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CHAPTER TWO

Chlorine

Chlorine-service tank cars are insulated pressure cars. This Union Tank Line car, leased to Hooker Chemicals, was built in 1957 and is shown in May 1959. It's a 10,500-gallon car with a center sill and an ICC 105A 300W specification. It has "FOR CHLORINE ONLY" stenciled on the right side. It was built by Union (Graver). *John Ingles; J. David Ingles collection*

Chlorine is among the most hazardous materials transported by rail, but it's a vital commodity as an ingredient in cleaning and disinfectant products, as a bleaching agent, in paper production, in water purification, and in a variety of industrial processes. Getting chlorine from manufacturing plants to industrial users has been done via tank car since the 1920s.

The most common method of producing chlorine is with electrolysis in a brine (sodium chloride, or salt) solution. To do this on a large scale requires a great deal of electricity, and thus chlorine is generally produced at large chemical plants.

Chlorine is a gas at room temperature, but liquifies readily under pressure—around 100 psi at 70 degrees F—making it more efficient to store and transport. This means specifications for chlorine are very similar to that of LPG (see Chapter 6), but chlorine is much denser; a gallon of chlorine weighs 10 pounds, more than double the 4.6 pounds of LPG. Chlorine is an inhalation hazard and reacts with many materials. This means all pressure vessels, connection points, valves, and seals must be as fail-safe as possible.

Tank cars carrying chlorine are distinctive, and most modelers of the 1930s to the present will be able to find logical reasons to include a car or two in their trains.

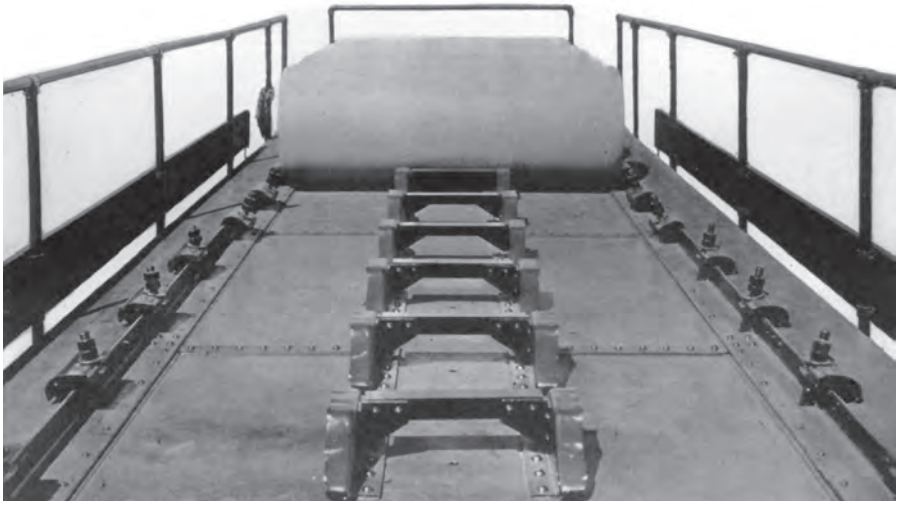
Early chlorine cars

Through the 1910s, chlorine and other pressurized goods were shipped in small tanks that were loaded aboard other freight cars; standard tank cars were only used for liquids not under

American Car & Foundry built this car for Solvay in 1934. It's a 5,800-gallon tank with a 40-ton capacity and a service platform and railing surrounding the bonnet. It has large manufacturer and commodity lettering. *Roy E. Meates*

Mathieson Chemicals leased this chlorine car from Shippers Car Line. The 40-ton, ICC 105A 300 car was built by American Car & Foundry in 1940. *American Car & Foundry*

From the 1930s through the 1960s, specially equipped flatcars (AAR class TMU) carried chlorine "ton containers" in built-in cradles on the deck; clamps secure the ends/rims of each cylinder. Each of the 15 cylinders weighs about 3,500 pounds loaded. The ACF car above is carrying loaded containers through Chicago in October 1960. *Above: J. David Ingles; below: American Car & Foundry*



pressure. The American Railway Association (ARA) released its first specifications for high-pressure tank cars in 1917. Class V cars were high-pressure cars with welded tanks and heavier shells than conventional non-pressurized cars. Chlorine was among the first commodities to travel in pressure tank cars.

