Investigation of a Composite Artefact from Gallows Bay, Nevis (Lesser Antilles)

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Summary
The report focuses on the investigative conservation of a composite object of iron and wood from Gallows Bay, Nevis (Lesser Antilles). The main aim was to compile analytical information (X-radiography, XRF analysis) which would serve to clarify the function(s) and technology of this device.

Keywords
Iron, Wood, Conservation, Post-medieval

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Introduction

The following is a brief report which focuses on the preliminary examination of a composite object of iron and wood from Gallows Bay, Nevis (Lesser Antilles).
This project was undertaken as a result of a request from Dr Elaine Morris (Project Manager, Nevis Heritage Project) for further investigation/clarification of this object.
The work was undertaken as part of the time dedicated to the University of Southampton at English Heritage's Conservation and Technology laboratories at the Centre for Archaeology, Fort Cumberland, Portsmouth.

Context

The artefact was recovered from Nevis**,** one of many islands associated with the Lesser Antilles (**see figure 1**), an arc of small islands in the Caribbean Sea which extend from Puerto Rico (in the north) to the northern coast of Venezuela (in the south).

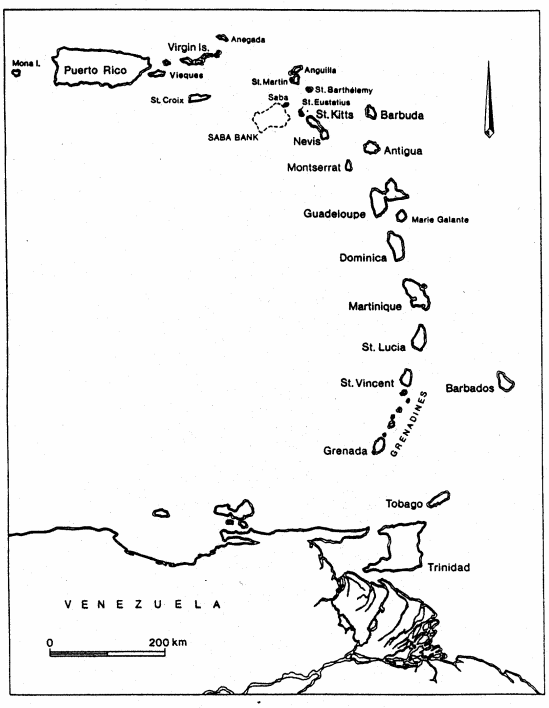

Figure 1: Map of Lesser Antilles (from Nokkert, 1995 pp97)

The object was recovered from context GB005 (**see figure 2**), one of several material concentrations discovered along the shoreline of Gallows Bay, in the SW.
Material recovered from this bay suggests that c.1750-1850 is likely to represent the most intensive period of site activity.

