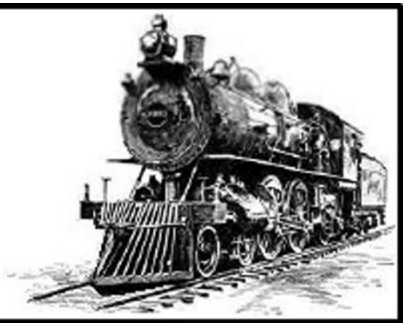
Maricopa Live Steamers

STACK TALK



JULY, 2020

The official newsletter of the Adobe Mountain Railroad in Phoenix, Arizona.
Operated by the Maricopa Live Steamers Railroad Heritage Preservation Society.

President's Page

It is July. As usual, we will not have a business or membership meeting this month. But in addition, in keeping with the county parks and recreation guidelines, there will be NO ice cream social in August. The new guidelines were posted on the entrances to the clubhouse and other buildings at the park. They come directly from the County, so there can be NO deviation from them. We urge you to stay at home. But, if you ARE out, **PLEASE** practice social distancing and wear a mask if anyone is around you, as per County guidelines.

I wish I had good things to report to the membership, but I don't. A few of us have been working on the track, so if you come out to run after dark, **PLEASE** be aware of the closures and the red flags that are posted to the right as you approach the spots where we are working. I guess there are a few good things to report – we are getting quite a bit of work done on the track structure. Between Tanks Alot and Werner Station, we have installed 450 concrete ties and, from what we saw as the old ties came out, it was none too soon. The termites were getting fat and happy in this area, and we have taken their dinner to the dumpster. We also installed two new replacement switches at Pieter Pass and have the westbound main out for concrete tie installation. As soon as we get the westbound side done, we will do the eastbound side. By doing it this way, the FarFlung Subdivision can remain open for your use. Just follow the switch alignment for temporary bypass.

COVID-19 RESTRICTIONS are still in place.

For members' health and safety, until further notice, all social activities at the Park have been cancelled.

State mandates are still in place prohibiting gatherings of more than 10 people, and everyone must stay at least 6 feet apart. ONLY members / immediate family can be at the Park. NO parties or gatherings of any type can take place at the Park.

Vice President's Page

We are also putting new ties across the bridge at Gamble on FarFlung, doing only one side at a time, so it can stay open for use. This is the bridge that got the new walkways of steel grating some months back, and will be 100 percent by the end of July.

If you are out on the railroad, you can see the spots where we have found considerable tie damage from critters, because there are concrete ties lined up where we will be working. Just to make the point, there has been NO Club monies spent for any of these projects. Everything from the rebar, concrete, tie plates and screws have been donated to the club. All the additions at the North Pole were also paid for through donations for everything. I want to emphasize that no club monies are being used for any projects or upgrades to the track or wayside buildings. That would be contrary to the by-laws.

There will be a Fall Meet of limited sorts. There will be NO meals provided, and gatherings at the clubhouse must not exceed 10 people. We are hoping for the best, but, unless we can get a camping permit from the County, there won't be any RV parking in the park. With 140 acres of park, we should be able to do our social distancing while on our trains. Just do not hit another train and we will be in compliance with the guidelines. According to John Draftz, the Mini-Ops session is being planned for Tuesday and Wednesday of Meet Week. More details as time grows closer and Covid normalizes, whatever "normal" turns out to be.

PLEASE, Stay Safe, have a Happy July 4th,
and hopefully next month I will have something more encouraging to say.

– Joe

Arizona closes bars, gyms and other businesses after 'brutal' increase in Covid-19 cases

(CNN) – In one of the most drastic rollbacks of reopenings yet, Arizona is closing bars, gyms, movie theaters and other businesses for 30 days amid a "brutal" increase in Covid-19 cases, Gov. Doug Ducey said Monday. Water parks and tubing must also close, Ducey said at a news conference, and events with more than 50 people are prohibited. The pullback comes as the state has seen a surge in Covid-19 cases recently. There are now almost 75,000 reported infections, up from 46,689 cases 10 days ago. "Our expectation is that next week, our numbers will be worse," Ducey said. "It will take several weeks for the mitigations we are putting in place to take effect." The largest increase is from those between the ages of 20 and 44 who now make up 22% of hospitalizations in Arizona, Ducey said.

Sixteen other states have either pulled back on reopenings or have put them on pause as their cases jump. Bars were ordered to close back down in Texas and parts of California. In some of South Florida, beaches were directed to close again during the upcoming holiday weekend, and on-premises alcohol consumption has been suspended statewide. Just days before the 4th of July weekend, groups of more than 10 people will be prohibited from gathering at outdoor pools in Arizona, including those at apartment complexes and private facilities, Ducey said. Arizona schools are also ordered to push back the start of the school year to August 17, he said. To reopen, affected facilities must attest to public health regulations and post it for the public to see, the governor said. The goal, he said, is to get the establishments back open in 30 days. "We're going to be monitoring the data along the way, and we're going to do everything necessary to protect public health," Ducey said. Restaurants will be allowed to remain open with physical distancing guidelines in place. Last week, Ducey said he wouldn't require people to wear masks who attended President Donald Trump's Phoenix rally on June 23. Monday, he encouraged all Arizonans to "mask up," but did not issue a statewide mandate for people to wear them.

From the Desk of: Dick Wieboldt – Engineer
Subject: **For Sale: Winton Consolidation**

Superscale fittings and injectors. Running gear recently rebuilt professionally. Current Maricopa Live Steamers boiler certificate. Extras including 500 lbs of coal.

Asking ***$14,000*** Email: dgwrailroad@earthlink.net
Cell: 614-361-1235

2020 Board of Directors and Adjunct Staff

Pete Pennarts – President
Joe Schnyder – Vice President
Mick Janzen – Secretary
Bob Douglas – Treasurer
Bill Cobb **Dave Griner** **Terry Liesegang** – Members at Large

Cliff Fought – Superintendent Construction
Hank Gallo – Superintendent Operations
Dave Kulman – Maintenance of Way Superintendent
Matt Rockwell – Sawmill Superintendent
Terry Liesegang – Road Signal Superintendent
Dakota Clemens – Tower Signal Superintendent
Bill Pardee – Boiler Inspector
Joe Fego – 1-inch Operations Superintendent
Joe Schnyder – Safety
Jim Zimmerman – Engineer Test Administrator
Perry McCully – Facility Administrator
John Broughman – Public Run Crew Coordinator
John Draftz – Advertising
Donna Hohm – Membership Committee Chairman
Matt Rockwell **Dennis Beatty** – Holiday Lights Committee Chairmen
John Bergt **Timothy Freeman** – Web Masters
Ken Giordano – Stack Talk Editor

Send emails / photos to:
MLSnewsroom@Gmail.com

From: Emily Miller (PRK)
Sent: Tuesday, June 30, 2020 1:56 PM
Subject: Operations under new Executive Order 20-43

All Concessionaires**:**

Due to the rising spread of COVID-19 cases, the Governor issued a new Executive Order on June 29th (EO 20-43, attached) for the temporary closure of some establishments and mandated a limit for social gatherings. With this new Executive Order and with the County's Board of Supervisor's action on June 19th (the wearing of facial coverings**;** link https://www.maricopa.gov/CivicAlerts.aspx?AID=1455), we recommend you comply with these newly established mandates and other regulations that are still in place.

What You Can Do

The best way to prevent illness is to avoid being exposed to this virus. These simple actions will lessen your chances of catching COVID-19 and spreading it to others**:**

- Wash your hands often with soap and water for at least 20 seconds. If soap and water are not available, use an alcohol-based hand sanitizer.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Stay home as much as possible, but especially when you are sick.
- Put distance between yourself and other people, at least 6 feet.
- Avoid gathering in groups of 10 or more.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces.
- Wear a mask or cloth face covering when in public places. **People can spread COVID-19 before they show symptoms, or even if they show no symptoms at all**. Continue to keep about 6 feet between yourself and others.

It is essential that you follow these guidelines, along with any updated guidelines by the CDC, Arizona Department of Health, and Maricopa County Department of Health. We need to continue to do our part to stop the spread of this virus.

Please let me know if you have any questions.

Thank you,
Emily Miller
Contract Administrator

Placed here due to lack of space elsewhere **–** in no way meant to detract from the seriousness of the letter above. Contribution from Matt Veprek. Consider this a sharing of Covid Protection ideas and not a joke. Covid is not a joke.

Masquerade (Phantom of the Opera Covid Parody)

click here**:** https://www.youtube.com/watch?v=lcp3pL4-fgo

GOVERNOR DOUGLAS A. DUCEY

STATE OF ARIZONA

EXECUTIVE ORDER

Executive Order 2020-43

Pausing of Arizona's Reopening
Slowing the Spread of COVID-19

WHEREAS, on March 11, 2020, pursuant to A.R.S. §§ 26-303 and 36-787, I, as Governor of the State of Arizona, issued a declaration of a Public Health State of Emergency due to the necessity to prepare for, prevent, respond to, and mitigate the spread of COVID-19; and

WHEREAS, on March 30, 2020, the Director of the Arizona Department of Health Services (ADHS), based on an epidemiological assessment of Arizona specific data and in alignment with the Centers for Disease Control and Prevention (CDC) guidance, recommended the State implement enhanced mitigation strategies which are continuing; and

WHEREAS, on May 12, 2020, Executive Order 2020-36, *Stay Healthy, Return Smarter, Return Stronger,* was issued outlining requirements for businesses to assist in mitigating the spread of COVID-19 as they reopened and mandated that businesses adopt policies consistent with guidance from the CDC and the ADHS; and

WHEREAS, as of June 28, 2020, there have been 73,908 diagnosed cases of COVID-19 in Arizona including 1,588 deaths, and the State is seeing an increase in the number of cases and hospitalizations; and

WHEREAS, the increased case numbers and hospitalizations also necessitate the need for an increased focus on precautionary measures by both businesses and individuals; and

WHEREAS, data has shown that community spread continues to grow at an exponential pace and is greatest among the demographic of 20-44 year olds; and

WHEREAS, there has not been sufficient time for mask mandates and limiting groups to have a demonstrable effect on containing the spread and additional measures need to be taken to ensure quicker containment; and

WHEREAS, it is necessary to impose additional measures to protect public health and safety and mitigate the strain on our health care providers by slowing the spread of COVID-19; and

WHEREAS, in taking such critical measures to protect public health there will be direct economic consequences for businesses across the State of Arizona that provide employment for many Arizonans, including bars and restaurants; and

WHEREAS, A.R.S. § 4-203, allows "[a] spirituous liquor license…[to] be issued only after satisfactory showing of the capability, qualifications and reliability of the applicant and, with the exception of

wholesaler, producer, government or club licenses, that the public convenience requires and that the best interest of the community will be substantially served by the issuance." ; and

WHEREAS, due to community spread of COVID-19, the state will not be substantially served by the issuance of certain liquor licenses; and

WHEREAS, Arizona is committed to containing the spread of COVID-19.

NOW, THEREFORE, I, Douglas A. Ducey, Governor of the State of Arizona, by virtue of the authority vested in me by the Constitution and laws of this state including A.R.S. §§ 26-303 and 36-787, hereby order as follows:

1. Effective June 29, 2020, organized public events of more than 50 people are prohibited unless the city, town or county in unincorporated areas has approved the event, and only if adequate safety precautions are implemented, including physical distancing measures. A city, town or county in unincorporated areas may deny a request for an organized event due to public health concerns related to COVID-19. Any approval may be subject to certain conditions or restrictions not inconsistent with this or any other executive order. Nothing in this order shall inhibit a person from engaging in constitutionally protected activities such as speech and religion, and any legal or court process provided that such is conducted in a manner that provides appropriate physical distancing to the extent feasible.

