



NEW MEXICO STEAM LOCOMOTIVE RAILROAD HISTORICAL SOCIETY

CELEBRATING NEW MEXICO CENTENNIAL 1912-2012

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A VERY GOOD YEAR

In 2011 there was progress in many areas of the 2926 restoration. Two major efforts dominated: boiler work and removal of the side rods and their roller bearing assemblies.

Boiler work centered on patching the boiler's rear wrapper sheet. Ultrasound testing of the boiler shell steel thickness had enabled creation of a complete map of boiler steel thickness. That allowed identification of all areas of boiler steel below required minimum thickness.

Such issues are common to steam locomotives that have spent years as static displays in parks. Asbestos was used in the steam age as the primary insulating material on steam locomotive boilers. Bare boiler steel was wrapped with asbestos, which in turn was held in place with an exterior sheet metal boiler jacket.

Most steam locomotives donated in the 1950s were displayed in outdoor settings with asbestos still in place. Weather and moisture always take a toll. Many years of the underlying boiler steel in direct contact with moisture laden asbestos cause spots of corrosion

We lucked out with #2926. Steel damage was limited only a few areas on the "rear wrapper sheet", the part that wraps the rear most portion of the boiler, enclosing the firebox.

There were three small rectangular areas on the engineer's side of the boiler and a larger area on the fireman's side that needed to be cut out and have a steel patch welded in. This is highly specialized welding work because it is on that portion of the boiler that operates under 300 pounds per square inch steam pressure.

In addition, the steel firebox is located inside this portion of the boiler. It is secured in place by hundreds of staybolts. They basically tie the side of the firebox to the exterior boiler shell. Because the required patches were in the staybolted part of the boiler, all the staybolts in the affected areas had to be replaced.

The result was a complex operation. It meant drilling staybolt holes into the steel patches in perfect alignment with matching holes in the firebox.

Welded stayrods are being used in place of the existing staybolts. Welded stayrod is a better technology unavailable during the steam age. Welders who are certified to work on boilers must do the this kind of welding work.

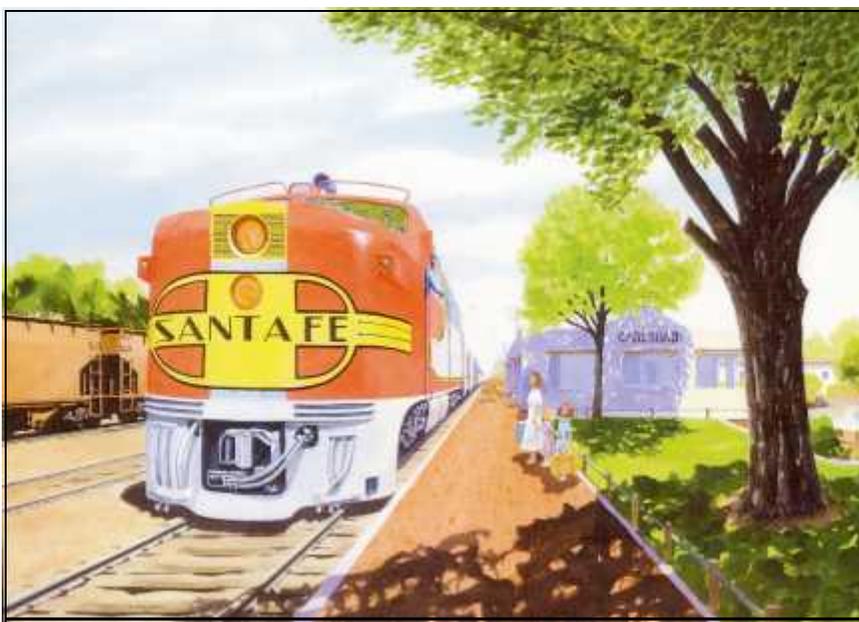
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"A REAL TRAIN TO GRANDMA'S"

A Raillfan Christmas Story—By Mike Hartshorne

"NO! I rode a real train to Grandma's!"

That was the indignant response I got when I showed my wife, Lida, the picture of the M-190 doodlebug being displayed in Belen, NM and suggested that it was the train she had ridden from Carlsbad, NM to Clovis. She couldn't say if her train had an EMD E8M or an Alco PA-1 or what but her train was a real train, not one of those (not-a-real-train) motors.



A snapshot of Mike's secret painting for Lida.

Since we were married 35 years ago I have been treated to many stories of her fond memories of leaving Carlsbad on the train for Clovis. She remembered walking the station platform in Clovis waiting for the next train and then boarding it for the trip to St. Louis on the way to visit her grandmother in Fairfield, Illinois.