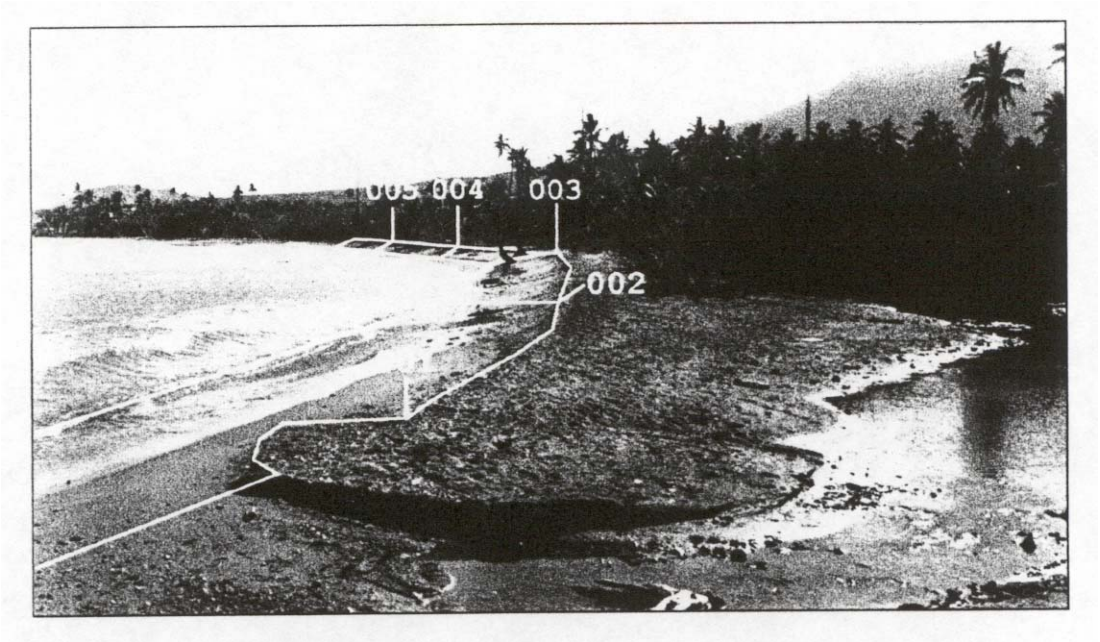

Figure 2: Location of GB005, Gallows Bay (from Bangeter, 2000 pp39)

The Object and its condition

***Description (see figure3 for further clarification)**:*
The object consists of two materials, iron and wood.
A rectangular iron plate (c.12.0x4.5x1.4) has been attached to a long strip of wood (c.24cm in length) with two nails/bolts at either end; the remains of a third nail/bolt can be seen at one end of the wooden strip, but its function is not entirely apparent.
Attached to the metal plate is what appears to be some kind of 'mechanism' consisting of a short, barrel-like component emerging from which is a long, flat 'arm' with a hinged terminal at one end, and what appears to be an articulated section at the other.
Other features include the remains of a small, dome-shaped item, embedded in the wood directly below the rectangular iron plate.

Condition:
Initially, the object had been packed in an airtight container (polypropylene container with snap-on-lid) immersed in water (seawater from Gallows Bay); this water was subsequently replaced with distilled water. It was later removed from its state of immersion and placed in an air-tight container padded-out with bubble-wrap for support.
The object is currently damp and appears to be stable. There are no obvious signs of active corrosion, areas of particular weakness or warping/shrinking/splitting of wood.
The wood has rounded edges (like driftwood), presumably a consequence of the erosive action of water currents. Some parts of the wood are quite dark (particularly

on the underside) and this might possibly be charring (as a result of fire?).The grain pattern of the wood is also quite clear.
The iron components appear quite stable, though some corrosion products have obscured some details. Flaking of some surfaces appears to have occurred at some point in the past, but certainly not recently.
The articulated section of the 'arm' has almost certainly suffered some physical damage: part of the 'arm' appears to have been bent back, and the shortest section of the articulation has been broken off.

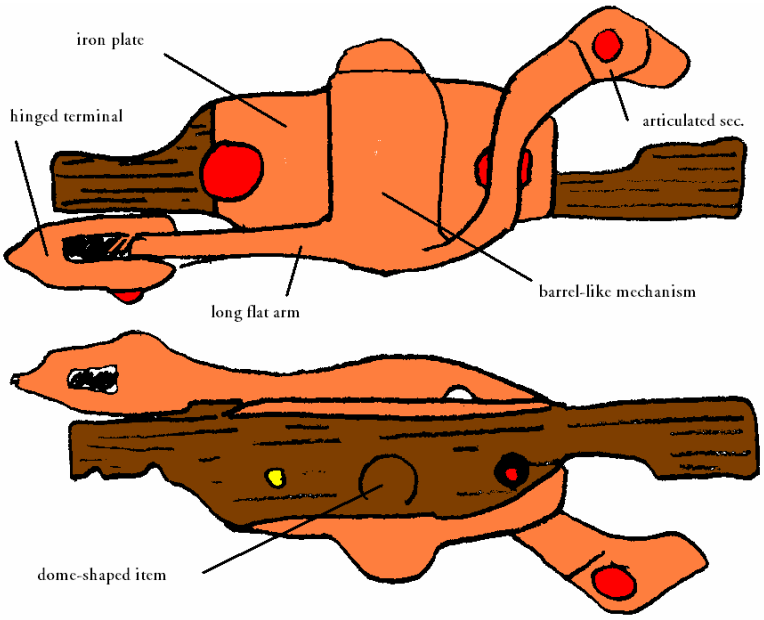

Figure 3: Diagram of object

Examination

The object was examined with the aid of a low power binocular microscope and by x-radiography.

