

HYDROGEOLOGIC ROAD LOG

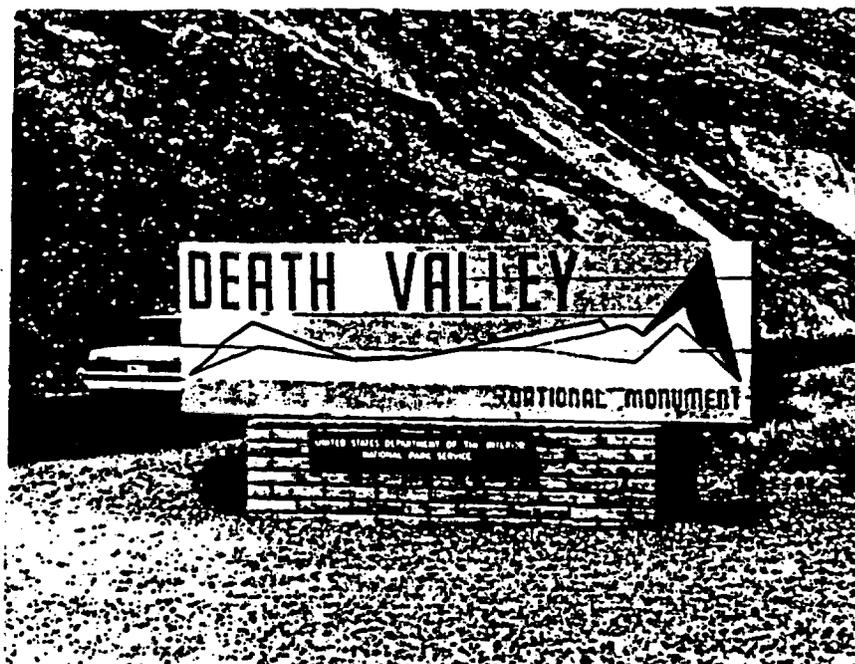
BY

JOE S. DOWNEY

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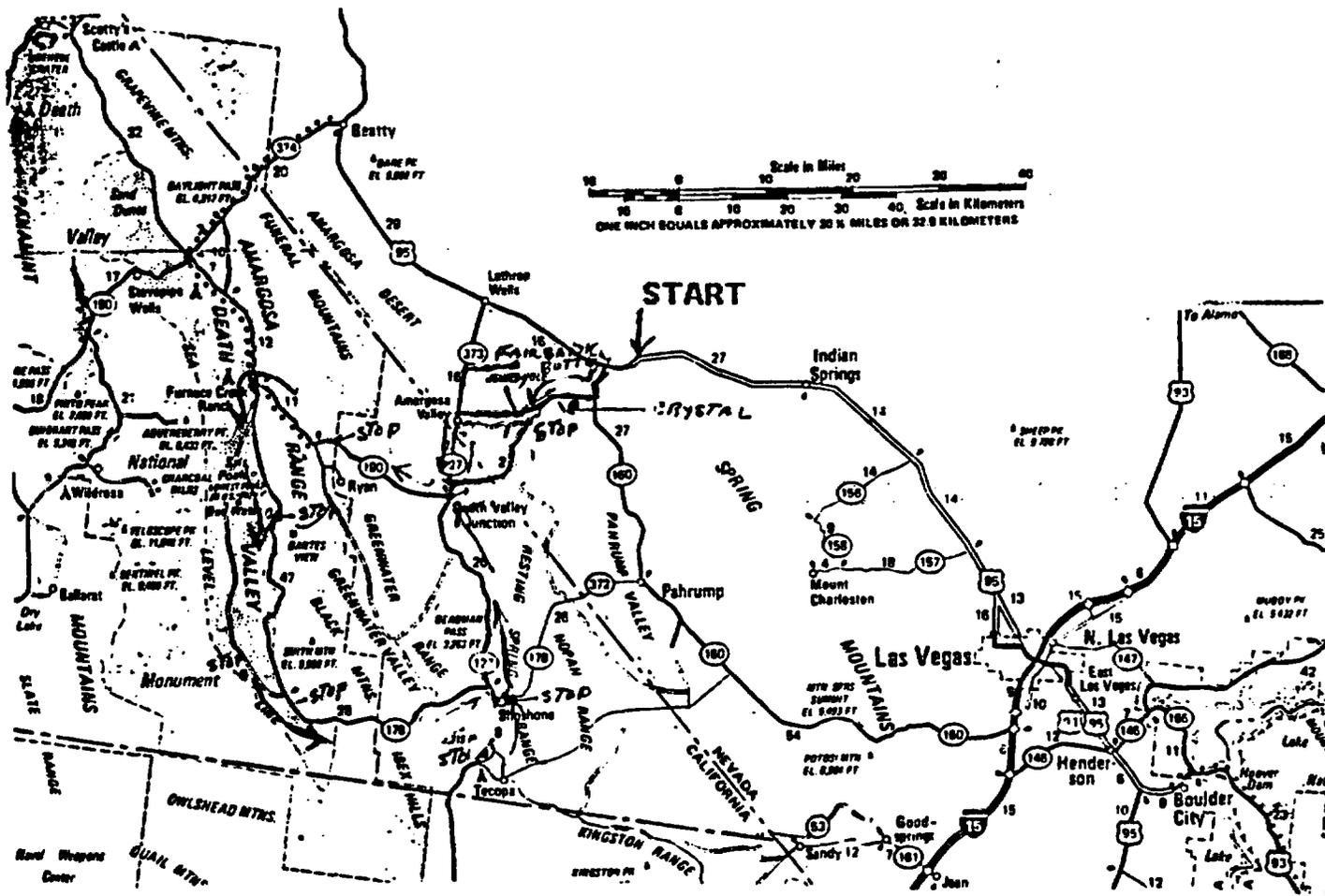
U.S. GEOLOGICAL SURVEY

