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MECHANICAL AND PRODUCTION ENGINEERING

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# HALIFAX PLACE, NOTTINGHAM

# SLAG REPORT

## Introduction

The production of early iron artefacts was the result of two processes; firstly the smelting process in which the metallic iron was extracted from the ore, and secondly the smithing process in which artefacts were manufactured and subsequently repaired or altered. Both processes generated slag as a by-product. Ironworking structures, furnaces and hearths, are rarely recovered or identified on archaeological sites. The interpretation of ironworking activity therefore relies on the identification of the slags. The ironworking residues were waste products of the process and therefore tend to be found in contexts contemporary with, rather than directly associated with, ironworking features. The nature of slags, notably their survivability, leads to problems of residuality on archaeological sites.

## The Identification of the Residues.

The ironworking process generated residues as by-products, and these can be broadly divided into diagnostic and non-diagnostic residues. The classification has been discussed in more detail elsewhere (McDonnell 1983, and McDonnell forthcoming)

The non-diagnostic residues may have derived from ironworking or other pyrotechnological processes, and comprise fuel ash slag and furnace/hearth lining. The diagnostic residues were direct by-products of the ironworking process.

A total of 60.9 kg. of residue were recovered from the excavation, and were classified, on their morphology, into the eight groups shown in Table 1. All the classes had typical morphologies, except the undefined group which could not be ascribed to either smelting slag or smithing slag with certainty.

TABLE 1 RESIDUE CLASSIFICATION (Weight in kg.)

| Diagnostic Residues | kg. | % of Total |
|---|---|---|
| Smelting Slag | 25.8 | 42.3 |
| Tap Slag | 18.1 | 29.7 |
| Smithing Slag | 7.0 | 11.5 |
| Hearth Bottoms | 2.0 | 3.3 |
| Undefined Slag | 6.9 | 11.3 |
| Cinder | 0.5 | 0.8 |
| Non-Diagnostic Residues | | |
| Furnace/Hearth Lining | 0.6 | 1.0 |
| Fuel Ash Slag | 0.1 | 0.2 |
| TOTAL | 61.0 | |

Residue Distribution (TABLE 2)

A small quantity of the diagnostic slags occured in Area A, the remainder was equally distributed between Areas B and C. There was no concentration of slags within B and C, but there were large deposits within individual pits e.g. Context 318 ( Area B ), and Context 328 ( Area C ).

TABLE 2 DIAGNOSTIC SLAGS BY AREA (Weight in kg.)

| AREA | SMITHING + HEARTH BOTTOMS | SMELTING + TAP SLAG | UNDEFINED SLAG |
|---|---|---|---|
| A | 0.4 | 0.5 | 0.0 |
| B | 4.2 | 22.0 | 3.8 |
| C | 4.4 | 21.3 | 3.1 |

The deposits of slag did not respect the property boundaries, and therefore it is unlikely that they originated from one of the properties excavated.

The Phase Distribution (Table 3)

The slag occurred in contexts including and later than Phase IV.6 and was concentrated in two phases. The majority of smithing slag and smelting slag occured in contexts that were disturbed and were unphased, perhaps the result of the levelling activity.

TABLE 2 DIAGNOSTIC SLAGS BY PHASE (Weight in kg)

| PHASE | SMITHING SLAG + HEARTH BOTTOMS | SMELTING SLAG + TAP SLAG | UNDEFINED SLAG |
|---|---|---|---|
| Unphased | 4.54 | 23.40 | 0.85 |
| VI.2 | 1.37 | 2.10 | 1.31 |
| VI.1 | 0.10 | 0.17 | 1.76 |
| V.2 | 1.58 | 16.03 | 2.39 |
| V.1 | 0.00 | 0.61 | 0.00 |
| IV.6 | 1.40 | 1.62 | 0.57 |

The second large deposit was in Phase V.2, 11.5kg. of the smelting slag was deposited in Pit 318. Only Contexts 284, 317, and 345 (all Phase V.2) contained more than 1 kg. of slag.

## Conclusion

The majority of the diagnostic slag occurred either in unphased contexts or appears to have been redeposited. It is therefore probable that the slag was brought onto the site (e.g. for levelling), and does not represent ironworking activity on the site.

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