

A History of the Louisiana Sulphur Industry

by Donia Byrnes

Although sulphur is found in many parts of the world, the American sulphur industry was born in Louisiana in the last decade of the 19th century. For some years, it had been an established fact that a rich deposit of sulphur lay beneath the surface in a swampy area of Calcasieu Parish near Lake Charles, Louisiana. The deposit was buried under several hundred feet of muck and treacherous quicksand filled with deadly hydrogen sulphide gas. Men lost their lives in their attempt to sink conventional shafts to this buried treasure. <1>

In 1890 a German-born chemist and engineer, Dr. Herman Frasch, introduced a novel idea. He proposed to superheat water, force it into the deposit through drill holes and melt the sulphur underground. Then, he reasoned, the liquid sulphur could be pumped to the surface. Dr. Frasch encountered many difficulties and disappointments before his process was a proven success. But on Christmas 1894 one of his wells coughed up the first cupful of liquid sulphur. Down through the years the basic principles conceived of by Dr. Frasch have continued to be used, and the soundness of his approach is well illustrated by the fact that since that modest beginning in 1894, more than 2 million long tons of sulphur have been produced annually in Louisiana. <2>

In 1895, a company was formed including Dr. Frasch; his associates, Frank Rockefeller and F. B. Squires; and Abram Hewitt, owner of the, Calcasieu property. Although they encountered many problems, Sulphur Mine, as their deposit was called, operated from 1895 to 1924 and produced 9.4 million tons of sulphur. <3>

The second commercial sulphur operation in Louisiana was started by the Jefferson Island Company on Lake Peigneur, between Abbeville and New Iberia, in 1932. The output from the Jefferson Island Mine was more than 300,000 tons in its first year of operation, but it declined rapidly. By 1936, when the mine was closed, total production had reached only 425,000 tons. <4>

The sulphur industry's growth in Louisiana really began in 1932 when Freeport Sulphur Company (Freeport) acquired the sulphur rights for Lake Grande Ecaille and vicinity in Plaquemines Parish. The site is about 55 miles below New Orleans, southwest of the Mississippi River, and within four miles of the Gulf of Mexico.

Grande Ecaille was described as "the mine that couldn't be built." It lies under a tidal marsh where river-borne sediment accumulates in the lagoons, and salt grasses eventually obtain a foothold. They form fibrous mats that float on the alluvial sediment and fine sand.

Prospecting was hampered by hordes of mosquitos that made it necessary to erect, on the barges, airplane propellers driven by Model-T Ford motors to serve as blowers. However,

in the sulphur industry, there are no considerations for plant location, such as markets, freight rates or labor supply. Over the dome is where the plant must be.

There was hardly a less inviting environment for a Frasch operation than Grand Ecaille, 10 miles from a drop of fresh water, in the middle of a swamp, far from highways and railroads, and with no means of building solid transportation; furthermore, it was subject to Gulf hurricanes, and it was plagued by mosquitos. In the history of the sulphur industry, there is no accomplishment comparable to this feat of conquering adverse conditions by Freeport. <5>

On Feb. 8, 1933, the first pilings for the plant were driven. Ten months later, on Dec. 7, the first wells were steamed, and initial production began the next day. By Dec. 31 there was 17,705 tons of sulphur on hand. To accomplish this, all materials were brought from the town of Port Sulphur on the Mississippi River, 10 miles through the canal that Freeport had dug, to the mine in the marshland.

Some of the materials transported from the town were 18,000 piles, 2.5 million board feet of lumber, and 2,700 tons of metal piping. In addition, more than 2,700 tons of steel were barged to the company's own shop at the mine site, where steel framework, tanks and walkways were fabricated. Moreover, 5.5 million cubic yards of earth had been moved. The resulting earthen cavity became the water reservoir, and the displaced earth was the fill for the townsite. <6>

In addition to an exorbitant investment, Freeport had to deal with Huey Long administration's punitive taxation policy. Civic groups interested in the development of industry in the state pressured the Legislature to place sulphur severance taxes at the same rate as that of oil and gas., 1933, the Louisiana constitution was amended to reflect this change, the tax rate was set at 27 cents per long ton. However, in August 1934, the tax increased to 60 cents, and in July 1936 it was raised to \$2. At this time, the rate in Texas was \$1.03 per long ton.

Although production decreased, Freeport's severance tax increased from \$399,000 in 1936 to \$816,000 in 1937. In 1938, the tax matter was referred to a state referendum and the amendment embracing revision of the tax was adopted in November 1938. It was set at the same rate as that in effect in Texas. <7> Grande Ecaille operated from 1933 to 1978 and produced 40.4 million tons of sulphur. <8>

At the time that Grande Ecaille was under construction, Freeport had laid out and constructed homes on a townsite at Port Sulphur. This new town was designed on a garden city plan with schools, hospital, clubhouse, lodge, park and wading pool for children, and flood-lighted tennis courts and baseball diamond.

