M&P LAB REPORT

LR # 233269

DIVISION: CSD
PART NUMBER: 308570-1007, S/N 0464B, J/N R742179
PROGRAM: EMB 145
REPORT DATE: 4/27/11

Background

Three filters and three fluid samples of Skydrol were submitted to the M&P Lab for analysis. The filters and the three fluid samples were marked as "Pressure", "Return" and "Case Drain".
One more fluid sample of Skydrol, an alcohol wash sample and a dark plastic bottle with fluid sample were also submitted for analysis as follows:

1. Three filters – Photograph of the filters and then patch test to identify the contaminants.
2. Three fluid samples – Particle count and patch test to identify the contaminants.
3. One fluid sample – Particle count and patch test to identify the contaminants.
4. A plastic bag with alcohol containing two particles – identify the particles.
5. A dark plastic bottle with fluid sample from the aircraft – Patch test and identify the contaminants.

Analysis

1. Three filters - The filters were photographed in the as-received condition (Figures 1 through 5). They showed some particles stuck in the filter mesh. The contaminants of the filters were processed on individual patches by using AK-225 solvent. Due to the extent of contamination from the filters, the fluid samples were processed and analyzed separately.
2. Three fluid samples - Particle counts on the three fluid samples could not be done by automatic particle counter Hiac due to the extent of contamination in the fluid samples. The fluid samples were also processed on individual patches by using AK-225 solvent (see Figures 6 through 11 for the photographs of the patches from the filters and three fluid samples).
3. One fluid sample - Part of the fourth fluid sample was tested for particle count by automatic particle counter Hiac (see attached data sheet). The remainder of the fluid was processed on a patch by using AK-225 solvent (Figure 12).
4. Alcohol wash sample - The two particles were processed on a patch (Figure 13).

5. Dark plastic bottle - Upon opening the dark plastic bottle it was noticed that there was another smaller white opaque bottle inside it. Part of this bottle inside had dissolved in the Skydrol fluid. Part of the fluid in the dark bottle was processed on a patch.

The contaminants on the patches were analyzed and identified by Energy Dispersive Spectroscopy (EDS) and Infra-red Spectrometer (FTIR).

Contamination analysis and evaluation after EDS and FTIR analysis:

Pressure Filter: The patch from pressure filter was contaminated with dark Teflon material, fibers, metal particles, some white Teflon grease, white aluminum corrosion and green paint particles.
EDS analysis run on nine metal particles showed four aluminum particles (2000 & 7000 series, up to 550 microns in length and 350 microns in width), three stainless steel particles (300 series, largest one measured 625x350 microns in length and width), one tin bronze particle (copper/tin, 500x40 microns) and one low alloy steel particle (iron, 410x200 microns).

Pressure Fluid sample: The patch from pressure fluid was contaminated with dark Teflon material, metal particles, fibers and some white Teflon grease.
EDS analysis run on seven metal particles showed five aluminum particles (2000 series, up to 560 microns in length and 150 microns in width) and two tin bronze particles (larger one measured 500x35 microns in length and width).

Return Filter: The patch from return filter was contaminated with dark Teflon material, Teflon grease, fibers, metal particles, white aluminum corrosion, o-ring material and some paint particles (red & green).
EDS analysis run on six metal particles showed they were aluminum particles (2000 series, largest one measured 1250x375 microns in length and width).

Return Fluid Sample: The patch from return fluid was contaminated with Teflon material, metal particles, fibers, some Teflon grease, few particles from adhesive and paint.
EDS analysis run on eleven metal particles showed seven aluminum particles (six 2000 series & one 7000 series, up to 1160 microns in length and 440 microns in width), one 300 series stainless steel particle (690x130 microns), one PH stainless steel particle (380x70 microns), one low alloy steel particle (590x570 microns) and one zinc particle (185x90 microns).

