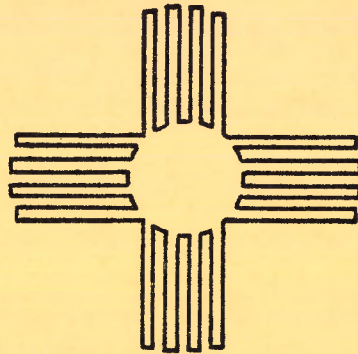


CIRCULAR 43

Geotechnical
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Carbon Dioxide in New Mexico (1959)

By EUGENE CARTER ANDERSON



NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

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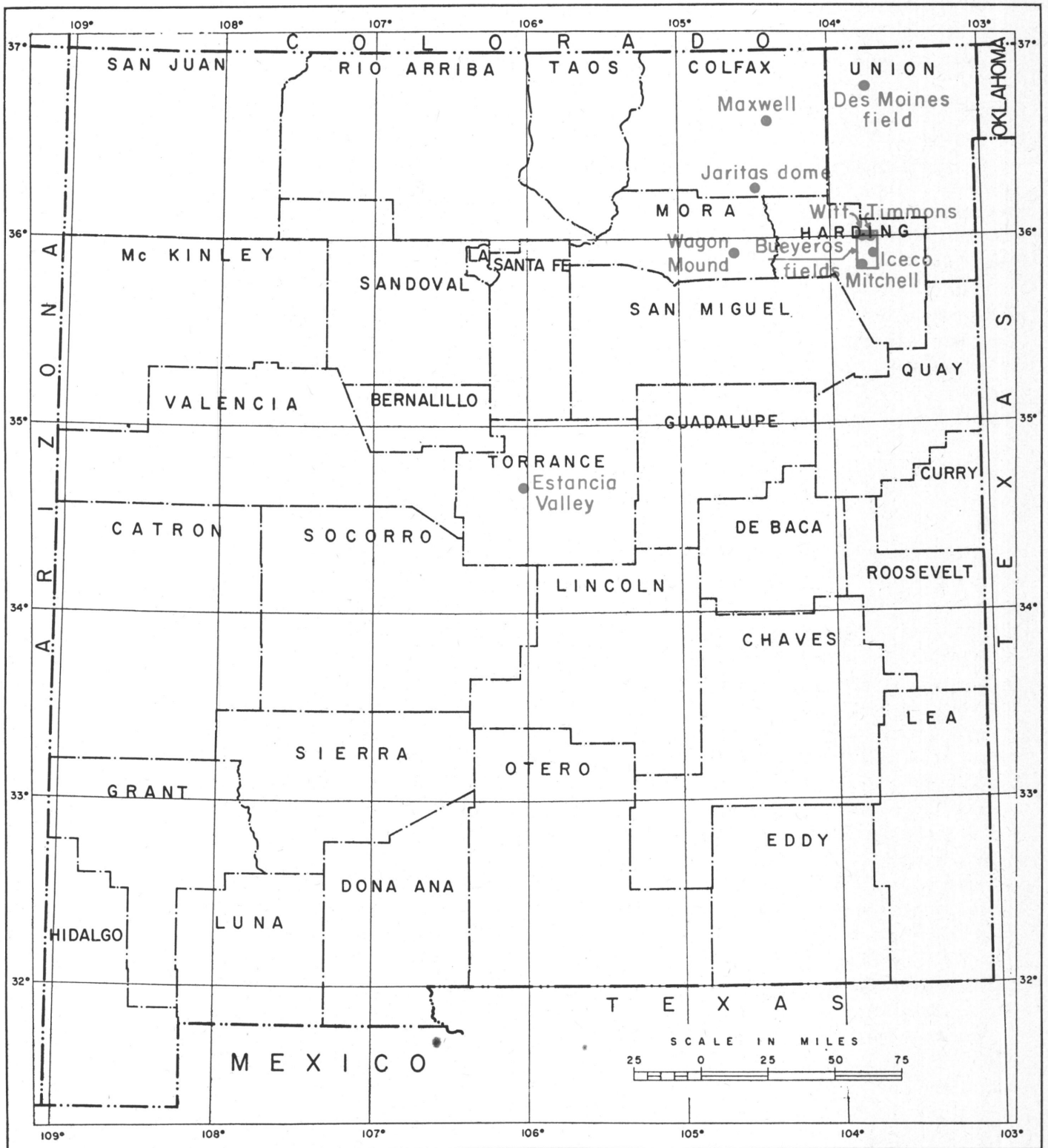
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CARBON DIOXIDE GAS FIELDS IN NEW MEXICO

Figure 1

INTRODUCTION

Since the publication, in 1942, of the study ¹ entitled *Carbon Dioxide in New Mexico*, by S. B. Talmage and A. Andreas, sufficient changes have taken place in the carbon dioxide industry to justify a revised edition of this circular.

Carbon dioxide, under normal conditions of temperature and pressure, is a heavy, inert, noninflammable, colorless gas. It is found in the atmosphere in a quantity approximating one-thirtieth of 1 percent at sea level. It is popularly called carbonic acid gas. It occurs in many coal mines and is known to the miner as "black damp." It is not actually poisonous in the true physical sense of the word, but, being heavier than air, it tends to accumulate in low places. A man breathing carbon dioxide in sufficient concentration will lose consciousness and die quickly from lack of oxygen.

