

Title: *PHASE I GROUND WATER ASSESSMENT FOR THE PLACITAS AREA*

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Key Topics: Placitas, hydrologic zones, hydrogeology, hydrochemistry, ground water withdrawal, ground water elevation, well log information, ground water yield

Summary:

- Geologic units of the Placitas area
 - Table 1. Paleozoic and Mesozoic rocks
 - Table 2. Cenozoic formations
 - Structure and Landforms
 - “Connell (1995) describes the Placitas and San Francisco faults as marking a zone of transition between the Albuquerque basin to the south and the Santa Domingo basin immediately to the north” (p. 11).
 - Erosion has been active in the Paleozoic and Mesozoic sections of the Placitas area (p. 11).
 - In many areas of older gravel covered terraces, recharge is prohibited by rich calcium carbonate zones (p. 11).
- Hydrogeologic Zones (Figure 4. Map of the hydrogeologic zones delineated in the Placitas study area (p. 14). Table 3. Statistical summary of estimated ground water (gpm) for hydrogeologic zones 1 through 5 (p. 16).)
 - Zone 1: Precambrian basement rocks and Paleozoic Sandia and Madera Formations
 - “...points of ground water discharge coincide with faults and/or the boundary between the Madera Formation and the Sandia Formation” (p. 13).
 - At the base of Cuchilla Lupe, the Madera comes in contact with a fault discharges ground water at the surface, providing the main drinking water for the village of Placitas (p. 13).

- Estimated yield of wells in zone 1 is highly variable and decreases with depth (p. 15).
 - This zone is very sensitive to seasonal fluctuations in precipitation (p. 15).
 - Zone 2: Shallow alluvial systems
 - Las Huertas Creek alluvium -ground water discharges from the Madera into the creek near the south end of the study area
 - ground water is recharged by Las Huertas Creek further north, in wet years this provides the most significant recharge for the Santa Fe Formation aquifers
 - Rainbow Valley alluvium and upper Arroyo del Ojo
 - Both are being intensively developed
 - Ground water yields are highly variable and fluctuate seasonally (p. 17).
 - Zone 3: Permian, Triassic, Jurassic and Cretaceous Formations
 - Mostly low permeability, flow is generally limited to fractured zones (p. 17).
 - Compartmentalized aquifers due to highly complex fracturing
 - Zone 4: Cretaceous Mancos, Dakota and Mesa Verde Formations
 - Highly variable ground water due to cement dissolution, fracturing and recharge potential (p. 18).
 - Zone 5: Upper and Lower Santa Fe Formation (Rio Grande Basin Sediments)
 - Generally high ground water yields due to larger grain size and unconsolidated sediments (p. 19).
 - The westernmost portion of the Placitas study area has the best producing areas. Faults in this area (Ranchos and Valley View Faults) may affect overall ground water flow (p. 19).
 - Several community systems in the western Placitas region are withdrawing ground water from these sediments (p. 20).

➤ Hydrochemistry

- Calcium, magnesium, sodium, sulfate and chloride.

➤ Hydrology

- Generally, in the Placitas area, ground water flows to the west-northwest from the Sandia Mountains (p. 25).
 - “Cuchilla Lupe appears to act as a conduit for ground water recharge to the Las Huertas graben to the east, the Village of Placitas to the west and the region directly to the north” (p. 25).
 - Las Huertas drainage appears to be an important drainage for ground water from the Sandias to the Santa Fe Group aquifer (p. 25).
- Ground water Withdrawal in the Placitas Area
- Figure 13. Annual ground water withdrawal by individual community drinking water systems (p. 27).
 - Figure 14. Annual ground water withdrawal by community drinking water systems (p. 28).
 - “From 1964 to 1996 approximately 380 million gallons have been withdrawn from aquifers in hydrogeologic zone 5” (p. 28).

Useful Figures:

- Table 1. Paleozoic and Mesozoic rocks (p. 6).
- Table 2. Cenozoic formations (p. 10).
- Figure 4. Map of the hydrogeologic zones delineated in the Placitas study area (p. 14).
- Table 3. Statistical summary of estimated ground water (gpm) for hydrogeologic zones 1 through 5 (p. 16).
- Figure 13. Annual ground water withdrawal by individual community drinking water systems (p. 27).
- Figure 14. Annual ground water withdrawal by community drinking water systems (p. 28).

References:

Connell, S. 1995. Quaternary geology and geomorphology of the Sandia Mountain Piedmont, Bernalillo and Sandoval Counties, central New Mexico: Unpublished M.S. Thesis, University of California, Riverside, 382 p.

Pearson, J.W., Peery, R.I., Finch, S.T., 1995, Hydrogeology and water-resource assessment for proposed Diamond Tail Ranch Subdivision Sandoval County, New Mexico, John Shomaker and Associates, Inc. for Diamond Tail Limited Partnership, 125 p.

Titus, F.B., 1980, Ground water in the Sandia and northern Manzano Mountains, New Mexico, New Mexico Bureau of Mines and Mineral Resources, Hydrologic Report 5, 66 p.

Table 1. Paleozoic and Mesozoic rocks in the Placitas area (Picha (1982), Menne (1989))				
Unit Name (and Age)	Thickness (meters)	Rock Type (lithology)	Rock Color	Degree of Cementation (where known)
Menefee (Cretaceous)	360 - 560	sandstone, siltstone, shale, coal	tan, red, black	calcite cement in sandstones
Point Lookout (Cretaceous)	75	sandstone	yellow-tan	mostly friable with localized calcite cement
Hosta Dalton (Cretaceous)	~ 65	sandstone with some shale	yellow-tan	moderately- to well-cemented with calcite
Mancos (Cretaceous)	> 350	shale	olive-gray-black	very little cement (slope-former)
Dakota (Cretaceous)	22	sandstone	yellow, gray-black	well-cemented (ridge-former)
Morrison Formation (Jurassic)	260	siltstones with sandstone, minor conglomerates	gray-green-maroon	not very well cemented (slope-former)
Todilto Formation (Jurassic)	15	gypsum, some limestone at base	white	limestone (ridge-former)
Entrada Formation (Jurassic)	35	coarse sandstone	tan-pinkish-red	poorly- to moderately-cemented, coarse sandstone well-cemented
Chinle Formation (Triassic)	400 - 500	3 units: shale + siltstone, sandstone + conglomerate, shale	reddish	sandstones moderately- to well-cemented with calcite (ridge-former)
Santa Rosa Formation (Triassic)	30 - 130	fine - coarse sandstone, conglomerate and shale; commonly fractured	white-gray-tan	well-cemented with silica (ridge-former)
Moenkopi Formation (Triassic)	?	fine - med. Sandstone, some shale, rare limestone	purple-brown	moderately cemented to friable with calcite and silica
San Andreas Formation (Permian)	25	interbedded limestone & sandstone	white-gray	moderately- to well-cemented (ridge-former)
Glorieta Sandstone (Permian)	~ 10	massive sandstone	white-gray	well-cemented (ridge-former)
Yeso Formation (Permian)	~ 120	sandstone with minor limestone	orange-brown	upper part: well-cemented with silica lower part: friable
Abo Formation (Permian)	250 - 300	shale, sandstone, minor conglomerate, limestone	reddish-brown	moderate to well cemented
Madera Formation (Pennsylvanian)	400 - 500	limestone	gray	well cemented, chemical sedimentary unit (calcite)
Sandia Formation (Pennsylvanian)	50-60	limestone, sandstone, shale, siltstone and conglomerate	olive-brown-grey	moderate to well cemented

Table 2. Cenozoic formations in the Placitas area; information taken from Kelly (1977), Hawley and Haase (1992; 1996) and Connell (1995).

Unit Name	Thickness (meters)	Rock Type (lithology)	Rock Color	Degree of Cementation (where known)
Quaternary fans and alluvium		sand, mud, gravel		mostly unconsolidated
Quaternary pediments		sand, gravel		mostly unconsolidated; locally weak to well cemented (CaCO ₃)
Upper Santa Fe Group (Sierra Ladrone Fm) (Miocene to middle Pleistocene)		axial river, transitional axial-piedmont and piedmont deposits w/ sand, pebbles and cobbles; conglomerate, sandstone and mudstone (predominantly coarse-grained)	yellow, reddish-brown	well to weakly cemented; otherwise unconsolidated
Lower Santa Fe Group (Miocene)		primarily piedmont deposits w/ silts clays and fine sands w/ local coarse-grained pebble to cobble conglomerate and sandstone (predominantly fine-grained)	base: reddish-brown	moderately- to well-cemented with some unconsolidated material