2. The Department of Liquor Licenses and Control shall cease issuing series 15, Special Event licenses and series 16, Festival/Fair licenses for the period of June 29, 2020 through July 27, 2020.

3. Notwithstanding any other law or executive order, effective at 8:00 pm on Monday, June 29, 2020, the following establishments shall pause operations until at least July 27, 2020, unless extended:

    a. Bars, meaning an entity who holds a series 6 or 7 liquor license from the Department of Liquor Licenses and Control and whose primary business is the sale or dispensing of alcoholic beverages. These entities may continue serving the public through pick up, delivery, and drive-thru operations as provided for series 12 liquor licenses in Executive Order 2020-09, *Limiting The Operations Of Certain Businesses To Slow The Spread Of COVID-19*.
    b. Indoor gyms and fitness clubs or centers.
    c. Indoor movie theaters.
    d. Water parks and tubing operators.

4. Pools may continue to operate as follows:
    a. Pools operated as part of a public accommodation, such as those at hotels but not those at multi-housing complexes, shall prohibit groups larger than 10 from congregating together in or near the pool.
    b. Privately owned pools located in public areas such as those at multi-housing complexes or other privately owned facilities may continue to be open provided that signage is included at all entrances to the pool reminding people to maintain physical distance and that groups larger than 10 should not congregate.

5. To receive authorization to reopen, entities shall complete and submit a form as prescribed by the Arizona Department of Health Services that attests the entity is in compliance with guidance issued by ADHS related to COVID-19 business operations. The form shall also be posted in an easily visible public place on the entity's premises. ADHS shall provide information to the public on those entities that have submitted such attestations on its website.

6. A local governmental jurisdiction shall have the authority to take immediate action against an entity that operates without submitting the prescribed attestation to the Arizona Department of Health Services.

7. Notwithstanding any other law or executive order, this executive order allows law enforcement and any regulatory agency, pursuant to their regulatory authority, to take immediate enforcement action against any business that fails to follow this Executive Order or any guidance issued by the Arizona Department of Health Services relating to COVID-19 for the protection of the public health, safety and welfare up to and including summary suspension for any license that the business holds.

8. If any provision of this Executive Order or its application to any person or circumstance is held invalid by any court of competent jurisdiction, this invalidity does not affect any other provision or application of this Executive Order, which can be given effect without the invalid provision or application. To achieve this purpose, the provisions of this Executive Order are declared to be severable.

9. This order shall remain in place until further notice, and shall be reconsidered for repeal or revision every two weeks after July 27, 2020.

IN WITNESS WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of the State of Arizona.

Douglas A. Ducey

GOVERNOR

DONE at the Capitol in Phoenix on this twenty-ninth day of June in the year Two Thousand and Twenty and of the Independence of the United States of America the Two Hundred and Forty-Fourth.

ATTEST:

Secretary of State

R. Dean Fillmore

July 14, 1949 – June 17, 2020

R. Dean Fillmore passed away on June 17, 2020 at Providence Hospital, Anchorage Alaska with family members at his side after a 5 year battle with kidney cancer. Dean was born to Paul (Bud) E Fillmore Sr and Bessie-Anna (Smelser) Fillmore on July 14, 1949 at the Cottonwood Community Hospital in Cottonwood, Arizona. Reared on the family farm in Flagstaff, then moving to Albuquerque, NM in 1951, he accompanied his parents and older brother Paul on their great adventure of moving to Alaska in May of 1955. Driving the gravel ALCAN Highway, they arrived at Chugiak, Alaska in June 1955 and stayed with friends until moving to Eagle River in August. Dean entertained everyone with his endless choruses of the "Ballad of Davy Crocket" which was popular at the time. He loved Alaska and resided here for 65 years.

Dean attended Chugiak Territorial School until Eagle River Elementary was built. He attended the new Chugiak High School and graduated in 1967. He joined the U.S. Navy in the All Alaskan Centennial recruit training company in 1967 on a "kiddie cruise" and served until late 1969. Serving in the Vietnam war, he was a trained jet engine mechanic and supported the DASH drone ASW helicopters on the USS De Haven DD-727 off the coast of Vietnam and the South Pacific, and was home-ported in Yokosuka, Japan and Long Beach, CA.

Dean attended UAA Aircraft & Power Plant School after his discharge from the Navy, and earned an Associates Degree and an FAA A&P license. Dean worked for several aircraft operations on Merrill Field, Bud's Aircraft and Gifford Aviation among others. He retired in 2014 after 24 years with Pen Air. He was a master sheet metal fabricator and made hundreds of repairs on many types of aircraft. His skills earned the trust and respect of his employers who sent him to repair aircraft in many U.S. states and territories.

Dean had many hobbies, including building and flying model remote controlled airplanes. He was an accomplished machinist and loved his live steam train hobby, and built one steam locomotive and had a second under construction. Dean, along with his brother and close friend Scotty Brooks, rode the back trails of Alaska from Eureka to a gold mine at the headwaters of Tyone creek and explored the Alaskan wilderness. He was a perfectionist in whatever he did. Seemed like, if it was broken or not operating properly, he could find and fix the problem with his mastery of the mechanical world**;** computers were a different story.

Dean is survived by his devoted life partner of 33 years Cheri Marsh**;** Brothers, Paul of Wasilla, Charles of Rim Rock, Arizona, and Sisters, Mary (Bill) Walsh and Norma Schaefer of Grants Pass, Oregon. Dean will be greatly missed and fondly remembered as a fun-loving and caring brother, partner, and loyal friend. Per his wishes, he will be cremated and ashes will be spread over several of his favorite places. A celebration of life will be held on Saturday, June 27th from 2-4pm at the Alaska Aviation Museum, 4721 Aircraft Dr.

The family would like to thank Dean's doctors and nursing staff at Providence Hospital for their care and compassion to Dean and his family. Donations may be made to Providence Palliative Care or the American Cancer Society.

Health and Safety Info provided by Bill Myers

From Johns Hopkins University Hospital regarding COVID-19:

❖ The virus is not a living organism, but is a protein molecule (DNA) covered by a protective layer of lipid (fat), which, when absorbed by the cells of the eyes, nose or mouth, changes their genetic code (mutation) and converts them into aggressor and multiplier cells. The virus does not enter through unbroken skin.

❖ Since the virus is not a living organism but a protein molecule, it is not killed, but decays on its own. The disintegration time depends on the temperature, humidity and type of material where it lies.

❖ The virus is very fragile. The only thing that protects it is a thin outer layer of fat. That is why any soap or detergent is the best remedy, because the foam CUTS the FAT (that is why you have to rub so much, for 20 seconds or more, to make a lot of foam). After dissolving the fat layer, the protein molecule breaks down and disperses on its own.

❖ HEAT melts fat. This is why it is so good to use water above 80 degrees F. for washing hands, clothes and everything. In addition, hot water makes more foam and that makes it even more useful.

❖ Alcohol or any mixture with alcohol over 65% DISSOLVES ANY FAT, especially the external lipid layer of the virus.

❖ Any mix with 1 part bleach and 5 parts water directly dissolves the protein, breaking it down from the inside.

Ed. – This is the Covid article from the April 2020 Stack Talk, and I feel it is worthy of a reprint. In April, Covid was still new to us, so maybe you didn't read it carefully. **PLEASE read it now.**

I saw the article on the next page and felt obligated to forewarn as many friends as possible to prevent as much suffering as possible. The **TAKE-AWAY: "It only takes ONE invisible virus to take root."** Even trained medical people are vulnerable. Pray for the best, but act in prevention of the worst. Most masks do not have eye shields. Although swimming goggles may look funny, **FAMILY SAFETY FIRST!** The story on page 9 reveals how vulnerable your eyes are, and that **cloth masks lull everyone into a false sense of security**, even nurses. **PLEASE** share pages 8 – 13 with as many friends and family as you can.

❖ Oxygenated water helps long after soap, alcohol and chlorine, because peroxide dissolves the virus protein, but you have to use it pure and it will hurt your skin. Peroxide can be helpful in the laundry when you can't use bleach.

❖ NO ANTI-BACTERIAL OR ANTIBIOTIC – The virus is not a living organism, like bacteria, so antibodies cannot kill what is not alive.

❖ NEVER shake used or unused clothing, sheets or cloth. While the virus is glued to a porous surface, it will disintegrate on its own, but only after:

3 hours (fabric and porous)	24 hours (cardboard)
4 hours (copper and wood)	42 hours (metal)
	72 hours (plastic).

But if you shake clothing or use a feather duster, the virus molecules become airborne for up to 3 hours, and can lodge in your eyes, nose or mouth.

❖ The virus molecule remains dangerous in external cold, or in artificial cold, such as air conditioners in houses and cars, which sends it airborne. It also needs moisture to remain viable, and especially darkness. Therefore, dehumidified, dry, warm and bright environments will make it degrade faster.

❖ UV LIGHT on any object that may contain the virus will make it break down faster. For example, to disinfect and reuse a mask, UV light is perfect. Be careful, because it also breaks down collagen (which is protein) in the skin.

❖ The virus CANNOT go through healthy skin, so wearing gloves is unnecessary. Just wash your hands often, for 20 seconds with foamy soap and warm water.

❖ Vinegar is NOT useful. It does not break down the protective layer of fat.

❖ NO SPIRITS, NOR VODKA, will do anything. The strongest vodka is only 40% alcohol, and 65% is required to break down fat and protein.

❖ LISTERINE does work because it is 65% alcohol.

❖ The more confined the space, the more concentrated the virus will be. The more open or naturally ventilated, the less concentration.

❖ You have to wash your hands before and after touching mucosa, food, locks, knobs, switches, remote controls, cell phones, watches, computers, desks, TV, etc., and when using the bathroom. Refrain from touching your face.

❖ You have to HUMIDIFY HANDS DRY. So much washing of hands will dry out the skin, and the virus molecules can then hide in the micro cracks, and enter broken skin. Using the thickest moisturizer will maintain healthy, unbroken skin.

❖ Also keep your NAILS SHORT, so that the virus does not hide there.

— Johns Hopkins University Hospital

It Took One Person, and One Errand, to Infect my Entire Family with COVID-19

Alix Atwell June 24, 2020

I wake with a start to flashing lights, blue and blinking against the darkness of my bedroom. Numbers. My body feels heavier than normal, like I have a weighted blanket on, but I don't. The base of my skull aches. So does my lower back. 88, 88, 88. It's not changing. That number is meaningful. I know that it is. Oh, yes. Now orienting myself, I realize what the number flashing on my trusty pulse oximeter means. Alarmed, I force myself to sit up.

"The doctor told me to sleep on my stomach but I keep waking on my back." My body has been trained to back sleep. I've used a cervical traction pillow for 10 years now. It's been a godsend. I'm a nurse. I herniated a disc in my neck on the job years ago while manipulating equipment as my tired body worked a double shift. I started my nursing career in the ER and ICU, but transitioned to labor and delivery a few years in. After lifting and moving patients, day in and day out, something was sure to give. It did. My neck snapped, or cracked, or shifted. An MRI would prove all three. My body screamed "enough."

Was it the same silent internal scream that woke me just now? "Enough**!**" "Enough sleep." "88 is too low**!**" "Wake up and die alive**!**" My late mother would use that phrase on me when I had watched too much TV or slept long into a Sunday afternoon, as teenagers are supposed to do. "Wake up and die alive." Was she watching out for me now? Did she wake me up?

Courtesy of **Alix Atwell** June 24, 2020

"But, mom. I'm not dying. I've been to the doctor. I'm not even sick enough to be hospitalized. My pulmonologist gave me inhalers and antibiotics just yesterday. He ordered home oxygen and instructed me to sleep on my belly. I'm not even sick enough for my insurance to approve same day oxygen delivery. I'm even healthy enough to be up writing this diatribe at 2:43 in the morning. Well, actually it's fear that's keeping me awake. But shhh **. . .** don't tell anyone. At least writing will distract me from my thoughts."