It was clearly a big deal. Her mom splurged on a sleeper. Lida and her little sister loved railroad dining with linen on the tables and a rosebud in a vase. The trip was not all play. There would be long walks lugging her own suitcase. Waiting for hours in Clovis on the hot summer platform was arduous. But it was a grand adventure. And it did not involve a doodle bug. (Silly me.)

I told Dave Traudt about this. In no time he found a black and white Kansas Historical Society photo of Santa Fe's No 82 at the Carlsbad station. That was too early in my wife's history but gave a great perspective of the scene.

Dave, his buddy Steve Peterson, Ernie Robart, and Steve Bradford got to work finding out which locomotives pulled The Cavern (Train 25/26) passenger train from Carlsbad to Clovis and back when my wife was in grade school. With a little sleuthing it must have been a PA-1. They found a color picture of the exact train at Portales.

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Then came a color photo of the M-190 at Carlsbad's depot. (Never mind that I could have been right.) It showed the color of the buildings and trackside walk. The historically correct 1960s consist had a PA-1 with a light weight baggage car and round end passenger car (probably chair car 3197) for The Cavern.

Armed with this information I got details of Lida, her sister and mom from old family photos and her sister's description of the colors of their little Samsonite suitcases.

From that point, recreating the memory was up to artist and NMSLRHS Board of Advisors member Gayle Van Horn. He put it all together in a watercolor showing the travelers at the Carlsbad depot with The Cavern waiting. It depicts the ladies speaking with the engineer above.

The painting was to be my surprise Christmas present for Lida. Gayle had a friend, Teresa, make a nice frame. And that brought a pre-Christmas surprise for both of us. Teresa was an acquaintance of ours that Lida and I hadn't seen since she was at our wedding 35 years ago!

With numerous folks in on this project it was tricky to keep the secret about my wife's Christmas present this year. This project worked against the advice of a Russian dictum that says "two can keep a secret if one of them is dead".

While this subterfuge was rolling Steve Bradford liked it so much I figured it might make a good Society Christmas card for the 2011 season.

Keeping the secret from Lida got even harder!

A little more sneaking around got it into the house undetected. It was fun and a relief to see the look on her face when she finally opened the present. Maybe she'll continue to let me "play with the train".

So if you got your NMSLRHS Christmas card in the mail recently go back and look at it once again.

Now you know the rest of the story!

LOOKING DOWN THE TRACK

Three Stages To Restoring New Mexico's Rail Heritage

Over fifteen years ago, Albuquerque native Ed Bukove was motivated to capture and showcase a portion of New Mexico's rich rail heritage. His actions led to the creation of our organization, the NMSLRHS, and the ultimate acquisition AT&SF Steam Locomotive 2926. During the first few years of the NMSLRHS, our efforts were directed at acquiring and moving 2926 (twice), creating an infrastructure, and learning to work together as a team. That was stage I in the development of a New Mexico Rail Heritage Program.



AT&SF 2926 In Its Prime: Two crew members chat while standing next the giant locomotive in San Diego CA. Stan Kistler Photo, circa 1950.

Stage II is restoring a rusting relic back to its prime as a representative of the memorable era of steam rail service. The restoration has taken all the efforts that we—and our many supporters—could muster. For almost ten years, bringing 2926 back to operating condition has been our primary objective. A decade of toil and \$1.4 million dollars later, that objective is in sight.

Now, as we are near to having an operational, high speed steam locomotive it is time look down the track to Stage III—operating 2926 as an icon of New Mexico's rail history.

There we face a new set of challenges we must meet before we can achieve the goal of operating one of the world's largest steam locomotives as a tourist attraction. It is time to start planning for the Stage III challenges—operation, public exposure, widespread attention, etc.

Locomotive 2926 is the largest of a very small number of surviving high speed steam locomotives capable of operating even occasionally for significant excursions. A few of the others operate occasionally in other regions of the U.S., and when they do, they draw huge crowds. No such locomotives are currently based in, or operating regularly in New Mexico and adjacent states.

Operation of 2926 with a consist of classic passenger cars has the potential to become a major tourist attraction, with a significant statewide economic impact. But just what does Stage III entail?

It means far more than just firing up a classic steam locomotive. Marketing, management of operational details, liaison with national, state, and local authorities and interests are just a few of the things that must be thoroughly studied and implemented. Fortunately, we have some examples to study.

There are similar activities in other parts of the country, where big steam draws national and worldwide attention. In the following article, Steve Bradford takes a look at a rail heritage operation in the Pacific Northwest. Future newsletters will look at big steam operations in other regions of the country.



