5.

ML091730482 email dated 2/2/2009;

titled: Monday update; contains pictures of analysis

Rick Piccolo

From: Rick Piccolo
Sent: February 02, 2009 11:46 AM
To: Kathy Modes
Cc: Penny Lanzisera; Stephen Poy; Mark Kattmann; Andy Partridge; Richard Dillon; Chris Heath; Ted Jackson; Nigel Paterson
Subject: RE: Monday update
Attachments: @

Hi, Kathy,

The results from the lab were returned to us shortly after your departure on Thursday. We are in the midst of reviewing it and the exerpts below discuss the material composition and particle size.

Regards,

Rick

********** discussion on composition
****

Using polarised light microscopy the continuous phase exhibits a low birefringence in this section – again a common feature of fluoropolymers. A hot stake microscopy experiment (Non UKAS) reveals that the melting point of this birefringence is very high (in excess of 300 degrees). This is further evidence of a high melting point polymer phase that binds the black opaque particles together.

What follows is a sequence of SEM / EDX spectra that gives a "fingerprint" of the inorganic material comprising the particles illustrated above. Characteristically, the particles contain Fluorine (probably the Fluoropolymer matrix) [redacted] are also detected and this appears to be due to fine particles entrained in the continuous phase. [redacted] the light micrographs are representative of this material which is likely to be wear debris. Traces of Iron were noted in many of the particles examined and on searching individual particles we noted small particles of Iron / Chrome / Nickel containing material – probably stainless steel. Occasionally we noted small Sulphur and Silicon peaks.

We therefore postulated that the clinical deposit was a soft fluoropolymer that has acted as a binding agent for wear debris fro[redacted] other parts of the machine.

