

## ***The Potential Savings to be Made***

It is very difficult to provide any accurate data on the overall savings on offer by using **Porta Treatment** for the simple reason that each operation is different. Estimates on cost savings can only be made on a case by case basis. Whilst **Porta Treatment.com** is happy to undertake such a study it is felt it may be easier for the operator, with all the required knowledge of the operating environment, to calculate the potential savings.

As a guide to the areas in which savings can be made the following lists are offered. It should be noted not all potential savings may be available from the very start, it will depend on the circumstance - such as whether the treatment is corrective or preventative.

When cost savings need to be considered in some or all of these areas:

- Fuel saving;
- Water saving;
- Staff time;
- Parts and other materials costs;
- Time unavailable for traffic;
- Potential water disposal issues.

The above savings can be made in the following areas, with certain items expanded on to underline the point:

- Blowdowns reduced in number:
  - One or two a year maximum;
- Washouts reduced in number\*:
- Water side boiler repairs during a period of running radically reduced if not eradicated\*:
- Heavy boiler repairs on the water side not required as before when operating in a fully preventative way\*:
  - Zero stay replacement through wastage;
  - Zero stay replacement through overheating failure;
  - Zero stay replacement through caustic embrittlement;
  - Zero plate repairs or replacement through wastage;
  - Zero plate repairs or replacement through overheating failure;
  - Zero plate replacement through caustic embrittlement;
  - Tubes can last over 20 years where regulation allows;
- Superheater element life greatly increased - Porta believed up to 30 years would be possible\*:
  - Effectively zero steam side corrosion;
  - Effectively zero steam side overheating failure;
- Pure steam reduces wear, increasing life expectancy and offering better efficiency in\*:
  - Slides valves;
  - Piston valve heads and rings;
  - Piston heads and rings;
  - All steam circuit valve packings;
  - Auxiliaries;
- Lubrication savings possible due to low contamination and thus it is more effective by volume;
- Less maintenance required on injectors, clacks etc due to zero fouling\*:
- Fuel savings:
  - Zero fouling increases efficiency of heat transfer, reducing fuel consumption;
  - Reduced water consumption through higher overall boiler efficiency;
- No water tanks repairs on the water side\*:
  - Zero plate repairs through corrosion;

- No requirement to pre-treat water before use, any water source, including very saline supplies, can be used without concern;
- No requirement to drain boiler and tanks for periods of storage except where frost damage is a risk\*:

\*All such marked items can assist in reducing the overall number of locomotives required for service where circumstances suit.

Costed figures outlining the success of the treatment regime at FCAF will be available on the completion of test reports covering the work carried out on FCAF Nos.2 and 3. However it can be stated that:

