The cover photo shows the GW bulk sugar tank truck leaving the Great Western sugar factory at Windsor, in Northern Colorado. Windsor is one of nine GW factories (there are 16, in all) with the tall, white clusters of bulk sugar storage bins that stand out in the background.

The Great Western Sugar Company's Chicago Terminal, above, an ultra-modern facility serving Greater Chicago with GW Sugar in both bulk-dry and liquid sugar delivered direct to the customer's plant in sanitary trucks.

Great Western's bulk sugar terminal in Milwaukee, where the food processing industry can also take advantage of GW Sugar by the truckload.
BULK SUGAR HANDLING
-----by the Truckload!-----

Your handbook for the study of bulk sugar handling
--- by the truckload ---
for the food processing industry

presented by
THE GREAT WESTERN SUGAR COMPANY
SUGAR BUILDING • DENVER 17, COLORADO
To Food Processors:

At first glance, to the long-time user of sugar, the equipment shown on these pages must represent some strange sights in comparison with the more familiar scenes of man-handled bags. But this striking contrast, as a matter of fact, represents significant advances in the efficiency and economy of in-plant sugar handling — bulk-dry or liquid.

It is with these advantages in mind that we present this booklet to you so that you may study and share our knowledge.

Here you will find various examples of bulk-dry and liquid sugar systems designed especially for the truckload user; that is, the plant without a rail siding, or without the need for the rail car's large volume of bulk sugar.

In sharing our ideas with you, we at Great Western draw on a backlog of some 30 years of experience with bulk sugar handling, both at our own factories and the plants of customers. We hope, particularly in these days of burdensome costs, that our ideas will prove to be of value to you in equipping your plant with the tools to meet tomorrow.

Sincerely yours,

Benjamin A. Oxnard
Vice President
Before Bulk Sugar

Remarkably inefficient.
Possibly unsanitary.
Possibly expensive.
Likely dangerous.
Usually wasteful.
Constantly cluttered.
Frequently troublesome.
Actually demoralizing.
or smooth-flowing efficiency?

After Bulk Sugar

No costly idle hands.
No contamination.
No spillage losses.
No messy, slippery floors.
No wasted storage space.
No clutter of bags.
No inventory puzzles.
No question of quality.
GW's new design in tall sugar bins, equal in height to a 17-story building.

Vibrating sifters screen the bulk sugar.

Spouts move sugar to loading or packaging stations.

Hopper and scale weigh out sugar by carload.

Chute and scroll remove sugar from bin bottom.
What's the secret of success with bulk sugar? It's conveying equipment. And it begins at GW Sugar factories, where tall, white bulk sugar bins store up to 30 million pounds of sugar each to provide total Company storage of 260 million pounds. Inside the bins, at far left, mechanical equipment moves the sugar through the stages shown in the adjacent cutaway photos. A completely enclosed system, sanitary and safe for food products. The sugar flows directly into Airslide rail cars, at left and below, to be delivered in top condition.

from the sugar factory...
...to the sugar terminal

The bulk sugar terminal, a new facility designed for just one purpose—the truckload user of bulk sugar.

Here, GW Sugar arrives in bulk rail cars to be stored and then delivered to the customer's plant.

And how? By sanitary tank trucks, engineered especially for sugar, either bulk-dry or liquid.

The terminal itself houses the equipment for conditioning the sugar and for processing liquid sugar.

Under one roof, it offers the same bulk sugar advantages formerly limited to customers on rail sidings with facilities to receive and handle carloads of sugar.
At right, Great Western’s bulk sugar terminal in Milwaukee with the Airlside car on the right, the sugar storage bin atop the building, and the bulk sugar delivery truck inside the enclosed loading facility.

At left, cars of sugar from GW factories in the West wait to be emptied at Great Western’s modern sugar terminal near Chicago. Below, an overall view of the bulk-dry and liquid plant in Chicago.

from the railroad car...
Here’s the Airslide sugar car in a typical unloading station at a GW terminal. Arrow points to fittings for emptying the car.

Close up of connections for unloading sugar. Sealed sleeve protects sugar flowing out of car into enclosed conveyor-elevator system. Hose injects air to actuate sugar removal system in car.

At terminal’s loading station, delivery truck receives sugar by gravity through a protective sleeve from overhead storage bin. Note dial scale at right for accurate recording of customer’s load.
--dry or liquid

Part of the complex liquid sugar process in a GW terminal. The system operates automatically under strict quality control.

The stainless steel tank truck for delivering liquid sugar receives its load inside an enclosed loading station at terminal, direct from process. Again, note dial scale for accurate weighing.

