30	5/17/08	2	1.4	Bone	Diagnostic			
G	3	1 x 2	3	20-30	5/17/08	22	60.0	Metal	Fragmentary			metal fragments and nails
G	3	1 x 2	3	20-30	5/17/08	6.9	4	Wood	Diagnostic			
G	3	1 x 2	4	30-40		1	0.2	Unidentified	Diagnostic			Button (ivory)
G	3	1 x 2	4	30-40		18	40.7	Metal	Non-Diagnostic	Nail		
G	3	1 x 2	4	30-40		13	4.4	Bone	Diagnostic			
G	3	1 x 2	4	30-40		1	0.9	Ceramic	Fragmentary			
G	3	1 x 2	4	30-40		25	39.1	Glass	Fragmentary			
G	3	1 x 2	5	40-50	5/31/08	2	1.5	Bone	Diagnostic	Unidentified		
G	3	1 x 2	5	40-50	5/31/08	1	4.8	Ceramic	Fragmentary			
G	3	1 x 2	5	40-50	5/13/08	1	2.1	Metal	Diagnostic	Nail		
G	3	1 x 2	5	40-50	5/31/08	5	13.1	Glass	Fragmentary			
G	3	1 x 2	surface	0	5/13/08	2	.05	Glass	Fragmentary	Unidentified		
G	3	1 x 2	surface	0	5/13/08	2	2.5	Glass	Diagnostic			bottle rim
G	3	1 x 2	surface	0	5/13/08	1	.14	Metal	Diagnostic	Other		buckle
G	4	1 x 2	1	0-10	5/3/08	1	0.8	Exotic	Non-Diagnostic	Unidentified		button?

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	4	1 x 2	1	0-10	2/3/08	1	1	Ceramic	Diagnostic			button
G	4	1 x 2	1	0-10		1	2.6	Metal	Diagnostic			Shotgun cartridge
G	4	1 x 2	1	0-10	5/3/08	26	47.5	Glass	Fragmentary			Multi colored glass
G	4	1 x 2	1	0-10		72	135.7	Metal	Diagnostic	Nails		Plethora of Metals
G	4	1 x 2	1	0-10	5/3/08	4	3.9	Wood	Diagnostic	Unidentified		
G	4	1 x 2	1	0-10	5/3/08	6	11	Bone	Diagnostic	Unidentified		Chicken Bones
G	4	1 x 2	1	0-10	5/10/08	2	1.5	Shell	Diagnostic	Unidentified		
G	4	1 x 2	2	10-20	5/31/08	14	22.6	Glass	Non-Diagnostic			multicolored
G	4	1 x 2	2	10-20	5/31/08	1	6.9	Glass	Diagnostic			bottle neck
G	4	1 x 2	2	10-20	05/31/08	4	1.2	Shell	Non-Diagnostic	Unidentified		
G	4	1 x 2	2	10-20	5/31/08	3	.9	Bone	Fragmentary			
G	4	1 x 2	2	10-20	5/31/08	1	0.3	Bone	Fragmentary			
G	4	1 x 2	2	10-20		9	16.1	Metal	Fragmentary	Nail		
G	4	1 x 2	2	10-20	5/17/08	30	229.0	Metal	Fragmentary	Nail		
G	4	1 x 2	2	10-20	5/17/08	8	9.7	Glass	Fragmentary			multi colored glass
G	4	1 x 2	2	10-20	5/31/08	35	62.4	Wood	Diagnostic			
G	4	1 x 2	2	10-20	7/10/09		too heavy	Rock				5 Big granite rocks Sparkly red rock, intrusive Not indigenous Large block granite
G	4	1 x 2	2	10-20	7/10/09	3	12.8	Glass	Fragmentary	Sherd		3 Pieces of clear glass each slightly curved.
G	4	1 x 2	2	10-20	7/10/09	1	0.6	Rock	Fragmentary			White crumbly material
G	4	1 x 2	3	20-30		1	5.7	Metal	Diagnostic			Shotgun shell
G	4	1 x 2	3	20-30	6/7/08	1	.5	Ceramic	Diagnostic			Button
G	4	1 x 2	3	20-30	6/7/08	1	1.0	Ceramic	Non-Diagnostic			
G	4	1 x 2	3	20-30		18	40.0	Glass	Fragmentary			multi colored glass, some clear
G	4	1 x 2	3	20-30	6/7/08	1	4.7	Glass				Base?
G	4	1 x 2	3	20-30	6/7/08	51	187.7	Metal	Diagnostic	Nail		
G	4	1 x 2	3	20-30	6/07/08	10	47	Bone	Diagnostic	Unidentified		Soup Bone and Others?
G	4	1 x 2	4	30-40	7/18/2009	3	1.2	Metal	Diagnostic	Blank	Sheet Metal	
G	4	1 x 2	4	30-40		2	12.6	Glass	Diagnostic			
G	4	1 x 2	4	30-40	7 June 2008	1	61.6	Glass	Fragmentary			Glass bottle neck w/intact top, thick brown glass. Lemgth: 7cm Width: 2.5 cm
G	4	1 x 2	4	30-40	7 June 2008	9	34	Metal	Non-Diagnostic	Nail		Square nails

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	4	1 x 2	4	30-40	7 June 2008	1	1.2	Metal	Diagnostic			Special Find: Levi Strauss clothing button, Diameter 1.6cm
G	4	1 x 2	4	30-40	7 June 2008	6	4.4	Glass	Fragmentary			Small shards of glass, 1 clear bottle glass fragment, 5 pane glass
G	4	1 x 2	4	30-40	7/10/09	3	8.9	Glass	Fragmentary	Sherd		3 Pieces total 1 Green 2 Clear (1 Curved)
G	4	1 x 2	5	40-50	7/1/09	6	21.2	Metal	Complete	Nail		6 Nails 4 cm (2) 4.5 cm (1) 4.3 cm (1) - Broken 7.5 cm (1) - Without head 8.5 cm (1) - Bent with no head
G	4	1 x 2	5	40-50	7/11/09	4	0.3	Wood	Fragmentary			Small pieces of charcoal.
G	4	1 x 2	5	40-50	7/11/09	6	7.3	Glass	Fragmentary			1 Piece of thick green colored glass 1 Mid thickness piece of orange glass 1 black piece of glass 2 Pieces of window glass, clear 1 Slightly thicker piece of clear with slight curve.
G	4	1 x 2	5	40-50	7/11/09	10	19.7	Metal	Fragmentary			
G	10	1 x 2	1	0-10	5/15/2009	22	33	Glass	Fragmentary	Blank	Multi colored glass. Possible window pane and bottle glass.	
G	10	1 x 2	1	0-10	5/15/2009	2	5	Fabric	Non-Diagnostic	Blank	Leather strip, maybe part of boot.	
G	10	1 x 2	1	0-10	5/15/2009	34	10	Metal	Fragmentary	Blank		2 rounded nails, sherds of metal, and one cylindrical piece of metal w/a two linear running parallel to the width of the piece
G	10	1 x 2	1	0-10	23 July 2009	1	64.4	Brick	non-diagnostic			Brick fragment
G	10	1 x 2	2	10-20	5/16/2009	2	1	Ceramic	Fragmentary	Blank	Multi colored glaze	
G	10	1 x 2	2	10-20	5/16/2009	72	28	Metal	Fragmentary	Blank		
G	10	1 x 2	2	10-20	5/16/2009	1	6	Metal	Diagnostic	Blank		A no.12 Blue Rival metal button engraved the year 1901
G	10	1 x 2	2	10-20	07/10/2009	1		Glass	Non-Diagnostic	Sherd		Clear
G	10	1 x 2	2	10-20	07/10/2009	1		Metal	Non-Diagnostic			This appears to be a staple.
G	10	1 x 2	2	10-20	10/07/2009	1	5.9		Non-Diagnostic			This is a pieCe of leaTHer.
G	10	1 x 2	2	10-20	5/16/2009	2	26	Bone	Non-Diagnostic	Blank		
G	10	1 x 2	2	10-20	5/16/2009	34	36	Glass	Diagnostic	Blank	Multi colored glass	
G	10	1 x 2	2	10-20	5/16/2009	193	161	Metal	Diagnostic	Nails		Rusted with soft metal brush
G	10	1 x 2	2	10-20	5/16/2009	22	18	Unidentified	Diagnostic	Blank	Boots	Boots