X-radiography:
After some preliminary testing, it was decided that a number of x-radiographs would be undertaken:

- At least one of these would record the condition and relationship between the two main types of material (Fe and wood) (**see figure 4**)
- Others would aim to clarify the internal workings (technology) of this artefact.

Results

The following offers a summary of results.

Condition:
X-radiography has revealed the following details:

- The iron is in fairly good condition (a large proportion of metal survives), with few areas showing extensive corrosion.
- Some parts of the wood appear to have been replaced with iron corrosion products, particularly in and around the areas closest to the main mechanism and plate.
- The articulated terminal is indeed broken off (**see figure 5**)

Construction/Technology:
Above all, x-radiography has been able to reveal a much clearer image of the various components that make up this artefact. Two of the more interesting results are summarised below:

- The iron plate has a straight edge at one end but a deliberate, triangular-shaped opening or cut-out at the other (**see figure 6**)
- Emerging from the centre of the long arm is a short, cylindrical pin or bolt which penetrates or is contained by the barrel-like component. The opposite end of this pin or bolt has what appears to be a deliberate, perforated terminal. It has been suggested to me that this would have been designed to receive a split pin (Chris Underwood, pers comm)

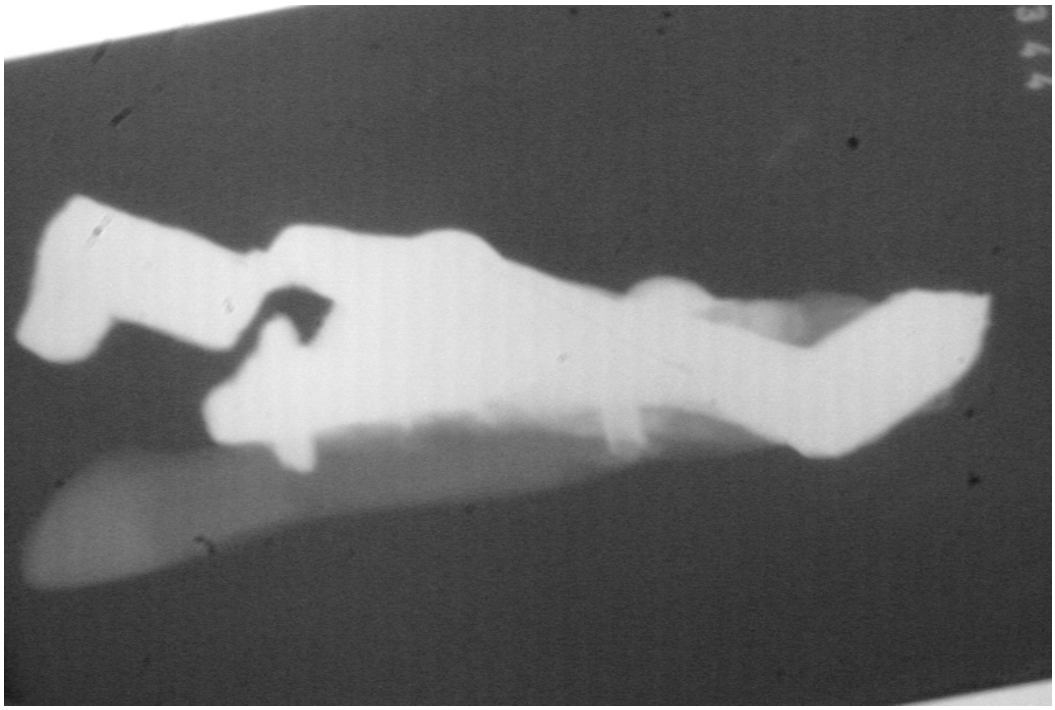

Figure 4: X-radiograph showing relationship between metal and organic components

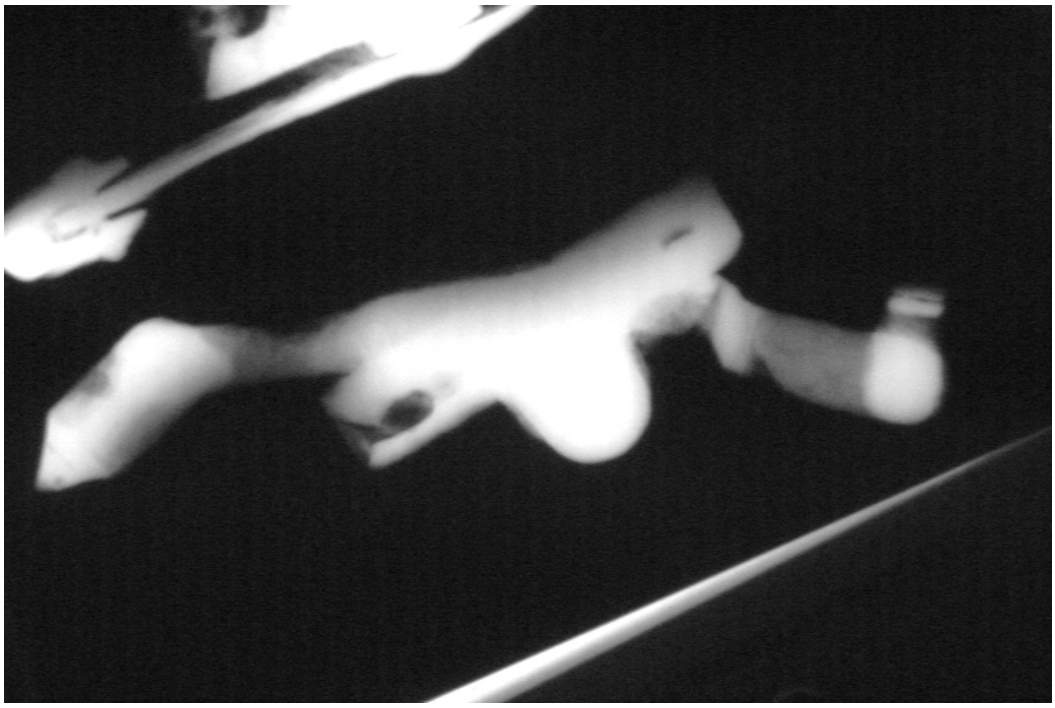

Figure 5: X-radiograph showing broken end of articulated terminal

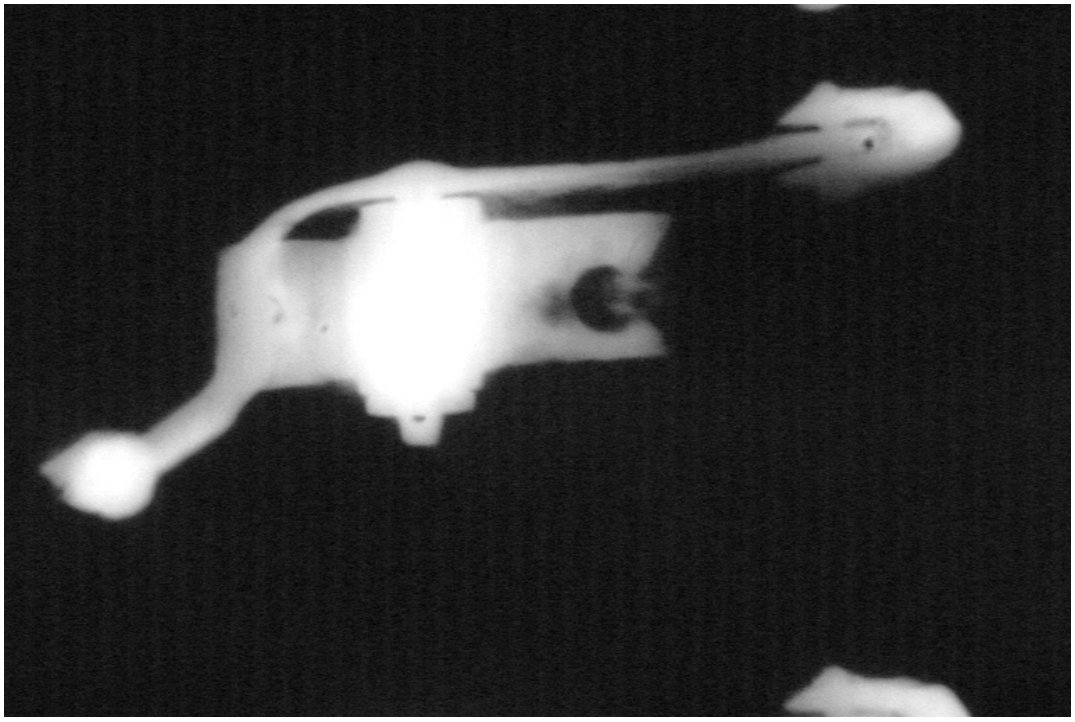

Figure 6: X-radiograph showing shape of iron plate and perforated terminal of barrel-like component

