Table 1: Common Facies and Processes

Facies	Grain Size	Bed Thickness (meters)	Structures/Textures
1: Chaotic facies (see Table 2)	Small-scale slumps to 100 m glide blocks	0.025-180	See Table 2
2: Conglomerate/ pebbly sandstone (see Table 3)	Chiefly pebble, boulders rare; mud or medium to coarse sand matrix	0.5-20	See Table 3
3: Nongraded sandstone	Fine to coarse sand, chiefly medium sand; locally pebbly	0.4-5	Structureless (massive) to poorly laminated; rarely with dish structures
4: Graded sandstone	Fine to coarse sand; mainly fine to medium sand; locally with granules	0.05-10; 0.15-0.4 most common	Basal scour; graded, most commonly structureless or planar laminate (commonly at shallow inclinations), or divided into structureless base and planar laminated upper part; uppermost part rarely ripple-laminated

Table 1: Continued

Facies	Interpretation	Lowe (1982	Pickering and others (1986)
1: Chaotic facies (see Table 2)	Disorganized units resulting from a variety of soft-sediment failure/transport mechanisms including block-gliding, block-slumping, slump-folding, and loading; includes rockfall deposits	..	F1.1, F2.1, F2.2
2: Conglomerate/ pebbly sandstone (see Table 3)	Mainly deposition from high-density, gravelly, sediment-gravity flows, and the current reworked deposits of those flows	See Table 3	A1.1, A1.2, A2.1-A2.8, B2.2
3: Nongraded sandstone	Rapid sedimentation from high-density turbidity currents or other high-density, cohesionless sediment-gravity flow; post-epositional modification by liquefaction\fluidization possible	S3(?)	B1.1
4: Graded sandstone	Deposition from waning, high-density, turbidity currents	Ta, Tb, Tab, Tabc	C2.1, C2.2

Table 1: Continued

Facies	Grain Size	Bed Thickness (meters)	Structures/Textures
5a: Thinly interbedded graded sandstone and mudstone	Mud to fine sand	Sand: 0.01-0.2; Mud: 0.01-1	Sand: basal scour; commonly graded; range from structureless to various combinations of planar laminations and ripple laminations. Mud: parallel-laminated mudstone, rippled siltstone layers or starved sand ripples; bioturbation common, but not extreme
5b: Thinly interbedded ripple laminated sandstone and mudstone	Mud to coarse sand	Sand: 0.02-0.4; Mud: 0.01-0.04	Sand: discontinuous beds with pervasive ripple laminations; thin beds with medium to coarse sand common; Mud: parallel laminated or ripple laminated siltstone; starved ripple horizons ubiquitous
6a: Parallel laminated and ripple laminated siltstone and mudstone	Clay to very fine sand	0.01- >10	Parallel-laminated clay-silt couplets; starved ripples of silt to very fine sand; very small-scale load structures; moderately burrowed
6b: Parallel laminated mudstone	Clay to very fine sand	0.01- >10	Parallel-laminated clay-silt couplets

Table 1: Continued

Facies	Interpretation	Lowe (1982	Pickering and others (1986)
5a: Thinly interbedded graded sandstone and mudstone	Sand: deposited from low-density turbidity currents. Mud: deposited from (and reworked by) turbidity current tail; hemipelagic sedimentation	Ta, Tab, Tabc, Tbc	C2.3
5b: Thinly interbedded ripple laminated sandstone and mudstone	Reworking of sand and mud by very low density turbidity currents or other dilute flow	Tc	..
6a: Parallel laminated and ripple laminated siltstone and mudstone	Deposition from very dilute turbidity currents and hemipelagic mud; sporadic weak bottom currents rework sediment	..	D2.1, D2.2, D2.3, E2.2
6b: Parallel laminated mudstone	Deposition from very dilute turbidity currents and hemipelagic mud	..	D2.1, D2.2, D2.3, E2.2

Table 2: Common Chaotic Facies and Processes

Chaotic Facies	Grain Size	Composition
1a: Mega-breccia	Angular blocks as much as 13 m; rounded gravel and sand as matrix; very poorly sorted	Indurated blocks derived exclusively from Jurassic units that compose the basin floor
1b: Slide blocks	Largest observed is 40 m thick with width and length >100 m	Coherent, intrabasinal blocks of thinly interbedded graded or ripple-laminated sandstone and silty mudstone
1c: Broken formation	Wide range of block sizes, from <1 m to at least 20 m thick and as much as 50 m wide	Coherent, intrabasinal blocks bearing facies 5a, 6a, and 6b (Table 1) with varying degrees of ductile deformation.
1d: Contorted strata	Sizes range from small <1 m inclusions in sediment-gravity flows to individual slump folds 15 m thick	A variety of intrabasinal material in the sand to mud size range
1e: Pebbly mudstone	Mudstone with pebbles very common, with angular blocks ranging in size up to 9 m less common, but locally important	Various combinations of pebbles (derived from distant continental arc), angular blocks (derived from Jurassic substrate, homogeneously intermixed with a high proportion of reworked intrabasinal mud

