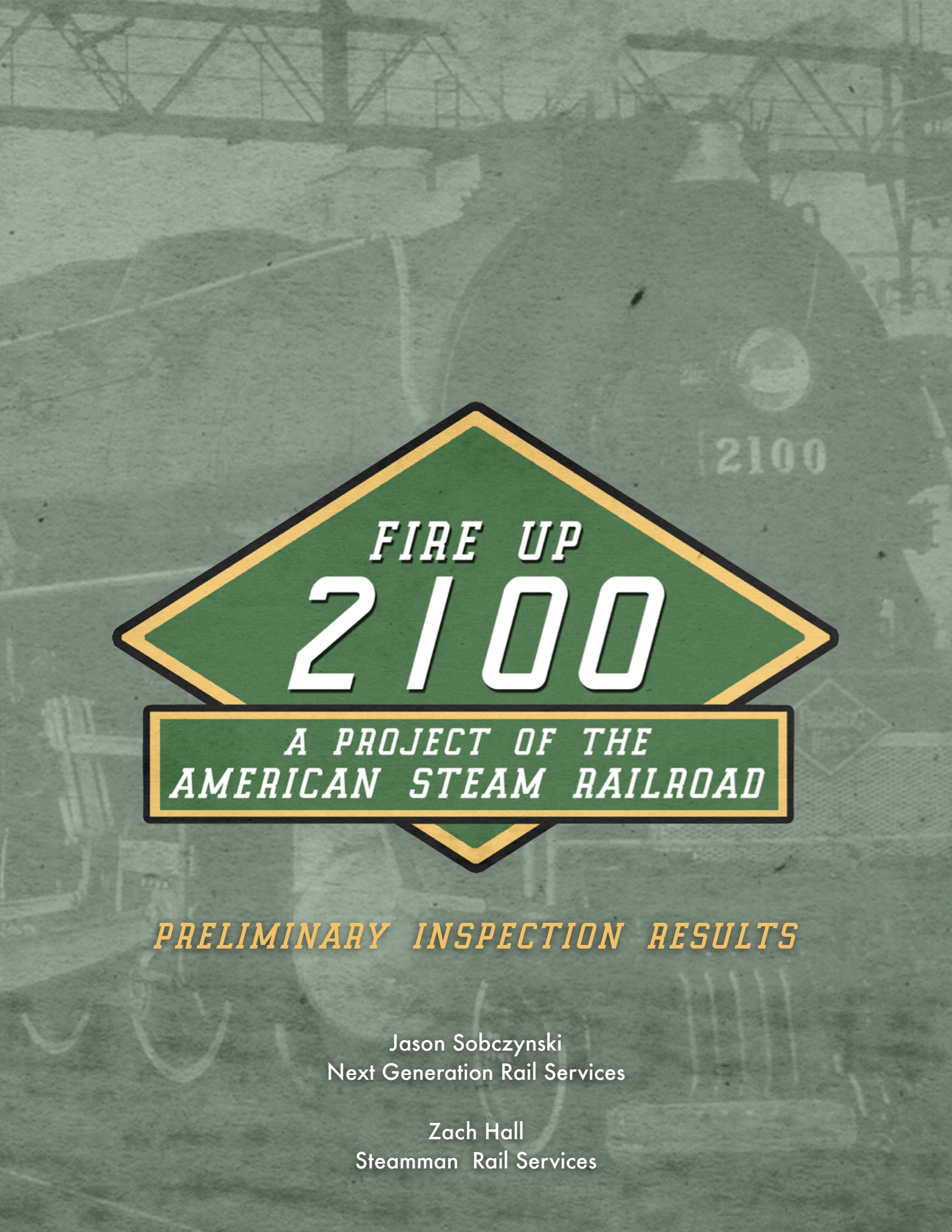

PRELIMINARY INSPECTION RESULTS

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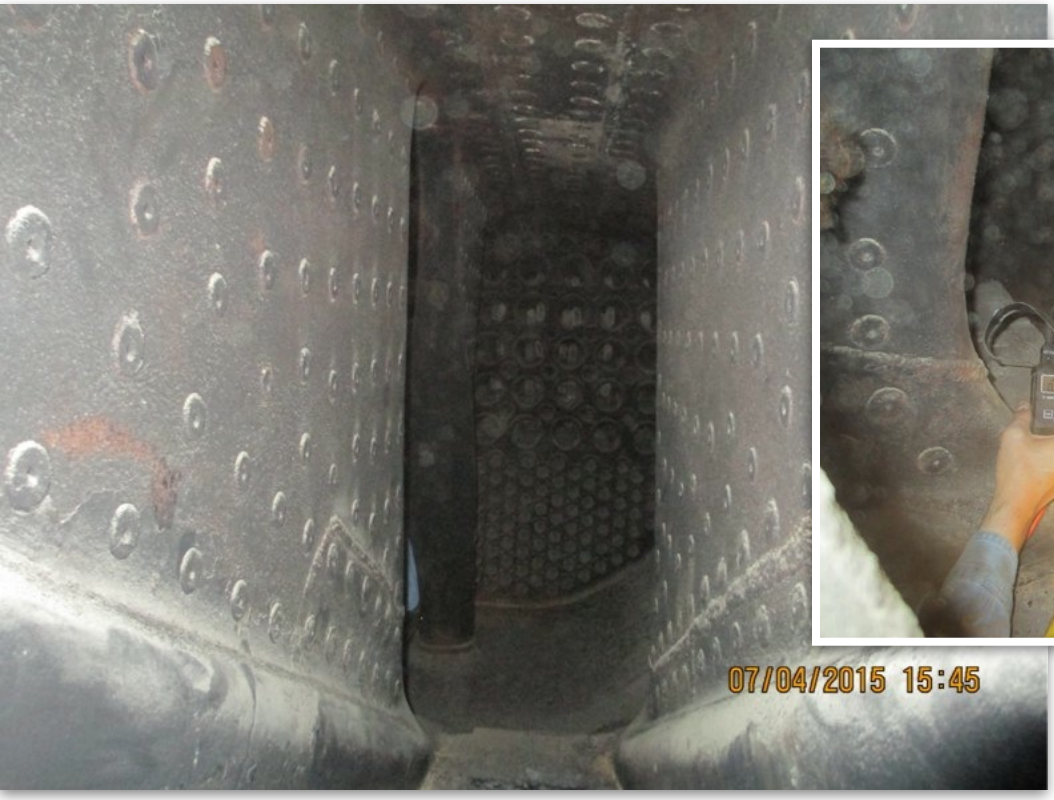
READING 2100
PRELIMINARY INSPECTION RESULTS

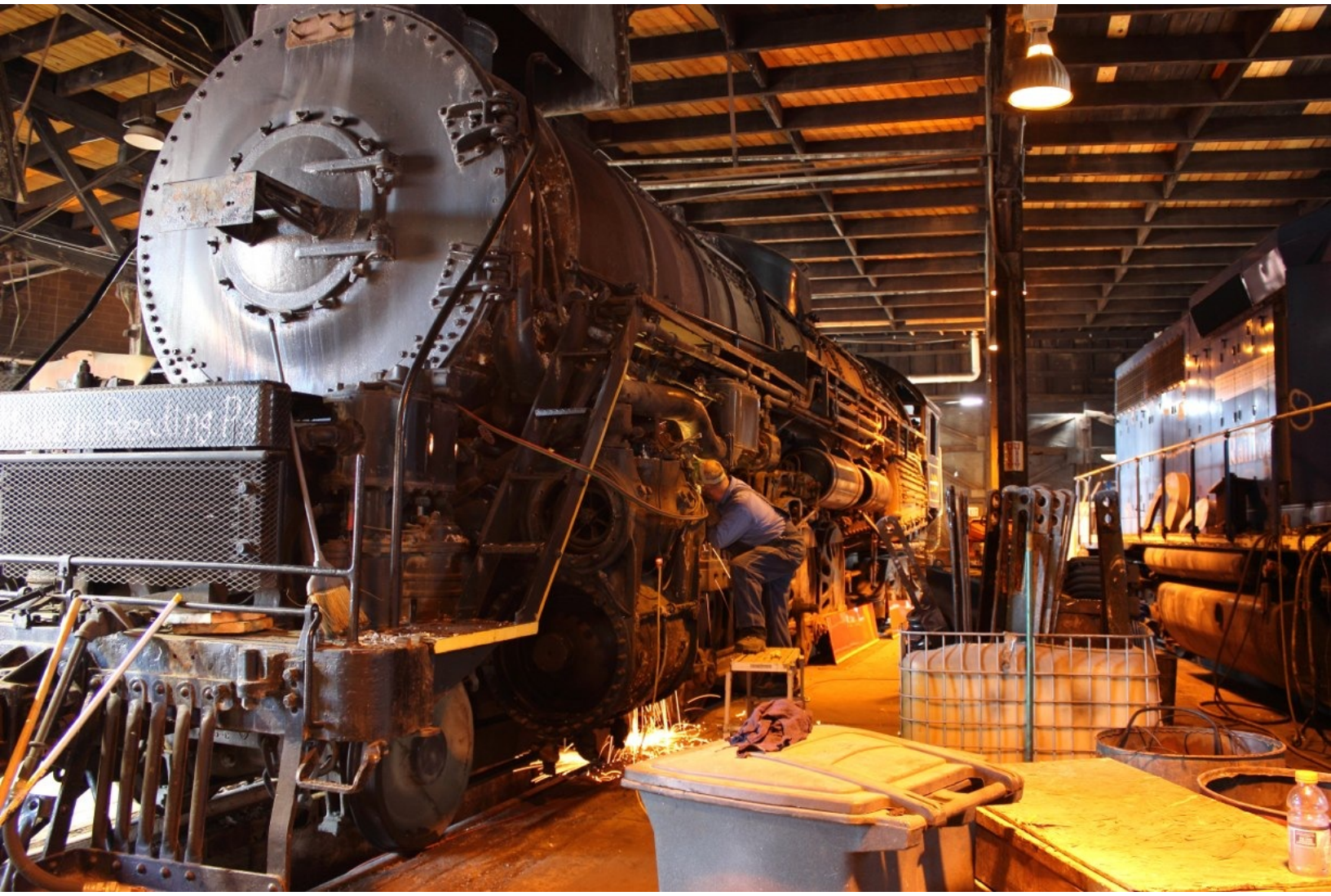
The data collected during the preliminary inspection of the 2100 has yielded promising data. Information collected has allowed us to put to rest a number of unpleasant rumors and chart a course for completing a comprehensive evaluation.