Before removal of outer skin, asbestos, appliances, piping etc., 2926 reveals rust and other results of years of abuse, exposure, and neglect.

BIG STEAM RAIL HERITAGE WORKS

*"Pulled by a diesel, it's just another train."
"Pulled a steam locomotive, it's a major event!"*

RAIL HERITAGE IN THE PACIFIC NORTHWEST

By Steve Bradford

One of the premier rail heritage operations in the country is the Oregon Rail Heritage Foundation (ORHF) in Portland Oregon. One of only a few big steam operations in the U.S., the ORHF is in the process of moving and expanding its facilities.

The ORHF is a 501(c)3 non-profit organization formed to establish a Rail and Industrial Heritage Museum. A primary objective was to secure a permanent home for the three steam locomotives owned by the City of Portland.

Oregon Enginehouse and Rail Heritage Center



At the end of the steam age in the 1950s, Portland was given three historic steam locomotives, two 4-8-4s, and a 4-6-2. They were:

- Southern Pacific #4449, the only surviving GS-4 Model 4-8-4;
- Seattle, Portland and Spokane #700, the only surviving SP&S 4-8-4, a clone of the Northern Pacific A-3 class 4-8-4s. (None of the Northern Pacific 4-8-4s survived.)
- Former Oregon Navigation & Railway #197 a turn of the century 4-6-2.

All were placed on display in a Portland city park, where they rested until the 1970s. AT&SF 2926 was given to Albuquerque at about the same time and displayed in Coronado Park. This action was repeated in cities around the country as the nation's railroads switched to diesel. Unfortunately, most have either been scrapped or have deteriorated to the point that only cosmetic restoration is feasible.

Southern Pacific #4449 was the first of the three to be restored. It was selected in 1974 for the starring role on the 1976 American Freedom Train, celebrating America's Bicentennial. After its American Freedom Train service it was restored to its original appearance and has operated in periodic excursion service ever since.



Southern Pacific #4449: When it operated as the Bicentennial American Freedom Train, it carried a red white and blue color scheme.

The SP&S #700 was returned to operation in 1990 and the ON&R #197 is currently being restored. All three are owned by the city and cared for, maintained and operated by three associated rail heritage preservation groups.



Check the internet for great pictures of 4449s 1976 American Bicentennial Journey.

For decades, all three locomotives have been housed in the former Southern Pacific (now Union Pacific) roundhouse on Brooklyn Street in Portland. Sitting in the middle of an intermodal yard, the locomotives are only accessible to the public when operating.

Additionally the roundhouse and the entire rail heritage operation is in the way of UP plans to expand their intermodal facility. So new facilities needed to be built.

Oregon Rail Heritage Foundation Board President Doyle McCormack indicates that he views the required move as a benefit. He states, "—the public will finally have access to the engines, and learn how important rail is to our history. ***These machines made America, Portland and the Pacific Northwest what they are today.***"

Doyle's view of the importance of steam certainly applies to New Mexico and other states of the Southwest as well as the Pacific Northwest. As our country grew from east to west, steam power led the way. One result was that many western towns and cities grew from nothing more than a water stop on the expanding rail systems.

We are very supportive of the ORHF efforts, and expect to learn from their experience and that of rail heritage activities around the country.

There have been no high speed standard gauge excursions based in New Mexico and adjacent states. However, New Mexico and Colorado have extensive experience in narrow gauge operations, and a number of our members are involved with those programs.

In future newsletters, we will take a look at other standard gauge big steam activity in Los Angeles, Cheyenne, Minneapolis and other parts of the country. We will also discuss the close-to-home narrow gauge operations in New Mexico and Southern Colorado.

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Luckily, our friends in Local 412 of the Plumbers and Pipe Fitters Union have that kind of experience and certification. From spring onward, Danny Rivera and John Gibbons worked hard preparing the large cuts in the wrapper sheet to receive the patches. It took much fitting, grinding, more fitting to get things just right. Holes were beveled, edges refined and in October, the three small patches were done on the engineer's side.

At the same time, work began to prepare for the large patch on the fireman's side. Perimeter welding on that patch was nearly complete by the end of the year. The patching kept several other members busy cutting stayrods, beveling and polishing holes, etc.

Meanwhile, removal of the siderods and the roller bearing assemblies developed into a much more of an effort than originally anticipated. The bottom line is that the siderods did not come loose from the crank pins very easily.

