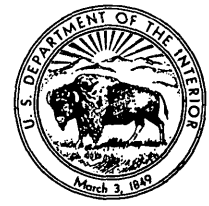
Core Logs from Bristol Cadiz, and Danby Dry Lakes, San Bernardino County, California

By A. M. BASSETT, D. H. KUPFER, *and* F. C. BARSTOW

GEOLOGIC INVESTIGATIONS IN THE MOJAVE DESERT AND ADJACENT REGION, CALIFORNIA

GEOLOGICAL SURVEY BULLETIN 1045-D

A detailed description of cores from a chain of three dry lake basins



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By A. M. Bassett, D. H. Kupfer, and F. C. Barstow

ABSTRACT

Detailed core logs of four holes drilled in Bristol, Cadiz, and Danby Dry Lakes in southeastern San Bernardino County, Calif., are given in the present report. These 3 dry lakes lie in a chain of basins having a drainage area of 4,000 square miles which is made up of alluvial slopes and of mountains composed of granitic, metamorphic, and volcanic rocks. Rainfall in the basins averages less than 3 inches annually.

In Bristol Dry Lake, 1 hole was drilled to a depth of 1,007 feet, and penetrated layers of dense clay alternating with salt. About 40 percent of the recovered core is halite, ranging from scattered crystals in clay to massive beds more than 8 feet thick. In Cadiz Dry Lake, 1 hole was drilled to a depth of 500 feet. The core is composed of clay, silt, and sand, with scattered gypsum crystals in small quantities, and a single salt layer, 1 foot thick, lying about 9 feet below the surface. Bedding in this core is horizontal down to a fracture at a depth of about 256 feet; from there to the bottom, the dip increases gradually to a maximum of 35°. In Danby Dry Lake, 2 holes were drilled: the first and more northerly one to a depth of 880 feet and the southerly one to a depth of 460 feet. Both cores are composed of clastic sediments ranging from clay to coarse sand with fine sand the most abundant. Crystalline gypsum in silt occurs between 310 and 520 feet in the northern hole and between 278 and 334 feet in the southern hole. The northern hole was drilled in gravel for the last 20 feet. No salt beds were cut in either of the Danby holes despite the occurrence of commercial salt deposits elsewhere on the surface of the playa. Correlation of sediments between any of these cores, even between those from the same basin, is difficult and seldom convincing.

Fossils were found in the Cadiz core and in both Danby cores. The most abundant fossils are *Chara*, the calcified seeds of the Charophyta algae. Foraminifers, ostracodes, gastropods, pelecypods, and barnacles, in order of decreasing abundance, occur at rare intervals in these three cores.

INTRODUCTION

As part of a program to study the saline deposits of the Mojave Desert region, the U. S. Geological Survey had four holes drilled on contract in the Bristol, Cadiz, and Danby Dry Lake basins in southeastern San Bernardino County, Calif. (fig. 5). This drilling was carried out between January 5 and March 16, 1953, and cores were taken the full length of all holes. The logs of these cores are here

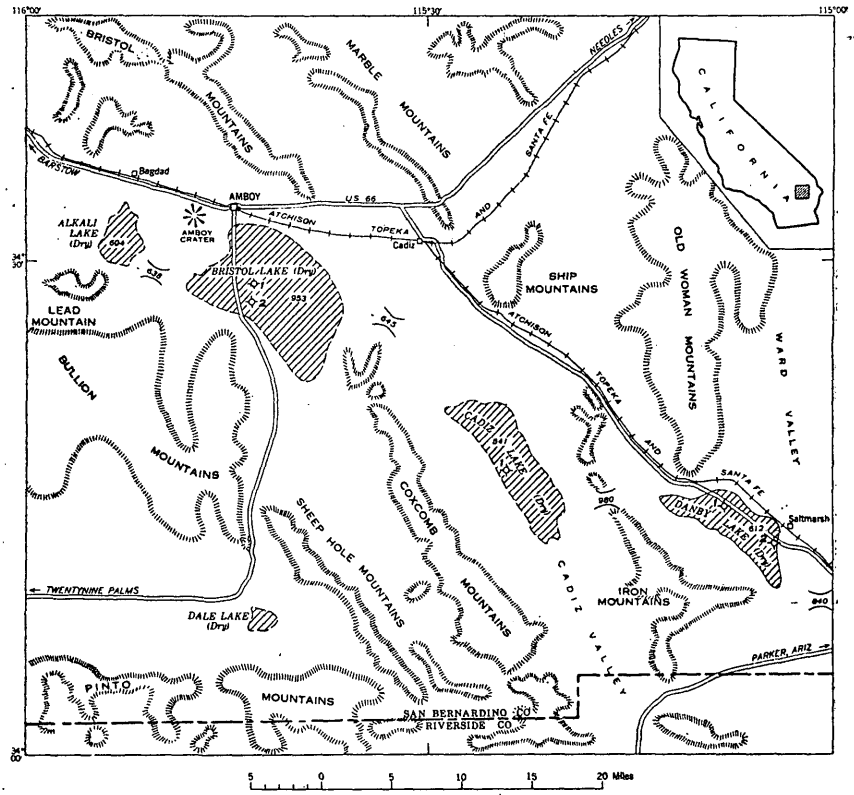

FIGURE 5.—Index map showing the location of Bristol, Cadiz, and Danby Dry Lakes and of the holes drilled. Also shown are the elevations (in feet) of dry-lake surfaces and of the passes that would have become spillways had the basins ever been filled by lakes.

presented written in summary and in detail as well as in graphic form (pl. 4).

A summary of the drill-hole data is given in the table below.

Drill holes in Bristol, Cadiz, and Danby Dry Lakes

[Core size was 2⅝ inches throughout, and the core barrel was 10 feet long]

Drill hole	Depth (feet)	Core recovery (percent)	Location (San Bernardino base line and meridian)
Bristol 1 [1]	1,006	-------	C., sec. 34, T. 5 N., R. 12 E.
Bristol 2	1,007	52	SW ¼, sec. 3, T. 4 N., R. 12 E.
Cadiz 1	500	47	NE ¼, sec. 4, T. 2 N., R. 15 E.
Danby 1	880	52	NE ¼, sec. 19, T. 2 N., R. 18 E.
Danby 2	460	61	SE ¼, sec. 34, T. 2 N., R. 18 E.

[1] Bristol core hole 1 was drilled in 1952 cooperatively by the National Chloride Co. and the California Salt Co., both operating on Bristol Dry Lake. The recovered core was subsequently logged by Kupfer. A graphic log is given on plate 4, but the core is not treated further in this report.

These 3 playas lie between long 115° and 116° W. and between lat 34° and 35° N. The main line of the Santa Fe railway and Highway 66 between Barstow and Needles, Calif., cross the area north of the playas. The Parker Branch of the Santa Fe and a parallel dirt road cut southeastward from the railroad town of Cadiz along the eastern border of the basins containing the playas. The very small population of the region, mainly in the town of Amboy, is supported by the salt and brine industry of Bristol Dry Lake and by supplying service for the highway and railroad.

Previous geologic work consists of regional reconnaissance studies by N. H. Darton (1915), D. G. Thompson (1929, p. 660–711), J. C. Hazzard (1933), and the California Department of Public Works, Division of Water Resources (1954). A geologic reconnaissance covering the region surrounding these dry lakes was made during the fall of 1953 by the first two authors of this report; it is now in preparation for publication. Results of the search for potash during World War I, including chemical analyses of brines from Bristol and Cadiz Dry Lakes, were published by H. S. Gale and W. B. Hicks (1920, p. 418–419). Comments on the composition, production, and reserves of salines in these dry lakes have been published by F. L. Hess (1910, p. 25–27), W. C. Phalen (1919, p. 185), D. F. Hewett and others (1936, p. 94–95), W. E. Ver Planck (1952, p. 47–48; 1954, p. 7–8), and L. A. Wright and others (1953, p. 217–242). A detailed description of Bristol Dry Lake was published by H. S. Gale (1951). No detailed published reports on Cadiz or Danby Dry Lakes are known to the writers.

ACKNOWLEDGMENTS

Mineral identifications were made with immersion oils by Robert D. Allen, then of the U. S. Geological Survey. The writers appreciate the cooperation given by personnel of the operating salt companies on Bristol Dry Lake, especially by Mr. M. M. Stephans, of the National Chloride Co. of America.

The fossils from Danby drill hole 1 were studied and identified by W. P. Woodring, Ruth Todd, and I. G. Sohn, of the U. S. Geological Survey, and by Manly Natland, of the Richfield Oil Corp. Those from Danby drill hole 2 were identified by W. P. Woodring and P. B. Smith, of the U. S. Geological Survey, and those from Cadiz drill hole 1 were identified by P. B. Smith. K. E. Lohman, of the U. S. Geological Survey, studied the samples from Danby 1 for diatoms but found none. Present information on the fossils is inadequate to determine their age; further work is planned.

GEOLOGIC SETTING

Bristol, Cadiz, and Danby Dry Lakes occur in a trough that trends west-northwest and is divided into three separate basins by northwest-trending mountain ranges that project into the trough. The dry lakes occupy the lowest parts of these basins and ultimately receive all the unevaporated water from the surrounding mountain slopes, a total drainage area of about 4,000 square miles. The rainfall of this region, however, is extremely low (2.28 in. annual average in the basins [1]), and the rate of evaporation extremely high; water, therefore, never stands on the playas except for a short period after heavy rain storms.

The mountain ranges surrounding these basins are composed principally of plutonic and metamorphic rocks of pre-Tertiary age. Limestone is fairly abundant in the mountains northeast of Bristol and Cadiz basins and absent elsewhere. Tertiary lavas and pyroclastic sediments are the predominant rocks west and northwest of Bristol Dry Lake. Volcanic rocks are less common east and northeast of the basins and absent south of them. No saline-bearing sediments crop out within the area tributary to the playas.

Two Quaternary basalt flows lie within the drainage basin of Bristol Dry Lake, a small one on the south slope of Lead Mountain and a larger one bordering Bristol playa on the west. The larger flow, which issued from Amboy Crater (also called the Bagdad Cinder Cone) 3 miles southwest of Amboy, poured out over a large playa dividing it into two unequal parts. The eastern part is Bristol Dry Lake and the western part is called Alkali Dry Lake. Although only briefly examined, Alkali Dry Lake appears to be similar to Bristol Dry Lake in virtually all respects. The large dry lake, which was formed before the deposition of the lava, was nearly 100 square miles, about twice the size of the present Bristol Dry Lake.

Bristol and Cadiz playas are separated by a low alluvial divide extending beyond the northeastern termination of the Coxcomb Mountains (fig. 5). This divide rises only 52 feet above the lowest part of Bristol Dry Lake and 104 feet above the lowest part of Cadiz Dry Lake. But for this low alluvial divide, Cadiz Valley would be a part of Bristol basin. Thompson (1929, p. 696) proposed the name Amboy Lake for a Pleistocene body of water which he thought existed in the large basin containing both Bristol and Cadiz playas. If this large basin had contained an overflowing lake in late Pleistocene time, such a lake would have attained a depth of more than 450 feet and a surface area of about 500 square miles before its waters could have escaped through the lowest pass in the Iron Mountains and flowed into Danby playa.

[1] Compiled by D. G. Thompson (1929, p. 90-91) from U. S. Weather Bureau records maintained for a period of 17 years at Bagdad, Calif.

Danby Dry Lake is the sump of a separate drainage basin, known as Ward Valley, that extends about 50 miles north of the playa, and has a drainage of about 1,000 square miles. A lake in this basin, for which Thompson (1929, p. 708) suggested the name Ward Lake, would have overflowed through a divide to the southeast, near Rice, and into the Colorado River.

In none of the three basins, however, have the writers found shoreline features, wave-cut terraces, or gravel bars, such as occur commonly around other desert basins that did contain overflowing Pleistocene lakes, though their absence does not constitute proof that such lakes never existed. This evidence is in accord with the theoretical argument that such huge bodies of water would not be expected even during pluvial periods, because the entire drainage basin lies within one of the most arid regions of the country. It seems likely that these basins contained only very shallow—perhaps ephemeral—lakes that did not overflow during the late Pleistocene epoch.

All three playas have more than one type of surface. The principal type is a puffy efflorescent surface, called "self-rising ground" caused by the evaporation of capillary brine. It is generally believed to indicate a basin with no external underground drainage. Somewhat less common in these playas is the clay flat—a surface of smooth, hard, compact clay—which indicates the water table lies at considerable depth. A third type is the salt crystal surface, in which salt crops out at the surface of the playa or is covered only by a relatively thin veneer of silt or clay.

Bristol Dry Lake is mostly efflorescent ground but has a brine-soaked crystal body very near the surface in its lowest part near the southwestern border of the playa. This occurrence of efflorescent ground and near-surface brine suggests that there is no underground escape of water from Bristol Dry Lake to the lower ground of Cadiz Valley. This, in turn, suggests that the pass between the two basins consists of a bedrock barrier that lies at relatively shallow depth beneath alluvium. Cadiz Dry Lake has, near the center of the playa, a similar brine and salt body surrounded by large areas of puffy ground, and in the northern part of the playa has many expanses of dry, clay flats. Danby Dry Lake has salt crystal bodies at the surface at both the north and south ends of the playa, areas of claypan along the southeastern part, and efflorescent ground for most of the rest of the playa.

Gypsum-capped pedestals on Cadiz and Danby Dry Lakes are remnants of a once higher playa surface that has been almost completely removed, probably by a combination of deflation and water erosion. This erosion is probably initiated by deflation and aided later by water which tends to level the playa surface after the wind

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has created irregularity in it. Elsewhere the surface of Danby Dry Lake is cut by numerous drainage channels, more than 5 feet deep and as much as 100 feet wide, which drain toward a sump near the southwest edge of the playa.

