

Mechanical Department Report

January 11, 2018

Acting CMO DS Elems

Unfortunately this is going to be quite a long report due to the amount of things I'd like to cover. On that note, I'll also be supplying an updated list of locomotives with all their known issues and as well as suspected issues. Depending on how much time I have for to write everything I may also be submitting a project proposal for the WP917-D to outline the planned work for that unit.

Timing and scheduling is going to be very tight for me this spring because of work, schooling and all the needed mechanical work I'd like to get done. As such I'll be trying to outline and develop process plans for all the work and maintain up-to-date progress reports to keep the work going. I'll be trying to get more personnel involved on the mechanical work as much as possible.

If at all possible I'd like to try and keep erroneous projects to a minimum this spring, and concentrate on a designated set of equipment before moving on; that equipment will hopefully be decided upon at this board meeting. The absolute priorities unless other wise directed will be what's left of the rental fleet (SP2873 & QRR 1100) followed by the as of yet determined equipment. Due to the breadth of what is needed to complete the 917 project that will probably be towards the end the work lineup, though I'd would like to try and get going on it by late spring; more on that later though. It should be noted that early this month the cold has taken a bit of a toll on 1100, or at a minimum brought some more issues to light, such that it may need more extensive work than previously though towards the end of the 2018 operating season. That could potentially push back the planned work for WP707.

Additionally, I'd like to reorganize and inventory the tool room, machine shop areas, welding bay and the far west bay were the power cords are in the next couple of weeks. I may also be able to ahold of four large adjustable-size work bench frames, though unfortunately the maple benchtops are already spoken for.

Rental Locomotives

Since we are down to two (mostly) operable locomotives for our standard rental plans I'll continue the report on that issue. While SP2873 and QRR1100 are definitely getting tired, they have and continue to soldier on despite minimal and deferred maintenance.

WP917 will need extensive work before I'm willing to release it back into operation due to safety concerns, the same goes for WP608, and WP921-D needs a frame truss repair and is worn out to the point of also needing an overhaul. WP2001 is pretty much good to go and is quite reliable other than the radiator leaks which we can manage for the moment. WP707 just needs the injector work. Ethan Doty has gone through our box cars and located some Westinghouse traction motors of the type used

in the USA1857, so we may have another solution for the issues plaguing the #1 traction motor on that unit. All WP1503 needs to get back in service is radiator work. The Baldwin AS-616's may have only a few minor issues keeping them from being returned to service but in-depth inspections should be done to them just in case. The same can be said of WP512 in addition to the needed wheel work, though in that vein all of our locomotives are in need of some form of wheel truing at this point.

In short that breaks down to two locomotives currently in service, three locomotives in need of some level of overhaul before they can safely operate, four locomotives that are operable or practically operable with minimal effort, three locomotives that need comprehensive inspections and potentially fall somewhere between the two prior categories, and all locomotives in need of some form of wheel work.

WP1503

As far as I know there are still plans to paint the 1503 this coming season. That shouldn't have any bearing on the needed radiator work or vice versa. The only thing keeping the unit from running mechanically is the leaking radiator, which I still plan on getting to sometime this season; repair or replace. Once the engine can run, I'd also like to check the timing on the injectors and check the fuel rack settings.

WP917-D

The bulk of this is copied over from my October 2018 report, since there haven't been any changes to the locomotive since then. Currently the locomotive presents two major safety concerns. The lube oil is heavily fuel contaminated and the L4 wheel is a major derailment hazard. While the oil issue has only been noted in the last couple of years the contamination became noticeably worse towards the end of last season and the beginning of this season. The bad wheel has been known about for quite a long time but we chose to ignore it for far too long and had the oil not posed such a fire hazard I'd still have called for the 917's removal from service pending a wheel change.

There are also a myriad of smaller issues to be looked into as well as cosmetic work and some other mechanical issues that will be easier to address while the locomotive is down for maintenance. I'll list all the issues that I can think of below.

Known Issues:

1. Contaminated lubricating oil (fuel): presents a major fire hazard.
2. Leaking fuel injectors: causing major oil contamination, see above.
3. Cooling system, shutters and controls: right side shutters inoperable due to bad air line
4. Air compressor, loud knocking: unknown cause but there are a couple of theories.
5. Excessive oil from air box drains: fire hazard.