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	10	1 x 2	2	10-20	5/16/2009	1	15	Exotic	Diagnostic	Blank	Wood patialy burned	none
G	10	1 x 2	2	10-20	07/10/2009	1		Glass	Non-Diagnostic	Sherd		Clear glass.
G	10	1 x 2	3	20-30	July 25, 2009	12	43	Glass	Fragmentary			most have curved surfaces, 4 small clear, 9 green, 1 amber
G	10	1 x 2	3	20-30	July 25 2009	15	18	Metal	Non-Diagnostic			15 metal fragments, flat, thin. Largest fragment roughly rectangular, 4.8 x 3 cm and approximately 1mm thick. All pieces similar thickness
G	10	1 x 2	3	20-30	July 25, 2009	10	42	Metal	Non-Diagnostic			3 square nail fragments, 10 full square nails
G	10	1 x 2	3	20-30	July 25, 2009	1	15.3	Bone	Non-Diagnostic			cow rib bone fragment
G	10	1 x 2	3	20-30	July 25, 2009	2	3	Metal	Non-Diagnostic			2 metal
G	10	1 x 2	3	20-30	July 31, 2009	1	67.1	Bone	Non-Diagnostic			cow bone frament with cut marks through the bone that would have suggested butchering
G	10	1 x 2	3	20-30	July 25, 2009	1	1	Metal	Non-Diagnostic			A piece of U-shape metal, function is unknown
G	10	1 x 2	3	20-30	July 25, 2009	1	4	Metal	Diagnostic			winchester shell casing
G	10	1 x 2	3	20-30	July 31, 2009	2	1	Bone	Non-Diagnostic			2 long bones from small animals, one complete, the other fragmentary.
G	10	1 x 2	3	20-30	July 31, 2009	18	53	Metal	Non-Diagnostic			square nail fragments
G	10	1 x 2	3	20-30	July 31, 2009	5 pieces	9.3	Glass	Non-Diagnostic			4 pieces clear, 1 piece green
G	10	1 x 2	3	20-30	7/31/2009	10	5.7	Exotic	Diagnostic	Other	Leather Boot	10 pieces of leather from a boot including 10 Grommets for laces, very fragile
G	10	1 x 2	3	20-30	7/25/2009	5	2.4	Exotic	Fragmentary	Blank	Leather Boot	4 pieces of leather with gromets (8) for laces and one gromet
G	10	1 x 2	3	20-30	July 25, 2009	1	519	Metal	Non-Diagnostic			Special Find - chisel, 10.5 cm, found between 2 bricks in the pile of bricks at the southwest corner of the unit
G	10	1 x 2	3	20-30	7/25/09	1	0.01	Plastic	Diagnostic			white button
G	10	1 x 2	4	30-40	8/1/09	3	2	Metal	Non-Diagnostic			3 rivets for clothing, couldn't see lettering
G	10	1 x 2	4	30-40	8/1/09	22	46	Metal	Non-Diagnostic	Nail		includes cut nails, nail fragments, 1 better preserved
G	10	1 x 2	4	30-40	8/7/2009	1	90	Metal	Complete	Other		Metal spike (Railroad? Picket stake?)
G	10	1 x 2	4	30-40	8/7/2009	1	110	Metal	Complete	Other	Railroad Spike	
G	10	1 x 2	4	30-40	8/7/2009	1	95	Glass	Fragmentary	Other	Broken Bottle Neck	
G	10	1 x 2	4	30-40	8/1/2009	1	0.5	Plastic	Complete	Other	Button	
G	10	1 x 2	4	30-40	8/7/2009	7	2	Fabric	Fragmentary	Other	Boot Fragments	
G	10	1 x 2	4	30-40	8/7/2009	8	24	Glass	Fragmentary	Blank	Glass fragments and possible metal fragment	

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	10	1 x 2	4	30-40	8/7/2009	1	0.4	Bone	Fragmentary	Limb		
G	10	1 x 2	4	30-40	8/7/2009	83	160	Metal	Fragmentary	Nail		
G	10	1 x 2	4	30-40	7/31/09	10	0.62	Glass	Non-Diagnostic			8 pieces clear, 2 pieces green, some have curved surface, 1 piece much thicker and lumpy
G	10	1 x 2	4	30-40	8/1/09	5	3	Fabric	Fragmentary			leather for boot 2 pieces have eyes for laces that lack grommets
G	10	1 x 2	4	30-40	8/1/09	4	63	Bone	Non-Diagnostic			1 large piece, vertebrae, cut 3 very small fragments
G	10	1 x 2	4	30-40	8/1/09	2	2.27	Wood	Non-Diagnostic	Nail		wood and nail nail found in wood, round head, 5 cm in length wood has tunnels, holes
G	10	1 x 2	5	40-50	11/6/2009	124	355	Metal	Diagnostic	Nail		
G	10	1 x 2	5	40-50	11/6/2009	84	130	Metal	Fragmentary	Blank		
G	10	1 x 2	5	40-50	11/6/2009	1	5	Bone	Complete	Blank		
G	10	1 x 2	5	40-50	6/11/2009	15	104	Metal	Diagnostic	Tool		
G	10	1 x 2	5	40-50	6/11/2009	1	358	Metal	Diagnostic	Other	swivel bracket	
G	10	1 x 2	5	40-50	6/11/2009	1	0.5	Shell	Diagnostic	Abalone	shell bead	
G	10	1 x 2	5	40-50	6/11/2009	7	185	Metal	Diagnostic	Nail	bolts, nails	
G	10	1 x 2	5	40-50	6/11/2009	1	333	Metal	Diagnostic	Manufacturin g	folded metal	
G	10	1 x 2	5	40-50	6/11/2009	2	3	Glass	Non-Diagnostic	Other	Glass Fragment	
G	10	1 x 2	5	40-50	6/11/2009	2	0.2	Bone	Non-Diagnostic	Other		
G	10	1 x 2	5	40-50	6/11/2009	1	615	Metal	Non-Diagnostic	Other	Metal Bracket	
G	10	1 x 2	5	40-50	11/6/2009	1	5	Bone	Complete	Blank	Small animal bone	
G	12	1 x 1	1	0-10	july 11 2009	1	1.3	Metal	Fragmentary			.32 Shotgun shell. Peters Co. S&W. Portion of.
G	12	1 x 1	1	0-10	4/17/09	2 and fragments	23.3	Metal	Non-Diagnostic			sheet metal pieces
G	12	1 x 1	1	0-10	July 11, 2009	4	7.1	Glass	Non-Diagnostic			Pieces of glass
G	12	1 x 1	1	0-10	July 17-18, 2009	~20	95.3	Glass	Non-Diagnostic			various pieces of green, brown, and clear bottle glass
G	12	1 x 1	1	0-10	July 17, 2009	2	1.4	Metal	Diagnostic			Levi Strauss & Co. denim rivets
G	12	1 x 1	1	0-10	July 17-18, 2009	1	4.4	Glass	Diagnostic			One piece of blue-ish clear bottle glass. Apears to be the lip of the bottle.
G	12	1 x 1	1	0-10	Jult 11, 2009	14	19.9 cm	Metal	Non-Diagnostic			Pieces of sheet metal, nails, and
G	12	1 x 1	1	0-10	July 17, 2009	9	19.9	Metal	Non-Diagnostic	Nail		Nails and fragments

