



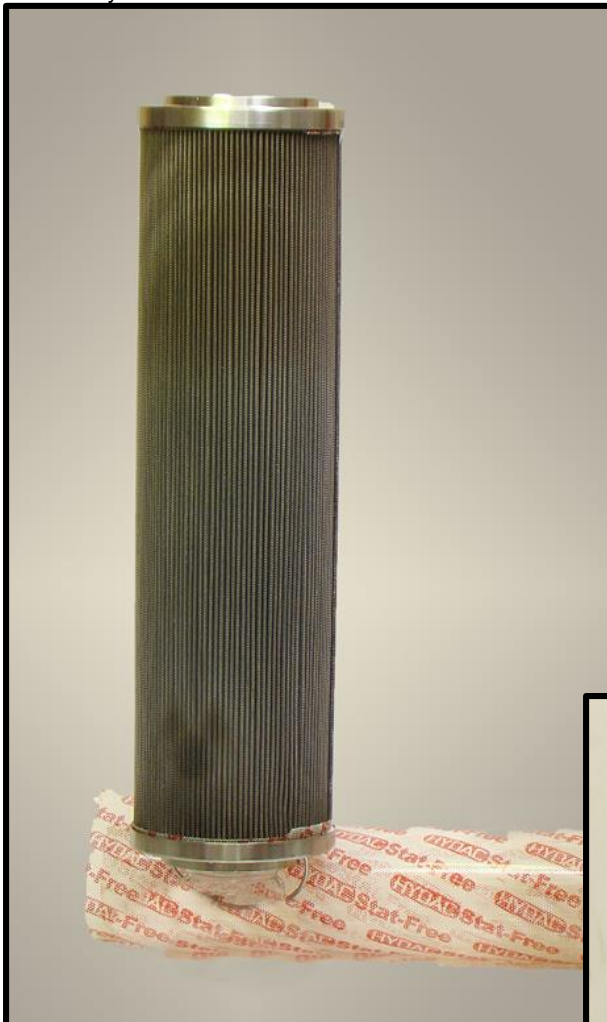
**WDA No 000 HP-OFA**

**Objective.** H.P Oil Filter Media Analysis Sample from 24/02/2015. Filter was opened and the media retrieved to analyse the dirt and wear debris removed by the filter.

**Method.** Sample preparation in accordance with R&T's Procedure No. 28A. Oil Filter Sample received was opened and media retrieved, Two samples were processed of wear debris trapped in a 200mm X 75mm section of the oil filter element. One sample was filtered @ 3 µm, the other sample was processed through the Ferrogram Maker to analyse the percentage of ferrous wear debris caught in the filter media. The amount seen in the video pictures is not directly relateable to the debris concentration per ml of oil.



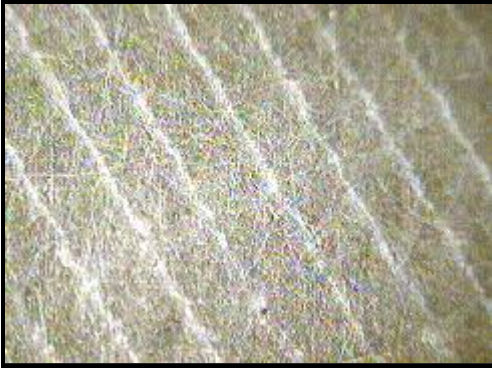
The Hydac Anti Static Filter was a robust well made mostly stainless steel oil filter.



The filter has 5 layers consisting of an outer perforated plastic sheet, nylon mesh, fine filter layer, fibre glass reinforcement layer and the inner fine Stainless Steel mesh supported by an inner steel tube welded to the base and end caps.



Washed Filter Element Exterior



**Outer Pressure Side of the Glass Fibre Filter Media @ 15X/45X**

There was a light amount of heat damaged lubricant remaining adhered to the washed media.



Washed Filter Element Exterior



**Outer Pressure Side of the Glass Fibre Filter Media @ 50X Sized 0.5-200 µm**

There was a light amount of heat damaged lubricant remaining adhered to the washed media.

