ELECTRO-CHEMICAL OPERATIONS

AT

Henderson, Clark County Nevada

October 1946

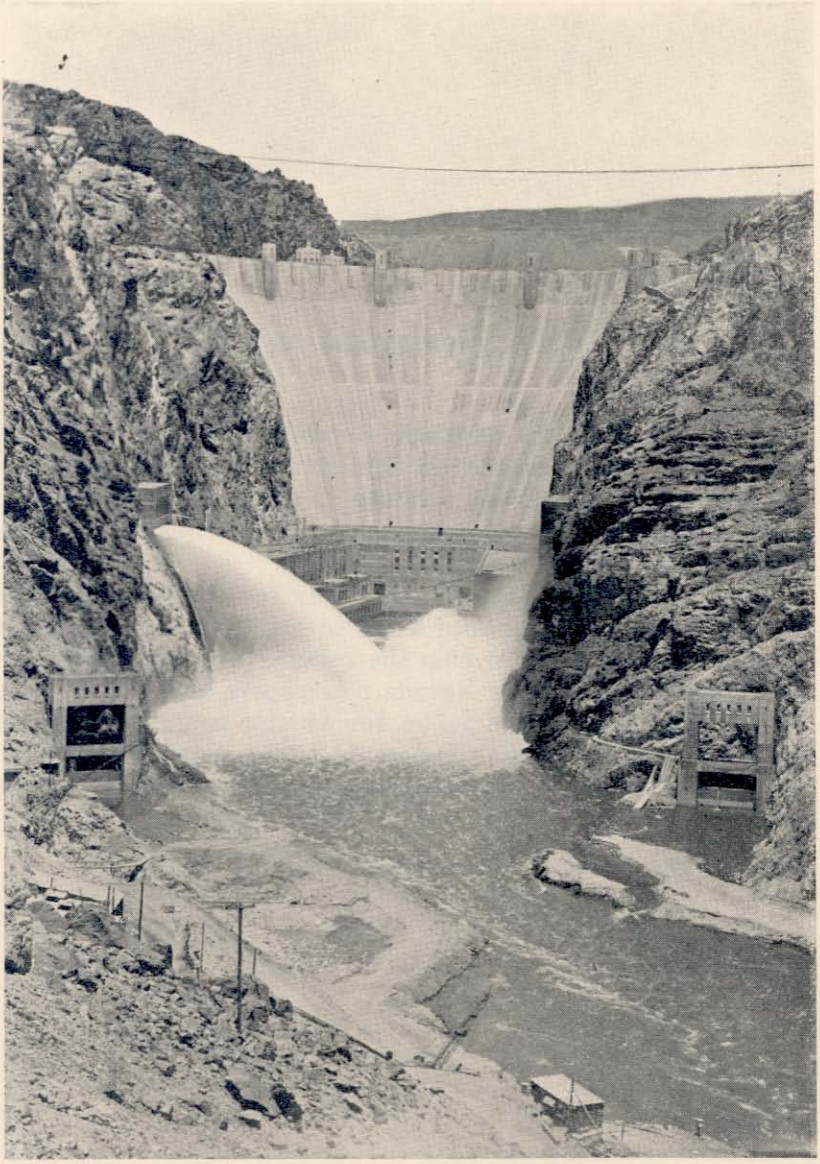
COLORADO RIVER COMMISSION OF NEVADA

INTRODUCTORY NOTE

At a meeting of the Colorado River Commission of Nevada, held at Las Vegas, Nevada, on September 24, 1946, a resolution was passed authorizing the printing as a pamphlet the following series of four articles regarding operations at Basic Magnesium Plant, Henderson, Nevada.

Mr. A. J. Shaver, Resident Engineer for the Commission at Las Vegas, Nevada, had been asked to submit these informatory statements to the press during the summer of 1946. They have been published in various Nevada newspapers and were received with much interest by the public, for which reason it was deemed that additional distribution in pamphlet form would promote further public interest in these rapidly growing projects in southern Nevada.

CARSON CITY, NEVADA, November 21, 1946.



Boulder Dam, source of electric power for plants at Henderson, Nevada

ELECTRO-CHEMICAL OPERATIONS AT HENDERSON, CLARK COUNTY, NEVADA

This is the first of a series of short articles, designed to acquaint the people of the State of Nevada with the operation of the Basic Magnesium Project, at Henderson, Nevada, and to show how the various and varied chemical companies now producing at Henderson are integrating their operations to make this location a chemical empire in the Southwest. This information is compiled by the Colorado River Commission of Nevada, through the office of the Engineer, A. J. Shaver.