The critical temperature of carbon dioxide is 31.1°C (88°F), at which temperature the gas can be liquefied under pressure of 73 atmospheres (1,000± pounds per square inch) at altitudes of 3,000 to 4,000 feet. Less than half that pressure will liquefy the gas at the temperature of freezing water. Carbon dioxide freezes to a white solid at -56°C (-69°F) under pressure of 5.1 atmospheres, but cold liquid carbon dioxide under pressure, if released rapidly through a nozzle, will precipitate directly as a solid resembling snow. This "snow" can be compressed into solid blocks and becomes the "dry ice" of commerce.

OCCURRENCE AND ORIGIN

Although carbon dioxide is a normal part of our atmosphere and it is possible to recover the gas from the air, the economic feasibility of such an operation would be questionable. It is abundant in many volcanic gases and appears to be a normal product accompanying the dying out of volcanic activity, as is evident in the Yellowstone Park region, at Soda Springs, Idaho, and at other localities. Large underground accumulations of the gas have been found in some regions that show much evidence of recent volcanism, and these occurrences have become the chief sources of the raw material for the dry ice, liquid gas, and bottled CO₂ gas of commerce.

In some areas of New Mexico, especially in the northeast quarter of the State, carbon dioxide has been found in abundance and under quite high pressure in structural traps that hold large amounts of granite wash and/or highly porous sandstone at depths that range from 800 to 2,700 feet.

One of the earlier discoveries of this gas in commercial volume in New Mexico was in the Estancia Valley of Torrance County, where a shallow, low-pressure field was found prior to 1930. This field was commercially developed in 1934. Much larger fields, however, were subsequently discovered in the upper reaches of the Ute Creek valley in Harding County, near Des Moines in Union County, near Wagon Mound in Mora County, and near Maxwell in Colfax County.

The gas pressure varies greatly in the fields that have been explored. The range is from 10 to 600 psi. The greater pressures have been found at depth. Frequently, two possible pay horizons have been found in the same field. The gas in all the fields so far exploited in this State occurs in the highly porous Abo (Santa Rosa) sandstone or in very loosely cemented arkose.

The locations of the known occurrences of carbon dioxide in New Mexico are shown on the accompanying map. Some of the known fields have not been produced commercially for reasons that will be discussed later in this report.

The origin of the gas accumulations in the structural traps and/or other favorable structures, as found in New Mexico, has not yet been determined by geologists and others who are acquainted with the fields and have made geologic studies of the areas in which the gas fields or pockets occur. It has been suggested, however, that carbon dioxide may have been formed by the action of igneous rocks at great depth coming in contact with limestone and driving off the carbon dioxide as is done in a lime kiln. Others suggest that the gas had its origin in the magmas which produced the igneous rocks of the area. The limestone-igneous con-

1. New Mexico Bureau of Mines and Mineral Resources Circular 9.

tact theory appears to be the more plausible for the Ute Creek valley area because of the very high purity of the gas found there. The gas in the Des Moines and Wagon Mound fields may well have had a different origin.

DISCOVERY AND DEVELOPMENT

As is often the case, the discovery of the carbon dioxide deposits in this State was made while search was being made for other commodities of economic importance. In all cases, except in the Estancia Valley, the CO₂ was encountered in wells that were being drilled for oil and/or gas.

Torrance County

In the Estancia Valley, the first gas discovery was made in a well that was being drilled for water. This discovery was confirmed, and a gas pool of commercial extent and quality was indicated, by a well being drilled nearby for oil. The main gas-bearing formation was encountered at 1,200 to 1,245 feet. The gas was more than 99 percent CO₂, the well-head pressure was 415 psi, and the well potential was 2,250,000 cubic feet per day. The well was plugged and abandoned.

This field was developed and placed in production in 1934 by the Witt Ice and Gas Co. Two wells were drilled in 1934 and a third well in 1937. The first two wells had a potential of 2,350,000 cubic feet of gas per day. The third well didn't produce and was plugged and abandoned.

The Witt Ice and Gas Co. plant near Estancia was the first carbon dioxide processing plant in the State and was reportedly the first plant in the United States to manufacture dry ice by a low-pressure process.

Mora County

In 1936, while drilling a test well for oil on a lease 16 miles south of Wagon Mound, the Arkansas Fuel and Iron Co. encountered a strong flow of CO₂ gas at a depth of from 1,450 to 2,225 feet. The gas was under very high pressure and was estimated to flow 25,000,000 cubic feet per day. The gas horizon also carried much water, and the gas itself contained as much as 7 percent nitrogen.

Two other wells drilled in this area a few years later encountered CO₂ gas at approximately the same depths.

This field has been promoted two or three times but has never been developed for commercial production. The water and nitrogen offer obstacles that apparently would be very difficult and expensive to overcome.

Colfax County

The California No. 1 Floersheim State oil test well drilled in 1925 on the Jaritos dome encountered low-grade (67%) carbon dioxide gas at a depth of 1,509 feet. The York Denton No. 1 State well drilled in 1940 just east of Maxwell encountered gas of very high quality (99.8% CO₂) at a depth of 1,515 feet. The first well had an indicated potential of 500,000 cubic feet per day; it was plugged and abandoned. The York Denton well had a potential of 153,000 cubic feet per day at 128 psi at the well head. This well was scheduled for production in 1942, but financing was not completed before the outbreak of World War II. The well is reported as "shut in" at this time.

Union County

In the Sierra Grande uplift, the Sierra Grande Oil Co. found 98.6 percent CO₂ gas at 2,300 feet in its No. 1 Rogers well drilled in 1935. Potential production was 6,000,000 cubic feet per day. The well was plugged and abandoned.