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
G	12	1 x 1	2	10-20	18 July 2009	4	6.4	Metal	non-diagnostic	nail/metal shreds		1 wire nail; 3 miscellaneous flat metal shards
G	12	1 x 1	2	10-20	18 July 2009	5	17.8	Leather	Fragmentary			Desicated leather with fininshing nails -part of boot?
G	12	1 x 1	2	10-20	7/25/2009	6	231.7	Exotic	Diagnostic	Other	Bottom pieces of Leather Boot	
G	12	1 x 1	2	10-20	7/24/2009	4	3.2	Exotic	Diagnostic	Other	Leather pieces with gromets	
G	12	1 x 1	2	10-20	7/24/2009	25	18.2	Exotic	Fragmentary	Blank	Leather Boot	Pieces of the sole of the boot
G	12	1 x 1	2	10-20	7/24/2009	14	9.9	Exotic	Fragmentary	Other	Leather Boot	Pieces of the leather part
G	12	1 x 1	2	10-20	7/24/2009	17	6.8	Metal	Diagnostic	Nail	Leather Boot Nails	these were with the boot parts, may be they are the nails from the boot
G	12	1 x 1	2	10-20	July 24, 2009	1	3.5	Metal	Diagnostic			
G	12	1 x 1	2	10-20	July 25, 2009	1	5.6	Ceramic	Diagnostic	Porcelain		Special Find - Company: T&R Boote, before 1891, ironstone platter, approximately2 cm by 1 cm, cream color with black lettering.
G	12	1 x 1	2	10-20	July 24, 2009	4	280	Glass	Non-Diagnostic			Pieces of green bottle glass
G	12	1 x 1	2	10-20	July 24, 2009		85.9	Metal	Non-Diagnostic	Nail		Nails and other rusty metal shards
G	12	1 x 1	2	10-20	July 24, 2009	14	58.2	Glass	Non-Diagnostic			Pieces of brown and clear glass
G	12	1 x 1	2	10-20	July 24, 2009	2	125.9	Glass	Diagnostic			Special Find - lower half of a blue-ish glass bottle with the letters "...MILANO" on one side and the letters "RBA" on the other side, and the number "2" on the bottom of the glass.
G	12	1 x 1	2	10-20	7/18/2009	21	23	Glass	Non-Diagnostic	Blank	Glass, colored, fragments (pane glass and other)	2 pieces of blue glass, a bottle top, 14 pieces of curved clear glass, 1 piece of green glass, 2 pieces of brown bottle glass, 2 pieces of pane glass
G	12	1 x 1	3	20-30	July 25, 2009	2	1	Plastic	Complete			2 whole buttons, one brown, one white
G	12	1 x 1	4	30-40	7/31/09	1	1	Bone				bone
S	19	1 x 1	1	0-10	7/24/2009	1	23	Bone	Fragmentary	Blank		
S	19	1 x 1	1	0-10	7/24/2009	6	19	Exotic	Fragmentary	Other	Leather	Small brown pieces of leather
S	19	1 x 1	1	0-10	7/24/2009	6	25	Glass	Fragmentary	Blank		5 green tint pieces, 1 blue tint
S	19	1 x 1	1	0-10	7/24/2009	29	65	Glass	Fragmentary	Blank		Clear glass fragments, most have flat surface. They are between 2.3-2.6mm thick. 3 have curved strface. The thickest is 3.8mm.
S	19	1 x 1	1	0-10	7/24/2009	1	2	Metal	Complete	Blank	Shell case of shotgun	Shell case, 9mm in diameter. Stamped with a small "O" within a big "O". Its length is 1.5mm long.
S	19	1 x 1	1	0-10	7/24/2009	1	33	Glass	Fragmentary	Blank		Top of bottle, part of the neck of the bottle. Blue tint. 6.2 cm in length.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
S	19	1 x 1	1	0-10	7/24/2009	1	2	Metal	Complete	Blank		Metal button. 1.7mm diameter, corroded.
S	19	1 x 1	1	0-10	7/24/2009	35	61	Metal	Diagnostic	Nail	nails and fragments	
S	19	1 x 1	1	0-10	7/24/2009	15	18	Metal	Diagnostic	Nail		
S	19	1 x 1	1	0-10	7/24/2009	1	0.5	Metal	Fragmentary	Blank	Metal Button	Metal button
S	19	1 x 1	2	10-20	7/25/2009	4	29	Glass	Fragmentary	Blank		Colored: 3green and 1 amber glass pieces. The green ones vary in thickness from 2mm to 5mm, large green fragment 7 cm long+/-5mm. 3.6cm is the widest.
S	19	1 x 1	2	10-20	7/25/2009	11	12	Glass	Fragmentary	Blank		1 flat 1.5mm glass. The rest (10) curved surface is 1mm-3.5mm thick. One clear fragment has embosed lettering "SYR"
S	19	1 x 1	2	10-20	7/25/2009	5	76	Bone	Diagnostic	Blank		5 fragments of butchered/cut cow bones, 4 from vertebral column,1 long bone
S	19	1 x 1	2	10-20	7/25/2009	4	13	Bone	Diagnostic	Blank		All possibly bird bones, 2 fragmentary and shaft, 2 long bones, one femur,one tibia
S	19	1 x 1	2	10-20	7/25/2009	7	2	Bone	Diagnostic	Blank		7 bones of amall anima, 3 longbones,2 ribs, 2 vertebraes
S	19	1 x 1	2	10-20	7/25/2009	1	1	Metal	Diagnostic	Other	Shotgun casing	
S	19	1 x 1	2	10-20	7/25/2009	50	160	Metal	Diagnostic	Nail		50 nails, plus fragments
S	19	1 x 1	2	10-20	7/25/2009	1	26.5	Ceramic	Fragmentary	Blank	6.2 cm X 2.9 cm	Fragment with glaze, dark redish clay body, irregular. Outside bottom with ridge for base, 9.5 mm thick at ridge.
S	19	1 x 1	3	20-30	7/31/2009	1	0	Metal	Diagnostic	Nail		Round Head Nail
S	19	1 x 1	3	20-30	7/31/2009	3	2.9	Metal	Diagnostic	Other		Sheet Metal
S	19	1 x 1	3	20-30	7/31/2009	6	14.6	Metal	Diagnostic	Nail		Square Head
S	19	1 x 1	3	20-30	7/31/2009	2	58.9	Lithic	Non-Diagnostic	Chunk		Red Morter
S	19	1 x 1	3	20-30	7/31/2009	4	5.1	Glass	Fragmentary	Blank		2 green pieces, 1 clear piece and 1 brown piece. The two green pieces fit together
S	19	1 x 1	4	30-40	7/31/2009	1	3.5	Metal	Complete	Nail		
S	19	1 x 1	4	30-40	7/31/2009	2	3.6	Metal	Fragmentary	Nail		
S	19	1 x 1	4	30-40	7/31/2009	1	0.3	Bone	Complete	Blank	small bone	Lots of bioterbation in area
S	19	1 x 1	Surface	0	7/24/2009	1	393	Bone	Fragmentary	Blank		Marrow Cavity filled with dirt, roots growing into dirt
S	19	1 x 1	Surface	0	7/24/2009	1	19	Glass	Complete	Blank		Metal strip, 11.8cm long.2.4cm thick.
S	19	1 x 1	Surface	0	7/24/2009	5	35	Glass	Fragmentary	Blank		5 pieces in total; 3 clear glasses. They are 2.4-2.8mm thick. Another 2 pieces are green in color. The curved surface is 3.4-4mm thick.
S	19	1 x 1	surface	0	7/24/2009	1	1054	Metal	Diagnostic	Other	shovel	Lime shove, largely rusted

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
S	19	1 x 1	surface	0		1	156.8	Glass	Diagnostic			fragments of glass bottles: first piece is curved surface, boat-shaped at one end, green, ~7.5 cm long, 8.3 cm wide, 3mm thick; second is large bottle fragment of different glass bottle, bottom intact, not washed, blue-green, 14 cm at longest, 8cm diameter, 6mm thick, rodent mandible found in dirt that was within bottle
S	22	1 x 1	1	0-10	1 August 2009	6	84.4	Glass	Fragmentary			six pieces of glass
S	22	1 x 1	1	0-10	1 August 2009	1	4.4	Glass	Fragmentary			Special Find: Cobalt blue glass
S	22	1 x 1	1	0-10	9/25/2009	3	0.5	Metal	Complete	Blank	Boot Grants	
S	22	1 x 1	1	0-10	8/7/2009	4	1	Metal	Complete	Blank		
S	22	1 x 1	1	0-10	09/2509	98	300.8	Metal	Fragmentary	Blank	Flat Metal	Brittle metal, net weight includes fragmented metal and all counted pieces include every piece of metal except for the dust balls found in the ball.
S	22	1 x 1	1	0-10	9/25/2009	32	68	Metal	Diagnostic	Nail		about 23 complete nails, 9 halved nails and lots of nail fragments
S	22	1 x 1	1	0-10	8/7/2009	30	179.6	Metal	Fragmentary	Blank	about 30 small flat metal fragments	several flat metal pieces, ranging from small bits to 1" x 2" pieces
S	22	1 x 1	1	0-10	8/7/2009	24	26	Metal	Diagnostic	Nail		Nails with fragments. Fragments are of deteriorating metal and broken nail heads.
S	22	1 x 1	1	0-10	8/1/2009	1	42.8	Bone	Fragmentary	Blank	may be a rib bone	12 cms long
S	22	1 x 1	1	0-10	8/1/2009	1	51.6	Bone	Diagnostic	Blank	May be an Ulna	bone measures 15 cms long
S	22	1 x 1	1	0-10	8/1/2009	5	19.4	Metal	Diagnostic	Nail	Square head nails	Nail legnths are 8 cm, 4 cm, 3 cm 2 cm
S	22	1 x 1	1	0-10	8/1/2009	1	0.3	Metal	Diagnostic	Blank	Rivet	
S	22	1 x 1	1	0-10	9/25/2009	3	13	Bone	Diagnostic	Blank		
S	22	1 x 1	2	10-20	8/7/2009	47	73	Metal	Diagnostic	Blank		
S	22	1 x 1	2	10-20	8/7/2009	2	2	Metal	Non-Diagnostic	Blank	unidentified circular metal objects	unidentified circular metal objects
S	22	1 x 1	2	10-20	8/7/2009	61	113	Glass	Fragmentary	Blank		Fragments of glass pieces in the color transparent, dark green, light green, brown
S	22	1 x 1	2	10-20	8/7/2009	4	3	Plastic	Complete	Blank	Buttons	4 plastic buttons in white color
S	22	1 x 1	2	10-20	8/7/2009	1	0.5	Metal	Complete	Blank	Button	
S	22	1 x 1	2	10-20	8/7/2009	127	255	Metal	Fragmentary	Blank		
S	22	1 x 1	2	10-20	8/7/2009	3	38	Bone	Diagnostic	Blank		
S	22	1 x 1	3	20-30	10/23/2009	13	21	Glass	Fragmentary	Blank		
S	22	1 x 1	3	20-30		27	257	Glass	Fragmentary	Blank		Fragments of glass bottle, bottom inscribed "211 B"