Liquid sugar truck takes on load and also pumps it into storage at the customer's plant. Here hose connects directly to outlet from liquid process at a GW terminal.
Dry sugar flows up sanitary tube direct from truck with pneumatic power.

Sugar moves through mechanical scrolls in truck tank to conveyors at plant.

Liquid sugar flows with pump power in truck through sealed hoses to plant.

**function + performance = value**

Here are the basic functional parts—some in different adaptations—that equip a food plant with high performance in bulk sugar handling.

**SUGAR STORAGE BINS**

Dry sugar storage bin located inside plant takes only a minimum of space.

Liquid sugar storage tank located inside plant with easy connection for delivery.
Portable hopper under sugar discharge spout can be moved to points-of-use.

Monorail hopper for dry sugar moves handily to various points-of-use.

IN-PLANT HANDLING EQUIPMENT

At left, enclosed scroll conveyor for dry sugar on ceiling inside plant to save space; similar conveyors can be located to fit the lay-out and process of a plant.

Overhead tubes, operating with air power, carry sugar from storage to use points.

Automatic weight hoppers for sugar and flour offer push-button convenience.
You just saw on the preceding pages

the functional parts of

bulk sugar handling systems.

Now you will see on the following pages

how these parts fit together

to form complete sugar handling units.

Different types of systems

appear on each set of facing pages,

keyed by color and initialed by example.

As you turn from page to page,

you will note modifications in the systems,

beginning with simplicity

and ranging to the more complex.
Air power lifts sugar to bin for drop by gravity to portable hopper . . . PAGES 16 & 17

Sugar drops by gravity from storage bin to existing in-plant equipment . . . PAGES 18 & 19

Sugar climbs atop five-story plant to bin directly over point-of-use . . . PAGES 20 & 21

Monorail hopper moves bulk sugar to various points-of-use on the way . . . PAGES 22 & 23

Monorail hopper works well to serve pulverizer for powdered sugar . . . . PAGE 24

Mechanical scrolls convey bulk-dry sugar from delivery truck to plant . . . PAGE 25

Overhead scroll conveyor on ceiling saves valuable floor space in plant . . . PAGES 26 & 27

In plant pneumatic system moves sugar by air to various points-of-use . . . PAGES 28 & 29

Air power and automation make the ultimate in bulk sugar handling . . . PAGES 30 & 31

Liquid sugar systems offer direct delivery and compact storage . . . . PAGES 32 & 33

Liquid sugar service eliminates numerous in-plant production problems . . . PAGES 34 & 35
now, to the customer's plant...

EXAMPLE A

Typical — but relatively simple. That’s the design of the pneumatic bulk sugar handling equipment illustrated here.

From the truck, through the tube, to storage bin, to point-of-use. It’s pneumatic because the sugar flows in air suspension from the power furnished by the truck. The sugar moves up one tube, while the air returns through the other tube to the truck’s filter system. The storage bin stands over the point-of-use in the plant and discharges sugar into portable hopper.
and direct to the point-of-use...

easily

efficiently

economically
up and over---
by airpower,
not manpower
Air-lift, instead of man-lift. Here's another pneumatic bulk sugar receiving system, still of basic design.

Yet this system was engineered to feed bulk sugar into an existing conveyor previously used for bagged sugar.

In addition, the storage bin here was erected to suit the needs of the plant. Note in photo at lower left how the bin is supported by vertical steel beams, outside the walls, without disturbing any of the structural members or process equipment inside.

then it’s a “free fall” to the existing plant equipment
the tall haul...

five floors up
It's a long way up—but no trouble for sugar to make the climb by air-lift.

Actually, sugar flows more efficiently by air in a vertical direction than horizontally. So it's no problem for the truck's power to place bulk sugar into storage bins atop multi-story plants. Here again, the system was designed to fit into existing equipment—and with only a modest outlay.

Using gravity, the sugar drops to points-of-use on two floors, a frequent situation in multi-story processing plants. Note below that truck and trucker attend to the transfer of the bulk sugar—without any help from the plant's personnel or equipment.

and the truck does the work
monorail mobility--a money maker

Still basic outside, but modified inside with a monorail.
Suspended from the ceiling,
the monorail carries the weigh hopper from the sugar storage outlet
to various points-of-use in the process.
In actual effect, it mobilizes a bulky and weighty product.
The installation here cost less than $5,000 in 1960,
inside and out, on the basis of construction in the West.
Considering manpower costs alone,
the monorail system of sugar handling can pay for itself in a year.
some more

EXAMPLE
methods of mechanical sugar handling

Another effective use, on the opposite page, for the monorail hopper. Here it carries sugar from the main receiving spout to the pulverizer to make powdered sugar. In this way, the sugar can be weighed out and accounted for accurately and then discharged into the pulverizer in the proper amounts without the mess and margin for error of man-handled bags. The same simple arrangement can be designed for ingrediators as well.