Near the town of Des Moines, two CO₂ gas horizons were encountered in a test well being drilled for oil. The first gas encountered was at 1,100 feet. The gas pressure from this horizon was 10 psi. The second gas was at 2,500 to 2,700 feet, and the pressure was 250 psi.

Both gas horizons were developed by two wells. The low-pressure gas was compressed to 250 pounds before being fed into the line that served the processing plant. This gas was only about 98.5 percent CO₂ and presented serious problems in the processing plant.

Harding County

The largest and by far the most productive carbon dioxide deposits found in the State to date are in the Bueyeros fields of the upper Ute Creek basin in Harding County.

The discovery well in this field was drilled in 1916 by the American Production Corp. The well was known as the No. 1 Bueyeros and was drilled as an oil test. Carbon dioxide was encountered at 2,000 feet, and the reported potential was 25,000,000 cubic feet per day. The pressure was not reported. The well blew wide open for about one year; it then bridged and later was plugged. It is recorded as having been plugged and abandoned in 1917.

In 1931, the Kumbaca Oil and Gas Co. drilled the No. 1 Derlin in NW $\frac{1}{4}$ sec. 34, T. 20 N., R. 30 E. This well encountered CO₂ at 940 feet and was completed as a CO₂ producer having a potential of 3,000,000 cubic feet per day and 38 psi pressure. It was produced by the Timmons Carbonic Co., of Clayton, New Mexico.

Many wells have been drilled, and several fields have been proven, in the basin since 1931. One well in particular is deserving of mention because of its production potential. The Colo-Mex Gas Co. drilled the No. 2 Baca in the NE $\frac{1}{4}$ sec. 31, T. 20 N., R. 31 E., in 1935. Carbon dioxide was encountered at 2,041 feet, and the well cut 100 feet of gas-bearing sand. The reported potential was 25,000,000 cubic feet per day under 578 psi pressure. This well was an offset to the discovery well drilled in 1916. It was plugged and abandoned.

RECOVERY, PROCESSING, AND USES

Recovery

At all the wells that have produced CO₂ in New Mexico, recovery has been by means of natural pressure. The gas is delivered from the wells directly to the processing plants through pipe lines that are from a few hundred feet to as much as 18 miles in length. The rate of delivery is controlled by valves at the well head.

Production was never attained from the fields in Mora or Colfax Counties, or from the Sierra Grande uplift field in Union County.

Processing

With the exception of the gas from the wells near Des Moines in Union County, all the fields that have been exploited have produced gas of more than 99 percent purity. The Des Moines gas is about 98 percent CO₂, containing about 2 percent nitrogen and a small amount of carbohydrid gas. The nitrogen and carbohydrid gases must be eliminated at a very early stage of the processing to avoid explosions in the final stages of compression.

At some of the wells, a little water seeps into the casing. This must be eliminated in order to avoid trouble from freezing in the pipes and compressors. It is the common practice to bleed off the water from the wells by means of gas pressure through a tube placed within the well casing and extending to a sump at the bottom of the well. The tube discharge is controlled by a valve at the collar of the well. In wet wells where the gas pressure is insufficient to eject the water as described above, other methods of trapping the water and drying the gas must be provided before the gas enters the processing circuit.

Compression

When the pressure of the gas as it comes into the plant from the wells is below the "critical" pressure for liquefying, compressors are used to boost the pressure to the required point.

Refrigeration

The compressed gas is chilled to the liquid state in refrigerating coils. Ammonia usually is used as the refrigerant, but CO₂ gas itself may be used. Liquefaction takes place at -15° to -18°C .

Sublimation

From a well-insulated, high-pressure storage tank, the liquid carbon dioxide is fed into bottles or tanks for delivery to those who use the gas in liquid form, or it is blown into the ice or snow chamber, which is a receptacle 20 inches square and 30 inches high. Here, the liquid CO₂ precipitates as snow, filling the chamber loosely. The top of the chamber is the plunger of a hydraulic press, which is forced down under approximately 200 tons pressure and compresses the carbon dioxide snow to a dense, solid block of dry ice about 10 inches thick. Any portion of the carbon dioxide that has not become snow is bled back into the liquid circuit. The liquid weighs about 93½ pounds per cubic foot, and the ice weighs 96 pounds per cubic foot. It requires 10 cubic feet of gas at about 350 pounds well-head pressure to make 1 pound of ice. The temperature of the ice is -109° to -115°F .

Packing and Shipping

The blocks of ice from the press are sawed twice across; the sawed blocks, approximating cubes 10 inches square and nearly 60 pounds in weight, are packaged in specially designed sacks of heavy paper. The wrapped blocks are placed in well-insulated storage bins or loaded directly for shipment.

From the plants located on the railroad, shipment is made in standard refrigerator cars equipped with special insulation on all sides and the floor, as well as by truck. Where the liquid carbon dioxide is shipped by rail, specially insulated, high-pressure tank cars are used, or the shipment is made in high-pressure steel bottles. By using the extra insulation in regular refrigerator cars, the loss in transit from the processing plant to the warehouse of the consumer has been reduced to less than 1 percent per day of travel. A large part of the ice and liquid gas produced is shipped by trucks having specially designed and insulated bodies. By using a layer of loose dry-ice particles between the kapok insulating mattresses and the packaged ice, the loss in transit is reduced to less than 1 percent per day of travel. The payload for a truck ranges from 10 to 20 tons. When liquid gas is shipped by tank truck, specially designed tanks are necessary. They must withstand pressures exceeding 3,000 pounds per square inch and be very heavily insulated. Bottled gas is handled by truck in much the same manner as is oxygen, hydrogen, or helium. The payload of the tank truck is usually 5 to 10 tons.