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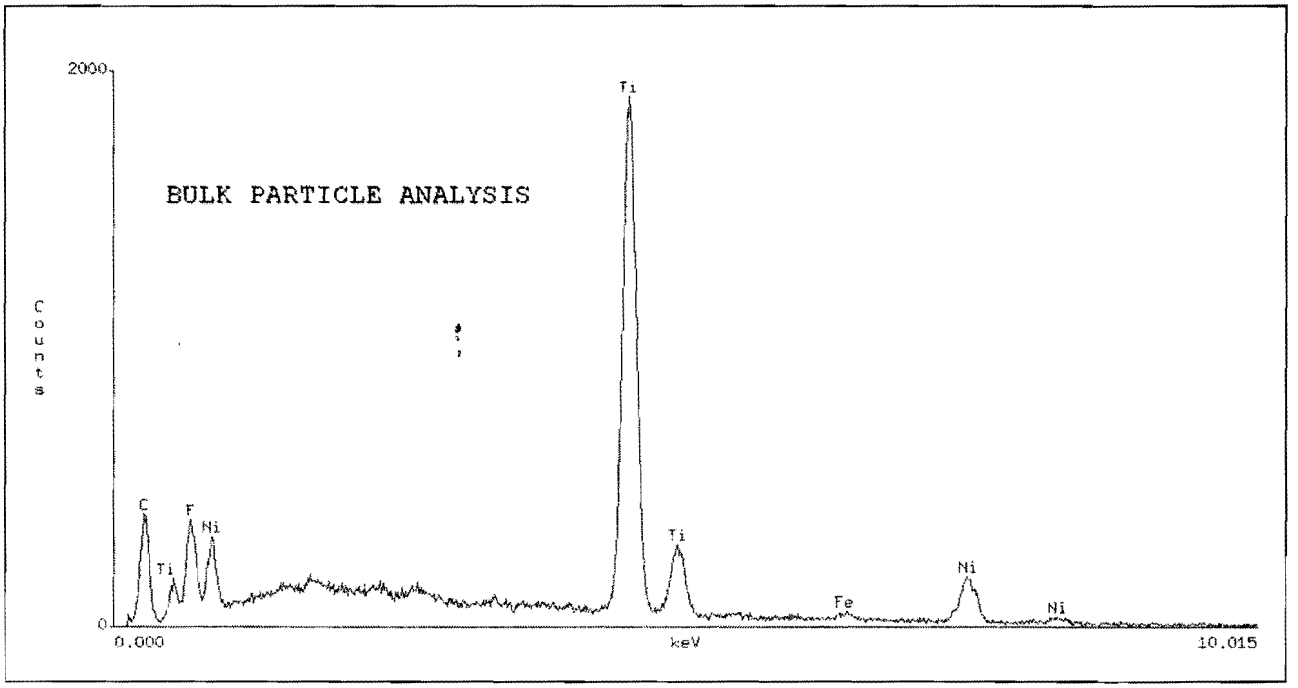
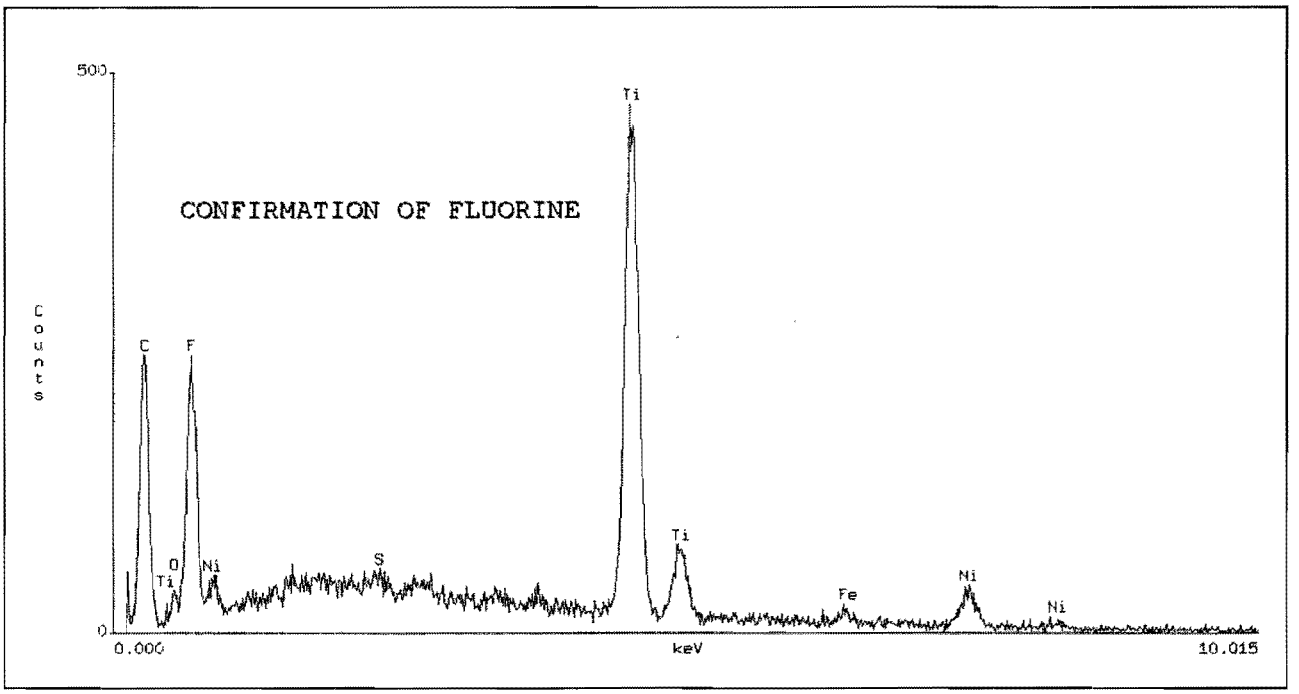
We therefore postulated that the clinical deposit was a soft fluoropolymer that has acted as a binding agent for wear debris from t[redacted]e and other parts of the machine.



MICW EDX (1) CLINICAL DEPOSIT.