200 µm



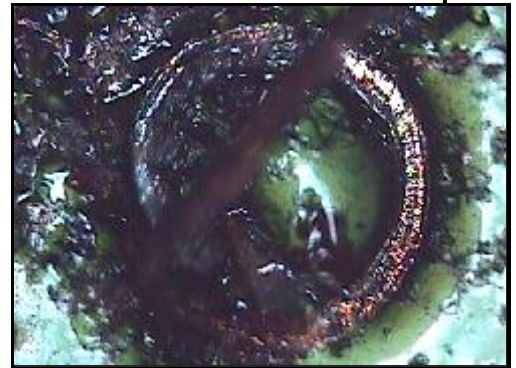
3 µm Membrane Filter Media Washing Solvent



These images at 100X/500X indicates the average wear debris and contamination deposited on the analysis filter from 1 CC of the sample being forced through the 3-µm Membrane Analysis Filter.

The brightness of microscope's bottom Green/Blue light shining up through the sample provides an indication of the level of wear debris and contamination per CC of sample.

100/100 µm



3 µm Membrane Filter Media Washing Solvent



**Large White Metal Bearing Abrasive Wear Particles @ 500X Sized 0.5-250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

20 µm



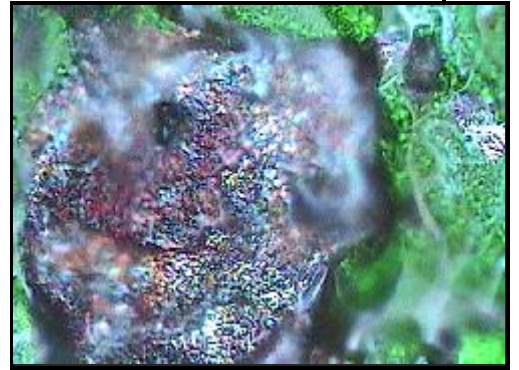
3 µm Membrane Filter Media Washing Solvent



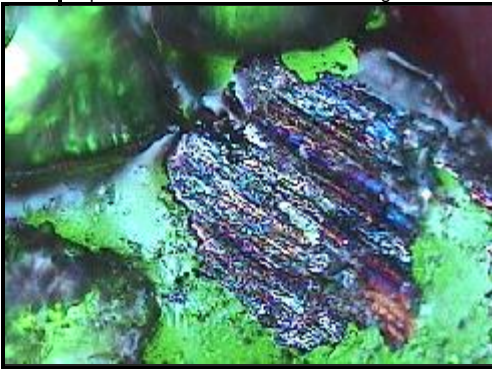
**Large White Metal Bearing  
Abrasive Wear Particles  
@ 200X Sized 0.5-250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

50 µm



3 µm Membrane Filter Media Washing Solvent



**Large White Metal Bearing  
Abrasive Wear Particles  
@ 200X Sized 0.5-250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

50 µm



3 µm Membrane Filter Media Washing Solvent



**Large White Metal Bearing  
Abrasive Wear Particles  
@ 500X Sized 0.5-250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

20 µm



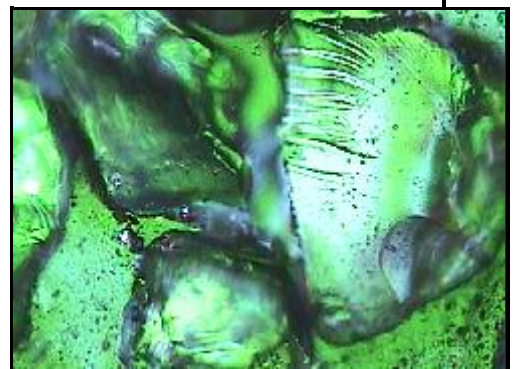
3 µm Membrane Filter Media Washing Solvent



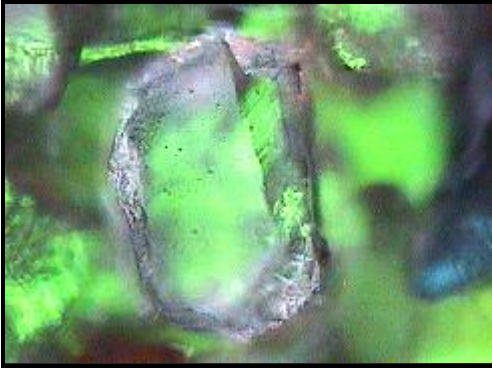
**Large Silica Type Crystalline  
Contamination.  
@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