Uses

The principal use of solid carbon dioxide, or dry ice, is as a refrigerant. It is especially useful in the long-distance shipment of fruits, vegetables, flowers, chemicals, and medicines. Pound for pound, it is from 10 to 15 times as effective as water ice for these purposes, and it is much less bulky. It is used for some purposes for which water ice cannot be used, such as in the quick freezing of fresh fruits, vegetables, and meats, which require temperatures far below "water ice-cold." Dry ice has found a place in many phases of heavy industry, such as the shrinking of metals and other materials, temperature control for storage, and air conditioning.

Liquid carbon dioxide has long been used in fire extinguishers, where it serves the double purpose of smothering the flame and lowering temperatures, in the manufacture of carbonated water and beverages, as a preservative for foods, and for a variety of other purposes.

In recent years, large quantities of dry ice have been and are being used by research laboratories where precise temperature control is necessary. The biggest market for ice produced in New Mexico, reportedly, is with the White Sands Missile Range, Holloman Air Force Base, Sandia Base, and Los Alamos laboratory. Other markets are with packing houses, food-processing plants, ice cream and carbonated beverage manufacturers and dispensers, florists, and shippers of perishable commodities.

Liquid carbon dioxide has replaced explosives for some purposes, as in coal mining. Expanding more slowly than dynamite, the liquid carbon dioxide breaks the coal more cleanly and with a greatly decreased proportion of fines. It has been used experimentally as a noiseless propellant of bullets and projectiles. It is finding uses in many phases of industry where inert gases are required.

It is estimated that about 22,000 tons of carbon dioxide solids (dry ice and liquid gas) was produced in New Mexico in 1958. About 410,000 million cubic feet of gas was delivered from the wells to the processing plants.

PRODUCING GAS FIELDS AND PROCESSING PLANTS (JULY 1959)

At the time this report was prepared, only two gas-processing plants were active in the State. Both were using gas from the Bueyeros fields. A third plant, located in this field, was on standby status, and another plant, located in the Des Moines field, was being reconditioned and prepared for producing liquid gas if and when marketing conditions should justify the operation.

In 1955, the year of greatest production of CO₂ gas in the State, there were five plants in production or on standby status. Three of these were operating continuously on a three-shift basis, one was operating intermittently to take up excessive demands on the three active plants, and one was on strictly standby status. Four of these plants were located within the area of the Bueyeros fields, Harding County; the other was in the Des Moines field of Union County.

Of the two plants presently operating, one is located on a branch line of the Southern Pacific R. R. and has train service at 3-day intervals. The other plant is some 40 miles from the railroad and is served by truck haul exclusively.

The two active properties and the three inactive properties in the State are described briefly below.

Carbonic Chemical Co.

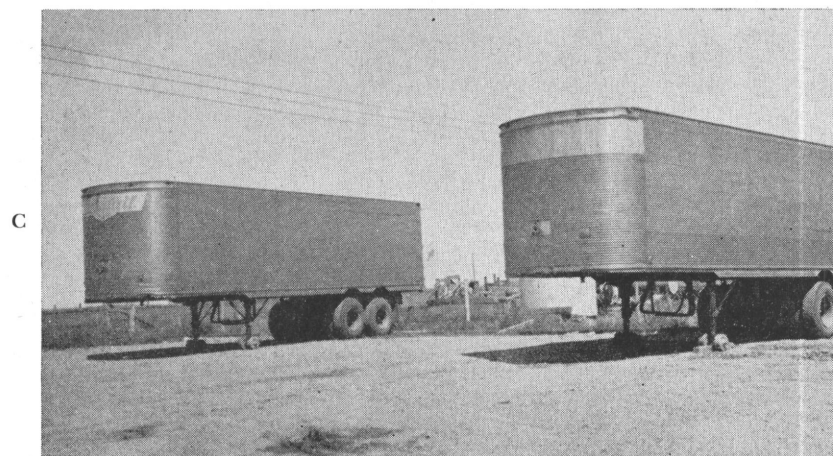
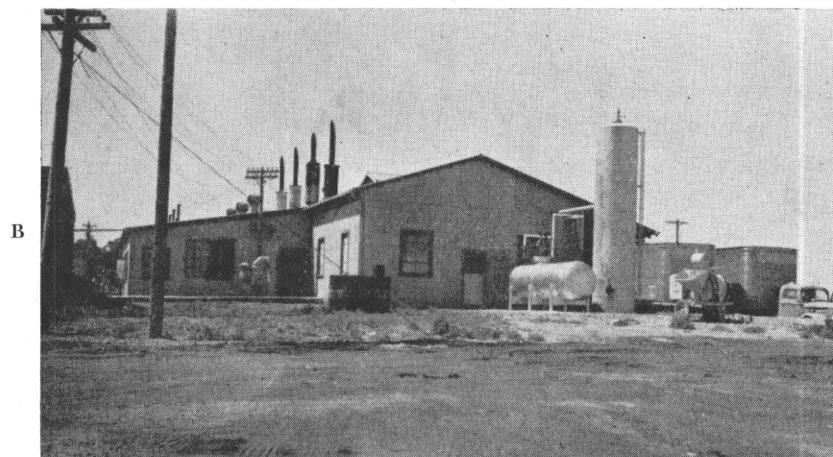
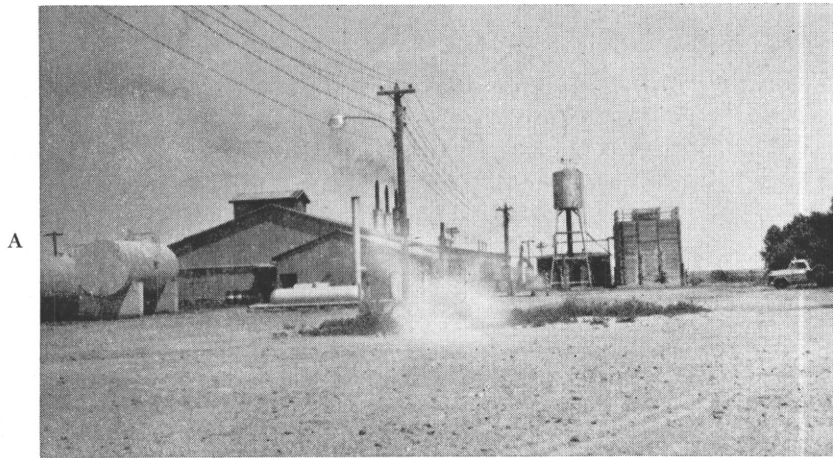
The largest operation, and the biggest producer of dry ice and liquid gas in the industry, is that of the Carbonic Chemical Co. This company's plant is located near Solano at Dioxide, a siding on the Tucumcari-Mosquero branch of the Southern Pacific R. R. The plant has a capacity of 125 tons of ice per day and produces 100 tons of liquid gas per week. It receives its gas from wells located on the Albert Mitchell ranch, some 18 miles east of the plant, in the southwest portion of the Bueyeros fields. Delivery of gas from the wells to the plant is made through a single heavy-duty 6-inch steel pipeline under normal well-head pressure.