DENVER, COLORADO



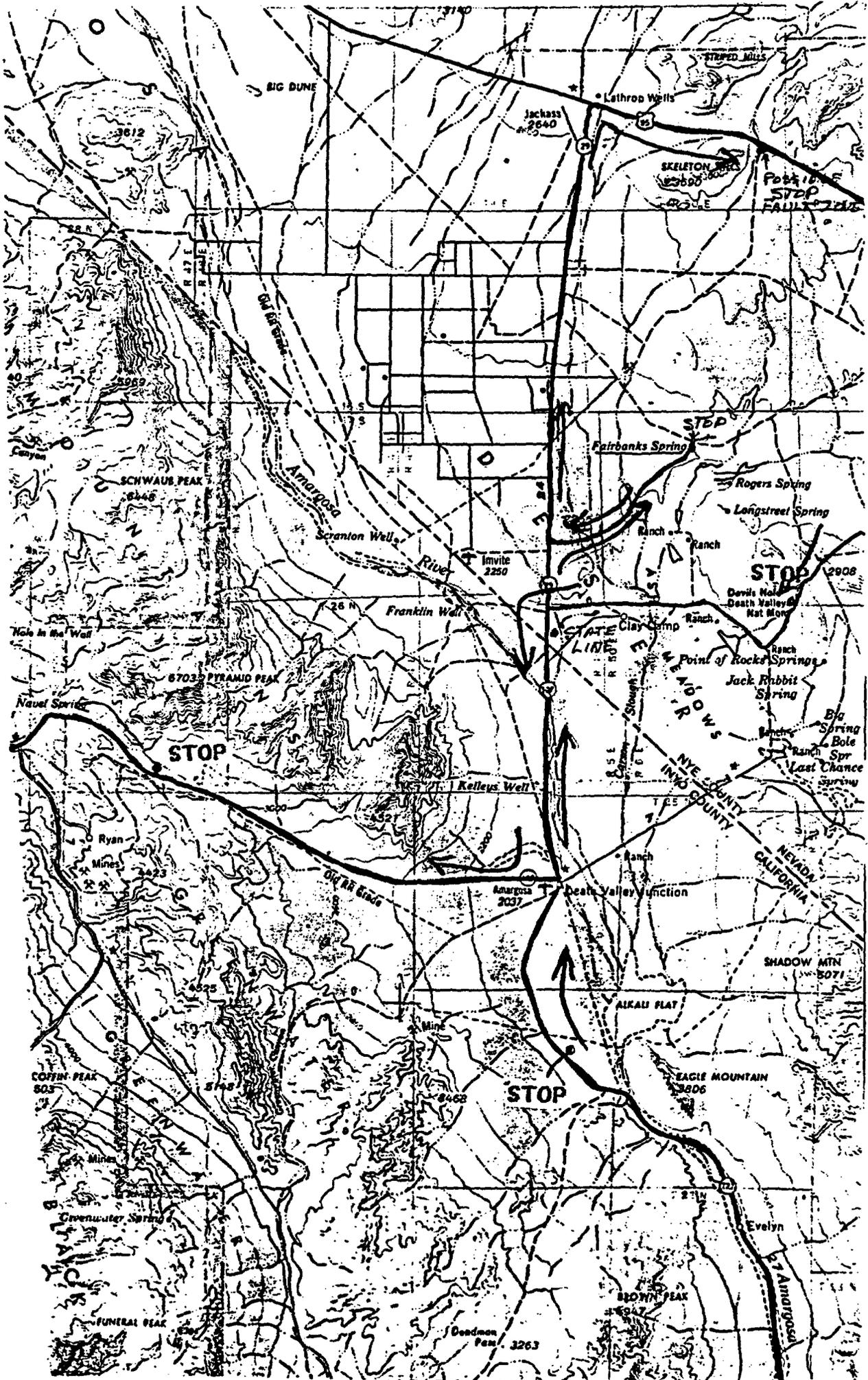
HYDROLOGY DOCUMENT NUMBER 519

FOR
AMARGOSA DESERT
AND
DEATH VALLEY AREAS,
NEVADA AND CALIFORNIA



REGIONAL MAP SHOWING GENERAL FIELD TRIP ROUTE.

To
Death
Valley





Compilation of ERTS imagery courtesy California Division of Mines and Geology. Central and southern Death Valley form the prominent valley that occupies the center of the photograph. Panamint and Owshead Mountains on left; Fort Irwin area and Avawatz Mountains occupy lower third of photo. Black Mountains, Greenwater Range, Resting Spring Range in uppermost right and Nopah Range from center to right center of photo. Funeral Mountains occupy upper left part of photo.