In 1927 the Interstate Commerce Commission (ICC) assumed the role of classifying tank cars. The previous ARA V high-pressure tank car became the ICC-105. The pressure was eventually added to the specification, with a "W" following indicating a welded tank.

The first chlorine cars of the 1920s and 1930s were small because of the high density of the product. Cars 3,000, 4,000, and 6,000 gallons in

General American built this 10,500-gallon pressure car in 1952. It's leased to Wyandotte Chemicals and carrying chlorine. The 70-ton car has a coating of snow atop it in this 1962 view. *J. David Ingles*

size (30- or 40-ton capacity) were common. These cars often stood out in trains because of their small diameters compared to typical 8,000- and 10,000-gallon general purpose tank cars. Even after larger (10,500-gallon, 50-ton) cars began appearing in the 1940s, many smaller cars were built and remained in service into the 1960s and later, serving customers who didn't require larger shipments. Size is a spotting feature of chlorine cars, as they are much smaller than pressure cars carrying LPG or anhydrous ammonia, both of which have about half the density of chlorine.

Pressure cars have a welded interior tank with thick walls to withstand pressures at 300 to 500 psi. These tanks were insulated, with a thinner outer metal jacket that covered the insulating blanket. Pressure cars have no bottom outlets or steam lines; all product inlets, outlets, and valves are located in the housing ("bonnet") atop the car, which is smaller than the large expansion domes found on steam-era non-pressure cars. (See Chapter 6 on LPG for a detailed photo.)

Through the 1950s, tank cars had separate frames (center sills), with the tank strapped into saddles above each bolster and a running board along each side. Centered side ladders led to the housing; some cars have platforms with railings around the bonnet (this is usually at the owner's or lessor's option).

From the 1930s through the 1960s, chlorine was also sometimes transported in small containers—pressure tanks or cylinders—aboard specially equipped 42-foot flatcars. These tanks, standard in the chlorine industry, are known as "ton containers." They are 30" in diameter, 82" long, weigh 1,500 pounds unloaded, and as their name implies, hold 2,000 pounds of liquid chlorine under pressure.

The 42-foot flatcars carrying them held 15 of the containers in transverse saddles along the car. This meant a fully loaded weight of about 52,000 pounds in cylinders, plus the car weight of about 34,000 pounds, to carry just 15 tons of product. The cars were popular with smaller users, such as municipal water utilities, where containers could

MODELING TIP

Chlorine cars

Chlorine cars can appear in freight trains in any region of the country, en route from producer to consuming industry. They are generally single-car shipments, although you'll see strings of cars near chemical plants that produce chlorine. Atlas offers a modern ACF chlorine car in HO and N scale. Trix and BLI have made 6,000-gallon models of older-era framed cars in HO (typical of 1930s and 1940s cars), which would be appropriate operating through the 1970s. The old Athearn HO "chemical tank car" could stand in for a larger car from the 1940s-50s. A 3-D printed kit for a cylinder/flatcar has been made by DMS Engineering (offered through Shapeways.com), and brass models have been offered for that car, as well as many other types of tank cars.

CHAPTER THREE

Lumber

A Southern Pacific flatcar carries strapped bundles of Sierra Pacific 1x4s in 1993. Individual bundles are strapped, then bundles are banded together for stability. The standard 53-foot, 75-ton car was an unusual choice by this period, as bulkhead and center-beam cars had become the primary lumber haulers. *J. David Ingles*