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
S	22	1 x 1	3	20-30	10/23/2009	30	90.8	Metal	Fragmentary	Nail		22 complete nails, various fragments
S	22	1 x 1	3	20-30	10/23/2009	1	0.6	Bone	Diagnostic	Post-cranial	top half small animal femur	
S	22	1 x 1	3	20-30	10/23/2009	26	41	Metal	Non-Diagnostic	Blank		Metal Fragments (seams/ends and "body" metal)
S	22	1 x 1	3	20-30	10/23/2009	3	0.5	Bone	Diagnostic	Blank		
S	22	1 x 1	4	30-40	11/6/2009	3	22	Glass	Fragmentary	Blank		Transparent pieces of glass
S	22	1 x 1	4	30-40	11/6/2009	1	0.5	Bone	Diagnostic	Limb		
S	22	1 x 1	4	30-40	11/6/2009	2	0.5	Carbon	Diagnostic	Chunk		
S	22	1 x 1	Surface	0	7/31/2009	1	169	Glass	Fragmentary	Bottom		Fragmentary of glass bottle, blue tint, bottom intact, molded. Embossed lettering "San Francisco". The letters "-Works" are arching over "San Francisco"
S	22	1 x 1	surface	0	9/25/2009	1	3.2	Fabric	Fragmentary	Other	leather	
S	23	1 x 1	1	0-10	8/11/2009	31	95	Bone	Fragmentary	Blank		
S	23	1 x 1	1	0-10	8/1/2009	28	92.1	Glass	Fragmentary	Blank		
S	23	1 x 1	1	0-10	8/1/2009	8	1.5	Exotic	Diagnostic	Blank	buttons	2 whole and some fragments
S	23	1 x 1	1	0-10	8/1/2009	2	2.5	Unidentified	Non-Diagnostic	Blank	unknown items	
S	23	1 x 1	1	0-10	8/1/2009	4	20	Glass	Fragmentary	Blank	writing on one piece	writing is:(top line) MAT, (bottom line) AP
S	23	1 x 1	1	0-10	8/1/2009	2	10.4	Metal	Diagnostic	Blank	2 small keys	
S	23	1 x 1	1	0-10	8/1/2009	4	15.8	Metal	Diagnostic	Blank	Buckles	pieces of a buckle
S	23	1 x 1	1	0-10	8/1/2009	5	26	Metal	Diagnostic	Shotgun shell		
S	23	1 x 1	1	0-10	8/1/2009	1	0.5	Bone	Non-Diagnostic	Blank	Small animal bone	Was found with nails and shotgun shells
S	23	1 x 1	1	0-10	8/1/2009	1	2	Metal	Non-Diagnostic	Other	Could be a rivit or bullet casing	Was found with nails and shotgun shells
S	23	1 x 1	1	0-10	8/1/2009	1	0.2	Metal	Diagnostic	Other	Top of metal rivit	Was found with nails and shotgun shells
S	23	1 x 1	1	0-10	8/1/2009	334	834	Metal	Diagnostic	Nail		There are fragments and their weight is included in the total weight. They have a weight of 163g.
S	23	1 x 1	1	0-10	8/1/2009	1	100	Metal	Non-Diagnostic	Blank	May be a bucket handle	
S	23	1 x 1	2	10-20	8/7/2009	37	unknown	Glass	Fragmentary	Blank		
S	23	1 x 1	2	10-20	9/10/2009	131	unknown	Metal	Fragmentary	Nail		
S	23	1 x 1	2	10-20	8/7/2009	6	unknown	Shell	Fragmentary	Blank		Unknown type of shell
S	23	1 x 1	2	10-20	9/25/2009	14	unknown	Exotic	Diagnostic	Other	Buttons of several types	
S	23	1 x 1	2	10-20	9/4/2009	6	unknown	Carbon	Fragmentary	Other	Charcoal	
S	23	1 x 1	2	10-20	9/25/2009	2	10.8	Ceramic	Diagnostic	Blank	Clay pipe bowl	Special Find

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
S	23	1 x 1	2	10-20	9/25/2009	4	15.3	Metal	Non-Diagnostic	Blank		Unknown metal objects
S	23	1 x 1	2	10-20	7/8/2009	34	42.5	Bone	Diagnostic	Blank		
S	23	1 x 1	2	10-20	7/8/2009	8	13	Metal	Diagnostic	Blank	Metal items, manufactured	2 shotgun shells, 1 bullet casing, 1 denim rivet, 4 shoelace eyelets
S	23	1 x 1	2	10-20	7/8/2009	2	1			Blank		Glass fragments, 1 clear, 1 colored
S	23	1 x 1	2	10-20	7/8/2009	1	1	Wood	Fragmentary	Blank	Nutshell fragment	
S	23	1 x 1	2	10-20	7/8/2009	620	1776	Metal	Diagnostic	Nail		2 bags
S	23	1 x 1	2	10-20	7/8/2009	620	1773	Metal	Diagnostic	Nail	Nails, large quantity	Nails, bulk, in 2 packages catalogued as 1 item
S	23	1 x 1	3	20-30	10/23/2009	5	10	Metal	Fragmentary	Nail		
S	24	1 x 1	surface	0	10/09/2009	1	HEAVY	Metal	Diagnostic	Other	large iron stake, 83cm long, 10cm thick, 1 inch slot near head	
S	25	1 x 1	1	0-10	8/1/2009	4	8.8	Metal	Diagnostic	Nail		
S	25	1 x 1	1	0-10	8/7/2009	2	2.2	Shell	Fragmentary	Blank		Some Fragments
S	25	1 x 1	1	0-10	8/1/2009	16	35.7	Glass	Fragmentary	Blank	White window glass	
S	25	1 x 1	1	0-10	8/7/2009	45	66.3	Metal	Diagnostic	Nail		Some Fragments
S	25	1 x 1	1	0-10	8/1/2009	4	3.1	Glass	Fragmentary	Blank	clear bottle glass	
S	25	1 x 1	1	0-10	8/1/2009	6	8.8	Glass	Fragmentary	Blank	bottle glass	
S	25	1 x 1	1	0-10	8/7/2009	14	58.3	Glass	Fragmentary	Blank		1 piece is brown glass the rest are clear glass
S	25	1 x 1	1	0-10	8/1/2009	1	6.9	Bone	Non-Diagnostic	Post-cranial	Animal bone	May be a Tibia
S	25	1 x 1	1	0-10	8/1/2009	1	0.4	Metal	Diagnostic	Blank	Staple	
S	25	1 x 1	1	0-10	8/1/2009	13	110.5	Glass	Fragmentary	Blank	Thick blue tinted window glass	one of two kinds of glass found at unit
S	25	1 x 1	1	0-10	8/1/2009	17	8.4	Bone	Fragmentary	Post-cranial		small bones possibly from a rodent
S	25	1 x 1	1	0-10	8/1/2009	2	3.4	Glass	Fragmentary	Blank	two pieces of molded glass	1 piece has a raised design, the other has the letters "RS" on it
S	25	1 x 1	1	0-10	8/7/2009	2	0.5	Bone	Fragmentary	Blank	Small animal bones	
S	25	1 x 1	1	0-10	8/7/2009	1	11.2	Metal	Fragmentary	Blank	Sheet Metal	
S	25	1 x 1	1	0-10	8/7/2009	1	70	Metal	Complete	Blank	Metal Wire	weight is not exact
S	25	1 x 1	1	0-10	8/1/2009	102	197.7	Metal	Diagnostic	Nail	Square-head nails, range of legnth: 3 cm - 8 cm	
S	25	1 x 1	2	10-20	9/25/2009	7	19.6	Metal	Diagnostic	Nail		
S	25	1 x 1	2	10-20	9/25/2009	1	1.7	Exotic	Non-Diagnostic	Blank	May be a game piece	