HYDROGEOLOGIC FIELD TRIP LOG

Prepared By

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U.S. Geological Survey

July 1989

Miles	Total Miles	Feature
Start	0	Intersection US Highway 95 and road to Mercury at bridge. "Peace Camp" area on south side of Highway 95.
0.9	0.9	End of 4-lane Hwy.
1.3	2.2	Water Well Army No. 1 used as a source of water for Mercury.
1.0	3.2	Entering a narrow part of Mercury Valley and passing through Paleozoic limestone.
1.5	4.7	Brick building - telephone relay station.
0.9	5.6	Point-of-Rocks-Road bearing almost due west.
1.1	6.7	White colored materials south of Highway are Tertiary (Miocene?) lake beds.
1.0	7.7	Junction U.S. Highway 95 and Nevada Highway 160. Turn south. Tertiary lake deposits are east of highway. High mountains to east and southeast are the Spring Mts. In the middle foreground is the Jonnie Formation of late Precambrian age.
		Due south at 12:00 O'clock are Paleozoic Limestones that may be slide blocks surrounded by alluvial fans.
1.3	9.0	Road crossing alluvial fan.
3.7	12.7	Turn right heading west on paved road to town of Crystal. Highlands dead ahead are Funeral Mts - low flat top mesa at 12:30 O'clock is Fairbanks Butte composed of Tertiary freshwater limestone.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
2.2	14.9	Crystal Municipal Airport and road to Cherry Patch Ranch, Mable's brothel of Sinful Joys, and Oriental Message and bathhouse.
0.6	17.1	Downtown Crystal.
0.2	17.3	End of pavement.
1.1	18.4	Entering Amargosa Flat or Peters Playa. Vegetation on right and left of road are Mesquite growing on sand dunes.
0.5	18.4	Road curves and passes through sand dunes covered by mesquite along sides of road.
1.0	19.9	Powerline crossing. Road fork--bear left. Edge of mesquite growth. Entering Playa proper. Elevation about 2,660 feet.
1.6	21.5	Fork in road, continue south on road. Road north goes to Fairbanks Butte, Fairbanks Spring and paved road to Lathrop Wells.
.5	22.0	Turn off to Moratti Clay Pit. Water levels in Pit less less than 20 ft below land surface.
1.8	23.8	Road winding through outcrops of Paleozoic Limestone of the Bonanza King Formation.
2.20	26.0	Turn right (west) on dirt road to Devils Hole, Elevation about 2,720 feet.
0.10	26.1	Devil's Hole--park--return to main road.
0.20	26.3	Turn right on main road and head southwest. Pond in distance at 2:00 O'clock is Crystal Pool supplied by Crystal Spring.
0.80	27.1	Phreatophytes growing at seep area or area of diffuse ground-water discharge area. Elevation about 2,650 feet. To left, lush growth at Ash Meadow Spring Discharge Sites.
0.2	27.3	Passing through Paleospring deposits. White deposits are cemented by calcium carbonate.
0.3	27.6	Road forks--continue straight (west), road to left goes to Pahrump, Nevada.
1.2	28.8	Road to Crystal Pool.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
.2	29.0	Diffuse ground-water discharge area supporting phreatophyte growth.
.2	29.2	Road turns due west. Plant in distance is mill for processing borate minerals.
1.3	30.5	Passing through diffuse ground-water discharge area with phreatophytes and grass. Tamerisk (salt cedar) and other phreatophytes.
1.4	31.9	Crossing channel of Carson Slough.
0.9	32.8	Crossing erosional scarp caused by downcutting of Carson Slough. Road curves right.
2.2	35.0	Junction of Pahrump Road (Spring Meadows Drive) with State Highway 373. Turn left on Highway 373 heading south. Tooth Shaped mountain at 10:00 O'clock is Eagle mountain at south end of the Amargosa Desert.
1.1	36.1	Stateline Community.
0.7	36.8	Stateline, CA-NV. California Highway CA 127. Stream-cut terrace east of the modern Amargosa River floodplain exposing a section of fossiliferous sediments. Sediments consist of non-bedded silt-sized grains with possible root casts up to 2 cm in diameter. These sediments may have been transported by wind and trapped by the marsh vegetation and/or wetted soil. This area corresponds with that predicted by numerical models of ground-water flow that simulated past wetter conditions, and may prove useful in validating the results of these models. A possible analogous area to this one exists in north Las Vegas Valley along US 95 where marsh-type sediments may be seen. However, at this site the sediments contain diatoms and volcanic ash shards similar to those found in the Tecopa Lake beds to the south.
1.4	38.2	Crossed Amargosa River.
4.1	42.3	Road turns about 30° directly South--at 11:00 O'clock is Eagle Mt.
