Scooping Water in the Age of Steam

By James Alexander Jr.

Scooping Water at the Ancora, NJ Track Pans; early 1950's.

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22 Hurt In Wreck of N.Y.C. Express

SOUTH BEND, Ind. Nov. 16, 1945 — At least twenty-two persons were injured this afternoon when the eastbound Advance Commodore Vanderbilt of the New York Central System ran into derailed freight cars at Lydick eight miles west of here.... Seven cars and the locomotive left the tracks and turned over in a cornfield.... Six other cars went off the track but did not turn over.... Special relief trains of sleepers and diners were sent from Chicago and Cleveland to take care of the uninjured passengers. (From the *New York Times*, November 17, 1945.)

The story of this wreck begins with a railroad innovation in England some eighty-five years earlier, and is related to the insatiable thirst of steam locomotives for water. Steam locomotives may consume up to seven or eight times as much water as coal, depending on design and operating factors. Even though water expands over 1600 times its volume when changed to steam, it is expelled into the atmosphere, generally after a single brief use.

While the design of early tenders attempted to reflect this consumption ratio, in practice trains had to stop frequently for water, even though there might be plenty of coal still on board. This meant time and fuel lost while the train slowed to a stop under a tower or hydrant, filled up, and then got back up to speed. Where speed was important, whether to meet competitive pressures, or simply to deliver passengers and freight promptly to their destinations, the unending need to replenish water was a significant problem.

In 1859, John Ramsbottom, Locomotive Superintendent of the London and North Western Railway in England, developed a water trough that could be installed between the tracks. A device called a scoop was installed under the tender, and could be lowered into the trough, with the locomotive's forward motion forcing the water up into the tender. Great Britain made extensive use of the system for its high-speed, long-distance passenger trains. By 1923, there were water scooping facilities at 57 locations, with some 141 individual water troughs installed. The English claimed to have the world's highest trough at 1,169 feet above sea level, as well as one almost at sea level, and also the only trough located inside a tunnel. The French also used a water scoop system on the Paris—Le Havre and Paris—Cherbourg lines between 1905 and 1963.

As with much early railroad technology, the "Ramsbottom system" soon spread to the United States. In 1870, the New York Central and Hudson Railroad, predecessor of the New York Central System, built the first track pan (as water troughs or track tanks were also known) at Montrose, NY, along the Hudson River. The Pennsylvania Railroad immediately followed suit, placing two troughs 800 and 1200 feet long at Sang Hollow, PA, by November 1870. The NYC and the PRR subsequently became the nation's two largest users of track pans. Other railroads in the Northeast followed in the next several decades. In 1887, the Maine Central installed three track pans for its Boston—Mt. Ferry express. In 1890, the Reading built a track pan at Yardley, PA, and the Jersey Central followed suit with pans at Green Brook, NJ. The Baltimore and Ohio constructed track pans at Swan Creek, MD, and Stanton, DE, on its "Royal Blue Route" between Washington, DC, and Jersey City, NJ.

The New York and New England (New York, New Haven and Hartford) employed a water pan in the 1890s, and the Chicago, Milwaukee and St. Paul was reported to be using pans after the turn of the century, as was the Lake Shore and Michigan Southern. However, the use of track pans did not spread to Canada, except for five pans in Ontario on the Michigan Central line connecting Detroit with Buffalo. By 1929, the Pennsylvania Railroad maintained about 80 water pans at 27 locations, totaling tender. Ramsbottom patented the system and placed it into operation on the Chester- Holyhead section of the L&NWRR in June 1860.


Whitmore Troughs providing water to The Welsh Guardsman

John Ramsbottom's trough was made of cast iron sections bolted together. Some early troughs were made of wood, as on England's Great Northern Railway. F. W. Webb, who served under and subsequently succeeded Ramsbottom, later claimed to have been involved in building the first trough in 1857. Actually, as early as 1854, an American, A. W. McDonald, was issued a patent for a "tank feeder" mechanism that used a trough parallel to the track.

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58 miles in length. By the 1940s, the New York Central used 71 pans at 29 locations, including those of its subsidiary, the Michigan Central. The use of pans did not extend to the west, however. Even the PRR did not use them on its route to St. Louis. Trains in the south and west typically were not under the pressures of time and intense schedule competition that characterized operations in the northeast. Other factors inhibiting the use of pans elsewhere were geography and climate. In a very dry and warm climate, massive evaporation of water from the pans would occur. In some western areas, water was in short supply or of such poor quality that it had to be brought in by tank car. On some lines, a second tender or a modified tank car was used to carry additional water.

