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Report 2024/15

Assessment of pyrotechnological
residues from land north of Bradford
Road, Trowbridge (TROW/24/EV)

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25th July 2024

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Abstract

The investigated materials comprised a total of approximately 3.5kg of residues from the burning of coal. The most likely, but not certain source of such an assemblage would be as waste from the operation of a small steam engine, but other possibilities cannot be excluded.

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Methods

All materials were examined visually, using a low-powered binocular microscope where required.

The assemblage was produced during a field evaluation by Archaeology Wales (site code TROW/24/EV)

This assessment was conducted in July 2024 and was commissioned by Dr Rhiannon Philp of Archaeology Wales.

Results

The investigated materials weighed approximately 3.5kg and comprised five separated fractions from a single 40l bulk sample (sample <1> from context (203). A total of 3562g of material was submitted (>5mm 2130g; >5mm picked 176g; 2-5mm 796g, <2mm 420g; <2mm magnetic fraction 40g).

The assemblage comprised various materials associated with the use of coal as fuel.

There was a small amount of unburnt coal (mostly in fragments of less than 20mm) and a much larger proportion of coal shale (in fragments ranging up to approximately 50mm). The coal shale pieces ranged from unburnt to highly altered (becoming white and brecciated as a result of heating) with many pieces showing adhering clinker from the partial melting of the shale. Some of the shale appeared completely unaltered and was rich in plant fossils. However, some of the larger burnt shale pieces showed relatively unaltered cores, so some of the apparently fresh material may simply be from the core of larger pieces.

The assemblage was rich in clinker (the slaggy material formed from the partial melting of the inorganic component of the coal (and coal shale). Most of this clinker was of low density, but a small proportion of pieces were denser, showed more indication of flow and were probably of a more iron-rich composition. The largest pieces of clinker were up to 60mm, with complex shapes indicating their formation around substantial pieces of melting coal shale.

The most abundant material in the assemblage by volume (though not by weight) was coke, the low-density carbonaceous product from the partial burning of coal. This occurred in fragments of up to 60mm, though much was of a finer grain size.

The finer grained fractions shows the presence of small blebs of clinker, with the finest (<2mm) fraction showing an abundance of sub-millimetre magnetic spheroids (with a superficial resemblance to spheroidal hammerscale but lacking the scale's characteristic surface lustre).

Interpretation

The detailed interpretation of assemblages of residues from the burning of coal is problematic, because there is little difference in the assemblages produced by different contexts of the burning.

Potential sources include steam boilers (for industrial purposes, for stationary engines, for locomotives, both on railways and as 'traction' engines and in many other contexts), other industrial process (brick making, gas production, other forms of ovens and kilns etc.) and even domestic settings (hearthths and heating systems).

Most large industrial boilers might be expected to produce larger pieces of clinker and to have less of the coal shale surviving in a relatively unaltered form. The assemblage does not show any indication of derivation from a metallurgical process (i.e no spills, as is common in fuel waste from crucible furnaces and no hammerscale, as is common in fuel waste from smithing hearths).

The pieces of clinker and the amount of coal-shale present in this assemblage, suggest the use of a rather poor-quality coal.

Multiple industrial works lie close to the site, as does a railway and gas works. The assemblage cannot be assigned to an origin in any of these with confidence.

Further work

This assemblage cannot be assigned to a more precise technological origin. Unless there are specific archaeological questions to be asked of the material, there would be little archaeological benefit from further investigation, so no further analysis is suggested.

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