What first seemed relatively straightforward became an effort that took much longer. To loosen and remove the end of each side rod special puller tools had to be designed and fabricated in the machine shop by Ralph Johnson and the gang. Each rod required a puller tailored to its dimensions.

Many of our members were involved in this project for several months. Once removed, paint was removed from the rods, (they were not painted when the engine was in service). The alloy rods were buffed and shined to look like new and were then put into storage.

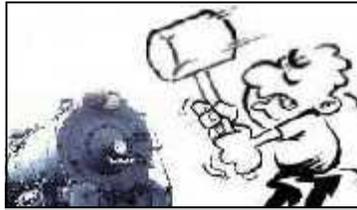
Phase 1 of the roller bearing project in the summer and early fall was removal and shipping the bearings to the manufacturer.

Bearing removal was also a challenge. They were press fit into the ends of the rods, and had to be extracted from crank pins. Again the homegrown ingenuity of the Society's volunteers overcame all problems. Each set of bearing assemblies required design and fabrication of an individually tailored bearing puller.

By August all bearings had been pulled, tagged and photographed and the Society had a full set of pullers. Later, the design and fabrication of special tools for re-installing the bearing assemblies will be necessary. Dave Van de Valde designed the special tools and led the pulling process assisted by Carlos Osuna, Dave Traudt and a lot of other volunteers. As usual, the success of the project relied on the capabilities of our machine shop team led by Ralph Johnson, and they came through by making the pullers to Dave's design.

While the last bearing assemblies were being removed, work began making specialized shipping containers so that they could be sent back to the Timken Company in South Carolina to be refurbished.

(Continued on back page)



BANGING ON A 2900

FEATURING—

ANDY RUTKIEWIC

BY MIKE HARTSHORNE

Andy came on board the 2926 effort about three years ago—just when we needed a chemist. We had encountered a lot of scale in various parts of the locomotive's boiler, pipes, and other parts exposed to water sediments. With his interest in history, an affinity for rail since childhood, and an attachment to his adopted state of New Mexico, Andy fit right in the 2926 crew.—Editor

Born August 20 1929 in Jamaica, Queens, New York City, Andy was the only child to post World War I immigrants John and Caroline Rutkiewicz. John was an electrician for Consolidated Edison in NYC. Caroline was a beautician.

Andy attended both public and private (catholic) schools in the primary and secondary grades in Queens. Later, he graduated with a BS in Chemistry from Long Island University in Brooklyn NYC. His motivation was an excellent high school chemistry teacher, A.W. (acid-water) Greenspan. That excited his interest in STUFF.

After his sophomore year at LIU Andy asked himself "What does a chemist actually do?" To find out he took a job as a Chemist Assistant with Colgate Palmolive Company in Jersey City NJ across the Hudson River from lower Manhattan. He worked full time for an assigned Chemist developing the company's first Liquid Dishwashing Detergent. He finished his degree at night in 1952. Colgate offered him a position as a Product Development Chemist where he stayed until 1956.



Andy, at his retirement party Dec 1992.

Andy met first wife Dorothy "Dot" May Trick through a fraternity brother in collage. They married upon his graduation and lived in Queens. They had their first three children, two girls and one boy while there. After a move to Pennsylvania came two more children, a girl and a boy. Meanwhile, his career as a chemist progressed.

In 1956 Andy was offered a position with EI DuPont de Nemours & Co as a Product Development Chemist at Marshal Lab in Philadelphia, PA. During his tenure at Dupont he was involved in the development of various automotive, household and personal consumer products. The most widely known is the REACH toothbrush, the first ergonomically designed toothbrush. Dupont sold the brand to Johnson & Johnson Inc.



Reach toothbrush award

In the latter part of his tenure Dupont divested itself of Consumer Products. Andy then did research on pigment dispersions for original equipment and refinish automotive coatings, before retiring from Dupont as a Research Associate in 1993. He then moved to New Mexico,

As with most of us during that era, there was also military service. Just after World War II the 42nd Infantry Division NY National Guard was reactivated. Andy enlisted in the 104th Artillery Battalion in Jamaica NYC, went to OCS, and became the Battalion Survey Officer.

When he moved to Pennsylvania he transferred to the 108th Artillery Battalion 28th Infantry Division in Philadelphia, PA. as the Battalion Survey Officer. He was a Battery Commander and held various staff positions. He retired after 27 years of service as Battalion Assistant S-3. His units were not called to federal service during the Korean and Viet Nam wars.



Andy and Dot at Military Ball 1950.