LOGGING METHODS

All cores were logged in the field within a few hours after removal from the holes and while still wet. They have not been relogged in the laboratory. The core from Bristol drill hole 2 was logged to a depth of 657 feet by Kupfer, and from there to the end (1,007 feet) by Bassett, who also relogged in greater detail the first 30 feet. The core from Cadiz drill hole 1 was logged by Bassett; all the core from Danby drill holes 1 and 2 was logged by Barstow.

In compiling the final logs, the following conventions were established for uniformity.

Recovery.—When the core recovered from any given run[2] was less than 100 percent, there was generally no reliable indication of the position of the recovered core within the run. For all of the logs here discussed, the core recovered has been arbitrarily assigned to the lower part of the run and the missing portion to the upper part. The average recovery for these 4 holes was 53 percent.

Location is given to the nearest tenth of a foot, but this does not imply accuracy of that degree in depth below the surface. It is intended to place a specific location in the core below the nearest accurately known depth.

Caving.—Between drilling runs, especially when the drill was idle overnight, material often caved in from the walls higher in the hole, and was unavoidably recovered in the core barrel along with the true core. In general, where this material was soft disordered mud without form, it was neither saved nor logged. However, where material at the top of the run, without form, and generally soft and disordered, might represent sediment in place, it was kept and logged and indicated in the logs as "probably slumped material." Some other portions of the core that appeared to have normal form, and were not of anomalous lithologic character, may also have been slumped material, but were not recognized as such, nor so logged.

Sediment names, textures, and structures.—Sediment names are in accord with those suggested by Wentworth (1922). The term "massive" as used throughout the logs for Bristol core 2 and Cadiz core 1

[2] The term "run" refers to the length of hole drilled between removals of the core barrel from the hole. Usually a run was 10 feet.

is intended to mean that stratification is difficult or impossible to see with the unaided eye. When used as a modifier of salt, "massive" means that the salt occurs in compact crystalline masses, rather than as isolated crystals embedded in a matrix. The term "clay" is used in the present report only in the sense of particle size. The mineralogy of the fine-grained aggregate was not established.

The dip of the bedding in all cores is within a few degrees of horizontal except below 256 feet in Cadiz core 1.

Nearly all core in the four holes is calcareous; that is, it effervesces in cold dilute hydrochloric acid. Because of this uniformity, the word "calcareous" has not been added to the logs of the Bristol and Cadiz cores; but it has been retained from the original field logs for the Danby cores. The presence of sodium chloride in small quantities in the cores could not be discerned because the drilling fluid used for all holes was the brine of Bristol Dry Lake. The presence of calcium chloride, which rarely forms in the solid state, also could not be determined because of the high concentration of calcium chloride in the Bristol Lake brine drilling fluid.

Colors.—In most lithologic descriptions colors have been named and numbered according to the "Rock-Color Chart" distributed by the Geological Society of America (Goddard and others, 1951). Where names included in the "Rock-Color Chart" are used without the number symbol, these colors were identified by memory without direct comparison with the chart. In places where names unlike those on the chart are used, it means no comparison with the chart was made, nor had the chart been utilized recently enough to permit color identification by memory. This latter category applied mostly to the Bristol core in which the color chart was used only rarely.

All core was logged wet, thus it had darker color values than when dry. For this reason the addition of color readings after the cores had dried could not be made without relogging all cores for color uniformity.

Salt.—In Bristol core 2, salt ranges from pure massive beds to isolated crystals disseminated in clay. The following approximate percentage ranges are intended for the core descriptions as used in the detailed log:

	Salt (percent)
Salt, massive	100
Salt, crystalline or massive; with some clay; or Salt crystals in clay.	75–99
Salt, crystalline, and brown clay	50–75
Clay, brown, and crystalline salt	25–50
Clay, brown; contains some salt	1–25

SUMMARY OF THE CORE LOGS

BRISTOL 2

The core of Bristol 2 is composed almost exclusively of salt and clay. About 40 percent of the total recovered core is composed of salt, which occurs in massive beds up to 12 feet thick (recovered core) and as scattered crystals in clay, ranging from the major constitutent to rare isolated crystals. Pure or nearly pure salt beds (more than 90 percent salt) at least 1 foot thick, number more than 40 and have an aggregate thickness of 142 feet. Seven of these are greater than 5 feet thick. Such nearly pure salt layers occur regularly throughout the entire core except between the principal commercial bed, at a depth of about 8 feet, and the next nearly pure salt layer at 153 feet. Brine, rich in calcium chloride, is pumped from the upper salt bed. Disintegration and persisting dampness of the core in certain places suggest the presence of calcium chloride brine at deeper levels. However, the use of Bristol lake brine as drilling fluid makes this difficult to confirm.

The most abundant sediment is a dark yellowish-brown or gray-green clay, frequently silty or sandy, generally dense and massive, and in part compact and weakly fissile. The color of the clay is in part related to salt content, for clay next to massive salt is always green. The contacts between green and brown clay are irregular as if related to secondary alteration, not sharp as if a primary depositional feature. Much of the clay, especially in the upper part of the core, contains disseminated sand grains. The clay is calcareous throughout and contains small limy nodules and patches and numerous small flecks and pods of anhydrite. Silt and very fine sand layers are common in the upper 30 feet of core, laminated silt continues to about 130 feet, and below that both are uncommon.

A 1-inch bed of white volcanic tuff composed of glass shards occurs at a depth of about 667 feet, and a 1-inch argillaceous limestone layer was noted at a depth of about 720 feet. In the few places where bedding could be observed, the attitude was virtually horizontal. No fossils were found.

Summary log of Bristol 2

Depth (feet)	*Description*
8	Clay, silt, and very fine sand, olive-gray and yellowish-brown; with a salt crust and a few scattered salt crystals and limy nodules.
12	Salt, massive, commercial bed; with olive-gray silt and clay.
90	Clay, gray-green; with salt crystals and sand grains.
110	Clay, green, and brown silt, laminated; some salt crystals.
138	Clay and silt, reddish-brown; with salt crystals.
153	Clay, gray and green; with salt crystals.
172	Salt, massive; 3 beds of 2.5 ft average thickness.

Summary log of Bristol 2—Continued

Depth (feet)	Description
255	Clay and salt, interbedded; clay is grayish green; several salt beds over 1.5 ft thick.
270	Salt, massive; beds 3.4 and 5.3 ft thick.
285	Clay, sandy, brown, laminated; some salt crystals.
305	Salt, massive; 4 beds recovered.
320	Clay, dark-brown; some salt crystals.
336	Salt, massive, and dark-brown clay; 3 salt beds, thickest one 5.7 ft thick.
421	Clay, brown, laminated; interbedded with massive salt layers.
430	Salt, massive, interbedded with brown clay.
508	Clay, brown, interbedded with salt layers 2 to 12 in. thick.
516	Salt, massive, pure; single bed 7.5 ft thick.
564	Clay, brown, and massive salt.
574	Salt, massive; 3 beds each about 1 ft thick.
659	Salt and brown clay, interbedded.
665	Salt, massive; with some brown clay and grayish-olive silt.
686	Clay and salt; with 1 in. volcanic tuff bed at 667 ft.
719	Salt, massive, and some green and brown clay; thickest salt bed is 8.4 ft thick.
726	Clay, brown; with limestone layer 2 in. thick at 720 ft.
735	Salt, massive; with some green clay.
822	Clay and salt, interbedded; in about equal amounts.
834	Clay, brown and green, massive; with limy nodules throughout.
852	Salt, massive, crystalline; with green and brown clay seams.
864	Clay, brown and green; with some salt crystals and seams.
980	Salt and brown clay, interbedded; salt beds up to 5 ft thick.
1,007	Clay, brown and green, massive; with salt crystals and flecks of anhydrite.

CADIZ 1

Clay, silt, and sand constitute nearly the entire sedimentary sequence exposed in Cadiz core 1. The predominant sediment is a dense clay of dark yellowish brown (10*YR* 3/2) frequently mottled or splotched with dusky olive green (5*GY* 4/2). In several places, quartz grains of coarse and very coarse sand size occur disseminated in the dense clay. Clastic sediments coarser than clay range in grain size from silt to medium sand, are generally yellowish brown, and are composed principally of quartz but also of the other common minerals of granitic rocks. To a depth of 240 feet, about half of the core is composed of sand layers. Below 240 feet, silt makes up about a third of the core and sand is rare.

Massive crystalline salt, 9 feet below the surface, forms a layer about 1 foot thick. It contains a sodium chloride and calcium chloride brine at the present water level. Salt also occurs as thin porous crystalline layers interbedded with clay and silt in the top few feet of the core. No other salt beds were encountered.

Gypsum in small quantities is fairly common from a depth of about 25 to 158 feet and sparse from there to 400 feet, below which none

was observed. It occurs scattered through the sand and clay as "fishtail" twins, wedge-shaped crystals, fibrous veinlets, crystalline powder, and thin stringers. The entire core is calcareous.

A very dense orange-brown or moderate-brown (5*YR* 4/4) clay, contrasting conspicuously with the normally yellowish-brown clay, contains fairly abundant white, tan, and grayish green irregular limy patches and very hard limestone nodules. This clay is present in a 13-foot bed between 158 and 171 feet and again intermixed with bluish-gray, reddish-brown, and other variously colored clays between 355 and 370 feet.

Fossils occurring in limestone nodules and adjacent clay beds were recovered throughout much of the core below 267 feet. They were identified by P. B. Smith, of the U. S. Geological Survey, who reported the faunal assemblage as similar to that found earlier in the cores from Danby Dry Lake and to consist of "Several species of rotaliiform Foraminifera (shallow water), ostracodes, and a great abundance of *Chara* (algae seeds, not useful in determining age). These fossils all indicate shallow brackish water" (written communication, 1953). Several chitinous spicules also were found. The evidence is insufficient to determine with certainty whether this represents a marine or nonmarine environment of deposition.

A slickensided fracture dipping 57°, at a depth of about 256 feet, marks a change in the dip of the bedding. Above that point, all bedding is horizontal; below it, the dip of the beds increases gradually from 10° to a maximum of 35° at 470 feet, the lowest bedding plane seen. These angles are probably too large to be explained by deviation of the drill hole from vertical, especially in view of the softness of the material. The dip of the beds may be attributed to folding or tilting of the lower beds, suggesting a different age for them than for the flat-lying beds unconformably(?) above them. However, these beds are similar lithologically and in color both above and below the fracture. The dip might be explained by post-depositional compaction of the clays. This compaction may have been greater at the center of the playa where the clays were thickest, with the result that the beds near the edge of the playa dip toward the center. The fossils are restricted to the tilted beds.

Summary log of Cadiz 1

Depth (feet)	*Description*
8	Sand, medium and fine, salty, over grayish-olive clay interlayered with porous salt and gypsum sand.
10	Salt, massive, crystalline; 1 ft recovered.
158	Clay and fine sand, yellowish-brown and grayish-green; with gypsum crystals disseminated throughout.
171	Clay, orange-brown, very dense; with tan limestone nodules.

Summary log of Cadiz 1—Continued

Depth (feet)	Description
208	No core; probably unconsolidated sand.
239	Sand, fine to very fine, rusty and moderate orange-brown; with thin seams of clay.
268	Clay, gray, gray-brown, and brown; with silt interlayers.
(256)	Fracture; horizontal beds above; inclined beds below.
270	Limestone, greenish-gray, very hard, fossiliferous (*Chara*), interbedded with brown clay and silt.
300	Clay and silt, brown, interbedded; with fossiliferous (*Chara*) limy nodules and patches.
333	Clay, green and brown; with minor amounts of gypsum; coarse sand grains throughout.
335	Limestone and clay, grayish-green, abundantly fossiliferous.
427	Silt and clay, brown, sparsely fossiliferous throughout; with limestone nodules in mottled green and brown clay below 368 ft.
434	Clay and silt, orange-brown and reddish-brown.
500	Clay, sandy clay, and silt, brown and orange-brown; with grayish-green fossiliferous limestone nodules.

DANBY 1

Danby 1 is the more northerly and deeper (880 ft) of the 2 holes drilled in Danby Dry Lake. Sand, ranging in grain size from very fine to medium, constitutes about half of the sediment of this core. Clayey silt and silty clay, interbedded and intergradational, are next most abundant. Massive and laminated clays make up less than 10 percent of the core, and gravel was the only material recovered from the bottom 20 feet of the hole. Crystalline gypsum is very abundant in 2 layers, the larger one over 200 feet thick. Limestone is a minor constituent. Despite the presence of commercial deposits of salt at the surface at both the northern and southern ends of the playa, no evidence of salt beds was found in this core.

The color of the upper 130 feet of the core is yellowish brown, but throughout the remainder, olive gray, dark and light greenish gray, pale bluish gray, and dark and light gray are the predominant colors. All of the core is calcareous, and, in the upper part, much of it is salty.

Crystalline gypsum, both massive and as interspersed crystals in mixed fine sediments, occurs in a 6-foot bed about 10 feet below the surface and in a 210-foot bed between 310 and 520 feet depth. In both of these layers, gypsum constitutes nearly half of the material present. Bassanite, a hemihydrate of calcium sulfate, identified by R. D. Allen and Henry Kramer (1953), occurs at depths of about 365 and 510 feet.

Light-gray and light-brown brecciated opaline shale occurs in a ½-inch layer of pale greenish-gray argillaceous limestone at a depth of about 570 feet. Some parts of the opaline material are pure silica

and cannot be scratched with a steel knife, but other parts with identical appearance are evidently incompletely opalized as they can be scratched. The largest of the breccia pieces is 1 inch long, but most are small sharply angular fragments one-tenth of an inch thick.