The benefits of carrying extra water in larger tenders or in supplemental tenders or tank cars had to evaluated against the extra weight required. For instance, the PRR's massive "coast-to-coast" long-distance tender, which held 22,000 gallons of water as well as 31 tons of coal, weighed so much when filled to capacity that the length of the train had to be reduced by one or two revenue-producing cars.

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Scooping Water in the Age of Steam continued...

Radnor Track Pans 1911. Click image for full size and details.

One of the most important matters which received the attention of the management [of the PRR] in 1905 was to provide a sufficient water supply.... Arrangements were made to secure an adequate supply of good water...and for the construction of the reservoirs and the piping....The water supply system now embraces 36 reservoirs and intakes... their total capacity is three-billion gallons. The total length of pipe lines in the system is 441 miles. The number of gallons furnished in 1926 was over 14 billions. The area of mountain land owned in the water supply system is 27,300 acres. The benefits more than justified the expenditures of 30 million dollars. -- (H. W. Schotter, *The Growth and Development of the Pennsylvania Railroad Company*, December 1927.)

Early railroad accounting did not always recognize the cost of the billions of gallons of water being consumed. Water had to be acquired from a viable source, piped to where it was needed, and treated to remove impurities and excessive minerals that impaired boiler efficiency.

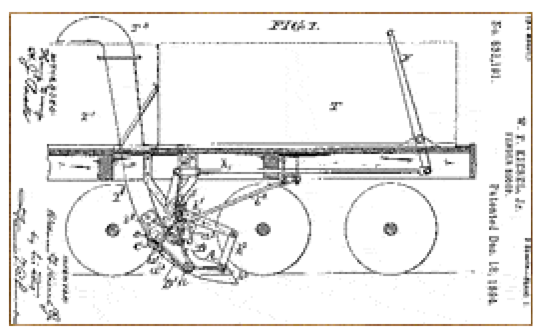
On the northeastern lines, however, the real trick was getting the water into the tender without having to stop the train. The earliest scoops were crude affairs. The New York Central scoop system was patented in 1870 by its designer, William Buchanan, Master Mechanic. This device, termed a "waterjerk," hung down into the trough just in front of the rear axle of the tender. The water pipe apparently ran up near the back of the tender, however, detailed descriptions of the system vary. In any event, early scoop designs left much to be desired.

William F. Kiesel, IV, grandson of the PRR's noted Mechanical Engineer, fondly recounts an incident from his family history:

Little Gladys Rankine nine years old, traveled in 1910 with her mother from Denver on the Chicago, Burlington and Quincy to Chicago, where she changed to the New York Central for the ride to New York City. Throughout her later

But as the scoop was lowered into the water in the pan, terrific resistance was encountered, such that great force was needed to lift the scoop back up; consequently, the scoops often did not perform as required. As train speeds increased, the scoop lifting problem intensified.

William F. Kiesel, Jr, obtained certain design rights from German engineers who had been working on the problem unsuccessfully, and in 1894, he obtained a patent on a new design that balanced the force of the water entering the scoop against the water exiting the scoop into the tender tank. This innovation doubled the efficiency of the system under test conditions: at 70 mph, 3.3 gallons were picked up per linear foot of trough (somewhat less in regular service). Kiesel's work on this and other railroad design innovations earned him the Franklin Institute's first George R. Henderson medal in 1928.



W. F. Kiesel's 1894 Scoop Patent

The original manual control specified in Kiesel's 1894 patent involved the fireman activating a long rod in the front of the tender to lower and raise the scoop. This rod was known to kick back at times, causing bodily harm. A later design employing air cylinders to operate the scoop greatly improved both safety and efficiency. Other railroads conducted their own research, but Kiesel's work established basic standards for scoop design. In England, scoops were lowered and raised by life, she would tell the family of the time a kindly gentleman had taken her onto the rear platform of the train so she could see the magnificent spray as a train on a nearby track took on water from the pan. She would always end that story by proclaiming “little did I ever expect to marry the son of the man responsible for the water scoop!”

The Kiesel Water Scoop on PRR No. 460

Gladys Rankine by then had become Mrs. William F. Kiesel, III. Her father-in-law, the PRR’s Mechanical Engineer, a holder of 135 patents, had early in his career studied the problems encountered by contemporary water scoops. Following early experimentation, the PRR adopted a standard scoop in 1879 that featured a copper dipper (the part that lowers into the water trough).