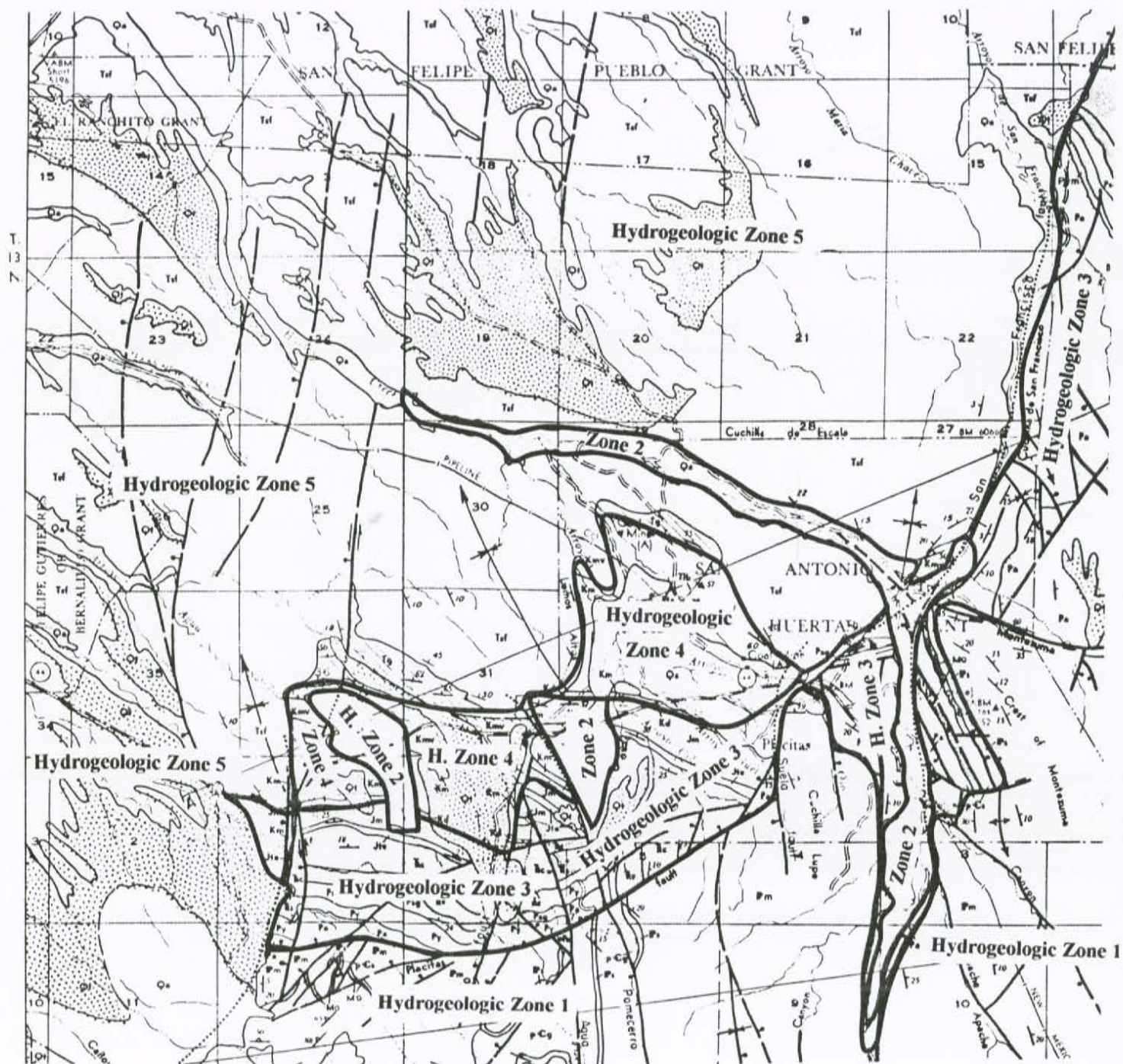


Figure 4. Map of the hydrogeologic zones delineated in the Placitas study area.

Table 3. Statistical summary of estimated ground water yield (gpm) for hydrogeologic zones 1 through 5. Data compiled from NMSEO records collected in this study.

Hydrogeologic Zone	Formation	Max	Min	Medium	Average	Standard Deviation	Sample Population (n)
Zone 1	Madera	280	1	10	40	77	12
Zone 2	Alluvium	15	2	13	NA	NA	3
Zone 3	Morrison	80	1	13	16	16	28
	Chinle	50	1	15	19	12	17
	Yeso	25	6	12	14	6	10
	Abo	220	5	17	36	57	27
Zone 4	Mancos	40	0.5	12	12	9.9	16
	Mesa Verde	40	1	15	15	14.1	16
Zone 5	Santa Fe Undivided	200	1	15	21	30	75

Hydrogeologic Zone 2; Shallow alluvial systems

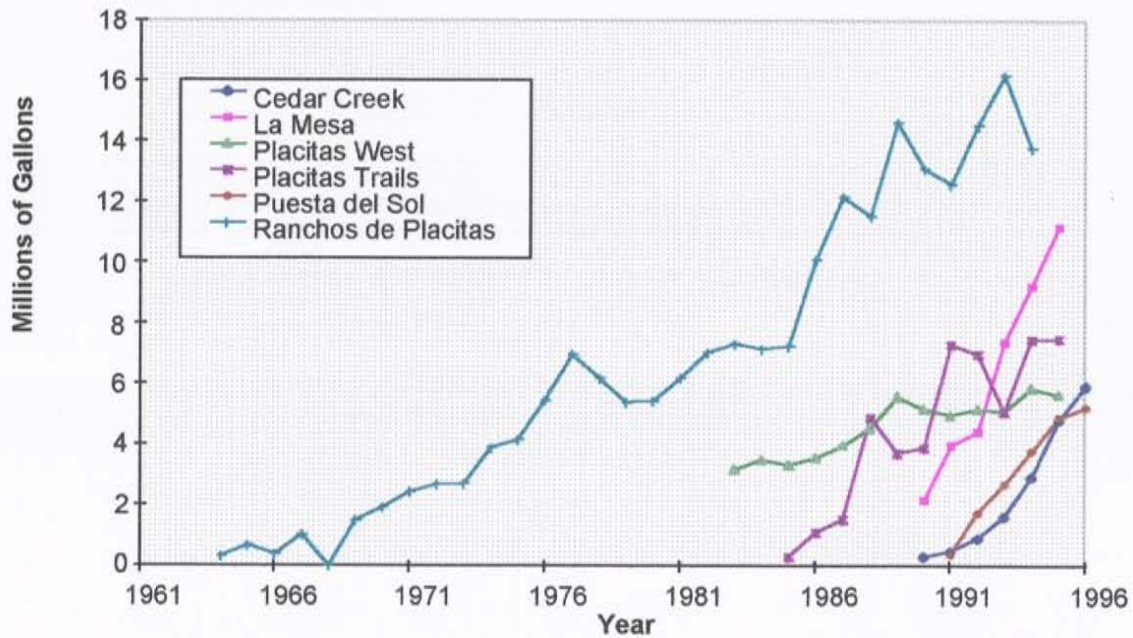


Figure 13. Annual ground water withdrawal by individual community drinking water systems.

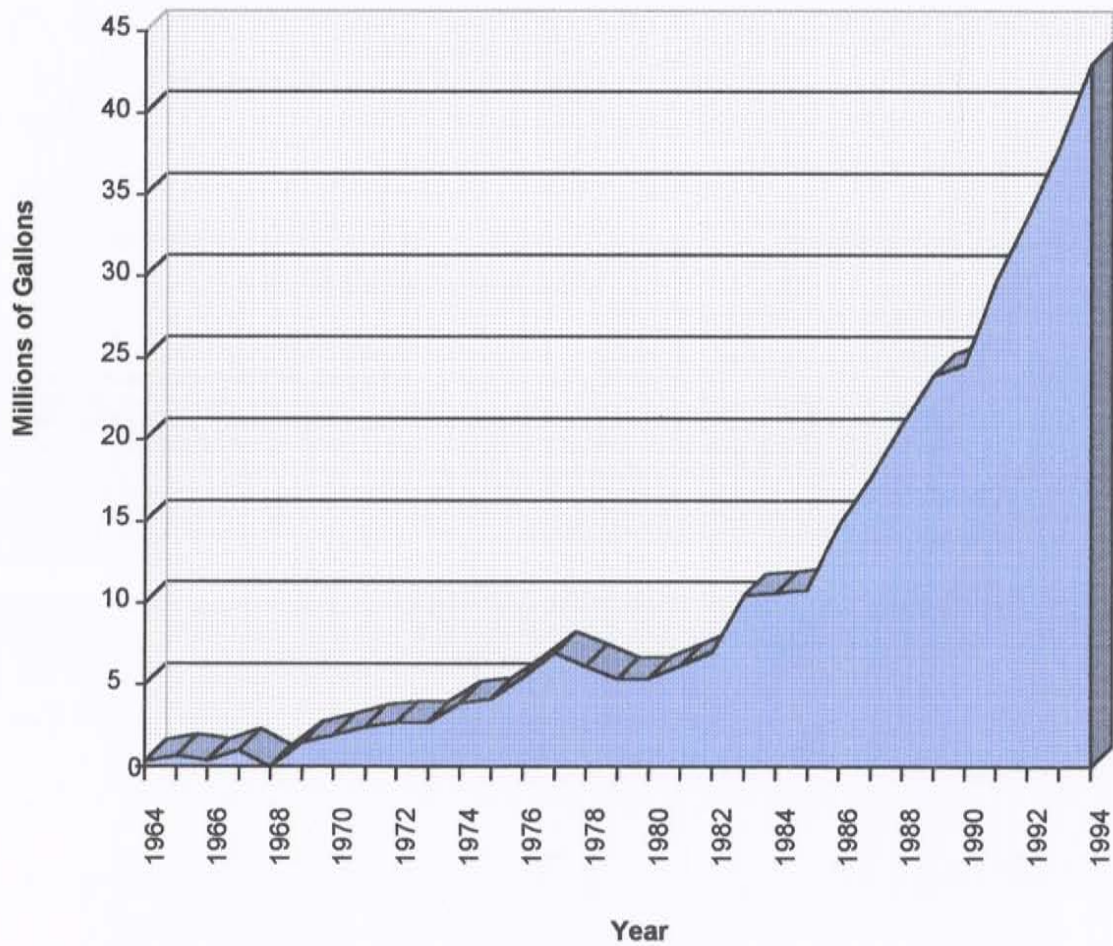
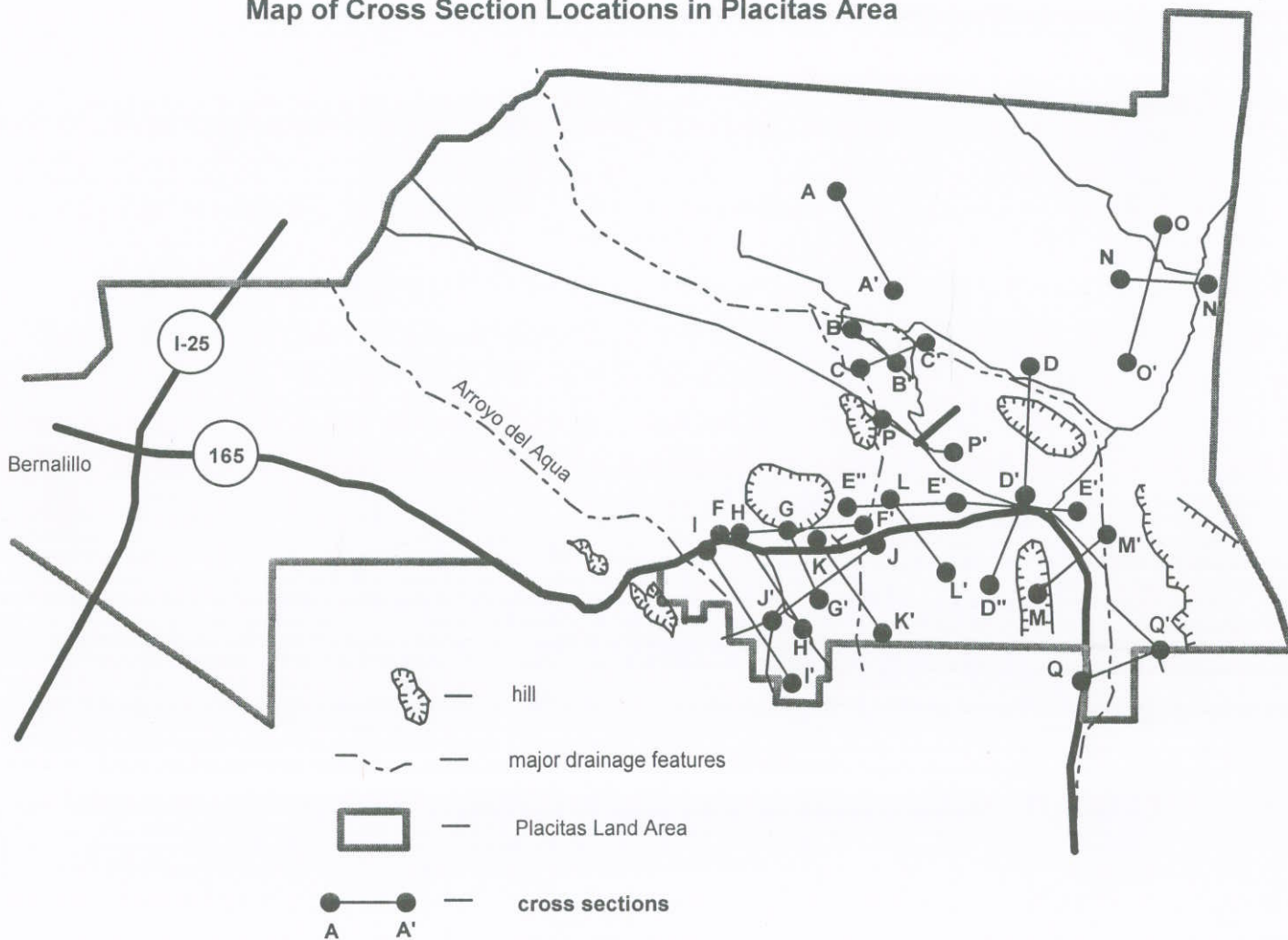