***Analysis**:*

Analysis of the drum-like mechanism was carried out using the Energy Dispersive X-ray Fluorescence Spectrometer (EDXRF) to determine whether or not lead had been used in this part of the object. It had been thought that one of the reasons why it had been difficult to produce informative x-radiographs of the internal workings of this mechanism was due to the possible presence of lead (which would obviously prevent x-ray penetration)

Results (**see figure 7**), however, show that lead is not present in this component (only in trace form) and that it is mostly composed of iron. It is thus more likely to be the density and condition of the metal that is preventing the acquisition of a more informative x-radiograph.

Further analysis (**see figure 8**) of the outer section of the barrel-like component with the emerging long, flat 'arm' (where light green corrosion products seem to be forming) detected the presence of a copper alloy (Cu and Zn). This might indicate that parts of this device are made of brass.

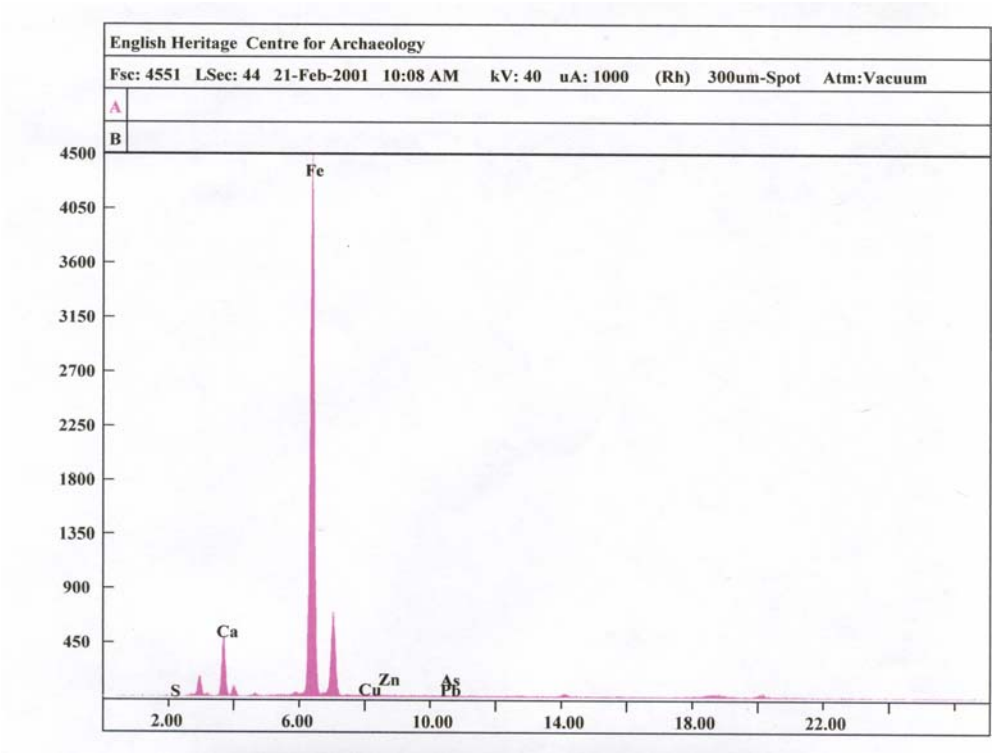

Figure 7: XRF analysis for the outer section of the barrel-like mechanism

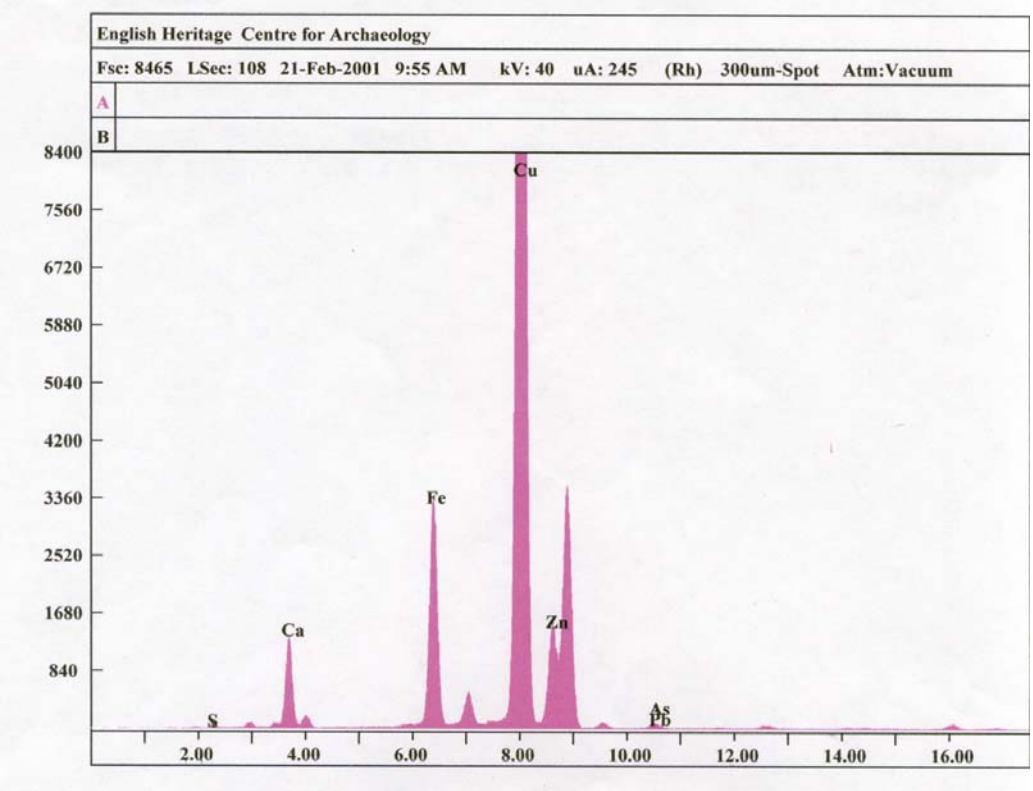

Figure 8: XRF analysis of the Copper-alloy section of the barrel-like mechanism

Future Work

Identification

It had originally been thought that the item might have been part of a matchlock musket. However, curators at the Mary Rose Trust were not convinced that it had ever formed part of handgun or similar weapon. Instead, they suggested that it might have been a structural fitting or part of a pumping device (the split pin component would seem to fit well with this suggested use). The findings presented in this report would tend to support this conclusion.

While this investigation was not able to confirm the possible function of this device, it is hoped that the information collected will help more informed individuals to ascertain its most likely function.