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screw-type control handles, by steam power, or even by “vacuum of the brake service.” Some tank engines even had double scoops for picking up water in either direction.

Sketches exist that show some American scoop mechanism and dipper design variations, but all are basically similar. Scoops could be found on passenger and freight engine tenders alike, including the PRR Atlantic, Pacific, Mikado, and Mountain classes, as well as the NYC Mohawks and Hudsons, among others.

The New York Central installed a new scoop design in the late 1930s that enabled taking on three gallons of water per foot for a total of 7200 gallons at speeds up to 80 mph, with only half the spillage of its other systems. A common problem in taking on water at high speed was the rapid buildup of air and water pressure, which would lift the tender hatches open and in extreme cases, spring the tender’s side walls. In the 1940s, the Central became concerned about window breakage on trains traveling on tracks parallel to other trains scooping water. They conducted several studies with a motion picture camera atop the tender to photograph the hatch as the tank overflowed at speed. This resulted in the design of modified scoops and new overflow vents to direct excess water downward to track level (see “High-Speed Water Scoop,” *Trains*, April 1945).

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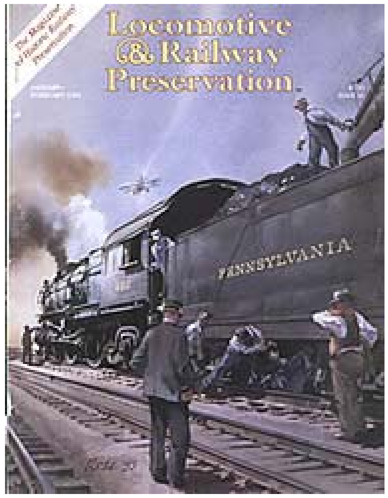

A Water Scoop Acted Up in a Famous Race. Click Picture forDetails.

Of five scoop-equipped PRR tenders at the Railroad Museum of Pennsylvania in Strasburg, the most easily viewed scoop is that installed on the Class E6 Atlantic No. 460, built in 1914. Popularly known as "The Lindbergh Engine," the locomotive's water-scooping ability played a major role in its famous 1927 dash to deliver the first newsreels to New York of Charles Lindbergh's triumphant welcome in Washington after his historic solo flight to Paris. (The scoop was not fully cooperative --read the exciting full account here.)

The overall length of the E6 tender's scooping mechanism is approximately four feet. The size of the dipper is 13 inches wide, 8-1/2 inches high (partially open on the top), and about 20 inches from the front edge of the scoop to its pivot point. In its retracted position, it would be about four inches above the rail.

Scoops on other PRR tenders followed the basic Kiesel design, with the air cylinder up behind the coal bunker or elsewhere down under. Another innovation adopted by the PRR was a steel shield around the scoop to deflect water spray; this device can be seen on both the K4 and the MI at the Railroad Museum.

John Prophet, a former NYC employee, spent many summers visiting track pans throughout both the NYC and PRR systems, and became a noted chronicler of railroad history. He recalls:

The mighty Hudson was pulled onto a siding as the fireman and engineer tried to figure out what was wrong. Despite having taken on water at the last track pan, and having cleaned out the right hand feed line's strainer, the injector could not draw any water into the boiler from that side. Finally, a man was lowered into the tender's tank and shortly emerged holding a dead box turtle that had been sucked up the scoop and was blocking the feed line intake.

that even if he could not stop the train in time to avoid some obstacle in the pan, he could still stop to make sure it had not fouled the scoop mechanism. To work best, the front edge of the dipper had to be even and free of nicks that might cause bouncing or undue vibrations during water intake. Lee Coleman, a former PRR engineman and fireman, recalls crawling under a tender with a poker to bang out dents in a scoop that inadvertently had not been retracted in time—hoping, of course, that management would not learn of the mistake.

Taking on water was at best an expensive and messy procedure. Water would spray all over the place, especially when scooped at high speed.

Shields were sometimes installed around dippers, and the sides of some pans were bent over the trough to hold down the splashup. The British use of deflector vanes lowered into the trough a foot ahead of the dipper to guide water into it apparently was not emulated in this country.

The greatest amount of excess water flying occurred when the tenders overflowed. With only the crudest water-level gauges available, it was often difficult to know exactly when the tank was full, so that topside hatches were often lifted by the rush of excess incoming water which then spilled all over everything.