Figure 14. Annual ground water withdrawal by community drinking water systems.

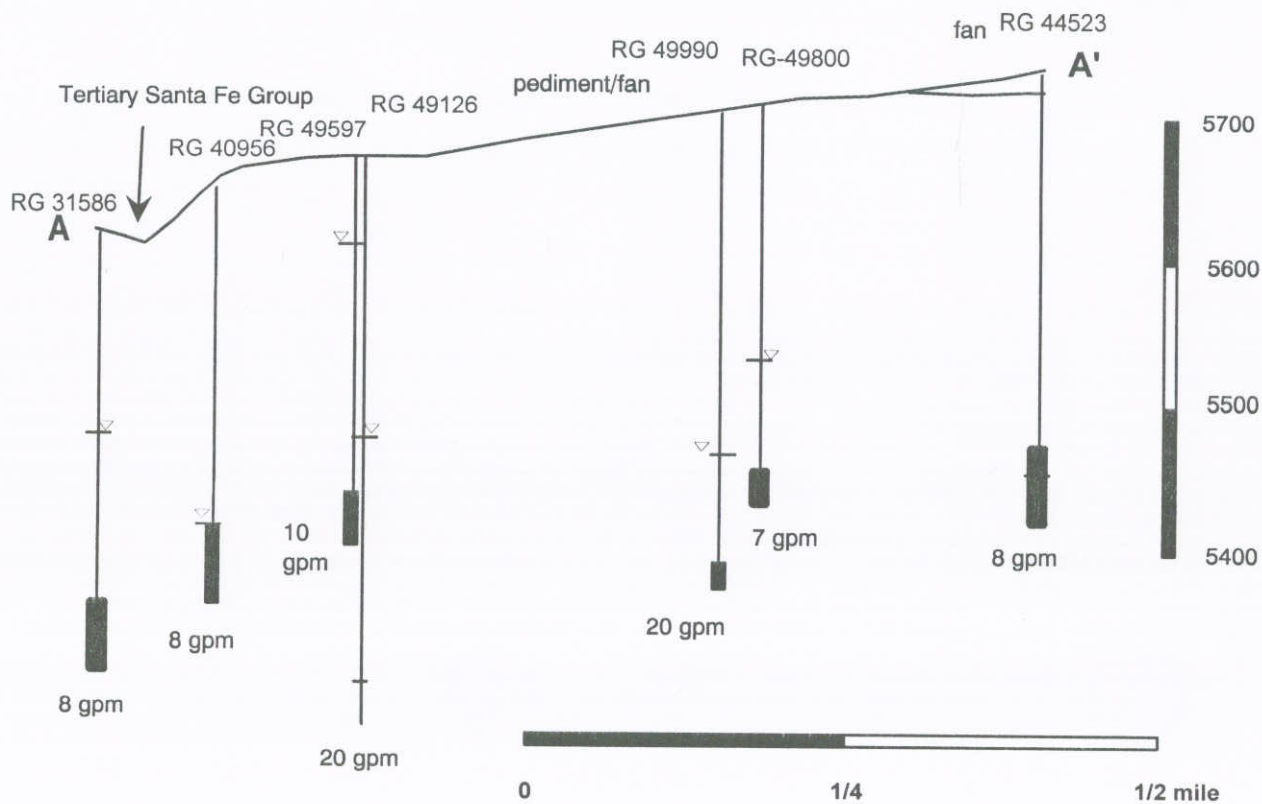
Map of Cross Section Locations in Placitas Area



← Southwest

Cross-section A - A'

