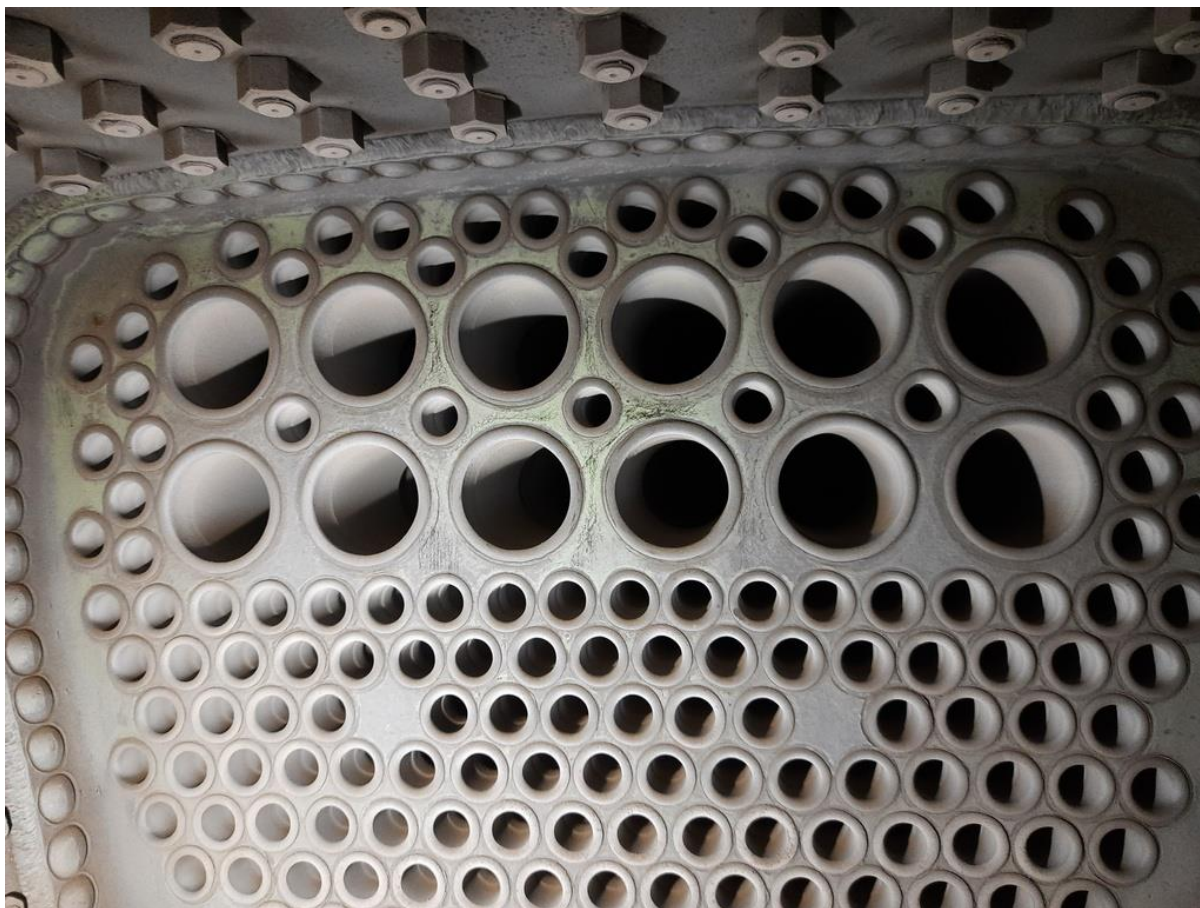


## Chlorine Content

An issue was seen on three trials carried out at the Keighley and Worth Valley Railway with 78022, which has a copper firebox. The trials were carried out with CPL's Heritage Blend 2, Heritage Blend 3 and Wildfire. After each test and after the engine had cooled down, a green patina was seen on firebox surfaces and tube beads.



**Green Patina on tubeplate of 78022**

Photo courtesy Ralph Ingham - KWVR

The patina was washed off between trials using water with a pH of 11.5.

To date, this issue has not been reported at trials on other railways, though the green patina may only be apparent when the engine is cold. If instances of the green patina are seen, send information and pictures to [coal@bvrw.co.uk](mailto:coal@bvrw.co.uk)

This is currently under investigation. Because it is a thin layer, it has not been possible to obtain enough for chemical analysis, though samples of ash, birds' nests and smokebox char have been taken for analysis. A literature review of historical and contemporary technical publications is also underway.

As part of the investigation, CPL obtained proximate analyses of the 3 fuels trialled.

The chlorine contents are: -

Fuel	Chlorine Content
Heritage Blend 2	.24%
Heritage Blend 3	.28%
Wildfire	.18%

As a comparison the chlorine content of coals recently used in the UK are: -

Coal	Chlorine Content
Ffos-y-fran	.07%
Kazak	.08%
Shotton	.02%

In UK preservation, although some years ago, there are known instances of high chlorine coals corroding copper fireboxes locomotives at the KWVR; Nos 957, 43924 and 41241. Fortunately, these were caught in sufficient time before lasting damage took effect.

At the Bure Valley a batch of high chlorine Ffos-y-fran etched welds on steel fireboxes.

Other railways may have their own experiences with high chlorine coal.

The current batches of CPL fuel have the similar levels of chlorine and are suitable for trials. Each user should use their judgement whether to use the current batches for extended use.

The HRA is working with CPL to develop the fuel and concerns about the high chlorine content were raised face to face with CPL at Director level. CPL have recognised our concerns, identified the source of the chlorine and are producing a batch (week commencing 16/5/22), using a different binder and modifying the production process. This is expected to bring the chlorine content down to circa 0.06%. CPL will send samples off to an independent laboratory for confirmation of the chemical analysis and physical properties. Locomotive testing is planned on the Bure Valley, East Lancashire, Keighley & Worth Valley and North Yorkshire Moors Railways.

**John Hind**  
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