Many of our readers will recall having read of the building of Basic Magnesium, Incorporated, at Henderson, Nevada; some probably worked at the project during its construction, and most all know that this "War Baby" cost Uncle Sam and his taxpayers some $140,000,000. But this industry was sorely needed to win the war against the axis! Uncle Sam's air force needed magnesium for flares, incendiary bombs, and other military needs; and industry needed this new lightweight metal in the construction of the vehicles of war and industry. In this it did not fail.

There are tons of magnesium stored at this project awaiting the call of the manufacturer and processor to fabricate it into peacetime materials.

Perhaps a review of some of the high lights in the building of this great plant might refresh our memories, and impress us with the magnitude of the undertaking.

Construction began in August 1941, and the project was in readiness for operation in April 1942. During the peak of construction some 12,000 men were employed by the contractors and their agents; and during operation of Basic Magnesium Incorporated, under the Anaconda Company as Agents for the Defense Plant Corporation, some 7,000 were steadily at work.

During the peak production period, the electric load at the Basic Project was some 295,000 kilowatts, with an annual consumption of about one and one-third million kilowatt-hours of energy annually. The maximum water used in the plant and in the town of Henderson during the peak, was some 667 millions of gallons during the month of August 1943. This amount would cover 2,045 acres a foot deep with Lake Mead water, pumped through the system that cost about five millions of dollars to build.

The electric system alone, for the operation of the processes

involved, cost about 12½ millions, and was considered the largest single electrical installation in the history of industrial construction. Some 23 millions of dollars' worth of silver was used in the electrolysis buildings! Two 230 KV transmission lines were built from Boulder Plant to Basic. 80 miles of copper bar was machined and installed.

This was the largest chlorine plant in the world—built at one time—80 chlorinators, with 880 electrolytic cells!

Whoever heard of 22 miles of glass pipe? This plant had it!

This was the largest refractory brick job in the world, some 20 million bricks were laid. 30 million feet of lumber were used in forms and buildings. The largest plumbing job in the history of man was done here at Henderson Plant.

Air ducts for the ventilating system required four million pounds of sheet metal! A system that conducted 20,000,000 cubic feet of air a minute through the system for air-conditioning, cooling, and ventilating.

Five hundred thousand control points were established in the survey job; 20,000 blueprints were handled through the engineering department; and 8 million cubic yards of dirt removed.

One thousand carloads of steel were used in the construction of buildings, tracks, ramps, runways, etc.; and in all 16,000 carloads of freight were brought in by rail!

And not the least, a town of permanency, for housing 8,000 people, was built to take care of the workers and personnel of this great industry.

At the conclusion of actual warfare, the Defense Plant Corporation turned this industry back to the Reconstruction Finance Corporation, and this has since been referred to the War Assets Administration for disposal or lease. Under the agency of J. M. Montgomery Company, chemical processors are being encouraged to establish permanent industries at Henderson at the Basic Project, and at this writing Stauffer Chemical Company, New York-Ohio Company, Hardesty, Western Eelectro-Chemical Company, and U. S. Vanadium are operating or rebuilding for operation.

The Colorado River Commission of Nevada has been working with the Montgomery Company and lessees at Henderson to secure an electric rate and supply of energy, so that these industries may be made permanent. We look forward to the building of a substantial chemical empire in Southern Nevada.

This is the second of a series of articles issued by the office of the resident Engineer of the Colorado River Commission of Nevada, to acquaint the public with the operations and chemical industries interested at Henderson, Nevada, at the Basic Magnesium Project.

In November 1944, the caustic and chlorine plant at Henderson continued operations, while all other departments at BMI had shut down. The purpose of this was to supply war industries with much needed chemicals.

After VE day, on May 21, 1945, to be exact, the Stauffer Chemical Company of Nevada leased the plant from the Reconstruction Finance Corporation and has continued operation through VJ day, and on to the present time.

The chlorine and caustic plant is a unit in itself. The main operating departments being the Cell House, Caustic Evaporator House, Brine Area, and Boiler House. Auxiliary departments and equipment include cooling tower, cell parts plant, machine shop, warehouse, laboratory, and office.

