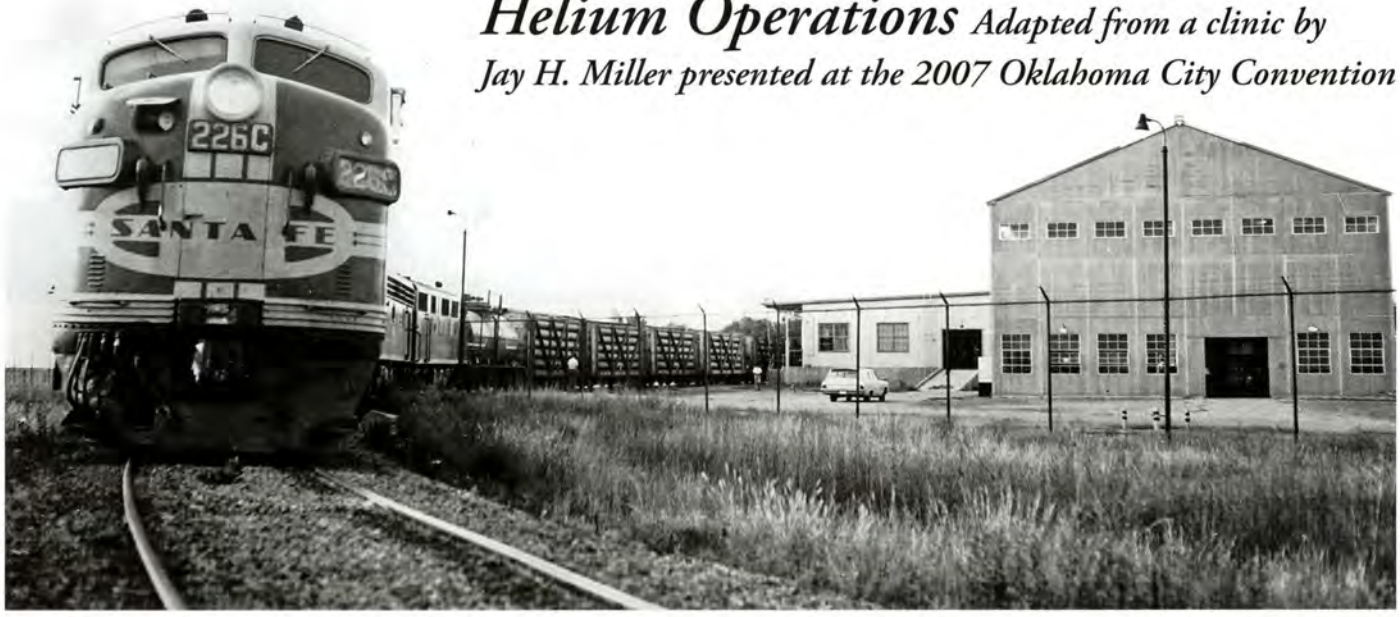
Passing Gas

An Overview of Santa Fe Helium Operations *Adapted from a clinic by Jay H. Miller presented at the 2007 Oklahoma City Convention*



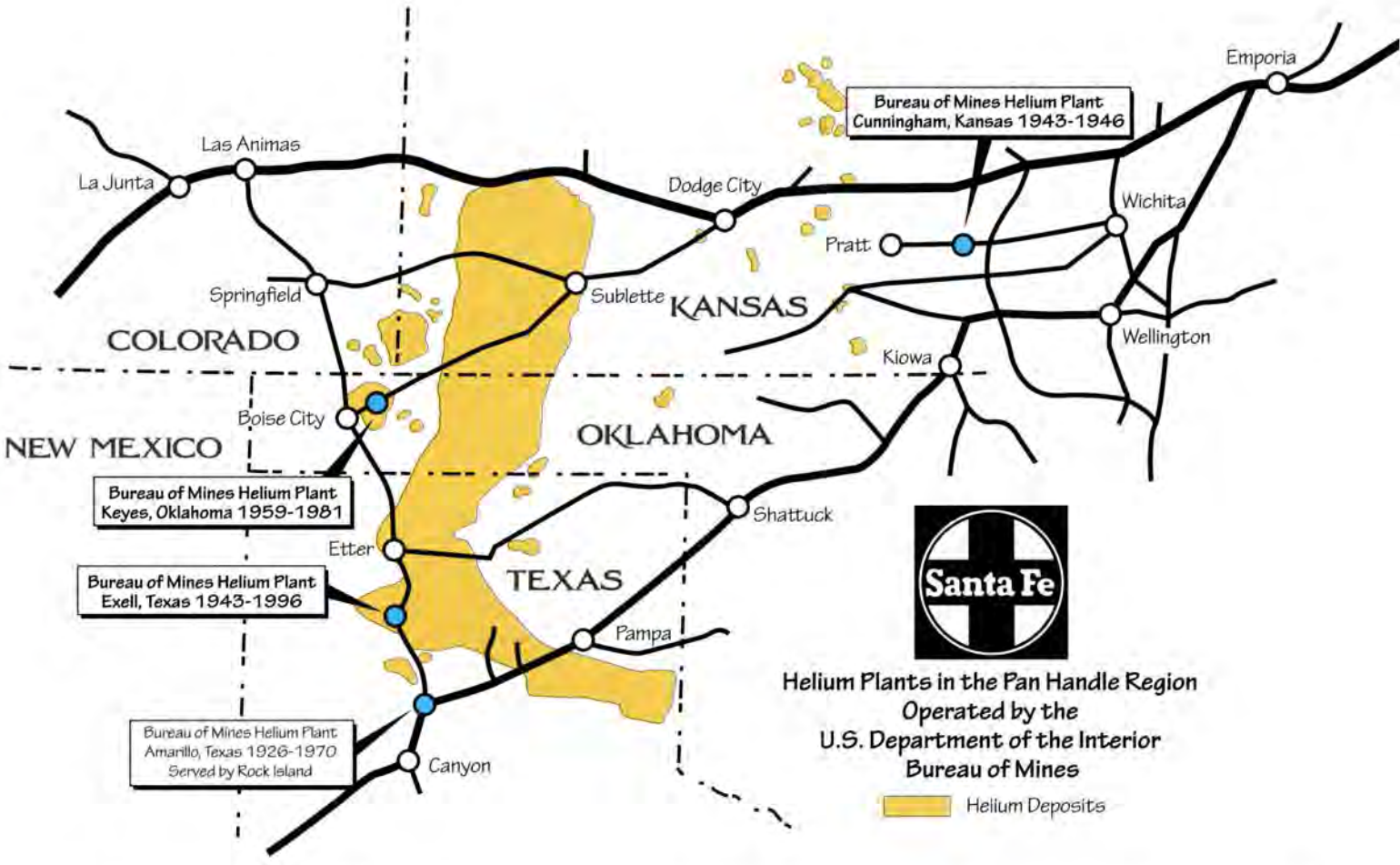
A Santa Fe local freight operating as Extra 226C West, has entered the U.S. Bureau of Mines helium plant at Exell, Texas, on August 30, 1966, to deliver empties and retrieve tank cars loaded with helium. By 1960 Exell was the largest producing helium plant in the world. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

