

**Salt Production, Danby Dry Lake  
San Bernardino County, California**

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Danby Dry Lake, situated in the Ward Valley, some 30 miles south of the railroad siding of Danby has been the site of sporadic salt production since the early 1880s. As early as 1882, J. B. Cook, who was associated with the discovery of Bonanza King silver mine, sank a 35 foot shaft in solid rock salt on the north end of Danby Lake. During the 1880s salt from Danby Lake was hauled by freight team to the Santa Fe railroad and shipped to the Waterman, Waterloo and Bonanza King Mines, as well as at mines in Arizona. Salt was an essential ingredient used in processing silver ore. In 1891 it was reported that W. H. Drew owned deposit and that salt from here was being “shipped to Arizona and Mexico for curing beef, salting stock, and for culinary purposes.”

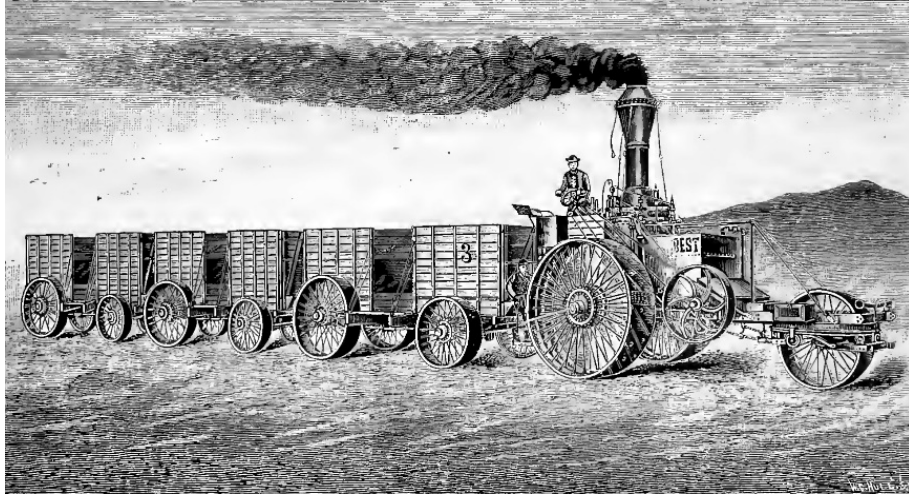
But Jonas B. Osborne, a wealthy Daggett mine owner, envisioned an easier way to haul the product to the railhead. On August 15, 1893, Osborne, Meyer Lewis of Alameda, W. E. Steadman of San Francisco, J. W. Sullivan of Seligman, Arizona, and E. E. Lewis of Los Angeles incorporated the Crystal Salt Company to work the deposit at Danby Lake. Osborn, constructed a road from Danby to Danby Lake which he paved with volcanic cinder and other rock for use by his steam traction engine powered “wagon train.” This “self-propelling wagon-train” was his own design, and he received a patent for it.

The steam tractor and wagons were constructed by Daniel Best, of San Leandro. The engine developed 50 horsepower, and hauled an average 40 tons of salt per trip. Including time for loading and unloading the 60-mile round trip took a day and a half.

The Mining and Scientific Press in 1898 described the failure of this expensive experiment:

“Danby is the shipping point for the Los Angeles companies now developing salt mines thirty miles south of here. Here is the field for operating traction engines, and here lies the remains of Osborn’s Leviathan – the huge monster that wouldn’t pull. It is said that this experiment cost a good man an even \$100,000.”

Osborne’s “wagon-train” was parked near the rail siding at Danby where it sat rusting at least until 1905.



Sketch of Osborne's "self-propelling wagon train"



Osborne's "self-propelling wagon-train" sitting at Danby.  
Photo Bailey (1902, p. 129).

When the Crystal Salt Company was active, a building was constructed of blocks of salt on the north end of Danby Lake. This curiosity, which measured about 16 x 25 feet, stood for some 50 years before it apparently melted into the ground. Photographs of it appeared in newspapers and the Mining Bureau's 1902 Bulletin on Salines early in the 1900s.