So, I sit up, prop pillows that in turn prop my oxygen level up to a healthy 97% and I breath in deep and deliberate. My headache fades. My back pain eases. I lean over and grab my computer and write for the first time in three long months. It's in me. First it invaded my husband, then my two children. Now me. That seems to be the order of business in my house. It's as if my body decides it cannot get sick until the others are on the mend. In 2017, it was influenza A. My husband brought it back as a souvenir on one of his many work trips to Japan. 2018 brought us Influenza B. "Are you serious? We all got flu shots**!**" Now it's SARS coV-2 (aka COVID-19.)

This time, the fated souvenir came from a trip to the gas station and Home Depot. My husband hadn't been out of the house in weeks. Since quarantine started, I had insisted on being the only one to go out and get food and supplies. After all, as a nurse of 27 years, I knew sterile technique. He retorted "You're being paranoid and controlling" — traits I openly admit to. I got them from my mother. "You forget. I worked in a genetics lab. I also know sterile technique." He was right. He was smart. He was a trained scientist who now worked in biotech. He probably knew germ theory better than I did. He donned his mask, armed himself with Purell and headed out. It had been so long since he left the house or did anything normal. He was itching for a change of scenery. Who could blame him?

It was May 1st (May Day) in Illinois and everything was blooming. My husband had developed bad allergies since our move from California three years ago. That evening, I recall commenting on his eyes. "Wow, your eyes are really bloodshot and swollen. Your eyelids are so puffy. Do they hurt?" "These darn allergies," he said. "Where are my drops, Hun?" "See, you should have let me go out instead," I smirked while handing him the drops.

(*continued next page*)

COVID-19 (cont'd)

I am an armchair epidemiologist. In high school, I had pipe dreams of working at the CDC with Anthony Fauci. My mom was earning a biology degree and was writing a paper about a new scary retrovirus called HIV. I was hooked. Later, I busied myself reading about outbreaks of Ebola, Dengue fever, SARS and MERS while eating popcorn and sipping on juice boxes alongside my two kids while they played with blocks and watched cartoons. When the news exploded with a novel virus spreading in China early in January 2020, I devoured every news article I could. This was the one we scientists were waiting for.

The lockdown was no surprise to me. I took the initiative and canceled our spring break trip to California, even though a dear old friend had planned my 50th birthday party with 40 of my dearest friends and family in attendance. This was weeks before the government advised against non-essential travel "in an abundance of caution." Friends thought I was an alarmist**!** Some still do.

I turned 50 a week into quarantine. Everyone was still adjusting. No one had their acts together yet. There was no car parade or Zoom party for my milestone COVID birthday. I transitioned into middle age with little fanfare. The only card I received in the mail was my AARP card. It didn't take long for the inactivity-related COVID-19 pounds and the absence of my-bimonthly beauty salon dye job to make me look the part of middle age. Now months into isolation, with 88 blinking back at me, I feel the part too.

88 is an ominous number for those of us in the medical field. With a pulse oxygen of 92%, I would place a nasal cannula (low flow oxygen) on my patient. But at 88%, I would choose a non-rebreather face mask (high flow oxygen) instead because, if their oxygen level remained that low, they could sustain permanent organ damage. I know medicine practices change rapidly and that I was trained old school. Things that were once routine, like bed baths, enemas and now even hand holding, are now passé. I can roll with change, but I honestly did not foresee that a day would come when a sudden oxygen saturation of 88% would buy you a home oxygen machine rather than a hospital bed. We have entered post-modern COVID times. The old rules no longer apply. More honestly, I'm scared. But I can't show it. I have an 11-year-old daughter who was crying yesterday as I left for my doctor's appointment. When I grabbed my car keys and bag, my dogs seemed concerned too. I had packed a little bag thinking 88 might be the magic number that would buy me a hospital STAYcation. "Mommy, you have to come home. I can't go through what I went through with daddy. I can't. It was too hard."

It's been a tough few months for all of us, but my daughter in particular is struggling the hardest. She has not been adjusting well to the sequestration, the home schooling, or having to go cold turkey on a pretty serious chipotle addiction. My 14-year-old son, on the other hand, is thriving. "I'm an introvert, mom. I was built for this**!**" He retreats to his bunk bed lair where he is now master of his destiny in video games. He has been asking to be homeschooled since the 3rd grade. He finally got his wish**!**

Things changed dramatically for us when their dad came down suddenly with flu-like symptoms on May 4th. We took the proper precautions. He was banished to the guest room for days. While he sweated it out alone, my two kids tried to navigate the news and their emotions between classroom Zoom meetings. They missed a few.

I busied myself sterilizing door knobs, facet fixtures, countertops and anything else in sight. My son came out of his lair a bit more often for hugs and food and clung to the dogs like a toddler does his blankie. My daughter busied herself sewing double-ply cotton masks for local essential workers, and baking fancy treats like coffee cake and macaroons. She learned to make homemade Frappuccino's (vanilla and strawberry) and whipped coffee frappés. The strawberry ones are to die for.

My husband's symptoms strangely and suddenly disappeared 4 days later. After a negative nasal-to-brain swab, and zero respiratory involvement, the docs insisted he was safe. He couldn't have had it, but even if he had, as long as he was symptom free and 7 days out from symptom onset, he was not contagious. So, on day 8 he rejoined us. The dogs, the kids, and the short order cook (me) were so happy. But the advice was wrong**!**

Two weeks to the day of his first symptom, my husband crashed. It was a Monday. He was working from home at his cool new suction standing desk sipping coffee and feeling fine at 10 am. He came into the kitchen, where I was homeschooling the kids at 10:30 saying his legs felt funny. "Honey, I don't feel quite right. I feel like my knees are going to just give out underneath me. I'm going to lie down for a bit." Less than an hour later his lips were blue, his face mottled, his hands and feet cold and yellow, like day-old dead.

(*continued next page*)

COVID-19 (cont'd**)**

He had rigors (that's nurses speak for vigorously and uncontrollable shaking – basically, shivers amplified – and is the tell-tale sign for full blown sepsis, way more ominous than an 88% oxygen saturation.) But his temperature was normal? So was his mentation? First killer hornets, now a zombie apocalypse? My brain couldn't compute what I was seeing. By the time I found my phone and reached the doctor, his fever was 103.1. We grabbed his phone, his charger, the keys and a couple of homemade masks, and drove the two miles to deposit him on the doorstep of the local hospital. Like a desperate mother depositing a newborn she loves dearly but is ill-equipped to care for, I left and soberly waited for word.

My husband was in the ER for 6 hours before they admitted him. They ran a slew of tests and labs. He would send me random texts and photos of his monitor between lab draws, his EKG, being whisked off to cat scan and x-ray and his cat naps. Before his transfer, a very kind nurse filled me in on his status and lab results. His numbers were really off. D-Dimer, 15. Ferritin, 1681. PCT 16. C-reactive protein 10.8. Magnesium 1.4. LDH, 439. AST, 445. Lymphocytes 3%. She read these off with a deadpan voice, but I had worked ER and ICU. The numbers she was reporting were WACK. He was REALLY SICK. She informed me that they sent off a nasal swab for COVID, gave him ibuprofen, oral antibiotics, IV magnesium and were sending him up to a COVID unit "just in case." Since he had zero respiratory symptoms and an elevated PCT which usually indicates a bacterial infection, it was unlikely.

It was a long night. I called the night nurse for an update just before her change of shift. She said my husband's blood pressure was very low and she was contacting the on-call hospitalist for directives. Not long after, the night shift nurse practitioner, who was on call upon his admission and was just ending her shift called. "His blood pressure fell to a dangerously low 60/40, but was now up to 80/60 with half a liter of fluid." (If 88 vs. 92 is the difference of an oxygen mask or a nasal cannula, a blood pressure of 60/40 vs. 80/60 is the difference of a med-surgical bed or an ICU bed. He wasn't pumping enough blood to keep his organs alive**!**) I panicked.

I knew from my experience, septic patients whose blood pressures drop dangerously low need multiple liters of fluid to perfuse their organs, not the equivalent of two cups of water. I started screaming and crying on the phone. Not my best moment. "Oh my god, he's going to die. Do something!" She calmly explained, they couldn't give him more because COVID patients have a tendency to shift fluid into their lungs and this could make him require a ventilator. She continued. "Strangely, COVID patients actually tolerate low blood pressures and low oxygen saturations extremely well. She reassured me that he was fully awake, talking clearly and was actually feeling OK. We're acting cautiously for a reason. We've got him. He's going to be OK." I was terrified, but reassured. I thanked her and hung up the phone.

After that, communication became spotty at best. The day shift nurse didn't return my calls two days in a row. Andy called between rests but he was sick, and fatigued. I didn't want to scare him with questions. He wouldn't have the answers anyway and asking would just feed his anxiety. He was being so brave. Like many men, he isn't usually a stoic patient and he doesn't do hospitals well. He nearly passed out when I cut my finger on his 35th birthday and required stitches. He was a comforting catatonic during the bloody delivery of our first child. I gave him what he needed, a loving wife and a good cheerleader. But there was no one there to give me what I needed. Information. Communication. Reassurance.

It wasn't until a physician friend kindly offered to make a few calls and look into some things that I was included in the loop of communication and got any follow-up lab values and test results. It was now late Wednesday. The infectious disease hospitalist of this suburban Chicagoland hospital had diagnosed him with typhoid. TYPHOID? Why? Because he had a negative COVID nasal swab (did I mention he had no respiratory symptoms) and he had diarrhea and a high fever.

The doctor had seen it a hundred of times before. He was trained overseas. But he had failed to call me to get a detailed history of my husband's present illness. He failed to note the complete lack of any GI symptoms until antibiotics were started and he was non-impressed when I informed him of my husband's swollen eyes three days before first symptom onset – even after I faxed him a Lancet article stating up to 50% of COVID cytokine storm patients don't present with respiratory symptoms, a JAMA article citing unusual but statistically significant cases of COVID-19 patients gaining transmission through the eyes with negative nasal swabs and elevated PCT's, and research directly linking elevated PCT levels to severe COVID-19 infections. (I had kept myself busy while waiting for word from the hospital.)

As a nurse, I am very concerned with the state of hospital care in the time of COVID. I know it is an extremely challenging time for all, but we must do better. My husband was too ill to give a complete history. Without family allowed at the bedside or included in the intake, even by phone, compromised hospital patients in the time of COVID have no voice and no advocate. This compromises care and can lead to misdiagnosis and inappropriate treatment.

(*continued next page***)**

COVID-19 (cont'd)

Dr. Typhoid placed him on multiple broad-spectrum IV antibiotics which only further exacerbated my husband's hospital induced diarrhea. The dogged doctor then proceeded to decrease the blood thinner he was placed on that would save his life if it were COVID. Thankfully, the night shift hospitalist, the nurse practitioner who reassured me days earlier that "she had him," was working that evening, noticed the change, corrected it immediately and insisted on stat scans at midnight to ensure no clots had formed in his legs or lungs during the subtherapeutic dosing. She called me to get approval and to inform me she was on it! But what does that say about a hospital when the doctors do not agree on the diagnosis or treatment plan?

Miraculously, by Thursday, my husband's labs were normalizing and his fever was down. He was even able to Zoom attend his son's 8th grade graduation ceremony! All cultures came back negative too, so I requested a COVID IGM and IGG before discharge. I thought, without a positive culture, there still was no definitive diagnosis. With great reluctance, Dr. Typhoid ran the IGG but said the hospital didn't have the capacity to run an IGM. IGG shows an immune system that has had and has recovered from an infection. It takes over 2 weeks of fighting an illness for the body to produce it. The IGM shows up first, during the earlier stages of fighting off a disease – it shows up about a week into the fight. A person can still transmit the disease to others at this stage. His COVID IGG came back negative.