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
S	25	1 x 1	2	10-20	8/7/2009	1	1.3	Bone	Diagnostic	Blank		
S	25	1 x 1	2	10-20	8/7/2009	1	22.6	Metal	Non-Diagnostic	Blank	Lead?	
S	25	1 x 1	2	10-20	9/25/2009	9	14.4	Glass	Fragmentary	Blank	1 piece is green, the others are clear	
S	25	1 x 1	2	10-20	8/7/2009	7	21.7	Glass	Fragmentary	Blank	6 pieces are clear, 2 pieces are green	
S	25	1 x 1	2	10-20	8/7/2009	1	40	Glass	Diagnostic	Blank	Small Bottle	Letter "McC" on the bottle
S	25	1 x 1	2	10-20	8/7/2009	23	50.9	Metal	Diagnostic	Nail	there is 1 staple with the nails	
S	25	1 x 1	3	20-30	10/23/2009	3	4.6	Metal	Non-Diagnostic	Blank	Unknown items	
T	16	1 x 2	1	0-10	7/30/09 and 7/31/09	48	133.4	Metal	Non-Diagnostic	Blank	Nails	
T	16	1 x 2	1	0-10	18-07-2009	4		Wood	Diagnostic	structural redwood		four pieces of structural redwood, planks are possibly part of floor boards Piece #1 - longest piece, 8 inch wide x 3/4 inch thickness x 34 inch long; contains square nails on both sides, with one larger bent square nail in center of piece; has an intact milled edges Piece #2--with original milled edges on both sides; no visible nail scars; 13.5 inche long, 4 inch wide, and 3/4 inch thickness; Piece #3--16.25 inch long, 3/4 inch milled edge thickness; 2.5 inch width; contains 10 square nails, each about 1 1/4 inch long. Piece #4- this 16 inch long, 3/4 inch thickness, 1 1/4 inch wide; contains 8 square nails (1 1/4 inch) on side of panel with five visible nail scars etched on thickness.
T	16	1 x 2	1	0-10	7 July 2009	22	96.1	Metal	non-diagnostic	nails		22 square cut iron nails
T	16	1 x 2	1	0-10	17 July 2009	1		Leather	Fragmentary			Special Find:Leather strap 6cm x 14cm with nails- door hinge?
T	16	1 x 2	1	0-10	4/7/2009	20	43	Metal	Diagnostic	Nail	Nails and Metal Fragments	10 nails, 6 square, 3 round
T	16	1 x 2	1	0-10	7/18/2009	11	20	Glass	Fragmentary	Blank	Several shards	2 Pc green, 2 Pc clear blue, 3 Pc clear, 4 Pc brown
T	16	1 x 2	1	0-10	7/17/2009	1	2	Ceramic	Fragmentary	Blank		White ceramic
T	16	1 x 2	1	0-10	7/17/2009	3	9	Metal	Complete	Shotgun shell	Shotgun shell, pistol shell, rivet	
T	16	1 x 2	1	0-10	17-07-2009	1	13.2	Metal	Fragmentary			Appears to be a kerosene lamp top, metallic, with red paint on it.
T	16	1 x 2	2	10-20	24-07-2009	1	32.7	Metal	Diagnostic			SPECIAL FIND: metal with four long nails inserted through corner holes; possible clock face.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	16	1 x 2	2	10-20	25-07-2009	1	31.2	Ceramic	Diagnostic	Frozen Charlotte Doll		SPECIAL FIND: FROZEN Charlotte Doll, 2.5 inch (9 cm) tall Ceramic doll is naked baby with color outlines of her eyebrow and lips. Her right hand is broken and her left foot is broken. Ceramic behind her head is rough, probaby to help her "float" - She is probably a "floating toy" made in Germany around 1880's to 1910s.
T	16	1 x 2	2	10-20	7/24-25/09	1	5	Metal	Diagnostic	Bottom	Shotgun Shell	
T	16	1 x 2	2	10-20	7/31/2009	1	4	Metal	Fragmentary	Blank	bullet casing	.38 cal. Smith and Wesson UMC
T	16	1 x 2	2	10-20	7/17/2009	7	49	Bone	Fragmentary	Domestic	Food scrap bone chicken, beef, pork	fractured and sawed
T	16	1 x 2	2	10-20	7/24-25/09	54	60	Glass	Non-Diagnostic	Other	clear, green, brown, and blue fragmentary glass of varying thickness	random broken glass
T	16	1 x 2	2	10-20	7/24-25/09	5	6	Metal	Diagnostic	Domestic	Buttons and Rivets	Blue jeans' buttons and rivets
T	16	1 x 2	2	10-20	7/25/2009	13	35	Ceramic	Fragmentary	Container		Broken ceramic top
T	16	1 x 2	2	10-20	7/24/2009	1	3	Bone	Fragmentary	Other		
T	16	1 x 2	2	10-20	7/24/2009	1	10	Glass	Fragmentary	Blank	Bottle fragment	Some letters on glass
T	16	1 x 2	2	10-20	7/25/2009	2	3	Exotic	Fragmentary	Other	Crystal	
T	16	1 x 2	2	10-20	7/24/2009	1	0.5	Metal	Fragmentary	Other	Foil with stamped lettering	Text listed as "Purveyors to his majesty 21 soho street london
T	16	1 x 2	2	10-20	7/24/2009	1	0.5	Metal	Fragmentary	Blank	Metal in shape of small x	
T	16	1 x 2	2	10-20	7/17/2009	1	2	Unidentified	Fragmentary	Blank	Tobacco pipe stem	
T	16	1 x 2	2	10-20	7/24/2009	1	160	Metal	Diagnostic	Other	metal shaft 1 1/2in x 7in	metal for door hinge
T	16	1 x 2	2	10-20	7-24-09, 7-25-09	134 (plus fragments)	366	Metal	Diagnostic	Nail		
T	16	1 x 2	2	10-20	7/30/2009	3	15.6	Metal	Diagnostic	Blank	two are the same, the other is a different type	two are 12 guage "Nitro" umc co 12, the other is a "Peters 44-40"
T	16	1 x 2	2	10-20	24-07-2009	4	4.1	Ceramic	Non-Diagnostic	Clothing		Special finds: 2 identical white ceramic buttons with four holes, depressions. 1 different type of cermaic button, dome shaped, white. 1 faceted crystal, diamond shaped object, with 8 flat sides around, and one shorter and one bigger base-like side.
T	16	1 x 2	2	10-20	25-07-2009	1	0.5	Chalk	Diagnostic			1 small "cameo" profile facing left; possibely political figure.