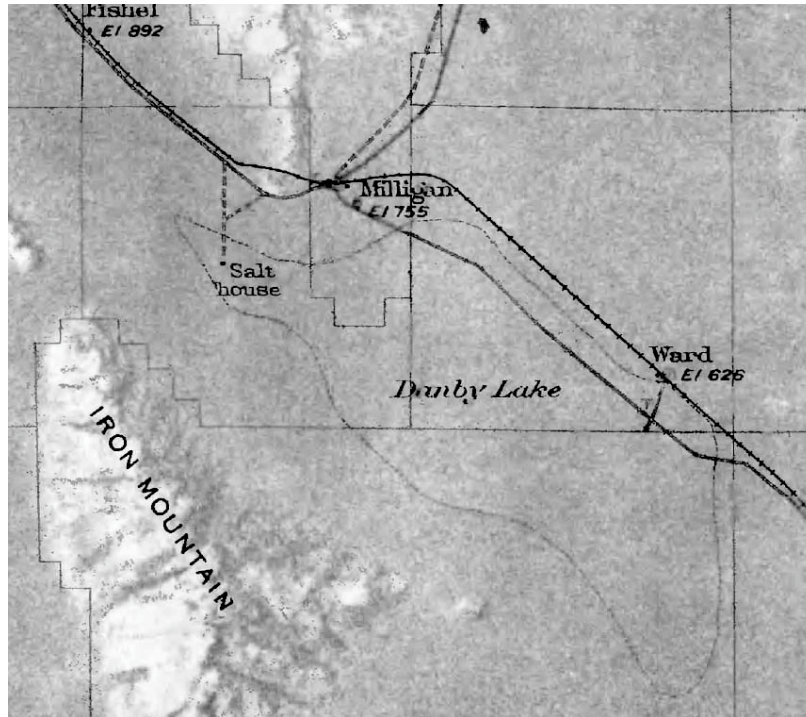


The Danby Dry Lake salt house. Photo Bailey (1902, p. 104).

On July 1, 1910 the Arizona and California Railway was completed from Phoenix, Arizona to the Santa Fe railroad at Cadiz. The railroad provided new opportunities to develop the Danby Lake salt resources. A few years later, Fred D. Milligan manager of the Milligan Salt Company was producing high grade table salt from the site of the Crystal Salt Company's earlier operations. Undoubtedly Milligan's name was inspiration for railroad siding of the same name.

David G. Thompson, who conducted field work for the US Geological Survey during 1917-1918, indicated that water was available at Milligan, a railroad section headquarters, and at Ward (later Saltmarsh) which was located about 2 miles down the tracks on the southeast side of Danby Lake. The railroad had sunk a well at Ward but at that time Milligan only had a cistern. Thompson also noted that there "was no store at either place where supplies could be obtained."

Operations of the Crystal Salt Company, and others that followed, in part were located on Section 16 T2N, R17E – a square mile of land deeded to the State of California in 1857, and subsequently sold. In 1912 F. Lee Fuller obtained mineral patent for 20 acres adjoining this parcel on the south. Following enactment of the Mineral Leasing Act of 1920, salt could only be obtained under lease from the US Government. Since then there have been numerous sodium leases issued by the General Land Office, and since 1946, the Bureau of Land Management.



Map showing the Salt House location based on Thompson's 1917-1918 field work.

In 1977 the Standard Salt & Chemical and the Danby Salt Companies were extracting salt here. On September 13, 2010 Salt Products Company, with headquarters in Indio, California, was granted a lease for 960 acres from the Bureau of Land Management.

