

TRONA

By Robert L. Sherman, '32

To many present and former students at Caltech the name of Trona conjures up vague thoughts of chemistry and desert regions, but probably few know of the American Potash & Chemical Corporation for which Trona is the common abbreviation, and of the unique process that research developed to make the town and plant possible.

Trona is situated on the shores of "beautiful" Lake Searles about 185 miles by road from Los Angeles and almost exactly 100 miles due North of San Bernardino. The lake is the crystalline remnant of one of a chain of ancient lakes starting with Owens Lake and ending with Death Valley sink; apparently for a considerable time it was the last of the series insofar as flow was concerned, with evaporation exceeding the inflow, thus building up a heavy charge of salts. As the inflow continued to decrease and evaporation continued unabated, or more probably augmented by the forces making a desert of the region, saturation was reached and crystallization commenced. Finally the lake reached the present state in which the brine is below the salt level in summer, and evaporation is restricted to the precipitation within the watershed. In winter the brine may get several inches deep over the salt body, but by summer the surface is dry and solid; cars are driven over it as on a paved road—an unusual "lake."

The brine which permeates the salt body is of course saturated with the various salts comprising the latter, of which the chloride and sulfate of potassium and the chloride, sulfate, carbonate, and borate of sodium are the more important, with numerous other salts also occurring in lesser quantities.

The main plant process involves evaporation of the brine from the lake in triple-effect evaporators during which operation the chloride, sulfate and carbonate of sodium crystallize out (the latter two as a double salt known as burkeite), due to their relatively flat solubility curves, with increasing temperature; sodium tetraborate and potassium chloride solubilities increase markedly with temperature and consequently remain in solution in spite of the removal of water. The "concentrated liquor" resulting from this step is then cooled in two stages, the first of which is relatively rapid, and during this stage potassium chloride is crystallized. The borate supersaturates, however, and by suitable operation can be held in solution, to come out during the second stage of cooling as crude borax which is separately refined.

The Soda Products plant was put into operation in 1934 to separate the burkeite removed during the evaporation step into its component salts, sodium carbonate, or soda ash, and sodium sulfate or salt cake. This is accomplished by a process of fractional crystallization which is a little too complicated to detail here.

Potassium chloride, or "potash," is sold in three grades, the two more impure forms representing the bulk of the production and being used for fertilizer manufacture; part of the production is refined for sale to caustic manufacturers.

Total potash production amounts to about 500 tons per day.

Borax (decahydrate) production aggregates about 270 tons per day; part of this is dehydrated by fusion in special furnaces, and part is converted to the technical and U.S.P. grades of boric acid by sulfuric acid; the remainder is sold as standard borax.

The soda ash and salt cake production figures now are about 135 and 200 tons per day respectively, and as this is a young plant, these rates are still increasing.

The World War, with the consequent shut-off of German potash for American fertilizer needs, gave Trona its chance. The then-struggling little outfit made profits as the price of potash soared, even though the process was inefficient and the products low-grade. Forethought pointed out that such conditions would not last, and every effort was bent on research and development which rewarded the corporation with the present status in which it now competes with all other producers on an even footing and profitably, having overcome difficulties which seemed insurmountable not so many years ago. The benefits of industrial research are not always appreciated as much as at Trona, and the recognition of that fact is evident in the relatively large and active research force maintained today.

As is not surprising, the Research Department claims the largest number of Tech men at Trona, with several others in the production and Engineering Departments.

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There follows a list of Tech men and the part they play in the production and development of the potash industry.

CHARLES F. RITCHIE, '22, is Assistant Director of Research and as such has charge of several of the various investigations in progress at any time, as well as a good deal of patent work. Mr. Ritchie is married and has two children.

H. TODD NIES, '23, is Patent Engineer, which position, in an organization constantly developing new processes and wrinkles, is no small one.

TOM G. BERNHARDI, '30, is Research Engineer engaged in several evaporation process problems such as heat exchanger, tube corrosion and hydraulic classification of salt sludges. Tom is married.

NORMAN GUNDERSON, '31, is a Research Engineer working mostly on new products and processes.

JULIEN PHILLIPS, ex '28, who finished at M.I.T., is also working on similar problems as well as on various wrinkles in the newer plants.

E. BRYANT FITCH, '32, is another Research Engineer at present doing process research on the Soda Products plant, which, being a complicated and still comparatively new process, keeps him busy.

HUNTER NICHOLSON, '33, is a Research Engineer working on general process problems throughout the entire

plant, trouble shooting, and developing and testing new equipment.

HENRY SUHR, '33, is a Research Chemist engrossed in equilibrium solubilities on various salt and water systems of any number of components; Hank is another married man.

FRANK R. BRIDGEFORD, '22, is the Production Department Manager and the oldest in point of service of all the Tech men at Trona. He has four Tech men working under him.

MORGAN FORNEY, '30, is an Evaporator Operator and as such has charge of the operation of, and the crews on, one of the three triple effect evaporator units.

HARVEY S. EASTMAN, '30, is the Soda Products General Foreman in charge of the operation of this plant and the crew of forty men.

ROBERT L. SHERMAN, '32, is the Production Office Engineer, engaged primarily in cost work and statistics; Bob is married.

JOHN M. FOX, JR., ex '31, is a Production Control Analyst.

WILLIAM H. ALLEN, '25, is Superintendent of the Testing and Development Division of the Engineering Department. His work gets him into almost every new process, wrinkle and piece of equipment throughout the plant. Bill is married and the father of two children.

WILLIAM E. JOHNSTON, ex '31, who finished at U.S.C. in '32, is in Allen's Division working on equipment testing throughout the plant.

RALPH WHISTLER, ex '34, who finished at U.S.C. in '34, is an Estimator in the Engineering Department. Ralph is married.



Trona, as seen from Scarles Lake after a rain.

Courtesy of General Petroleum Corp.