Among the early tenants of Port Sulphur were Mary Louise and Z. W. "Bill" Bartlett, who moved into House No. 12 upon its completion in 1932. Bartlett worked for Freeport for 43 years and retired in 1973 as vice president of Southern Operations.

However, in 1932 he was a young mining engineer and served as a field foreman at Grande Ecaille. He remembers these early days as times of daily challenges and solutions, as times of learning and accomplishment, and as times of immediate research and development. The daily 20-mile round-trip boat ride was a time to talk to friends, to read the paper, or to have a good game of boure; it also was a time to discuss, and many times to solve, the particular engineering problems of the day.

Mary Louise recalls the completeness of the townsite when they arrived. She says, "The company had provided everything for the security and happiness of our families. We had friends with the same interests, we had entertainment in the clubhouse, we could walk to churches, and we had hours of pleasure on the tennis court and the baseball diamond. Furthermore, the children had excellent schools and music lessons, and the baseball diamond, wading pool, and park provided hours of amusement for them." <9>

Bartlett affirms that the canal from Port Sulphur to Grande Ecaille served many purposes. Parallel to the canal was a pipeline nine miles long that carried water from the reservoir at the townsite to the mines. Flanking this pipeline was an electric transmission line for power for the pumps at Grand Ecaille.

Additionally, barges were loaded with the ore and moved to storage vats in Port Sulphur. At this time all sulphur was sold in solid form, and large power shovels broke up this solid sulphur in the vats and loaded it by conveyor belts to railroad cars, ocean-going vessels and barges. <10> By 1947, Freeport had developed the thermos railway car for the shipment of liquid sulphur, and in 1955, the first shipment of liquid sulphur to customers via barge was loaded at Port Sulphur. <11>

At their second mine in Louisiana, Bay Ste. Elaine in Terrebonne Parish, Freeport pioneered a marine mining operation. The power plant was built on an immense barge, almost a block long, and towed through lakes, bayous and canals for 65 miles to the mine site. It was partially sunk in place by letting water into the hold. All other buildings were constructed and installed in the same way.

From the plant, elevated pipelines carried water and air to the wells, which were drilled from floating rigs. One of the most serious problems to be overcome at Bay Ste. Elaine was the lack of fresh water. This problem was solved by the invention of a new process, researched and developed in Freeport laboratories during a 10-year period, which made possible the use of saltwater for mining sulphur. <12> Bay Ste. Elaine began operations in 1952 and ceased operations in 1959 after producing 1, 131,204 tons of sulphur. <13>

Freeport's next mine site was at Garden Island Bay at the mouth of the Mississippi River in Plaquemines Parish and was a semi-marine operation. Drilling rigs were mounted on barges, and they worked in the canals that were constantly being cut to reach the mine sites. Garden Island Bay had to be built to withstand hurricane winds and high water. In addition to the forests of piles on which the power plant rests, its foundation is a steel and concrete mat topped by 16-foot-high concrete cells, which support the main floor on which the equipment is installed.

Because Garden Island Bay is 20 miles beyond the end of the nearest road, all construction materials had to be transported by water. Since there was a lack of firm ground for storage, sulphur ore was towed, still molten, in specially designed insulated barges to vat sites about 70 miles away in Port Sulphur. This mine site was completed in 1953 and cost \$14 million to design and build. It is the third largest sulphur mine in the United States and is still in operation. <14>

Development of a mine at Lake Pelto in Terrebonne Parish on the fringe of the Gulf Coast was begun in 1955 by Freeport. Because the mine site was under six to eight feet of water and only separated from the Gulf by a narrow strip of land, considerable time was required for engineering studies. It was necessary for Freeport to build a man-made island for the sulphur mining plant and facilities. Floating rigs from the abandoned Bay Ste. Elaine mine were put into use at Lake Pelto. <15> This mine began production in 1960 and continued in operation through 1975 after producing 5,621,500 tons of sulphur. <16>

When Freeport acquired sulphur rights to its first off-shore mine in 1956, it faced formidable problems. Known as Grand Isle Block 18 Dome, the orebody is about 1,800 feet below the surface in 45 feet of water about seven miles off-shore from Grand Isle in Jefferson Parish.

The experience Freeport had gained in the Louisiana marshes was taxed to the limit when applying proper engineering principles to similar conditions in 45 feet of water where working platforms had to be elevated 70 feet above the ocean waves.

Additionally, all structures had to be built with sufficient height and strength to withstand the fury of hurricane winds and waves. An interesting fact to note is that whereas the usual capital expenditure required to provide a job for one employee in industry as a whole amounts to \$14,000, the Grand Isle project on a per employee basis exceeded \$ 100,000. <17>

Grand Isle Mine, the first and only off-shore sulphur mine in the history of the industry, was designed to make it one of the world's most efficient sulphur mining operations. The major factors that Freeport considered in construction were wind forces, wave forces, foundation conditions and corrosion.