6. Exhaust leak, #9 cylinder: cylinder knocks and fills upper deck with smoke until engine warms up to ~100°F.
7. Electrical cabinet, various contactors and wiring: issues with contactor picking up, some wiring needs to be addressed.
8. Airbrake stand: some minor leaks and valves could use some attention/servicing.
9. Air leaks, various: there are a multitude of leaks in and around the locomotive.
10. Water leaks, various: left bank water pump, engine fill lines, radiators etc.
11. Oil leaks, various: there are a multitude of minor oil leaks likely from failing seals on the accessory and gear covers at both ends of the engine block; fire hazard.
12. Body work

I'm sure there are a few things I left out but that gives an overall encompassing look at what needs to be addressed. The first four items in addition to the leaking radiators will need to be dealt with before I'd feel comfortable releasing the locomotive back into service. Since the work will likely have the unit down for a while it presents an opportunity to complete a lot of other work without worry of rushing it back into service.

Ideally the injector and other engine work would be done when the radiators are out, especially considering what I'd like to do in regards to the type of engine work. The length of time to complete the mechanical work would also be an ideal time to work on the nose and body panels. If we are going to be taking the time to address as many of the issues listed above as possible (hopefully all of them) then I feel that we should be as thorough as possible in the overhaul of 917. This should probably include pulling all the heads and pistons for measurement and inspection of the heads, pistons and liners. When everything is off and the crankcase is drained would also be an opportune time to clean the sludge from the airbox and airbox drain lines.

It isn't going to be a cheap or quick undertaking. We're all aware of the cost of doing just the injectors and an oil change, and adding in any needed parts should we find issues with the power assemblies or other accessories will rapidly add onto those costs. There is also the matter of tooling, of which we have very little in the way of heavy engine maintenance tools. While I've planned on making some there is a possibility that we may need to purchase some though that has yet to be determined. Heavy tooling isn't cheap; luckily tooling is a (typically) one shot cost for non-consumable items. I'll be compiling a list of the needed tools for the 917 project in the coming weeks as a part of the continuing project proposal/write-up.

WP707

The work on the 707 wont be happening until after we get the SP2873 and QRR1100 through the shop for their annual inspections. By then we'll have an updated price quote for the injectors for this year and I'll have an idea of how my work and school schedule sits for allowing me to do the mechanical instruction for the injector swap and fuel rack adjustment.

As stated on the first page the work may be pushed back a ways into the season depending on how the annual inspections go on the two rental engines. If everything goes well then we should be looking at some time in mid-April. I'll discuss the possible complication with that below in 1100's section.

USA1857

While I've been putting off working on the Fairbanks because of the issues with the #1 traction motor and the work/lack of tools needed to further inspect it I think we may have a few solutions to get things back on track... so to speak. I suspect that there is an issue with the either the commutator's concentricity or it being out-of-round I didn't have the time or space to set up in the shop for doing the needed check. Luckily towards the end of last season Ethan Doty found some more Westinghouse traction motors while going through our boxcars, among them a couple of 362 motors. 1857 either has 362-D motors or Fairbanks Morse's license built version though that really doesn't matter too much since they are fully interchangeable.

I'd like to pull out the best of the 362 motors for inspection. It will be much easier to inspect and test a "free" motor on the shop floor than trying to do the work in the pit. If we are lucky we'll have one or two good motors on our hands that can be swapped out for the problematic motor under 1857, and we can deal with its issues at our leisure.

That just leaves the leaky auxiliary fuel pump, which will be swapped out with a unit I plan on rebuilding at work in the next couple of months as I have time.

QRR1100

While 1100 has been mostly reliable other than the occasional battery issue the deferred maintenance is definitely starting to show. Towards the end of the 2018 season the air issues under the cab started to crop up again. Seth Adams did some work with the air equipment under the cab back in November but it seems to the some the seals he softened let go not long after he left. Luckily it appears the mystery valve under the cab that is causing the problems can be removed without any issues to the operation of the controls. In addition to the usual air problems, Seth emailed me a list of mechanical items that he thought should be addressed. Most of the issues have been known about for some time.