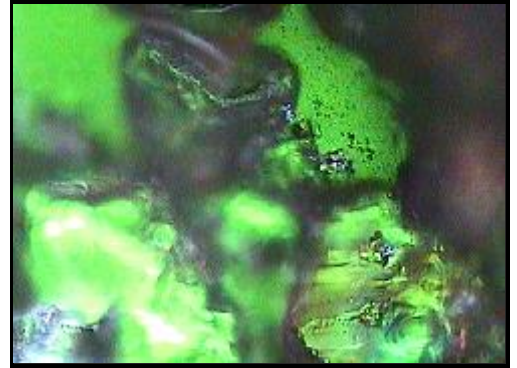
3 µm Membrane Filter Media Washing Solvent



**Large Silica Type Crystalline Contamination.  
@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



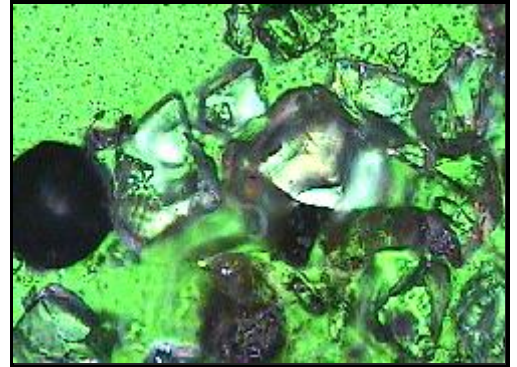
3 µm Membrane Filter Media Washing Solvent



**Large Silica Type Crystalline Contamination.  
@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



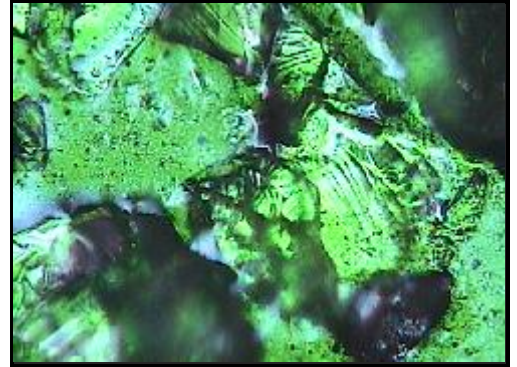
3 µm Membrane Filter Media Washing Solvent



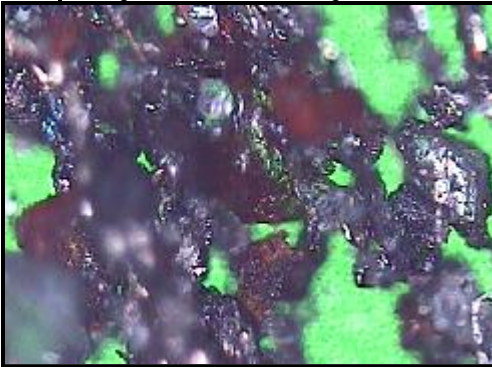
**Large Silica Type Crystalline Contamination.  
@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



Ferrogram Filter Media Washing Solvent



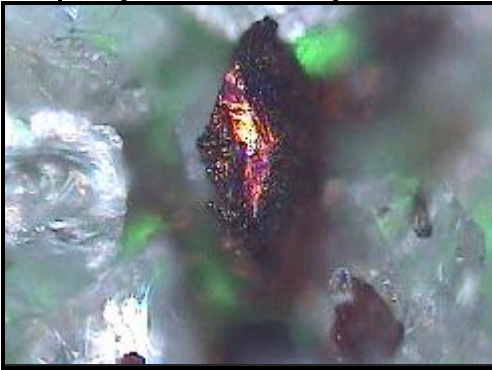
These images at 100X/500X indicate the average view of the magnetic and paramagnetic components of the sample after passing a diluted 1 CC portion of sample through the Ferrogram maker. The Ferrogram Maker's magnetic field arranges the samples magnetic and paramagnetic components into the typical rows as the sample runs down the glass slide.

The microscopes bottom light shining up through the sample provides an indication as to the potential level of wear debris and contaminating particles per CC of sample.