EXAMPLE

If the pneumatic system of receiving sugar is not practical or desirable for a certain plant, then the sugar can be received entirely by mechanical equipment. For example, below, the truck operates a scroll in the bed of the tank to discharge the sugar into connecting scrolls and conveyors that enter the plant, all enclosed, and proceed to the storage bin.
across the ceiling...

and into the process

Another use of economical air space—on the plant ceiling!

Completely out of the way,

the enclosed conveyor on the ceiling in the photo at right

carries the sugar from the storage bin

directly to the point-of-use to fit the lay-out of the plant.

The system here also combines two methods

of handling—the air lift to place the bulk sugar in the storage bin,

and the mechanical scroll to move the

sugar from the bin across the ceiling to the point-of-use.
entirely enclosed--and out of the way
The "air age" in sugar handling takes complete advantage of the principle of pneumatic power. Pneumatic power in the truck lifts the sugar into the storage bin, while pneumatic power in the plant moves the sugar in sanitary tubes from storage to points-of-use. It is the preferred system for handling both sugar and flour—and it is nearly automatic with the use of push-button controls and mixers.
EXAMPLE

the ultimate--
Here is the ultimate for handling sugar by air-lift—a completely automatic system for both sugar and flour.

The plant's pneumatic power withdraws the sugar and flour from the interior storage bins, top photo opposite.

It then carries both through tubes to separate weigh stations, appearing at left opposite and above right.

After automatic weighing, the sugar and flour flow by air through a single tube to the dough mixer, at right above.

The system here makes ideal and efficient use of all the most advantageous features of bulk handling—

air pressure, air space, and automation—without a bag in sight.
It's like curb service. For plants that need liquid sugar—like beverage bottlers and ice cream makers—there are many advantages in bulk delivery in sanitary tank trucks. Delivery is direct, storage is compact.

In delivery, as shown on these pages, the truck simply pumps the liquid sugar from the stainless steel tank through sealed neoprene hoses into the connection with the plant's storage tank. In use, as sketched at right, liquid sugar is pumped from the tank through the pipes and measuring meter to the vats in the blending room. Then it flows directly into the process.
liquid sugar can "liquidate"
Just like bulk-dry sugar, liquid sugar in an engineered system can solve many in-plant production problems. It is ideal for the plant process where surplus liquid need not be boiled away, or the process where more water must be added. In addition, the customer can be assured of liquid sugar produced with the utmost care and quality control in Great Western’s own sugar terminals. And again, as shown in these photos of another liquid sugar installation, the product is delivered without the use of any plant personnel, or equipment.

now, turn the page.................

for the very latest method of trucking bulk-dry sugar direct to the door of the plant "off the beaten track"
the dual-purpose truck---

It's now possible — with the new dual-purpose truck — to extend the advantages of bulk-dry sugar to truckload customers with plants outside the range of GW terminals. This unique service to the remote truckload user is provided by the fact that the dual-purpose van hauls sugar one way and dry cartons of other goods on the return trip — all with the complete assurance of sanitation and quality.
The dual-purpose truck forms a sealed sanitary compartment for sugar by the lifting of the two bulkheads in the center section of the van. The drawing above shows the location of the compartment, while the photo at right shows the rear bulkhead being lifted from the deck to wall position.
The dotted portion of the drawing below shows the position of the sugar load in the dual-purpose truck; it carries about 35,000 pounds. The view at left shows one of the four loading hatches, while the photo below shows a close-up of the unloading hoppers with sanitary covers.

the dual-purpose truck---here's
The dual-purpose sugar truck enters a typical sheltered loading station at a Great Western factory.

**how it works**

Here are the preparations for loading the dual-purpose truck with sugar direct from the bulk storage bins at the factory.
In the system above, the storage bin stands at ground level with a scroll to carry the sugar from the hoppers of the dual-purpose truck to a bucket elevator running up over the top of the bin. In use, the same elevator takes the sugar from the bottom of the center cone back up over the bin for discharge through a tube leading down to the hopper in the plant.

In the system at left, the bin stands atop the roof of the plant; a scroll moves the sugar from the hoppers of the dual-purpose truck to a bucket elevator running up over the bin for discharge into a spout leading to storage. In use, the sugar falls by gravity through the center cone into the plant.