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	16	1 x 2	2	10-20	24-07-2009	1	9.6	Metal	Non-Diagnostic			Possible "can opener" or a key.
T	16	1 x 2	3	20-30	25 July 2009	1		Porcelain	Fragmentary			Special Find:Half of Porcelain button, four holes
T	16	1 x 2	3	20-30	7/25/2009	5	9	Glass	Fragmentary	Blank		3 Pc clear, 2 Pc clear blue, 1 Pc brown
T	16	1 x 2	3	20-30	7/25/2009	2	3	Metal	Fragmentary	Nail	Nail fragments	
T	17	1 x 2	1	0-10	18-07-2009	1	87	Glass	Non-Diagnostic			dark brown glass bottle neck with lip intact -probably of J-Type (contained fermented liquid, possibly ale or beer); 10 cm long neck. Could be either handblown or mold blown.
T	17	1 x 2	1	0-10	17 July 2009	18	37.9	Glass	Fragmentary			13 pieces of pane glass, 5 pieces of green and brown bottle glass
T	17	1 x 2	1	0-10	17 July 2009	1		Ceramic	Fragmentary			Small Porcelain shard
T	17	1 x 2	1	0-10	18 July 2009	3		Metal	Fragmentary			2 cut nails and small, flat, thin metal piece
T	17	1 x 2	1	0-10	17 July 2009	4	44.6	Glass	Fragmentary			4 shards of blue bottle glass
T	17	1 x 2	1	0-10	17 July 2009	1	21.6	Glass	Fragmentary			green shard of bottle glass
T	17	1 x 2	1	0-10	17 July 2009	1	3.2	Ceramic	Fragmentary			brown glazed container ceramic fragment
T	17	1 x 2	1	0-10	17 July 2009	7	33.8	Glass	Fragmentary			7 shards of clear bottle glass
T	17	1 x 2	1	0-10	17 July 2009	1	8.8	Metal	non-diagnostic			3 inch cut square nail embedded in wood
T	17	1 x 2	1	0-10	17 July 2009	2	8.3	Glass	Fragmentary			2 fragments of amber bottle glass
T	17	1 x 2	1	0-10	17 July 2009	2	5.9	Glass	Fragmentary			2 fragments of amber bottle glass
T	17	1 x 2	1	0-10	17 July 2009	4	6.5	Glass	non-diagnostic			4 fragments of bluish tinted clear glass possibly pane, some with curves
T	17	1 x 2	1	0-10	7/17/2009	3	33	Bone	Fragmentary	Blank	Bone fragments, animal	
T	17	1 x 2	2	10-20	7/24/2009	17	93	Metal	Diagnostic	Nail	Highly corroded	Nails and fragments, rusted
T	17	1 x 2	2	10-20	7/24/2009	4	12	Metal	Fragmentary	Blank		Fragments, possibly metal
T	17	1 x 2	2	10-20	7/24/2009	6	26	Bone	Diagnostic	Post-cranial	Rib fragments	
T	17	1 x 2	2	10-20	7/24/2009	65	183	Glass	Fragmentary	Blank		Pale green glass, clear glass
T	17	1 x 2	2	10-20	7/24/2009	1	3	Glass	Fragmentary	Blank		Glass fragment with letters RY, clear, other letter, fragmentary
t	17	1 x 2	2	10-20	7/24/2009	30	56	Glass	Fragmentary	Blank	Colored glass	Glass, brown, green and opalescent
T	17	1 x 2	2	10-20	7/24/2009	1	8	Glass	Fragmentary	Blank	Glass, brown,lettered	Glass, brown, letters E on 1st line; CHI on 2nd, plus fragment
T	17	1 x 2	2	10-20	7/24/2009	1	3	Ceramic	Fragmentary	Blank	Ceramic, glazed, brown	
T	17	1 x 2	2	10-20	7/24/2009	1	32	Glass	Diagnostic	Blank		Special find; part of bottle neck molded, amber color. Bottom: 3.9cm,top: 2.7cm;bottom: 1.7cm, top: 1.5cm

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	17	1 x 2	2	10-20	7/24/2009	1	7	Glass	Diagnostic	Blank		Special find. Quartz-like in appropiate curved top-possible glass bottle stopper
T	17	1 x 2	2	10-20	7/24/2009	1	4	Glass	Diagnostic	Blank		Special find. Greenish color, curved surface
T	17	1 x 2	2	10-20	7/24/2009	1	0.5	Metal	Diagnostic	Blank		Button, 1.6cm in diameter. The inner top circular shelf is slightly raised. The center is slightly depressed, the outer rim is also raised.
T	17	1 x 2	2	10-20	7/24/2009	1	1	Wood	Diagnostic	Blank		Button. The button back is smooth, it is 1.8cm in diameter. For the inner rim, it is 1.1 cm in diameter
T	17	1 x 2	2	10-20	7/24/2009	1	0.5	Metal	Diagnostic	Blank		Metal grommet. Outer diameter is 9mm, inner diameter is 4mm
T	17	1 x 2	2	10-20	7/24/2009	8	8	Ceramic	Fragmentary	Blank	Ceramic and unknown, fragmentary	3 white, 5 dark fragments
T	17	1 x 2	3	20-30	25-07-2009	1	50.7	Glass	Non-Diagnostic	bottlle neck		SPECIAL FIND: intact dark brown bottle neck probably mold blown with ribbed skirt (broken) About 6.5 cm long
T	17	1 x 2	3	20-30	25-07-2009	1		Bone	Non-Diagnostic	vertebra		could be pig, cow, or sheep vertebra. Of interest are the visible butcher margins
T	17	1 x 2	3	20-30	25 July 2009	9	17	Glass	non-diagnostic			9 fragments of varying size and color - a few clear with blue tint possibly window glass; a couple are amber brown colored, possibly bottle glass
T	17	1 x 2	3	20-30	7/24/2009	24	27	Glass	Diagnostic	Blank		24 glass shreds, some clear,amber,green,and blue tint. Some are thin and some are thick.
T	17	1 x 2	3	20-30	7/24/2009	2	25	Glass	Fragmentary	Blank		Glass fragmentary fluted body from a brown/amber bottle. It is probably a square bottle for some type of food storage
T	17	1 x 2	3	20-30	7/24/2009	2	4	Metal	Non-Diagnostic	Other	Rivet and metal shard	
T	17	1 x 2	3	20-30	7/24/2009	1	2	Metal	Complete	Nail		Nail, round head
T	17	1 x 2	3	20-30	7/25/09	1	3.5	Metal				Nail
T	17	1 x 2	Surface	0	17 July 2009	4	364.9	Bone	Fragmentary	Bone		No visible butcher marks, cow vertabra, distal end of femur, conylc-fragment, small bone fragment
T	21	1 x 2	1	0-10	7/7/2009	1	0.6	Ceramic	Diagnostic	Blank	Pipe stem	Part of a white ceramic pipe stem
T	21	1 x 2	1	0-10	7/7/2009	1	0.5	Wood	Diagnostic	Blank	Button	
T	21	1 x 2	1	0-10	7/7/2009	1 (single clip in 2 fragments)		Metal	Fragmentary	Blank	Metal clip	
T	21	1 x 2	1	0-10	7/7/2009	7	23.4	Metal	Non-diagnostic	Blank		One of the pieces is a flat triangular shape

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	21	1 x 2	1	0-10	7/7/2009	1	0.6	Unknown	Diagnostic	Button, porcelain or white glass		
T	21	1 x 2	1	0-10	7/7/2009	1	5	Metal	Non-diagnostic	Large staple		
T	21	1 x 2	1	0-10	7/30/2009	1	7.8	Metal	Diagnostic	Blank	Buckle	3.5 cm in length, special find
T	21	1 x 2	1	0-10	7/30/2009	5	6.2	Glass	Diagnostic	Blank	Ribbon Glass Marble	may be evidence of children, special find
T	21	1 x 2	1	0-10	7/30/2009	4	0.1	Shell	Diagnostic	Bottom	Very Delicate	In four small pieces
T	21	1 x 2	1	0-10	7/30/2009	1	4.9	Exotic	Diagnostic	Blank	Graphite stick, blue grey color	Picture 40, special find
T	21	1 x 2	2	20-30	7/31/2009	73	151	Metal	Non-Diagnostic	Nail	rusty nails	73 pieces plus fragments
T	21	1 x 2	2	10-20	8/1/2009	16	36	Bone	Fragmentary	Blank		Presumed rodent bones: rib and hip socket; mid-sized bone, possibly cat
T	21	1 x 2	2	10-20		2	4	Exotic	Complete	Blank	Special find	Game pieces: 3.5 cm. and 4 cm.
T	21	1 x 2	2	10-20	7/30/2009	1	15	Metal	Non-Diagnostic	Shotgun shell	single shell casing	
T	21	1 x 2	2	10-20	7/31/2009	1	2	Ceramic	Diagnostic	Other	pipe fragment	
T	21	1 x 2	2	10-20	7/30/2009	1	22	Metal	Non-Diagnostic	Other	lead pipe cap, lid, end	possible lead lid. heavy
T	21	1 x 2	2	10-20	7/31/2009	2	9	Glass	Fragmentary	Rim	clear glass rim and fragment	fragment has letters "JO" written into it. looks to be from same glass bottle
T	21	1 x 2	2	10-20	8/7/2009	1	2	Metal	Diagnostic	Grommet		
T	21	1 x 2	2	10-20	8/7/2009	1	1	Metal	Diagnostic	Blank	Levis-Strauss jean rivet	
T	21	1 x 2	2	10-20	8/7/2009	1	<1	Unknown	Diagnostic	Blank	button	Fragmentary. White. May be plastic or porcelain.
T	21	1 x 2	2	10-20	8/7/2009	5	9	Glass	Non-diagnostic	Blank		One piece of clear pane glass, two pieces of clear curved glass, one green curved piece, one brown curved piece
T	21	1 x 2	2	10-20	8/7/2009	3	2	Ceramic	Non-diagnostic	Blank		3 white, glossy, 2.6-mm thick fragments
T	21	1 x 2	2	10-20	8/7/2009	1	15.4	Stone and glass	Non-diagnostic	Melted glass bonded to stone		
T	21	1 x 2	2	10-20	8/7/2009	50	83.3	Metal	Diagnostic	Nails		
T	21	1 x 2	2	10-20	8/7/2009	1	2.2	Brick	Diagnostic	Small ball		Found with about 2 dozen similar pieces, along with some children's toys
T	21	1 x 2	3	20-30	5/19/2009	2	214	Metal	Non-Diagnostic	Blank	Spikes	One long, thin and curved. One thick and bent at a 90-degree angle
T	21	1 x 2	3	20-30	5/19/2009	1	8	Bone	Cervical vertebra	Blank		
T	21	1 x 2	1 & 2	0-20	7/31/2009	40	73	Glass	Fragmentary	Blank		32 pieces bottle glass; 8 pieces painted