Accelerating Voltage: 15 KeV
Live Time: 100 seconds

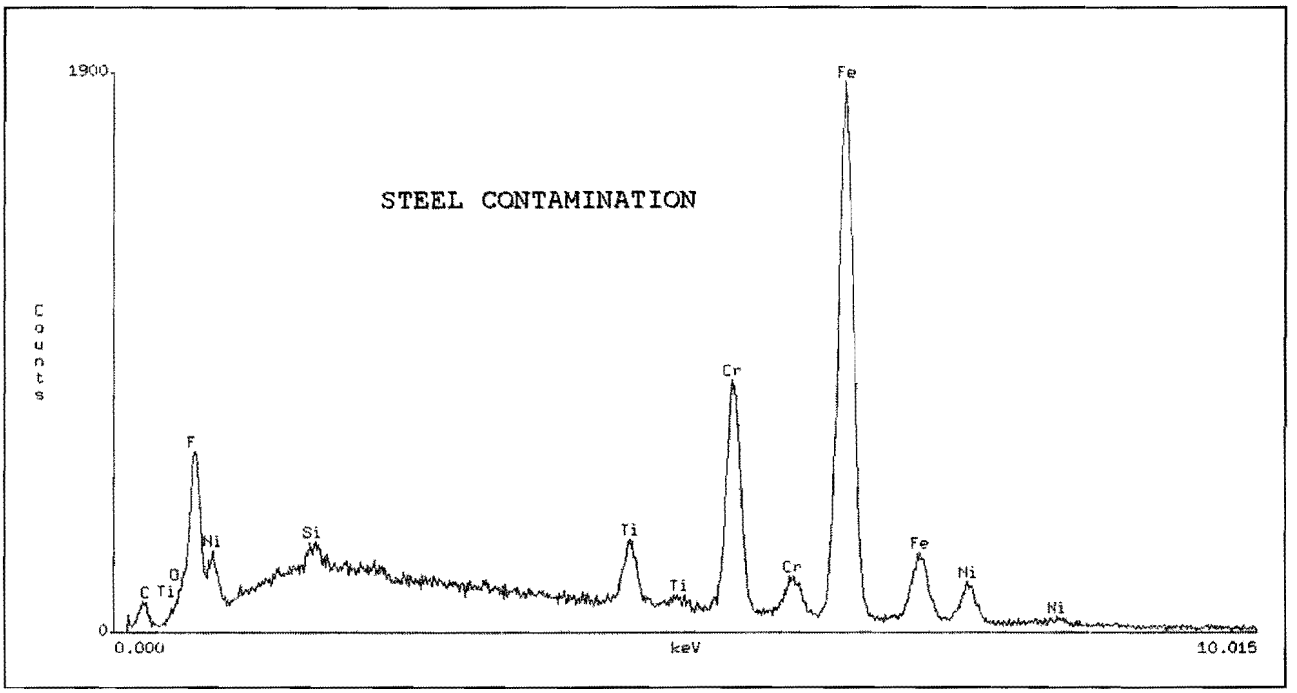
Take Off Angle: 35°
Dead Time: 13.27



MICW EDX (1) CLINICAL DEPOSIT.

Accelerating Voltage: 15 KeV
Live Time: 100 seconds

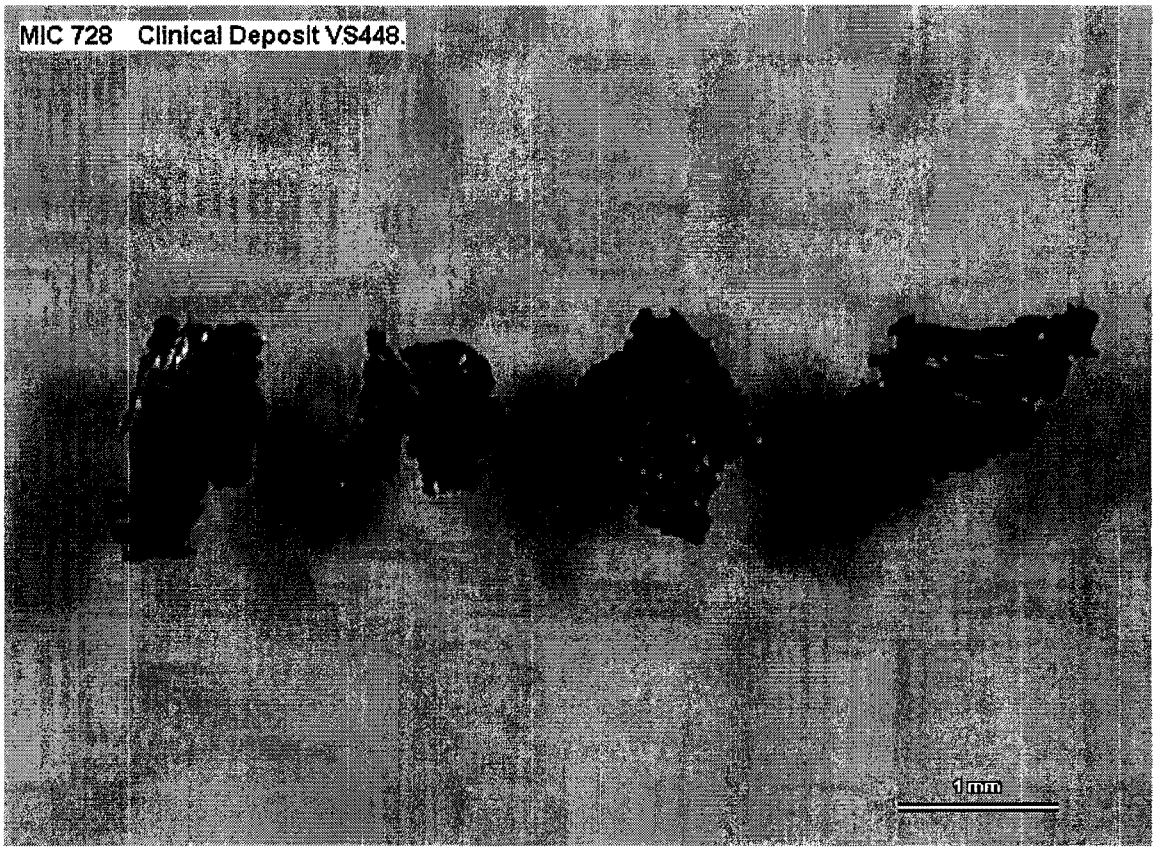
Take Off Angle: 35°
Dead Time: 8.047



MICW EDX (1) CLINICAL DEPOSIT.