Scoops had their problems, and picking up whatever was in the track pan—debris, dead animals, lumps of coal, or junk tossed in by kids just to see what would happen—was one of them. While such material could jam or even break the apparatus, the intake pipe incorporated a reverse bend above the tender's water level to prevent water from draining back out should the scoop be torn off by accident.

Standard practice when taking on water was for the engineer to be especially watchful of the pan ahead so

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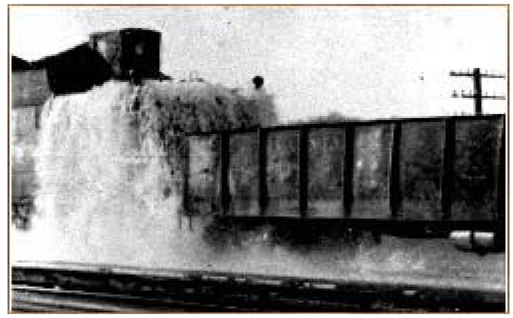

Back of Tender overflows at Wilmore Track Pans
Photo by Mark Blaisdell, courtesy Charles Eggie

Conductors commonly warned passengers in the first several coaches to close their windows when the train approached water pans. Water was known to come crashing through an improperly secured vestibule door on the first car behind the tender and wash down the aisle. Splashing water could also knock out windows on trains passing on adjacent tracks, especially if the spray included chunks of coal washed off the tender.

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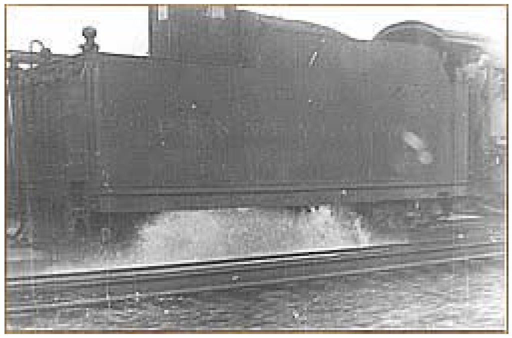

Fireman watching for overflow at Wilmore Pans

On the approach at Wilmore

Charles A. Eggie, a retired Pennsylvania Railroad plumber foreman assigned to the Wilmore pans, tells a tragic story:

Even through the windows closed against the bitter night, a scream was heard in the house alongside the track pans. The occupant, a railroad man, knew exactly what it meant, and he grabbed for the phone to have the eastbound freight flagged down at the next tower. There, the body of a tramp was found frozen against the back end of the tender. Hitching a ride "in the blind" hanging on the back of the tender, the tank filled from the trough, and overflowed down the back of the tender, soaking the man in water that rapidly turned to ice. He screamed but dared not let go, and died.

Winter was a difficult time for scooping water, both on the engine and on the ground. When approaching the pans in very cold weather, it was not uncommon for firemen to make the dangerous climb over the coal pile to look back for any poor soul hiding in the blind, but under catenary, this climb typically was not attempted for fear of electrocution.

At first there was considerable complaint that the troughs were often not more than two-thirds full.... The pumpmen were instructed to inspect the troughs five minutes before schedule time of trains.... It has been suggested that a float valve might be installed to allow the troughs to be filled automatically, but as the pumpmen were required to patrol the trough regularly. . .it is not considered that this would be any advantage, as it might make the pumpmen careless. (E. E. Russell Tratman, Railway Track and Track Work; McGraw-Hill, New York, 1909.)

Track pans were not standard catalog items; hence, there were many variations in their construction. The length of pans grew over the decades, with early pans ranging up to 1200 feet. By the 1940s, the typical length was between 1500 and 2500 feet. The PRR pans averaged 1500 feet. The longest pans were also on the PRR: 2685 feet at Wilmore, PA. Length depended in part on the

In order for the top of the pan to present the required one inch of clearance below the top of the rails, the standard eight-inch ties were sometimes dapped out by up to 2-1/4 inches, creating a recess into which the pan would fit. (In England and France, the top of the trough was higher than the railhead, requiring a modified scooping operation.)