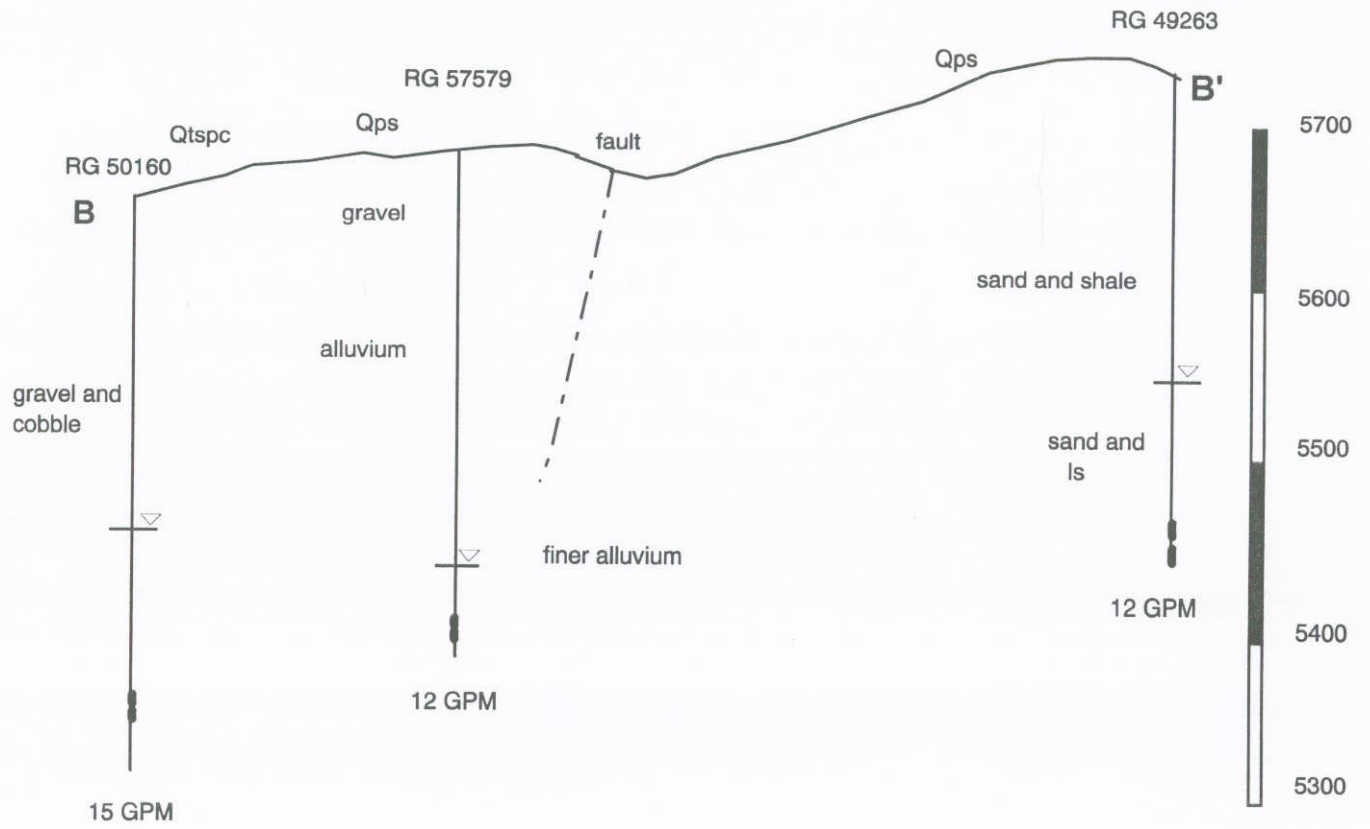
Northeast →



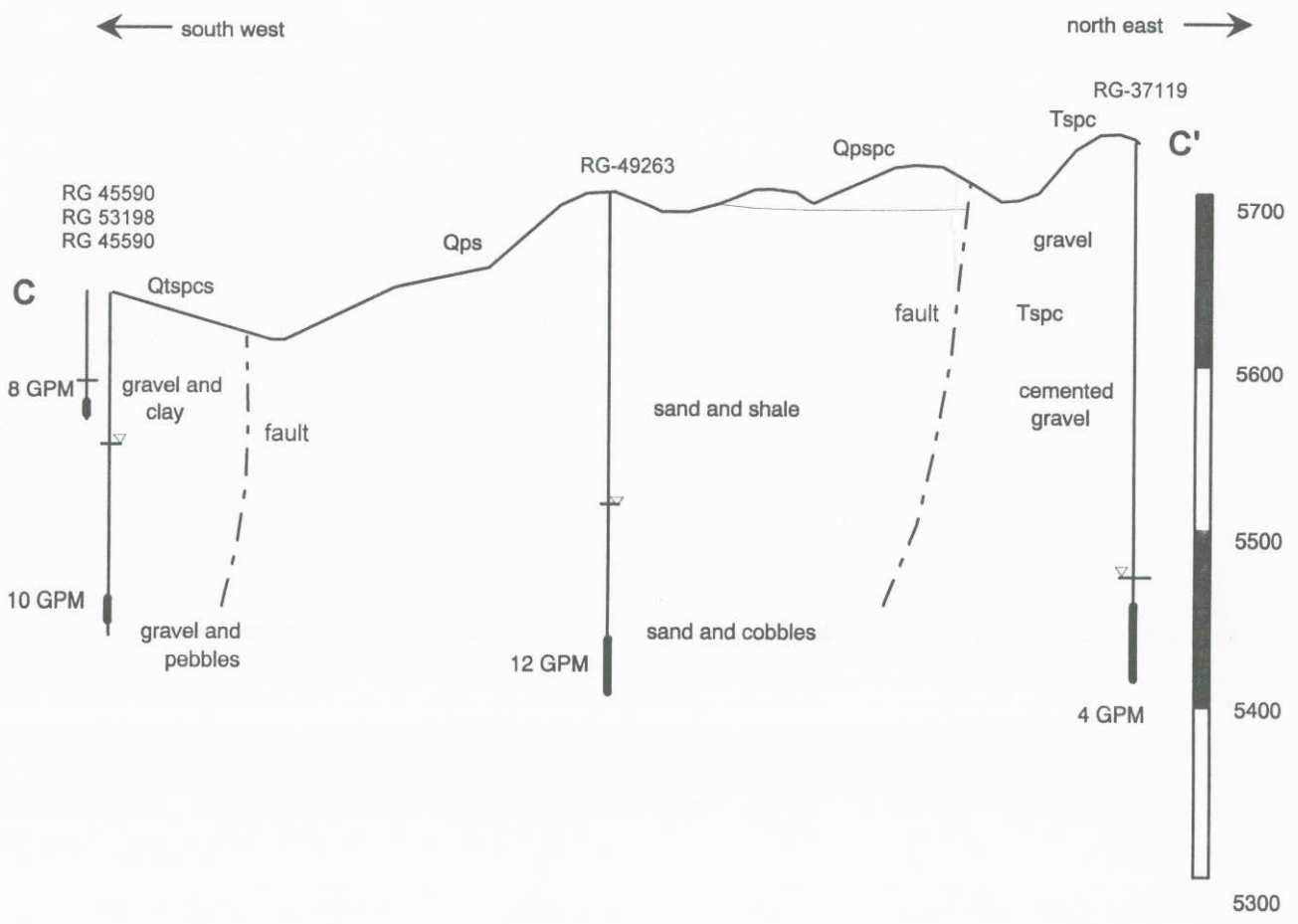
Cross Section B - B'

← north west

→ south east



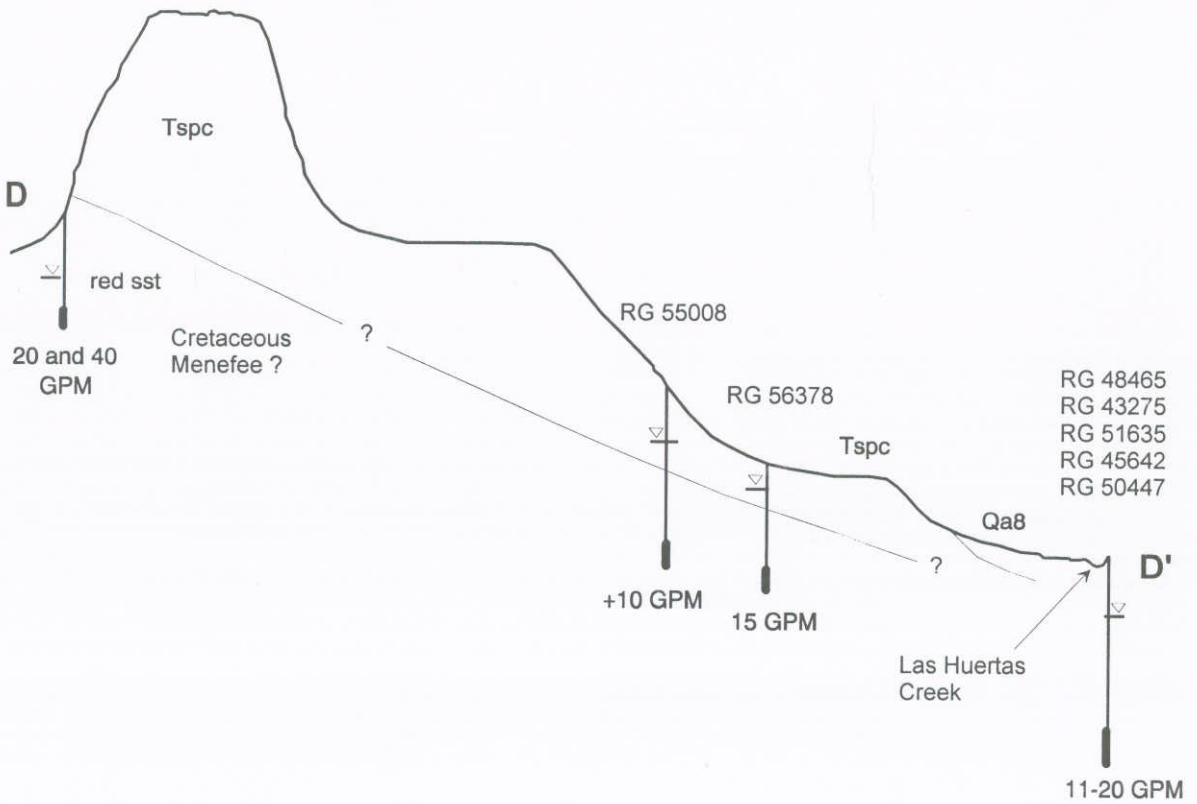
Cross Section C - C'



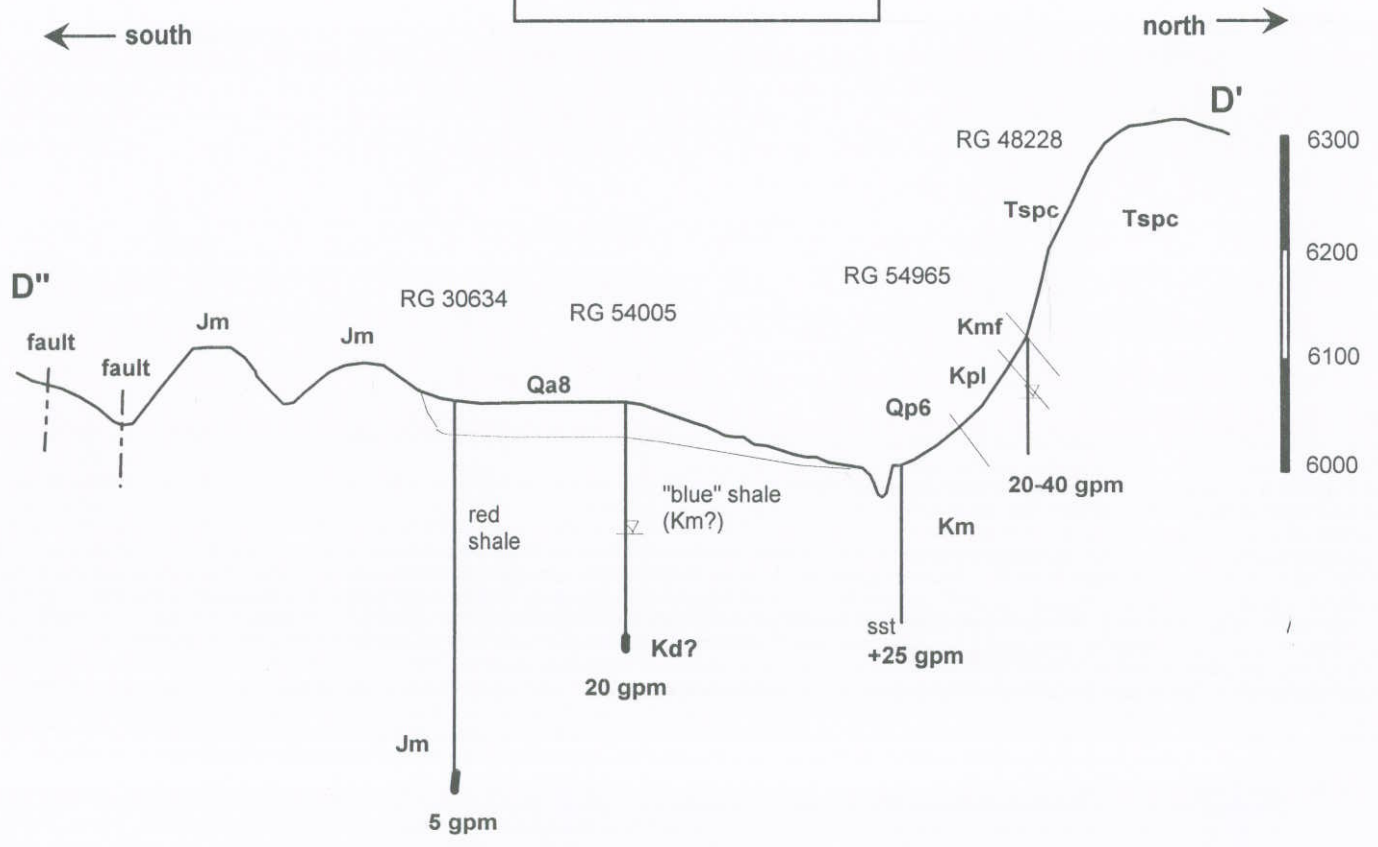
Cross Section (D - D')