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## Notes

### **Mining and Scientific Press 16 Aug 1890, p. 105**

#### Crystal Salt Valley

Lies 27 miles S. E. of Danby, 4 miles S. E. from the southerly end of Old Woman's mountain and 50 miles from the Colorado river, at an elevation of 600 feet above the level of the area. It forms a basin-shaped depression of 4 by 10 miles in extent. The central portion is 5200 feet long by 2600 feet wide and is covered by a saline efflorescence. Below this crust are found prismatic crystals of great beauty and transparency which are highly prized by scientific institutions and mineral collectors for cabinets, as they do not deliquesce on exposure to the atmosphere. They occur in a solid bed of crystalline salt of unknown depth and extent. Its product is mined by open cuts and hauled in freight teams for a distance of about 30 miles to Danby, for transportation by rail to a market. Of the many unnumbered valleys of extent and importance in these desert regions, we find Soda Lake, noted for its alkaline and saline product.

### **Mining and Scientific Press 10 Jan 1891, p. 18**

#### Crystal Salt,

A very appropriate name, as aside from its beautiful, clear, transparent, crystalline structure, it is very near chemically pure chloride of sodium. Near the center of the bed a shaft has been sunk 60 feet. This crystallized product returned, by analysis at the California State Mining Bureau's laboratory, 97 per cent pure salt. Water was encountered at a depth of 33 feet, which, on evaporation by the sun's rays, returns a pure saline powder suitable for table use or for any other purpose for which salt is used. This salt has been mined, hauled to Danby on the A. & P. R. R., and shipped to Arizona and Mexico for curing beef, salting stock, and for culinary purposes. W. H. Drew of San Bernardino is the owner.

### **Mining and Scientific Press 28 Jan 1898**

—Daniel Best, San Leandro, Cal., has built a train of traction engine and wagons for the Crystal Rock Salt Mining Co. for use on the company's road, 32 miles long, from the mine to the A. & P. station. The company produces salt of fine quality, pronounced by assayers equal to the Liverpool imported. It has recently incorporated with \$500,000 capital in this city and controls about 1000 acres of "mining\* ground" in San Bernardino county about 50 miles west of The Needles on the Colorado river, from which the salt is mined in large crystal blocks.

### **Mining and Scientific Press 2 Apr 1898, p. 373**

Danby is the shipping point for the Los Angeles companies now developing salt mines thirty miles south of there, Here is the field for operating traction engines, and here lies the remains of Osborn's Leviathan—the huge monster that wouldn't pull. It is said that this experiment cost a good man an even \$100,000. After this failure Best came along with his motor and hauled salt so fast the market was soon glutted. Another start is to be made, and then salt will come in at the rate of thirty tons per day.

### **Mining and Scientific Press 11 Feb 1899 p. 155**

The Crystal Salt Co., which controls some 14,000 acres of a salt deposit on the salt marsh, thirty-three miles from Danby, has just finished assessment work on the property. The company has a macadamized

road to the marsh on which they operate a traction engine, which hauls their output to Danby, their shipping point on the Santa Fe railroad.

**San Francisco Call, 5 Dec 1891**

Incorporated Companies: The Crystal Salt Company, J. G. Severence, R. Butterfield, John M. Moss, Julian L. Lockwood and D. E. Alexander. Capital stock \$100,000, of which \$55,000 has been subscribed.

**San Francisco Call 15 Aug 1893**

New Incorporations: The Crystal Salt Company has incorporated with a capital of \$200,000 fully subscribed. Directors— Meyer Lewis, Jonas B. Osborne, W. E. Steadman, J. W. Sullivan, B.E. Lewis.

**Sacramento Daily Union, Volume 85, Number 150, 15 August 1893**

Articles of Incorporation: The Crystal Salt Company of San Francisco. Capital stock, \$200,000, with Meyer Lewis of Alameda, Jonas B. Osborne of Daggett, San Bernardino County, W. E. Steadman of San Francisco, J. W. Sullivan of Seligman, Arizona, and E. E. Lewis of Los Angeles as Directors.