Case Drain Filter: The patch from case drain filter was contaminated with Teflon material, fibers, white aluminum corrosion and metal particles.
EDS analysis run on thirteen metal particles showed six low alloy steel particles (largest one measured 2785x350 microns in length and width), three aluminum particles (largest one measured 385x200 microns in length and width), three tin bronze particles (up to 500 microns in length and 80 microns in width) and one 300 series stainless steel particle (285x115 microns).

Case Drain Fluid Sample: The patch from case drain fluid was contaminated with Teflon material, fibers, white aluminum corrosion and metal particles.
EDS analysis run on fifteen metal particles showed six low alloy steel particles (largest one measured 1040x450 microns), five aluminum particles (up to 760 microns in length and 240 microns in width), two tin bronze particles (larger one measured 290x200 microns), one stainless steel particle (750x400 microns) and one brass particle (copper/zinc, 280x210 microns).

Skydrol Fluid Sample: The patch was contaminated with dark Teflon material and metal particles.
EDS analysis run on ten metal particles showed nine aluminum particles (7000 series, up to 510 microns in length and 160 microns in width) and one low alloy steel particle (350x120 microns).

Two particles in alcohol: One particle was red in color and it was epoxy material (775x200 microns). The other particle was mass of fibers (800x300 microns).

Fluid from the Dark Bottle: The patch showed layer of the dissolved plastic bottle along with dark particles and few clear particles in it. The layer was acrylic material (bottle). EDS analysis run on several dark particles showed they were dark Teflon and molydisulfide (dry lube) materials. EDS and FTIR analyses run on the clear particles showed they were silica (sand) particles and they measured up to 120x80 microns in length and width.

Materials & Processes
Parker Aerospace

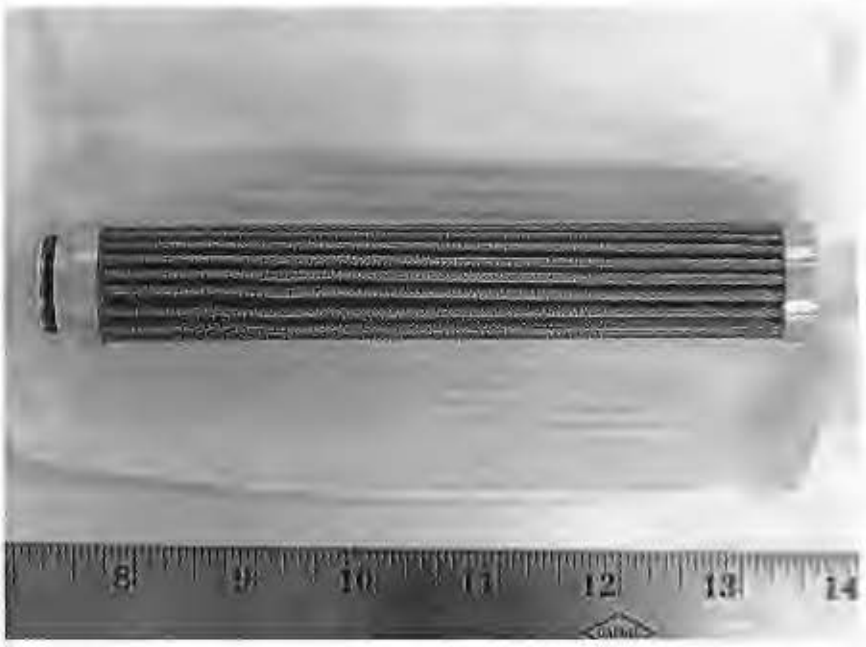

Figure 1: This photograph shows the Pressure Filter.