South ←

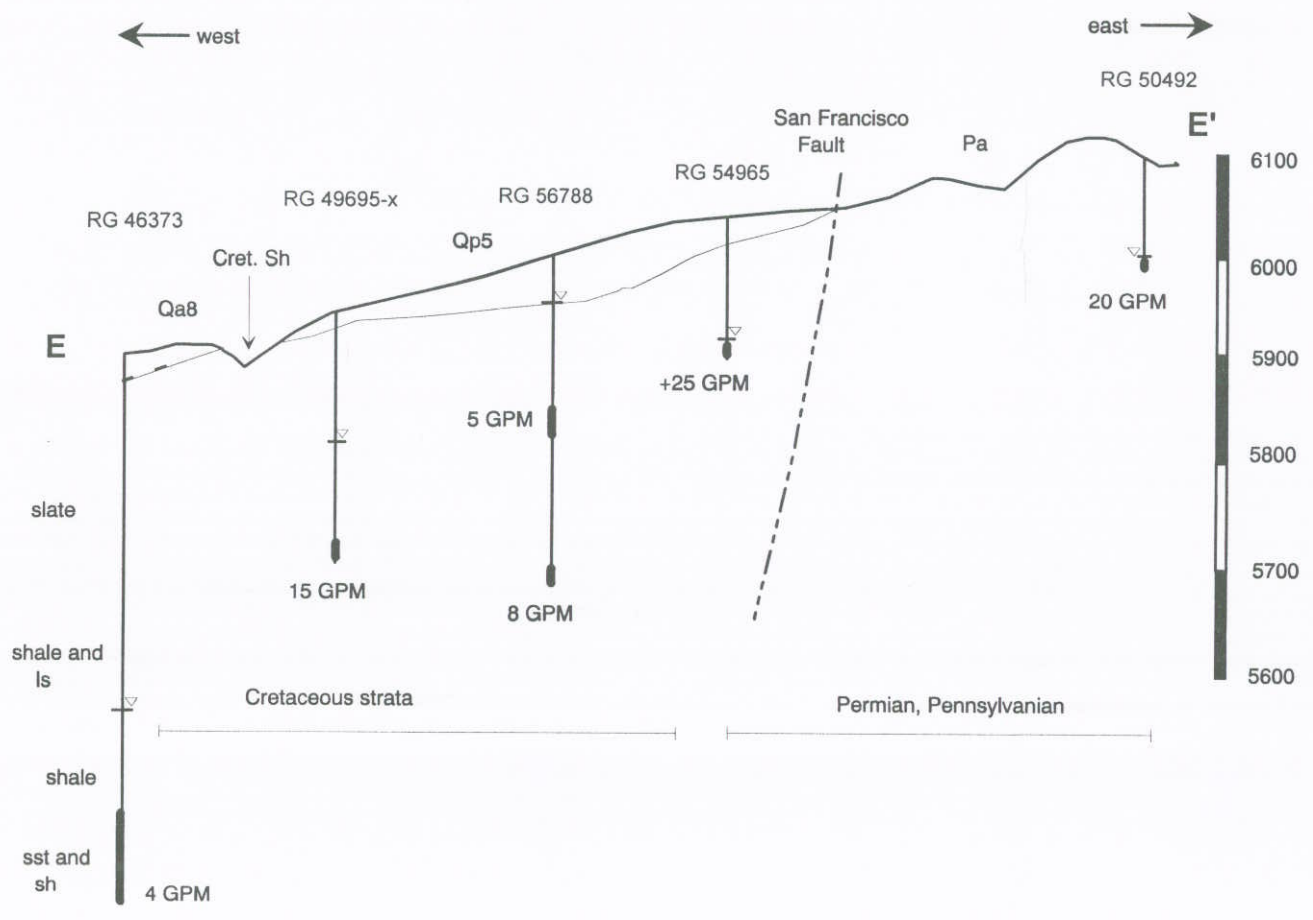
North →



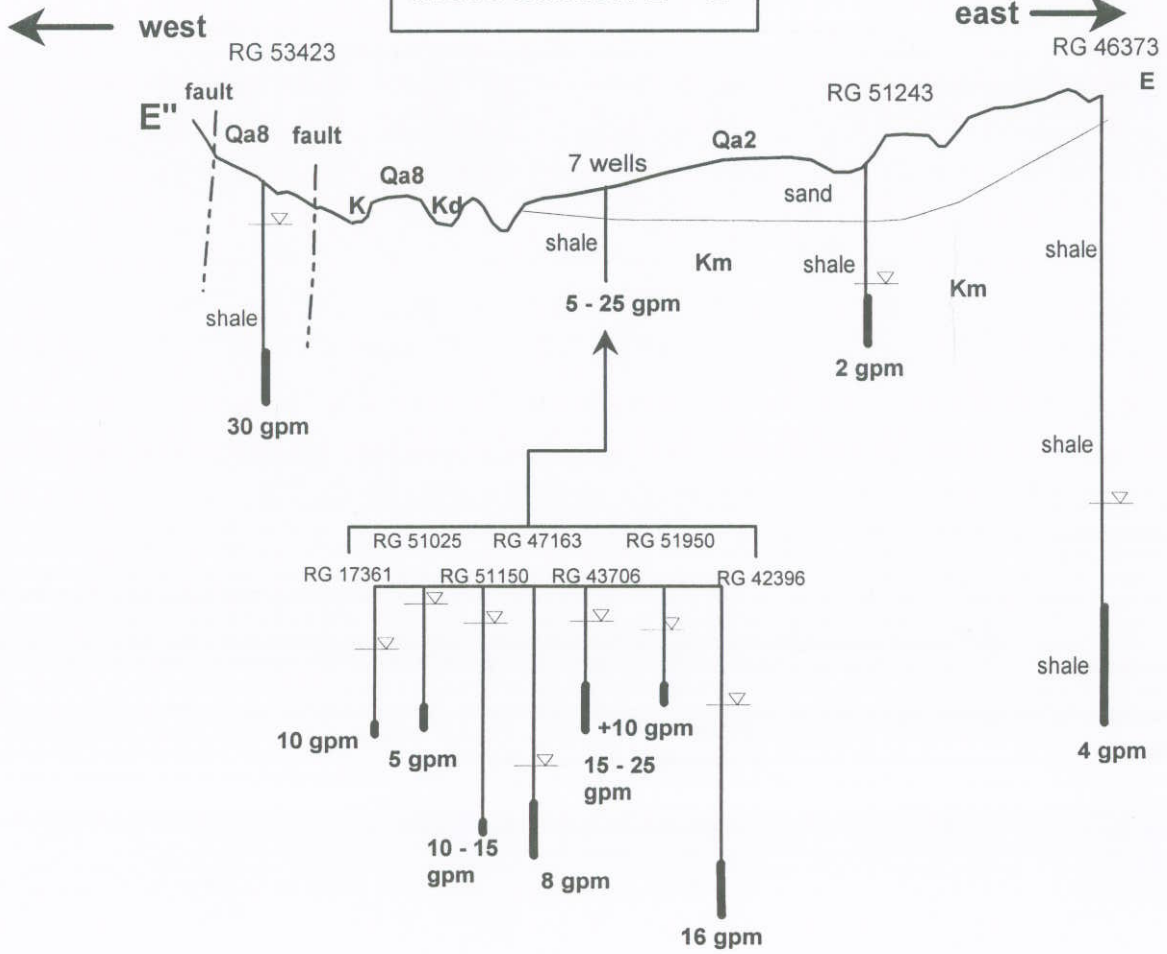
Cross-section D' - D''



Cross Section E - E'



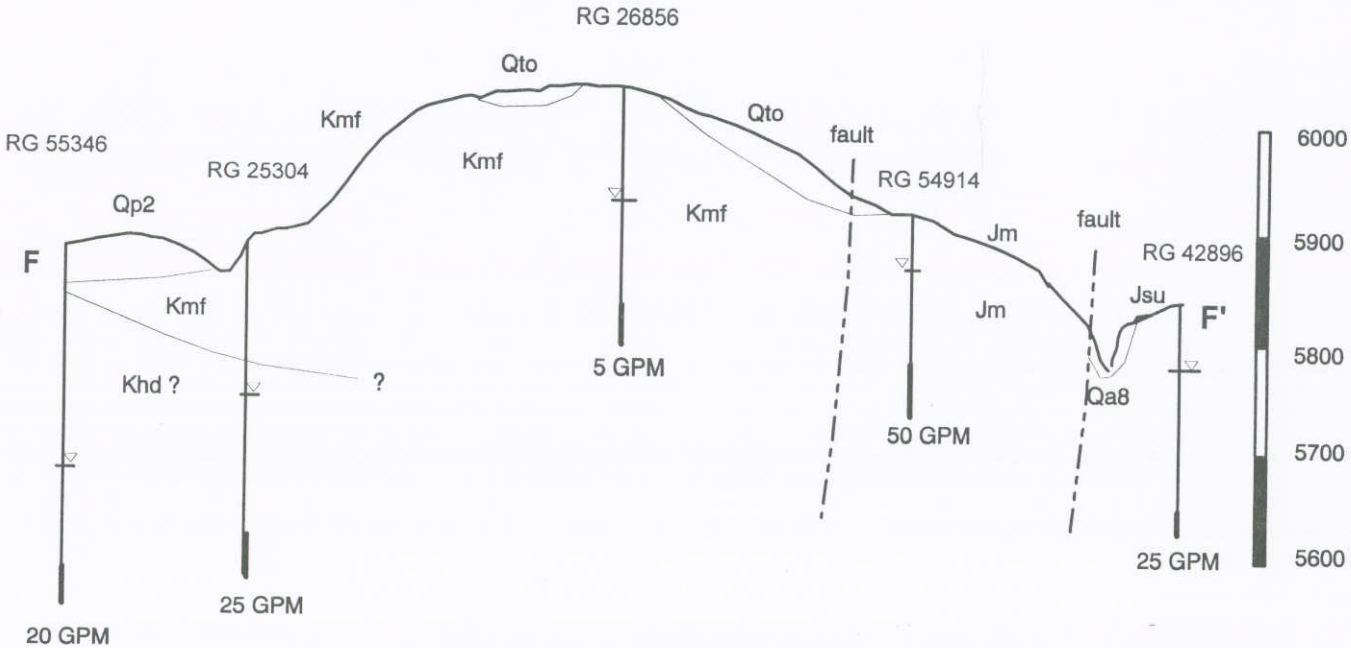
Cross section E' - E''



Cross Section F - F'