100 µm



Ferrogram Filter Media Washing Solvent



**Large White Metal Bearing  
Abrasive Wear Particles  
@ 200X Sized 0.5-250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

50 µm



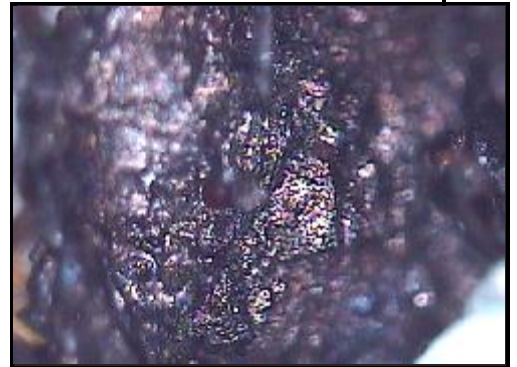
Ferrogram Filter Media Washing Solvent



**Large White Metal Bearing  
Abrasive Wear Particles  
@ 200X Sized 0.5-1250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

50 µm



Ferrogram Filter Media Washing Solvent



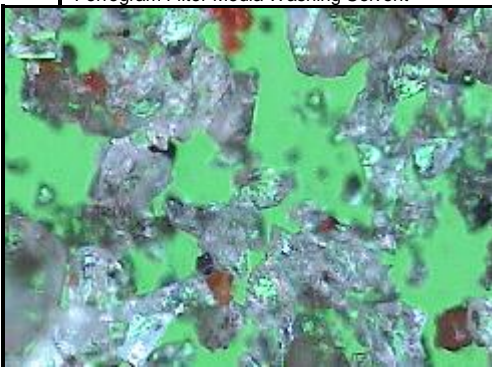
**Large White Metal Bearing  
Abrasive Wear Particles  
@ 200X Sized 0.5-1250 µm**

There was a moderate to heavy amount of this hard particle damaged metallic wear debris present in the sample.

50 µm



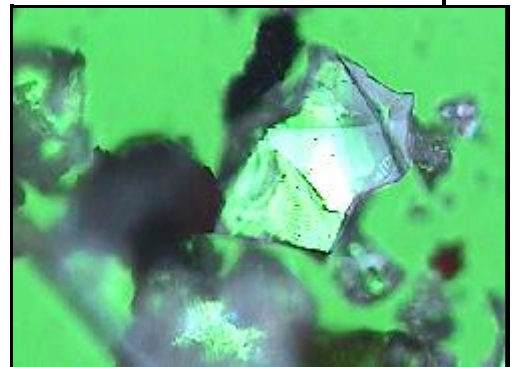
Ferrogram Filter Media Washing Solvent



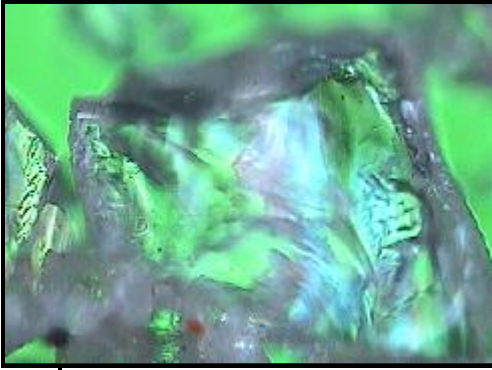
**Large Silica Type Crystalline  
Contamination.  
@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



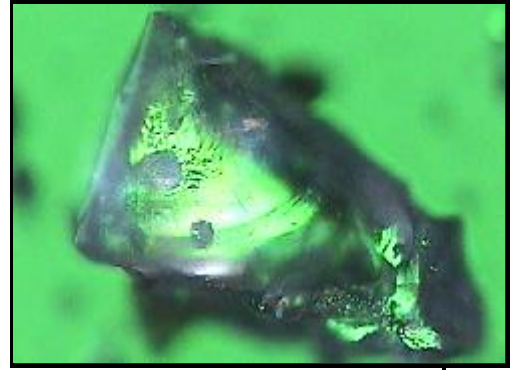
Ferrogram Filter Media Washing Solvent



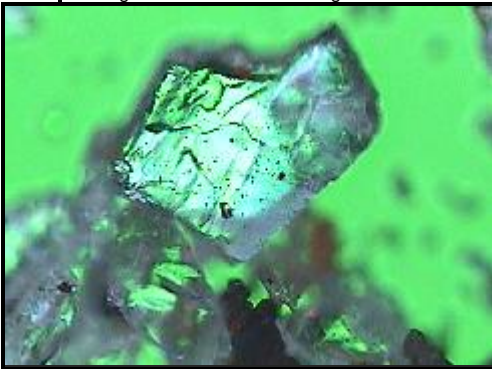
**Large Silica Type Crystalline Contamination.**  
**@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