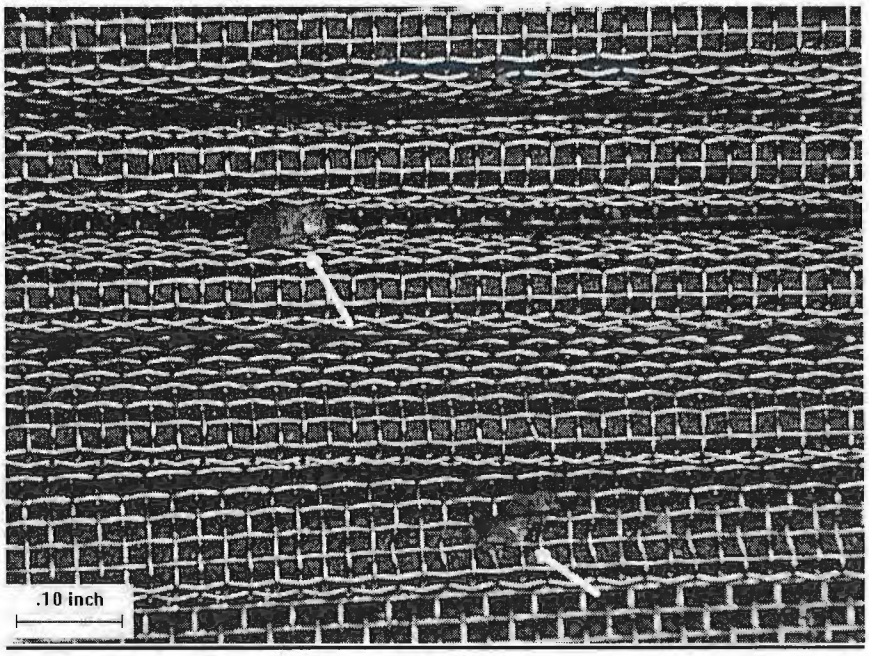

Figure 2: Arrows point to 2 particles in the Pressure filter.
Magnification: Approx. 7.5x

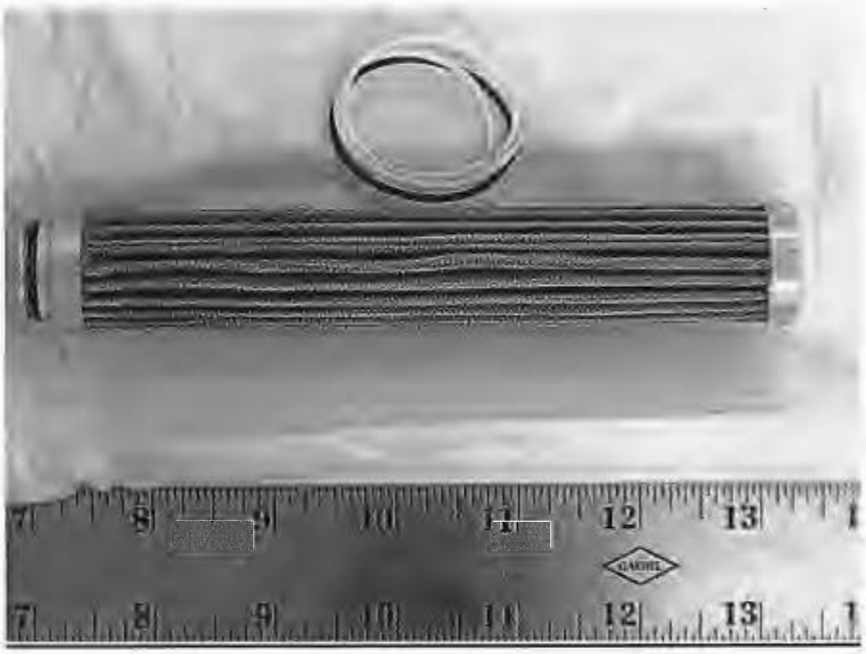

Figure 3: This photograph shows the filter and seals from Return.

