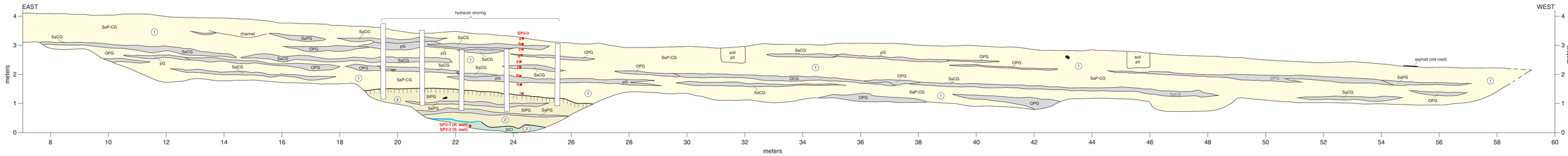
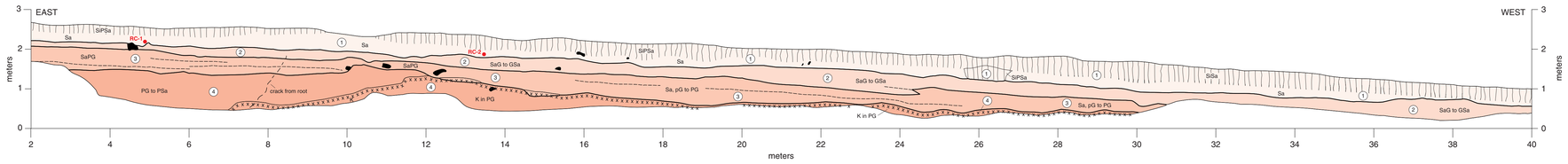
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

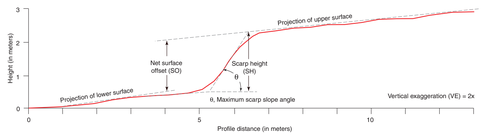
OPEN-FILE REPORT
OFR 99-155
Plate 2 of 2



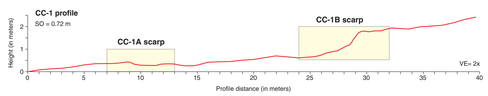
Salt Pan Vista Trench
Trench orientation = 248° (S 68° W)

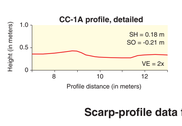


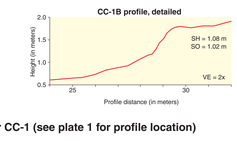
Ridgecrest Trench (east of "Boneyard")
Trench orientation = 260° (S 80° W)



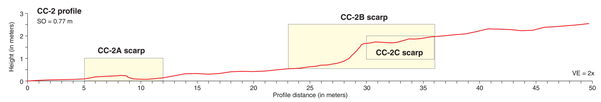
Graphic representation of fault scarp morphology terms

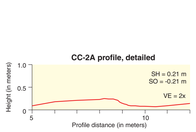


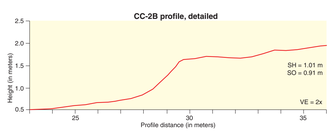


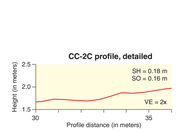


Scarp-profile data for CC-1 (see plate 1 for profile location)

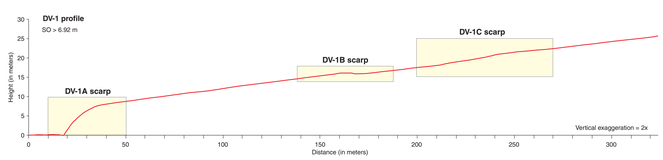


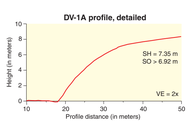


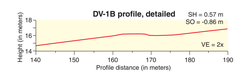


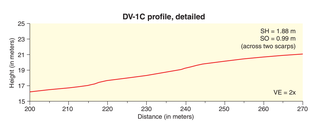


Scarp-profile data for CC-2 (see plate 1 for profile location)

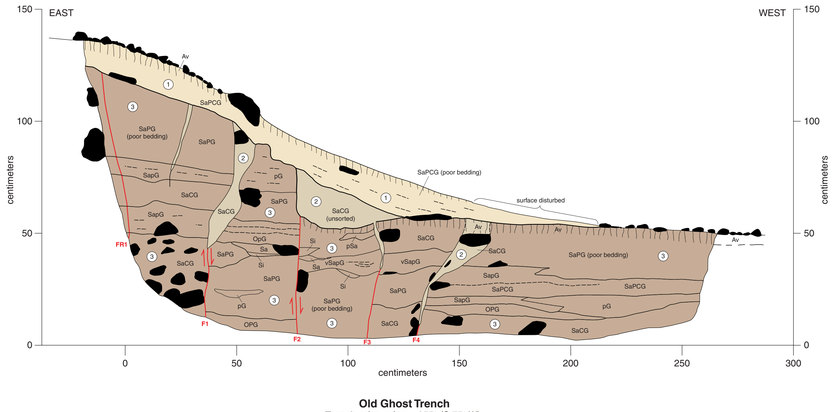








Scarp-profile data for DV-1 (see plate 1 for profile location)