Dark grayish-green lamellar clay between about 570 and 590 feet, is composed of layers one-tenth of an inch thick separated by paper-thin laminae of white strongly calcareous clay. Between 780 and 790 feet, several beds of light-gray limestone, 1 or 2 inches thick, occur in a medium-gray to nearly black massive limy clay. Directly beneath these limestone beds is a 17-foot section of thinly laminated fissile shale with laminae alternating between very pale yellowish gray and dark bluish gray.

Isolated pebbles in clay and silt were struck at depths of 801, 840, and between 845 and 850 feet. From 860 feet to the bottom of the hole at 880 feet, only coarse gravel, pebbles, and cobbles were recovered.

Fossils were located at depths of 732.4, 738.4, 785.9, and 845.0 feet. These samples were studied by W. P. Woodring, Ruth Todd, and I. G. Sohn, of the U. S. Geological Survey, and Manly Natland, of the Richfield Oil Corp. They reported (written communications, 1953) a fauna consisting of foraminifers, ostracodes, pelecypods, gastropods, and a barnacle. *Chara* seeds are also present. K. E. Lohman, of the U. S. Geological Survey, searched the samples for diatoms but found none.

Summary log of Danby 1

Depth (feet)	Description
10	Silt, clayey, dark yellowish-brown, salty.
16	Gypsum, crystalline, and dark yellowish-brown clayey silt.
50	Silt, clayey, yellowish-brown, salty, massive.
130	Silt, clayey, interbedded with fine and medium sand and silty clay, mostly yellowish-brown.
310	Sand, fine, interbedded with clayey silt and silty clay, mostly olive gray.
520	Gypsum, crystalline, occurring in and interbedded with dark yellowish-brown and olive-gray clay, silt, and fine sand.
533	Sand, fine, silty, interbedded with clayey silt; multicolored but predominantly olive gray and yellowish brown.
570	Clay and some sand, mostly yellowish-gray and light greenish-gray.
590	Clay, lamellar, hard and compact, mostly dark greenish-gray.
670	Sand, fine and very fine, silty, olive-gray and dark greenish-gray, poorly consolidated; with some clay and limestone.
760	Sand, fine, silty, interbedded with massive and lamellar clay, olive-gray and light-gray. Fossils at 732.4 and 738.4 ft.
780	Clay and clayey silt, massive and lamellar, pale bluish-gray and greenish-gray; in part with very thin lamellae of white carbonate.
788	Limestone, massive, light-gray, interbedded with massive and lamellar clay. Fossils at 785.9 ft.

Summary log of Danby 1—Continued

Depth (feet)	Description
805	Clay, fissile, very limy, grayish olive-green to dark-gray alternating with light-gray; lesser amounts of silt and coarse sand.
860	Sand, medium and fine, moderate orange-brown; with some darker brown silt and clay, and cobbles at 840 and 850 ft. Fossils at 845 ft.
880	Gravel, primarily angular granodiorite pebbles and cobbles.

DANBY 2

The core from Danby 2 is composed principally of mixed fine-grained clastic sediments—clay, clayey silt, silty clay, clayey sand, and sand ranging from very fine to coarse. Most abundant is very fine sand which, in one place, between 180 and 250 feet in depth, is 70 feet thick without significant change in grain size or color.

A layer of well-indurated strongly calcareous medium-grained sandstone, between 120 and 130 feet in depth, is distinctive by comparison with the usual poorly indurated material. Between about 407 and 420 feet lies a dense orange-brown clay with tan limy nodules identical in appearance with a layer in Cadiz core 1 between 158 and 171 feet. Crystalline gypsum embedded in clayey silt extends from a depth of 278 to 334 feet—a thickness of 56 feet. Pebbles were struck at depths of 333, 351, and 391 feet, but playa sediments continued below them to the bottom of the hole. No salt was cut by this hole, even though salt forms a crust on the playa several feet thick less than a mile south of the drill site.

Fossils were found at only one point in the core, at a depth of 449 feet, where they are abundant and comprise a major part of a bed of light-buff sand. The fossils identified by W. P. Woodring and P. B. Smith are gastropods, pelecypods, foraminifers, *Chara*, and one barnacle.

Summary log of Danby 2

Depth (feet)	Description
38	Clay, silty, light-brown to moderate yellowish-brown,salty.
120	Clay, clayey silt, and clayey very fine sand, yellowish-gray to light-buff.
140	Sandstone, medium-grained, and massive light olive-gray very fine sand.
180	Silt, clayey, light olive-gray, massive.
250	Sand, very fine, light olive-gray, massive.
278	Clay, silty, and clayey silt, light olive-gray, bedded.
334	Gypsum, crystalline, interbedded with moderate yellowish-brown clayey silt; gypsum about 40 percent; pebbles at 333 ft.
391	Sand, very fine to coarse, interbedded with silty clay, dark to light yellowish-brown and greenish-gray to light olive-gray; pebbles at 351 and 391 ft.
407	Clay, compact, light olive-gray to greenish-gray.
420	Clay, dense, orange-brown; with pale-buff limy nodules.
460	Sand, fine and very fine, interbedded and intergradational with clayey silt and silty clay, variegated colors mostly light gray and buff. Fossils at 449 ft.

488653—59——3

CORRELATIONS BETWEEN CORES

Correlation of sediments is difficult to make within a single basin as well as between separate basins. This points out the need for many drill holes in order to test adequately the content of sediments beneath a playa. For example, commercial salt deposits occur at both the north and south ends of Danby Dry Lake, but the two Danby drill holes, which were drilled in-between, penetrated no salt.

Bristol and Cadiz basins are separated only by an almost imperceptible alluvial divide that rises about 50 feet above the lowest part of Bristol Dry Lake. It would seem reasonable that the two, being parts of the same drainage basin, should have had approximately the same sedimentary history. Yet the cores from Bristol and Cadiz Dry Lakes have virtually no similarities: the Bristol core consists of clay and 40 percent salt; the Cadiz core predominantly of sand and silt with only a single bed of salt 1 foot thick. However, it is possible that this difference may be only apparent and not real. If nonsaline shore facies and salt-bearing central facies both persist in depth, it may be that the Cadiz hole was placed too far from the center of the playa (inaccessible to the drill rig) and tested only the shore facies, whereas the Bristol hole was placed in the lowest part of the playa and tested the central facies.

A potential correlation between Cadiz and Danby cores is found only in the dense orange-brown clay, which occurs in both cores and is a very distinctive unit. It could be the result of the weathering of a particular type of rock in the Iron Mountains, the range lying between the two basins, or of some volcanic phenomenon.

Correlation between the two cores from Danby Dry Lake can be made only in a general way. The upper 120 to 130 feet of sediment in both cores is a yellowish-brown silty clay, and beneath that in both cores the clay is usually olive gray and contains coarse sand grains. Both cores have a thick sequence of crystalline gypsum in clay, but of widely differing thickness and at surprisingly different depths if their time of formation is taken to be similar. Below the gypsum layers any correlation between the two Danby holes becomes very uncertain.

In Bristol Dry Lake the 2 salt companies operating there cooperatively drilled a hole (Bristol 1) to 1,006 feet. This hole is slightly over 1 mile north-northeast of Bristol 2. The log of this core is shown graphically on plate 4. It is based on very poor core recovery in the lower half (only 37 ft of core between 512 ft and bottom of hole) but is adequate to make clear that the numerous salt layers beneath

the playa cannot be individually correlated below the top commercial bed. Nineteen shallow holes drilled by the Metropolitan Water District of Southern California (Gale, 1951) also indicate that the salt is widespread, but that the individual beds are lenticular and discontinuous.

If the sediments had been deposited in perennial lakes, a continuity of layers within each basin would be expected, and correlation between cores from the same basin would be relatively direct. That such correlation is so difficult suggests that the deposits were irregularly laid down in ephemeral lakes as a result of intermittent floodings, or that the salines have been redistributed by ground water after deposition. In fact, both of these processes were probably effective.

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CORE LOGS

Bristol drill hole 2

[52 percent of core recovered]