1.5	43.8	Town ahead is Death Valley Junction. Junction of California Highway CA 190, and CA 127--right turn to Death Valley National Monument. Elevation about 2,000 feet.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
	43.8	Proceed west with Funeral Mts. on right. Green Water Range is straight ahead.
5.5	49.3	At 9:00 O'clock--Basalt Flows capping Tertiary (?) deposits. Basalt has been dated at about 3.9 my.
7.5	56.8	Road cut through Pliocene Basalt flow. Elevation about 2,820 feet.
2.1	58.9	Upturned and distorted Tertiary (Oligocene (?) to Miocene) sediments. Elevation 2,580 feet.
0.4	59.3	At 1-2 O'clock, white deposits are Paleospring deposits.
0.6	59.9	Stop. Entering Death Valley National Monument--Travertine Point. Notice white veins cutting exposures. These are composed of CaCO ₃ spring deposits. Elevation about 2,480 feet.
0.6	60.5	At 12:00 O'clock mine dumps from Borax mining. At 9:00 O'clock is the Billie Mine.
1.1	61.6	Road left to Dante's View, continue straight. Elevation about 2,000 feet.
3.2	64.8	Road by upturned Pliocene Lava beds of the Furnace Creek Frm.
1.3	66.1	Upturned sand and gravel deposits capping Miocene Lake Beds - about 1,150-ft elevation.
1.4	67.5	20 Mule Team Canyon - Miocene/Pliocene Lake beds. Elevation about 990 feet.
1.2	68.7	At left road to Zabriskie Pt., Elevation about 780 feet.
0.8	69.5	Road parallels major drainage. Note channel deposits from past flood events.
1.0	70.5	Travertine Spring to right with phreatophytes growth--Note Palm trees. Elevation about 480 feet.
		Major discharge area for flow system--Note lush growth. Screwbean Mesquite on right.
1.0	71.5	Paleospring deposit about 220 feet elevation. upturned Miocene-Pliocene Lake beds.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
0.5	72.2	Furnace Creek Inn - (Harvey House Operator). Turn left on paved road south to Badwater. Elevation 0 msl. Alluvial Fan at 1:00 O'clock and phreatophytes growing in valley.
8.8	73.0	Fault Scarp on left side. At 3:00 O'clock (right) notice large alluvial fans across valley.
2.8	75.8	Road to left goes to Desolation Canyon - continue straight.
0.4	76.2	Road winds around Basalt flows.
0.3	76.5	Mushroom Rock on left.
1.5	78.0	Road on right to west side of Death Valley.
2.6	80.6	One-way road to Artists Drive on left. At 2:00 O'clock salt deposits on floor of Death Valley.
1.7	82.3	Road crossing large alluvial fan. Note rills on left and right showing coarse deposits from past flood events.
2.1	84.4	Road to Natural Bridge on left.
1.4	85.8	At 2:00 O'clock, large expanse of salt deposits.
0.9	86.7	Ground-water discharge areas on right. Note at 12:00 O'clock small alluvial fan built out from toe of mountain.
1.1	87.8	Sign pointing to Telescope Peak across valley in the Panamint Range. Elevation of peak is 11,049 feet.
0.6	88.4	Parking lot at Badwater--resident ostracode is <u>Cyprideis beaconensis</u> . Elevation 282 feet below msl.
0.5	88.9	Crossing toe of Alluvial fan.
0.4	89.3	Notice coarse alluvial debris from flood events.
3.7	93.0	Toe of Mountain Front. Note altered rocks along fault zone.
0.8	93.8	3:00 O'clock. Note ground-water seepage area from fault area.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
2.5	96.3	Starting across large alluvial fan that enters valley from east side.
2.7	99.0	At 1:00 O'clock note small fans built out from mountain front.
2.6	101.6	At 12:00 O'clock note older dissected alluvial fans.
2.5	104.1	Mormon Pt on left.
0.5	104.6	Ground-water seepage from toe of dissected fans.
1.7	106.3	Ground-water seepage area from toe of fans.
1.6	107.9	Ground-water seepage area from toe of alluvial fans and phreatophytes.
4.8	112.7	At 10:00 O'clock, east side of road are Basalt flows.
0.6	113.3	Junction with west side road, turn right on to dirt road heading west.
0.7	114.0	Crossing channel of Amargosa River as it enters Death Valley from south.
1.1	115.1	<u>Stop.</u> Turn vehicles around at Cinder Cone on south side of road.
		<u>Stop at Cinder Cone.</u> Cinder Cone split by movement along major fault. Return to paved road.
1.8	116.9	Return to paved road from "West Side" road, turn right and proceed south.
0.4	118.2	Shoreline Butte on west.
		<u>Stop.</u> Note shorelines of Lake Manly cut into Butte. Pleistocene Lake Manly reached a depth of about 600 feet in Death Valley and was the result of melting of glaciers far upstream in the highlands of the Sierra Nevada mountains. The lake dried up about 10,000 years ago and has been dry since, except for a period about 2,000 years ago when a shallow lake/pond about 30 feet deep occurred in the Badwater area.