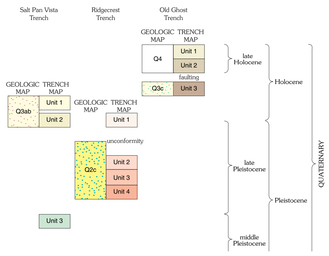


Old Ghost Trench
Trench orientation = 255° (S 75° W)

Scarp-profile data for CC-3 (see plate 1 for profile location)

Scarp-profile data for DV-2 and DV-3 (see plate 1 for profile location)

CORRELATION OF GEOLOGIC AND TRENCH MAP UNITS



DESCRIPTION OF UNITS MAPPED IN TRENCHES

Salt Pan Vista Trench

No evidence for faulting was found in the trench. The trench units demonstrate lateral continuity and tectonic stability of the geomorphic surface formed by geologic map unit Q3ab.

Unit 1 — **Unit 1**—Alluvial gravel, upper unit. Most of the unit is comprised of fluvial sandy gravel, but as much as 25 percent of the unit may be of debris-flow origin. Most of the surface (of Salt Pan Vista) has been modified by cultural activities. However, the soil pits reveal a weakly developed zonal soil characterized by a 6-8 cm thick silty Av (vesicular A) horizon over a weakly developed (stage I) Bk horizon with minor gypsum. The underlying material (C horizon) is oxidized to about 50 cm depth, but there is little pedogenic carbonate development associated with the C horizon. Unit 1 is probably equivalent to geologic map unit Q3b of Klinger and Piety (1996).

Unit 2 — **Unit 2**—Alluvial gravel, lower unit. Upper part of unit is characterized by a slightly oxidized sandy pebble gravel that may be a weakly developed soil that formed at the surface prior to deposition of unit 1. The debris-flow layers contain abundant rip-up clasts derived from Cenozoic bedrock (Funeral Formation) to the east. The upper contact is slightly wavy but sharp, indicating little or no erosion prior to burial by unit 1. Conversely, the basal contact of unit 2 is irregular and sharp, and represents an unconformity on unit 3. Unit 2 is probably equivalent to geologic map unit Q3a of Klinger and Piety (1996).

Unit 3 — **Unit 3**—Lacustrine silt. Unit 3 is an unbedded clayey to sandy silt, relatively dense, compact, and light gray in color, but oxidizes to a light yellowish brown on exposure. Paleomagnetic analysis indicates that the silt is normally magnetized. This lacustrine material was deposited during an older phase of Lake Manly, more than 100,000 years ago (based on preliminary thermoluminescence (TL) analyses.

Ridgecrest Trench

No evidence for faulting was found in the trench. The trench units demonstrate lateral continuity and tectonic stability of the geomorphic surface formed by geologic map unit Q2c.

Unit 1 — **Unit 1**—Eolian sand and silt. This eolian unit has a 20-50 cm thick Btyk soil horizon that reflects a moderate degree of soil development considering the present hyperarid climate of the region. The Btyk has prismatic structure (3-6 cm in diameter) and is noticeably oxidized (7.5YR colors) compared to the underlying parent material (10YR colors), which is a slightly calcareous silty fine-grained sand. Unit 1 should be younger than geologic map unit Q2c of Klinger and Piety (1996). Preliminary TL analyses indicate an age of 15±14 ka for the basal part of this unit.

Unit 2 — **Unit 2**—Upper gravel. Units 2 is a massive, poorly stratified sandy gravel and gravelly sand. The upper part is matrix-supported, suggesting a debris-flow origin. The lower part is a crude to moderately bedded sandy gravel of fluvial origin. The upper and lower contacts of unit 2 and most of its bedding planes are subparallel to the land surface. Unit 2 is roughly equivalent to geologic map unit Q2c of Klinger and Piety (1996).

Unit 3 — **Unit 3**—Middle gravel. Unit 3 is primarily a fluvial gravel with a stone line at the top, suggesting that unit 2 eroded some of the upper part of unit 3. Unit 3 is generally finer grained than 2, has more laterally continuous beds and bedding planes, and is parallel to the surface. Throughout the length of the trench there is no evidence of deformation of unit 3. The basal contact of unit 3 is marked by a prominent stone line and downward coarsening of clasts (to pebble and medium cobble size), indicating an unconformity with unit 4. Unit 2 is roughly equivalent to geologic map unit Q2c of Klinger and Piety (1996).

