



### Hitachi 5500 Face Shovel Hydraulics System Bypass : Thiess - Liddell Coal, Hunter Valley

FTA was approached to install a bypass filtration system on the hydraulics of a 5500 Hitachi Face Shovel being commissioned for Thiess at Liddell Coal in the Hunter Valley.



The shovel has a 6,500 litre hydraulic system so it was decided to install a JQ440 filtration system on board using a spare pump that was available in the hydraulic circuit.



Results indicate that now the system has been running for 1,500 hours the FTA system is doing the job efficiently. The Oil report attached (Sample 192546) indicates after a week's work the oil in the reservoir was at an ISO of 18/14. Sample 192547 indicates the oil returning to the reservoir at ISO of 15/12 after the filters, a 64% reduction. Sample 195995 done at 1,447 hours indicates the oil in the total system and reservoir is now at 15/12.

Element changes are now set at 500 hours and wear metals are well within specification.

The filtergram results underline the importance of using filtergrams to assess the life of the element. A lot of what is being captured is put down to start up wear and assembly. By trapping this material in the FTA system, the life of the OEM filters and the machine's hydraulic components along with the hydraulic oil will be extended now and in the future.

# Oil Test

4 Walter Street | PO Box 400  
 Singleton NSW 2330  
 Phone: (02) 6571-1444  
 Facsimile: (02) 6571-4433  
 Web: www.oiltest.com.au

**This Report No:**

195.995	18-Apr-03	19-Apr-03	4-Jul-03
-	192,546	192,547	195,995
-	0hrs	0hrs	1447hrs
-	-	9	1,447
	No	No	No

**Client:** Filter Technology Australia Pty Ltd  
**Attention To:** PHILLIP MARHEINE - 71 Racecourse Road, Rutherford  
**Machine:** LIDDELL1 Liddell Coal  
**Sample Location:** HE555 - Hitachi 5500 - Hydraulic System  
**Oil Type:** HYDRAULIC OIL 46

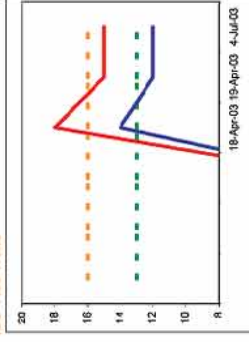
**Particle Analysis**

Limit	1733
> 4 um Count	2769
> 6 um Count	320
> 10 um Count	61
> 14 um Count	35
> 21 um Count	11
> 25 um Count	4
> 38 um Count	4
> 70 um Count	1

**Cleanliness Analysis**

ISO-4/06 1.14um	1814	1512	1512
Water Content ppm	89.6	69.2	66.8

**ISO 4/06 Trend**

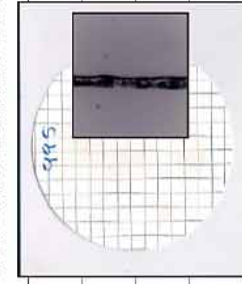


**Comment**

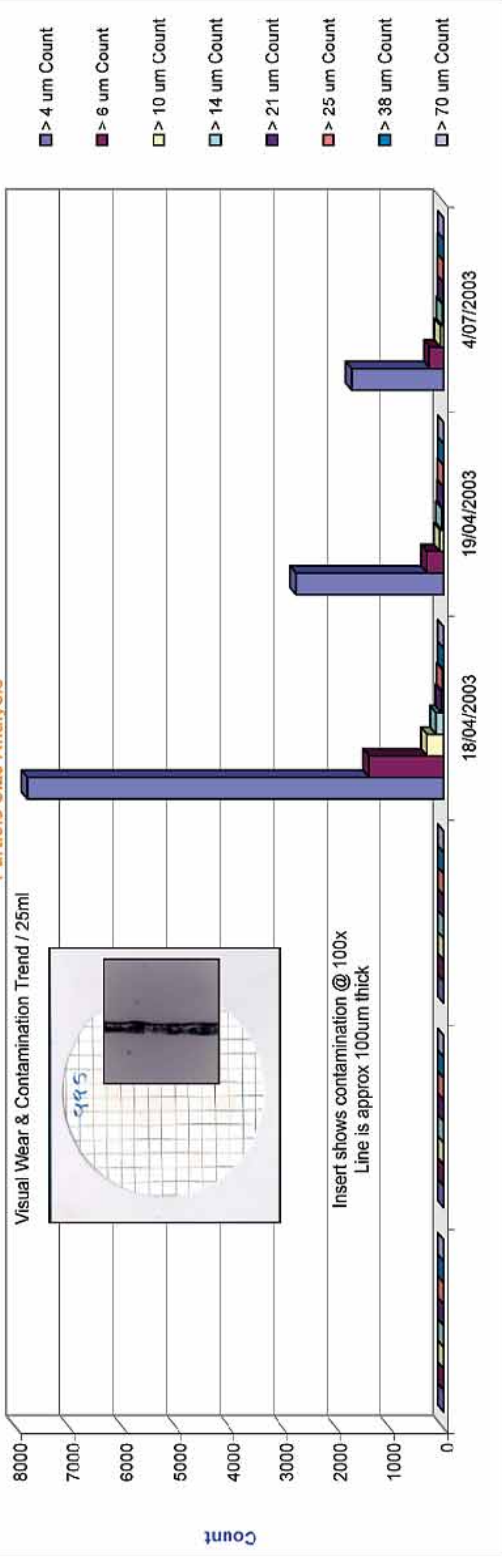
Results within acceptable limits.  
 Continue with regular maintenance and monitoring. NOTE: Element was 500hrs old at time of sampling.