Depth (feet)	Unit thickness (feet)	Description
1.8	1.8	Salt and dark yellowish-brown (10*YR* 4/2) clay and silt; porous sponge of crystalline salt composing about 70 percent of material; clay contains limy nodules ¼ in. thick; puffy salt-encrusted silt at surface.
2.8	1.0	Clay and silt, moderate olive-gray (5*Y* 4/2) and dark yellowish-brown (10*YR* 4/2), massive; contains disseminated small salt crystals and small limy specks.
4.7	1.9	No core.
6.0	1.3	Clay, moderate olive-gray, massive; contains salt crystals and limy nodules and layers.
6.5	.5	Clay, silt, and very fine sand, moderate yellowish-brown (10*YR* 5/4) and dark yellowish-brown (10*YR* 4/2).
8.3	1.8	Clay, moderate olive-gray (5*Y* 4/2), and salt crystals; salt about 25 percent.
11.5	3.2	Salt, impure, and olive-gray clay and silt; principal commercial bed; saturated with brine rich in calcium chloride.
19.5	8.0	No core.
20.0	.5	Clay, silt, and very fine sand, yellowish-brown (10*YR* 5/2); contains scattered salt crystals (25 percent).
24.1	4.1	No core.
25.0	.9	Clay and silt, dark yellowish-brown (10*YR* 4/2), and pale yellowish-brown (10*YR* 6/2) biotitic very fine sand; contains scattered salt crystals (20 percent).
28.8	3.8	No core.
30.0	1.2	Clay, grayish-olive (10*Y* 4/2), and salt, in equal amounts; fine to coarse sand grains throughout clay.
34.0	4.0	No core.
35.0	1.0	Clay, gray-green; contains small salt crystals and fine sand grains throughout.
37.7	2.7	No core.
40.0	2.3	Clay, gray-green; contains small salt crystals and fine sand grains throughout.
43.0	3.0	No core.
45.0	2.0	Clay, gray-green; contains small salt crystals and fine sand grains throughout.
49.0	4.0	No core.
50.0	1.0	Clay, gray-green; contains small salt crystals and fine sand grains throughout.
51.0	1.0	No core.
55.0	4.0	Clay, gray-green; contains small salt crystals and fine sand grains throughout.
59.1	4.1	No core.
60.0	.9	Sand, fine, green and brown.
69.1	9.1	No core.
70.0	.9	Clay, sandy; contains small salt crystals.
76.1	6.1	No core.
80.0	3.9	Salt crystals in clay.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
85.6	5.6	No core.
90.0	4.4	Clay, green, and brown silt, laminated; contains flecks and pods of anhydrite.
94.5	4.5	No core.
100.0	5.5	Clay, green, and brown silt, laminated; contains some salt crystals; with massive salt bed 0.4 ft thick.
105.6	5.6	No core.
107.0	1.4	Silt, brown, and salt crystals.
110.0	3.0	Salt crystals in reddish-brown clay.
113.8	3.8	No core.
120.0	6.2	Clay and silt, reddish-brown; contains some salt crystals.
128.4	8.4	No core.
130.0	1.6	Silt, brown, and fine granular gray salt.
138.3	8.3	No core.
140.0	1.7	Clay, gray; lies above salt crystals in clay.
146.2	6.2	No core.
150.0	3.8	Clay, green; contains some salt.
152.3	2.3	No core.
155.0	2.7	Salt, very fine granular and crystalline.
162.3	7.3	No core.
165.0	2.7	Salt, massive.
169.7	4.7	No core.
172.0	2.3	Salt, massive and as crystal clusters, and well-bedded grayish-brown clay and silt.
176.8	4.8	No core.
180.0	3.2	Clay, silty, brown, laminated, and crystalline salt.
183.0	3.0	No core.
185.0	2.0	Silt, clayey, brown, laminated, and crystalline salt.
191.0	6.0	No core.
193.0	2.0	Salt, massive.
198.5	5.5	No core.
200.0	1.5	Salt, massive.
206.6	6.6	No core.
210.0	3.4	Clay, gray; contains some salt and flecks of anhydrite.
216.3	6.3	No core.
220.0	3.7	Salt, massive.
227.6	7.6	No core.
230.0	2.4	Clay, sandy, grayish-green; with thin salt layers at base.
237.0	7.0	No core.
240.0	3.0	Clay, sandy, green, and salt layers.
245.7	5.7	No core.
250.0	4.3	Clay, brown, laminated; interbedded with thin salt layers.
254.7	4.7	No core.
260.0	5.3	Salt, massive; with some brown clay layers.
263.6	3.6	No core.
267.0	3.4	Salt, massive; with some brown clay layers.
272.8	5.8	No core.
277.0	4.2	Clay, sandy, brown and some green, laminated; with several salt layers.
283.6	6.6	No core.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
287. 0	3. 4	Clay, sandy, brown, laminated; with several salt layers.
287. 4	. 4	No core.
290. 0	2. 6	Salt, massive.
297. 1	7. 1	No core.
298. 0	. 9	Salt, massive.
300. 0	2. 0	Salt layers, thin; interbedded with gray plastic clay.
302. 0	2. 0	No core.
305. 0	3. 0	Salt, massive.
310. 5	5. 5	Clay, dark-brown, compact; contains some salt.
315. 0	4. 5	No core.
318. 0	3. 0	Clay and sand, dark-brown; contains some salt.
320. 6	2. 6	No core.
323. 0	2. 4	Salt, massive; with some dark-brown clay and sand.
327. 3	4. 3	No core.
330. 0	2. 7	Salt, massive; with some dark-brown clay.
330. 3	. 3	No core.
336. 0	5. 7	Salt, massive.
340. 8	4. 8	No core.
343. 0	2. 2	Clay, dark-brown, massive; contains salt in lower part.
347. 4	4. 4	No core.
350. 0	2. 6	Salt, massive; with some dark-brown clay.
356. 6	6. 6	No core.
359. 0	2. 4	Clay, brown, laminated.
360. 0	1. 0	Salt, massive.
364. 4	4. 4	No core.
366. 0	1. 6	Clay, brown, and salt.
367. 0	1. 0	Salt, massive.
369. 2	2. 2	No core.
370. 7	1. 5	Salt, massive, above brown clay.
372. 0	1. 3	Clay, yellowish-brown, laminated.
375. 8	3. 8	No core.
380. 0	4. 2	Clay, brown, laminated.
383. 6	3. 6	No core.
385. 0	1. 4	Salt, broken; with some clay.
390. 7	5. 7	No core.
395. 0	4. 3	Clay, brown, hard, laminated; with salt seams.
403. 2	8. 2	No core.
404. 5	1. 3	Clay, brown, hard, laminated.
405. 0	. 5	Salt,massive.
405. 5	. 5	No core.
411. 0	5. 5	Clay, dark-brown, compact, plastic.
415. 1	4. 1	No core.
417. 0	1. 9	Clay, buff (10*YR* 7/2), laminated.
421. 3	4. 3	No core.
424. 5	3. 2	Salt, massive, and brown plastic clay.
427. 1	2. 6	No core.
428. 0	. 9	Salt, massive.
429. 5	1. 5	Clay, brown.
430. 0	. 5	Salt, massive.
431. 5	1. 5	Clay, buff (10*YR* 7/2), laminated.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
432.5	1.0	Clay, brown, interbedded with salt beds 2–6 in. thick.
437.0	4.5	No core.
440.0	3.0	Clay, brown, interbedded with salt layers 2–6 in. thick.
447.9	7.9	No core.
450.0	2.1	Clay, brown, interbedded with salt.
453.3	3.3	No core.
456.0	2.7	Clay, brown, interbedded with salt.
459.5	3.5	No core.
463.0	3.5	Clay, brown, interbedded with salt layers 2–6 in. thick.
465.8	2.8	No core.
468.0	2.2	Clay, gray and brown, laminated, interbedded with salt layers 2–12 in. thick.
470.4	2.4	No core.
473.0	2.6	Salt in layers 2–12 in. thick; with some brown laminated clay.
480.1	7.1	No core.
483.0	2.9	Clay, gray and brown, laminated, interbedded with salt layers 2–12 in. thick.
487.5	4.5	No core.
490.0	2.5	Clay, brown, and salt layers; salt predominates in lower part.
497.0	7.0	No core.
500.0	3.0	Salt and clay, interbedded.
503.6	3.6	No core.
507.0	3.4	Clay with some salt; may be slumped material in part.
508.5	1.5	No core.
516.0	7.5	Salt, pure, massive; with very little clay.
520.5	4.5	No core.
525.0	4.5	Clay, brown, laminated.
532.4	7.4	No core.
535.0	2.6	Clay, brown, over massive salt.
538.4	3.4	No core.
541.5	3.1	Salt, massive.
545.0	3.5	Clay, brown.
552.3	7.3	No core.
553.7	1.4	Clay, brown.
555.0	1.3	Salt and brown clay; salt 60 percent.
561.7	6.7	No core.
562.6	.9	Mud; probably slumped material.
563.8	1.2	Clay, brown.
565.0	1.2	Salt, massive.
571.4	6.4	No core.
572.7	1.3	Salt, white, massive.
573.4	.7	Salt, green, granular.
574.3	.9	Clay, brown.
575.0	.7	Clay and salt.
577.1	2.1	No core.
580.0	2.9	Salt, massive.
583.5	3.5	No core.
585.7	2.2	Clay, brown.
586.0	.3	Salt, massive.
590.5	4.5	No core.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
598.4	7.9	Clay, dark-brown, compact, laminated.
598.8	.5	Salt.
599.5	.6	Clay, brown.
600.0	.5	Salt.
608.0	8.0	Salt with some clay.
613.0	5.0	Clay, brown, compact.
618.0	5.0	Salt, crystalline to massive; with some clay.
620.0	2.0	Clay, brown, compact.
622.8	2.8	No core.
626.2	3.4	Clay, brown, compact.
627.0	.8	Salt, crumbly, and clay.
628.2	1.2	No core.
637.0	8.8	Salt, mostly massive; with some clay.
637.6	.6	Salt, massive.
639.5	1.9	Clay, brown.
649.5	10.0	Clay and salt, intermixed, and massive salt interbedded with thin stringers of brown clay.
651.4	1.9	Salt, massive.
657.0	5.6	Clay and salt, intermixed, and massive salt interbedded with thin stringers of brown clay.
658.5	1.5	Salt, massive; with less than 10 percent clay.
658.8	.3	Clay, brown, silty.
659.8	1.0	Salt, pure, massive.
662.5	2.7	Salt, with about 20 percent green and brown clay.
662.8	.3	Silt, grayish-olive (10*Y* 4/2); contains about 20 percent salt.
664.3	1.5	Salt, massive; with 20 percent brown and green silty clay.
666.9	2.6	Clay, moderate yellowish-brown (10*YR* 5/2); contains small tan limestone nodules.
667.0	.1	Tuff, white; composed of glass shards.
673.3	6.3	No core.
676.5	3.2	Clay, brown (10*YR* 5/2), massive; with flecks of anhydrite at 678 ft.
677.0	.5	Salt and green clay, in equal amounts.
680.6	3.6	No core.
685.9	5.3	Clay, dark-brown (10*YR* 3/2) and moderate-brown (10*YR* 5/2), massive; with 1 salt bed 1 in. thick.
687.0	1.1	Salt, massive; with less than 5 percent green and brown clay.
691.4	4.4	No core.
692.1	.7	Salt and green and brown clay, in equal amounts.
693.3	1.2	Clay, brown (10*YR* 5/2).
694.9	1.6	Salt with about 10 percent green and brown clay.
697.0	2.1	Salt and 30 percent green clay; presence of calcium chloride suggested by dampness of core after drying for 4 yr.
698.6	1.6	No core.
707.0	8.4	Salt, massive; with less than 5 percent brown and green clay.
707.7	.7	No core.
710.5	2.8	Salt, pure, massive.
714.9	4.4	Clay, brown (10*YR* 5/2), (10*YR* 5/4) and some green (10*Y* 6/2).
717.0	2.1	Salt with less than 20 percent brown clay.
719.6	2.6	Salt, massive; with 5 percent green clay.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
720.0	0.4	Clay, green, and salt, in equal amounts.
720.1	.1	Limestone, argillaceous.
726.0	5.9	Clay, brown, massive.
727.0	1.0	Salt, massive, and green clay; salt about 60 percent.
730.6	3.6	Salt, massive; with several green clay seams 4 in. thick.
734.6	4.0	Salt, massive.
736.6	2.0	Clay, brown; with salt vein.
739.8	3.2	No core.
745.0	5.2	Clay, brown, massive; with flecks of anhydrite and 3 salt beds each 1 in. thick.
747.0	2.0	Salt, massive and crystalline; with 20 percent brown clay and 5 percent green clay.
749.3	2.3	No core.
750.3	1.0	Clay, brown, laminated.
756.2	5.9	Salt, partly massive; with green clay.
757.0	.8	Clay, green and brown, and salt.
759.1	2.1	No core.
762.6	3.5	Clay, brown, and salt crystals 1/16 to 1 in. thick; salt less than 50 percent of core.
764.8	2.2	Salt, granular and massive; with less than 5 percent green clay.
767.0	2.2	Clay, dark-brown, massive and in part fissile; with 5 percent salt crystals 1–2 in. thick.
772.0	5.0	No core.
777.0	5.0	Clay, brown; some weakly fissible; with 0.7 feet salt.
782.1	5.1	No core.
782.9	.8	Mud, distorted; probably slumped material.
783.9	1.0	Clay, brown, and mud; poor core, possibly slumped material.
784.3	.4	Salt crystals 1 in. thick.
785.9	1.6	Clay, dark-green, massive; with 3 salt beds each 2 in. thick.
786.8	.9	Clay, brown, massive; with salt crystals ½ to 1 in. thick.
787.0	.2	Salt, crystalline; with less than 10 percent green clay.
792.3	5.3	No core.
794.8	2.5	Clay, brown, weakly fissile; with flecks of anhydrite in last half foot.
797.0	2.2	Salt, crystalline; with 20 percent green clay.
802.4	5.4	No core.
804.0	1.6	Salt, crystalline; with 10 percent green clay.
804.9	.9	Clay, fine sandy, brown.
805.1	.2	Salt crystal.
806.8	1.7	Clay, brown, weakly fissible.
807.0	.2	Salt, fine granular and massive, clayey, green; bitter taste.
808.8	1.8	No core.
811.3	2.5	Mud, brown; disordered, probably slumped material.
814.6	3.3	Clay, brown, massive; with tan limy nodules and a salt crystal layer, 1 in. thick, in green clay.
815.0	.4	Clay, banded gray-green and black.
815.3	.3	Salt, massive.
815.7	.4	Clay, brown, massive; contains a small limestone nodule.
816.5	.8	Clay, green, massive.
817.0	.5	Salt, massive.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
819.8	2.8	No core.
821.0	1.2	Salt, massive.
822.3	1.3	Salt, broken; with brown clay, containing ½-in. crystals and grains of salt.
822.8	.5	Clay, brown grading to green, massive.
823.7	.9	Clay, green, massive; contains salt crystals 1 in. thick.
827.0	3.3	Clay, brown, massive; contains limy nodules throughout.
831.6	4.6	No core.
832.4	.8	Mud, brown; probably slumped material.
834.0	1.6	Clay, brown, massive; contains very few salt crystals ¼ in. thick.
837.0	3.0	Salt, massive; with green clay seams.
839.2	2.2	No core.
842.0	2.8	Mud, brown, soft; probably slumped material.
845.3	3.3	Salt, crystalline; with seams of brown clay.
847.0	1.7	Salt, crushed and broken, in brown clay.
848.7	1.7	No core.
849.6	.9	Mud, brown, soft; probably slumped material.
851.7	2.1	Salt, crystalline weakening to crumbly at bottom; less than 1 percent brown clay.
852.7	1.0	Clay, mixed brown and green; contains embedded salt crystals ½ to 1 in. thick.
854.8	2.1	Clay, brown, massive; with salt seams and crystals.
855.0	.2	Clay, green, and salt, in equal amounts.
856.5	1.5	Clay, brown, massive; with 2 salt seams 1 in. thick.
857.0	.5	Clay, mixed brown and green, and massive to crumbly salt, in equal amounts.
859.2	2.2	No core.
860.2	1.0	Mud, brown, soft; probably slumped material.
864.2	4.0	Clay, brown, massive; with salt crystals and seams and a few small stringers of green clay; also contains tan limy nodules between 861.0 and 861.5 ft.
867.0	2.8	Salt, crystalline; with brown clay seams.
872.9	5.9	No core.
873.3	.4	Salt, granular and massive; with green sandy clay of bitter taste.
873.5	.2	Clay, brown, massive.
874.2	.7	Salt, massive; with 5 percent green clay; unbroken salt cube 2½ by 2¼ in.
874.9	.7	Salt; with 20 percent green sandy clay of bitter taste.
875.4	.5	Clay, brown, massive.
877.0	1.6	Clay, brown, massive, and broken salt, in equal amounts.
882.2	5.2	No core.
885.6	3.4	Salt, massive; with less than 5 percent of green clay.
886.1	.5	Salt, broken.
886.3	.2	Clay, green.
886.5	.2	Salt, crushed.
887.0	.5	Clay, brown, massive; contains 10 percent salt crystals.
887.4	.4	Mud, brown, soft; probably slumped material.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
893.4	6.0	Clay, brown, massive; with salt crystals at 888.0, 888.4, and 891.3 ft.; contains light-tan limy nodules at 889.0 and 890.0 ft.; granular salt at 892.6 and 893.0 ft.
897.0	3.6	Clay, brown and green, finely interlayered with salt, in equal amounts.
902.0	5.0	Salt, massive; with less than 1 percent green clay.
903.0	1.0	Clay, brown and green, interlayered with salt; in equal amounts.
907.0	4.0	Clay, brown, massive; contains limy nodules ½ in. across at 903.2 ft.; contains salt crystals ½ in. thick at 904.2, 904.4, 904.6 and between 904.8 and 905.0 ft.; vein of salt ¼ in. thick extends vertically upward 2 in. into brown clay.
912.0	5.0	No core.
912.7	.7	Salt and green clay.
916.1	3.4	Clay, brown, weakly fissile; contains limy nodules ½ in. across at 914.5 ft.
917.0	.9	Salt, crushed, and green clay, contorted and compressed.
921.6	4.6	No core.
926.3	4.7	Mud, brown, soft, contorted; probably slumped material.
926.6	.3	Clay, mixed brown and green.
926.9	.3	Salt, massive; with some brown clay.
927.0	.1	Salt; finely crushed in drill bit.
932.4	5.4	No core.
934.7	2.3	Mud, brown, soft; probably slumped material.
935.3	.6	Clay, brown.
937.0	1.7	Salt, massive, and brown clay; in equal amounts; poorly cored.
942.5	5.5	No core.
945.3	2.8	Mud, soft, contorted; probably slumped material.
947.0	1.7	Salt, massive and crystalline, finely ground, and contorted brown clay.
952.0	5.0	No core.
954.8	2.8	Mud, soft, contorted; probably slumped material.
957.0	2.2	Salt, massive and crushed, and brown clay; in equal amounts; core disordered.
962.0	5.0	No core.
962.3	.3	Mud and salt; broken core; pieces of salt and green clay suggest loss of salt.
966.7	4.4	Clay, green, brown, dark-brown, and almost black; with small veinlet of salt.
967.0	.3	Salt, massive.
974.5	7.5	No core.
975.1	.6	Clay, brown, massive.
975.3	.2	Salt, pure, massive.
976.8	1.5	Clay, brown, massive; with green fissile shale in plates 1 mm thick.
977.0	.2	Salt, massive; piece held in drill bit.
981.6	4.6	No core.
983.1	1.5	Clay, brown; with thin green clay layer at top.
984.1	1.0	Clay, brown; contains 5 percent salt crystals.
986.2	2.1	Clay, brown; contains numerous limy nodules in lower half.