Lighter-than-air craft (dirigibles) were first used extensively by the military during World War I. Hydrogen gas was used to inflate and lift the airships. It was relatively easy to extract from water, but it had one major drawback—it was highly flammable. The famous *Hindenburg* disaster at Lakehurst, New Jersey, on May 7, 1937, underscored this fact. However there was another gas that was nearly as buoyant as hydrogen—helium. While helium is a very abundant element, unlike hydrogen it is not easily extracted from the atmosphere where most gasses are suspended. Discovered in 1868, it was first commercially produced in 1918, too late for World War I.

Navy L Class blimps over Moffett Field, circa 1943. One 30-tube rail car could fill more than two of these. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

During the 1920s and 1930s the U.S. Army Air Corps and Navy experimented with various lighter-than-air ships using helium as the lifting medium. Fortunately for the United States, it is blessed with some very rare underground deposits of the gas. Discovered when drilling for oil and natural gas, these deposits are concentrated in the Cliffside Gas Field around the Panhandle of Texas, Oklahoma and Southern Kansas. Over 90% of the world's known deposits of helium are located here. In 1928 construction began on the nation's first helium extraction plant at Amarillo, Texas.

World War II precipitated a dramatic increase in demand for the gas. In the early days of the war, maritime shipping off the East Coast of the United States was being sunk at an alarming rate by German submarines and on the West Coast it was feared that the Japanese would soon be doing the same, or even invading. At the time the Navy's blimps—or as they preferred to call them, "airships"—were an ideal patrol



craft. They were slow, stable and had the ability to stay aloft for long periods giving the crews ability to scan the oceans in detail. At the onset of hostilities, President Roosevelt approved the construction of 200 lighter-than-air craft for naval reconnaissance. Congress appropriated nearly $17 million to expand federal helium operations and the Bureau of Mines constructed four new plants; at Exell, Texas, Otis and Cunningham, Kansas, and Navajo, New Mexico. Among the new plants constructed, the Exell plant was to be the most significant. Located 35 miles north of Amarillo, the plant processed its first helium on March 13, 1943.

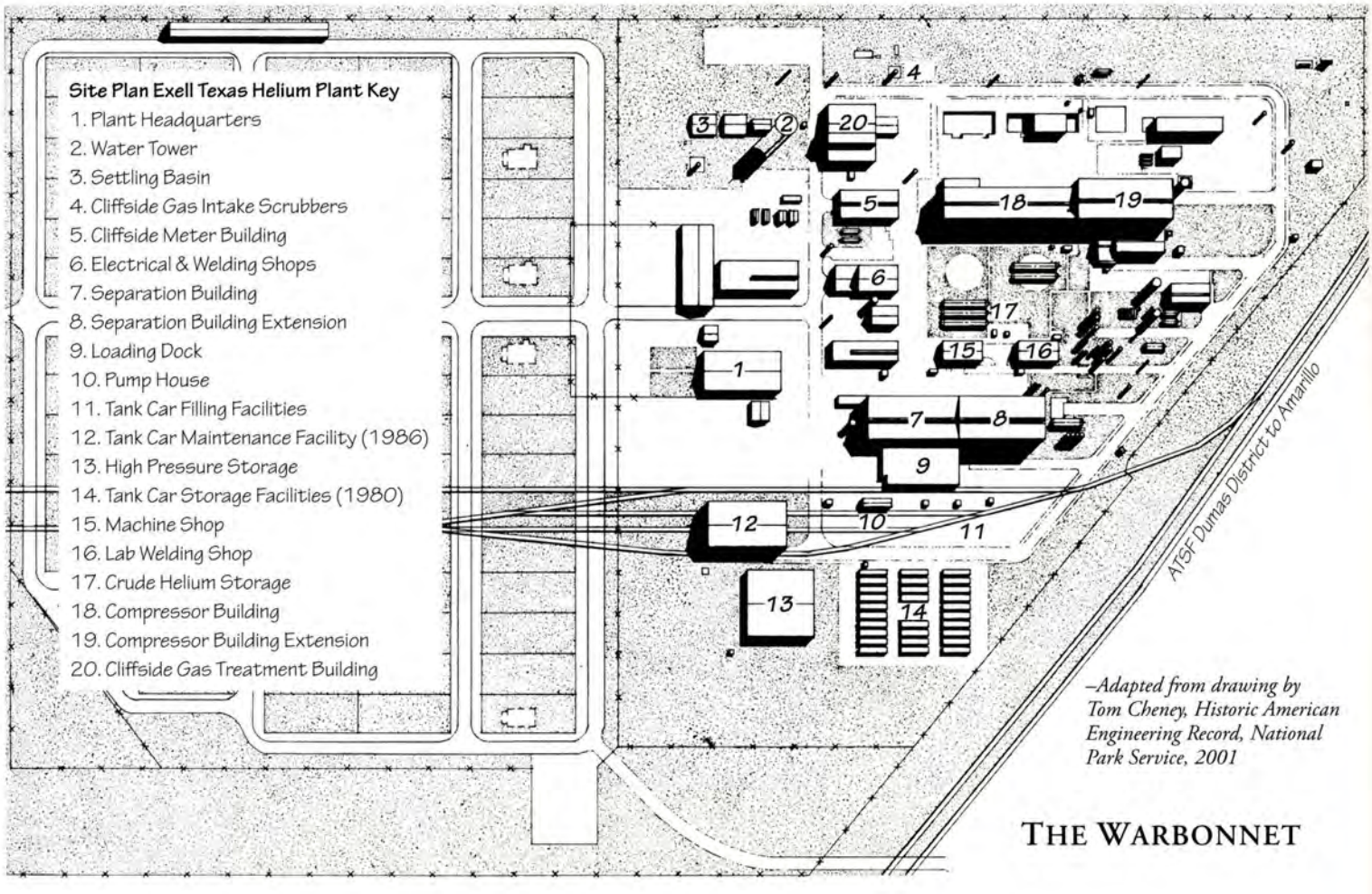
As other wartime plants ceased operations by 1951, Exell's helium production remained steady. In fact, due to the emerging "space race," Congress appropriated $6 million for Exell plant expansion in 1956-57, which nearly tripled annual production levels. Another new plant was completed, at Keyes, Oklahoma, in 1959.

