Figure 5. West view of the Deep Canyon trench.

these age estimates, we rounded the calendar ages to the nearest half century. Two-sigma (2σ) error limits are shown for the age estimates (table 1), and are similarly rounded.

Clarkston Fault

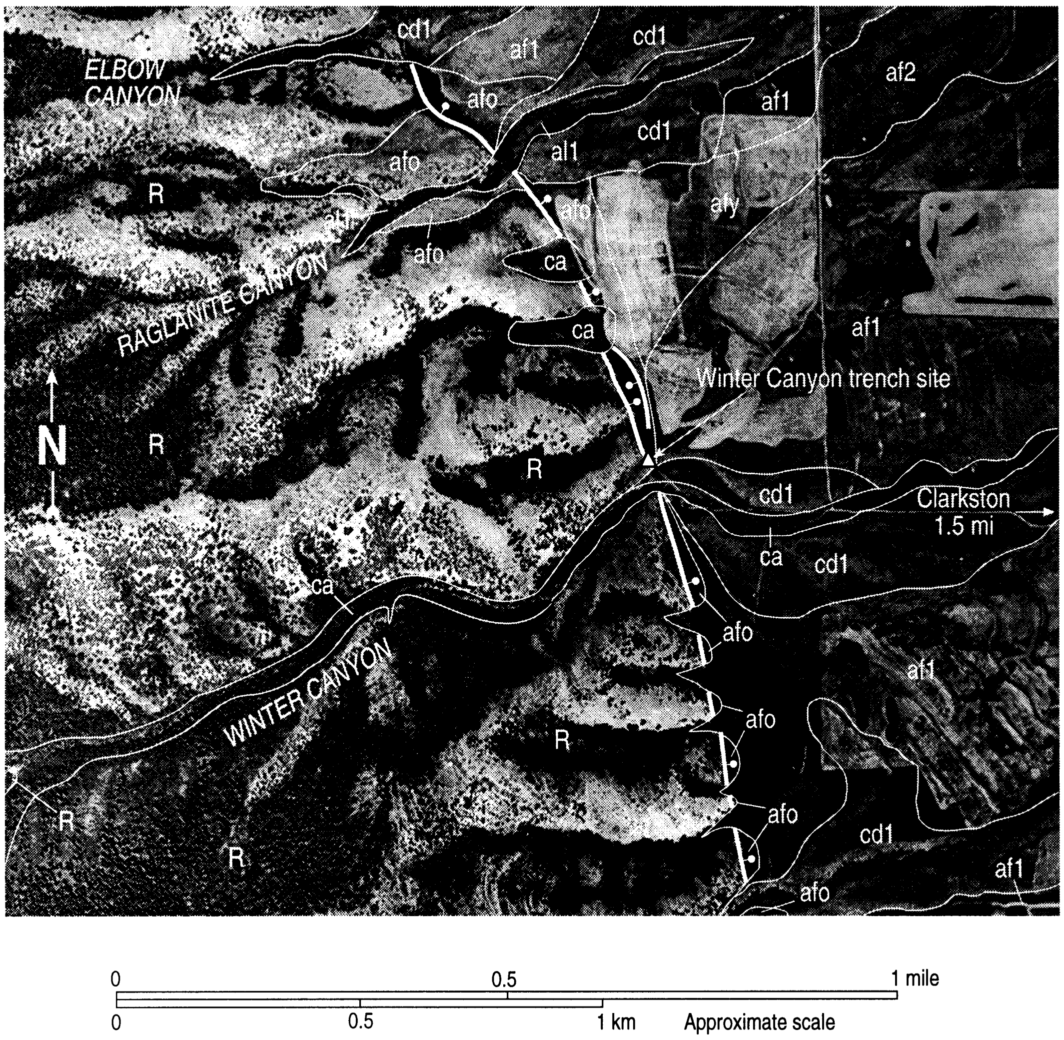
Geology

The Clarkston fault is 35 kilometers (22 mi) long (11 kilometers [7 mi] in Utah, 24 kilometers [15 mi] in Idaho) and for most of its length consists of a single, sinuous fault trace with discontinuous east-dipping normal fault scarps. The fault lies at elevations above the highest shoreline of Lake Bonneville and generally separates unconsolidated deposits in the hanging wall from bedrock in the footwall (Solomon, 1997). The elevation of the Bonneville shoreline near the south end of the Clarkston fault, north of Short Divide, is distinctly lower than the shoreline elevation to the south on the Junction Hills fault (Solomon, 1997). North of Short Divide, the Bonneville shoreline is at an elevation of about 1,570 meters (5,151 ft), but south of the divide the shoreline is at an elevation of about 1,579 meters (5,181 ft). Hanson (1949) mapped a transverse fault in Short Divide that separates distinctly different geologic terranes to the north and south and shows a total estimated 3,000 meters (9,800 ft) of down-to-the-south stratigraphic throw. The concealed projection of the Short Divide fault obliquely intersects the Clarkston and Junction Hills faults.