Bristol drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
987.0	0.8	Clay, green; contains about 5 percent salt and about 5 percent flecks of white clay mineral or anhydrite.
993.0	6.0	No core.
997.0	4.0	Clay, brown, weakly fissile and massive; contains salt crystals scattered throughout; tuffaceous(?) material at 994.0 and 994.4 ft; green micaceous layers at 995.0 and 995.7 ft.
1,003.5	6.5	No core.
1,006.1	2.6	Clay, brown; contains salt crystals in green clay patches, limy nodules, and specks of white anhydrite.
1,007.0	.9	Salt and green clay.

Cadiz drill hole 1

[47 percent of core recovered]

Depth (feet)	Unit thickness (feet)	Description
1.4	1.4	Sand, medium, fine, and very fine, yellowish-brown; with salt as crystals, crystalline masses, and as surface crust; with gypsum as a crystal sand.
8.0	6.6	Clay, grayish-olive (10*Y* 4/2), dense, interlayered with porous salt and gypsum sand.
9.0	1.0	Salt, massive, coarsely crystalline; probably saturated with brine rich in calcium chloride as core is still damp after drying for 4 yr.
16.5	7.5	No core.
18.8	2.3	Clay, green and brown, contorted; contains about 20 percent salt crystals.
19.0	.2	Sand, fine, light-gray and medium-gray; presence of calcium chloride suggested by dampness of core after drying for 4 yr.
24.7	5.7	No core.
26.1	1.4	Clay, gray-green, dense; with light-brown (5*YR* 5/6) clay stringers.
27.2	1.1	Sand, fine, granitic; contains streaks of gypsum.
29.0	1.8	Clay, dark-brown; contains "fishtail" gypsum crystals ¼ to ½ in. long.
37.6	8.6	No core.
39.0	1.4	Clay and silt, light- and medium-brown; contains gypsum globules.
46.3	7.3	No core.
46.8	.5	Clay and silt, dark blackish-green and light brownish-green; contains masses of 1-mm gypsum crystals.
48.7	1.9	Silt and fine sand, light gray-green; contains gypsum grains and crystals.
49.0	.3	Gypsum, very fine granular to fine-granular, white with gray streaks.
58.0	9.0	No core.
59.2	1.2	Sand, fine, light gray-green, gypsiferous.
59.8	.6	Clay, dusky yellowish-brown (10*YR* 2/2).

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
60.0	0.2	Silt, light-tan (10*YR* 6/4); with a tangle of "fishtail" gypsum crystals.
67.5	7.5	No core.
68.2	.7	Sand, fine, yellowish-brown.
68.4	.2	Gypsum, powdery.
68.6	.2	Sand, fine, yellow-brown.
69.8	1.2	Clay, brown; with 1-in. layer of tangled gypsum crystals.
70.0	.2	Sand, very fine to medium, light-tan.
79.3	9.3	No core.
80.0	.7	Clay, brown, interbedded with fine sand and powdery gypsum.
85.0	5.0	No core.
90.0	5.0	Clay, brown, interbedded with fine sand and gypsum; with a conspicuous 2-in. flinty white layer at 89.6 ft. composed of montmorillonite and finely granular halite with a trace of sylvite.
93.7	3.7	No core.
100.0	6.3	Clay, brown; contains limy patches and nodules toward bottom and fine sand and scattered gypsum crystals throughout.
106.9	6.9	No core.
107.1	.2	Sand, medium, quartz; contains gypsum flakes.
108.0	.9	Clay, brown.
108.8	.8	Sand, fine; with ½-in. gypsum layer.
110.0	1.2	Clay, brown.
118.9	8.9	No core.
119.3	.4	Clay, brown.
119.7	.4	Gypsum and fine quartz sand.
120.0	.3	Clay, brown.
129.0	9.0	No core.
129.4	.4	Sand, fine, brown; contains sparse 1-mm quartz grains.
130.0	.6	Gypsum crystals; with a few tan limy nodules.
139.5	9.5	No core.
140.0	.5	Clay, brown; with crystalline gypsum.
140.4	.4	No core.
140.8	.4	Clay, brown.
141.3	.5	Gypsum, medium-granular and as crystals; contains 1-mm quartz grains.
143.3	2.0	Clay, brown; contains some gypsum.
145.8	2.5	Sand, fine, brown; contains coarse quartz grains and gypsum flakes and crystals.
146.6	.8	Silt, brown; contains coarse quartz grains and gypsum.
149.1	2.5	Sand, very fine to medium, brown; contains coarse quartz grains.
150.0	.9	Sand, very fine, brown; contains coarse quartz grains and gypsum.
152.1	2.1	No core.
158.8	6.7	Sand, brown; ranging from very fine sand containing coarse quartz grains to coarse sand in thin lenses; with ½-in. layer of biotite flakes at 155.6 ft.

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
160.0	1.2	Clay, moderate-brown (5*YR* 4/4), very dense; contains tan limy patches; distinctive unit.
165.7	5.7	No core.
171.1	5.4	Clay, moderate-brown (5*YR* 4/4), dense; contains light-gray and light pinkish-brown limy nodules; distinctive unit.
171.2	.1	Sand, fine, brown and gray.
171.4	.2	Clay, medium- to dark-gray, thinly laminated; with limonitic ochre between the laminae ¼-mm thick.
208.4	37.0	No core.
210.0	1.6	Sand, fine to very fine, moderate orange-brown (10*YR* 6/4); poorly consolidated; with 1-in. chocolate-brown clay seam.
218.6	8.6	No core.
220.0	1.4	Sand, fine, quartz, moderate orange-brown (10*YR* 6/4), poorly consolidated.
228.6	8.6	No core.
229.1	.5	Sand, fine, quartz, poorly consolidated.
229.7	.6	Clay, gray-brown, dense; with thin seams of yellow rusty fine sand.
230.0	.3	Sand, fine, yellow, rusty; with laminae of clay.
237.8	7.8	No core.
238.9	1.1	Sand, fine to very fine, poorly consolidated.
239.6	.7	Clay, gray-brown; with thin seam of light-gray silt.
239.8	.2	Sand, very fine, rusty.
240.0	.2	Clay, light-gray, limy, very hard.
245.8	5.8	No core.
250.0	4.2	Clay, medium-gray, dense; interlayered with beds of light grayish-brown silt.
256.0	6.0	No core.
256.6	.6	Clay, gray-brown, dense; slickensided fracture dips 57°.
256.8	.2	Clay, dark red-gray, dense; dips 28°, possibly due to drag from movement on above fracture.
257.4	.6	Clay, greenish-gray.
260.0	2.6	Clay, brownish-gray, dense; with light-gray silt seams and several limy layers.
263.9	3.9	No core.
267.9	4.0	Clay, dark-brown, very dense; with some light-gray silt layers.
268.2	.3	Silt, light-gray, and dark-brown clay.
268.5	.3	Limestone, greenish-gray (5*GY* 6/1), hard; fossil foraminifers, ostracodes, and abundant *Chara*.
269.2	.7	Silt and clay, finely laminated.
269.4	.2	Limestone, greenish-gray (5*GY* 6/1), hard; sparse fossil *Chara*.
269.7	.3	Clay, dark-brown; contains ¼-in. limy nodule; no fossils.
270.0	.3	Silt and very fine sand, brown and light gray-brown, finely interbedded.
273.7	3.7	No core.
279.4	5.7	Silt, pale yellowish-brown (10*YR* 6/2) finely interbedded and crossbedded with dark yellowish-brown (10*YR* 4/2); contains sparse clay seams.
280.0	.6	Clay, dark-brown, dense; with lighter brown silt seams.
280.7	.7	No core.

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
285.3	4.6	Silt interbedded with clay, pale to dark yellowish-brown, crossbedded.
288.6	3.3	Clay, dark-brown, massive.
288.8	.2	Silt, light-brown; contains one nonfossiliferous pale yellowish-brown (10*YR* 6/2) hard limestone nodule.
289.3	.5	Clay, sandy, medium-brown, nonbedded; contains some limy splotches; sparsely fossiliferous, with 1 mollusk(?) shell 1/10 in. long.
289.6	.3	Clay, silty, medium-brown; weakly fossiliferous; contains 1/4-in. lenses of dark-brown clay having a hackly appearance.
290.0	.4	Clay, sandy, medium-brown; contains 1 hard tan limestone nodule 1/2 in. thick.
294.9	4.9	No core.
296.7	1.8	Clay, dark-brown, blocky and massive, weakly laminated; contains 1 fossil gastropod shell 1 mm long.
297.7	1.0	Clay, medium-brown, granular, nonbedded; contains gypsum.
299.1	1.4	Silt, dark to pale yellowish-brown, thinly laminated.
299.4	.3	Clay, moderate olive-gray (5*Y* 4/2), dense.
300.0	.6	Silt, light to dark yellowish-brown, thinly laminated; contains pods of medium-brown clay.
306.3	6.3	No core.
310.0	3.7	Clay, sandy, medium-brown; no bedding.
313.5	3.5	Clay, dark-brown (10*YR* 3/2), massive; contains gypsum vein 1/4 in. thick with green clay borders.
315.7	2.2	Clay, brown, also mottled brown and green.
315.9	.2	Clay, silty, green; contains clear coarse quartz grains and has a bitter salty taste.
318.4	2.5	Clay, mottled brown and green, also dense brown; contains coarse and very coarse quartz grains.
318.8	.4	Gypsum, aggregate of large crystals.
319.8	1.0	Clay, brown; contains scattered gypsum crystals throughout.
320.5	.7	Clay, brown, massive; contains 2 very hard but shattered limestone nodules.
327.0	6.5	No core.
327.7	.7	Clay, mottled green and brown, dense and massive.
329.6	1.9	Clay, brown, dense.
330.0	.4	Clay, mottled green and brown; with 1-in. bed of very fine sand and silt.
333.4	3.4	Clay, dark yellowish-brown (10*YR* 4/2), massive, interbedded with silt.
333.5	.1	Limestone, light gray-green, hard; abundant fossil *Chara*.
333.8	.3	Clay, silty, grayish-green (10*GY* 5/2); abundant fossil *Chara*.
335.0	1.2	Clay, brown; contains moderately abundant fossil *Chara* in green clay blotches; spots and flecks of anhydrite.
335.2	.2	Gypsum, fibrous, asbestiform bed.
335.7	.5	Clay, sandy, brown; contains medium to coarse sand grains.
337.6	1.9	Clay, brown, dense.
340.0	2.4	Silt, light- and dark-brown; thinly color laminated.
345.2	5.2	No core.

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
349. 2	4. 0	Silt, medium yellowish-brown; not color laminated; gypsum seam ½ in. thick.
350. 0	. 8	Clay, dark-brown, dense; with lighter brown silt laminae.
355. 9	5. 9	No core.
356. 5	. 6	Clay, brown, dense; mottled with green clay containing sparse fossil spicules and shells.
358. 6	2. 1	Clay, reddish-brown and olive-brown, dense, blocky; no fossils.
359. 0	. 4	Clay, brown mottled with green, dense; contains sparse fossil *Chara* in green clay.
360. 0	1. 0	Clay, dark yellowish-brown, dense.
360. 7	. 7	Clay, medium-brown, very dense, blocky.
361. 9	1. 2	Clay, brown, massive; contains medium, coarse, and very coarse sand grains.
362. 1	. 2	Silt, finely laminated; contains ¼-in. layer of powdery gypsum.
363. 0	. 9	Clay, light-brown (5*YR* 5/6), dense, blocky.
364. 7	1. 7	Silt, clayey, light-brown, and dark-brown silty clay.
365. 0	. 3	Clay and silt, medium bluish-gray (5*B* 5/1) and greenish-gray (5*GY* 6/1), calcareous; contains gypsum, both powdery and as crystals, and fossil *Chara*.
368. 3	3. 3	Clay, light-brown (5*YR* 5/6) and moderate-brown, dense; contains scattered coarse quartz grains and sparse fossil *Chara* in green clay blotches.
368. 6	. 3	Limestone nodule, pale greenish-tan, hard; lies between walls of abundantly fossiliferous (*Chara*) green clay.
369. 8	1. 2	Clay, dark-brown and light-brown (5*YR* 5/6); contains sparse fossil *Chara* in green clay areas.
370. 0	. 2	Limestone nodules, medium orange-tan (10*YR* 6/4); contain biotite flakes and quartz grains; no fossils.
370. 6	. 6	No core.
373. 3	2. 7	Clay, sandy, brown; sparse fossil *Chara*.
376. 4	3. 1	Silt, alternating light and dark yellowish-brown, finely interbedded with light-brown (5*YR* 5/6) blocky clay.
378. 7	2. 3	Clay, sandy, medium-brown.
379. 4	. 7	Silt, light and dark yellowish-brown.
379. 9	. 5	Clay, dark-brown, dense.
380. 0	. 1	Silt, light and dark yellowish-brown.
386. 5	6. 5	No core.
387. 7	1. 2	Clay, brown, dense; with areas of mottled green and brown clay containing *Chara* and gastropods.
389. 9	2. 2	Silt, dark-brown, well-bedded.
390. 0	. 1	Limestone nodule, light-brown, hard.
390. 7	. 7	No core.
391. 4	. 7	Clay, brown with green patches; contains ½-in. gray-green hard limestone nodule; all sparsely fossiliferous (*Chara*).
392. 9	1. 5	Silt and clay, medium- to dark-brown.
393. 2	. 3	Clay, olive-brown, very dense.
394. 3	1. 1	Clay, brown; with medium sand.
395. 1	. 8	Clay, slate-green and brown; contains thin gypsum vein and pale greenish-gray (5*GY* 7/1) limestone nodule.