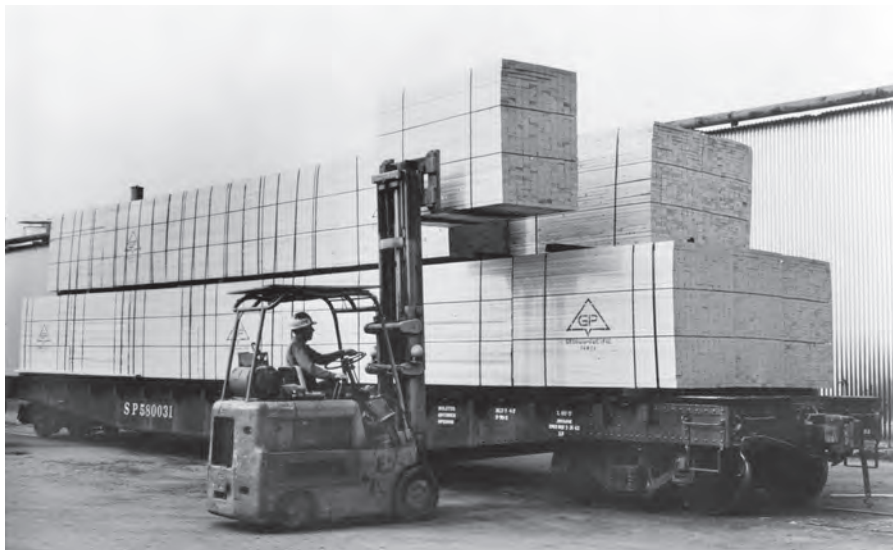
Wood products, including dimensional lumber, milled shapes, plywood, and other sheet materials, are vital for construction across the continent. Railroads have always been a prime carrier of these goods, and currently move about 420,000 carloads of lumber annually. How railroads have carried this traffic has changed substantially since the steam era.

Through the 1950s, lumber loads were hand-stacked on flatcars. Large posts in the cars' stake pockets hold the loads; posts were tied together with planks or wire across the tops of the loads. This is on Union Pacific in the 1940s. *Union Pacific*

Most lumber in the U.S. is used for housing, so there is a close correlation between lumber traffic and the new-housing market. One modern center-beam car carries enough framing lumber to build five or six new houses.

Lumber is produced at sawmills throughout the U.S., with the majority in the Pacific Northwest and Southeast. Many areas in Canada also produce building products. Major companies include Weyerhaeuser, Georgia-Pacific, Sierra Pacific, Canfor, Potlatch, and RSG; many smaller companies and mills produce specialty products. Lumber products are also imported, arriving at coastal and Gulf ports.

Lumber-producing areas will see the highest concentration of rail traffic, with railcars going literally everywhere in the country. The final destination for lumber cars today is usually a large reload center or lumber distribution company that stores and reloads products onto trucks for final delivery to lumber yards and contractors. Through the 1960s, deliveries direct to lumber yards were common; small towns and cities often had multiple lumber yards, which either had their own rail spurs or used team tracks. The shift in market since that time has eliminated many small dealers, although some larger lumber yards still receive rail shipments directly.



Southern Pacific staged this photo in 1963 to show the then-innovative technique of bundling loads, which allows easy loading and unloading by forklift. The railroad also noted that bundling allowed larger loads: about 75,000 board-feet (bf) here, compared to about 42,000 bf for a hand-stacked load. *Southern Pacific*

Types of lumber being shipped fall into a few categories. Dimensional lumber includes rough-cut and finished planks in various grades, kiln-dried, which can be treated or untreated.

Bulkhead flatcars provide increased load stability compared to standard flats. This 62-foot Mississippi & Skuna Valley car is loaded with rather loosely stacked bundles in 1980. *J. David Ingles*

Dimensional lumber for construction has always presented a challenge in transporting, as it's made in lengths from 8 to 16 feet, making it difficult to load in boxcars.

Plywood increased in popularity in the 1940s, and a variety of sheet materials are now common: particle board, MDF (medium-density fiberboard), OSB (oriented-strand board), and plasterboard (drywall); all require protection from the elements.

Through the 1950s, the typical method of shipping lumber was by hand-stacking it, either on a flatcar or—for high-grade untreated lumber that requires protection—in a boxcar. Both were labor-intensive.

Flatcars

Through the 1950s, standard flatcars were common for dimensional lumber loads not requiring protection from weather. Lumber was stacked board by board either directly on the car deck or on thin crosswise strips. As many stacks would be loaded as length allowed, with longer boards at the bottom and shorter boards on top; mixed loads were common.

Loads were secured by vertical posts in the car's stake pockets. The posts were tapered slightly at the bottom and sized to force-fit in the pockets. These posts would be secured across the top of the load by horizontal boards, wire, or cable, pulling the sides together and compressing downward on the stacks as much as possible to limit shifting.

MODELING TIP

Models and loads

Models are available of all types of lumber cars, and loads (open and wrapped) are available as well. The methods and cars used often overlapped time periods based on what the originating mill and final customers preferred and what freight cars and other equipment were available to them. Prototype photos are your best source when determining what fits the period and region you model. Modeling open lumber loads is a great way to create unique models for your layout.