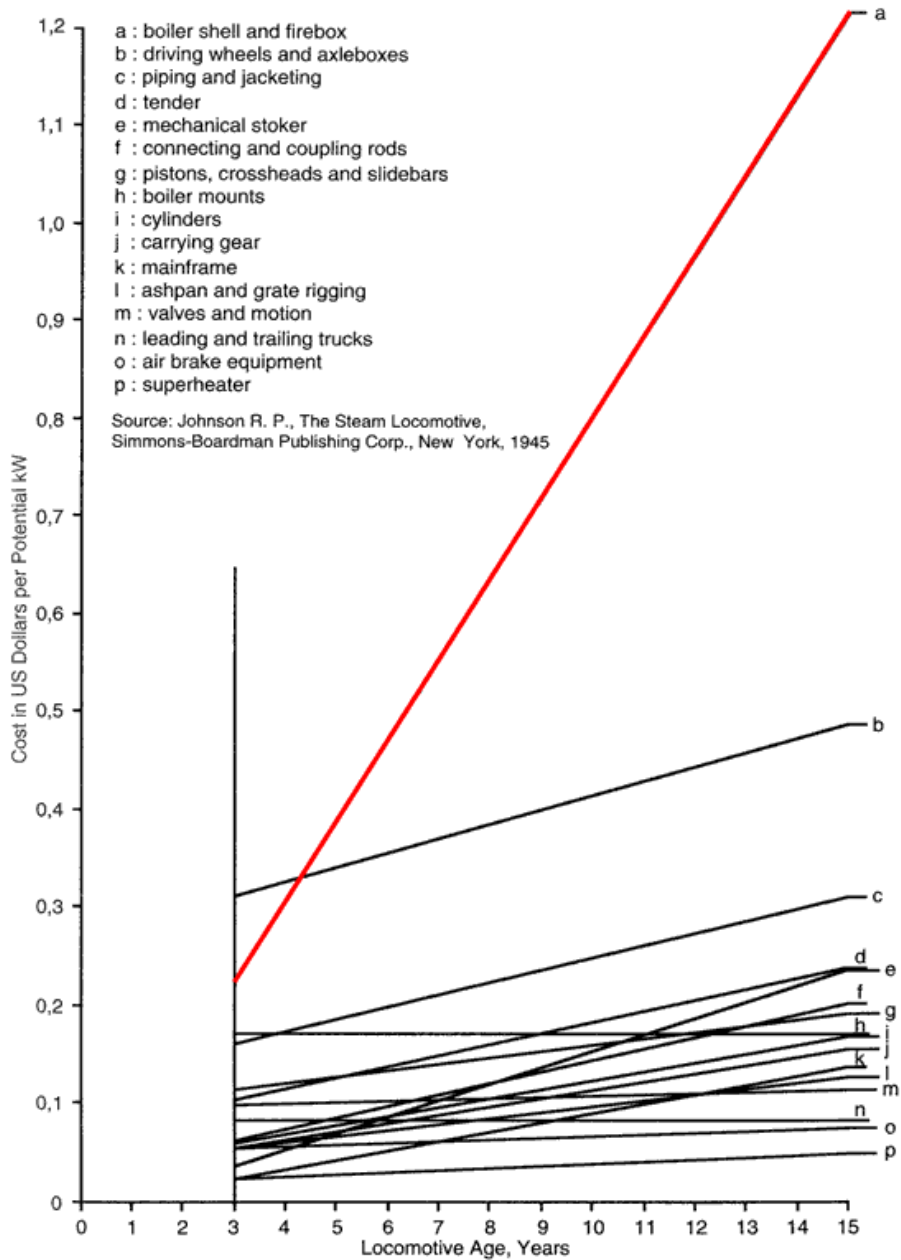
- FCAF No.2 has not had to have any boiler maintenance whatsoever since 2001, when the current boiler was fitted. This includes the periods of maintenance, such as over the winter of 2003, when a large amount of mechanical work was undertaken;
- FCAF No.3, the boiler of which suffered very badly during the 1995-1999 period of running with no boiler treatment or correct maintenance procedures, has been trouble free since 2000, one year into the treatment application;
- Since October 2000 neither FCAF No.2 or No.3 have not lost a day in service or failed due to boiler problems;
- Washouts at a minimum of 6 monthly intervals; 209 days in steam is the current maximum achieved. However this washout only occurred as it was scheduled, not because it was required;
- Blowdowns have been reduced to no more than a couple every six months. In each case  $\frac{1}{4}$  of the water showing in the gauge glass was extracted via the blowdown valve. All blowdowns are undertaken whilst at the locomotive depot. Blowdowns when running are prohibited;
- All water tanks are scale free through the action of the treatment, not manual cleaning;
- All water tanks are virtually corrosion free, remaining corrosion dates from before the treatment was implemented. There is no new corrosion.

Porta quoted the use of uncontaminated steam had the effects listed below. These figures are striking and underline why ensure pure steam is of great importance:

- 10% increase in overall mileage possible between periods of workshop repairs;
- 15% decrease in peak output when nearing the point at which workshop repairs would be necessary.

As a further example if it is considered that washouts can be reduced from once monthly to once a year PT would lead to a 91% reduction in the number of washouts required and at least a 91% reduction in all related items.

The graph which follows, taken from D.Wardale's book "*The Red Devil and Other Tales from the Age of Steam*", shows how boiler repairs (line in red) formed the greatest fraction of the overall cost of locomotive repairs in the USA over the life of a locomotive.



Maintenance Cost Trends for Locomotive Components (Classified Repairs)

Whilst not all boiler repairs are due to water side causes it is not inaccurate to state the majority are. As any locomotive operator will know water side boiler repairs are neither inexpensive or necessarily easy tasks. Through the use of **Porta Treatment** line a would be nearly flat throughout the entire life of the locomotive and at a much lower level in the graph.