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
397. 5	2. 4	Clay, dark-brown, dense.
400. 0	2. 5	Clay, dark-brown, interbedded with lighter brown silt.
403. 3	3. 3	No core.
410. 0	6. 7	Clay, mottled and splotchy green and brown; sparse fossil *Chara*; contains coarse sand lenses.
420. 0	10. 0	Silt and silty clay, dark yellowish-brown (10*YR* 3/2) and moderate-brown (5*YR* 3/4), interbedded throughout with mottled green and brown clay; brown clay contains sandy layers.
423. 5	3. 5	No core.
424. 5	1. 0	Silt, clayey, brown.
425. 4	. 9	Clay, dark-brown, very dense; with laminae of silt; dip of laminae 30° from horizontal.
426. 4	1. 0	Silt interbedded with silty clay, dark-brown.
427. 0	. 6	Clay, brown; with sparse fossil *Chara* in green clay splotches.
427. 1	. 1	Clay, olive-brown, very dense.
427. 2	. 1	Clay, moderate-browns (5*YR* 2/4 to 5*YR* 5/4), very dense.
427. 3	. 1	Sand lens, predominantly very coarse (up to 4 mm) but grading down to extremely fine.
427. 7	. 4	Silt, moderate-brown.
428. 7	1. 0	Clay, moderate-brown (5*YR* 4/4), dense.
430. 0	1. 3	Clay, gray-green and dark-brown, limy; sparsely fossiliferous, with brown chitinous spicule.
430. 9	. 9	No core.
433. 3	2. 4	Clay, brown, dense; dip of bedding 30° from horizontal.
433. 5	. 2	Clay, dark reddish-brown (10*R* 3/4), dense.
437. 7	4. 2	Clay, sandy; sand grains all sizes up to 2 mm.
439. 2	1. 5	Clay, brown and green; sparse fossil *Chara* in green clay.
440. 0	. 8	Silt, brown.
446. 4	6. 4	No core.
450. 0	3. 6	Clay, brown with green patches, dense; possibly slumped material.
458. 3	8. 3	No core.
459. 5	1. 2	Clay, brown, dense; contains sand grains.
460. 0	. 5	Limestone nodules, tan and green, extremely hard; green nodules contain fossil *Chara*.
466. 0	6. 0	No core.
467. 7	1. 7	Sand, fine; dampness of core after drying for 4 yr suggests it was saturated with calcium chloride.
470. 0	2. 3	Clay, light-brown (5*YR* 6/4) and dark-brown (10*YR* 3/2) to pale yellowish-brown (10*YR* 6/2) very dense, well-bedded.
471. 3	1. 3	No core.
473. 8	2. 5	Clay, brown and pale orange-brown (10*YR* 7/2), dense; dip about 35°.
475. 6	1. 8	Clay, tan-brown; with light-gray and very light gray sandy clay patches containing sparse *Chara*.
480. 0	4. 4	Clay, medium to light orange-brown, very dense; with green clay and limy clay splotches bearing deepest fossils (*Chara*) found in this hole.
480. 8	. 8	Clay, brown to brownish-gray, dense.

Cadiz drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
488. 5	7. 7	Clay, light olive-gray (5*Y* 5/2) darkening to brownish-gray (5*YR* 4/1) near bottom; with some lighter gray silt beds.
490. 0	1. 5	Sand, very fine, light-gray; with thin clay seams.
498. 4	8. 4	No core.
498. 8	. 4	Clay, brown, contorted.
499. 0	. 2	Limestone nodule, gray-green; no fossils.
500. 0	1. 0	Silt and clay, light gray-brown.

Danby drill hole 1

[52 percent of core recovered]