West ←

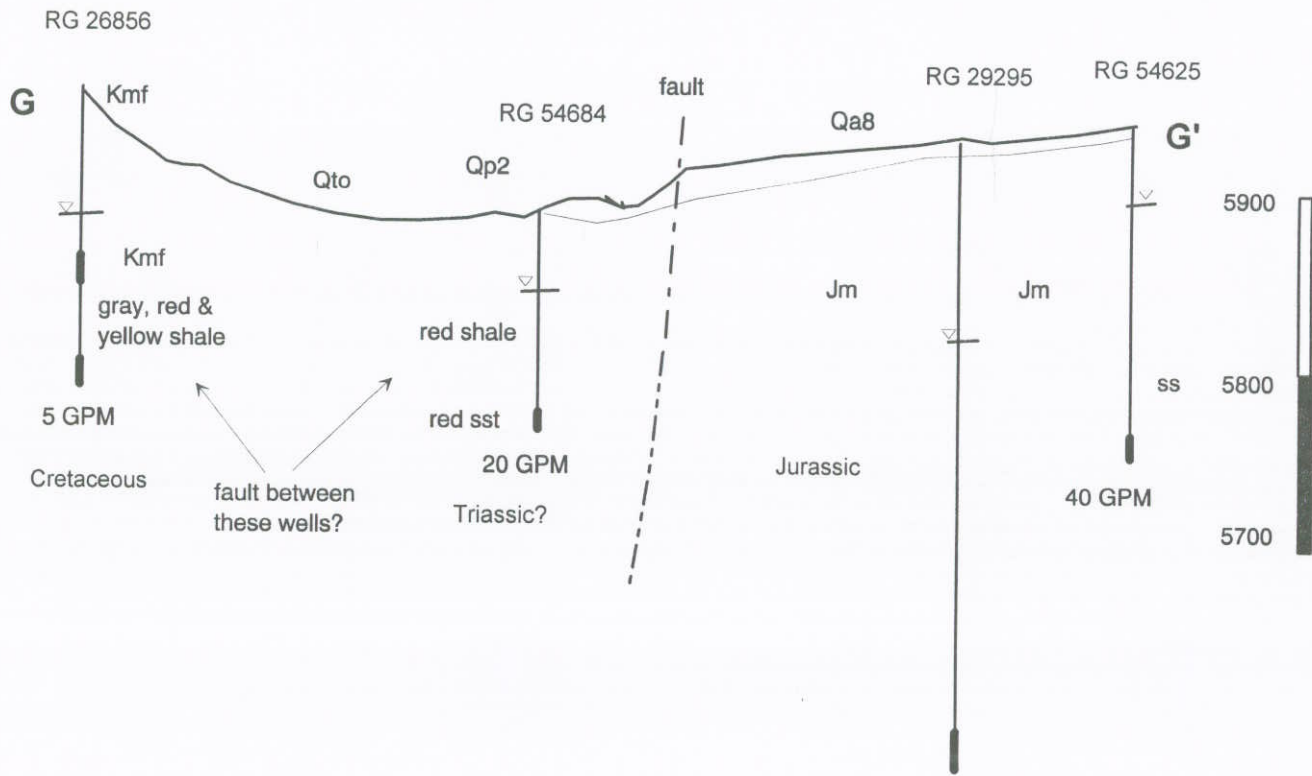
East →

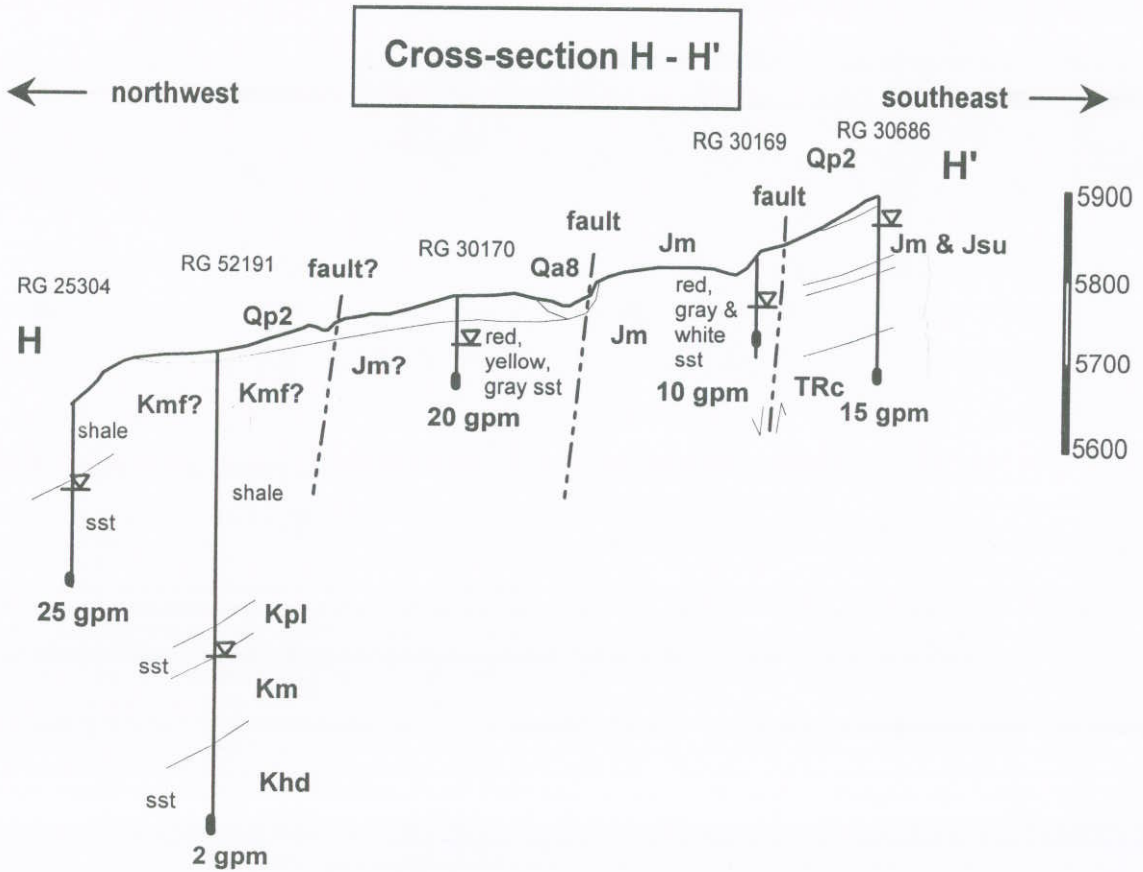


Cross Section G - G'

← Northwest

Southeast →

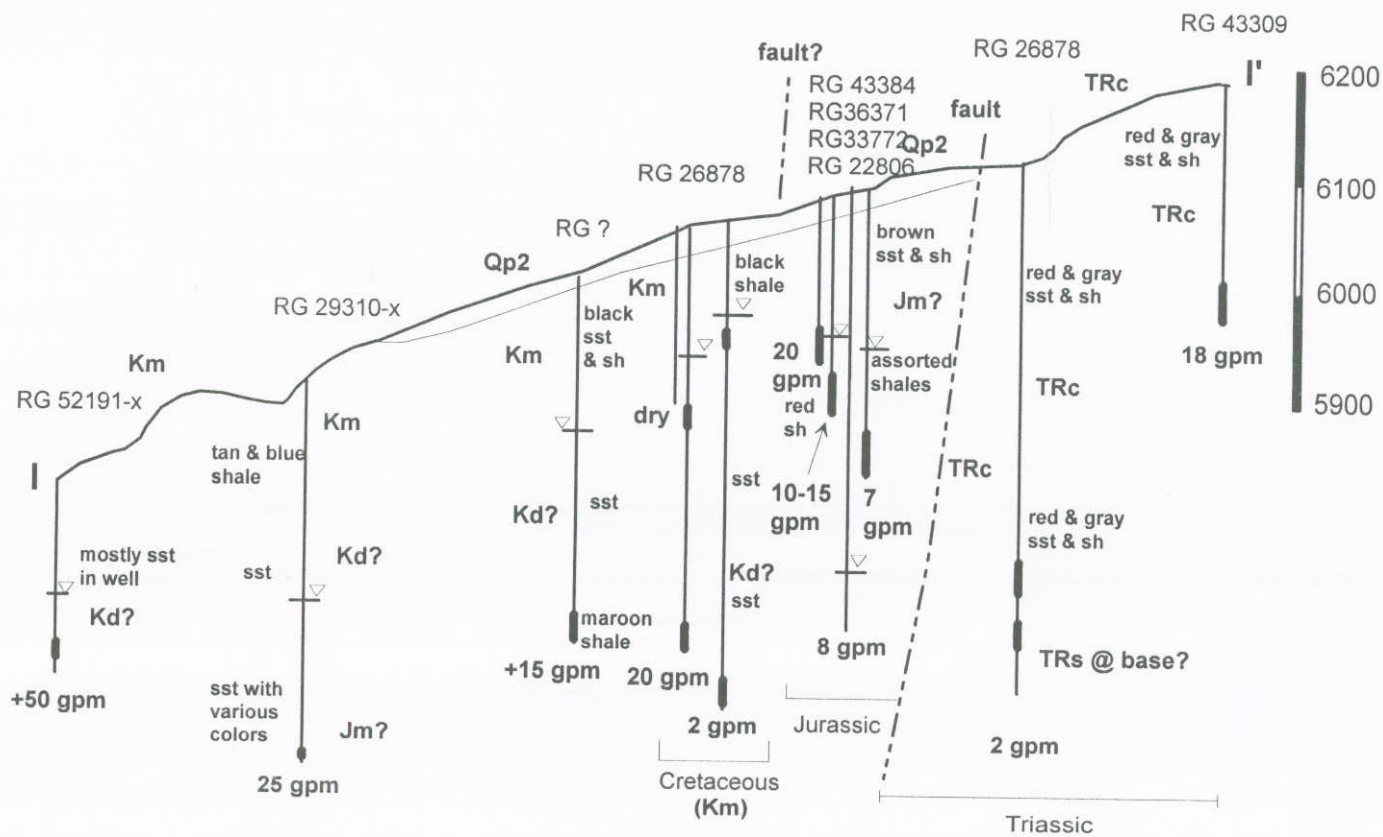




← northwest

Cross-section I - I'