A total of 13 wells have been drilled by this company. All have been good producers. Presently, 7 wells supply the requirements of the plant, 3 are on standby basis, and 3 are shutin. The wells are about 2,100 feet deep, and the shutin pressure at well head is 565 psi. The gas-bearing formation is a very porous, coarse arkose. A small amount of water is evident in the formation, but any water accumulation in the wells is easily expelled by the gas through a tube inside the well casing. The discharge is controlled by a valve at the well collar.

At the plant, the gas is liquefied at -15°F at the pressure (about 530 psi) at which it is received from the wells. Ammonia is the refrigerant. The liquid is reduced to the solid state either by pressurizing or by spraying into snow chambers and compressing. The pressure used is about 125 tons. The rated capacity of the presses is 200 tons psi.

The ice is packaged and moved to storage, or loaded directly into refrigerator cars or into well-insulated truck trailers for delivery to users or distributors. The markets are mostly west of the Mississippi River, but some shipments are made to the Chicago area. Much of the production goes to the A.E.C. establishments at Los Alamos and Sandia Base, and to the research laboratories at White Sands and Alamogordo.

The plant was built in 1939 and has been in production since that time. It has been modernized extensively, and the operation is being made nearly automatic at this time. It is operating presently at capacity on a three-shift basis. Eighteen men are employed.



CARBONIC CHEMICAL CO. PLANT,
SOLANO, NEW MEXICO

- A. View looking south.
- B. View looking northeast.
- C. Specially insulated trailers for delivering ice.

The company, reportedly, is owned by R. L. Harrison, of Albuquerque, and Albert Mitchell, of Albert, New Mexico. It operates its own delivery trucks, which carry 34,000 to 38,000 pounds of ice, depending on the point of delivery. Loss is less than 1 percent for 24 hours of transit.

Iceco

Iceco, owned by the Schwartz Co., of El Paso, Texas, operates the second active plant in the Bueyeros fields. This company is one of the more recent operators in the State. Its plant and wells are located about 3 miles directly south of Bueyeros village and 6 miles north and east of the Carbonic Chemical Co.'s wells on the Mitchell ranch.

The plant has a capacity of 53 tons of ice per day. It does not market liquid gas. However, the company has a plant in El Paso, Texas, where the ice is returned to the liquid state to meet market demands.

The plant receives its gas from four wells located close by. The wells are 2,150 feet deep, and the shutin gas pressure is 442 psi at the well head. The gas is produced from a zone of granite wash or arkose, and some water accumulates in all the wells. The water is ejected from the bottom of the wells by gas pressure through a small tube placed inside the casing.

The most recent well on the property was drilled in 1956. The capacity of the plant has been increased recently, and operations have greatly improved. Production from the wells is more than ample to supply the maximum capacity of the plant.

The Iceco plant was built in 1952 and has operated since that time on a varying load, depending on market demand. The gas-processing methods followed at the plant are practically the same as those employed at the Solano plant of the Carbonic Chemical Co. The gas is liquefied by refrigeration, and the liquid is sprayed into the snow chambers and compressed into blocks of ice under 75 tons pressure (as compared with 125 tons at Solano). The resulting blocks of ice are somewhat thicker or deeper than those made at Solano, but the weights are approximately the same.

This plant distributes its product solely by truck. The dry ice reaches markets in the Omaha and Kansas City areas, in the Ft. Worth, Dallas, and Houston areas, in the Rocky Mountains region, and as far west as the Pacific coast.

Witt Ice and Gas Co.