The three products, chlorine, caustic soda, and hydrogen are formed in the electrolytic cells when DC current passes through the salt brine fed to these cells. Chlorine comes off as a gas and is purified, and then liquified by refrigeration and compression before shipment in tank cars. The dilute caustic soda, or cell liquor, is purified and then concentrated in vacuum evaporators to a 50% solution and then is also shipped in tank cars. Hydrogen is delivered to users on the project in gaseous form.

Chlorine is used in the manufacture of household bleaches, muriatic acid, and synthetic organic chemicals, and in dry cleaning and other solvents. It is used more specifically in bleaching paper pulp, paper, and textiles, water purification, petroleum refining, metallurgy, and food preservation.

Caustic soda is needed in the manufacture of soap, paper, water softening chemicals, sodium chemicals and drugs, paints, paint removers, and in fabrics of various kinds. It is used also in oil refining, rubber manufacture, and metallurgical extraction.

Hydrogen is used in the manufacture of synthetic muriatic ammonia, hydrogenation of oils, and in metallurgy.

It can be seen that the products made in this process of the project are basic to the chemical industry and other manufacturing. It is the nucleus therefore, of most of the industries that are being developed at the Basic Magnesium Project, which may well become the center of a great Nevada industry. For example, the Hardesty Chemical Company, soon to be in operation, will

take from the Stauffer Chemical Company, chlorine to manufacture numerous chlorinated products; caustics for processing others, and chlorine and hydrogen for producing muriatic acid. This latter in turn will be used by the United States Vanadium Company here at Henderson in the treatment of tungsten ores.

Each new product attracts new users, so that with the cooperation of Federal, State and other agencies, we may expect a real inter-related industry at the Basic Project.

The Stauffer Plant has at present a monthly capacity of 3,600 tons of liquid chlorine, 4,000 tons of caustic soda, and 100 tons of hydrogen. A second cell house can be put into production upon reasonable notice, which will nearly double the above output, and will about double the requirements for raw materials as listed below.

In a month of operation at the Stauffer Plant 6 to 7 thousand tons of rock salt are required; 225,000 gallons of fuel oil is used in generating steam to operate caustics evaporators and to supply other lessees on the project. This plant alone consumes approximately 10 million kilowatt-hours of electric energy monthly, costing between $26,000 and $32,500 in the operations of the electrolytic cells and operation of scores of motors and incidental equipment. Stauffer Company consumes about 25 to 30 million gallons of water monthly.

The freight bills for this company alone for monthly supplies and operations is in the neighborhood of $100,000—mostly for rail haul of raw materials and finished products.

In November 1945 the Nevada New York-Ohio Corporation Plant, a Stauffer Associate, started operation. This plant is a consumer of chlorine and aluminum metal. It produces aluminum chloride, used for many purposes, particularly for oil refining and the manufacture of synthetic rubber.

These Stauffer industries employ about 150 persons, a large percentage of these employees being the men and women who operate the production equipment. In addition there are a number of machinists, pipefitters, electricians, carpenters, painters, and others who keep the wheels of industry turning; and the office workers, chemists, warehousemen, and supervisors.

About 75 percent of the employees of the Stauffer Company live in Henderson, Victory Village, and Carver Park—all substantial cities in this growing industrial area.

Many of the Stauffer personnel were drawn to Nevada by the building of the original Basic Magnesium Project during the war or have returned here following the war, and expect to make

their homes in Southern Nevada. They pay taxes in Nevada, send their children to school in Nevada, contribute to the social and economic life of this State—they are a PART of Nevada.

Mr. A. T. Newell, Chemical Engineer, is the General Manager in charge of operations of the Stauffer Company of Nevada.

This is the third of a series of short notes issued by the Office of the Resident Engineer, Colorado River Commission of Nevada, Las Vegas.

Early in 1945 there was begun at Henderson a program for the conversion of one of the Basic Magnesium Project Units into a plant for the manufacture of potassium chlorate—a chemical in great demand for the war effort and allied industries. Operations were started in July 1945, even before conversion of the plant was completed, and the first potassium perchlorate was being turned out as the war ended.

This plant is being constructed by the Western Electro-Chemical Company under a five-year lease of grounds and building from the Reconstruction Finance Corporation (now the War Assets Administration).

The monthly productive capacity is 2,400,000 pounds of sodium chlorate, potassium chlorate, and potassium perchlorate; with production at the present time being concentrated on the latter. A large part of this production is sold in the United States.