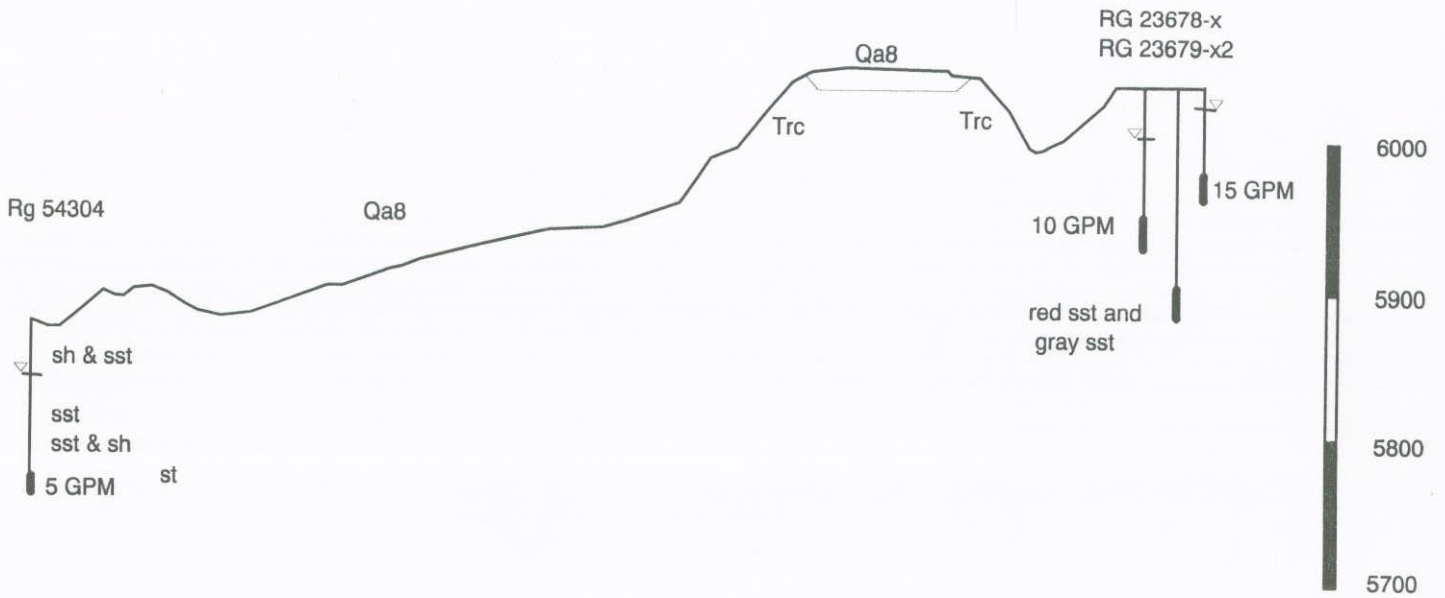
southeast →



CrossSection K - K'

← Northwest

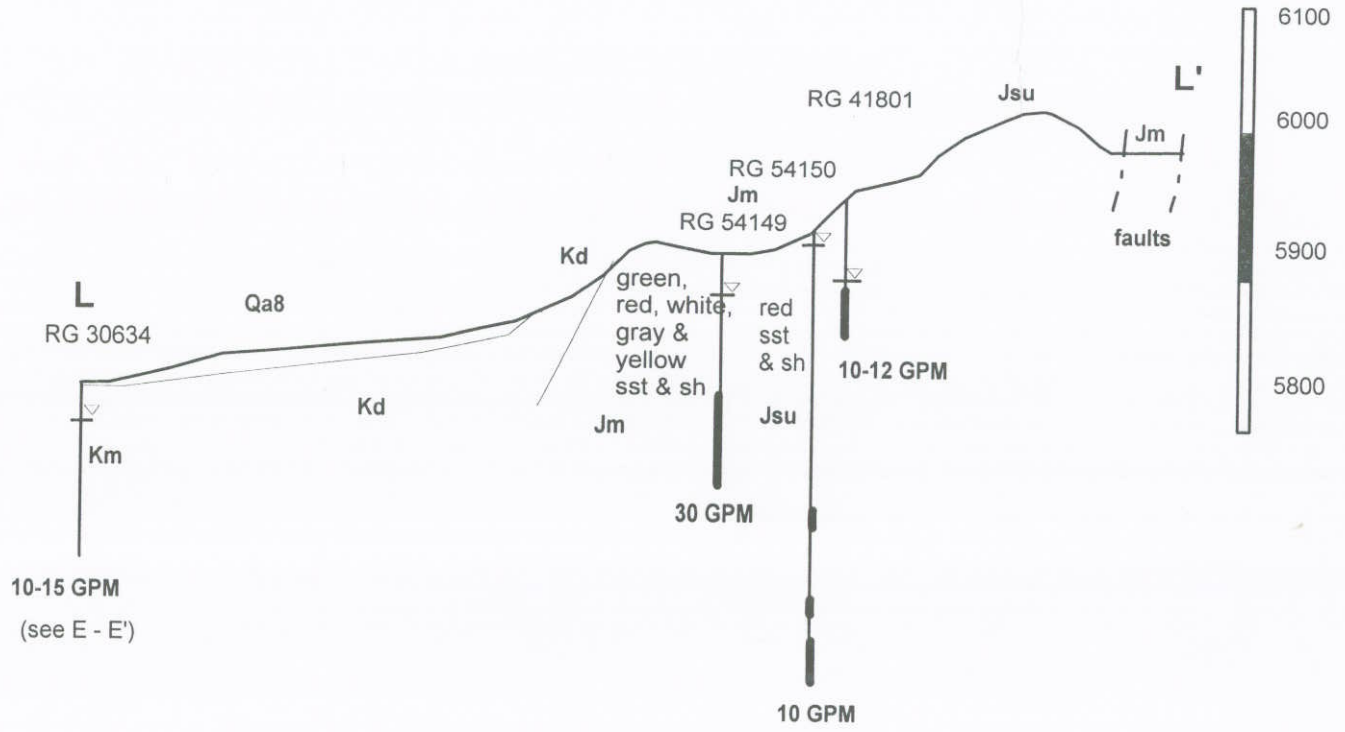
Southeast →



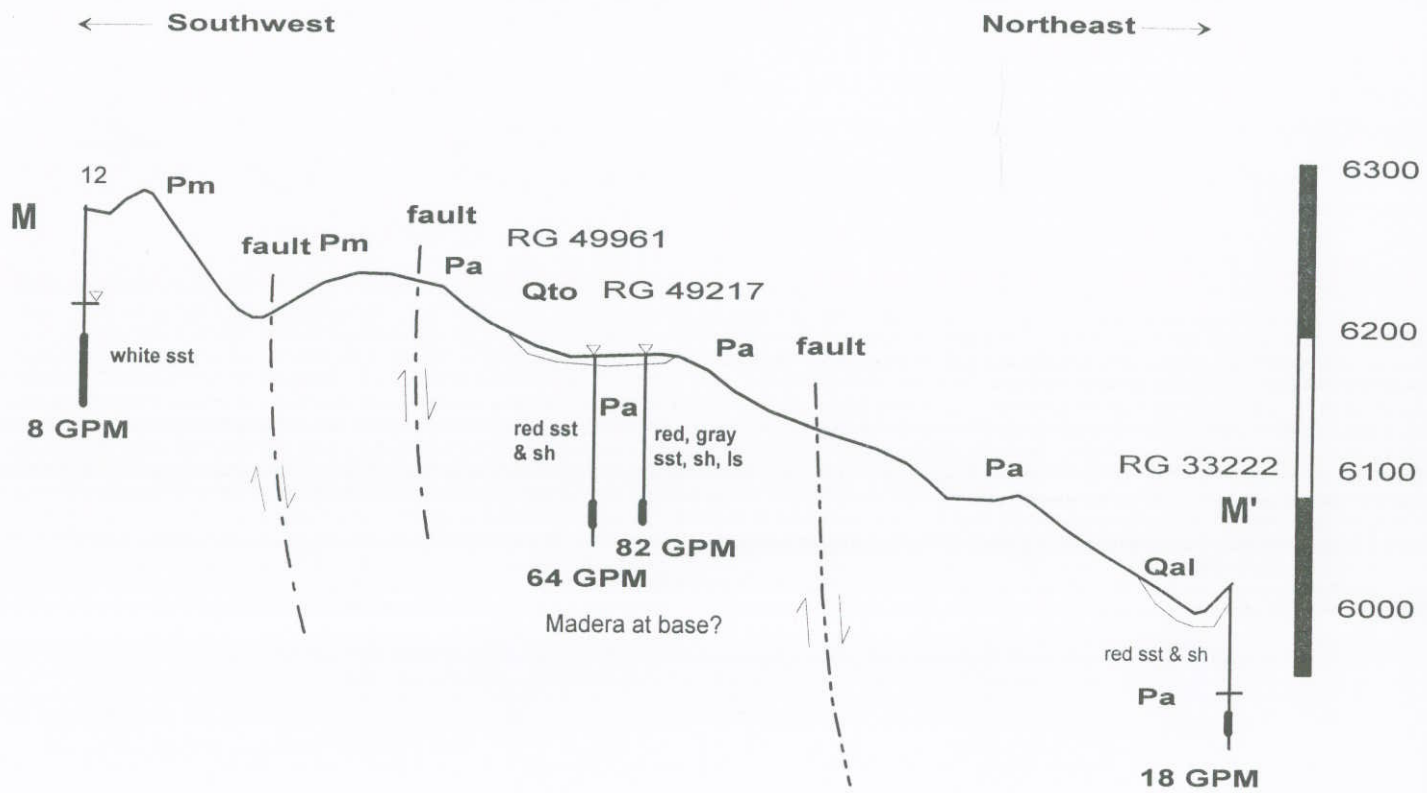
Cross Section L - L'