It was noticed six winters ago that the lower liner seals had a habit of leaking when the temperatures get low in the winter, which is due to component contraction. Three seasons ago we discovered that practically the whole engine had been put back together at the mill with RTV and that it has over time lost some of its elasticity. So far we've been lucky that only some of the lower liner seal locations are the issue as opposed to the upper sealing surfaces. At the end of last year I noticed that airboxes on both sides had far more coolant in them than in past years, with coolant coming from tell-tale holes that had previously remained dry. It hasn't been a particularly cold winter thus far either, so the engine is leaking more coolant in warmer temperatures which doesn't bode well. Luckily it still seems that the upper sealing surfaces are still sealed well enough that I haven't found any noticeable traces of coolant in the crankcase. Just as a precaution I've taken a couple of oil samples to have analyzed. Once the temperatures warm up as we head into spring we should decrease the chances of a coolant leak into the pan.

The other issue that has cropped up again in the cold is that of weak batteries. It's been mentioned in the Presidents report so I'll just leave it at that.

SP2873

Like 1100 the 2873 continues to soldier on, but is starting to show the wear and tear. I'll likely submit some updated oil samples from 2873 when I submit the samples from 1100 though in this case it will be to check for fuel dilution. I plan to run 2873 through the shop first for its annual inspection and maintenance.

Some of the issues from last spring have been dealt with such as the leaky R1 brake cylinder which Seth fixed at the end of last season. There are some issues though that continue to get worse; namely the radiator leak and the leaking seals on the bottom of the oil cooler. I have a plan for replacing the leaking radiator which will be one of the first work items once the locomotive is in the shop. I need to check what we have in stock and cross-check some part numbers, but I think we have some of the required gaskets for the oil cooler.

Like 917 the 2873 has a few 645 assemblies in it that I'd like to swap out for 567C assemblies, but that won't happen until the locomotive undergoes an injector swap and oil change which I don't plan on doing until next season if at all possible. The results of the oil sample will be a determining factor though.

Shop Bays, Tool Room & Organization

This section isn't going to be particularly popular. Once the passenger cars are pulled from the shop I'd like to leave it clear for a short period and take advantage of the space to deal with some long overdue projects; cleaning and organizing the tool room and some of the shop bays.

While it's long been on the to-do list things came to a head the last time I was at the museum trying to get the oil samples from 1100 where retrieving simple tools such as wire cutters were perverted into some kind of industrial Easter egg hunt. I'll simply leave it at tools are not being put back in their proper locations or just being dumped in random drawers.

I'll be emptying out the drawers and clearing the pegboard in the tool room as well as emptying the toolbox in the machining bay in order to do a wholesale reorganization. The tools that the mechanics and machinists frequently use and need, as well as the metric tools, will be separated and kept in the red toolbox and the machinists locker at which point the toolbox will get a new lock. The tool room will be reorganized and optimized to store everything else.

I'll be clearing out the welding bay to make room for different equipment. I'd talked with Rod and Habeck a few years back about putting the then new to us injector testing stand and our parts washer in that bay as opposed to in the back by the deep sink. Mostly because we'd have to cut down the walls in order to get those pieces of equipment back there. I also plan on moving the solvent tanks into the bay as well. There should still be enough room for a small work bench in there.

Non-Locomotive Equipment

I haven't had much of a chance to talk with Bil Jackson about the so-called Rubber Tire Fleet and other auxiliary equipment. Hopefully we'll be able start talking about that in the coming week or so.

I'd like to remind everyone that we plan on implementing forklift training and certification this spring. With that will be some new inspection paperwork for the forklifts as well as some of the other vehicles.

Locomotive Inspection Form M1001

The latest version of Form M1001 went up on the web page last season. I've replaced all the forms in the operations cubby with the updated form. The only major changes are a new section for the engine oil check, more lines logging for defects, and some changes to the wording pertaining to the form's signature fields. It is also now a two page document. The second page is ruled for adding comments and also contains the signature fields.

Miscellaneous

Once I get a better handle on how my work and school schedule sets up at the end of the month and we've got the shop bays and tools dealt with I'll start scheduling locomotive annual inspections. As stated above SP2873 will be the first in line. Once we get to that point I'll try to maintain up-to-date progress reports on the equipment and what we have planned. I'll be willing to do an instruction course on performing annual inspections for those that are interested, as we'll have ample work and opportunity as we rotate locomotives through the shop through the spring into the season.

I'd also like to remind everyone that we are low on lube oil for the locomotives. Both units currently in service are at the low marks on the dipsticks and will need to be topped off before the season starts.