FIREBOX INTERIOR

Upon engaging into the preliminary inspection our first objective was to determine what, if any, damage had been done to the interior firebox of the locomotive as a result of the conversion to oil. The actual condition of the firebox is very good. Despite our best efforts we were unable to locate waffled, bagged, or burned sheets in either the firebox itself or the thermic syphons and only minor leaks were noted around a few bolts. The only notable repairs required within the firebox pertain to the syphon “diaphragms” and the replacement of about 60 crown bolts which no longer have a “head” protruding above the sheet. Many locomotives currently in service would be lucky to have a firebox in this good of condition.

Following the empirical observation of the sheets’ condition, we engaged in determining the condition of the sheets for the purpose of refreshing the locomotive’s Form 4. It was discovered that the average sheet thickness of the crownsheet, doorsheet, sidesheets and syphons is around .430, which is almost 1/8” above the minimum thickness. It is unknown why the Reading chose to utilize such a very thick material (original thickness was likely 15/32”) as all of the blueprints call for the application of 3/8” plate.





BOILER AND FIREBOX INTERIOR

Our focus next shifted to the boiler exterior both prior to and following the removal of the jacketing. Approximately 120 flexible staybolt sleeves had improper repairs made to them. These repairs consisted of applying schedule 40 couplings to the boiler shell (by welding) around sleeves which likely were no longer in a condition to contain pressure. These couplings were then plugged with cast iron (most made in Thailand) pipe plugs. Schedule 40 pipe fittings are rated 150 psi steam in a piping system and they are not manufactured of A105 material. The caps are also of a lower pressure rating due to their cross section and they are not of a material or which allows them to be used as a first point of pressure retention from the power boiler.

The solution for these repairs consists of removing all of the pipe couplings, flexible bolts and flexible sleeves. Following the removal of these items a NDT inspection will be conducted on the affected area to determine whether or not any damage was done to the boiler shell. At that point it will be determined if a patch is required or if the original fabric is of a condition which allows for continued service.