By the 1970s, bundled loads were often wrapped to protect them. This 70-foot, 80-ton Burlington Northern bulkhead flatcar is carrying wrapped, bundled loads in the late 1980s. *Jeff Wilson collection*

Shifted loads were a problem with standard and bulkhead flats. Train motion has shifted and misaligned the lumber load significantly on this Apache car in 1969; it has been set out for restacking at Topeka, Kan. *J. David Ingles collection*

As you can imagine, along with being labor-intensive, this method did not secure the loads tightly. Boards were prone to shifting lengthwise during hard coupling or slack running in and out, and rocking motion could cause lateral misalignment, as well.

Gondolas were sometimes loaded in similar fashion, with vertical posts wedged between the lumber load and the inside walls of the car.

Flatcars with bulkheads, first widely used for pulpwood, began appearing in larger numbers in the 1940s and 1950s. These became popular for lumber loads, as they contained extreme lengthwise shifting of loads. They were built in a wide variety of styles. A disadvantage was that the bulkheads added extra weight that took away from car capacity.

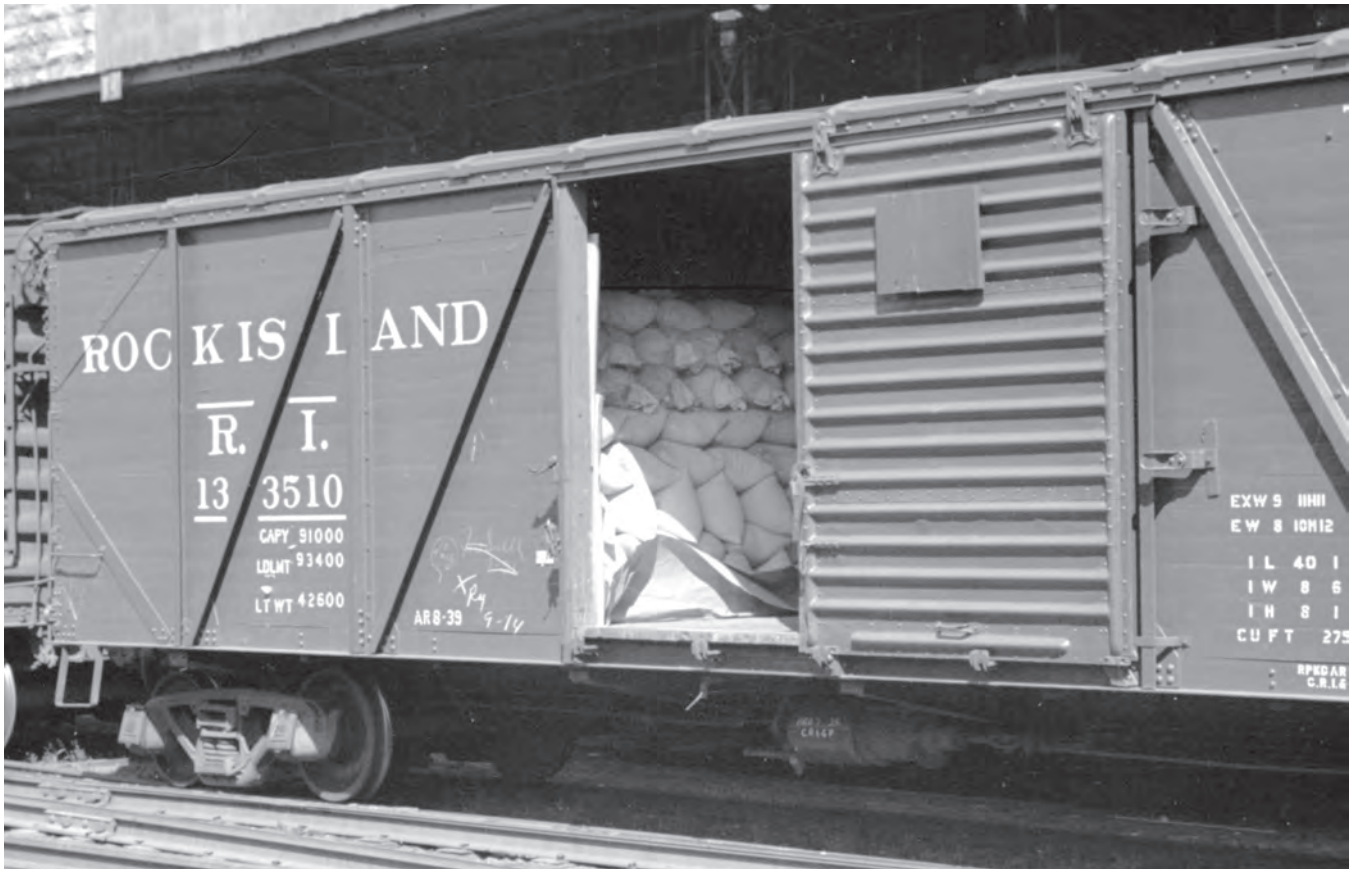
Standard 40-foot boxcars protected lumber loads well, but loading and unloading them stick-by-stick was time- and labor-intensive. *Clem Albers; Library of Congress*