**Particle Size Analysis**

Visual Wear & Contamination Trend / 25ml



Insert shows contamination @ 100x  
 Line is approx 100um thick



Site: Filer Technology Australia Pty Ltd  
 Attention To: PHILLIP MARHEINE  
 Machine: LIDDELL1 Liddell Coal  
 Sample Location: HE555 - Hitachi 5500 - Hydraulic System  
 Oil Type: HYDRAULIC OIL 46

# Oil Test

4 Walter Street \ PO Box 490  
 Singleton NSW 2330  
 Phone: (02) 6571-1444  
 Facsimile: (02) 6571-4433  
 OKAY

Sample Date	18-Apr-03	19-Apr-03	4-Jul-03
Analysis Report No.	-	192,547	195,985
Service Meter Reading	-	1447hrs	1447hrs
Oil Hrs	-	9	1,447
Oil Changed?	-	No	No

### Wear Metals

Limit	18-Apr-03	19-Apr-03	4-Jul-03
lead ppm	0	0	0
iron ppm	1	1	3
aluminium ppm	0	0	0
copper ppm	19	19	11
chromium ppm	0	0	0
tin ppm	0	0	1
nickel ppm	0	0	0
silver ppm	0	0	0
titanium ppm	0	0	0

### Contaminants

Limit	18-Apr-03	19-Apr-03	4-Jul-03
silicon ppm	1	0	0
sodium ppm	0	0	0
vanadium ppm	0	0	0

### Oil Additives

Limit	18-Apr-03	19-Apr-03	4-Jul-03
magnesium ppm	18	16	3
zinc ppm	22	24	19
molybdenum ppm	0	0	0
calcium ppm	3	0.4	3
phosphorous ppm	293	291	262
boron ppm	0	0	0
barium ppm	3	3	0

### Physical Tests

TBN	0	0	0
TAN	0.00	0.00	0.00
fuel dilution %	0	0	0
water %	0	0	0
viscosity index	141	135	128
visc @ 100oC - Cst	7.48	7.37	6.93
visc @ 40oC - Cst	43	43	41

### FTIR Analysis

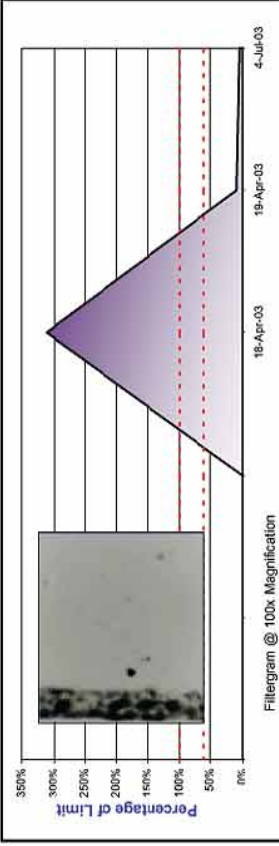
soot - abs	0	0	0
glycol%	0	0	0
Water ppm	90	69	67
oxidation - abs	0	0	0
nitration - abs	0	0	0
sulphation - abs	0	0	0