After the United States lunar landing in 1969, helium shipments dropped off sharply. As a result, the Amarillo plant ceased production entirely in 1970, followed by the closure of the Keyes, Oklahoma, plant in 1981. Exell, however, continued to provide federally manufactured helium to NASA for the Challenger Space Shuttle and the Columbia Orbiter. Production eventually terminated with the Helium Privatization Act of 1996.

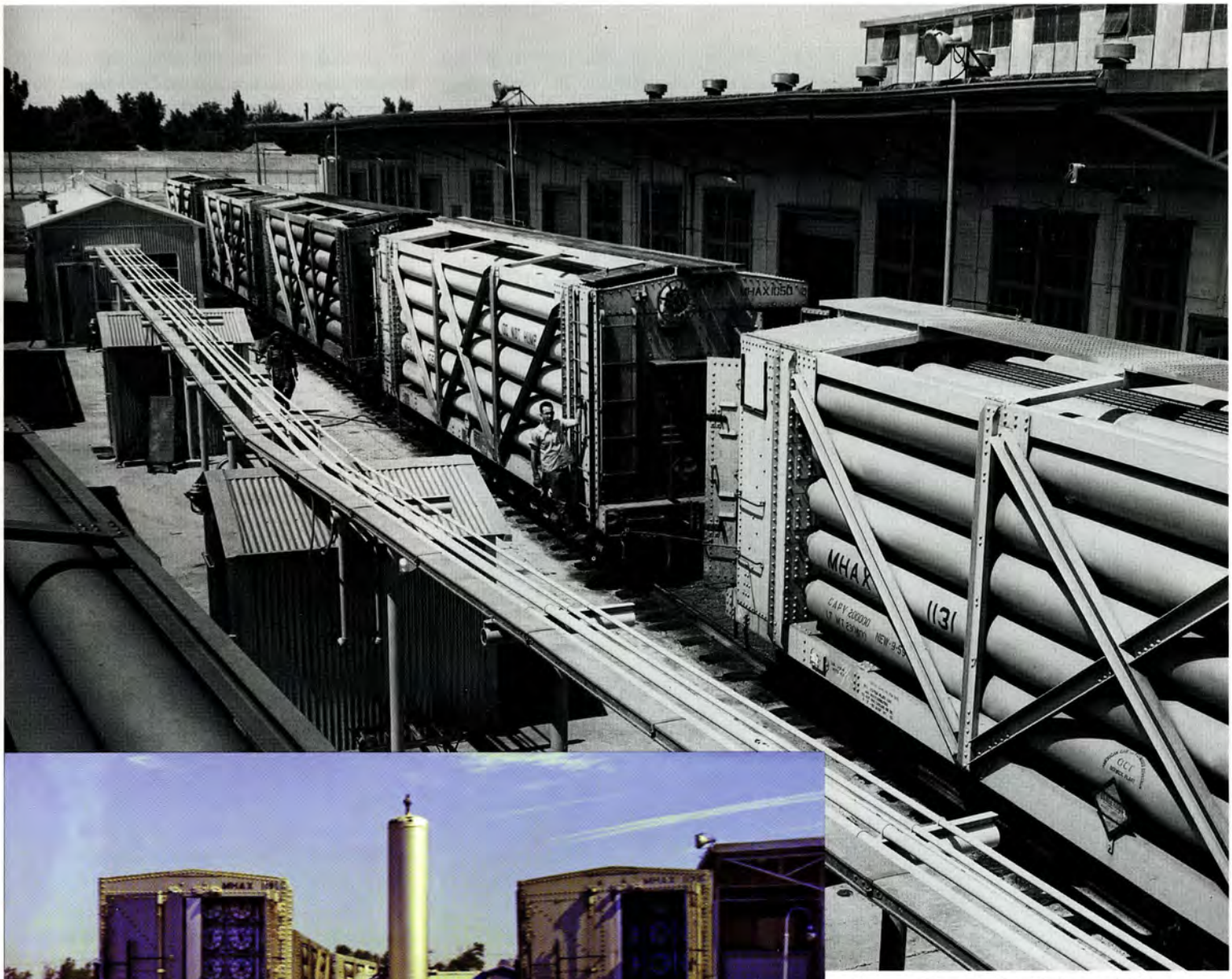
Selected Helium Shipment Destinations

Consignee	*Destination*	*Time Frame*	*Possible Routing*
NAS	Tillamook, Oregon	(1940-1948)	ATSF-SP
NAS	Richmond, Florida	(1940-1945)	ATSF-FEC
NAS	Hitchcock, Texas	(1940-1949)	ATSF
NAS	Moffett Field, California	(1943-1959)	ATSF-SP
NAS	Santa Ana, California	(1940-1991)	ATSF
NAS	Houma, Louisana	(1940-1945)	ATSF-SP
NAS	Glynco, Goergia	(1940-1959)	ATSF-SOU
NAS	Weeksville, North Carolina	(1943-1957)	ATSF-SOU
NAS	Lakehurst, New Jersey	(1926-1962)	ATSF-PRR
NAS	South Weymouth, Massachusetts	(1940-1945)	ATSF-B&O
NASA	Cape Canaveral, Florida	(1950-1963)	ATSF-FEC
NASA	Cape Kennedy, Florida	(1963-1973)	ATSF-FEC
NASA	Vandenberg AFB, California	(1957-)	ATSF-SP
NASA	Langley, Virginia	(1943-)	ATSF-C&O
NASA	Stennis/Bay St. Louis, Missouri	(1961-)	ATSF-L&N
USAEC	Oak Ridge, Tennessee	(1940-)	ATSF-SOU
USAEC	Fermi Lab, Batavia, Illinois	(1974-)	ATSF-CAE
USAF	Missile Test Center Rich, California	(1949-)	ATSF
USAF	Edwards AFB, Muroc, California	(<1953)	ATSF
NASA	Rocketdyne, Santa Susana, Calif.	(1947-1996)	ATSF-SP