If you look closely at Shore Line Butte to the south you will see many features that appear to be terraces or benches cut into the rock. These are wave cut features at former shorelines of Lake Manly.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
		Lake Manly sediments in the valley offer an opportunity to obtain much additional information on the Pleistocene/Recent climate in the region.
1.3	119.5	Ashford Mill ruins and channel of Amargosa River to the west.
2.0	121.5	Paved road turns left, dirt road straight ahead goes to Baker, California.
0.8	122.3	At 10:00 O'clock note small sand ramps to the east.
3.9	126.2	Jubilee Pass, Elev 1,290 feet.
3.6	129.8	Basalt flows on northeast side of road and other basalt capped hills in local area.
1.7	131.5	Basalt flows and National Monument boundary sign--Road now California 178.
4.1	135.6	Salsbury Pass - Elevation 3,315 feet road passes through Miocene/Pliocene volcanics. Resting Springs Mts is the high range to the east.
10.6	146.2	Junction of Highway California 190 and California 127. Turn right on California Highway 127; go south.
0.2	146.4	Large diffuse ground-water discharge area with springs.
0.6	147.0	At 9:00 O'clock, Basalt flow - near Shoshone, California.
0.7	147.7	Shoshone, California.
0.1	147.8	Junction Highway 127 and Highway 178 to Pahrump, Nevada; refer to log for side trip "A" for more information.
0.1	147.8	Shoshone International Airport on east side of road - watch out for low flying aircraft.
2.9	150.7	Passing through Tecopa lake beds - greenish yellow bed capping tops of some beds is the Lava Creek ash.
2.3	153.0	Tecopa Hot Springs junction.
0.8	153.8	Flowing well near the site of the Amargosa Borax Works. After stop return to paved road and proceed north.
8.6	162.4	North to intersection of California Highway 129 and California 178 (west).