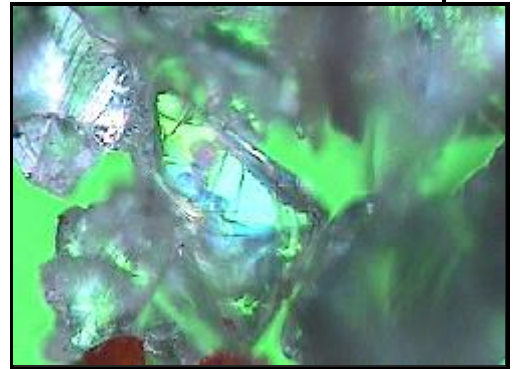
Ferrogram Filter Media Washing Solvent



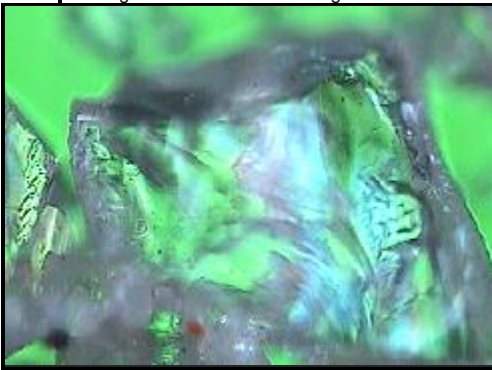
**Large Silica Type Crystalline Contamination.**  
**@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



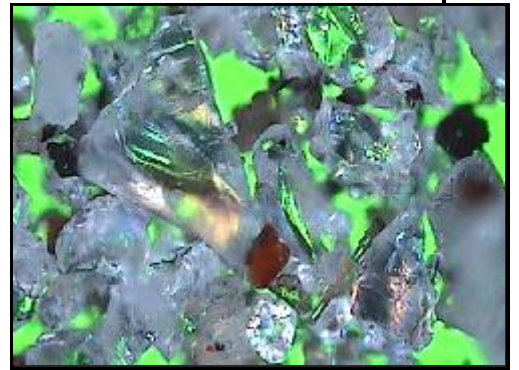
Ferrogram Filter Media Washing Solvent



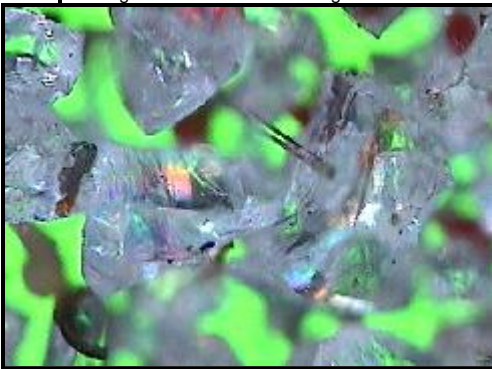
**Large Silica Type Crystalline Contamination.**  
**@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



Ferrogram Filter Media Washing Solvent



**Large Silica Type Crystalline Contamination.**  
**@ 200X Sized 0.5-250 µm**

There was a heavy amount of this hard environmental contaminate present in the sample.

50 µm



**240215 Results Conclusions and Recommendations**

The H.P Oil Filter Media Analysis indicates the system the high pressure oil filter is from has been or is being heavily dusted with a heavy amount of fine hard environmental crystalline contaminates and resulting wear debris deposited upon the analysis slides. The size of this contamination is too large to have originated from a filtered source like the reservoir breather, unless this in an unfiltered N<sub>2</sub> Blanket Reservoir then this could occur.

The amount of hard particle damaged abrasive wear debris extracted when compared to the amount of crystalline contamination found was light indicating the system filters are efficient removing these hard contaminates before extensive wear damage could be caused. Check the time this filter was in use to establish a likely contamination ingress timeline.

Take dust samples around this application to ascertain whether this type of contaminate is environmental.

The attached Tape Samples with this report indicates how dust samples can be taken.



Rob Simmonds  
Reliability Manager

The analysis provided is indicative of conditions based upon sample information received and quality of sample processed. Recommendations are provided as a guide only. Any decisions relating to repair of components or changes to procedures are entirely at the discretion of the customer.