CHAPTER SEVEN

Flour and sugar

Airslide covered hoppers revolutionized carrying flour, sugar, and other powdered and granulated products in bulk. This 2,600-cubic-foot car, built in 1961, is leased to U and I Sugar in this 1968 view. It has the open end-platform style of early cars. *J. David Ingles*

Bulk food raw materials such as flour and sugar were being shipped in large quantities by the early 1900s. Large-scale bulk handling was difficult because the products were easily contaminated, so bags and sacks in boxcars were the standard shipping method. By the 1940s, manufacturers and shippers were working on better ways of hauling the products, leading to specialized covered hoppers.



Hundred-pound bags were the common method of shipping flour through the 1940s. This single-sheathed Rock Island 40-foot boxcar has just been loaded at the Pillsbury Mill in Minneapolis in 1939. *John Vachon, Library of Congress*

Flour milling had become a huge industry by the late 1800s, with large-scale milling centers well established in Minneapolis, Minn.; Buffalo, N.Y.; and other areas. Sugar refineries, likewise, had become larger, centered in sugar beet-growing areas of the Midwest and West.

By the early 1900s, commercial bakeries and food-processing companies were using more of these products. Unlike commodities such as coal and grain, which can be carried in bulk in open hoppers or boxcars, flour and sugar are easily contaminated. Bugs, rodents, and mold can easily infest unprotected products, and water—even moisture from humidity and condensation—can ruin shipments.

Thus the standard method of shipping was small containers that could be managed by one or two workers, either by hand or by use of a hand cart or dolly. Flour was historically handled in wooden barrels that held 196 pounds (a measurement that became the industry standard through much of the 1900s). By 1910, this had largely shifted to sewn cloth sacks each holding 100 pounds. Paper sacks began appearing in the 1910s, with smaller sizes intended for retail sale. Sugar, likewise, was typically transported in 100-pound sacks.

A great deal of these products traveled by rail, with many long-distance shipments to end users located across the continent. The standard

Flour sacks were easily damaged and contaminated, so cars had to be tightly sealed and free of protruding nails and wood splinters. The walls, floor, and door openings were lined with paper. *John Vachon, Library of Congress*

Domino bulk car

An early attempt to carry bulk food products is this American Sugar Refining Co. (Domino brand) car. The Pennsylvania Railroad in 1951 built it by rebuilding an old boxcar into a covered hopper, with roof hatches and three outlet bays. The 40-foot long, 2,060-cf creation was a one-of-a-kind car, and remained on the ASRX roster into the 1980s.

Domino's unique bulk car is shown in service in 1967. *J. David Ingles*

The Buffalo Creek Railroad, jointly leased by Erie and Lehigh Valley, served Buffalo's (N.Y.) flour-milling district. Its fleet of boxcars had special lining to protect flour sacks; the stenciling left of the door reads "SPECIAL WEEVIL CONTROL CAR. DO NOT CONTAMINATE. RETURN EMPTY TO BUFFALO FOR FLOUR RELOADING." *J. David Ingles*

MODELING TIP

Sugar and flour cars

Models of various Airslide and pressure-differential covered hoppers are available in all scales. Flour mills can be very modelable subjects for a layout, as can sugar refineries and commercial bakeries and other end users. Flour and sugar cars can appear in trains in all areas of the country; you can model the traffic without modeling the industries. You'll find more of these cars at and near milling and refining areas.