Like many of us, Andy first became enamored of steam trains at an early age. It happened in first grade at St. Monica's school in Jamaica, NYC. Jamaica Station is the major junction point for the Long Island Railroad (a sub of the Pennsy) where electric trains from Penn Station in Manhattan were switched to steam and now diesel power. The roadbed is elevated above street level to facilitate street cross traffic and at the same height as the first grade school room. What a distraction! The tracks were only about 50 yards from the windows.

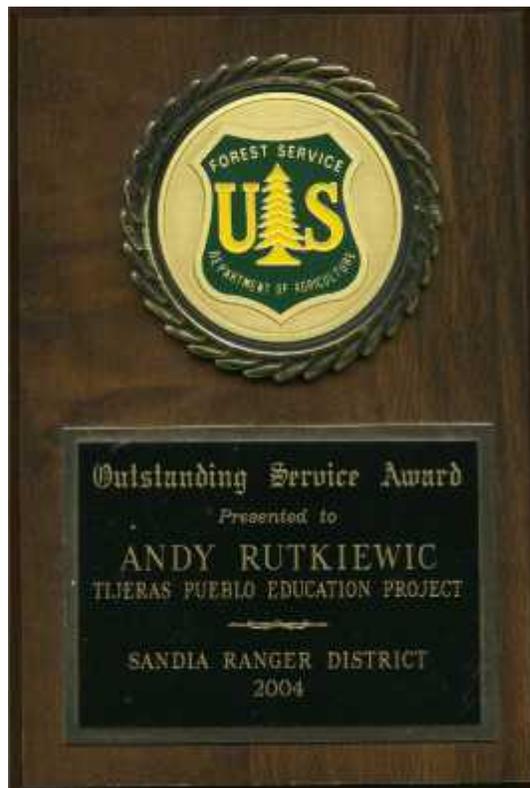
The outside track was a switching spur on which a squeaky 0-4-0 would run back and forth. Needless to say, when that often happened Sister Mary Rose did not have his undivided attention. Later in his primary grades, he would have to walk from his house to the library through a tunnel under the main line of the LIRR from his house. There also happened to be a local station by the tunnel. He would time his trip so he could watch the west bound Canon Ball Express from Montauk Point come by powered by a big bad Hudson at full throttle. The rail attachment continued into adulthood. After he married Dot he was a member of the Crocheron and Northern Model Railroad club [HO] in Flushing NYC until they moved to Pennsylvania.

Andy traveled the Northeast Corridor from Philly to NY and Washington on business many times. One time Dot and their two youngest children took a coach trip from Wilmington, DC to Hollywood, FL to visit his parents. That was UNFORGETTABLE. The train wrecked vehicles both ways.

Andy's first daughter is now the Curriculum Coordinator [preK-3] for the Worcester County, MD Public Schools. His first son is a Captain for Delta Airlines in Atlanta GA. His third daughter is a HVAC designer for SIEMENS in Richmond, VA. His second son is the head trainer of Endurance Race Arabians [100 miles] for Lana Dupont Wright in Chesapeake City, MD. His second daughter died from a serious disease as a sophomore in collage. Dorothy died of a heart attack in 2001 after 49 years of marriage. Andy was enchanted in the Land of Enchantment by Jane Woodworth and they were married in 2005.

After Andy retired to New Mexico he became a volunteer for the Sandia Ranger District, Cibola National Forest, USDAFS. At the pre Columbian Tijeras Pueblo Archeological Site he served as a docent. That assignment started his interest in Native American culture, history, archeology and preservation. While at Tijeras Pueblo he was instrumental in the construction of an adobe Interpretive Center by Tijeras Pueblo Volunteers. When he heard a presentation by Mike Hartshorne and Steve Bradford on #2926 at a Historic Preserva-

tion Conference in Taos his interest in steam locomotives revived. Less than enchanted by the bureaucracy at the Sandia Ranger Station he joined NMSL&RHS.



Tijeras Education project

One of Andy's first contributions to the restoration of the 2926 was his introduction of phytic acid. (See scale and chemistry article, next page.) This eco-friendly acid does a remarkable job of cleaning caliche deposits from pipes with no damage to the metal and easy disposability. It was not long before Andy became a Society leader and is now an elected member of the Board of Directors. I persuaded Andy to be the Chairman of the Fundraising Committee a while back.

Andy's gang has pursued multiple funding grants, some successful, some not. Andy is conversant with the Albuquerque Convention and Visitor's Bureau and local museums. His gang has also assumed a Community Liaison function to raise the profile of NMSLHRS among local, state, and national officials.