The sodium chlorate is used in the manufacture of chemicals, and more particularly as a base for weed killers. Potassium chlorate is used particularly in the manufacture of matches; while the perchlorates are used as an oxidizing agent for jet fuels, and are presently being purchased by the Government and its agencies and contractors.

Power consumption at this plant is about 8 million kilowatt-hours a month; the monthly payroll about $34,000 a month, and the freight bills about $18,000 monthly. Most of the latter is in the hauling of raw materials from outlying States; hydrochloric acid from Pittsburg, California; salt from Amboy, California, and basic materials (chlorate) from New Mexico.

About 125 persons are employed on the Western Electrochemical project, and most of these live in the Henderson Townsite, where they are a substantial part of this thriving community.

The project operations of the Western Electro Chemical Company are in charge of Fred D. Gibson, a well-known Nevada chemical and metallurgical engineer.

The Hardesty Chemical Company (trade name for this industry here being HARCO) is not yet in production at Henderson, but when in full production will employ about 100 men.

This chemical company will produce synthetic organic chemicals most of which will be shipped to other chemical houses for further processing and conversion to commercial and marketable products.

Some raw material will be shipped to this company at Henderson. When in full production it is expected that the Stauffer Company, now operating here, will supply the caustics and chlorine.

The supervisory staff of the Hardesty Company has been here for some time, overseeing the reconversion of Unit number 2 into Hardesty specifications.

Samuel J. Cohen is President of Hardesty, with principal offices in New York City and Henderson, Nevada, and Nevada operations are under M. A. Mastin, General Manager.

This is the fourth of a series of sketches of industry in Southern Nevada compiled by the Resident Engineer, A. J. Shaver, of the Colorado River Commission of Nevada.

The United States Vanadium Corporation has leased building space at Henderson, Nevada, at the site of the Basic Magnesium Project, these facilities to house a chemical tungsten refining operation.

Tungsten, as our readers know, is an element which adds hardness and strength to steel, and is used primarily in the manufacture of high-speed tool steel, tungsten magnet steel, Hays Steelite and Steelite alloys. Tungsten in this process here at Henderson is brought from Winnemucca, Nevada, and Bishop, California. At these mining locations the ore is mined directly by the U. S. Vanadium Corporation, and is treated by soap-flotation to produce a low-grade tungsten concentrate. It is presumed also that similar low-grade ores will soon be available from custom mills and other small producers in this southwest area. These concentrates are shipped to Henderson by 25-ton trucks operated by private contractors, running on a long-haul schedule to supply the process for U. S. Vanadium.

Limestone, used in the processing, is secured locally from nearby sources in Clark County, and is shipped both by rail and truck. The reagents used are mainly acquired from the Stauffer

Company, another of the industries at the Basic Magnesium Project.

The tungsten concentrates, shipped in to the project, will be further treated and produce higher grade tungsten products which in turn will be used in steel treatment and processing. The final product is to be shipped to the major steel manufacturing centers of the United States.

The monthly payroll of the United States Vanadium at Henderson is about $50,000, this initial development employing about 100 men.

Vanadium has a five-year lease on buildings belonging to the United States (War Assets Administration), and the reconversion and replacement of equipment has been financed entirely by the Vanadium Corporation.

The private industrial development of the Government-owned facilities at Henderson depends upon a combination of many factors: low cost power, availability of suitable production buildings, and the possibility of coordinating and integrating the activities of the various operators at the project. Availability of skilled labor and accommodations for them and their families is of prime importance, and a major necessity. The responsibility of the labor groups in Clark and Lincoln counties, working with the employers for mutual interest, will be a controlling factor in this development, and in the continuation of activity of the present employers, and the attraction of additional private industry.

The United States Vanadium Corporation is to be closely associated in operation with the Stauffer Chemical and Hardesty Chemical industries through the purchase of reagents and other vital and necessary materials and chemicals used in the tungsten processes. U. S. Vanadium is a subsidiary of Union Carbide and Carbon Corporation, owners and operators of a large number of plants in the various parts of the United States.

It is anticipated that research now in progress by the Vanadium Corporation on the development of processes for the production of high grade and highly refined varied tungsten products will enable United States Vanadium Corporation to add further to the industrial development of the southwestern Nevada section and to the entire southwest area of this country.

Mr. J. R. Van Fleet, President; Mr. Blair Burwell, Vice President in charge of operations; and Mr. J. Ray Coulter, General Manager, are the principal corporation officials concerned with the entrance of U. S. Vanadium into the Henderson area.