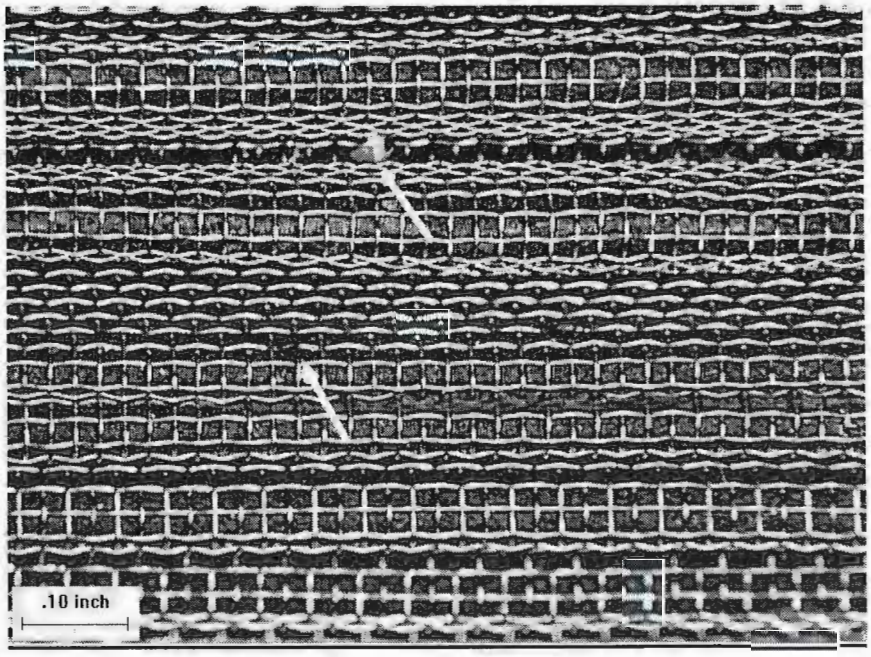

Figure 4: Arrows point to 2 particles in the Return filter.
Magnification: Approx. 7.5x

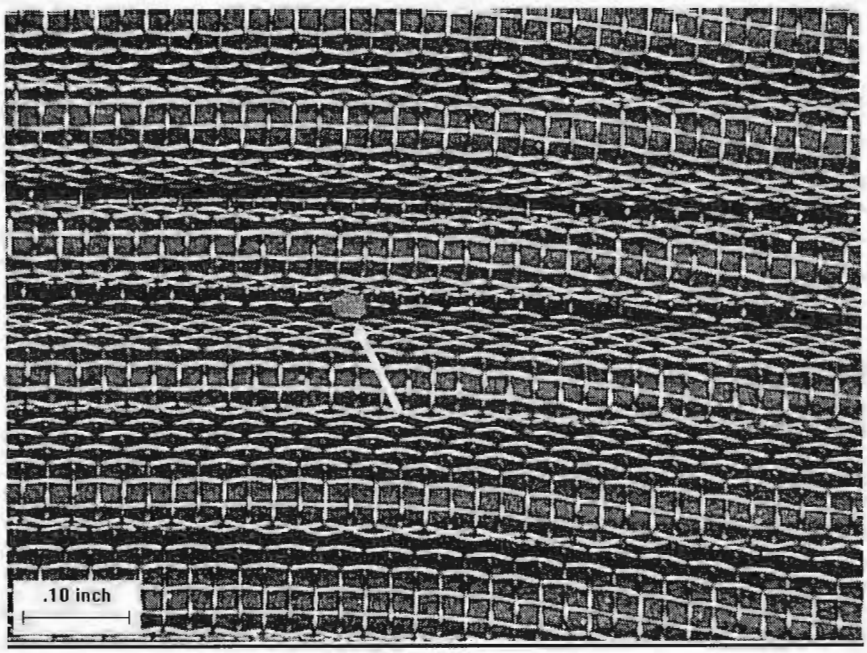

Figure 5: This photograph shows close up of Case Drain Filter (arrow points to a particle). ***Magnification: Approx. 7.5x***