Andy is one of the big drivers behind the six remarkable New Mexico railroad history centennial celebration panels that now grace our site. To kid him about all these endeavors I have nicknamed his committee the "Plots and Plans". Judging by the email traffic each day it is easy to see that Andy is relentless and tireless in pursuit of the Society's success. I believe that we are darned lucky we have him!

SAFETY NEWS

As we start the New Year it is once again time to conduct our annual safety refresher training course. This year there will be two sessions.

The first session was held on Saturday, January 21. At Local Union 412's union hall, 510 San Pedro SE, in Albuquerque. It began promptly at 09:00, and was well attended.

If you missed that session, the second will be held on Saturday, February 18, at a location to be announced. The session will last approximately one hour.

All members who wish to continue working at the restoration site must attend one of these two sessions. If you are unable to attend either one of the sessions you will be required to attend a full New Member Orientation to renew your work site privileges.

As always, you must also have made your annual contribution to NMSL&RHS for 2012. Check with Secretary Gail Kirby if you are not sure of your contribution status.

For members who live out of state, I will be sending an electronic version of this session along with a document that must be signed and returned to me by regular mail.

The next New Member Orientation will be held on Saturday, February 4th beginning promptly at 9 a.m. at the restoration site Reefer Conference area. Potential new members are more than welcome to attend this session.

For more details you may contact me at kc5ntw@sdc.org.

Jon Spargo, Chief Safety Officer
NMSL & RHS



After closely studying the safety headgear pictured above, our Chief Safety Officer has determined that it is not suitable for use around the 2926 restoration site.

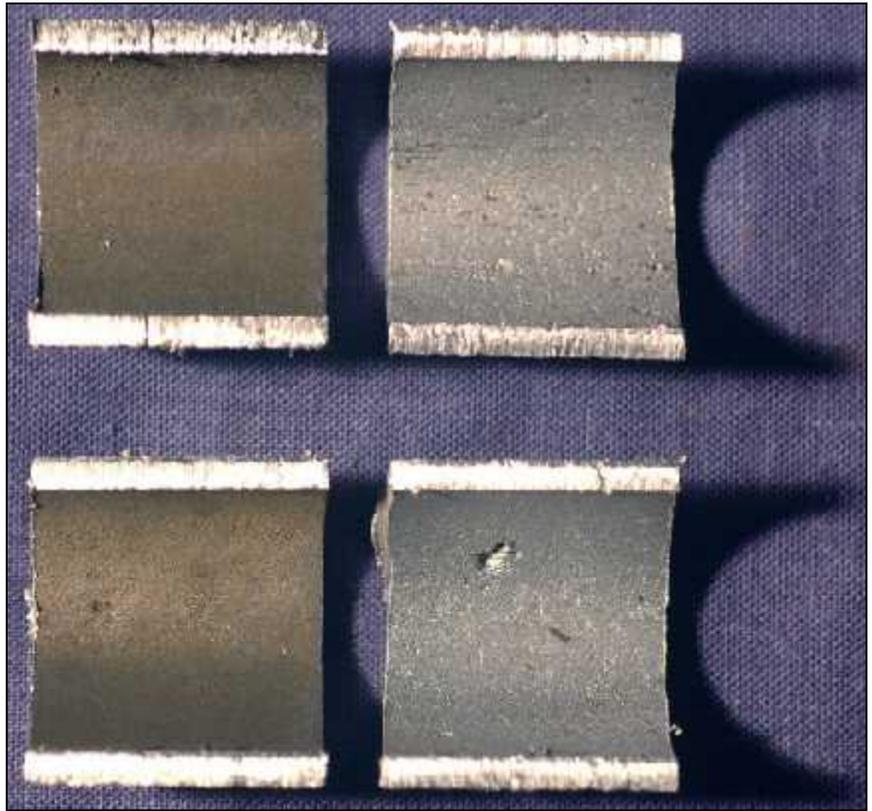
More Scale Chemistry Than You Ever Wanted to Know

Those who have been following our progress on 2926 are well aware that we have encountered large amounts of scale—in the tender, tubes, pipes, pumps, and anything else exposed to mineral laden water. Hard work and elbow grease worked in accessible spaces like inside the tender. It would not work on places we couldn't reach, such as inside superheater tubes.

We chose phytic acid to remove the scale. Two questions arose: 1) How well is the acid working?; and, 2) What is the composition of the scale?

In the following article, John Taylor addresses those questions.—Editor

Through the good graces of Roger Jutte, a self-described “former lab rat” for the Nalco Corporation, we received an analysis of the scale we are struggling to remove from the superheater tubes. Dr. Roger Swanson and Dr. Paul Desch of Nalco offered their services in analyzing sample pieces of the tubes that Roger sent to them.