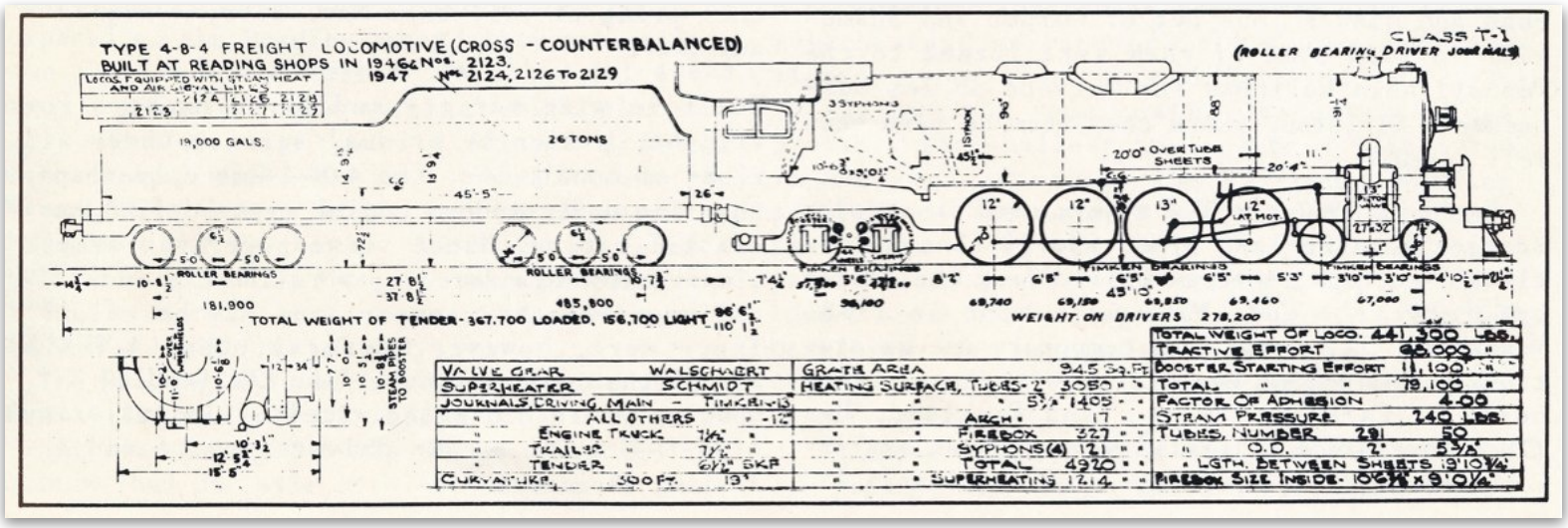
The riveted joint to the backhead has seen severe deterioration of rivet heads of in two areas around the seam to the outerwrapper. A repair plan will be developed following further inspection and engineering analysis. Elsewhere around the exterior of the firebox the only defects immediately noted consisted of damage to or incorrect repairs of washout plug sleeves.

The boiler barrel appears to be in good condition overall. Rumors consisting of illegal seal welding of seams and rivets proved to be false. While some seal welding was done, the resulting welds demonstrate a method of application consistent with NBIC code as is applicable to locomotive boilers. A schedule 40 coupling was incorrectly applied by welding to the belly of the second course in place of a previously existent washout plug. It is unclear as to why this alteration was made to the locomotive boiler though we believe it was for filling the boiler as there is a firehose fitting in the none code compliant/non-steam rated ball valve which was utilized as a first point of pressure retention. Normally a fitting is attached to the injector delivery line which allows for the same function without altering the pressure vessel.

The front tube sheet is in pristine condition.

BOILER INTERIOR

The boiler interior reveals what appears to be a healthy pressure vessel. There is no grooving along the rear tubesheet knuckle, no cratering visible around crown or side staybolts, no pitting, no loose braces and only a somewhat above average amount of scale on the barrel. For reasons unknown, the firebox sheets are substantially cleaner than those in the balance of the boiler. The tubes and flues are in almost new condition.



NEXT PHASE OF BOILER INSPECTION

Prior to a full and comprehensive scope of work can be developed for the boiler of 2100, there is some addition inspection work which must be conducted. Those steps are:

- Remove all firebrick from firebox
- Re-install all washout plugs and otherwise make the boiler capable of holding water.
- Chemically wash the interior of the boiler to remove all scale. This will permit a more comprehensive visual inspection as well as aiding the discovery of any leaks in the following steps.
- Hydrotest to full hydro pressure and preform an in-depth inspection for any leaks around the entirety of the pressure vessel. This will of course be followed by an internal inspection to determine the condition of the braces, hammer testing of bolts etc.
- Steam test to full operating pressure to determine if there are any other leaks which are not visible until such time that there is steam pressure in the boiler. This will also give us an opportunity to test the air pumps, hot water pump, cold water pump and dynamo.

ANCILLARY SYSTEMS

No obvious defects were found within the appliances other than the injector. The threads on 2 of the 3 connection points have been damaged with the threads on the steam inlet having been destroyed due to cross threading. A contributing factor to the damage of the threads is that of steel nuts and tail-pieces having been made to replace the originals of bronze construction. Further inspection of the appliances will take place during and prior to the steam test.

The safety valves are of great interest on this locomotive. The OEM specification shows 3 3.5” consolidated safety valves and the size of the spud holes in the boiler support this. However, the locomotive had been operating with only 2 3” consolidated valves with the hole for the third having been filled with a plug. We will be replacing the safeties with a donation of 3 “new old stock” valves of the correct size.

The brake system (while crude) is intact and seems to be in good repair with the exception of the reservoirs. They are original to the locomotive, of riveted lap seem

construction and thus do not engineer out to be compliant with the required standards set forth in part 230.