Depth (feet)	Unit thickness (feet)	Description
4. 0	4. 0	No core.
10. 5	6. 5	Silt, clayey, dark yellowish-brown (10*YR* 4/2), calcareous, salty; wormlike cavities stained by iron and manganese; thin beds of fine sand in lower part.
12. 3	1. 8	Gypsum, crystalline.
14. 0	1. 7	Silt, clayey, dark yellowish-brown (10*YR* 4/2), calcareous, salty; as above but with less manganese stain and more iron stain.
15. 2	1. 2	Gypsum, crystalline; with calcareous and salty silt.
16. 2	1. 0	Silt; as above but more clayey; contains thin beds of mica.
16. 4	. 2	Gypsum, crystalline.
20. 0	3. 6	Silt; as above, but more clayey; contains thin beds of mica.
22. 5	2. 5	No core.
30. 0	7. 5	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, salty, massive; with thin bed of medium sand at 27.5 ft.
37. 5	7. 5	No core.
40. 0	2. 5	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, salty, massive; thin bed of coarse sand at 39.5 ft.
45. 5	5. 5	No core.
50. 0	4. 5	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, salty, massive.
53. 0	3. 0	Sand, fine, gray; grades to gray clayey silt.
60. 0	7. 0	Sand, fine, clayey, and silty; contains many very coarse sand grains and granules (up to 4 mm).
62. 0	2. 0	No core.
65. 0	3. 0	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, salty.
69. 5	4. 5	Sand, medium, silty, calcareous, salty.
70. 0	. 5	Clay, silty, calcareous, salty; some brown limestone.
72. 5	2. 5	No core.
74. 0	1. 5	Sand, medium, silty.
78. 0	4. 0	Silt, clayey, dark yellowish-brown (10*YR* 4/2).
79. 0	1. 0	Sand, fine, silty.
80. 0	1. 0	Clay, silty, yellowish-brown (10*YR* 5/2), calcareous, salty.
89. 5	9. 5	No core. Probably unconsolidated dark yellowish-brown (10*YR* 4/2) calcareous silty clay.
90. 0	. 5	Limestone, brown, and poorly cemented mudstone.
93. 0	3. 0	No core.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
97. 5	4. 5	Silt, clayey, moderate yellowish-brown (5*YR* 5/4), calcareous, salty.
98. 0	. 5	Sand, medium, silty, light-brown (5*YR* 6/4), calcareous.
99. 0	1. 0	Sand, medium; grades to silty clay.
100. 0	1. 0	Clay, silty; interbedded with medium sand; both dark yellowish brown (10*YR* 4/2); well bedded.
104. 5	4. 5	No core.
105. 0	. 5	Clay, silty, dark yellowish-brown (10*YR* 4/2), calcareous.
106. 5	1. 5	Sand, fine.
110. 0	3. 5	Silt, clayey, interbedded with fine sand; iron stains on sand fillings; limestone nodules at 109.0 ft.
118. 0	8. 0	No core.
118. 5	. 5	Silt, clayey, dark yellowish-brown (10*YR* 4/2); becomes more clayey at 118.5 ft.
120. 0	1. 5	Clay, dark yellowish-brown, interbedded with light olive-gray (5*Y* 5/2) clay.
128. 0	8. 0	No core.
129. 7	1. 7	Clay, silty, dark yellowish-brown (10*YR* 4/2); mudstone fragment at 129.0 ft.
130. 0	. 3	Silt, greenish-gray (5*GY* 6/1), interbedded with light greenish-gray (5*GY* 8/1) calcareous silt.
131. 5	1. 5	No core.
132. 5	1. 0	Silt, light olive-gray (5*Y* 6/1), calcareous.
137. 5	5. 0	Sand, silty, calcareous, massive.
140. 0	2. 5	Silt, medium dark-gray (*N* 4), calcareous, thinly bedded, hard and compact.
144. 0	4. 0	No core.
150. 0	6. 0	Silt, interbedded clayey and sandy, medium dark-gray (*N* 4).
158. 0	8. 0	No core.
159. 0	1. 0	Silt, fine-sandy, massive.
160. 0	1. 0	Clay, silty, calcareous, salty, thin-bedded.
169. 9	9. 9	No core.
170. 0	. 1	Sand, fine, silty, banded grays.
177. 5	7. 5	No core.
178. 0	. 5	Sand, medium, silty, olive-gray (5*Y* 4/1).
179. 0	1. 0	Sand, fine, silty, olive-gray (5*Y* 4/1).
180. 0	1. 0	Silt, gray, and medium sand; both calcareous and nonsalty.
187. 0	7. 0	No core.
188. 5	1. 5	Sand, medium, silty; contains flattened nodules of clay.
190. 0	1. 5	Silt, finely interbedded with fine sand, both olive gray (5*Y* 4/1), calcareous.
195. 0	5. 0	No core.
195. 3	. 3	Sand, fine, silty and clayey, olive-gray (5*Y* 4/1), massive.
196. 0	. 7	Sand, medium, silty, olive-gray (5*Y* 4/1), massive.
199. 5	3. 5	Silt, clayey; contains cavities of medium sand.
200. 0	. 5	Sand, medium, silty, calcareous, slightly salty, well-bedded; manganese stain on sand bedding.
206. 0	6. 0	No core.
208. 5	2. 5	Silt, clayey, olive-gray (5*Y* 4/1), calcareous; color banded.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
209.0	0.5	Sand, medium, silty, olive-gray (5*Y* 4/1), calcareous, thinly bedded.
210.0	1.0	Silt, clayey, olive-gray (5*Y* 4/1), calcareous.
217.0	7.0	No core.
220.0	3.0	Sand, fine, silty, interbedded and intergradational with clayey silt, both olive gray (5*Y* 4/1), calcareous, and non-salty; thin bedding seen in clayey silt where clay and silt are of higher concentration.
227.0	7.0	No core.
227.5	.5	Silt, clayey, olive-gray (5*Y* 4/1), calcareous.
230.0	2.5	Sand, medium, calcareous.
235.5	5.5	No core.
240.0	4.5	Sand, medium, silty, olive-gray (5*Y* 4/1), calcareous, massive; bed of clayey silt of same color at 236.0 ft.
247.0	7.0	No core.
250.0	3.0	Sand, medium, silty, olive-gray (5*Y* 4/1).
257.0	7.0	No core.
257.5	.5	Sand, fine, silty, olive-gray (5*Y* 4/1), calcareous; grades to coarse sand at 257.5 ft.
260.0	2.5	Clay, silty, olive-gray (5*Y* 4/1), calcareous, massive; contains cavities of coarse sand.
264.5	4.5	No core.
268.0	3.5	Sand, medium, silty, olive-gray (5*Y* 4/1), massive, but with traces of bedding; carbonaceous(?) material at 268.0 ft.
270.0	2.0	Silt, clayey, olive-gray (5*Y* 4/1), calcareous; thinly bedded at 269.0 ft; fissile along planes with smooth and highly polished surfaces dipping 45° to axis of core.
277.0	7.0	No core.
278.5	1.5	Sand, medium, silty, olive-gray (5*Y* 4/1), calcareous, bedded: limestone cuttings of pale orange-brown (10*YR* 7/2) at 277.0 ft.
280.0	1.5	Silt, clayey, olive-gray (5*Y* 4/1), massive; medium sand at 279.5 ft.
285.0	5.0	Sand, fine, silty, interbedded and intergradational with clayey silt, both olive gray (5*Y* 4/1), calcareous.
289.0	4.0	Sand, medium, silty, interbedded with clayey silt; distinct bedding; contains small inclusions of reddish-brown clay.
290.0	1.0	Sand, coarse, olive-gray (5*Y* 4/1), calcareous; volcanic cinders at 289.0 ft.
296.0	6.0	No core.
296.5	.5	Clay, silty, thinly interbedded with fine sand, both olive gray (5*Y* 4/1); volcanic cinders at 296.5 ft.
300.0	3.5	Clay, silty, olive-gray (5*Y* 4/1), calcareous, massive; thin bedding at 297.0 ft.
305.0	5.0	No core.
309.8	4.8	Silt, clayey, olive-gray (5*Y* 4/1); bedding at 306.0 ft.
310.0	.2	Gypsum, crystalline.
320.0	10.0	No core.
320.4	.4	Gypsum crystals in pale yellowish-brown (10*YR* 6/2) clayey silt.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
322.6	2.2	Gypsum, crystalline.
323.0	.4	Gypsum, crystalline, in clayey silt; bedded.
327.0	4.0	Gypsum, crystalline, moderate yellowish-brown (10*YR* 5/4) clayey silt.
330.0	3.0	Gypsum, crystalline, in calcareous pale orange-brown (10*YR* 7/2) silty fine sand.
333.0	3.0	No core.
339.0	6.0	Gypsum, crystalline, in calcareous moderate yellowish-brown silty fine sand; locally well-bedded; grades into silty clay at 336.0 ft and 338.5 to 339.0 ft.
340.0	1.0	Gypsum, crystalline.
347.0	7.0	No core.
349.0	2.0	Clay, silty, olive-gray (5*Y* 4/1), calcareous; contains nodules of moderate yellowish-brown (10*YR* 5/4) clay.
349.8	.8	Gypsum, crystalline, in clayey silt; becomes increasingly clayey with depth.
350.0	.2	Sand, fine, greenish-gray, calcareous.
354.5	4.5	No core.
359.5	5.0	Clay, silty, dark yellowish-brown (10*YR* 4/2), calcareous; contains flattened clay nodules and gypsum crystals which increase in quantity with depth.
360.0	.5	Gypsum crystals in silty clay; with thin beds of clay.
364.0	4.0	No core.
370.0	6.0	Gypsum, crystalline, and bassanite in calcareous dark yellowish-brown (10*YR* 4/2) silty clay; quantity of gypsum increases with depth to completely gypsum at 370.0 ft. Bassanite at about 365 ft.
377.5	7.5	No core.
378.0	.5	Sand, silty, massive.
380.0	2.0	Gypsum, crystalline, in dark yellowish-brown (10*YR* 4/2) silty clay.
387.5	7.5	No core.
390.0	2.5	Gypsum crystals and crystalline gypsum in slightly calcareous dark yellowish-brown (10*YR* 4/2) silty fine sand.
397.0	7.0	No core.
400.0	3.0	Silt, clayey, dark yellowish-brown (10*YR* 4/2), calcareous; interbedded with gypsum crystals and crystalline gypsum.
407.0	7.0	Gypsum, crystalline, in dark yellowish-brown (10*YR* 4/2) clayey silt; thin bed of dark-gray silt at 407.0 ft.
410.0	3.0	Silt, clayey, light olive-gray (5*Y* 6/1); contains crystalline gypsum.
411.0	1.0	No core.
420.0	9.0	Gypsum, crystalline, in calcareous yellowish-brown (10*YR* 5/2) clayey silt; with fine sand at 410.0 to 411.0 ft.
424.0	4.0	No core.
430.0	6.0	Gypsum, crystalline, in olive-gray (5*Y* 4/1) salty clayey silt.
434.5	4.5	No core.
440.0	5.5	Gypsum, crystalline, in salty olive-gray (5*Y* 4/1) clayey silt.
441.0	1.0	Sand, medium, silty.
443.0	2.0	Gypsum, crystalline, in clayey silt.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
450.0	7.0	Silt, clayey, olive-green (5*Y* 4/1), calcareous, salty; thin bed of medium sand at 446.5 ft.
452.5	2.5	Silt, clayey, bedded; fine sand and some biotite at 451.0 ft.
460.0	7.5	Gypsum, crystalline, in salty calcareous olive-gray (5*Y* 4/1), silt.
461.0	1.0	No core.
464.8	3.8	Gypsum, crystalline, in slightly salty yellowish-brown (10*YR* 5/2) clayey silt; gypsum concentration grades from 40 percent at 461.0 ft to 0 percent at 461.5 ft, then increases with depth to 80 percent at 464.8 ft.
465.1	.3	Gypsum, crystalline; contains stringers of clay and off-colored gypsum crystals giving a "marble cake" appearance.
465.3	.2	Gypsum, crystalline clusters, in salty yellowish-brown (10*YR* 5/2) clayey silt; gypsum about 60 percent.
466.4	1.1	Silt, clayey, yellowish-brown (10*YR* 5/2), salty; small amount of gypsum.
467.3	.9	Gypsum, crystalline, in salty yellowish-brown (10*YR* 5/2) clayey silt; some thin-bedded clays.
470.0	2.7	Gypsum, crystalline; contains stringers of clay and off-colored gypsum crystals giving a "marble cake" appearance.
480.0	10.0	Gypsum, crystalline, in salty calcareous yellowish-brown (10*YR* 5/2) clayey silt; gypsum concentration varies from 10 to 80 percent with average around 60 percent; at various zones silt grades to silty fine sand and gypsum decreases.
482.5	2.5	No core.
490.0	7.5	Gypsum, crystalline, and very little calcareous yellowish-brown (10*YR* 5/2) silt; silt more abundant at 482.5, 483.6, 484.7, and 485.7 ft; silt and off-colored gypsum crystals give a "marble cake" appearance.
492.6	2.6	No core.
500.0	7.4	Gypsum, crystalline, and some slightly salty calcareous yellowish-brown (10*YR* 5/2) silt; silt content high at 492.2, 495.2, and 497.1 ft; overall gypsum 90 percent.
509.0	9.0	No core.
510.0	1.0	Gypsum, crystalline, with bassanite; contains 10 percent clayey silt.
512.6	2.6	No core.
519.9	7.3	Gypsum, crystalline, in salty calcareous olive-gray (5*Y* 4/1) silt; gypsum occurs in compact flattened nodules at points of highest concentrations.
520.0	.1	Sand, fine, interbedded with salty calcareous clayey silt, both olive-gray (5*Y* 4/1).
527.0	7.0	No core.
527.5	.5	Silt, clayey, pale yellowish-brown (10*YR* 6/2); interbedded with thin beds of green clay.
528.4	.9	Sand, fine, clayey and silty; contains pockets of yellowish-gray (5*Y* 8/1) sand, also yellow fine sand nodules bordered by dark clay.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
528.9	0.5	Clay and fine sand of variegated color, including olive-gray (5*Y* 4/1), very light gray (*N* 8), and pale-red (10*R* 6/2) clay, and yellow calcareous salty sand; clay color at 528.9 ft grades from olive gray (5*Y* 4/1) to dark greenish gray (5*GY* 4/1).
530.0	1.1	Sand, medium, silty, light olive-gray (5*Y* 5/2), calcareous, salty, massive; closer inspection of sand reveals apple-green clay coating on many of the sand grains.
535.5	5.5	No core.
536.2	.7	Sand, medium, silty, light olive-gray (5*Y* 5/2), calcareous, salty, massive.
538.8	2.6	Silt, clayey, pale olive-gray (5*Y* 7/1), interbedded with olive-gray (5*Y* 4/1) clay; grades into massive salty slightly calcareous pale olive-gray (5*Y* 7/1) silty fine sand.
538.9	.1	Clay interbedded with sand; clay is pale olive gray (5*Y* 7/1), olive gray (5*Y* 4/1), and moderate orange pink (10*R* 7/4); sand is yellow grading to brown and to nearly black at top and bottom.
539.2	.3	Sand, medium, silty, pale yellowish-brown (10*YR* 6/2), calcareous, massive.
539.3	.1	Clay interbedded with very fine sand; clay is pale olive gray (5*Y* 7/1) and olive gray (5*Y* 4/1), calcareous; sand is dark yellowish orange (10*YR* 6/6) with dark brown top and bottom.
539.7	.4	Sand, fine, clayey and silty, pale yellowish-brown (10*YR* 6/2), calcareous.
539.9	.2	Clay interbedded with very fine sand; clay is pale olive gray (5*Y* 7/1) and olive gray (5*Y* 4/1), calcareous; sand is dark yellowish orange (10*YR* 6/6) with dark brown top and bottom.
540.0	.1	Sand, very fine, silty, pale yellowish-brown (10*YR* 6/2), calcareous.
541.0	1.0	No core.
542.0	1.0	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, massive.
545.4	3.4	Silt, clayey, yellowish-brown (10*YR* 5/2), calcareous, poorly consolidated and water-saturated (core slumped beyond recovery); clayey section at 544.8 ft. contains nodule of crystalline gypsum.
545.8	.4	Silt, clayey, yellowish-brown, calcareous.
546.2	.4	Silt, clayey, yellowish-brown, calcareous, salty; contains cavities filled by moderate yellowish-brown clay and medium sand.
548.8	2.6	Sand, medium, silty, yellowish-brown, calcareous, salty, massive.
549.5	.7	Clay and silty clay, calcareous, salty; variegated colors: bluish white (5*B* 9/1), olive gray (5*Y* 4/1), dark greenish gray (5*GY* 4/1), pale pink (5*RP* 8/2), and light greenish gray (5*G* 8/1).
550.0	.5	Sand, very fine, clayey and silty; grades into salty calcareous clayey silt interbedded with clay.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
552.5	2.5	No core.
552.7	.2	Sand, fine, interbedded with calcareous clay; bedding distorted; sand grains are coated green.
555.0	2.3	Clay, pale grayish blue-green; thinly interbedded with volcanic dust.
556.4	1.4	Clay, light-gray (*N* 7), calcareous, massive.
556.5	.1	Clay, dark-brown; thin bed bordering slickensides.
556.9	.4	Clay interbedded with calcareous moderately micaceous fine sand; angle of bedding 20° from horizontal.
560.0	3.1	Clay interbedded with calcareous clayey silt; massive clay containing cavities filled with fine sand between 558.6 and 559.9 ft.
561.0	1.0	Clay, and silty clay, color banded but generally yellowish gray (5*Y* 8/1); pastel green and yellow also observed.
562.0	1.0	Clay, yellowish-gray (5*Y* 8/1), massive; with thin beds of pastel green and dark yellowish-orange (10*YR* 6/6) clay.
562.2	.2	Sand, very fine, brown, massive.
563.0	.8	Clay, dark greenish-gray (5*G* 4/1), massive.
564.8	1.8	Clay, light greenish-gray (5*GY* 8/1), massive; bed of very fine sand between 564.4 and 564.6 ft.
568.9	4.1	Clay, light greenish-gray (5*G* 8/1), to greenish-black (5*G* 2/1), lamellar; carbonaceous material containing pyrite at 565.2, 566.0, and 566.5 ft.
569.9	1.0	Clay interbedded with silty very fine sand, both light greenish gray (5*G* 8/1).
570.0	.1	Limestone, clayey, lamellar; contains ½-in. bed of brecciated opaline shale.
576.5	6.5	No core.
577.1	.6	Shale, dark greenish-gray (5*GY* 4/1), calcareous, lamellar, highly compact.
580.0	2.9	Clay, grayish-olive (10*Y* 4/2), calcareous, lamellar.
583.0	3.0	No core.
583.7	.7	Clay, dark greenish-gray (5*G* 4/1), lamellar.
584.7	1.0	Sand, very fine, dark greenish-gray (5*G* 4/1), massive.
589.7	5.0	Clay, dark greenish-gray (5*G* 4/1), lamellar.
590.0	.3	Sand, fine, dark greenish-gray (5*G* 4/1); contains carbonaceous material.
598.2	8.2	No core.
600.0	1.8	Sand, very fine, silty, greenish-gray (5*GY* 6/1), calcareous, salty, massive.
605.0	5.0	No core.
610.0	5.0	Sand, very fine, silty, medium greenish-gray (5*G* 5/1), calcareous, salty, faintly bedded; more compact clayey beds at 606.3 and 608.8 ft exhibit parting.
613.8	3.8	No core.
620.0	6.2	Sand, fine, silty, light greenish-gray (5*GY* 8/1), calcareous, massive; micaceous fine sand partings.
625.0	5.0	No core.
629.0	4.0	Sand, fine, silty, dark greenish-gray (5*GY* 4/1), calcareous, massive.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
630.0	1.0	Clay, light greenish-gray (5*GY* 8/1), calcareous, massive.
639.0	9.0	No core.
640.0	1.0	Sand, fine, silty, dark greenish-gray (5*GY* 4/1), calcareous, massive.
646.2	6.2	No core.
647.6	1.4	Sand, fine, silty, dark greenish-gray (5*GY* 4/1), calcareous, salty, massive.
647.8	.2	Clay, dark greenish-gray (5*GY* 4/1), calcareous, lamellar.
648.0	.2	Sand, fine, silty.
648.1	.1	Clay, dark greenish-gray (5*GY* 4/1), lamellar.
648.5	.4	Sand, fine, silty, dark greenish-gray (5*GY* 4/1), massive.
649.4	.9	Clay, dark greenish-gray (5*GY* 4/1), massive.
649.5	.1	Limestone, gray.
650.0	.5	Sand, fine, silty, dark yellowish-brown (10*YR* 4/2), calcareous, massive.
656.4	6.4	No core.
658.4	2.0	Sand, fine, silty, olive-gray (5*Y* 4/1), calcareous, massive.
658.7	.3	Sand, fine; grades in depth to gray silt then back to carbonaceous fine sand.
659.8	1.1	Sand, fine, silty, olive-gray (5*Y* 4/1), massive.
660.0	.2	Silt interbedded with fine sand, both olive gray (5*Y* 4/1).
665.0	5.0	No core.
669.2	4.2	Sand, fine, silty, olive-gray (5*Y* 4/1), calcareous, massive.
670.0	.8	Clay interbedded with silty fine sand, both olive gray, calcareous.
679.1	9.1	No core.
680.0	.9	Clay interbedded with silty fine sand, both light gray.
681.9	1.9	No core.
687.9	6.0	Sand, fine.
689.5	1.6	Clay, laminated, thin-bedded.
689.8	.3	Sand, fine.
690.0	.2	Clay, massive.
693.0	3.0	No core.
693.5	.5	Clay, sandy.
700.0	6.5	Sand; last 2 ft very slightly consolidated.
705.8	5.8	No core.
706.4	.6	Clay, multicolored, predominantly orange; may be slumped material.
710.0	3.6	Sand, fine.
717.1	7.1	No core.
718.0	.9	Clay, disordered and without form; probably slumped material.
719.4	1.4	Clay, disordered and with vertical bedding and fragments of sand; may be slumped material.
720.0	.6	Sand, fine, interbedded with dense, compact gray flinty clay; contains some limestone.
728.8	8.8	No core.
729.7	.9	Clay, disordered; probably slumped material.
730.0	.3	Sand, massive.
731.4	1.4	No core.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
740.0	8.6	Sand, fine, silty, interbedded with massive and lamellar clay; calcareous and carbonaceous at places; with micaceous partings; fossil ostracodes and foraminifers at 732.4 and 738.4 ft and in addition, gastropods, pelecypods, and barnacles at 738.4 ft.
747.5	7.5	No core.
750.0	2.5	Sand, fine, interbedded with lamellar clay and massive silty clay; becomes highly limy at 750.0 ft.
758.6	8.6	No core.
760.0	1.4	Sand, fine, clayey, interbedded and intergradational with clayey silt and clay, all dark greenish gray (5*GY* 4/1) and calcareous.
763.0	3.0	No core.
770.0	7.0	Clay, massive, bedded, and lamellar, interbedded with clayey silt, mostly pale bluish-gray (5*B* 8/1), all calcareous; clay lamellae greenish gray with fine lamellae of white carbonate material; limy beds at 757.0 and 758.3 ft.
772.5	2.5	No core.
780.0	7.5	Clay, massive, interbedded with clayey silt, both greenish gray (5*GY* 6/1) darkening to almost black at 774.0 and 776.5 ft, calcareous.
780.7	.7	No core.
781.5	.8	Limestone, light-gray (*N* 7); no bedding; roller bit blocked.
785.0	3.5	No core.
785.3	.3	Sand, fine, in hard sandy limestone, both light gray (*N* 7); fine sand partings.
785.5	.2	Limestone, light-gray.
786.2	.7	Clay, massive and lamellar, interbedded with silty clay, both light gray; fossil ostracodes and foraminifera at 785.9 ft.
787.5	1.3	Limestone, light-gray.
790.0	2.5	Clay, massive and lamellar, grayish olive-green (5*GY*3/2), carbonate-rich; strong hydrogen sulfide odor; core well broken by roller bit.
798.7	8.7	No core.
799.0	.3	Clay, dark-gray (*N* 3), massive.
799.3	.3	Silt, thinly interbedded with carbonate-rich clay.
799.8	.5	Clay, greenish-gray (5*GY* 6/1), massive, highly compacted.
800.0	.2	Sand, coarse, clayey and silty; quartz is subangular to rounded, somewhat frosted suggesting it was windblown.
800.5	.5	No core.
801.0	.5	Silt, clayey, brown, massive.
801.3	.3	Clay, compact, fissile; contains pebble of dioritic rock.
804.7	3.4	Clay, silty, grading to silty fine sand, both pale yellowish brown (10*YR* 6/2).
805.0	.3	Sand, fine, brown, green, and dusty white; colors alternating starting with white at top grading to green and then to brown, with series repeated several times.
807.3	2.3	No core.
808.8	1.5	Silt, clayey, dark yellowish-brown; contains dark-blue clay nodules; probably slumped material.