**Wright et. al. 1953, p. 218** Until 1948 salt was obtained from near-surface deposits at Danby Lake

*Danby Lake.* Danby Lake is about 12 miles southeast of Cadiz. Although much less thoroughly explored than Bristol Lake, it is similar in that it contains extensive deposits of sodium chloride as well as marginal accumulations of gypsum. Danby Lake is about 10 miles long and 2 to 3 miles wide. The easily recoverable sodium chloride is confined to a single, shallow layer, which, over an area of 8 to 16 square miles, ranges from a foot to as much as 10 feet thick. It is covered by a few-inch to 8-foot overburden. Analyses of the salt rock consistently show more than 97 percent sodium chloride. The brine, commonly encountered within 4 or 5 feet of the surface, has a sodium chloride content of 11.6 to 31.6 percent and very small proportions of other salts.

p. 240 It is reported that Sodium sulfate was recovered.

p. 180 Selenite-bearing playa lake beds along SE. margin of Danby Dry Lake. (Aubury 06:287; Noble 31:57,58, Ver Planck 52:48)

p. 186 Avery (Evans) Sec. 16, 21 2N 17E Danby Lake. Patented land totaling 660 acres. Site of operations of Crystal Salt Co. and of famous salt house. (Bailey 02 :104,128-129; Cloudman 19:893; Tucker 21: 357; 30 :320; 31 :396; 43:539- 540 . )

p. 187

See discussion of Danby Lake in general saline section in text herein . See also Aver y, Metropolitan water District and Reeder. Salt recovered in late 1800's by the Crystal Salt Co . and sold to silver mills in Arizona for chloridizing. Some shipped to San Franc isco. (Bailey 02: 104,128- 129; Cloudman 19:893; Phelan 19:187; Tucker 21 : 351; 30:320; 31 :396; 43 : 539-540,01.7. )

Metropolitan Water Dictrict Sec. 22, 23, 24, 25, 26 2N 17E

Danby Dry Lake . District has application for leases on 1,680 acres. Exploration work and pilot plant erected 1939-1941. No production.

#### **Cloudman 893-894**

R. B. Evans, Pasadena is working a rock salt deposit at Danby Lake, south of Ward Siding. The salt is hauled by wagon to Ward and shipped to So. Cal. Six men employed. Only a small production.

Milligan Salt Company is producing high grade table salt at Milligan. The salt is produced by evaporating the brine in vats and recrystallizing the salt. Only a salt has been produced. Fred D. Milligan is manager.

#### **Bailey 1902 p. 128 -29**

Danby. – The Surprise salt mines are located about 25 miles southeast of Danby, a station on the Santa Fe Railroad. They are located in the bottom of a dry valley, about 6 miles from the south end of Old Woman's Mountains. The rock salt lies in two strata, each from 2 inches to 8 feet in thickness, separated from each other by a thick seam of clay, and covered by a layer of sand and dust that is from a few inches to 2 feet in thickness. The salt bed has been developed over a tract of some 40 acres, and the claims of the locators cover over 800 acres. For some time this deposit was worked by the Crystal Salt Company, who hauled the salt to Danby in traction wagons. The larger portion of the product was sold to the silver mills for use in chloridizing. Some of this salt has been shipped to San Francisco, and proved to be of superior quality.

In 1882, J. B. Cook is said to have dug a shaft 35 feet deep in solid rock salt, before water was reached. A 65-foot shaft, now caved in, is said to have shown 22 feet of solid crystal salt. AN analysis of the clear rock salt gave: Sodium chloride, 98 per cent; water 1.3 per cent; and traces of silica, iron, aluminum, potassium, and calcium. A small spring of good water exists 3 ½ miles from the lake, while a large spring is situated 13 miles distant.

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Current operations: <http://www.actual-life.com/?p=784>

#### **Desert Dec 1977, p. 46 DANBY DRY LAKE**

As the crow flies, Danby's lakebed— the last of the "Salty Three" —lies about 30 miles northeast of Dale Dry Lake.

Most of the road is paved. A good, graded road leads north from Iron Mountain Pumping Plant and crosses the lakebed. This road is good but stay on it—sand and soft lakebed await the unwary. On this playa, lenticular bodies of nearly pure rock salt occur near the surface.