Track pans were ramped with thicker steel on both sides of each end in order to present a gradual rise that would protect the pan from violent collision with a scoop that had either been lowered prematurely or raised too late. This incline guided the scoop into its "up" position, from which it could descend again if not properly secured. In the early days before the use of air- operated controls, firemen were known to simply let the pan ramp push the extended scoop back up rather than risk a broken bone caused by the control rod "bucking" back on them. This practice, of course, wasted water and was discouraged. Some firemen pulled the rod with a rope. In the 1930s, the English devised an automatic scoop-raising mechanism that employed a float in the tender tank, but this device was not used in the United States.

Water was fed to the pans from a nearby pumphouse; automatic flow controls employing floats were widely used in this country. When freight trains were being pushed from the rear, it was important to refill the pan as rapidly as possible after the lead engine(s) had taken on water. Four minutes were usually required to refill standard track pans.

characteristics of typical trains, whether locomotives were double-headed, and the effect of topography on water consumption. Quite typically, several tracks had pans in parallel operation. Pans were constructed on flat terrain and preferably not on curves. With variations, they averaged from 30 to 45 miles apart.

Except for some very early wooden construction, and some of bolted cast iron, most pans were constructed of steel—first riveted plates and later formed steel sections welded together. They were usually fastened by spikes applied to flanges welded on the sides of the pan. The spikes were applied so as to permit expansion and contraction. Steel track pans were usually between 3/16 in. and 3/8 in. thick, often with a lip of some four inches rolled over from the top. Pan depth was between six and eight inches; width varied between 19 and 29 inches.

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Tender on Pusher Locomotive Overflowing

Pan maintenance was especially difficult in winter, requiring that attendants be on duty around the clock. Even flowing water could freeze in the pans in extremely cold weather, and often spray coated the surrounding ground and structures with ice. Accordingly, trackside boilers were installed, often salvaged from old locomotives, to shoot live steam into the pans at intervals. Some lines heated and recirculated the water, and in many instances, steam or hot water lines were installed parallel to each track to melt away spray ice. These pipes often continued some distance beyond the end of the pan because of the icing mist that often followed a high-speed water pickup. Crews of workers were often dispatched to chip away the ice and keep the pans and drains clear, a difficult—and dangerous—job. In some cases, the scoops on the tenders were sprayed with steam to keep the mechanism from freezing.

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Scooping Water in the Age of Steam continued.....

M1 Scoop under spray shield

In all seasons, track pan areas were constantly wet, slippery, and covered with moss and debris. Steady leakage or splashing of water could undermine the trackbed; consequently, Belgian blocks and similar paving materials were typically installed to protect the understructure and guide the excess water to drains that were installed throughout the pan area. Tunnels of up to four feet diameter crossed under the trackbed at intervals to collect the water and provide access to the water supply and steam pipes. In some cases, the captured water was recycled. Periodic cleaning out of these tunnels was difficult and messy.

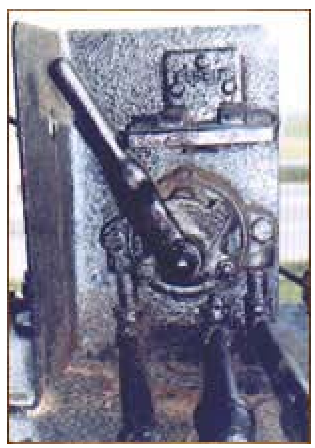
Track pans were provided with marker lights to indicate beginning, middle, and end.

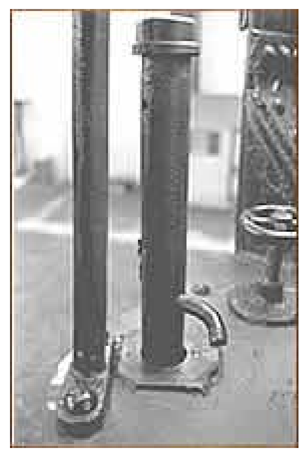
Track troughs in service will be marked:
At entrance By day: White target
By night: Lunar white light
At exit By day: Yellow target
By night: Yellow light
At middle Same as at entrance.
Out of service By day and night, all yellow targets and yellow lights.
Enginemen must be notified when tank troughs are out of service.
Care must be used to prevent unnecessary overflow of tank.
When passing over tank troughs, the use of poker or scraper and the shaking of grates is prohibited.
(From *The Pennsylvania Railroad—Rules for Conducting Transportation*, September 30, 1951.)

Railroads maintained elaborate rules to avoid problems at water pan installations. Pan locations typically were identified in employee timetables, along with specific guidance as to which locomotive would take on water in what order and for how many seconds, speed reductions, and the responsibilities of engineer and fireman. Nevertheless, it was not unknown for single locomotives to

Track Pan Symbol Used on Track Maps.