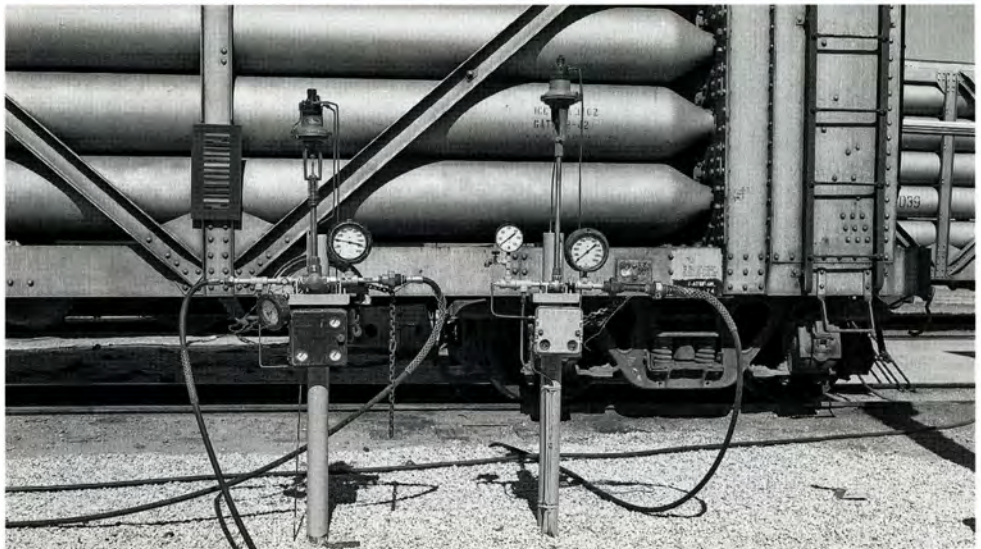
General view of the helium plant at Exell, Texas, looking north circa 1970. Santa Fe's Dumas District passes the complex at the bottom. Of the 13 helium tank cars in view, one appears to have had its roofwalk removed. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*



–Adapted from drawing by Tom Cheney, Historic American Engineering Record, National Park Service, 2001



Above: Tank car loading facilities at Exell circa 1961. The loading dock building in the background dates from 1943. At left is the same facility on August 14, 1981. The rail car capacity would be doubled and new tank car maintenance building erected in 1986. *–Two photos, U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*



Helium tank car filling connections at the Exell plant as they appeared February 17, 1974. The connection was made with the tanks through small-diameter high-pressure hoses. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

Shipping Helium by Rail

The only practical method to transport the helium from the wells to where it was needed was to compress it then use some kind of tank capable of holding the compressed gas. The first helium railcars were built by Bethlehem in 1926 and featured three large pressure cylinders suspended on a skeleton-framed car. The next design featured a number of smaller diameter cylinders stacked together, again suspended over an open frame. Enclosed sections at the ends of the cars, one of which housed the ends of the cylinders where the gas was loaded and unloaded, gave the cars a unique look as if someone had cut the mid section out of a boxcar and stacked a bunch of torpedoes in the space. The first of these multi-tube cars were built in 1930 by General American Tank Car and featured 28 18½-inch diameter cylinders. This design proved satisfactory but production was limited and prior to Word War II the entire fleet of helium cars totaled just 14.

USNX 1001, the only U.S. Navy three-tube car at Lakehurst, New Jersey, November 2, 1926. Two others were built by Bethlehem for the Army Air Service. *–Navy Bureau of Aeronautics*

USNX 1004, one of five 28-tube cars built by GATC in 1930, at the Amarillo helium plant circa 1934. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

One of 65 World War II-era 30-tube cars built by GATC in 1942-1943. With only minor modifications, this was to become the pattern for all future helium tank cars. *–GATC photo, U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

In 1942 and 1943 another 65 cars were built by GATC to a 30-tube design. Once the 30-tube design was established as the standard, only minor external details of the car's design could be seen over the various orders. Another 162 cars were built in several batches between 1955 and 1962. In all, a total of 241 cars were built by several different car builders, with the majority by American Car & Foundry.

One thing the cars were noted for was their heavy weight for the era. When the average freight car might have a 50- to 70-ton capacity, these babies weighed as much as 111 to 122 tons empty! To handle this weight, special heavy-duty trucks were used that featured outside hung clasp brakes. The cars also were equipped with dual air brake components.

One persistent legend is that the cars were lighter loaded than when empty. Not so. Compress helium and at some point it becomes heaver than air. Helium was transported in the cars at 3,000 psi. Even at this tremendous pressure the gas did not add that much weight to the car. One reason this lighter-when-loaded confusion persists is the way the weight stenciling was shown on the cars. Normally the capacity of a car would be considerably more than the lightweight, but on the helium cars they could show a "Lt Wt" 243,400 with a "Capy" of 279,000. The empty weight of a typical helium car was 243,400 pounds. The typical fill capacity of the car was 279,000 cubic feet. Helium weighs .011 pounds per cubic foot at 1 atmosphere. With the typical fill pressure of car at 3,000 psi, the weight of the helium in the car would have been just 3,069 pounds. Thus the total weight of a loaded car on the rails would have been 246,469 pounds.

Cars built before 1959 featured solid brass-bearing trucks with the square journal boxes and wooden roof walks. Post 1959 the cars were equipped with roller-bearing trucks and metal grate roof walks. The last order in 1962—30 cars by Magor—was

the only series that were equipped with a heavy-duty roller-bearing truck without the outside hung clasp brakes.

All of the Navy cars were transferred to the Bureau of Mines and re-lettered MAHX with a few going to the Atomic Energy Commission lettered ATMX. In 1964 the ATMX cars were folded into the Bureau of Mines car fleet and were so lettered.