They sent him home on Friday to recover. His discharge diagnosis in his chart was "Typhoid Sepsis - NOT COVID." They sent him home with food preparation instructions. Dr. Typhoid insisted that even IF it were COVID, patients are not contagious if they are afebrile and are 7 days out from first symptom onset. Therefore, no isolation was necessary.

I know that is the current company line, but that conclusion does not sit well with me. I do not see the data to back it up. I did not trust Dr. Typhoid's advice, and our own personal history, with my husband's symptoms returning so suddenly and profoundly 14+ days in seemed evidence to the contrary. I desperately wanted my husband home and safe, but I did not want to risk infecting me and my kids. We were still asymptomatic. Or were we? Just hours before I was set to pick up my husband, my son's nose turned on. Like a faucet! He went through two full boxes of tissues in two hours. There was snot everywhere! His eyes glazed over. I took his temperature, 99.7.

"Mom, my stomach hurts too." Ugg! What do I do now? I could sequester him and my husband in the back room, but my husband needed his rest. He would be too sick to care for my son on his own. Would it even be possible for me to care for them without contaminating my daughter without home PPE? And in reality, the cat was likely already out of the bag. If my son now had symptoms, my daughter and I were surely already exposed. She and I have compromised lungs. This was not good! With great reluctance, I decided the only practical course of action was to ride the wave together. Sometimes practical logic sucks. At least we would all have each other.

Where was I? Oh yes, Friday May 22nd. My youngest sister's birthday, my husband's hospital discharge day and the start of my pediatric rotation. The next couple of weeks consisted of TID temperature checks (that's three times a day for non-hospital folk) and nightly pulse oximeter checks. A neighbor was kind enough to lend me her spare when Andy first got sick. The stores were out and Amazon was on back order. For the next two weeks, there was not a day that went by without one kid or the other having a fever. Just under 100, not high enough to call the doctor but not low enough to breathe a sigh of relief. One kid had a bad headache one day, the other woke with diarrhea and nausea the next. Both were acting in their typical sick style. My son, uncharacteristically cuddly, my daughter ornery as a tired old mule. Throughout it all, I cleaned, cooked, worried, mowed, ordered from Instacart, worried, and went on walks around the neighborhood with my husband to build up his lost stamina.

A week ago today, 20 days after my husband's hospital discharge and my kids first symptoms, I mowed the lawn. I started coughing when I went to bed. Coughing after mowing is not abnormal for me. I have bad lungs from a sick building I used to work in. They are sensitive to fumes. But afterward, my lungs felt like they were on fire. That was odd. I grabbed the pulse oximeter. 89! "That can't be right? Can it?" I sat up and took a few deep breaths and it jumped to 97. "That's more like it," I thought. I poured myself a finger of Barenjauger, a yummy honey liquor every medicine cabinet needs, sipped it to quell my cough, and went to sleep.

I felt fine the next day. The kids were better. Andy was back working at his standing desk. It was gorgeous out, sunny and warm with low humidity. I decided to take advantage. I trimmed the hedges, took some nature photos and cut some flowers from my garden. Later that day, I celebrated a niece's High School graduation via Facetime. We were back to pandemic normal! But that night, the same thing happened. A burning cough and a low pulse oxygen level. It stayed low when lying on my back, but was up to normal if I turned on my side or sat up.

(*continued next page*)

COVID-19 (cont'd**)**

I spent the weekend in denial. "I'm not getting sick. I'm not getting sick." I did the laundry, then accompanied my husband on his daily recovery walk, but when he declined to take the hilly street to the right, I didn't push him. I was feeling winded already. I attended another niece's college grad party. But now I was sipping Barenjauger in the afternoon to hide my pesky dry cough from my Zoom family. My energy was good. I didn't have a fever, but my lower back and legs ached. Maybe it was just from the yardwork. Sunday evening, I got an oxygen reading of 83. Now I was scared.

I spent Monday morning calling local urgent care centers to see who could do COVID testing, x-ray and labs. I called my primary care physician and my pulmonologist call lines and was directed to messaging systems where I could text symptoms and set up virtual encounters. It took COVID to finally bring healthcare into the digital age**!** It was late afternoon before I spoke with a live body but gratefully, I secured an appointment for the following morning with my pulmonologist who was equipped to see COVID patients, could do the dreaded nasal swab and take an x-ray. By this time, I was short of breath coming up stairs and easily fatigued doing household chores. A mild but present pressure and tightness in my chest accompanied me wherever I went. I watched impatiently to a blinking 90, waiting for morning to come.

I had an early morning appointment. I arrived early and called from the car so they could gown up as instructed. "Enter through the side door, the one with the large pink COVID warning on it." Within minutes of my arrival, my vitals, chest x-ray and nasal swab were done. It really wasn't so bad and was over in a second. Why are people making such a big deal of it? My doctor was fantastic. As a Chicagoland pulmonologist, he was now far more familiar with the disease process than he would like to be. Luckily, his PPE, diligence and up-to-date knowledge has kept him disease-free so far, knock on wood. He stood in full garb, hand on the door, 6+ feet away and told it to me straight.

You have COVID. Whether the test comes back positive or negative, you have COVID. You will feel worse before you feel better. You will not feel like yourself for at least another 2 months, if not longer. You are infectious. With what I am seeing, your family could be shedding virus if they live with you, even if they have no symptoms and have recovered from it. He prescribed me meds and oxygen and gave me instructions. But he prefaced them. "These are just supportive measures. We have no treatment. And you are the healthiest COVID patient I have seen here yet, likely because you are here early in your course, so take care and call or text with any questions or changes. And with that, I was sent home."

That was yesterday. My headache is now gone and my oxygen blinks reassuringly at 97. I will not sleep soundly until I get my oxygen tank **. . .** but by that time, the steroids will likely have kicked in. My doctor forewarned me of the fun involved**!** I am grateful. I am home. I have a plan. I am the last one to get sick in the house, so I will have company through my illness. I have the tools to monitor myself and the meds to support my body in healing. I have no idea what tomorrow will bring. The only certainty right now, other that the pending sunrise I am about to witness, is that I will not be choosing Dr. Typhoid's hospital should I require further services.

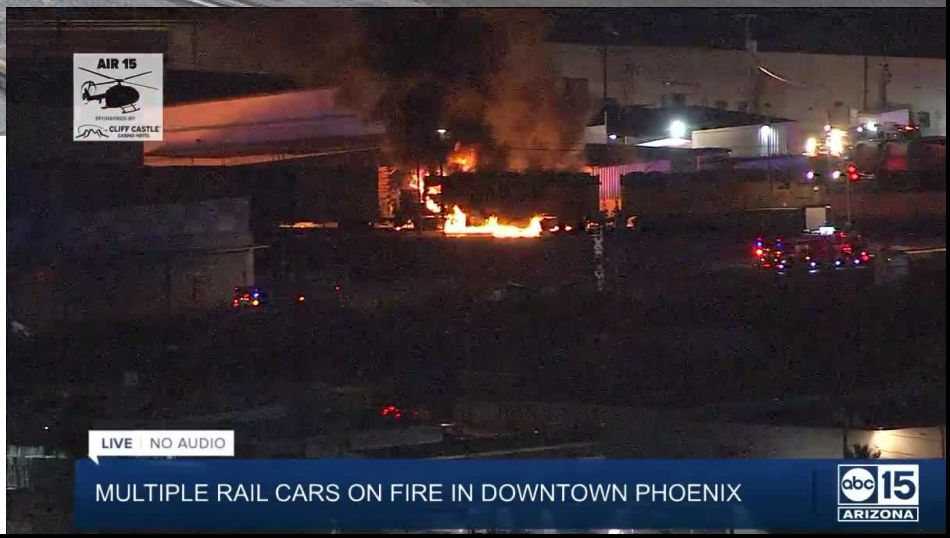
Epilogue:

It turns out that the delay in my home oxygen delivery was because COVID is not currently a qualifying medical condition on ANY insurance. I had to pay out of pocket to receive it but even that required upper management approval. It seems home oxygen requires a chronic condition like COPD or congestive heart failure. Home management is best for non-critical cases of COVID. It frees up much needed hospital resources, keeps cost to a minimum and keeps healthcare workers safer. COVID is not currently considered a chronic condition, however many people are suffering months-long debilitating symptoms. They even have a name. Long haulers.

The day after I wrote this, my daughter relapsed. She had a high fever, chills, weakness, uncontrolled shaking, a rapid heart-rate and stated "the air feels thin**!**" She required an emergency room evaluation because our local pediatrician office has a policy of not seeing COVID patients. I was not allowed to take her because I had symptoms. My husband was a rockstar**!** Her symptoms resolved as quickly as they came. The experts at Lurie reassured us that children handle the waves of COVID symptoms far better than adults and she was safe, for now, to ride it out at home. The very next day, my husband's symptoms returned. Fever, chills, body aches and malaise. They are now long haulers too.

Seven days after my test was performed, my doctor called with my COVID swab result. Positive. Validation, too little, too late. If my husband had gotten proper testing and safer instructions, my kids and I may have been spared. We are convalescing side by side, me with my oxygen and steroids, my daughter with her breathing treatments and Tylenol. My husband is pushing himself, working from home, between bouts of symptoms. My dear son is helping out around the house, taking care of the dogs and he even made us cupcakes. There are a lot more COVID stories out there. I believe ours will have a happy ending. I just don't know how many more chapters there will be until we get there. But we have each other. We have a roof over our heads and friends that deliver meals and supplies. We have access to treatment. We are the lucky ones. ♦

MEMBER CONTRIBUTIONS!



abc 15 ARIZONA

Multiple train cars derail and catch fire in downtown Phoenix

By: abc15.com staff ***Posted at 8:07 PM, Jun 19, 2020***

Fire crews say a train derailment in downtown Phoenix sparked a fire. Officials say four rail cars were derailed and one caught fire near 9th Ave and Buchanan Street. At around 7:34 pm a Union Pacific train derailed box cars carrying plywood while leaving a rail yard. Officials called out a HAZMAT incident due to the chemicals on scene. There were no injuries in this incident and the cause of the derailment is currently under investigation.

Our overly-friendly (and overly-flammable) "Flowers"

AZCentral.com News Article submitted by Geronimo Vidales

When it's spring, the mountains turn yellow. So do fields and front yards, gravel-covered church playgrounds and almost everything in between. And there's no telling when it'll return to normal. After a wet and windy winter, an invasive weed has blanketed the Valley's mountain outskirts. From New River to the White Tanks to the Estrella Mountains, acres of desert turned into Instagram-friendly seas of yellow that naturalists fear could disrupt local ecosystems and wrap entire communities in thick, flammable flowers.

"It's been alarming for all of us," the Arizona Native Plant Society's Kara Barron said. "Everybody's like, 'What is this? It's everywhere.'" But you can call it stinknet. A distant cousin of the chamomile that goes into tea — same family, different genus — stinknet is relatively new to Arizona. It's native to South Africa, and wasn't spotted in the United States until the early 1980s. It spread to Arizona sometime after the turn of the century. Then, as all desert creatures eventually do, it waited for water.

Then came one of the wettest winters on record. When it finally dried out, stinknet painted the Valley yellow. "It's just the right conditions," Desert Botanical Garden herbarium curator Andrew Salywon said. "It's becoming a huge problem." Now, barely two decades into its Arizona residency, the state has decided it's unwelcome. The Department of Agriculture has proposed adding ***Oncosiphon piluliferum*** to its Noxious Weeds list, labeling it a "high priority pest for quarantine, control or mitigation if a significant threat to a crop, commodity, or habitat is known to exist."

Stinknet is designed to go viral. It's a short, shrubby bush with dozens of branches that rise no more than a couple feet off the ground. In bloom, those branches fill with bright yellow flowers that look like tiny golf balls. Those are the problem. Each ball can contain as many as 400 flowers. And a single plant has been found with up to 4,000 balls.

