

██████████
DERA Radiation Protection Services
Institute of Naval Medicine
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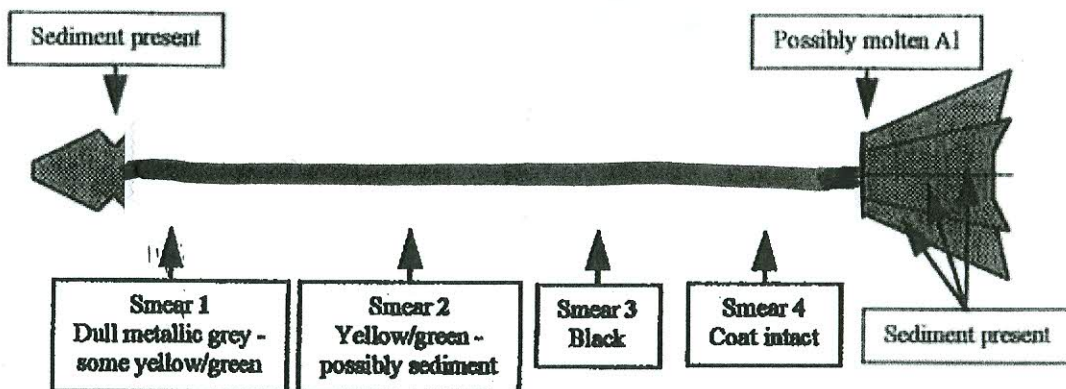
Our Ref. DERA/Ranges/Land(ESK)/ECR/121/001
Your Ref.

28 October 1997

Dear ██████████

DU Penetrator Recovered from the Solway Firth

1. Please find enclosed the smears and a small sample of oxide taken from the penetrator which was recovered from the Solway over the weekend. The schematic below indicates the locations from which the smears were taken.



2. The penetrator is currently in storage at Eskmeals in a container filled, as best we are able, with nitrogen gas in an attempt to arrest further corrosion.
3. Should you require any further information, please do not hesitate to contact me. In the meantime I would be grateful if you could provide personal dose information and the smear analysis results as soon as possible.

Yours sincerely,

██████████
██████████
Radiation Safety Officer

DERA Eskmeals

Health Physics Section

Recovered Depleted Uranium Penetrator

Introduction

1. The penetrator was recovered from the Solway Firth on Friday 24 October 1997. It was, however, not handed over to DERA personnel until Monday 27 October 1997 when the boat docked at Maryport, Cumbria.
2. On receiving the projectile it was first monitored to ascertain whether or not the item was in fact manufactured from depleted uranium (DU). On confirming this it was placed into a sealed transport container and immediately returned to the 'active' laboratory at VJ Battery, DERA Eskmeals.
3. In the laboratory the penetrator was monitored both visually and radiologically but in-depth assessment was not possible without more specialised equipment.
4. Following inspection, the penetrator was photographed and then placed in a container filled, as best we were able, with nitrogen gas in an attempt to arrest further corrosion.

Observations

Physical Description

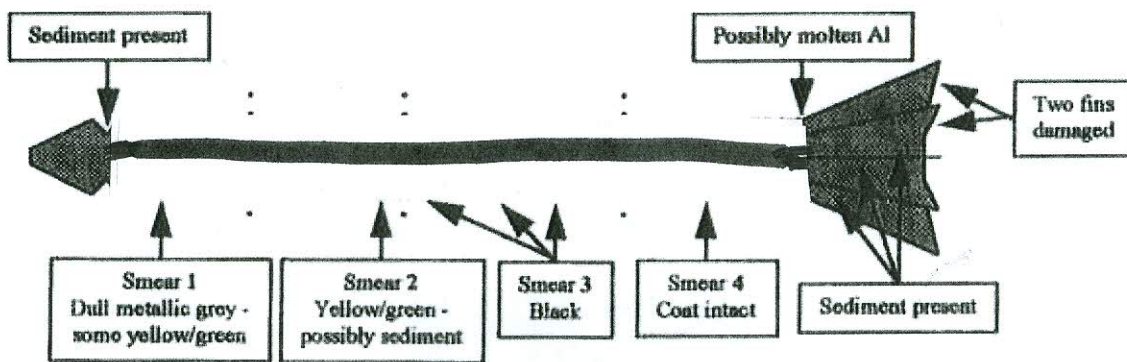
Length	approximately	██████████
Diameter	approximately	██████████
Weight	approximately	██████████

Condition

5. Overnight storage in the laboratory had allowed the penetrator to thoroughly dry out. As a result there was a noticeable but unquantifiable increase in the amount of blooming and the black oxide had lost its cohesiveness and was markedly more friable.
6. The penetrator was in remarkably good condition for something that has been fired out of a gun and into the sea where it had remained for an (as yet) undetermined period. The corrosion present is relatively light and the penetrator can be considered in five distinct regions:
7. At the front the metal is dull grey, the aluminium coating has gone and slight yellow/green oxide 'blooms' have formed. Some silt is compacted into the shoulder.

8. In front of the [redacted] area more extensive yellow/green oxide has formed and there is some silt trapped in the [redacted]
9. To the rear of the [redacted] area but in front of the [redacted] area there is more extensive oxidation. This is black and friable and there is some erosion of the DU.
10. The back end of the penetrator is still coated with aluminium - this is bright and apparently unaffected by the seawater. Between the [redacted] area and the fins there are what appear to be globules of aluminium mixed with oxidised DU, possibly caused by heating.
11. The fins are largely intact except for two which have slight damage. Silt and sea shell fragments are impacted between the fins.

The schematic below should help to identify the various areas referred to above.



Smear Results

12. Before being sent to DRPS, the smears taken were initially screened using a Harwell solid-state alpha drawer assembly operating at 43% efficiency. All smears were taken over an area of approximately 40cm² and the results as shown below are in counts per 300 seconds net of background:

Smear 1	90 counts
Smear 2	58 counts
Smear 3	68 counts
Smear 4	37 counts
Smear 5	Nil

[redacted]
Radiation Safety Officer

DERA Eskmeals
29 October 1997