Some of these bodies are two miles square and 10 feet thick. Crystal Salt Company was the first to mine the deposits in the 1880s and huge blocks of salt were quarried from the northwestern end of the playa. They were loaded on wagons and hauled by steam traction engines to the railroad at Danby—a distance of about 25 miles. The salt was shipped to the silver mines at Calico, as well as some Arizona mines for use in the silver chloridizing process. The Crystal Salt Company built a house from salt blocks which reportedly stood for over 50 years. It was a testimonial to the dryness of the region.

There have been several operations on Danby in recent years, including the Milligan Plant of Standard Salt & Chemical and the Danby Salt Operations. Sometime ago we toured the latter and collected excellent crystals of halite and selenite that had just been exposed by a scraper.

Danby Salt obtained its products by pumping brine from 30-foot wells into large evaporative ponds. A machine harvested the salt and placed it on a conveyor to be washed and semi-dried. It was then put into storage tanks for further drying. A final drying was given in a huge butane drier. The final product was screened into eight sizes and grades, then sacked and shipped by truck. Fine crystals of selenite and halite can *generally* be collected from Danby Lake as indicated on the map. A shovel, small one-half-inch mesh screen, a bucket of water for cleaning, and paper for wrapping are all the equipment needed. Egg cartons are great for storage of specimens, too. If conditions have been favorable, a day or two of easy digging should produce some nice crystals for your collection and plenty of trading. During two trips to this locale, every shovelful of dirt contained numerous crystals —both singular and in groups.

On a subsequent trip, not a perfect crystal was to be found! This is why I used the word "generally" above. An unusually heavy rain had acted as a solvent on the crystals. Such weather affects mining and, at times, operations are temporarily suspended. A winter tour of the "Three Salty Sisters" will disclose a different type of mining and offer the rockhound an opportunity to add some interesting crystal specimens to his collection. The roads are uncrowded and the weather pleasant unless a "front" races through. This is a region of violent contrasts and, at times, it will be "a bloom" with a winter spring or lost in the clouds of a desert sandstorm. Perhaps, it is the challenge of not knowing what the desert has in store for us that brings us back to enjoy her treasures again —and again — and again.

**Tucker 1931 p. 396**

Danby Dry Lake Salt Deposit. It comprises 660 acres of patented land located on Danby Dry Lake near Ward, a station on The Atchison, Topeka and Santa Fe Railroad on Parker cut-off. Owners, R. B. Evans of Pasadena and Russ Avery of Los Angeles, California. A bed of salt from 8 to 15 feet in thickness occurs below the lake surface, being overlain with 3 to 5 feet of sand and clay mixed with gypsum.

The salt is quite pure, as analysis shows 98% sodium chloride. The estimated tonnage in this deposit is stated to be 25,000,000 tons. Two men employed.

Bibl: State Mineralogist's Report XVII, p. 357.

**Thompson, David G, 1929, The Mohave Desert Region California, USGS Water Supply Paper 578 p. 704**

On this railway *Ward* is a pumping station and Milligan is a section headquarters. Water is available at both places, but in 1918 there was no store at either place where supplies could be obtained.

p. 708 None of the deposits were being worked

*"Ward well* The railroad well at Ward is the only reliable watering place hi the valley, except the cistern at Milligan. Two or three other watering places exist, but they are in out-of-the-way places, difficult to reach, or otherwise not certain sources of supply. In 1910 the Atchison, Topeka & Santa Fe Railway drilled a well at Ward to a depth of 118 feet. Water was struck at 42 feet and stood 40 feet from the surface. The well sanded up and was abandoned. In November and December, 1913, a second well was drilled to a depth of 603 feet. The log of the well, furnished by the railroad and given below, shows that the materials penetrated are in large part undoubtedly lake or playa deposits. Although salt deposits are known to occur only a mile or two south of the well, none were reported in the well. The well is situated beyond the border of the lake in its initial stage.

**General Land Office Patent**

20 acre patent to F. Lee Fuller 4/4/1912 Salt No. 1 N1/2 NWNE Sec 21 2N 17E claim located 12 Aug 1909