Ed. – That's 1,600,000 flowers (seeds) per plant**!**
I "Googled" the plant and read that normal herbicides DON'T kill it, but it's not all bad. It is an annual plant, and grows from seed each year. When it starts to germinate from last year's seeds, between September and March, keeping the plants cut down to the ground before the seed pods grow will eliminate next year's plants. If just one seed pod germinates, gets broken open during mowing or is left on the ground, there will be more plants next year. Like Covid-19, it takes a 110% effort to eradicate it by not letting any seeds get out, or we keep fighting it every year. We would need an army of weed-whackers to keep cutting the seedlings down, probably weekly, before they flower. Maybe the "Department of Agriculture" will help with control or mitigation.

BEFORE

Stories and Photos by Geronimo Vidales

I thought I would send these two weather "comparison" pictures. Amazing how the weather has changed in the last 10 years.

AFTER

BEFORE

The seven trees we planted around Werner Station are already 18 months old **!**

AFTER

SNEEK PEEK: Coming next month

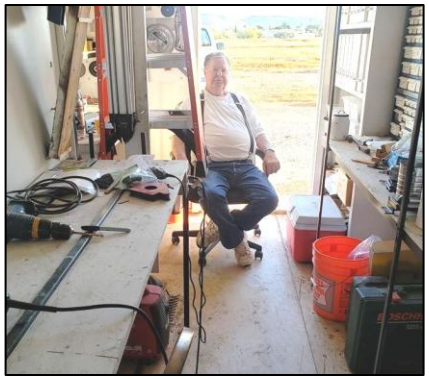
Owney, The Mail Pooch, immortalized and The Pullman Porters

Story and Photos by Hank Gallo

Sunset at Maricopa Live Steamers. Za'vion bids goodnight after doing some work around the park. Membership has its privileges.

Story and Photos by Hank Gallo

Dewey Mills was out early "watching paint dry" on some freight cars he was working on. We miss all of our friends at the park, but will see ya soon**!**



TRACKING TRACKSIDE PROGRESS 2020

CEMENT TRUCK

Stories and Photos by Perry McCully

Despite the heat and lack of funds to keep up with improvements and repairs around the park, things are still getting done. Some of the members wanted to get cement brought in for their own projects, but, if you order less than a truck load of 5 yards of cement, it is very expensive. Since the club needed to do some repairs to keep things safe to walk around the park, Pete started asking for donations for the needed repairs and got over 600 dollars, so 6 yards of cement was ordered and poured this past Sat. June 27 with a lot of help, as you can see.

The club is still making cement ties, so we need donations to continue this project. Two or three people have been carrying the club and paying for all of the cement for the ties, which is over two hundred dollars a pop to buy a pallet of bags. These two or three people can only pay so many times before they run out of money. When that happens, rail repairs will come to a screeching halt. I know times are hard right now, but anything that you could send would help out a lot and would be greatly appreciated.

THANK YOU – Perry

Cliff Fought made a grain elevator frame and needed a floor for it. It will be used to store Christmas decorations for the area, which is next to Seagraves siding.

The roof on the concession stand needed to be reroofed.

(*continued next page*)

CEMENT TRUCK (cont'd)

TRACKING TRACKSIDE PROGRESS 2020

Scotty Brooks and Matt Rockwell needed cement at their container.

The wood flooring on the back side of the engine repair barn was falling apart and was becoming a hazard. The wood was pulled up and cement was installed.

The club needed cement at the North pole, so that the club could store Christmas decoration on the back side of the projector screen. It will be enclosed for storage.

TRACKING TRACKSIDE PROGRESS 2020

ANOTHER HEAT KINK

story and photo by Joe Schnyder

This is inbound Arntchoo between Harnish Valley bridge and the track crossing for FarFlung. This section was laid in 2003 and has had no major work since then. With a 110 degree day, the small screws and the termite infested ties, you see the rail had to go somewhere and the rotten ties let it go to a very tight gauge. This section is 8 panels long 160 feet and it made better sense to replace it all instead of putting a bandaid on it. Terry Liesegang and myself pulled up the old panels, dug it out, made new plastic tie panels and installed it all in just one week of work. Thanks to Mike Grant for helping Terry cut and drill the ties, and thanks to Perry McCully for helping me clean up the old rotten ties and get them in the dumpster to leave a clean work space. I put concrete ties in under the joints and at the ends of the bridge and the crossing to help hold the track down and make a firm base under the joints for longevity. When I put the last piece together, the rail temperature was about 145 degrees and would burn my hand when I forgot to put my glove on. This will be good for many years to come. I will not have to distress this section in the summertime.

Because of the extreme heat for the next 4 months, if you come out to the park, please do not forget water. And if you come out in the late evening, remember the snakes come out very late and are back in their holes before the sun comes back up, so please be careful and watch where you step and put your hands. Saw a really big one going in a hole the other morning at about 5**:**45 am, and all I saw was the rattles disappearing down the hole.

TANKS ALOT / WERNER BRANCH

story and photo by Joe Schnyder

Here is the section between Werner station and Tanks Alot that is being retied with concrete because of the tie condition. These have been in since 2003 or 2004, and have small screws and termite damage. When Scott and Daniel Mack were taking these panels up, the greater part of the ties stayed in the ground because the screws no longer had a hold in the wood. There were long sections that the only thing holding the rail was ballast. Good thing it was tangent track. With today's temperature of 107, we will not need to distress the rails later because, as I am laying them, the rail temperature is around 140 degrees. It is too hot for me to put my hand on the rail without gloves. This section will have a life span of about 75 years and, with the weight of the ties, it holds the track down in the ballast to keep us from having sun kinks.

STEAM LOCOMOTIVES

BOILERS

OPENINGS AND REINFORCEMENT

by Dave Griner

Hello. Here we go, off onto another discussion, this time concerning "openings."

The term is used to define those points in a boiler that have been cut or drilled out for the purpose of providing a penetration through the boiler structure for several reasons**:** washout plugs, feed water supply, blowdowns, and various pipe tapping's.

The ASME Code allows openings of a certain size to be used without reinforcement or compensation for the material removed. That size is**:**

PG-32.1.4 Openings in Shells and Headers.

No calculation need be made to determine the availability of compensation for a single opening **(**see PG-32.1.3**)** that is not covered by PG-38, PG-52, or PG-53, in shells or headers when the diameter of the finished opening ***d***, as defined in PG-33.3, does not exceed the larger of *(a)* or *(b)* below.

(U.S. Customary Units) *(SI Units)*

(a) the value of ***d*** max as follows: $d_{\max} = 2.75\left[Dt\left(1-K\right)\right]^{1/3}$ $d_{\max} = 8.08\left[Dt\left(1-K\right)\right]^{1/3}$

(b) the smaller of one-fourth the inside diameter of the shell or header or 2-3/8 in. **(**60 mm**)**

Typically the openings for washout / inspection plugs are not reinforced, mainly because the size is small enough to encompass self-reinforcement that can be verified through the use of the equations noted above.

Here is an example of such a case **–**
These are threaded washout openings into a backhead.

(*continued next page***)**

OPENINGS (cont'd**)**

Other openings, such as those for feed water supply, many times will have reinforcement provided, as shown here (*below*).
Note the reinforcing pad has a small hole drilled in it.
That is to verify there is no leakage between the shell and the pad.

Sadly, the photo (*below*) shows a failure of this type.

This is a photo of a small boiler (*below*) that has had reinforcement applied to the dome opening and the feed water supply openings. Maybe a bit overdone, but it shows how it comes out in smaller jobs.

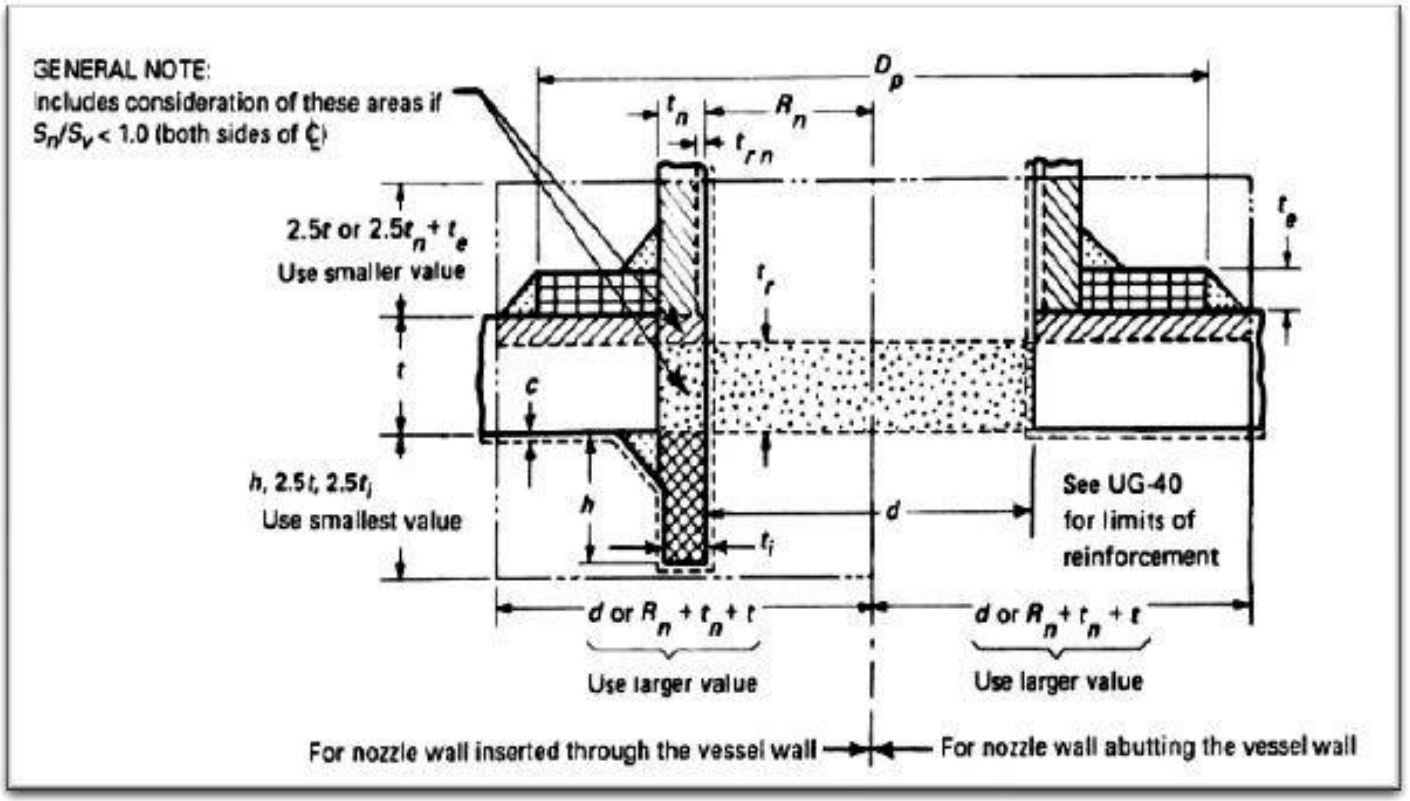
(*continued next page*)

OPENINGS (cont'd)

Here is how the ASME Code provides a method of calculating the required reinforcement for a given opening of any size. Apologies for not being able to illustrate the entire set up, but it is probably enough to show the thought process involved.

Well, that was a quick trip into reinforcement of openings. Next time we'll look at the washout plugs themselves and their requirements.