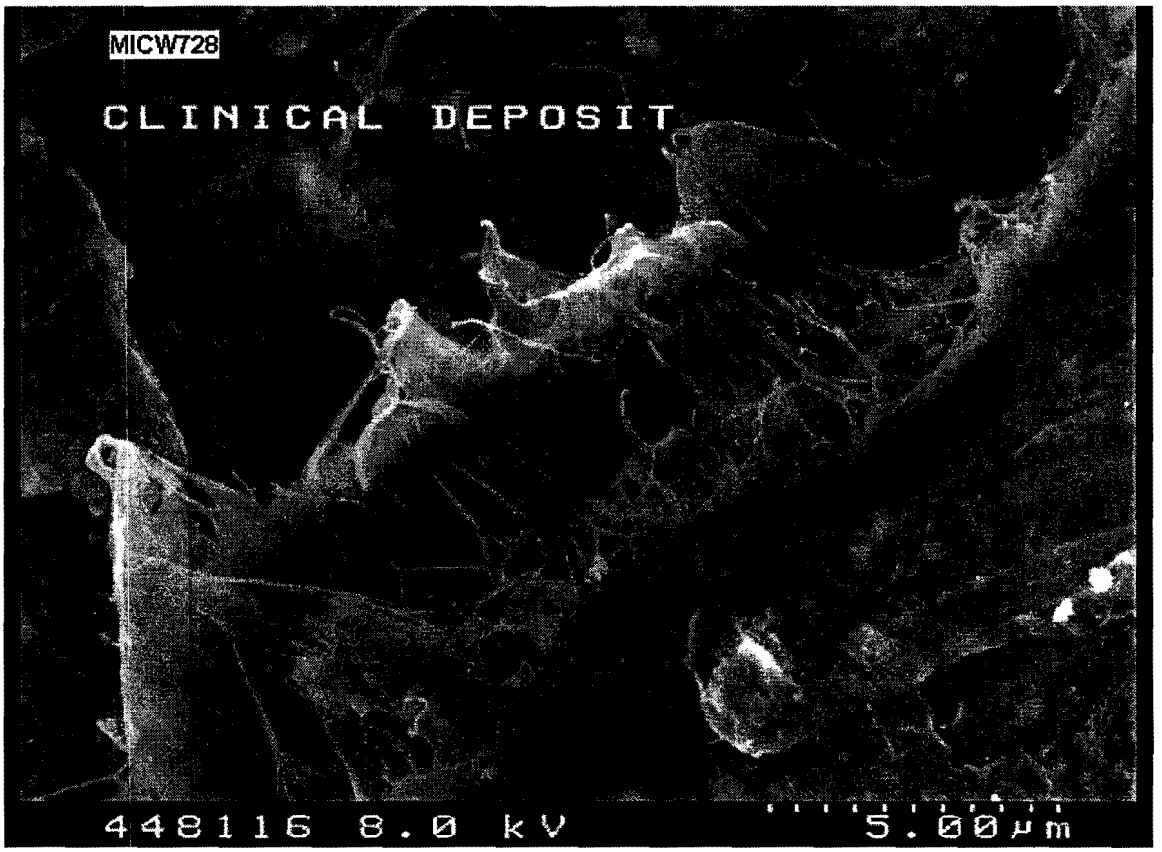
Accelerating Voltage: 15 KeV
Live Time: 100 seconds

Take Off Angle: 35°
Dead Time: 19.242



The clinical deposit was removed from the package and found to be very homogeneous. All the particles were very similar and there was little evidence of any other "extraneous" contamination such as fibres, mineral particles and general "office dust". The above image is very characteristic of all the particles in the package.

In thin section the particle is comprised of a soft transparent continuous phase which is impregnated with opaque black debris. The particle size of this debris can be determined with reference to the attached scale bar (10 microns).


MICW728
CLINICAL DEPOSIT
448116 8.0 kV
5.00µm

MICW728
CLINICAL DEPOSIT
448117 8.0 kV
3.00µm

The black and white images above are high resolution FESEM images and characterise the clinical deposit well.