Upon approaching a track pan, the engineman would advise the fireman to get into position at the control valve, which was located above the water leg on the front of the tender behind the engineer. The engineer would then issue the drop-scoop order, often verbally and with a body signal as well as a blast on the whistle. This same procedure was repeated to signal raising the scoop. Even though most pans had end ramps to help raise the scoop, an on-board-controlled raising mechanism was necessary to avoid possible damage.





Scoop Control Valve (l) Tender Water Level Monitoring Pipe(r)

The scoop control on PRR tenders featured a valve handle lock, a drop-down piece to prevent the handle from being moved accidentally. The scoop control mechanism on the New York Central involved a control operated by the fireman on the left side of the tender and two cut-out cocks, one operated by the fireman and the other by the engineer. Which brings us back to the accident at Lydick on the NYC in 1945 recounted at the beginning of this article.

back up for a second runby to fill the tank.

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Thought we forgot, didn't you?

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Scooping Water in the Age of Steam concludes.....

As a New York Central train approaches the New Hamburg Track Pans, turbulence in the pan is created by the onrush of water from the filling inlets on the sides. Note the concrete slabs to curtail erosion, the ever-present heating/pump plant, and the heating pipes protected under metal curbing adjacent to tracks.

Water Scoop Operation Leads to Derailment and Collision

As a result of its investigation. . .of a derailment and collision on the New York Central at 2:58 p.m. on November 16, 1945, the Interstate Commerce Commission has recommended that that road arrange water scoops on its locomotive lenders so they will be operated by a single valve, and that it install a mechanism which will automatically raise and secure the water scoops in "upper position". . .when they leave the troughs from which engines take water while in motion.

After the accident occurred, the mechanism involved [the freight train's scoop] was found to operate properly, and it had been tested before the freight left Elkhart, 24.71 miles east of the point of collision. It was found however, that if one of the cut-out cocks was closed before the valve was set for the dipper to be raised, it would not complete the movement, but would come to a stop with the bottom surface about level with the top of the rails.

It was found that the dipper had not been fully retracted in this instance, as four planks from highway crossings were driven into it, and other pieces of plank were found on the brake beams.... A protruding plank was found to have wedged open a switch point. . .and the derailment of the freight resulted [with which the Advance Commodore Vanderbilt then collided]. (From *Railway Mechanical Engineer*, Feb. 1946, p. 101.)

Anything protruding from a speeding train can cause damage, and by their nature, water scoops did occasionally catch up more than water.

Track pans and water scoops, like much early railroading technology, were an outgrowth of the Industrial Revolution, embodying systems and structures that today seem unsophisticated and even crude. However, considerable skill and empirical knowledge went into such

Track pans today are gone and largely forgotten. The New York Central removed its last pans at Lawton, Michigan, in 1954. The Pennsylvania Railroad pans at Hawstone, PA, saw service through 1956, nearly the end of steam on that mighty line. In Great Britain, where it all began, the last steam locomotive to scoop water was the famous Flying Scotsman on May 1, 1968. For another decade, pans were used on England's East Coast Main Line by Deltic diesels to take on water for their steam generators used to heat passenger cars.

Young Tommy Taber's scientific curiosity just had to be satisfied. On a hot summer day in 1914, he courageously crawled close to the Jersey Central tracks at Green Brook, NJ, so he could see just what happened when the scoop passed through the water trough. Alas, his view was blotted out by a fan-shaped sheet of water that completely drenched and momentarily blinded the curious young man. In answer to the understandably hilarious commentary of his more cautious friends who watched from a distance, Tommy said (in partial truth), "Well, I expected that—and now I'm a lot cooler than you are!" He never repeated the experiment.

Thomas Townsend Taber grew up to be a noted railroad author and historian. In 1960, without telling his family, he sent off to England an article he wrote entitled "An Elegy on Railway Water Troughs in the USA," in which he recounted this youthful experience. More than thirty years later, when a section of discarded track pan was found buried at the bottom of an embankment at Wilmore in the Alleghenies, another writer, searching for information on this subject, was initially discouraged by an apparent lack of available data.

Then, as if directed by fate, he stumbled upon a dusty cardboard box on a shelf in the archives of the Railroad Museum of Pennsylvania. In it was Tom Taber's faded manuscript, which began with the following:

equipment and it served a bygone era well.