The Witt Ice and Gas Co. was the initial producer of dry ice in New Mexico. The first plant was located in the Estancia Valley of Tarrant County. It was built in 1934 and operated until 1942 on gas piped from wells located within 6 miles of the plant. The gas pressure was low, and the wells were plagued by water seeping into the casings. The gas pressure was not sufficient to expel the water through tubes as has become the practice in some of the Bueyeros fields. Owing to the water encroachment, the full flow of gas could not be utilized.

The Estancia Valley field was abandoned in 1912 when the Witt Company acquired the holdings and plant of the Ute Carbonics Co. located in northwestern Ute Creek valley, Harding County.

The Witt ice plant is located about 4 miles northwest of the village of Bueyeros. The plant, which is presently idle and on standby status, is served by 5 wells, each about 800 feet deep, which produce from a coarse sandstone and granite wash. The shutin gas pressure at the well head is 38 to 40 psi. Some water is evident in all the wells, particularly in the No. 5 well, where an electric pump has been installed. Power lines have been built to other wells preparatory to installing pumps, if necessary.

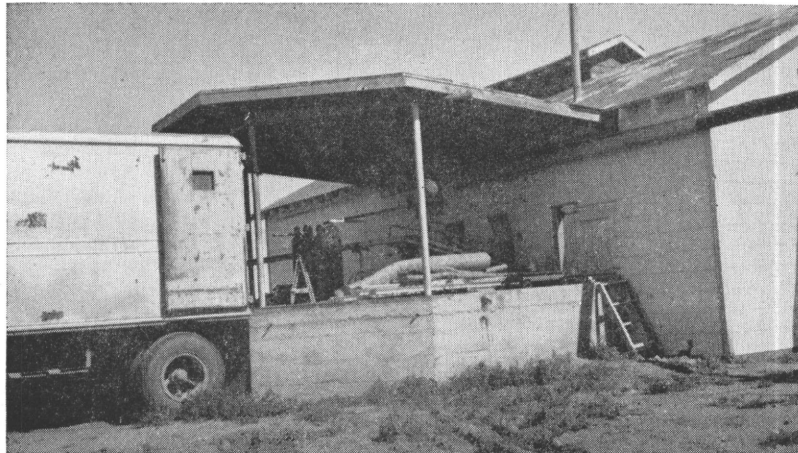
The wells are located in secs. 27 and 28, T. 21 N., R. 30 E. The plant is in sec. 28.

This plant was built by the Ute Carbonics Co. in 1940. It has a rated capacity of 20 tons of ice per day, but normally it produces about 17 tons per day. The gas is received at the plant at well-head pressure, less about 5 pounds. When necessary, it is dried and then compressed to the critical pressure for liquefying at -18°F . Some of the liquid is marketed as such, but most of it is converted to snow and then to ice, as is done at the Iceco and Solano plants.

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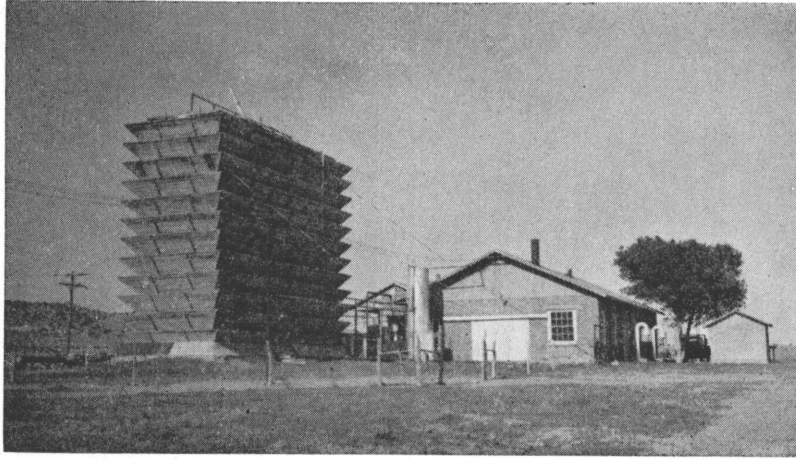
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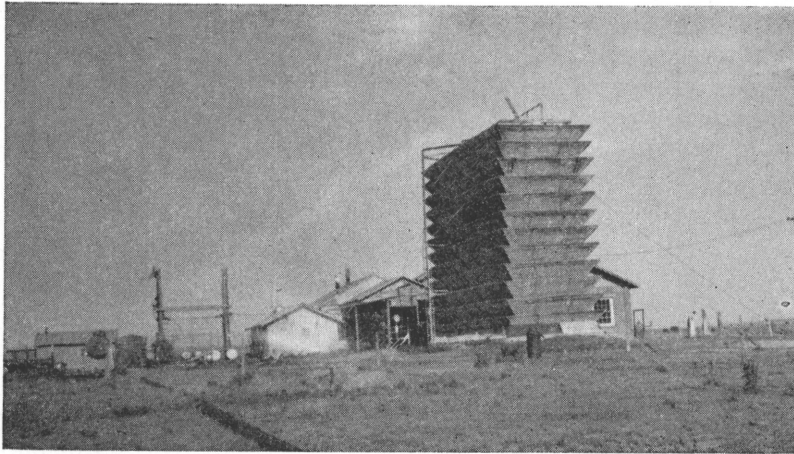
ICECO PLANT, NEAR BUEYEROS, NEW MEXICO

A. View looking northeast.

B. Loading dock. Packaged ice (center) moving into truck by conveyer.



A



B

WITT ICE AND GAS CO. PLANT,
NEAR BUEYEROS, NEW MEXICO

- A. View looking northeast.
- B. View looking east.