Sample sections from the superheater tubes that have been cut for analysis

Several tests were done, including x-ray diffraction (XRD), x-ray fluorescence (XRF), glass-bead blasting (GBB), and detailed microscopic analysis.

The XRD of the scale revealed that the major chemical components of the scale are Hydroxylapatite ($\text{Ca}_5(\text{PO}_4)_3(\text{OH})$) and Pectolite ($\text{NaCa}_2\text{HSi}_3\text{O}_9$). The most significant minor component is Potassium Magnesium Iron Silicate Hydroxide ($\text{KMg}_3\text{FeSi}_3\text{O}_{10}(\text{OH})_2$).

Percentages of the major elements from XRF (reported as oxides) are:

SiO_2 —36.9%	P_2O_5 —13.2%	Na_2O —4.8%
CaO —24.9%	MgO —9.6%	

Desch cut a portion off each section and then glass-bead-blasted (GBB) the surface of the section that was not cleaned by acid. Thickness measurements for the GBB sample ranged from 0.100 to 0.106 inches. For the sample that we had cleaned with phytic acid, the thicknesses ranged from 0.103 to 0.111 inches. There were some locations on the acid-cleaned sample still covered by a black oxide layer on the external surface, which likely resulted in the

slightly higher readings in places. Desch concluded that there was no evidence of metal loss on the acid-cleaned part.



Figure 1: Microphotograph of acid-cleaned sample

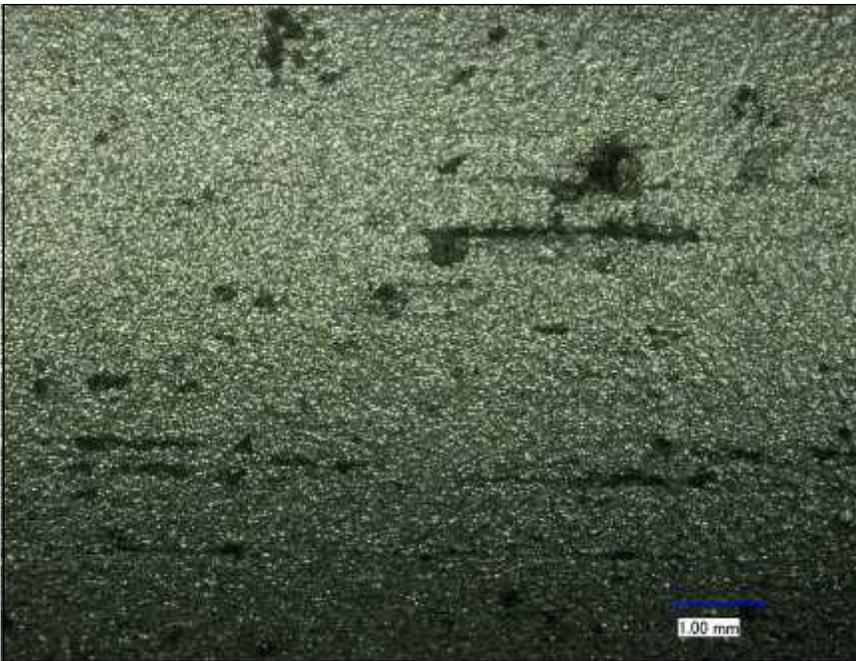


Figure 2: Microphotograph of GBB sample

The external surfaces look similar. Both sections had an irregular surface contour consisting of many depressions. The depressions on the acid-cleaned sample looked slightly deeper. Desch longitudinally split the portions to look at the internal surface, and noticed some moderately deep depressions in places on both sections. He thinks these depressions were caused by idle time oxygen corrosion over the years.

Close microscopic observation revealed some shallow longitudinally grooves on the internal surface of the acid-cleaned sample, (See Figure 1). These features are typical of damage caused by acid cleaning. The attack on the acid-cleaned section looks minor, if not superficial. A few longitudinally oriented grooves were also present on the internal surface of the GBB sample (See Figure 2), but they were less numerous and not as deep.

Bottom line, there was some minor localized attack due to the acid cleaning. It is important to note that stressed areas of the boiler may be more prone to attack when exposed to an aggressive acid solution.

Desch pointed out that superheater scale is generally associated with carryover. In that case, he is concerned some caustic materials may have been introduced. Concentrated caustic can cause stress corrosion cracking (SCC) in some instances, generally in areas of high applied or residual tensile stresses (such as at welds). He noted SCC in old boiler designs (often riveted boilers of locomotives) caused some issues. We see SCC in some steam systems that experience carryover of hydroxide (caustic embrittlement) from time to time.