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	24	1 x 1	1	0-10	8/1/2009	30	88	Metal	Fragmentary	Blank	Some pieces are wire, some are chunks	
T	24	1 x 1	1	0-10	8/1/2009	4	4.5	Glass	Fragmentary	Blank		
T	24	1 x 1	1	0-10	8/1/2009	14	43.9	Metal	Diagnostic	Nail	Various sizes	
T	24	1 x 1	1	0-10	8/7/2009	3	48	Ceramic	Fragmentary	Blank	it looks like they are from the same plate	has some printing on the bottom- words "china", partial word "ams"
T	24	1 x 1	1	0-10	8/11/2009	2	2.7	Unidentified	Diagnostic	Blank	2 buttons	one looks like it is made of porcelain, the other may be metal
T	24	1 x 1	1	0-10	8/1/2009	5	9.5	Metal	Diagnostic	Other	shotgun shells	3- 12 guage, 1- 38 caliber, 1-45 caliber, and some scraps of metal
T	24	1 x 1	1	0-10	8/7/2009	76	117.2	Glass	Fragmentary	Blank		3 pieces of green, 11 pieces of brown, 62 pieces of clear
T	24	1 x 1	1	0-10	8/7/2009	3	17.3	Wood	Non-Diagnostic	Blank		
T	24	1 x 1	1	0-10	8/1/2009	1	3.4	Metal	Non-Diagnostic	Other	Special find	
T	24	1 x 1	1	0-10	8/1/2009	6	44.8	Metal	Diagnostic	Nail		3 large pieces and 3 small pieces
T	24	1 x 1	1	0-10	8/7/2009	1	39.9	Metal	Diagnostic	Blank	Lighter- Special Find	Front: Logo and the word "foremost", the bottom: with words "High Quality Lighter, Penguin, NO. 19531 Japan"
T	24	1 x 1	1	0-10	8/7/2009	60	241.7	Metal	Fragmentary	Blank	Chunks	
T	24	1 x 1	1	0-10	10/24/2009	11	14.4	Glass	Fragmentary	Blank		one of the pieces has lettering on it "N E"
T	24	1 x 1	1	0-10	10/24/2009	1	5.1	Bone	Fragmentary	Blank	unknown bone	
T	24	1 x 1	1	0-10	10/24/2009	2	1.3	Ceramic	Diagnostic	Porcelain	Buttons	
T	24	1 x 1	2	10-20	8/7/2009	12	11.1	Glass	Fragmentary	Blank		10 pieces of clear, 1 piece of green and 1 piece of brown
T	24	1 x 1	2	10-20	8/7/2009	22	89.8	Metal	Fragmentary	Blank		
T	24	1 x 1	2	10-20	10/24/2009	17	34.8	Glass	Fragmentary	Blank		5 pieces of brown, 12 pieces of clear
T	24	1 x 1	2	10-20	10/24/2009	21	102.3	Metal	Diagnostic	Nail		
T	surface	surface	surface	0		1	too heavy	Metal	Diagnostic	Unidentified		Iron ring, 8 inches diameter, .5 inch thick
T	surface	surface	surface	0		1	too heavy	Metal	Diagnostic	Unidentified		Iron strap with round top
T	surface	surface	surface	0		1	195.3	Glass	Diagnostic	Bottom		Bottom of a glass bottle. "E B & COL. 9687" imprinted on the bottom. It was found near feature T but there was no unit on the bag.
T	surface	surface	surface	0	00/00/2007	1	100	Metal	Diagnostic	Blank	Metal Ring	weight is more than stated, missing a lot of information. May be hand wrought wheel, barrow rim, barrel template. 36 cm diameter

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
T	surface	surface	surface	0	05/11/2007	1	HEAVY	Metal	Diagnostic	Other	narrow gauge I-bar rail track (to transport manufacturing / manufactured materials); 55cm long	narrow gauge I-bar rail track (to transport manufacturing / manufactured materials); 55cm long
X	15		1	10-20	17 July 2009	2	8.9	Metal	Fragmentary	Nail		One is complete and one is not
X	15		1		17July2009	1	5.4	Bone	Non-Diagnostic			Appears to be a bird or poultry bone
[redacted]												
	A1	STP				1	3	Bone	Fragmentary	Tooth		BOVINE TOOTH
	A1	STP				1	0	Glass	Non-Diagnostic	Sherd		GLASS FRAGMENT
	A1	STP				6	65	Metal	Non-Diagnostic	Other		VARIOUS METAL PIECES
	A10	STP				2	3	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENTS
	A10	STP				20	11	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
	A10	STP				1	0	Unidentified	Non-Diagnostic	Unidentified		UNKNOWN MATERIAL
	A10	STP				7	11	Metal	Non-Diagnostic	Nail		METAL NAILS AND OTHER VARIOUS METALS
	A10	STP				8	15	Glass	Fragmentary	Other		GLASS FRAGMENTS
	A10	STP				1	45	Glass	Diagnostic	Other		Y
	A11	STP	0	0	05/11/2007	1	>1000	Brick	Complete	Blank	large fired brick, mostly complete, 7.5cm thick	located N500 E560
	A11	STP				91	90	Metal	Diagnostic	Nail		METAL NAILS
	A11	STP				6	8	Metal	Non-Diagnostic	Unidentified		METAL PIECES
	A11	STP				2	1	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENTS
	A11	STP				1	6	Lithic	Non-Diagnostic	Unidentified		BALL OF CLAY
	A11	STP				34	52	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	A11	STP				1	0	Bone	Fragmentary	Unidentified		BONE FRAGMENT
	A11	STP				1	3	Ceramic	Fragmentary	Other		CERAMIC PIPE FRAGMENT
	A11	STP				1	1	Metal	Non-Diagnostic	Other		LEAD/FOIL
	A12	STP	0	0	05/11/2007	1	>500	Brick	Diagnostic	Blank	partial fired brick, incised LL	incised LL; location N500 E560
	A12	STP	0	0	05/11/2007	1	>500	Brick	Diagnostic	Brick	fired brick with stamped letters, almost complete	stamped letters; location N500 E560
	A12	STP	0	0	05/11/2007	1	<0.05	Metal	Non-Diagnostic	Other	possibly part of a can	

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
	A12	STP	0	0	05/11/2007	7	4	Glass	Fragmentary	Blank	7 glass fragments of different colors; some are curved	
	A12	STP	0	0	05/11/2007	1	<1	Plastic	Fragmentary	Blank	curved white plastic fragment	
	A12	STP	0	0	05/11/2007	1	<1	Ceramic	Fragmentary	Blank	lip of a ceramic object	
	A12	STP				1	10	Bone	Fragmentary	Unidentified		BONE FRAGMENT
	A12	STP				81	198	Glass	Fragmentary	Other		GLASS FRAGMENTS
	A12	STP				1	2	Unidentified	Non-Diagnostic	Unidentified		RING SHAPED OBJECT
	A12	STP				5	5	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
	A12	STP				1	22	Ceramic	Diagnostic	Other		CERAMIC PIPE, INITIALS T.D.
	A12	STP				2	5	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENT, musterd colored glaze
	A12	STP				129	218	Metal	Diagnostic	Nail		METAL NAILS
	A12	STP				15	18	Metal	Non-Diagnostic	Chunk		METAL CHUNKS
	A12	STP				2	3	Metal	Diagnostic	Other		METAL STAPLES
	A12	STP				0	11	Metal	Non-Diagnostic	Unidentified		UNIDENTIFIED METAL PIECES
	A12	STP			05/11/2007	1	>500	Brick	Fragmentary	Brick	partial fired brick (3 sides)	shovel test pit 565, location N500 E560
	A13	STP	1			15	230	Metal	Fragmentary			some large metal fragments
	A13	STP				24	47	Glass	Non-Diagnostic	Sherd		Various colors
	A13	STP				1	6	Glass	Diagnostic	Rim		
	A13	STP				1	7	Glass	Diagnostic	Bottom		
	A13	STP				1	3	Ceramic	Fragmentary	Other		CERAMIC FRAGMENT PIPE
	A13	STP				2	2	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
	A13	STP				1	1	Metal	Complete	Other		METAL BUTTON
	A13	STP				19	33	Glass	Fragmentary	Other		GLASS FRAGMENTS
	A13	STP				1	48	Glass	Diagnostic	Other		GLASS BOTTLENECK
	A13	STP			5/4/07	1	2	Shell	Fragmentary	Unidentified		SHELL FRAGMENT
	A13	STP			5/11/07	1	1	Shell	Fragmentary	Unidentified		SHELL FRAGMENT
	A13	STP			5/11/07	21	16	Shell	Fragmentary	Unidentified		MUSSEL and SHELL FRAGMENTS
	A13	STP			5/11/07	10	3	Shell	Fragmentary	Unidentified		UNIDENTIFIED SHELL FRAGMENTS
	A13	STP				1	2	Shell	Fragmentary	Clam		CLAM FRAGMENT
	A13	STP			3/04/07	16	46.3	Metal		Nail		a mix of metal stuff including: flattened pitcher flat pieces nails