Two Track Pan Sections Retrieved from Wilmore.

Track Pan Exhibit at RR Museum of Pennsylvania

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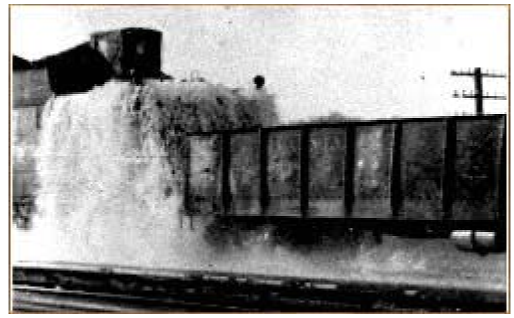
The useful “water trough,” or “track tank” or “track pan” as it is known in the United States, has vanished from our petroleum-worshipping country, for it preceded the steam locomotive into oblivion—unwept, unhonored and unsung.

Well, not quite.



Click picture for larger view.

Read the story of the Wilmore Track Pans

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THE WILMORE TRACK PANS

Wilmore Track Pans, October 1906

By James Alexander Jr.

Originally published in *Milepost*, the Journal of the Friends of the Railroad Museum of Pennsylvania. February 1993

The Pennsylvania Railroad's Wilmore track pan installation, the largest ever built, was a fine example of the public works that running a railroad entailed. Located on the western slope of the Alleghenies near the PRR's Pittsburgh Division milepost no. 260.8, Wilmore was the scene of both heavy freight and fast passenger traffic. By the early 1940s, its four track pans were each 2685 feet—the world's longest.

Constructed on a tangent (straight track section), the entire length had been carefully engineered to be perfectly flat to keep the water level even. Each pan was 26 inches wide with a four-inch lip overhanging inward to reduce splashing. Pan depth was seven inches except on Track 1 which used 152-pound rail and pan depth was increased to eight inches to better enable Mountain class locomotives to scoop water. Pan sections were made of steel and were welded together. Replacement sections were stored nearby to replace damaged pans as needed. Periodic welding and repairs were necessary when the pans were damaged by scoops or developed leaks.

Water was supplied by gravity through a 20-inch pipe with 20 pounds of pressure from a nearby mountain reservoir that was created by the PRR when it built the Wilmore Dam. As early as 1929, this installation was using 1.5 million gallons a day. The added demands during World War II made it necessary to supplement the water supply by municipal service at 85 lb pressure from nearby Benns Creek. After the war, a water treatment plant was added to reduce boiler corrosion.

Water level in the pans was measured by an indicator or equalization pipe, one per pan, located at the midpoint of

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the pan. This pipe led to a valve house in which a 14-inch round tank housed a float that in turn controlled a pilot valve to the main 10-inch valve in the pit below. Water was admitted through the four-inch supply lines that ran underground, through the undertrack tunnels, and up to the pans.

There the supply line pipes were joined via a flexible hose that allowed for expansion/contraction to a four-inch elbow which fed water through openings in the sides of the pans. With ten filling points on each pan admitting water at right angles to the pan length, splash was contained by the four-inch overhanging lip. (At other installations, water was fed in through the bottom of the pan or through the side in an angled fashion, or from behind deflector plates.) There were three valve houses at Wilmore, one opposite the boiler plant and the other two a thousand feet in each direction.

At times, small fish from the reservoir found their way into the pans, sometime jamming the water level floats, which caused the pans to overflow. The pans had to be cleaned periodically to remove dead fish, coal, and other debris.

To protect the trackbed from erosion by water splashed during scooping, thousands of Belgian blocks were laid beside the tracks and a series of drains installed. The Wilmore installation contained ten tunnels at right angles to and under the right of way. The first and last of these were within ten feet of the pan ends and the rest spaced about 300 feet apart. These tunnels, which carried off drainage and housed the water supply and indicator lines, were of four-foot-diameter bolted cast iron sections.

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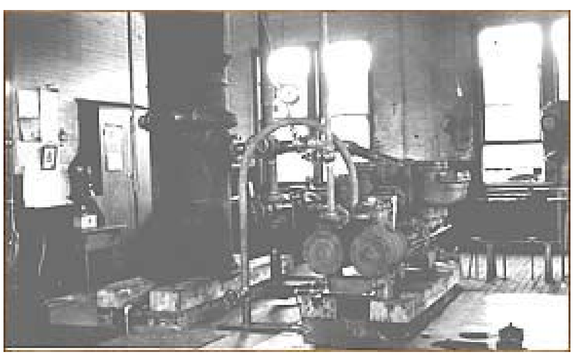
THE WILMORE TRACK PANS
continued ....