Our thanks to Roger and to the Nalco folks for providing this important data. We will follow up with evaluations of our boiler water chemistry and be on the lookout for indications of the SCC that they mentioned.

PHYTIC ACID FACTS & PHENOMENA

Phytic Acid (Phytate in salt form) discovered more than 150 years ago is nearly ubiquitous in nuts, cereals, grains. It plays many roles (both good and bad) in the everyday existence of humans and other animals alike.

- Farmers have long known that natural fertilizer from non-ruminants is phosphate-rich because phosphorus & inositol aren't absorbed in the gastrointestinal tract of non-ruminants.

- It reduces absorption of vitamins and minerals such as niacin, calcium, iron, magnesium, and zinc in non-ruminants. Thus it becomes a consideration in a balanced daily diet.

- On a totally different note, a few years ago, scientists at Britain's Birmingham Univ. discovered that E. Coli bacteria breaks down phytic acid and releases the phosphate molecules, which bind to uranium to create a uranium phosphate precipitate. The precipitate can be harvested to recover uranium, and voila – no more nuclear waste.

- And finally, our one and only Dr. Mike says that in "doctor talk" the hydroxylapatite is called hydroxyapatite. It is the complex of calcium making up your bones. It is also used as a powder/solid in some orthopedic procedures doing joint prostheses, repairing fractures that otherwise won't heal, graft material replacing chunks of bone removed for one reason or another, etc. If you have had a bone mineral density test (Dual Xray Absorptiometry or DXA) it was measuring the density of the material in your vertebral column, hip, etc.)

And now phytic acid is being used to remove an accumulation of scale inhabiting the innards of AT&SF Steam Locomotive 2926.

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Bob DeGroft, supervisor of the entire side rod and bearing removal effort persuaded Timken to examine the bearings and make any necessary repairs. The rare, highly specialized parts required careful packaging to prevent damage while in shipment. The shipment included three pallets carrying thirteen, custom built, wooden shipping boxes, each containing a bearing assembly, or associated parts. Randy McEntire, aided by team members Pete Ormson and Scott Eckstein designed and built the shipping boxes.

Concurrent with the first phase, Phase 2 consisted of identifying and obtaining detailed, technical drawings of the bearings for use by Timken and the Society. The Temple Railroad and Heritage Museum, Temple, TX had the required drawings in their extensive AT&SF historical archive. Bob DeGroft, Dave Traudt, and Dave Van de Valde drove to Temple and spent several days researching their holdings and identified a large number of drawings bearing directly on the restoration of 2926. The museum made available to the the NMSLRHS. We copied and digitized all drawings considered pertinent to the restoration.

Other highlights of the year, mechanically speaking, included the design and fabrication, in-house, of a pipe swaging tool custom designed to swage (squeeze) down the diameter of one end of each boiler tube. Since there are 220 large tubes and 52 small tubes, tube swaging was an important item and was estimated to cost \$10,000 if we had to have it done commercially.

Dave Van de Valde designed a hydraulic machine made from off-the-shelf parts and a few purchased items to do the swaging. So for the small cost of a hydraulic pump and a few other parts, thousands of dollars were saved. All the pipe was swaged in less than ONE day!

Meanwhile, painting and cleaning of parts removed from the engine is a continuing process. Some, such as the many pumps, accessories and appliances required considerable attention. Those devices and their sub components were disassembled, checked, refurbished and repaired. For our Open House in October, the big drive wheels, smokebox front, and other external parts received a coat of paint to allow visitors to see what 2926 will look like when it goes back on the high rails.

Finally, the infrastructure that keeps the restoration moving forward demanded constant attention. Maintenance, repair, and/or replacement of equipment, tools and machines continued, as needed. **Yes, it was a pretty good year!**



The highly polished side rods are stored inside one of our storage containers. Once their large roller bearings are returned for the Timken plant in South Carolina, they will be taken out of storage and reinstalled.

CUB SCOUT VISIT TO THE RESTORATION SITE

Anyone familiar with the NMSLRHS knows that visitors, individually or in groups, are always welcome at our restoration site. On Saturday January 14 we had a special group visit the site for a tour and briefing on the restoration of an iconic steam locomotive. A Cub Scout Pack, along with several parents spent part of the afternoon touring the site.



In the first picture, Bob DeGroft shows a group of Cub Scouts a rusted bolt, and explains that a new one will have to be made in the machine shop. In the second picture, Mike Hartshorne provides another group with a close-up description of 2926.