Take care,
Dave



The Gettysburg Railroad explosion 25 years later

16 min. video

CLICK HERE: https://www.youtube.com/watch?v=7TJPmkcPer8

As we learned last month, Part PL was added to the ASME Boiler Code because, as Linn Moedinger wrote in her article, Railroad Boilers are still being used today across the US for museum excursion trips and these "steam locomotives operate in densely populated environments where the need to ensure safe boilers is paramount. Millions of people ride behind and stand next to these things every year." This video highlights the faulty training and maintenance sometimes provided by part-time, volunteer railroad workers.

(Reference: Stack Talk, June 2020, pp. 20-26)

SPECIAL FEATURE!

National Aeronautics and Space Administration

The NASA Railroad

The NASA Railroad is a 38-mile industrial short line on the Kennedy Space Center in Central Florida. It connects to additional Air Force trackage on Cape Canaveral Air Force Station. The railroad system is government owned and contractor operated.

1963 to 1983:

In 1963, the Florida East Coast Railway built a 7.5- mile connection to the Kennedy Space Center from its mainline just north of Titusville, Florida. The line required a drawbridge to be built over the Indian River, part of the Intercoastal Waterway. The steel bridge and its approaches are approximately a half-mile long, built on concrete pilings. The draw span stays open continuously until a train approaches, and the crew activates a switch to lower it.

The Florida East Coast connection joined 28 miles of NASA-constructed track at a junction named Wilson's Corners. The Florida East Coast built two yards, a seven-track yard now called Jay-Jay at the main line interchange (originally called Cape Canaveral Junction), and a second seven-track yard called Wilson Yard, slightly west of the geographical location of Wilson's Corners.

East of Wilson Yard, the line divides with a nine-mile branch going south to NASA's Vehicle Assembly Building (VAB) and the Kennedy Space Center Industrial Area, the other another nine-mile branch going east toward the Atlantic Ocean for service to the NASA launch pads and the interchange with the Air Force track.

In the late 1970s, NASA acquired three World War II-era ex-U.S Army Alco S2 locomotives for local switching in the area of the Vehicle Assembly Building and the KSC Industrial Area. The Florida East Coast provided track maintenance, crews and locomotive power for the arriving and departing traffic.

1983 to Present:

NASA purchased the Florida East Coast portion of the railroad line in June 1983. Because of the hazardous commodities hauled over the railroad, particularly the solid rocket boosters for the space shuttle, NASA decided to completely rebuild and upgrade the line. The original track was 100- or 112-pound jointed rail on wood cross ties and limestone ballast. It was replaced with 132-pound continuous-welded rail (ribbon rail) and concrete cross ties (sound familiar?). The work was done by the track maintenance subsidiary of the Florida East Coast. The track was constructed to 60 mph standards, which is Florida East Coast mainline speed; however, normal operating speed is 25 mph to reduce maintenance and increase the life span of the track.

To replace the aging S2 locomotives, NASA acquired three EMD SW-1500 locomotives, built in 1968-1970 for the Toledo, Peoria and Western Railway. Each was painted with the NASA Railroad red, gray and black color scheme, and the locomotives were re-numbered 1, 2 and 3. They are maintained in-house at the NASA Railroad Shop at Kennedy. One of the original Alco S2 locomotives has been preserved at the Florida Gold Coast Railroad Museum in Miami.

A NASA locomotive passes by a space shuttle on a launch pad at Launch Complex 39 en route to Cape Canaveral Air Force Station on the NASA Railroad. The train is delivering helium, a commodity used in launching the Titan rocket.

(*continued next page*)

NASA Railroad (cont'd)

The primary traffic on the NASA Railroad has been the solid rocket booster segment cars. Each of the two booster rockets on the space shuttle consisted of four segments, each 32 feet long and 12 feet in diameter weighing an average of 150 tons. So, each launch requires delivery of eight segment cars. Each segment car weighs 510,000 pounds and there were a total of 24 railroad cars in the overall fleet. They were delivered to Kennedy from the Thiokol plant in Wasatch, Utah, over a route that uses the Union Pacific, Kansas City Southern, Norfolk Southern, CSX and Florida East Coast Railway.

The segments were stacked in the Vehicle Assembly Building before being joined with the external tank and space shuttle orbiter. After launch, the twin solid rocket boosters, empty of their fuel, are recovered from the Atlantic Ocean, broken down into individual segments once again and returned to Thiokol by rail. These solid rocket boosters also were used for the Ares IX test flight. Initially five-segment solid rocket boosters will be used for the Space Launch System (SLS) heavy lift rocket. The Air Force also had, until recently, three specially modified SW-8 locomotives for the Titan IV rocket. Used to switch the solid rocket booster segments that are delivered to Cape Canaveral Air Force Station, the three units were completely rebuilt by the mechanics at the NASA Railroad locomotive and equipment shop. These locomotives would later deliver the fully assembled Titan IV rocket to the launch pad. The Titan IV program has since ended. The NASA Railroad also has had a unique move interchanging traffic with Cape Canaveral Air Force Station, using specially designed cars for the Air Force and the Navy.

The Air Force used helium to purge the lines of the Titan rockets that use liquid fuel. However, the helium arrives as a liquid. A plant at Kennedy converts it to a gas which is then loaded into these specialized cars that are hauled by the NASA Railroad to the Air Force interchange. These cars originally were owned by the Bureau of Mines, and when the government left the helium business, some of the fleet was transferred to Kennedy for in-plant use.

The NASA Railroad owns a small equipment fleet of specialized cars and hoppers, as well as some highly specialized cars such as the solid rocket booster structures car. Many of these cars travel to other NASA locations to bring back components that cannot move by highway. An example are skirts and frustums which are very large, bulky rocket motor parts that are transported on the booster structures car.

There are some significant cost-saving opportunities available to NASA where modified or specialized railroad cars could be used, avoiding the expense of shipment by cargo aircraft or barge. The cars sometimes also eliminate the need to disassemble oversized items. The railroad shop has either modified existing equipment or fabricated new rolling stock. In some cases, a modified freight car could be cost effective just for a single one-way trip.

On March 30, 1982, space shuttle Columbia landed at the back-up landing site at the White Sands Test Facility in southern New Mexico, concluding STS-3. The dry lake bed runway at Edwards Air Force Base was flooded from heavy rain. All of the ground support equipment to be used to service Columbia after landing had to be moved from Edwards Air Force Base in California to White Sands, near Las Cruces, N.M.

If ever needed, the original plan was to fly the equipment in waves of Air Force C-5 and C-141 air cargo planes. However, at the time of the STS-3 landing, they were not available in sufficient time to have the equipment on the ground at White Sands for Columbia's arrival. Using equipment furnished by the Sante Fe Railroad, two trains were used to move the equipment over the lines of Sante Fe and Southern Pacific for the 1,000-mile distance between Edwards and White Sands. By using rail, the cost saving to NASA was more than $2 million for the equipment's round trip.

A NASA train crosses the Indian River on the NASA Railroad to deliver solid rocket boosters for the space shuttle at Kennedy Space Center. For safety, box cars serve as spacer cars between the individual booster segments.

(*continued next page*)

NASA Railroad (cont'd)

Progressive Railroading – Insider Reports (February, 2011)

Short-Lines: NASA Railroad's Future in Question

Later this year, the National Aeronautics and Space Administration is scheduled to launch the final space shuttle mission, bringing to a close the agency's 30-year space shuttle program. What that program's end will mean for NASA's short-line railroad at Kennedy Space Center has yet to be determined. "That's the $64 million question," says George Diller, a NASA spokesman. As the shuttle program winds down to its final launch this summer, the space center's basic infrastructure, which includes the NASA Railroad, is under review, Diller says. For the past 30 years, the short-line has been an important component of the shuttle program, providing a system for transporting the solid rocket boosters from ATK Aerospace Systems' Utah manufacturing plant to the space center on Florida's east coast.

Private Railroads Play a Large Part

The solid rocket boosters are transported in eight-piece segments during a seven-day journey over track owned by Union Pacific Railroad, Kansas City Southern, Norfolk Southern Railway, CSX Transportation and Florida East Coast Railway (FEC), says Dave Hoffman, who managed the NASA Railroad for 13 years until he retired in 1996. NASA owns three SW-1500 locomotives, but the rocket booster segment cars are owned by UP, CSXT, KSC and FEC, says Diller. Most of the rolling stock is standard operating equipment for freight rail, but some of the rocket-booster structure cars were designed and customized by NASA with Hoffman's input. The railroad dates to the U.S. space program's early days, and FEC has a long history with the short line, Hoffman says.

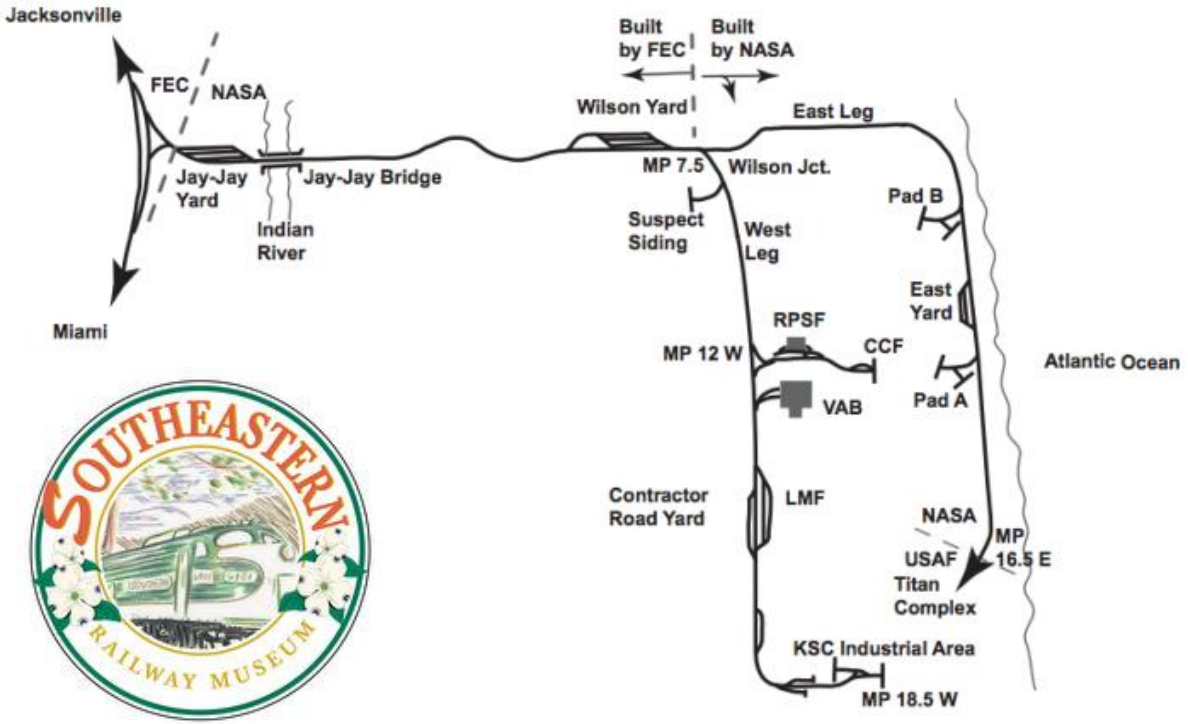
In 1963, FEC built a 7.5-mile connection from its mainline north of Titusville, Florida, across the Indian River to the Kennedy Space Center, which was under construction at the time. The FEC connection joined 28 miles of NASA-built track at the Wilson Corners junction, just north of the space center. FEC also built two seven-track yards: Jay-Jay Yard at the mainline interchange, and Wilson Yard. At Wilson Corners on the Space Center's northern end, the railroad splits into two 9-mile stretches of track. One segment leads to the space center's vehicle assembly building (VAB) and launch pad areas; the other, to the Cape Canaveral Air Force Station. By the time the shuttle program took off in the 1980s, NASA Railroad's mainline between the FEC interchange north of Titusville and the space center's vehicle assembly building required upgrading, Hoffman says. As originally built, the track wasn't equipped to accommodate the weight of the 12-foot-wide, 150-ton rocket-booster segments.