Conservation

No decision has been taken on the retention of the artefact at present but, if the decision to retain it is taken, it will require further conservation to ensure its stability.

It is currently being stored in a cold room (c. 3-5°C) in an air-tight container, triple bagged with self-sealing polyethylene bags and supported by bubble-wrap. This has slowed down considerably the rate of evaporation as well as stabilised its condition.

However, in the long term some of the following factors may affect the condition and stability of the object:

- shrinking/splitting of wood (through the process of dehydration)
- active corrosion of iron/copper-alloy
- problems arising from the presence of soluble salts.

These problems will eventually have to be addressed if the object is to be retained as part of an existing archive. This would most certainly involve some kind of treatment including the removal of soluble salts and the stabilisation of the wood and metal components.

References

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Nokkert, M., 1995 *Prehistoric Faunal Exploitation on St. Martin. An analysis of the vertebrate faunal material from the pre-Ceramic Norman Estate and the Cedrosan Saladoid des Peres sites.* Thesis for the title 'Master of Arts' on 'Archeologie en Cultuurgeschiedenis van Indiaans Amerika' at the University of Leiden, The Netherlands.

Acknowledgements

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Also many thanks to Karla Graham (E.H.) for help with descriptions.

Materials and Equipment

Radiography was undertaken with the following facilities and equipment, all available at the CfA.
For X-radiography:
AGO Installations Limited x-ray unit (AGO HS 225kV Hi-Stability system).
AX Kodak film loaded into rigid light-fast cassettes with lead screen intensifiers.

For XRF analysis:
EDAX Eagle II