Table 2: Continued

Chaotic Facies	Deposit Thickness/Geometry	Occurrence/Distribution	Interpretation
1a:	75 m maximum exposed thickness; very lenticular	Occurs only in Pinos Fm. adjacent to Choyal fault; rests within deep scour on Jurassic unconformity	Large blocks moved by rockfall, or landslide; sparse matrix filled intersticies between stacked blocks
1b:	Individual blocks reach at least 40 m in thickness and are very tabular; unknown thickness or geometry of aggregate deposit	Occurs only in Pinos Fm., with increased abundance up-section, especially near the Choyal fault south of Arroyo Coloradito	Detachment and translation of coherent slab of slope material
1c:	Deposits range from a few meters to at least 180 m in thickness; deposits are broad (100s m to a few km), with marked lateral thickness variability	Occurs sporadically throughout the Pinos Fm., but especially abundant on both sides fo the Choyal Fault south of Arroyo Coloradito, within 2 km east of the coastline	Translation and tumbling (biaxial rotations) of semi-lithified slump blocks
1d:	Individual slump layers range in thickness from several cms to 10s m; generally very poor lateral continuity	Individual slump layers range in thickness from several cms to 10s m; generally very poor lateral continuity	Gravity-driven soft-sediment deformation during minor to moderate downslope translation
1e:	Pebbly mudstone beds range in thickness from 2 cm to 20 m; lateral continuity is poor in thin beds and unmapped in thicker units; blocky mudstone is laterally mappable for 2-3 km	Sporadic rare mudstone beds throughout the Cretaceous section; significant proportion of u. mudstone unit of Vargas Fm. in headwaters of Gran Cañon; blocky mudstone is abundant in the blocky-olstotrome unit of the Pinos Fm. in Arroyo Coloradito	Debris flow after mixing and homogenization of interstratified gravel and mud by slope failure; channel-wall slumping; incorporation of substrate mud into erosive gravelly flows; blocky mudstone forms as rockfall from uplifted scarps triggers slope failure in muddy substrate

Table 3: Common Conglomerate Facies and Processes

Conglomerate Facies	Grain Size	Bed Thickness (meters)	Structures/Textures
2a: Blocky conglomerate	Gravel: pebbles with rare cobbles and rarer boulders; Blocks: up to 6 m	1-20 m	Clast-supported to matrix-supported; disorganized
2b: Nongraded conglomerate	Chiefly pebbles	0.5-2 m	Clast-supported; disorganized
2c: Conglomerate or breccia with mud matrix	Ranges from granule to boulder; chiefly pebbles	0.5-20 m	Clast- supported to matrix-supported; disorganized to moderate a-axis imbrication (when rare, non-equant or discoidal clasts are present)
2d: Graded, and complexly-graded conglomerate with sand matrix	Chiefly pebbles	0.5-7 m	Clast-supported to matrix-supported; wide variety of simple and complex grading styles; internal scours and bounding scours abundant
2e: Gravelly sandstone	Gravel: granules to small pebbles; Sand: medium to coarse, chiefly medium	1-15 m	Normal grading in gravel fraction; distribution or cyclic grading in sand fraction; granule-lined internal scour surfaces and low-angle cross stratification common

Table 3: Continued

Conglomerate Facies	Interpretation	Lowe (1982	Pickering and others (1986)
2a: Blocky conglomerate	Downslope remobilization of rockfall deposits by highly-competent gravelly sediment-gravity flow	..	A1.1
2b: Nongraded conglomerate	Rapid deposition by frictional freezing from very high-density, gravelly, sediment-gravity flow, without subsequent reworking by the tail of the flow	..	A1.1
2c: Conglomerate or breccia with mud matrix	Gravelly debris flow; imbrication occurs in deposits with low proportion of matrix, where grain interactions were likely	..	A1.2
2d: Graded, and complexly-graded conglomerate with sand matrix	Deposition from, and commonly reworking by, surging (?), sand-rich, high-density, gravelly sediment-gravity flow	R2, R2-R3, R3, R2-R3-S1	A2.2, A2.3, A2.4
2e: Gravelly sandstone	Deposition from, and commonly reworking by, surging (?), sand-rich, high-density, sediment-gravity flow	S1, R3-S1, R3-S1-S2, S1-S2-(S3?), Tab	A2.5, A2.6, A2.7, A2.8

Table 3: Continued

Conglomerate Facies	Grain Size	Bed Thickness (meters)	Structures/Textures
2f: Interstratified conglomerate and gravelly sandstone	Chiefly pebbles and medium to coarse sand	0.5-2 m	Clast-supported or matrix-supported, horizontally- and cross-stratified conglomerate and sandstone layers
2g: Matrix-poor conglomerate	Pebbles to small boulders	1 m or less	Clast-supported, nongraded to normally-graded

Table 3: Continued

Conglomerate Facies	Interpretation	Lowe (1982	Pickering and others (1986)
2f: Interstratified conglomerate and gravelly sandstone	Reworking of gravel and sand beneath strong turbidity currents or other dilute flow	R1-S1	A2.1, B2.2
2g: Matrix-poor conglomerate	Coarse-grained lag deposit left by winnowing of fines beneath turbidity currents	..	A1.1