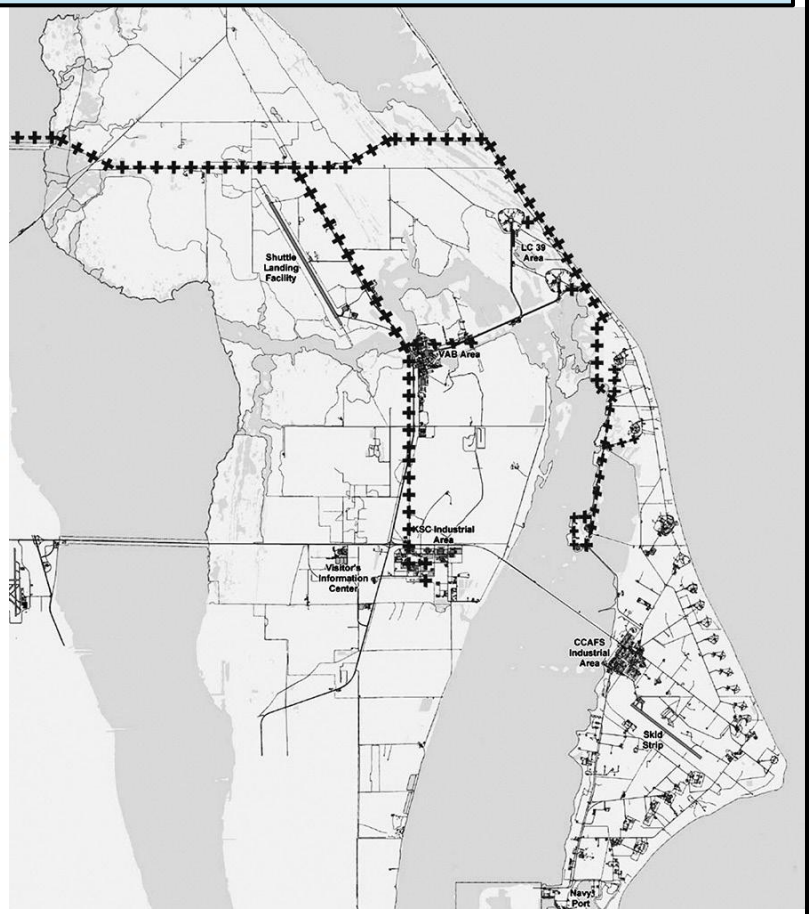
So, NASA contracted FEC to rebuild the mainline with heavy welded rail, concrete ties and granite ballast to meet safety and weight requirements. The reconstruction helped ensure the track would survive the area's salty air and humid climate, Hoffman says. "Some of that track has been out there since the late 1980s and all we've had done [to maintain it] is spray for weeds," he says. The railroad has been used to haul other hazardous cargo, such as chemicals used in making rocket propellant, Air Force Titan rockets, Navy Trident missiles and shuttle booster segments for the Ares I-X flight test.

Although President Barack Obama has said he's committed to NASA's future and its space-exploration mission, he's also called for expanding commercial companies' involvement in space transportation, including transporting astronauts to the International Space Station. In December 2010, Space Exploration Technologies Corp. (SpaceX) used Cape Canaveral Air Force Base to launch an unmanned rocket for testing in orbit — a first for a privately owned company. The rocket successfully parachuted back to Earth three hours later. How the NASA Railroad might be used to serve commercial businesses like SpaceX is part of NASA's ongoing study. "We are reviewing what the long-term requirements are for NASA, what requirements the Department of Defense will have, and what the needs of the commercial launch industry may be," Diller says. "We don't expect we'll have all the answers to that until late in 2011 or sometime in 2012."

(*continued next page*)

NASA Railroad (cont'd)





Source: Historical Survey of KSC Railroad; Archaeological Consultants, Inc.

Southeastern Railway Museum (July, 2019)

Critical to the Countdown: The NASA Railroad

The role of the railroad during the Space Shuttle era is well known and well documented. For nearly three decades, solid rocket booster (SRB) segments were transported from a space and aviation research plant in Promontory, Utah to the Kennedy Space Center (KSC) on the tracks of Union Pacific, Kansas City Southern, Norfolk Southern, CSX, and the Florida East Coast Railway. The reusable segments traveled the route on custom-built cars and were accompanied by a team of technical experts who monitored the cars and segments as they made the seven-day trip to Florida. Upon arrival, every car was inspected, and spacer cars were added to redistribute the weight of the train so it could traverse one final hurdle**:** a drawbridge over the Indian River and into the restricted zone. Once at KSC, four booster segments, each 12 feet wide and 150 tons, were stacked vertically in the Vehicle Assembly Building. Two complete boosters were joined with the external fuel tank and the orbiter and rolled out to the launch pad standing 184 feet tall. After launch, the SRBs were recovered from the ocean, broken down into their segments, and transported by rail back across the country to the Thiokol facility (now Northrop Grumman) where they started.

(*continued next page*)

NASA Railroad (cont'd)

During the peak of the Shuttle program, the NASA Railroad operated 38 miles of industrial trackage constructed to 60 mph standards, though NASA's track speed is just 25 mph. Trains carried four to five million pounds of hazardous materials and were more often seen creeping along at 10 to 15 mph. The last shipment of booster segments arrived in 2010, and the final flight of the Space Shuttle launched July 8, 2011. Lacking booster traffic, the NASA Railroad ceased operations in 2015 and, though much of the trackage remains, many of the specialized rolling stock have been donated to museums, transferred to NASA's commercial space partners, or sold.

But the NASA Railroad was activated long before the Space Shuttle was even conceptualized. In 1963, Cape Canaveral Air Force Station and Kennedy Space Center were in the midst of a construction boom. The Space Race was in full swing**:** the Russians had launched a man into space before the Americans and soon, Alexei Leonov would become the first cosmonaut to perform extravehicular activity (a spacewalk). NASA was playing catch-up. To be the first to put a man on the Moon and return him safely to Earth, NASA would need bigger launch pads, training centers, testing facilities, assembly buildings, hangars, trenches, a launch operations center, offices, storage spaces, and other massive structures. NASA had recently purchased nearly 84,000 acres of land at the Cape and developed a master plan that included a railroad system to provide railroad car delivery of construction supplies for the new spaceport. As the Apollo program progressed, the railroad would be used to deliver equipment for the launches.

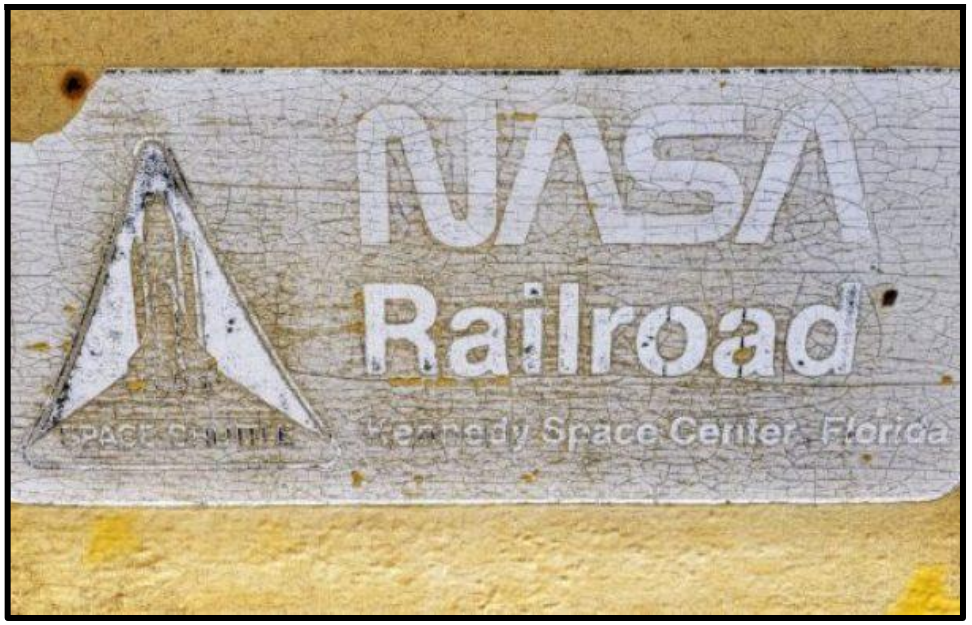


Photo: Kristen Fredriksen

NASA reached an agreement with the Florida East Coast Railway for the construction and operation of a railroad within Kennedy Space Center and Cape Canaveral Air Force Station (CCAFS). The FEC would construct a 7.5-mile connection from its mainline near Titusville, FL that required building a drawbridge over the Indian River, part of the Intercoastal Waterway, to Wilson's Corner on the east side of the river. There and at the junction near Titusville, the FEC would construct two 7-track yards using material salvaged from the removal of the FEC's mainline double track. The FEC provided maintenance, crews, and locomotives for arriving and departing freight traffic.

The US Army Corps of Engineers (ACOE) was responsible for building the 28 miles of trackage planned within the Kennedy Space Center. An eastern and western branch were conceived**:** the eastern branch would connect Launch Pads 39A and 39B at KSC with the CCAFS and Titan Launch Complex closer to the coast, and the western branch would link the massive Vehicle Assembly Building with the industrial section of KSC.

(*continued next page*)

NASA Railroad (cont'd)

The ACOE awarded the railroad construction contract to Jacksonville's B.B. McCormick and Bailes-Sey with the condition that the railroad be completed within 180 days, around January of 1964. This deadline coincided with the delivery of large quantities of construction materials, including steel for the Vehicle Assembly Building. While the railroad was not completed within this ambitious time frame, it was finished in its entirety by the following year.

The NASA Railroad carried around 30,000 carloads of materials in its first five years, including the Tennessee river rock used to cover two 40-foot-wide lanes of the 7.6-mile-long Crawlerway four to eight inches thick. One Saturn V rocket required 56 railroad tank cars of propellant. Railroads were involved even when materials were shipped on roads; rocket parts were trucked to KSC from various manufacturing centers around the country with the help of local law enforcement and flagmen from nearby railroads who were assigned the special duty of facilitating the safe transport of the rocket materials and the accompanying entourage over a crossing.

KSC Railroad Construction, 1965. Source: Historical Survey of KSC Railroad

Construction of a spur into the VAB.
Source: Historical Survey of KSC Railroad, Archaeological Consultants, Inc.