General American's 2,964-cf Trans-Flo covered hopper, built in 1948, was the predecessor to the Airslide car, and was built for flour service. This one carries a faded Nabisco logo (at left) in this 1961 view. *John Ingles, J. David Ingles collection*

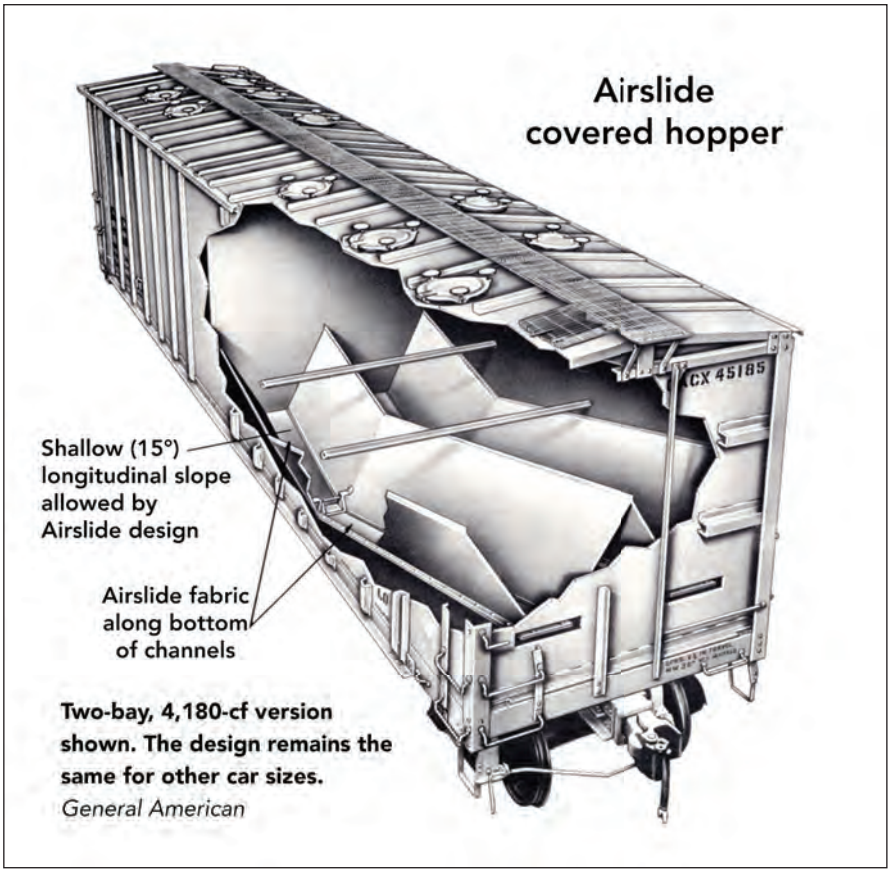
40-foot, 50-ton boxcar was the most common car used through the steam era.

Flour and sugar sacks are easily damaged, so the main requirement for boxcars was that they be clean, free from leaks in the roof and walls, and not have any protruding nails or wood or metal shards or splinters that could tear a bag. Paper lining was applied to the car floor and walls before loading. Calculating the load was simple: for a 50-ton boxcar, 1,000 100-pound bags was a full load. The method was labor-intensive and time-consuming, both at the mill/refinery and for the end user (wholesaler or food processor), which then had to unload, store, and re-handle the sacks before using them.

Even with the development of specialized bulk covered hoppers, plenty of flour was still shipped in bags in boxcars into the 1960s, especially to smaller processors that didn't have pneumatic handling and storage systems.

Covered hoppers

Covered hoppers by the 1940s carried products like cement, lime, phosphate, and carbon black. Food products,



General American's Airslide covered hopper, introduced in 1954, used air pressure through perforated fabric at the bottom of each bay to aerate powdered and granulated loads, effectively liquefying them for smooth unloading. *General American*

Through the 1960s, Airslide cars often carried the logos of their lessees, in this case Minnesota's Tennant & Hoyt, makers of Golden Loaf Flour. The 2,600-cf car, built in 1961, is shown in 1970. *J. David Ingles*