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
1.2	163.6	Winding road through Tecopa Lake beds which are covered with alluvium.
1.4	165.0	Channel of Amargosa River east of road.
2.3	167.3	Road follows west bank of Amargosa River.
1.2	168.5	Road crosses Amargosa River Channel.
0.5	169.0	Road crosses Amargosa River Channel.
3.4	172.4	12:00 O'clock - Eagle Mountain dead ahead. Composed of Paleozoic limestones, this 600-m high block of Paleozoic and Precambrian rocks is thought to have slid along a listric fault surface from the Resting Spring Mountains to the east. Tertiary fanglomerates, siltstones and sandstones lie unconformably on the southern end of Eagle Mountain. The mountain may act as a barrier to ground-water flow causing the abrupt change in water-table altitude observed in drill holes at Franklin Lake playa to the north (water levels at 600 m) and drill holes 1 mile south of Eagle Mountain (water levels at about 530 m). The mountain may also be, in part, responsible for ground water to discharge at Franklin Lake playa.
3.8	176.2	Road crosses Amargosa River Channel.
1.6	177.8	Eagle Mt may be a "slide block" that moved downslope to the Basin center. Basalt flow on west side of road.
1.0	178.8	Road follows Amargosa River channel.
1.6	180.4	Stop - Alkali Flat or Franklin Lake playa. This 14 ² "dry" lake is one of the principal discharge areas for the ground-water flow system from Yucca Mountain and vicinity. Annual estimates of ground-water discharge at Franklin Lake playa range from 1 to 3 mm/d throughout the year. Total discharge is estimated to be about 23,000 m ³ /d, most of which occurs as bare-soil evaporation from the water table which ranges in depth from 3 m to 0.2 m below land surface. Over thirty piezometers were used to determine vertical and lateral distribution of hydraulic head at the playa. The lighter colored areas of the playa correspond to areas with efflorescent salts; dark-colored areas have a soft, puffy, porous surface believed to result from ground-water capillarity causing salt crystal growth and swelling of clays.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
7.0	187.4	Small town of Death Valley Junction and Historic District.
0.10	187.5	Junction California Highway 127 and California Highway 190 to Death Valley, stay on Highway-127 north.
1.7	189.2	At 2:00 O'clock - white deposits are Ash Meadow Spring line. At 9:00 O'clock, Funeral Mts. Straight ahead in far distance is Busted Butte near Yucca Mt. Large Mountain Block at 11:00 O'clock is Bare Mt.
3.9	193.1	Amargosa River Channel - "watch out for rafts and water skiers."
1.5	194.5	Entering the Silver State on Highway Nevada-373.
0.2	194.8	Metropolis of State Line, Nevada, and Junction of Spring Meadows Drive and Nevada Highway 373.
1.5	196.3	Road to Ash Meadows. Continue straight on Hwy 373.
0.9	187.2	Turn right on dirt road to Fairbanks Butte. Bend ahead--Ash Meadow Spring Line visible in distance. High peaks in distance are Spring Mts with Mt Charleston at 1:00 O'clock.
2.7	198.9	At 12:00 to 2:00 O'clock - north end of Ash Meadows Spring line.
1.0	200.9	Crossing marsh and lake deposits of Miocene to Pliocene age.
1.7	202.6	Fairbanks Spring and National Wildlife Refuge. On left Fairbanks Butte composed of Tertiary fresh-water limestone. Turn around and return to Highway 373.
5.5	208.10	Junction of Fairbanks Spring Road and Highway 373. Turn right on Hwy 373 - Road continuing to west goes to clay processing plant.
3.1	211.2	Amargosa Valley commercial area (El Camino). A modern ghost town that was overdeveloped during economic boom period.
2.1	213.3	Amargosa Valley Post Office on west side of highway.
2.9	216.2	Yucca Mt at 11:00 O'clock. Road going west goes to Amargosa Farms area.

HYDROGEOLOGIC FIELD TRIP LOG

Miles	Total Miles	Feature
5.1	221.3	Junction with U.S. Highway 95, turn right.
0.6	221.9	10:00 to 11:00 O'clock. Stripped Hills composed of upturned Paleozoic Carbonate. At 2:00 O'clock is Specter Range, notice sand ramps.
1.8	223.7	At 10:00 O'clock large sand ramp on flank of Stripped Hills.
2.9	227.8	To right - Rock Valley Fault Zone - Note, Calcium Carbonate Caliche deposits in road cut.
1.2	227.8	2:00 O'clock Peters or Amargosa Flats Playa. At 12:00 O'clock North end of Spring Mts.
8.4	236.2	Paleozoic carbonate "Inselberg."
1.5	237.7	Junction U.S. Highway 95 and Nevada Highway 160 to Pahrump, Nevada.
7.7	245.4	Mercury cutoff and return to starting point.