The system at right, on the opposite page, features a similar scroll and elevator conveyor to carry the sugar from the dual-purpose truck to the storage bin—but with the bin above the ground level at the side of the plant, and with a side cone for the discharge of the sugar directly to the point-of-use.
In delivery of bulk sugar by the dual-purpose truck, the customer can take advantage of the most economical receiving and storage equipment. Here are three examples of systems. All feature simple mechanical handling equipment to convey the sugar to inexpensive—yet serviceable—storage facilities. The in-plant handling system can be simple, or complex, depending on the plant’s needs.
add up the advantages...

for bulk-dry sugar

1. Improves plant sanitation.
2. Increases available floor space for other uses.
3. Eliminates much labor.
4. Increases labor force efficiency.
5. Simplifies product and inventory control.
6. Decreases warehousing costs.
7. Minimizes bacterial contamination.
8. Eliminates cost of bag and packaging.
9. Easy distribution of sugar within plant.
10. Saves storage space.
11. Sugar delivered pneumatically and conveniently.
12. Bulk-dry sugar can be used for all purposes.
13. Transportation costs sometimes an advantage over liquid.

eliminate this...
eliminate this...

for liquid sugar

1. Improves plant sanitation.
2. Increases available floor space for other uses.
3. Eliminates much labor.
4. Increases labor force efficiency.
5. Simplifies product and inventory control.
6. Decreases warehousing costs.
7. Easy distribution of sugar within plant.
8. Saves storage space.
what about GW Sugar and Great Western...

GW Pure Sugar is the name of the product, whether in bulk, bag, or package. The familiar initials stand for Great Western—The Great Western Sugar Company, to be exact—incorporated in 1905.

It is a Western enterprise, with 16 sugar factories in the four states of Colorado, Nebraska, Wyoming and Montana.

The factories process sugar from one of the most remarkable plants of nature—the sugar beet—grown by some 9,000 individual farmers on well over 200,000 acres of irrigated land adjacent to the mills.

This acreage yields in factory production each year about one billion pounds of sugar, or 10 million hundredweight bags, the actual figure depending upon crop conditions.

With this volume of production as one of the biggest processors of beet sugar in the nation, Great Western can assure a ready supply of sugar in a variety of grades and containers for both home and industry. The term containers here ranges from the one ounce individual serving for the table to the truckload and railroad carload for industry.
Besides sugar, Great Western also manufactures mono-sodium glutamate (MSG) for intensifying the natural flavor of many foods, various forms of beet pulp and liquid protein concentrates for livestock feed, along with potash for fertilizers. These latter products all are actually by-products of the sugar beet.

It is easy to see, then, that the sugar beet actually produces two crops in one. First, there is the sugar; and second, there are the by-products for feeding livestock to produce meat. These two necessities of life — sugar and meat — truly indicate the sugar beet's vitality in both human nutrition and business economy.

And furthermore, the beet continues to yield greater amounts of sugar and by-products through agricultural research and processing techniques largely advanced by Great Western. And the improved techniques — backed by strict quality control — produce a sugar of more than 99.9 percent sucrose . . . It cannot be distinguished from the refined sugar from any other plant — whether cane, maple, watermelon, or whatever. It's GW Pure Sugar.
Fort Morgan, Colorado

Brighton, Colorado

Ovid, Colorado

Loveland, Colorado

Windsor, Colorado
bulk sugar and bins

To serve the increasing demand for bulk sugar, Great Western now has towering bulk sugar storage bins at nine of the 16 GW Sugar factories. Eight of the bin factories appear here. Each cluster of bins at a factory holds from 20 to 30 million pounds of sugar, (or a Company-wide total of 260 million pounds), readily available, in top condition, for shipment to the customer. Great Western originated the idea of storing sugar in bulk bins, building its first bin system in 1930. Now, 30 years later, the Company still builds more bins to meet the expanding use of GW Sugar in bulk. The latest construction project, at the ninth bin factory, appears on the next page.
another cluster of "tall boys"

The walls soar up on another set of bulk sugar storage bins at the GW factory at Longmont, Colorado. When completed, they will be 185 feet high or as high as a 17-story building, dwarfing the factory's smaller set of bins in the picture. They will be the third set of tall bins—highest in the world for sugar—built by Great Western in the last three years. And they will hold 30 million pounds of sugar, giving the factory a total sugar storage of 50 million pounds.
and now...

GW serves Dallas and Fort Worth

GW Pure Sugar in bulk — either dry or liquid — becomes available by the truckload for food processors in the Dallas and Fort Worth area late in 1960 with the opening of Great Western's new sugar terminal in the West Trinity district. It appears here in an artist's conception with the bulk sugar storage bins atop the plant, the bulk sugar rail cars on the tracks, and one of the delivery trucks on the driveway. The terminal will employ the most modern, super-sanitary facilities to serve Dallas and Fort Worth customers with Pure GW Sugar, long a familiar trade-mark in Texas.