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
	A15	STP				1	1	Exotic	Diagnostic	Other		BUTTON
	A15	STP				1	5.3	Metal	Fragmentary	Nail		METAL NAIL AND FRAGMENTS
	A15	STP				4	16	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	A2	STP				3	0	Lithic	Non-Diagnostic	Chunk		MICA
	A2	STP				6	10	Glass	Non-Diagnostic	Unidentified		GLASS FRAGMENTS
	A21	STP				1	171	Bone	Fragmentary	Other		COW BONE
	A29	STP			5/18/07	2	14	Lithic	Fragmentary	Other		Chalky lime, may have been processed
	A4	STP				2	4	Metal	Diagnostic	Nail		NAILS
	A5	STP				3	7	Wood	Non-Diagnostic	Unidentified		WOOD
	A7	STP				1	0	Glass	Non-Diagnostic	Unidentified		GLASS
	A7	STP				1	2	Metal	Non-Diagnostic	Unidentified		METAL
	A8	STP				1	1	Metal	Diagnostic	Other		METAL BELT BUCKLE
	A8	STP				5	3	Glass	Non-Diagnostic	Unidentified		GLASS FRAGMENTS
	A9	STP				15	65	Metal	Non-Diagnostic	Nail		VARIOUS METAL NAILS, ETC.
	B10	STP				1	0	Glass	Fragmentary	Other		GLASS FRAGMENT
	B12	STP				1	0	Shell	Fragmentary	Unidentified		UNIDENTIFIED SHELL, POSSIBLY SNAIL
	B12	STP				0	63	Metal	Fragmentary	Unidentified		METAL PIECES
	B12	STP				7	7	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	B12	STP				6	4	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
	B12	STP				3	4	Metal	Non-Diagnostic	Unidentified		NAILS AND SCREWS
	B12	STP				3	2	Plastic	Fragmentary	Unidentified		PLASTIC PIECES
	B13	STP			5/11/07	4	4	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	B13	STP			5/11/07	2	5	Metal	Diagnostic	Other		METAL BUTTON AND BULLET PIECE
	B14	STP				3	1	Plastic	Non-Diagnostic	Unidentified		PLASTIC PIECES
	B14	STP				2	3	Bone	Fragmentary	Unidentified		BONE FRAGMENTS
	B14	STP			5/11/07	6	9	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	B15	STP			5/11/07	2	2	Metal	Fragmentary	Unidentified		METAL PIECE
	B15	STP			5/11/07	2	0	Carbon	Non-Diagnostic	Other		CHARCOAL
	B18	STP				3	2	Metal	Fragmentary	Unidentified		METAL PIECES
	B6	STP				1	1	Glass	Fragmentary	Unidentified		GLASS FRAGMENT
	B6	STP				2	2	Metal	Fragmentary	Nail		NAIL PIECES
	B6	STP				5	26	Carbon	Non-Diagnostic	Other		BURNED EARTH

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
	B8	STP				3	3	Lithic	Fragmentary	Limestone		LIMESTONE FRAGMENTS
	C1	STP				0	100	Lithic	Diagnostic	Other		LIMESTONE
	C1	STP			5/18/07	19	49	Glass	Fragmentary	Other		GLASS FRAGMENTS
	C1	STP			5/11/07	5	3	Metal	Fragmentary	Unidentified		METAL PIECES
	C1	STP			5/11/07	1	0	Bone	Fragmentary	Other		BONE FRAGMENT
	C1	STP			5/11/07	1	1	Ceramic	Fragmentary	Other		CERAMIC FRAGMENT
	C1	STP			5/11/07	1	9	Glass	Fragmentary	Other		PROCESSED GLASS
	C10	STP				60	54	Glass	Non-Diagnostic	Sherd		MULTIPLE COLORS WITH WINDOW GLASS - FLAT bag 1 of 2
	C10	STP				3	4	Wood				POSSIBLE WOOD USED IN CONSTRUCTION - IT IS REALLY FLAT
	C10	STP				2	1	Ceramic	Non-Diagnostic	Porcelain		
	C10	STP				2	458	Metal	Non-Diagnostic	Other		METAL PIPES WITH DIRT IN THEM
	C10	STP				30	63	Metal	Non-Diagnostic	Nail		NAILS AND METAL CHUNKS
	C10	STP				21	20	Bone	Non-Diagnostic	Other		VARIOUS BONE FRAGMENTS AND PARTIAL ANIMAL MANDIBLE
	C10	STP				27	73	Metal	Non-Diagnostic	Nail		NAILS, PARTIAL BUCKLE, AND OTHER METAL PARTS
	C10	STP				11	48	Bone	Fragmentary	Unidentified		VARIOUS BONE FRAGMENTS
	C10	STP				12	69	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENTS
	C10	STP				2	6	Carbon	Non-Diagnostic	Charcoal		CHARCOAL
	C10	STP			3/25/07	1	1	Shell	Fragmentary	Unidentified		FRAGMENTARY SHELL
	C10	STP				17	43	Ceramic	Fragmentary	Brick		BRICK FRAGMENTS
	C10	STP				2	7	Ceramic	Fragmentary	Brick		BRICK FRAGMENTS
	C10	STP				1	53	Metal	Diagnostic	Other		FORK
	C10	STP				1	1077	Ceramic	Diagnostic	Brick		BRICK CHUNK
	C2	STP				15	32	Glass	Non-Diagnostic	Domestic		Multi-colored glass shards
	C2	STP				7	9	Metal	Diagnostic	Nail		7 rusted metal fragments, at least 3 nail heads
	C2	STP				1	10	Bone	Fragmentary	Unidentified		
	C2	STP				4	3	Ceramic	Non-Diagnostic	Brick		
	C4	STP				8	9	Bone	Fragmentary			8 tiny bone fragments
	C5	STP			5/18/07	1	3	Ceramic	Complete	Other		White porclean marble
	C6	STP				2	3	Metal	Diagnostic	Nail		NAILS
	C6	STP				10	19	Ceramic	Fragmentary	Brick		BRICK FRAGMENTS

Feature	Unit #	Unit Size	Level	Depth	Date Excavated	Count	Weight(g)	Material	Condition	Description2	Description3 - Details	Comments
	C7	STP				1	3	Bone	Non-Diagnostic	Unidentified		BONE
	C7	STP				1	1	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENT
	C7	STP				2	1	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	C7	STP				2	5	Metal	Diagnostic	Nail		NAILS
	C8	STP				15	9	Bone	Non-Diagnostic	Unidentified		BONE FRAGMENTS
	C8	STP				9	20	Metal	Diagnostic	Nail		NAILS FRAGMENTS
	C8	STP				5	10	Glass	Fragmentary	Unidentified		GLASS FRAGMENTS
	C8	STP				2	8	Ceramic	Fragmentary	Unidentified		CERAMIC FRAGMENTS
	C8	STP				1	0	Unidentified	Non-Diagnostic	Unidentified		UNIDENTIFIED
	C8	STP				1	10	Metal	Non-Diagnostic	Unidentified		METAL PIECE
	C8	STP				1	1	Metal	Diagnostic	Other		METAL FISH HOOK
	C9	STP				26	118	Glass	Diagnostic	Bottom		GLASS BOTTLE BOTTOM AND GLASS FRAGMENTS
	C9	STP				6	11	Ceramic	Non-Diagnostic	Other		POTTERY FRAGMENTS
	C9	STP				24	45	Bone	Non-Diagnostic	Other		BONE FRAGMENTS
	C9	STP				5	4	Metal	Diagnostic	Nail		NAILS
	C9	STP				11	30	Metal	Diagnostic	Nail		NAILS
	C9	STP				36	33	Ceramic	Fragmentary	Brick		BRICK FRAGMENTS