MACHINERY

The machinery includes running, driving and valve gear, spring and brake rigging is in good to fair condition depending upon the specific item.

The spring rigging and brake rigging appear to be in very good condition having received new pins and bushings in the 1980s. The valve-gear does also appear to be in good to very good condition but we cannot definitively conclude this until it all comes apart and is dimensioned out.

The front and rear truck appear to be in very good condition and are ready for service in their current condition. The only items remaining to see thorough inspection are the roller bearings. An initial inspection indicates they are in good condition however we will seek confirmation from a Timken representative.

The cylinders and valves appear to be in good condition free of any grooving, scoring or wear ridges. The only item of immediate concern is that of the piston rings. They were replaced in the 80's with an improper design. The locomotive is equipped with hi-dynamic pistons which are designed to work with segmented piston rings of an "L" cross section. In this design the "vertical" portion of the L rides within the ring groove while the horizontal member rides between the piston and the cylinder wall thusly spreading the load (weight) of the piston over an area equal to the width of the piston. This arrangement consists of 4 segmented rings (2 in each groove) of which 2 are made of iron and two of bronze. Currently, the rings consist of two single piece iron rings each of which are about 1-1/16" wide. All of the piston and rod weight is currently being carried by these rings.

Items of concern in the machinery observed during the initial inspection phase are as follows:

- Left and Right wrist pins very loose, inspect for out of round fit
- Left side wrist pin made in 80's incorrectly, replace
- 3 of 4 knuckle pins very loose in rod fit, inspect for out of round fit
- Both eccentric cranks have been bored to almost 1/16" oversize to main crankpin, weld up and re-bore
- All eccentric crank bolts are of very poor fit, replace

- Excessive lateral motion on left side crosshead, re-tin
- Left crosshead guide far out of vertical tram, retram
- Closely examine condition of tinning on right crosshead, re-tin if required.
- All lube lines for machinery lack any terminal checks, install checks
- L1 grease cake melted out, inspect further
- Right eccentric bushing loose, replace
- Right and left main rod rodeye liner very loose, replace
- Left side main rod floating bushing seized in rod, remove, replace floating bushing
- Missing brake rigging safety hangers @ #2 driver, fabricate, install
- Main axle wedges run all the way down to binder, raises concern of tram issues.
- L1 flange wearing significantly more than any others. Re-tram locomotive driving axles and trucks
- Intermediate crankpin not lubricated in accordance with ANY standard practice, correct by making provisions to lubricate rod. (this explains the stories of the intermediate crankpins running rather warm on all T1's which operated in preservation)
- All floating bushings have dramatically insufficient holes as they were installed in the 80's. As all of the bushings will be replaced it is of no great concern and the proper pattern will be installed on the new ones.
- While rods are off of the locomotive check for proper tram between all rod eyes, adjust as needed
- Most all crankpins are scored from a lack of lubrication. The most recent operator for a long time did not possess any type of hard grease gun. Once one was obtained it was "only used when the bearings started to get hot". Check quarter on pins, either trepan with a portable machine or quarter depending upon the condition of the existent quarter and throw.
- Air reservoirs are not part 230 compliant, replace
- NDT inspect by ultrasound all axles and crankpins

- A consistent “knock” was observed between the R1-R2, likely another symptom of a tram issue
- Crown brass material installed in the 80’s reported to have been matched to reading original. If this is the case it is not suitable for grease lubrication. Perform material analysis and proceed accordingly.

TENDER

The tender appears to be in remarkable condition. The work performed in the 80’s was done very well and the tender has seen virtually no use since. The only inspection work required on the tender is that of the roller bearings, every other aspect is a known quantity. The bearings will be drained, flushed and inspected by a rep from SKF.

SYNOPSIS

As stated at the beginning of this document this is an initial report. More specific detail regarding condition and cost will come through once the study is completed. Reading 2100 is an extremely good candidate for a return to service.

We have already identified approximately $50,000 to $80,000 dollars of required boiler work and as much as much as $185,000 to $600,000 dollars of machinery work. A sampling of potential costs is outlined below:

Main Tender and Aux Tender Repairs
$100,000

- 40 year repair to all trucks
- New wheel sets
- Conversion to rotating end cap bearings
- Painting

Current Running Gear Repairs
$270,000

- Replace bent main rod
- Replace brasses with proper metal
- Replace Rings with proper segmented rings
- Convert driving boxes to force oil

To identify and finalize the final scope of work and associated costs we need to invest $47,000 into the project to complete the comprehensive evaluation/study, which will include: driver and rod removal, checking of tram, frame, and rods, NDT inspection of crank pins, axles, and piston rods, and the ultrasound survey.