← Northwest

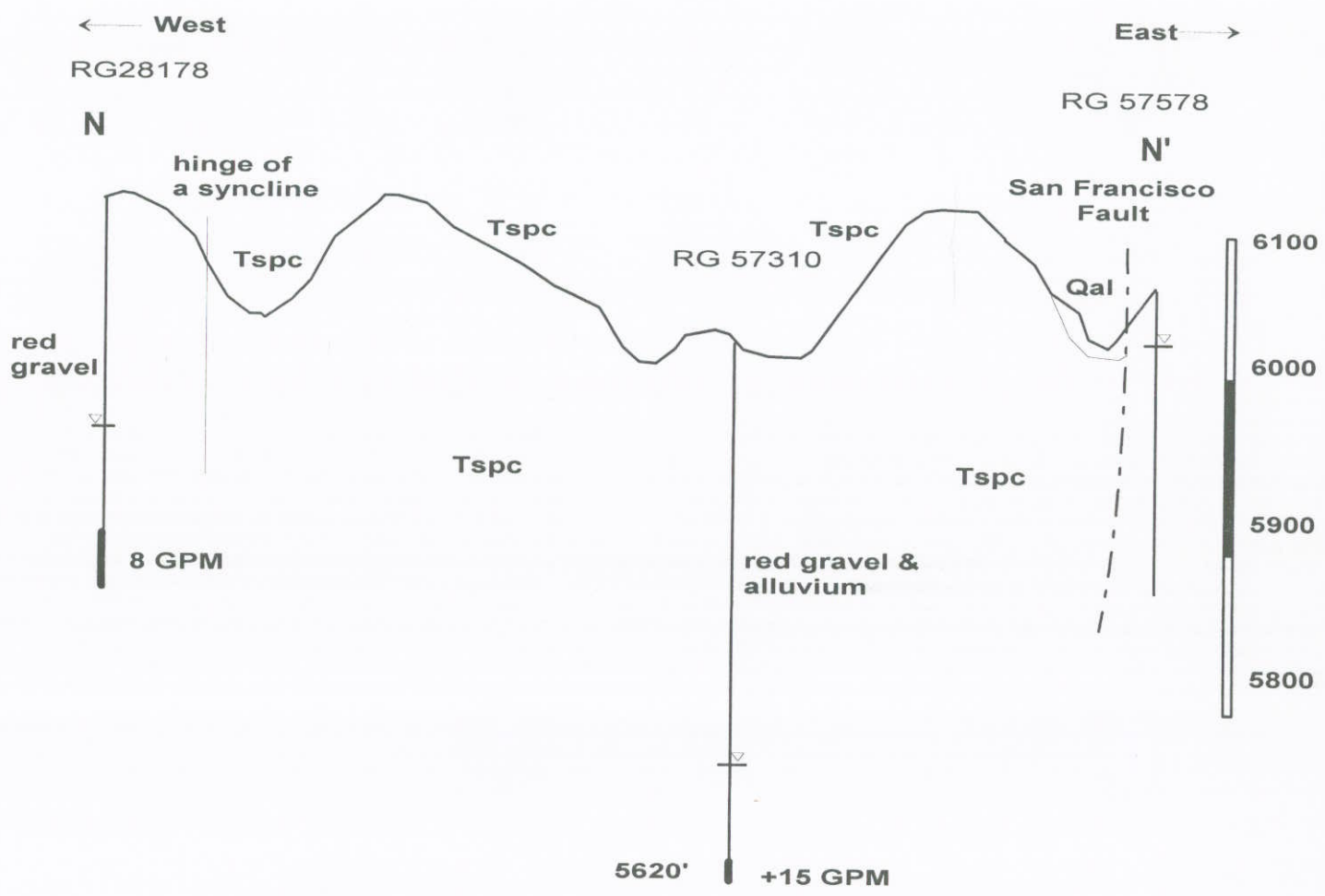
Southeast →



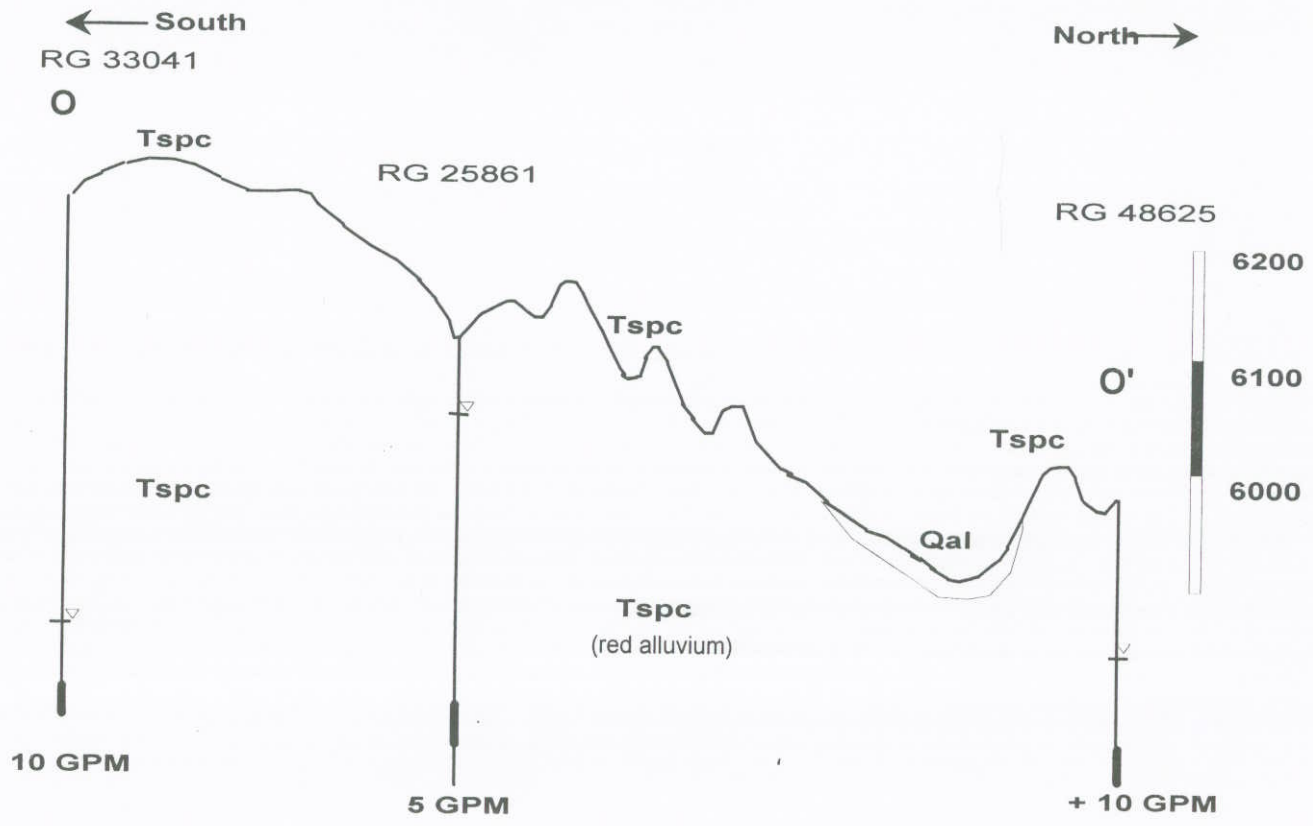
Cross Section M - M'



Cross Section N - N'



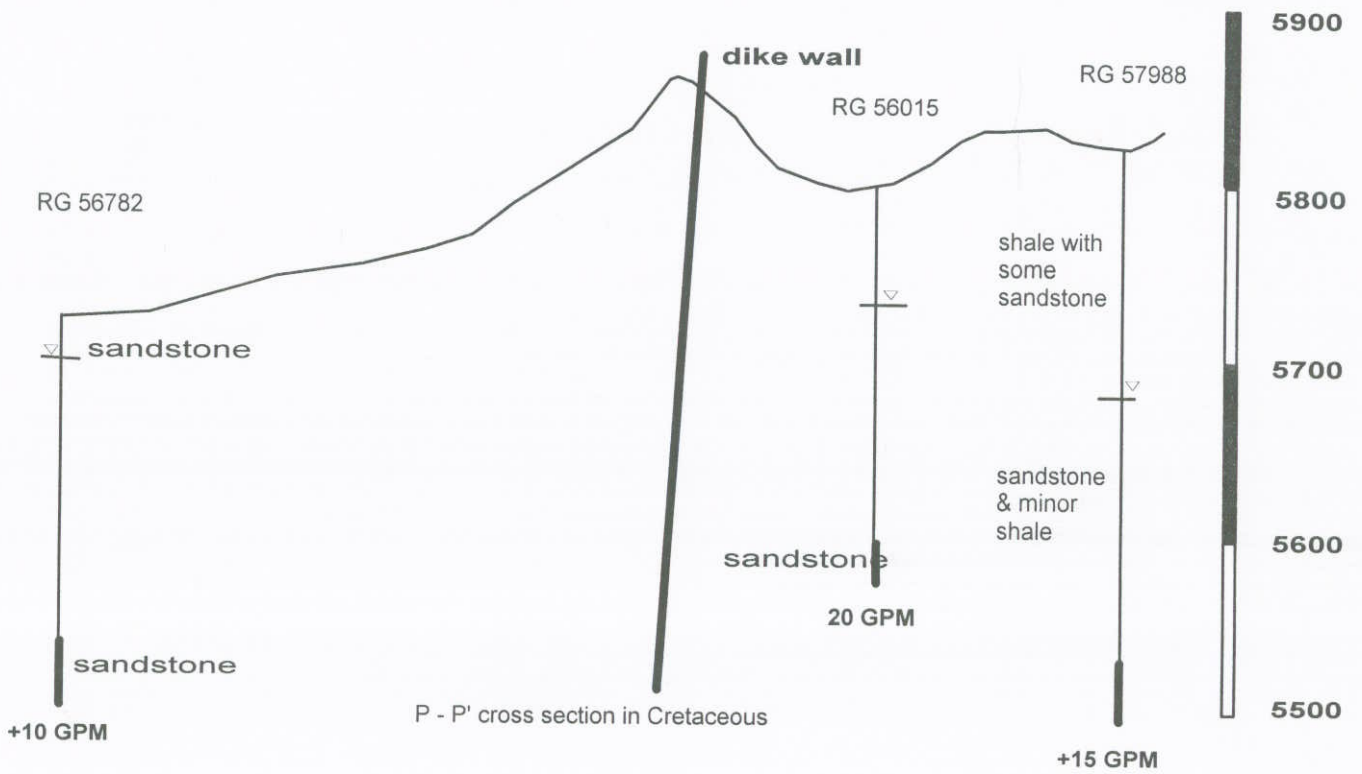
Cross Section O - O'



Cross Section P-P'

← West

East →



Cross Section Q-Q'

← **West**

East →

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