In later years, the trucks or roof walks would not provide a clear indication of the year built as older cars were upgraded with roller bearings and metal roof walks beginning in the early 1960s. Later, in response

The business end of MHAX 1018 at Exell, Texas, right, circa 1960. This was originally a 1943 U.S. Navy car that was reassigned to the Bureau of Mines and reporting marks changed to MHAX during the transfer in June-July 1955. Note the trucks with their outside hung clasp brakes and solid brass-bearing journals. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

ATMX 1004, above, was part of a 20-car order built by ACF in February 1955. Cars 1001-1019 were assigned to the Atomic Energy Commission with ATMX reporting marks right from the builder. *–Courtesy Ed Hawkins*

Left: Typical Barber stabilized design ASF clasp brake solid-bearing truck, similar to other designs used, except for the last order in 1962. All trucks were of heavy-duty versions. The wheel sets had very thick rims and treads and large diameter axles. On solid-bearing trucks, the journal boxes were much larger in comparison with other freight car trucks. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

MHAX 1150, was built by ACF in 1960 and is seen here at Exell on November 19, 1962. The car was delivered with the heavy-duty trucks fitted with roller bearings and a metal roof walk. Notice how low it sits on the trucks. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

Color view of MHAX 1150 in November 1961, at Exell exactly one year old. Note the cars were placarded "Dangerous" when empty. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

to the federal mandate, all of the cars would be modified loosing their roof walks and having their side ladders shortened. In the last few years of their service a number of the helium cars were semipermanently connected in sets of two and renumbered with a single number with one car designated with an "A" and the second car a "B" after the common number.

Helium and the Santa Fe

Santa Fe provided service through the heart of the helium belt and played a vital roll as the originating carrier in handling helium traffic for over five decades. Of the six federal facilities active during the war, Santa Fe served three: Exell, Texas, on the Dumas District of the Plains Division, Cunningham, Kansas, on the Wichita District of the Panhandle Division and Navajo, New Mexico. (The loading terminal was at Gallup on

MHAX 1092, built in August 1957 by ACF, is seen here in 1988. It represents the last configuration of these cars with no roof walks, short ladders and roller-bearing trucks. *–Two photos, U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

Above: A Santa Fe crew switches helium tank car USNX 1003 into the Exell, Texas, plant on March 17, 1943, four days after the facility was opened. Left: Santa Fe also served the Navajo helium plant 500 miles to the west of the Texas panhandle from this loading terminal at Gallup. Seen in 1944, a guard tower underscores the need for security at this vital installation. The Navajo plant was closed immediately after World War II. *–Two photos, U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

Twenty-three years after opening, on August 30, 1966, Santa Fe was still regularly switching the Bureau of Mines Exell helium plant. Rail shipments of helium peaked that year at nearly 2,300 cars. *–U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth*

The Bureau of Mines helium plant at Keyes, Oklahoma, was opened in 1959 at the height of the space race. Located on the Cimarron Valley District of the Middle Division, Keyes was switched by mixed trains Nos. 173 and 174. In the view below, a complicated move is underway ay Keyes on March 18, 1960. Intra-plant switching was handled by a small industrial locomotive in the mean time. The view of it, left, and the general view of the plant, above, were both taken on November 10, 1965. *–Above and left, U.S. Bureau of Mines, National Archives and Records Administration, Ft. Worth; Santa Fe Collection, Kansas State Historical Society*

Mixed train No. 174, destined for Dodge City, rolls east with two loaded helium cars in the consist near Montezuma, Kansas, on the Cimarron Valley District of the Middle Division in December 1967. Combine 2642 brings up the rear. *–Herman Page*

the First District of the Albuquerque Division). The Rock Island handled the facility at Amarillo and Missouri Pacific switched the Otis, Kansas, plant. Santa Fe also later served the Keyes, Oklahoma, plant when it came on line in 1959 via the Cimarron Valley District of the Middle Division.

Initially the gas was shipped to U.S. Naval Air Stations acting as airship bases on the East and West Coasts. Even as the use of airships was curtailed and many bases closed, it wasn't until late 1961 that the Navy ended the use of lighter-than-air craft. This might have been the end for the need to transport large qualities of helium but the Atomic Energy Commission and aerospace industries found it was ideal for flushing out lines and tanks, testing of pressure vessels, welding and other uses. In fact the industrial use of Helium would far exceed the lighter-than-air-ship needs. Amarillo, Exell and Keyes shipped their product to numerous Department of Defense, Atomic Energy Commission, Office of Defense Mobilization, Department of Interior, and defense contractor production and research facilities throughout the United States.

In the mid-1990s the government made the decision to turn over the helium business to the private sector and by 1998 nearly all of the cars were retired to the scrapper's torch. A small number, less than two dozen, remain on the rails and are used for intra-facility needs at the Kennedy Space Flight Center in Florida. A few others are reported to be likewise used at the Vandenberg and Edward's rocket bases in California. Three of the cars were preserved and are on display, one at the Amarillo Railroad Museum, one at the Gulf Coast Railroad Museum in Houston, and another at the Gold Coast Museum in Miami. ✪

Mixed train No. 174 departs Boise City at 6:35 a.m. August 15, 1968, with two units, a combine and two helium tank cars for the plant at Keyes. *–Joe McMillan*

–Thanks to Bill Childers, Jeff Ford, Goodyear Tire and Rubber Co., Ed Hawkins, Richard Hendrickson, Keith Jordan, John McCall, Joe McMillan, John Moore, Larry Rodriguez—U.S. Navy, retired and the National Archives and Records Administration at Fort Worth for help with this article.

Modeling Helium Tank Cars

By J. Patrick Bray

I have always liked the unique look of the helium cars and adding one or two of these oddballs is always an eye-catcher in any train consist. Unfortunately, at present there are no real quality models of the cars available without spending a king's ransom for brass models. So I set out to see what I could do with what is out there.

In O scale, Lionel did a three-tube car, but the examples I have seen don't look anything like the prototype three-tube cars, and are more toy-like than scale models. Pecos River imported a very nice brass O scale model of a multi-tube car, however these are rare and expensive. As for N scale, Atlas did a 30-tube car in plastic. They almost did it right in that the structural bracing and ends were done as separate castings and the tubes look good. However the structural cross bracing is way out of scale. By kit--bashing using more scale cross members and roof details it could probably be a pretty decent car. I have seen a Roco model that looks to me like it may be the Atlas car released under the Roco name, (or vice-versa).