Wilmore Track Pans, October 1906. Laying heating pipes in trench between tracks.

Periodically, the tunnels under the tracks had to be cleaned out or entered for repairs—a cramped, unpleasant task. To accomplish this, one end of the tunnel was closed and entry was made by removing boards covering a pit at the other end and descending a ladder into the pit. Unlike some other installations that recycled drainage water, runoff at Wilmore was guided to the nearby Little Conemaugh River.

Winter presented special problems. To keep the pans from freezing, steam was injected into the water supply line in contrast to earlier systems that shot live steam directly into the pans (because the supply lines occasionally froze). Pan water was thus warmed slightly and usually kept in slight motion to deter freezing. However, Wilmore did not use a circulation system to reheat the pan water as some other installations did.

The ice created by splashing was a major hazard. A thawing system used at Wilmore involved a closed hot water system. The boiler house contained five boilers, two for the steam injection system, two for the hot water thawing system, and a backup boiler.



Pump and Heater similar to Wilmore's, at Bellwood Track Pans

The two-inch-diameter thawing pipes, which ran off an eight-inch header, were located on either side of the track on top of the ties near their edge for the length of the pan. Thereafter, they ran under the tracks and converged between the tracks for another 800 feet beyond the leaving end of the pan to thaw ice from water dripping off the undercarriages.

The water in the thawing pipes was heated to over 200 deg F and pumped through the circuit. It was still warm when it returned through the underground return pipes.

water splashing from the scooping operation would hit the steam pipe and cool the steam down to warm water, so this method was not used at Wilmore. In 1906, an alternate system that involved burying these pipes was tried at Wilmore and Bellwood (see photo at top), but this was later removed at both sites. (The New York Central covered its between-track steam pipes in order to deal with the problem of splashing water cooling down the steam.)

Thawing effect of buried heating pipes is seen at Bellwood Pans.

The Wilmore track pan facility was manned 24 hours a day from November 1 to April 1, and intermittently for the rest of the year. Frequent checks of the plumbing and drainage as well as repairs to leaks and system damage were often required. Charts in the pumphouse automatically recorded water levels.

Operation of the pans was the responsibility of the PRR Maintenance of Way Department, while operation of the boilers and pumps was supervised by the Maintenance of Equipment Department.

PRR I1 “hippo” taking on water at Wilmore. Note Belgian blocks lining tracks to facilitate water runoff (Photo by Mark Blaisdell courtesy of Charles Eggie.)

The hot water thawing system, which was more efficient than a steam pipe system, was effective except during extended below-freezing periods. Then, gangs of up to 50 men were employed to chip the ice away—a slippery and dangerous job.

At some installations, an additional steam-fed thawing pipe was used in the six feet between two tracks. However,

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The Wilmore pans continued in operation until the spring of 1953, when sections were cut out to enable expansion of the dry steel of the remaining pans when the water was drained. By the following fall, all the pans had been removed. The boilers and pumps were removed in 1955, thus obliterating a fine example of steam railroad water scooping operations.

This story was researched at the Railroad Museum of Pennsylvania and the Hagley Museum and Library. Information was collected from both formal archival sources and real railroaders who saw track pans in action. A key source was Charlie Eggie, who had been the Pennsylvania Railroad's Plumber Foreman at the Wilmore track pans. Mr. Eggie provided both keen recollections and invaluable amateur photos of scooping in action. Following publication of our initial story on track pans, Mr. Eggie visited the Railroad Museum of Pennsylvania, viewed the Museum's track pan exhibit which features a section of track pan retrieved from Wilmore, and donated a wooden shim that had been used there to adjust the pan's height to proper tolerances. Wooden shims -- something we had missed in our research into the written record.

Railroads employed tens of thousands of workers in tasks that went beyond the typical role of the engineer and conductor. Railroads maintained impressive physical infrastructures and large corporate support systems that allowed the people and commerce of America to move across the miles and mountains. It is the memories of these railroaders, their fondness for the human side of their important and demanding tasks, and the glint in their eyes as they retell their stories that make this historical research so rewarding. Their passing can only be lamented, but also honored in recognizing their accomplishments.

-- JA

Read the main story on this subject: Scooping Water in the Age of Steam

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