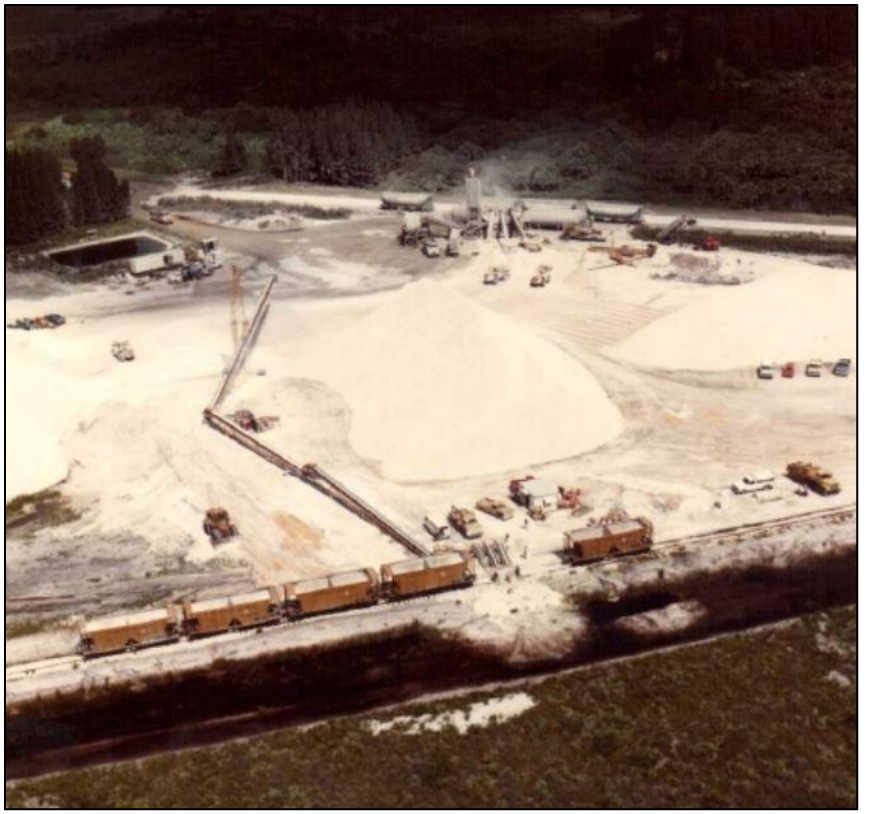
(*continued next page*)

NASA Railroad (cont'd)

Railroads also played a role in Apollo astronaut training. The 'sandpile' was a large, flat area of sand at KSC where various tools intended for use on the lunar surface were tested by scientists and astronauts. Florida sand, however, did not present a realistic sampling of rocks astronauts might encounter on the Moon. If the geologists in charge of training Apollo crew members wanted the astronauts to get some real practice with the instruments, they would need to bring in rocks from other regions. Gordie Swann, the Principal Investigator of the lunar Field Geography experiment and part of the team involved in selecting lunar landing sites, had been stationed in Flagstaff in support of the manned spaceflight program and was tasked with developing lunar geologic exploration procedures. Swann arranged to have two gondolas full of rocks and ballast from an Atchison, Topeka, and Santa Fe Railway quarry shipped to Florida. For more variety, Swann brought in a carload of anorthosite from California. Dump trucks of other rocks arrived from around the country. Astronaut John Young, the ninth man on the Moon, joked that "a million years from now somebody will be trying to figure out what all those fancy rocks are doing in this sand."

The railroad system at KSC remained as originally constructed until 1974 when a spur was built to haul runway-building materials to the future site of the Shuttle Landing Facility. Later, in 1983, NASA bought the FEC portion of the railway and upgraded the line in preparation for Space Shuttle operations. The future of the NASA Railroad is uncertain. The trains left years ago, but NASA maintains about 17 miles of the once-38-mile network.

A possible extension of the line to Port Canaveral has been explored. And the railroad could potentially carry booster segments again for NASA's next giant leap: the Space Launch System (SLS). This heavy-lifting rocket will use two 5-segment SRBs to provide 75% of the vehicle's liftoff thrust. Today, the SRBs are undergoing testing at Northrop Grumman Innovation Systems in Promontory, Utah at the same facility where the Space Shuttle SRBs began their 2,800-mile journey to the Kennedy Space Center. The research plant is only a ridge away from the Golden Spike National Historical Park — the 15-minute drive is just enough time to reflect on the sprawling landscape's transportation heritage, where transcontinental past meets interplanetary future.



Construction of the Space Shuttle runway. Source: Historical Survey of KSC Railroad, Archaeological Consultants, Inc.

Photo credit: NASA / Tony Gray

(*continued next page*)

NASA Railroad (cont'd)

Jennifer Leman Popular Mechanics (June 17, 2020)

NASA's Famous Rocket Railroad Is Back in Business

NASA's massive SLS rocket and Orion spacecraft recently arrived at NASA's Kennedy Space Center in Cape Canaveral, Florida after a 10-day, cross-country journey from Northrop Grumman's facility in Promontory, Utah. And it arrived in style on the storied NASA Railroad. The 10-segment rocket booster and its accompanying spacecraft are slated to orbit the moon in the next few years and, eventually, ferry the first woman and next man to the moon in 2024, if the schedule holds. The first test flight of the system, Artemis I, is expected to blast off sometime next year.

"It is good to see booster segments rolling into the Kennedy Space Center," Mike Bolger, program manager of Exploration Ground Systems, said in a press statement. "The team can't wait to get started working on the boosters that will send the SLS rocket and Orion spacecraft on the first Artemis mission to the moon." The rocket boosters are the first to be slapped on the mobile launcher. Now that the segments have arrived, a team will offload them and begin assembly and integration. Each of the 180-ton booster segments were loaded onto souped-up railcars for their journey across the country. It's the first time in 10 years that NASA has shuttled rocket parts along its 38-mile industrial short line in Central Florida.

As the space race took off in the 1960s, NASA's Kennedy Space Center partnered with Florida East Coast Rail (FEC) to construct track that would be used to shuttle rocket parts across its sprawling campus. In 1965, the agency joined 28 miles of its newly built track to the FEC's recently constructed 7.5-mile track at Wilson's Corners junction, according to the Southeastern Railway Museum. FEC also constructed two rail yards, Jay-Jay Yard and Wilson Yard, to park unused locomotives.

Before rocket-filled rail cars slip into NASA's restricted zone, they have to cross a half-mile-long drawbridge spanning the Indian River. The 9-mile-long East Leg of the NASA Railroad connects to launch pads 39A and 39B along the coast. The West Leg, also 9 miles long, connects to an industrial complex and the agency's Vehicle Assembly Building.
In the first 5 years of operation, the railroad delivered 30,000 carloads of material to help construct the massive crawlway connecting the VAB to the launch pads, according to the Southeastern Railway Museum.
It took 56 railroad cars to transport the propellant needed to fuel the famed Saturn V rocket. The railroad, per the museum, was also integral in ferrying Apollo astronauts to "the sandpile," a lunar testing ground.

In 1983, NASA purchased the 7.5-mile stretch of FEC railway in order to upgrade it for the burgeoning shuttle program. Throughout its rich history, the NASA Railroad has had a number of specialized locomotives, including three World War II-era ex-U.S Army Alco S2 locomotives, purchased in the 1970s, and three EMD SW-1500 locomotives, which NASA acquired in the 1980s. In 2014, NASA sent its "NASA red"-painted locomotive no. 2 to the Gold Coast Railroad Museum in Miami. A year later, the agency donated locomotives no. 1 and 3 to the Natchitoches Parish Port in Natchitoches, Louisiana, and Madison Railroad in Madison, Indiana, respectively.

With the upcoming Artemis mission, the celebrated railway is back in business.

Photo credit: NASA / Kim Shefflet

(*continued next page*)

NASA Railroad (cont'd)

NASA RELEASE 20-064 (June 16, 2020)

Rocket Motors Arrive at Spaceport for First NASA Artemis Moon Mission

The rocket booster segments that will help power NASA's first Artemis flight test mission around the Moon arrived at the agency's Kennedy Space Center in Florida on Monday for launch preparations. All 10 segments for the inaugural flight of NASA's first Space Launch System (SLS) rocket and Orion spacecraft were shipped by train from Promontory, Utah. The 10-day, cross-country journey is an important milestone toward the first launch for NASA's Artemis program.

"The arrival of the booster segments at Kennedy is just the beginning of the SLS rocket's journey to the pad and onward to send the Orion spacecraft to the Moon," said NASA Administrator Jim Bridenstine. "Artemis I will pave the way toward landing the first woman and the next man on the surface of the Moon in 2024 and expanding human exploration to Mars."

Each rocket booster has individual motor segments, located between the forward assemblies and aft skirts, making up the largest single component of the entire booster. The two SLS rocket boosters, four RS-25 engines, and core stage, produce a combined total of more than 8.8 million pounds of thrust power during launch.

"It's an exciting time at NASA's Kennedy Space Center as we welcome Artemis flight hardware and continue working toward the Artemis I launch," said Kennedy Space Center Director Bob Cabana.

Each booster segment, weighing 180 tons, is filled with propellant and outfitted with key flight instrumentation. Due to their weight, Northrop Grumman, which is the booster lead contractor, transported the segments in specially outfitted railcars to make the 2,800-mile trip across eight states to Florida's Space Coast.

Twin rocket boosters for NASA's Space Launch System (SLS) that will power Artemis missions to the Moon have arrived at the agency's Kennedy Space Center in Florida. The two motor segments, each comprised of five segments, arrived at Kennedy's Rotation, Processing and Surge Facility (RPSF) on June 15, 2020, by train from a Northrop Grumman manufacturing facility in Promontory, Utah. The booster segments will remain in the RPSF for inspection prior to processing until it's time to move them to the Vehicle Assembly Building for stacking on the mobile launcher. This is the first piece of flight hardware to arrive at Kennedy by train for the Artemis program, but NASA's Exploration Ground Systems (EGS) can expect to receive additional hardware soon, including the Launch Vehicle Service Adapter and the rocket's core stage. NASA is working toward an Artemis I launch date in 2021, keeping the program moving at the best possible pace toward the earliest possible opportunity. ***Credits: NASA / Kevin O'Connell***

(*continued next page*)

NASA Railroad (cont'd)

"The fully assembled boosters for NASA's Space Launch System rocket are the largest, most powerful solid propellant boosters ever built for flight," said Bruce Tiller, manager of the SLS Boosters Office at NASA's Marshall Space Flight Center in Huntsville, Alabama. "These enormous rocket motors help provide the necessary launch power for the SLS deep space rocket."

Now that the booster segments are at Kennedy, NASA's Exploration Ground Systems team will prepare them for assembly and integration activities that start with offloading the segments. Teams will attach the aft segments to the aft skirts and offload and store the remaining segments from the railcars in preparation for stacking.

"It is good to see booster segments rolling into the Kennedy Space Center," said Mike Bolger, program manager of Exploration Ground Systems. "The team can't wait to get started working on the boosters that will send the SLS rocket and Orion spacecraft on the first Artemis mission to the Moon."

The solid rocket boosters are the first elements of the SLS rocket to be installed on the mobile launcher in preparation for launch. The aft booster assemblies will be lifted on to the mobile launcher, followed by the remaining booster segments, and then topped with the forward assembly. Teams at Kennedy have been preparing for the arrival of the booster segments by assembling and testing the aft skirts and forward assemblies of the boosters, and practicing stacking procedures with booster pathfinders, or hardware replicas, earlier this year. NASA and Northrop Grumman completed casting in 2019 of all 10 of the motor segments for both the first and second Artemis lunar missions, and are now working on the boosters for the Artemis III mission, which will land the first woman and next man on the Moon in 2024.

With the arrival of the boosters, the only remaining pieces of hardware for the Artemis I flight test to be delivered to Kennedy are the launch vehicle stage adapter, which connects the rocket to the Orion spacecraft and will arrive this summer, and the SLS core stage, which will be transported to Kennedy by barge after the Green Run hot fire test later this year at NASA's Stennis Space Center near Bay St. Louis, Mississippi.

Through the Artemis program, NASA will return astronauts to the Moon's surface in four years. SLS, along with NASA's Orion spacecraft, the Human Landing System and the Gateway in orbit around the Moon, will serve as NASA's backbone for deep space exploration. SLS is the only rocket that can send Orion, astronauts, and supplies to the Moon on a single mission. We'll explore more of the lunar surface than ever before, and collaborate with our commercial and international partners to establish sustainable exploration by the end of the decade. Then, we will use what we learn on and around the Moon to take the next giant leap – sending astronauts to Mars. ♦

A train carrying the rocket motors for NASA's Space Launch System rocket after departing a Northrop Grumman manufacturing facility in Utah for NASA's Kennedy Space Center in Florida on June 5, 2020. The 10 booster segments will power Artemis I, the first mission of NASA's Artemis program, to the Moon. The 180-ton booster segments are transported in specially outfitted railcars to make the 2,800-mile trip across eight states to Kennedy. ***Credits: Northrop Grumman***