In HO there are three options, well four if you count total scratch building: Ambroid and later Northeastern did a kit a number of years ago which consisted of crude soft metal castings for the car's ends and wooden shapes to create the remainder of the car. To model the individual tubes you were supplied with wood doweling which you were instructed to insert into a pencil sharpener to taper the ends. While this taper gave a rough representation of the tubes, the prototype tube ends had quite a different shape. Further, the grain distracted from representing the actual steel cars and there were no rivet details, something that was quite prominent on the prototypes.

Pecos River also produced an HO brass model some years ago. Rare and expensive, the car featured end doors that could be opened showing the tube ends. However, the tubes on these cars appear to have been stamped out of a single sheet of brass giving the impression that the tubes were connected when in fact each tube was independent of the others. Even if the car was a little more in my price range it would require a lot of work to bring it up to the look of the

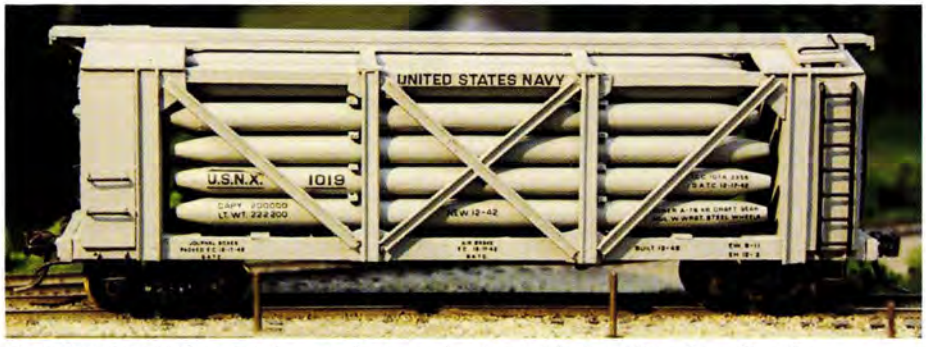


Fig. 1 Completed HO scale helium car from wood and metal Ambroid kit. -*Steve Sandifer*

Fig. 2 Pecos River Brass imported helium tank cars in both original versions with friction bearing trucks, high ladders and roof walks and a later version with no roof walks and short side ladders. -*Richard Hendrickson*

era I model.

I did give considerable thought to scratch building a couple of cars using structural styrene shapes and commercially available freight car details. All of the prototype helium cars were built using rivet construction and with the new relief rivet decals I could add that element. While the cars look a bit complex, they would not be all that hard to do, with the exception of the ends of the individual tubes. I just have not come up with a reasonably simple way to mass-produce the unique shape of the tank ends.

Reworking the AHM Car

This leaves the AHM helium car as the other option. This car was produced probably sometime in the 1960s when manufacturers were trying to keep the cost of producing a model as low as possible. To that end, quality and accuracy would sometimes be sacrificed. In the case of AHM's helium car, the overall dimensions and details are reasonably accurate and they did a very good job on the tanks. However, their model was cast as a single unit so the side and top bracing are attached to the tubes when the prototype's structural bracing was independent of the tubes. Casting the bracing with the tubes leaves the cars looking toy-like.

I had a couple of the AHM cars in my "maybe-someday" box. Looking them over I wondered if I could do something to make a reasonable model from them. I felt if I could remove the existing bracing castings from the tubes and replace with plastic structural channels independent of the tubes it would go a long way to improve the car. The first step to replace the X-bracing was to remove the existing castings. I chucked a motor tool router bit in my bench drill press and using it as a mill, nibbled away a little of the bracing at a time. I was careful to remove as much of the casting as I dared without touching the tubes. I highly recommend using some kind of drill press or mill as tackling this by hand would require extreme care to avoid damaging the tubes.

On the prototype the roof walk was suspended above the tubes with the support from a couple of cross-braces. AHM also cast this bracing with the tubes. In addition there is a full-length solid casting below the roof walk that is also cast into the tubes. So the view of the model from where it is most often seen does not have the open look that is clearly seen on an actual car. To correct this roof view I also routed out these AHM flaws.

Fig. 3 The AMH plastic helium tank car was offered in a variety of colors and lettered for a number of roads, none of which ever rostered any of the cars. This view shows the cross-bracing that was cast into the tubes taking away from what could be a decent scale model. -Pat Bray

Fig. 4 Using my drill press as a mill to remove the cast-in X-bracing a little at a time.

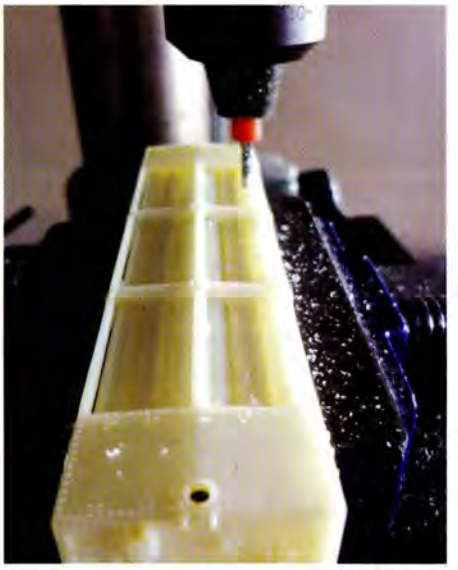


Fig. 5 Routing out the structural castings on the top of AHM's car.

Fig. 6 A curved blade was used to remove the last of the castings to flush with the tubes.

After removing as much of the unwanted castings as I dared with the power tool, I used my pocketknife to scrape back and forth to remove the last of the castings until even with the tubes. A curved blade in a hobby knife will work fine, but I don't recommend a pointed or square chisel blade for this step. From this point one could continue removing the remainder of the bracing castings down to the round shape of the tubes, or stop somewhere in between. It is not necessary to remove all of

Fig. 7 With the cast-in bracing down flush with the tubes, new X-members were cemented in place. The scars from the original castings are hidden behind the new bracing.

Fig. 8 The new roof has the feel of the open look of the prototype.

the cast-in bracing as the new bracing will hide some of the old castings.

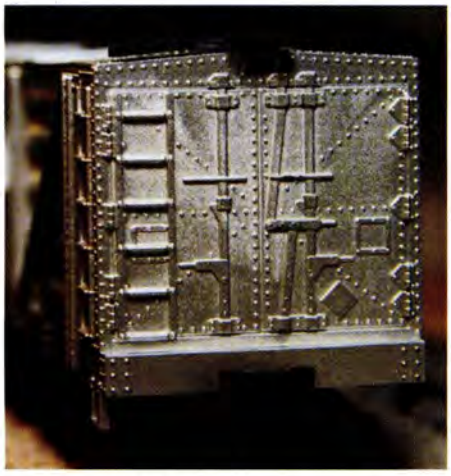
With the unwanted original cross-bracing removed, I used Evergreen .08 channel to replicate the structural elements. Be sure to line up the new channels to hide the scars of the original cast-in bracing. Solvent-type glue works great to cement the styrene shapes to the model.