Table 1. *Radiocarbon results and calendar-calibrated age estimates taken from the Winter and Deep Canyon trenches, and Roundy Farm stream cut. MRE - most recent surface-faulting earthquake, PE - penultimate surface-faulting earthquake, MRC - mean residence correction, CAS - carbon age span, LHC - lower horizon contact, UHC - upper horizon contact, WCFZ - West Cache fault zone.*

Laboratory sample number (Field sample number)	*Material sampled*	*Radiocarbon age in 14C yr B.P.*	*AMRT age estimate in 14C cal B.P. (two-sigma error)*	*MRC (in yr)*	*CAS (in yr)*	*Notes*
Winter Canyon trench, Clarkston fault, WCFZ						
Beta-110958 (WCT-RC1)	Upper 5-10 cm of paleosol S1	3,420 ± 50	3,650 (3,550-3,800)	150	200	UHC of paleosol S1 beneath MRE colluvial wedge.
- (WCT-RC2)	Upper 5-10 cm of paleosol S1	-	-	-	-	Backup sample for WCT-RC1 not submitted to lab.
Beta-110959 (WCT-RC3)	Fault-scarp colluvium	2,200 ± 50	2,200 (2,050-2,300)	300	200	Distal portion of MRE colluvial wedge.
Beta-110960 (WCT-RC4)	Fault-zone colluvium	3,530 ± 80	3,800 (3,600-4,000)	300	200	Heel of MRE colluvial wedge in fault zone.
Roundy Farm stream cut, Junction Hills fault, WCFZ						
Beta-110961 (RF-RC1)	Fault-scarp colluvium	7,690 ± 110	8,450 (8,250-8,650)	300	200	MRE colluvial wedge near UHC of paleosol S1.
Deep Canyon trench, Wellsville fault, WCFZ						
Beta-110953 (DCT-RC1)	Degraded charcoal	21,500 ± 160	-	-	-	Radiocarbon age too old to be calibrated. Limiting age for PE.
Beta-110954 (DCT-RC2)	Lower 5-10 cm of paleosol S1	4,540 ± 50	5,250 (5,000-5,350)	300	200	LHC of paleosol S1.
Beta-110955 (DCT-RC3)	Upper 5-10 cm of paleosol S1	4,020 ± 50	4,500 (4,350-4,600)	150	200	UHC of paleosol S1 beneath MRE colluvial wedge.
Beta-110956 (DCT-RC4)	Fault-scarp colluvium	3,010 ± 40	3,200 (3,050-3,300)	300	200	Distal portion of MRE colluvial wedge.
Beta-110957 (DCT-RC5)	Lower 5-10 cm of soil S2	1,790 ± 60	1,700 (1,550-1,850)	300	200	LHC of soil S2 above MRE colluvial wedge.

Two areas of potential displaced Holocene deposits exist on the Clarkston fault (Solomon, 1997). The first area is at the mouth of Winter Canyon, roughly 3 kilometers (2 mi) west of Clarkston, and the second is at the mouth of Raglanite Canyon, 0.8 kilometers (0.5 mi) north of Winter Canyon. Surficial deposits at these areas consist of upper Holocene to middle Pleistocene alluvium and colluvium (figure 6; Solomon, 1997). The fault at Winter and Raglanite Canyons consists of a single, discontinuous fault trace buried at the canyon mouths by stream alluvium, debris flows, and undivided colluvium and alluvium (figure 6). The canyon mouths are separated from each other by steep, faceted, range-front spurs (Solomon, 1997). South of Winter Canyon, the fault marks a contact between upper to middle Pleistocene fan alluvium and bedrock (figure 6). Directly north of Winter Canyon, the fault displaces a narrow apex of an upper Holocene alluvial fan (figure 6). At Raglanite Canyon, the fault displaces upper



DESCRIPTION OF MAP UNITS AND SYMBOLS

af1	Fan alluvium, unit 1 (upper Holocene)
cd1	Debris flows, unit 1 (upper Holocene)
al1	Stream alluvium, unit 1 (upper Holocene)
afy	Younger fan alluvium (Holocene to uppermost Pleistocene)
ca	Colluvium and alluvium, undivided (Holocene to middle Pleistocene)
afo	Older fan alluvium (upper to middle Pleistocene)
R	Bedrock, undivided

Normal fault, bar and ball on downthrown side, dashed where approximately located.

Contact

Trench site

Figure 6. Air-photo geologic map of the Winter Canyon trench site vicinity (modified from Solomon, 1997).

to middle Pleistocene fan alluvium (Solomon, 1997). Between Winter and Raglanite Canyons, the fault also marks the contact between upper to middle Pleistocene fan alluvium and bedrock (figure 6).

Sequence of Deposition and Faulting in the Winter Canyon Trench

The Winter Canyon trench was excavated slightly north of the mouth of Winter Canyon across a roughly 4-meter- (13-ft-) high scarp of the Clarkston fault. The trench exposed a single main fault trace (figure 7) and evidence for one surface-faulting earthquake. The oldest unit exposed in the Winter Canyon trench is a calcium-carbonate cemented alluvial-fan deposit (unit 1, plate 1A). The alluvial-fan deposit is overlain by loess (unit 2, plate 1A). A soil A horizon (paleosol S1, plate 1A) formed on top of unit 2. These units are displaced down to the east by the most recent surface-faulting earthquake (MRE) on the Clarkston fault. A colluvial wedge (unit 3, plate 1A) roughly 1.3 meters (4.3 ft) thick lies on top of unit 2 and paleosol S1. A modern soil (S2, plate 1A) is forming on top of units 2 and 3. Unit 2, paleosol S1, and soil S2 showed considerable animal burrowing. Evidence in the trench exposure also indicates that the degraded-scarp free face continues to the surface and is not buried by colluvium. Colluvial deposits (generally with a modern soil A horizon) typically overlie the degraded-scarp free face in trenches along the Wasatch fault zone (for instance, Black and others, 1996; and Lund and Black, 1998). Therefore, we believe degradation of the scarp was very gradual and is still continuing.

Figure 7. South view of fault zone exposed in the Winter Canyon trench, Clarkston fault.