Plate 3

Shipments from the plant are entirely by truck. The principal markets are located within quick truck-delivery distances—Denver, Wichita, Oklahoma City, Dallas, and El Paso. The Cardox Co., of Denver, has been one of Witt's best customers, and recently Witt and Cardox combined their interests.

The Witt Ice and Gas Co. in recent years has become an important distributor of CO₂ gas products, supplying a large percentage of its customers with ice and liquid gas purchased from other producers.

The Bueyeros plant has been on a standby basis for several years, operating only when market conditions have warranted. The plant was last operated in December 1957.

Timmons Dry Ice Co.

The Timmons plant and the three wells that supplied it with gas are located in sec. 34, T. 21 N., R. 30 E. This operation has been discontinued. The wells are shutin, and the plant equipment has been dismantled and moved away. The buildings remain but are scheduled to be removed in the near future.

The Timmons plant was the first to be built in the Bueyeros fields. It was also the smallest, having a maximum capacity of 10 tons of ice per day. Normal production was 6 or 7 tons per day. It was served by 3 wells, 2 in the immediate vicinity of the plant and the other about one-half mile away.

The wells are about 900 feet deep and produced from a coarse sandstone through a 5-inch casing. The capacity or potential of the three wells is about 1,000,000 cubic feet per day. The shutin pressure is 35 psi. The pressure at the plant was about 30 psi. Both liquid gas and ice were produced. The liquid gas was sold in 50-pound bottles to soft-drink and carbonated-water bottlers in west Texas, Oklahoma, and Kansas. The ice went to Denver and Amarillo.

During the late years of this company's activities, it discontinued production and became solely a distributor of CO₂ products.

Liquid Carbonics Co.

Originally a subsidiary of Gruemmer Industries, Inc., this operation is being reorganized as the Southwestern Chemicals Corp. and will be a subsidiary of the Southwestern Mineral Corp., of Modina, Illinois.

The plant of this company and the gas field that supplied its needs are located just north of the town of Des Moines in Union County.

The original discovery of CO₂ gas in this area was in the Sierra Grande No. 1 Rogers test drilled in 1935. This well reportedly encountered gas at 2,245 feet in granite wash and coarse sandstone. Three productive horizons were reported. The gas contained 98.6 percent carbon dioxide, and the well had a reported potential of 6,000,000 cubic feet per day. It is located in sec. 4, T. 29 N., R. 29 E. It was plugged and abandoned.

This gas field is presently known as the Des Moines field.

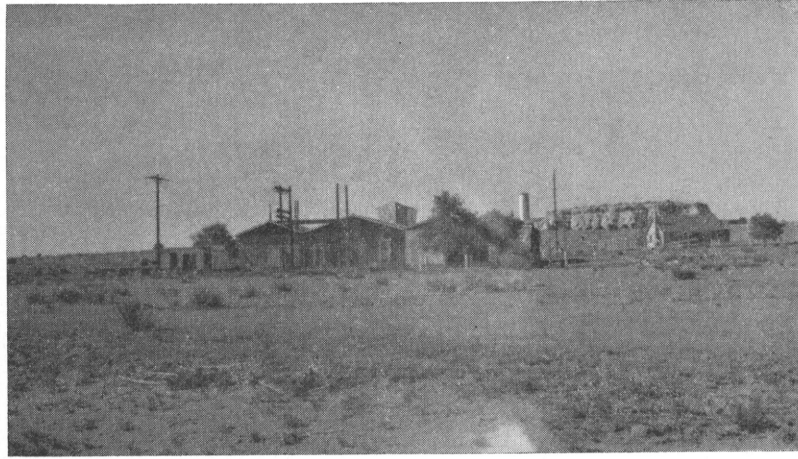
In 1954, Gruemmer Industries became interested in the field, obtained leases, and drilled two wells. Carbon dioxide gas was encountered in both wells, at depths of 2,460 feet and 2,700 feet. The gas was 98.6 percent CO₂, with 1 percent nitrogen and a fraction of 1 percent carbohydrid gas. Both of the lesser gases were destined to cause much trouble in processing.

The shutin well-head pressure at one well is 250 psi; at the second well, the pressure is only 10 psi. In order to use the gas from both wells, it was necessary to install a compressor in the low-pressure delivery line to the plant.

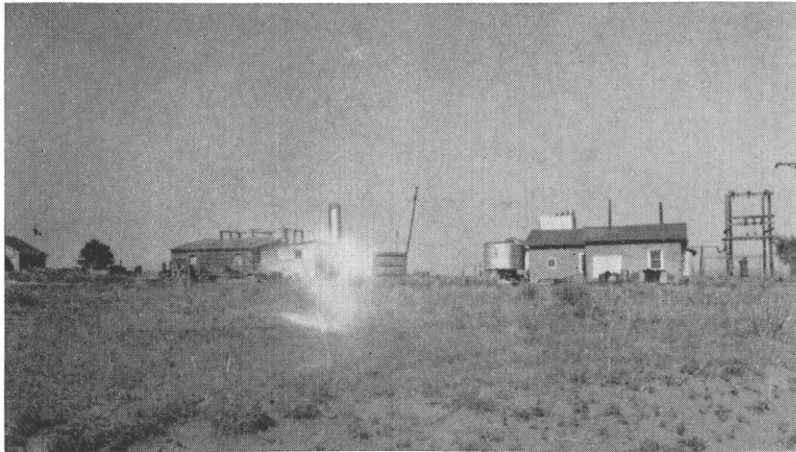
A plant to produce liquid gas was constructed alongside the Colorado Sc Southern Ry. tracks, 1 mile north of Des Moines. This plant was in production in 1955 and during part of 1956. Much difficulty was encountered in eliminating the two minor gases from the CO₂ before the critical point for reducing the gas to the liquid state was reached.