I wanted my cars to represent the 1942-43 design that featured a wood running board. The model comes with a steel grate walk, but typical of many of the plastic models of the era it is too thick and the grating is not very well done. While both wood and steel grate running boards are commercially available, I chose to scratch build mine. I used .02 strip Styrene that I scored to represent the individual boards and wood grain. For the cross member supports I just used more of the .08 channel turned channel side down.

I next turned my attention to the end details. On the "A" end of the car there were hinged doors that opened to allow access to the ends of the tubes for loading/unloading. The AHM end details are pretty weak. I used a chisel blade in my hobby knife and removed the latching rods being careful not to remove items I wanted to keep, like the hinges (and rivets). Using some .015 X .020 flat brass stock I fabricated new rods and associated hardware. This turned out to be quite a task and as these details are not all that visible when the cars are coupled, you may opt to skip this. Other modifications to the AHM car included removing all the cast-in hand grabs, stirrups, end and side ladders and brake wheel. These were all replaced with commercial detail or scratch parts.

One noticeable characteristic of prototype helium cars was they were low riders. As viewed from the side, a typical boxcar or reefer of the day rode high enough that the top of truck frames could be seen. The helium cars set lower so the tops of the truck frames were well hidden by the car's side sills. AHM used the same underbody frame and floor that they used on their boxcars, which, results in their helium car riding noticeably too high.

To lower the model on the trucks I chose to just scratch build a whole new underframe. On the actual cars there was no floor, just a center sill and cross members open to the tubes. These interior frame elements were basically in line with the side sills and would not be seen when viewing the car from the side. None of this framework can be seen unless your model is turned upside-down. I opted to add what frame detail I did model to a "floor." I used some .06 sheet styrene cut to fit between the side "shelves" that the old AHM floor would ride on. To the new floor, I added some cross members that extend about ⅛-inch beyond the new floor creating tabs. These tabs made stops so the new floors would set level with the shelves. To attach the new floors to the cars I used a plastic solvent glue to attach ½-inch lengths of ¼-inch square styrene tube to the car ends. These blocks were set so the new floors would rest level on them and be level with side shelves. Once the solvent was well set, I drilled and tapped holes to receive 2-56 screws in the blocks 5/16-inch from the car ends. This would allow the flange of Kadee's 158 coupler box to extend flush with the

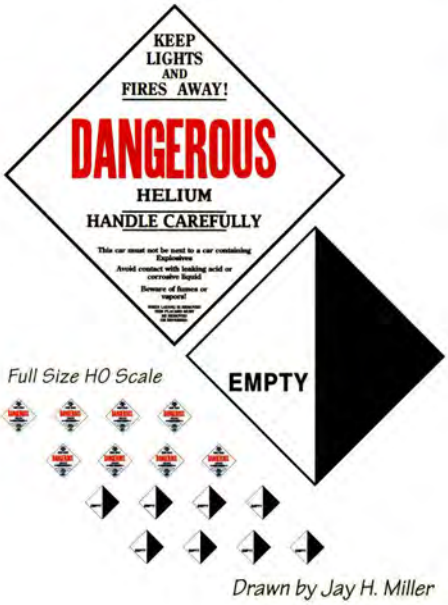


Figs. 9 & 10 The AHM A End casting, and as modified with strip brass shapes and new ladder.

model's end sill. With the car lowered to a more correct height, the end sills have to be notched for the coupler box. A 3/8-inch 2-56 screw not only secures the coupler box, it holds the new floor to the car.

To cope with the extreme weight of the prototypes, the cars were equipped with a dual air brake system. Each car was equipped with two control valves, reservoirs, brake pistons, and associated piping and mechanical hardware. As with the interior structural members, none of the car's air brake system's details like rods and piping are visible unless the car is turned over. I chose to add only the major components that would be seen in silhouette below the side sills. To bring the car to the NMRA recommended weight, 3 oz. of weight was attached to the inside of the floor using double-sided foam tape.

Next came the distinctive trucks with their outside-hung clasp brakes that were used on all but the 1962 cars. The good news is that Athearn stocks a truck used with their reissue of the Round House modern ore car which features the extended frame and roller bearing journals which all of the active helium cars would eventually be equipped. The bad news is, if trying to be true to the prototype, this truck does not have the outside brake beam and other components. So for any car built before 1962 it will be necessary to add the outside brake details, and if built before late 1959, to modify the trucks to solid bearing with square journal boxes.



Full Size HO Scale

Drawn by Jay H. Miller

Fig. 11 Blocks at the ends of the shell have been drilled to hold the coupler boxes and floor to the car body. These are set so the new floor will be level with the shelves cast inside of the model where the original floor rested. The end sills have been notched for the new coupler height.

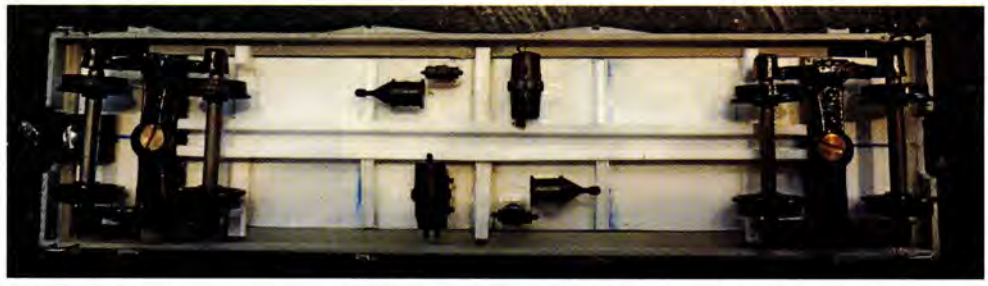


Fig. 12 While the prototype cars had no floor, with the underbody frame open to the tubes, I chose to simplify things as shown. The extended frame members create tab stops so the floor sets level with the cast-in side shelves. What few dual air brake system details modeled were those that would be seen in silhouette when viewed under normal operating conditions.