The basic structures are composed of a template, piling and a deck section. The templates and deck sections were fabricated on shore and barged to the site for erection. The template, 80 percent of which is below the water, provides a pattern spacer and guide for driving the piling, which actually supports the structure and also acts as underwater bracing for the piles against wind and waves.

After the piles and templates were welded together, the prefabricated deck sections were inserted into the open-ended piles and then this section was welded to the other two. Some of the largest lifts in the history of construction were made in placing these structures.

The power plant section, made in two sections weighing 650 tons each, was set by an 800-ton crane in seven hours. The cost of rental of this equipment was \$20,000 per day, and its use was subject to the weather; however, only one day was lost due to bad weather conditions during the entire erection period of 59 working days. These steel structures are subjected to three different corrosion environments - the submerged zone, the splash zone, and the salt air zone. In addition to adding steel and copper coverings to prevent corrosion, more than 870,000 square feet of steel were coated with an inorganic zinc silicate. <18>

Another problem that faced Freeport was the transportation of the ore from the mine site to the storage vats at Port Sulphur. The most economical, all-weather way was found to be by pipeline from the mine to Grand Isle, Louisiana, and from there by liquid tank barges to Port Sulphur. The pipeline at the mine is buried about five feet below the Gulf bottom and consists of three concentric pipes -- a protective casing, a hot water jacket line, and a sulphur line. <19>

Production began at Grand Isle in 1960, and in 1963 the combined production of the Garden Island Bay and the Grand Isle mines was more than 2.5 million tons of sulphur, which made Freeport, and the state of Louisiana, the world's largest sulphur producer. This combined production has continued to exceed the 2 million ton mark through 1984. <20>

Most of the sulphur used in this country is converted to sulphuric acid. A large portion of the acid is then returned to the soil as fertilizer. Other acid uses include petroleum refining, numerous chemicals, steel, rayon and paint. Non-acid uses include rubber, insecticides, carbon bisulphide and sulphite pump.

The per capita consumption of sulphur in the United States is about 70 pounds per year, compared to the consumption of aluminum and copper, which is about 20 pounds each, annually. For instance, it takes 37 pounds of sulphur to help make a ton of newsprint and about 18 pounds are required to clean and prepare the surface of each ton of steel that is produced. <21>

According to Bill Bartlett, if you trace the ancestry of any product, somewhere you will find sulphur. The state of Louisiana likes that idea, he says, because an abundant supply of the mineral makes it a good place for industry to hang its hat. Bartlett says that all the oil refiners, all the manufacturing chemists and all the industries that have come to the Mississippi Valley are customers for sulphur in some way or another. <22>

Since 1933 when Grande Ecaille produced its first sulphur, Freeport has contributed substantially to the economic growth of Louisiana. In 1966, at Uncle Sam, Louisiana, this company built a chemical complex that utilized sulphur in the production of phosphoric acid and sulphuric acid. Today, it is one of the world's largest producers of these vital chemicals. As the sulphur industry continues to expand and grow in Louisiana, and along its coast, it maintains its course in furthering the economic well-being of the state of Louisiana.

Notes

- 1 Address to American Institute of Mining Engineers by Z. W. "Bill" Bartlett, vice president for Southern Operations, Freeport Sulphur Company, 1959.
- 2 Ibid.
- 3 William Haynes, *The Stone that Burns* (Norwood: Plimpton Press. 1942), pp. 24-35.
- 4 Ibid., pp. 225-229.
- 5 Ibid.. pp. 239-246.
- 6 H.S. Burns, "Building Grande Ecaille, " *Chemical Index* (June 1934) p. 504.
- 7 Haynes, pp. 254-256.
- 8 Publication of Freeport Minerals Company, 1979.
- 9 Z. W. "Bill" and Mary Louise Bartlett, personal interview in New Orleans, Sept. 9. 1985.
- 10 Ibid.
- 11 Publication of Freeport Minerals Company, 1979.
- 12 *Sulphur is Where You Find It*. Publication of Freeport Sulphur Company, March 1954.
- 13 Publication of Freeport Minerals Company, 1979.
- 14 Freeport Sulphur company, 42nd Annual Report. Dec. 31, 1954.
- 15 Freeport Sulphur Company, Annual Report, Dec. 31. 1958.
- 16 Publication of Freeport Minerals Company, 1979.
- 17 Z. W. "Bill" Bartlett, personal interview in New Orleans, Sept. 6, 1985.
- 18 The Grand Isle Mine, "Freeport Sulphur Company's Offshore Venture." Z. W. Bartlett, C. O. Lee, and R. H. Feierbend (New Orleans: Freeport Sulphur Company, 1959.)
- 19 Ibid. Freeport McMoRan Inc., 1984 Annual Report.
- 20 Address to American Institute of Mining Engineers by Z. W. Bartlett 1959.

21 Z. W. "Bill" Bartlett, personal interview in New Orleans, Sept. 5. 1985.

[Return to 1985-6 Table of Contents](#)