Danby drill hole 1—Continued

Depth (feet)	Unit thickness (feet)	Description
809.4	0.6	Sand, medium, slightly clayey; spotted with hematite stains.
810.0	.6	Sand, medium, dusty-white; interbedded with moderate olive-brown (5*Y* 4/4) clayey and silty fine sand; brown grades to reddish pink toward center of core.
816.7	6.7	No core.
817.2	.5	Clay, silty, dark yellowish-brown (10*YR* 4/2), massive; contains fragments of hard, compact clay.
820.0	2.8	Sand, medium, silty, moderate orange-brown (10*YR* 6/4), massive.
827.5	7.5	No core.
830.0	2.5	Sand, medium, silty, moderate orange-brown (10*YR* 6/4), massive.
837.0	7.0	No core.
840.5	.5	Granodiorite boulder; some fragments brought up.
846.0	5.5	No core.
850.0	4.0	Clay and silt, disordered; probably slumped material; bottom 0.8 ft contains broken fragments of granodiorite. Fossil foraminifers and carbonized wood fragment found in disordered material; source location indeterminate.
858.5	8.5	No core.
859.5	1.0	Clay and silty clay, brown to blue-black, massive, disordered.
860.0	.5	Granodiorite fragments (driller believed he was forcing a boulder ahead of the bit with mud as a lubricant)
880.0	20.0	Gravel, primarily of granodiorite; recovered only fragments.

Danby drill hole 2

[60.7 percent of core recovered]

Depth (feet)	Unit thickness (feet)	Description
5.0	5.0	No core.
8.8	3.8	Clay, silty, moderate yellowish-brown (10*YR* 5/4), calcareous, salty.
14.0	5.2	Clay, silty, calcareous, salty; more silty than above.
15.0	1.0	Clay, silty, moderate yellowish-brown (10*YR* 5/4), calcareous, salty.
25.0	10.0	Clay, silty, light-brown (5*YR* 5/6), calcareous, salty; contains subangular grains of quartz (1 mm).
30.0	5.0	Clay, silty, light-brown (5*YR* 5/6), micaceous, calcareous, salty, massive.
31.8	1.8	No core.
33.0	1.2	Clay, silty, dark yellowish-brown (10*YR* 4/2), calcareous, salty.
38.0	5.0	Clay, silty; more clayey than above and lighter in color.
38.3	.3	Sand, medium, poorly sorted.
40.0	1.7	Clay, silty, light-buff, calcareous, salty.
48.0	8.0	Clay, silty, massive; contains many cavities filled with fine sand.
50.0	2.0	Clay, light-buff, massive.
53.3	3.3	No core.

Danby drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
55. 3	2. 0	Clay, light-buff, calcareous, massive.
60. 0	4. 7	Sand, very fine, clayey; lenses rich in biotite.
63. 4	3. 4	No core.
70. 0	6. 6	Silt, clayey, calcareous, salty, massive; contains many rounded 1- to 2-mm quartz grains.
76. 5	6. 5	No core.
80. 0	3. 5	Silt, clayey, light-buff, calcareous, massive.
86. 5	6. 5	No core.
90. 0	3. 5	Silt, clayey, light-buff, calcareous, massive.
96. 2	6. 2	No core.
100. 0	3. 8	Silt, clayey, yellowish-gray (5*Y* 8/1), calcareous, massive; sand-filled cavities at 97.0 ft.
107. 2	7. 2	No core.
110. 0	2. 8	Silt, clayey, yellowish-gray (5*Y* 8/1), calcareous, massive.
118. 2	8. 2	No core.
119. 5	1. 3	Silt, clayey, yellowish-gray (5*Y* 8/1), massive.
120. 0	. 5	Sandstone, medium-grained, well-cemented.
129. 0	9. 0	No core.
130. 0	1. 0	Sandstone fragments and limy nodules containing calcite-filled vugs.
133. 0	3. 0	No core.
140. 0	7. 0	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive.
142. 6	2. 6	No core.
150. 0	7. 4	Silt, clayey, light olive-gray (5*Y* 6/1), calcareous, massive.
158. 0	8. 0	No core.
160. 0	2. 0	Silt, clayey, light olive-gray (5*Y* 6/1), calcareous, massive.
169. 5	9. 5	No core.
170. 0	. 5	Silt, clayey, light olive-gray (5*Y* 6/1), calcareous, massive; faint bedding planes.
175. 5	5. 5	No core.
180. 0	4. 5	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive; not well sorted mineralogically.
187. 0	7. 0	No core.
190. 0	3. 0	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive.
199. 2	9. 2	No core.
200. 0	. 8	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive.
204. 0	4. 0	No core.
207. 0	3. 0	Sand, light-brown (5*YR* 6/4,) massive.
210. 0	3. 0	Sand, light olive-gray (5*Y* 6/1), massive.
212. 0	2. 0	No core.
220. 0	8. 0	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive; not well sorted mineralogically.
229. 0	9. 0	No core.
230. 0	1. 0	Sand, very fine, light olive-gray (5*Y* 6/1), calcareous, massive; not well sorted mineralogically.
232. 0	2. 0	No core.
250. 0	18. 0	Sand, very fine, clayey, light olive-gray (5*Y* 6/1), calcareous, massive; becomes more clayey with depth.
260. 0	10. 0	Clay interbedded with silty clay, light olive-gray (5*Y* 6/1), calcareous, thinly bedded.

Danby drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
263.0	3.0	No core.
270.0	7.0	Clay, light olive-gray (5*Y* 6/1), brown at depth, massive, bedded; grades downward to silty clay and to very fine sand.
278.0	8.0	Silt, clayey, moderate yellowish-brown (10*YR* 5/4), micaceous.
281.0	3.0	Gypsum, crystalline, in clayey silt; gypsum 80 percent.
290.0	9.0	Silt, clayey, moderate yellowish-brown (10*YR* 5/4), micaceous; contains a few gypsum crystals.
293.0	3.0	No core.
299.7	6.7	Silt, clayey, light-buff, micaceous, calcareous.
300.0	.3	Gypsum, crystalline; 90 percent.
301.0	1.0	No core.
301.3	.3	Gypsum, crystalline.
310.0	8.7	Gypsum, crystalline, in calcareous clayey silt interbedded with medium sand.
318.0	8.0	No core.
319.0	1.0	Silt, clayey, light-buff, calcareous; contains a few gypsum crystals.
320.0	1.0	Gypsum, crystalline; 75 percent.
326.5	6.5	No core.
330.0	3.5	Clay and silt, disordered; with 0.2 ft crystalline gypsum and bassanite interbedded with clay.
332.5	2.5	No core.
332.9	.4	Pebbles of limestone and biotite-rich diorite.
333.9	1.0	Gypsum, crystalline, in coarse sand.
338.0	4.1	Sand, fine, thinly interbedded with silt.
340.0	2.0	Sand, fine, silty, grading to fine gravel, both light brown (5*YR* 6/4), calcareous.
346.5	6.5	No core.
350.0	3.5	Sand, very fine, and silt, both light brown (5*YR* 6/4), calcareous; faint bedding planes.
351.4	1.4	No core; drill struck boulder.
351.5	.1	Sandstone, medium- to coarse-grained; loosely cemented with calcareous cement.
352.0	.5	No core.
352.4	.4	Silt and clay, both calcareous, massive.
352.8	.4	Sand, medium, dark yellowish-brown (10*YR* 4/2).
353.3	.5	Sand, fine, dark yellowish-brown (10*YR* 4/2).
360.0	6.7	Sand, fine, interbedded with clayey silt, both moderate yellowish brown (10*YR* 5/4).
364.0	4.0	Sand, fine, silty; grades to silt at depth.
364.7	.7	Sand, very fine, highly carbonaceous.
365.5	.8	Sand, fine, silty, and clay; sand is moderately reactive in dilute cold hydrochloric acid, but clay is not reactive.
370.0	4.5	Sand, very fine; grades to silt at depth.
373.8	3.8	No core.
380.0	6.2	Clay, massive and compact, grading to fine sand and back to compact clay at bottom, all greenish gray (5*GY* 6/1) and slightly calcareous.
381.5	1.5	No core.
381.8	.3	Sand, very fine, clayey, poorly sorted.

Danby drill hole 2—Continued

Depth (feet)	Unit thickness (feet)	Description
382. 4	0. 6	Clay, silty, extremely compact.
383. 6	1. 2	Clay, silty; disordered.
384. 8	1. 2	Clay, very fine sandy, extremely compact.
390. 0	5. 2	Sand, fine, silty, grading to medium sand at depth, both light olive gray (5*Y* 5/2); poorly sorted.
391. 0	1. 0	No core.
391. 2	. 2	Pebble of volcanic rock 1½ in. across; light-brown lava with phenocrysts of epidote and hornblende.
393. 0	1. 8	Silt, clayey, faint-red to greenish-gray, massive, compact; contains limy nodules and large quartz grains.
394. 3	1. 3	Clay, disordered fragments.
395. 0	. 7	Clay, faint-red to greenish-gray, massive, extremely compact.
396. 0	1. 0	Clay, disordered fragments.
397. 0	1. 0	Clay, light-brown (5*YR* 5/6) to greenish-gray (5*GY* 6/1), extremely compact; fossil foraminifers.
398. 6	1. 6	Clay, disordered.
399. 0	. 4	Clay, light olive-gray (5*Y* 5/2), calcareous, nonsalty, extremely compact; stained by iron oxide.
400. 0	1. 0	Clay, disordered fragments, and massive clay at 400.0 ft.
406. 0	6. 0	No core.
407. 0	1. 0	Clay, green, calcareous, massive.
409. 8	2. 8	Clay, calcareous, massive and hard; contains limy nodules at 409.4 ft.
410. 0	. 2	Sand, very fine, moderate-brown (5*YR* 4/4).
420. 0	10. 0	Clay, moderate-brown (5*YR* 4/4), massive; contains light-buff limy nodules.
425. 5	5. 5	No core.
430. 0	4. 5	Silt, clayey, light-gray to medium-gray to brownish-red; grades to fine sand at depth; cavities filled with micaceous fine sand; quartz grains 1–4 mm distributed throughout core.
435. 5	5. 5	No core.
438. 0	2. 5	Sand, very fine, light-brown, calcareous, massive.
440. 0	2. 0	Clay, fine sandy, variegated colors; vugs with calcite crystals; fossil ostracodes, foraminifers, and *Chara*.
443. 0	3. 0	No core.
445. 0	2. 0	Silt, clayey, disordered; contains distorted limy nodules and cavities filled with limy fine sand; bedding 3–4 mm thick in more clayey sections.
449. 0	4. 0	Clay, silty, light-brown, massive; grades to clay of variegated colors and then to clayey fine sand with depth.
449. 2	. 2	Clay and fine sand, both light buff; abundant fossil gastropods, pelecypods, foraminifers, *Chara*, and a barnacle.
450. 0	. 8	Sand, fine, light-gray, massive.
453. 0	3. 0	No core.
460. 0	7. 0	Sand, very fine, very pale yellowish brown (10*YR* 7/2), massive; becomes more clayey at several zones with depth.

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