Fig. 13 Detail of the 100-ton roller-bearing, outside clasp brake trucks that most of the active cars would ride on in later years. Note also the shelf-type couplers; another detail from late in their careers.

Wanting my cars to represent the 1942-43 cars as originally equipped, I did some work to the Round House trucks. To create the outside hanger I bent some .019 brass wire in a U shape to the width of the center of the horns on the truck frame. I then made another 90-degree bend to the arms, about 3/32-inch above the cross member. After the bend, I cut excess wire so the ends were about 3/16-inch in length. A thin strip of brass stock was glued using ACC to the cross member to give the look of a brake beam. I harvested some brake shoes from some plastic passenger trucks in my junk box and glued them to the beam. I drilled some .02 holes in the truck horns a little more than 1/8-inch in depth. Drilling a very small pilot hole using maybe a No. 78 drill helps to assure the .02 hole is centered. The brake beam unit is inserted into the truck

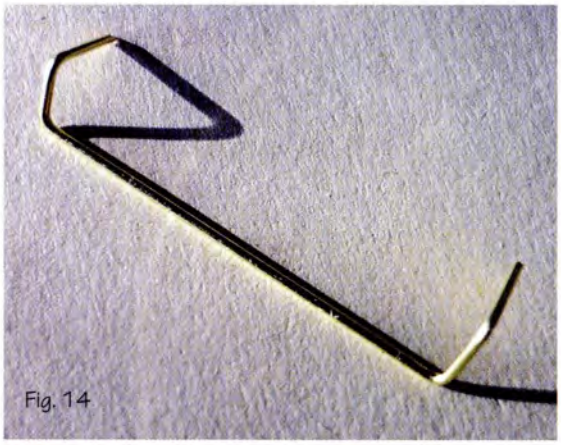


Fig. 14

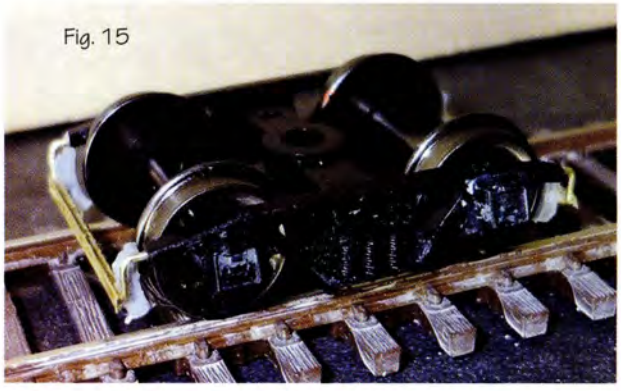


Fig. 15

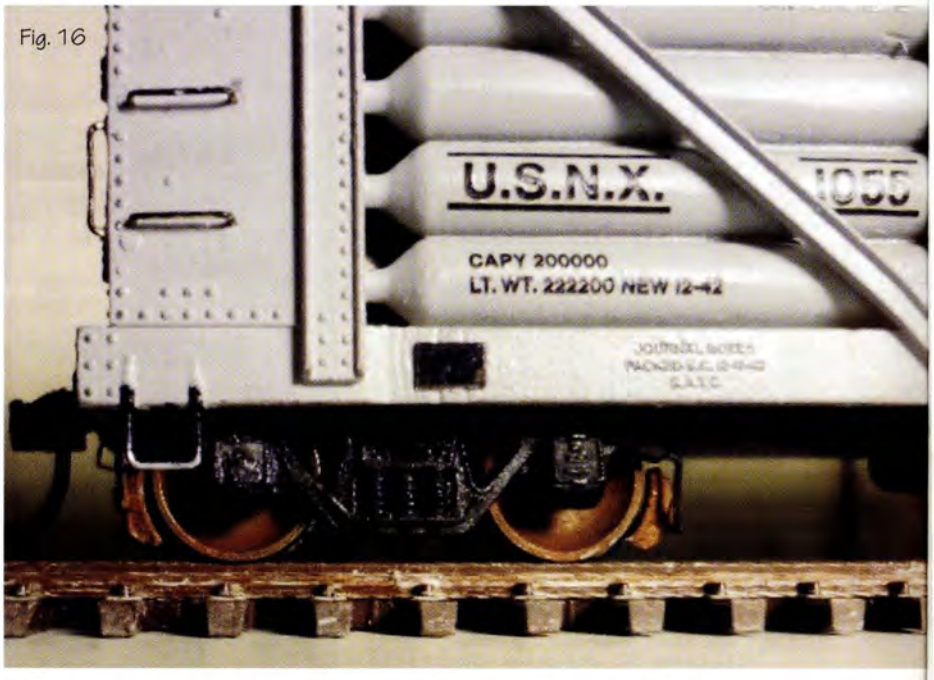


Fig. 16

Fig. 14 Here is one of the frames for the outside clasp brakes made by bending some .019 brass rod to the width of the truck's horns. Figs. 15 The Round House/ Athearn 100-Ton truck modified with solid bearings and outside brake details. Fig. 16 The modified trucks installed on the car partially concealed by the lowered carbody.

adjusting so the brake shoes just clear the wheels. Using a razor saw, I cut the journal boxes off a set of old Athearn passenger six-wheel trucks and again used ACC to attach them to the Round House truck. Modeling the outside clasp brake detail adds a nice touch to a model.

Painting and lettering the car depends on what era being represented. Being an old Navy man, I wanted my cars lettered for the United States Navy—USNX. The Navy cars were painted "Navy Gray." However, looking at old photographs the shade of gray seems to vary from pretty dark to light gray although this might be due to the film's ability to capture the actual shade. I picked a little lighter gray as it gives a better contrast for the black lettering. The underbody, end sills and safety appliances were painted black. For cars later assigned to the Atomic Energy Commission, ATMX, or Bureau of Mines, MAHX, Navy Gray was replaced by silver with black details as on the Navy cars. The silver paint would look more like light gray after a few years of natural weathering.

Tony Thompson worked with Gerald Glow to do custom decals for the Navy cars. They can be ordered from Gerald at: http://home.comcast.net/~jerryglow/decals.html.

Art work for the AMTX and MAHX cars has been created by Alain Kap and can be found online at: http://www.atsfrr.com/Reviews/HO/Freight/Helium/HeliumDecals.pdf. ✪