Unit 4 — **Unit 4**—Lower gravel (cemented). Unit 4 is a massive to poorly bedded pebble gravel to gravelly sand; the best stratification is in beds of pea-size gravel. These gravels are much like unit 3 except they contain a firmly cemented duricrust composed of calcrete (calcium carbonate). The calcrete is discontinuous and extends upwards into the base of unit 3 and downward into bedrock (QTf): its distribution suggests ground-water origin. However, it may either be a pedogenic accumulation or ground water feature: not enough of the unit was exposed to make a well informed decision about its origin. Although exposures of unit 4 are limited, the package of mixed fluvial and debris-flow deposits might be equivalent to the basal part of the gravel that forms the 5-m higher ridge to the south of the trench. We correlate this ridge-forming gravel with Klinger and Piety's (1996) geologic map unit Q2b, which is quite extensive in the northern part of the Old Ghost alluvial fan complex.

Old Ghost Trench

This trench shows evidence of faulting. The resulting deposits of scarp-colluvium were mapped in two parts: a wash facies (unit 1) resulting from sheetwash and creep processes, and a debris facies (unit 2) resulting from the initial gravitational collapse of the scarp.

Unit 1 — **Unit 1**—Scarp colluvium, wash-facies. This upper part of the colluvium is an unsorted, poorly (crudely) bedded sandy pebble to cobble gravel. It forms an elongate envelope (mantle) that extends across the entire scarp, but pinches out at the crest and toe of the scarp. A weak 3-5 cm thick Av horizon has formed on the wash facies, indicating rapid accumulation of eolian dust on the scarp.

Unit 2 — **Unit 2**—Scarp colluvium, debris-facies. This lower part of the colluvium is an unsorted, massive sandy cobble gravel. It fills fissures along fracture zones (FR1 and FR3) and a wedge-shaped body a colluvium at the base of the fault with the largest offset (F2).

Unit 3 — **Unit 3**—Gravel. Unit 3 is a package of crudely bedded alluvial and debris-flow deposits. The materials range from small lenses and pockets of sand and laminated silt to sandy pebble and cobble gravels. The contacts between alternating fine- and coarse-grained layers are subparallel to the original ground surface and to one another. Where unburied at the west end of trench, the surface of unit 3 is marked by a 5- to 6-cm thick Av horizon that can be traced scarpward (east) to within about 20 cm of fault F2. The Av horizon is barely noticeable near the fault, owing to disturbance by adjacent faulting and collapse of scarp materials (unit 2). We correlate this major fan-forming gravel (unit 3) with Klinger and Piety's (1996) geologic map unit Q3c, which is quite extensive in the southern part of the Old Ghost alluvial fan complex.

EXPLANATION OF TRENCH MAP SYMBOLS

[Abbreviations: μ, micron (1 mm = 1000 μ)]

Cl	Clay, <2μ size
Si	Silt, 2-62μ size
Sa	Sand, 62-2000μ size
G	Gravel, 2-256 mm size
p	Pea-size gravel (2-4 mm)
P	Pebble-size gravel (4-64 mm)
C	Cobble-size gravel (64-256 mm)
Av	Vesicular A horizon (calcareous silt)
B	B horizon (modifiers: t, argillic; y, gypsum; k, calcium carbonate)
K	Calcrete (calcium carbonate-cemented layer or soil horizon)
O	Open-work texture (clast-supported gravel)
v	Very (i.e., vSaCG = very sandy cobble gravel)
1	Map unit (unique to each trench, numbered from surface down)
■	Samples for ^{36}Chlorine dating
●	Samples for TL (thermoluminescence) dating
	Location of mapped clasts
	Faults and fractures (only in Old Ghost trench)
	Marl (calcium-carbonate-rich biogenic accumulation at top of unit 3, SPV trench)
	Facies or subunit boundary (intra-unit contact)
	Stratigraphic contact (contact between units)
	Unconformity. Contact with evidence of weathering (oxidation) or soil development
	Boundary with carbonate-cemented unit (below)
	Bedding planes within units

Maps of Exploratory Trenches and Topographic Profiles Across Scarps in the Cow Creek Facility and Surrounding Area, Death Valley, California

By

Michael N. Machette, Carlos Ninci Martinez, Anthony J. Crone, Kathleen M. Haller, Lee-Ann Bradley, and Giuliana D'Addezio

1999

USGS science for a changing world

Trenches mapped and scarp profiles measured by authors in Oct. 1998; further changes by Michael N. Machette, Dec, 1998-March 1999.

Map graphics prepared by Lee-Ann Bradley, Dec. 1998-March 1999.

For sale by U.S. Geological Survey Information Services, Box 25286, Federal Center, Denver, CO 80225