### Particle Analysis

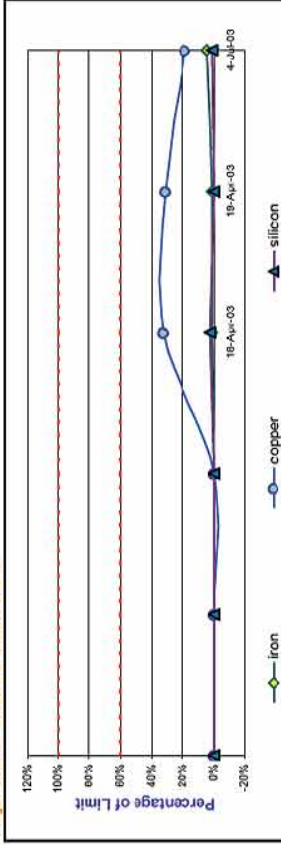
particle count in 1ml	7807	2769	1733
ISO-4406 6um \ 1.4um	18/13	18/14	15/12
PQ90 Fe - mg \ ltr	-/-	62	2

NOTE: This machine's oil condition report should be used in conjunction with normal maintenance practices. All care will be taken in processing and analysing samples but no express or implied guarantee is offered in regard to the continuing operation or condition.

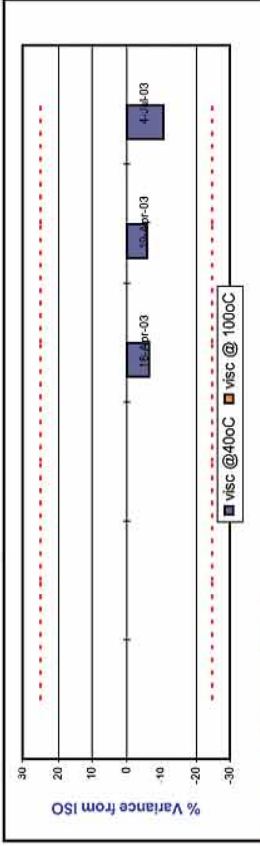
### PO - Ferrrous Wear Debris (Fe ma \ ltr)



### Major Small Particle Element Trends



### Viscosity Condition From New Oil Specification



### Comments & Recommendation

Results within acceptable limits. Continue with regular maintenance and monitoring. NOTE: Element was 500hrs old at time of sampling.

# Oil Test

Unit 4 Walter Street Complex  
 Singleton NSW 2330  
 Phone: +61 2 6571-1444  
 Fax: +61 2 6571-4433  
 www.oiltest.com.au

Machine ID: Hitachi 5500 Excavator  
 Component Name: Hydraulic Filter  
 Manufacturer: Hitachi  
 Model: EX5500  
 Site: Liddell Coal  
 Maintenance Division: Field Equipment

SampleID: OIL-000167  
 Date Sampled: 10 July 2003  
 Machine Hrs: 1447  
 Oil Hrs: 1447  
 Filtered Oil Hrs: 1447  
 Filter Hrs: 500



### Filter elements

Filter : Filter is in good cond and is free from pressure deformation or water damage.



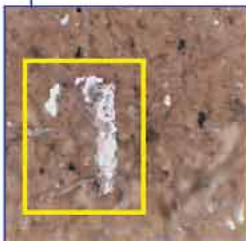
### Filter Patch

Filter patch : Debris from filter is washed through a 47mm x 0.8um filter membrane.



### Contaminants @ 100x

Overview of wear and contamination viewed through a microscope @ 100x magnification. Contaminants include, dust, ferrous and non ferrous wear metals.



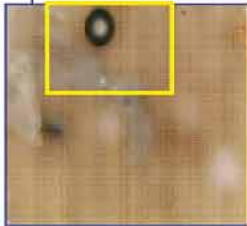
### Fatigue @ 100x

Ferrous Fatigue 300um in size. Fatigue Wear. Results when cracks develop in the component surface allowing the generation and removal of particles. Leading causes of fatigue wear include insufficient lubrication, lubricant contamination, and component fatigue.



### Non Ferrous @ 500x

Copper Alloy 36um in size. Copper-alloy, depending on component metallurgy could indicate bearing race, thrust washer / spacer or gear wear.



**Spheres @ 500x**

Sphere 20um in size. Spherical Particles: These particles are generated in the bearing cracks. If generated, their presence gives an improved warning of impending trouble as they are detectable before any actual spalling occurs. Rolling bearing fatigue is not the only source of spherical metallic particles. They are known to be generated by cavitation erosion and more importantly by welding or grinding processes.



**Contaminants @ 500x**

Dust and wear particles 2um and above. Contamination. The presence of contaminants (air borne dust) can cause increased wear. Filtering out dust particles helps reduce wear and can increase the suitability of the oil for continued use.

**Comments**

A significant amount of dust contaminants were observed. It appears that the filter is effectively trapping particulates from 2um and above.