The liquid gas was marketed in Denver and nearby areas. Delivery was made in bottles and in specially designed tank cars. The operations at this plant became intermittent and finally ceased in late 1956 or early 1957.

At the present time, a new company is being organized, and it is expected that this field will become active again in the near future.



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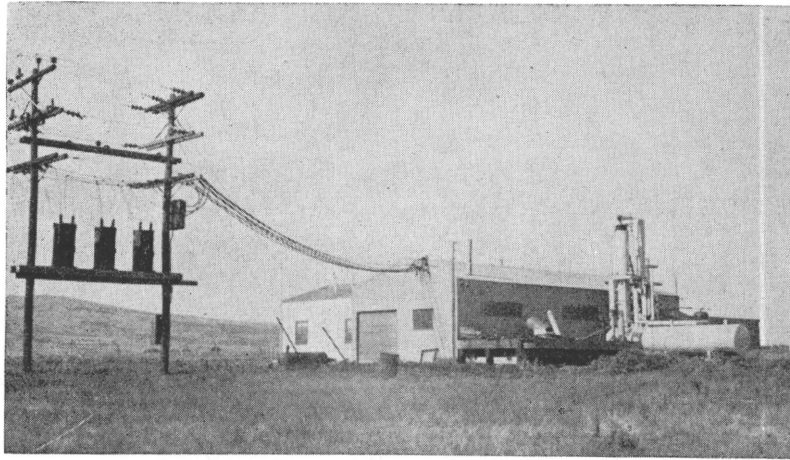
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TIMMONS DRY ICE CO. PLANT (ABANDONED),
NEAR BUEYEROS, NEW MEXICO

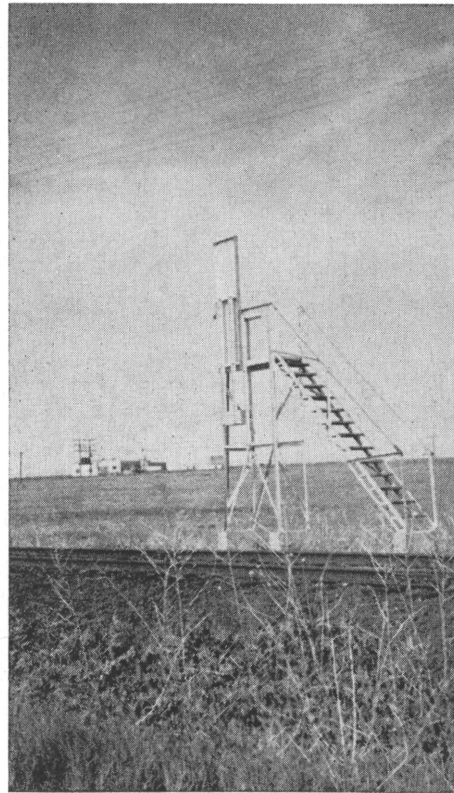
A. View looking north.

B. View looking east.

Plate 4



A



B

LIQUID CARBONICS CO.
(SOUTHWESTERN CHEMICAL CORP.) PLANT,
NEAR DES MOINES, NEW MEXICO

A. View looking west.

B. Liquid-gas loading facility on Colorado & Southern Ry. Plant in background.

Economics of the Industry

There are two processing plants in operation in the carbon dioxide fields of northeastern New Mexico. A third plant is on standby status, and a fourth is being overhauled and reconditioned preparatory to resuming production when market conditions improve. A fifth plant, which was formerly active in the field, after being idle for several years, has been dismantled and moved away.

The two active plants have a combined daily capacity of 178 tons of dry ice. One of these produces 100 tons of liquid gas per week. The plants operate on 3 shifts, 5 days a week, employing a total of 30 men and using over 3,500,000 cubic feet of gas per day. The gas comes from 11 wells located in 2 sections of the Bueyeros fields some 6 miles apart.

The two inactive plants have a total daily capacity of 17 tons of ice and 10 tons of liquid gas. These plants will use gas from 7 wells when in production and will employ 16 men.

The CO₂ ice and liquid-gas industry has, until recently, been a seasonal business. The plants have operated at capacity during the summer months and at a reduced rate during the winter months. In recent years, however, the demand for both ice and liquid has increased greatly, and production has held at a uniformly high level throughout the year.

The New Mexico industry has been, and still is, handicapped by problems of transportation to markets and is beginning to feel competition from plants that produce ice and liquid from CO₂ gases recovered from the flue gases of industrial plants located in areas where dry ice and liquid gas are in demand.

One company delivers its products with its own trucks or by rail. The other depends upon truck transportation entirely, having the problem of poor roads during wet weather.

The product from the plants has a market value to the distributors or large users of 1½ to 3½ cents per pound at the plant. The investment in plants is heavy because of the rugged type of equipment necessary to handle materials under very high pressures and at extreme temperatures.

Although employment in the industry is not large, the payrolls are definitely important to the economy of the area concerned. The industry is small in comparison with the petroleum, mining, livestock, or agricultural industries. However, it has value well above the million-dollar level and contributes appreciably to the overall economy of the State.

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