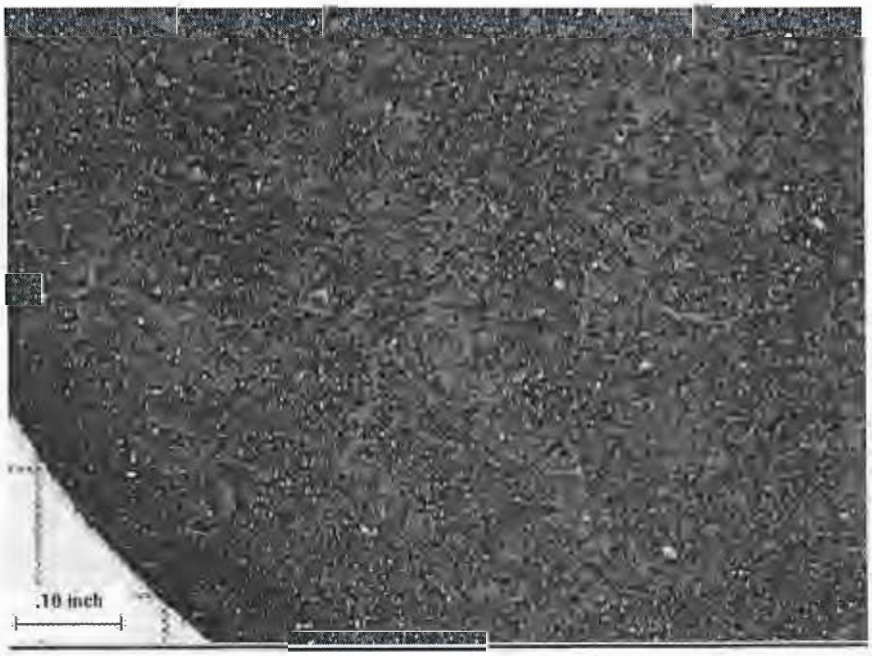

Figure 6: This photograph shows part of the patch from Pressure filter.
Magnification: Approx. 7.5x

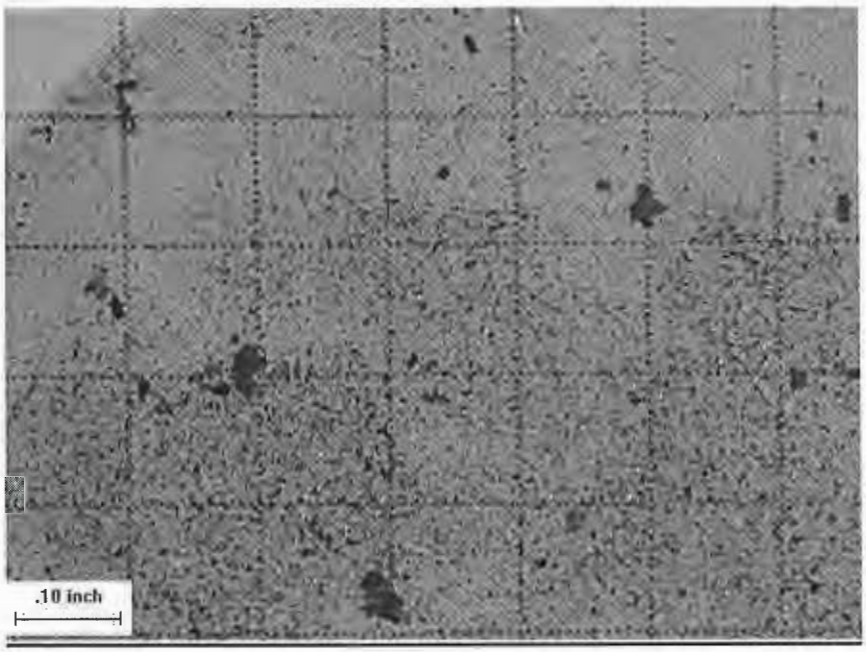

Figure 7: This photograph shows part of the patch from the fluid sample from Pressure. ***Magnification: Approx. 7.5x***

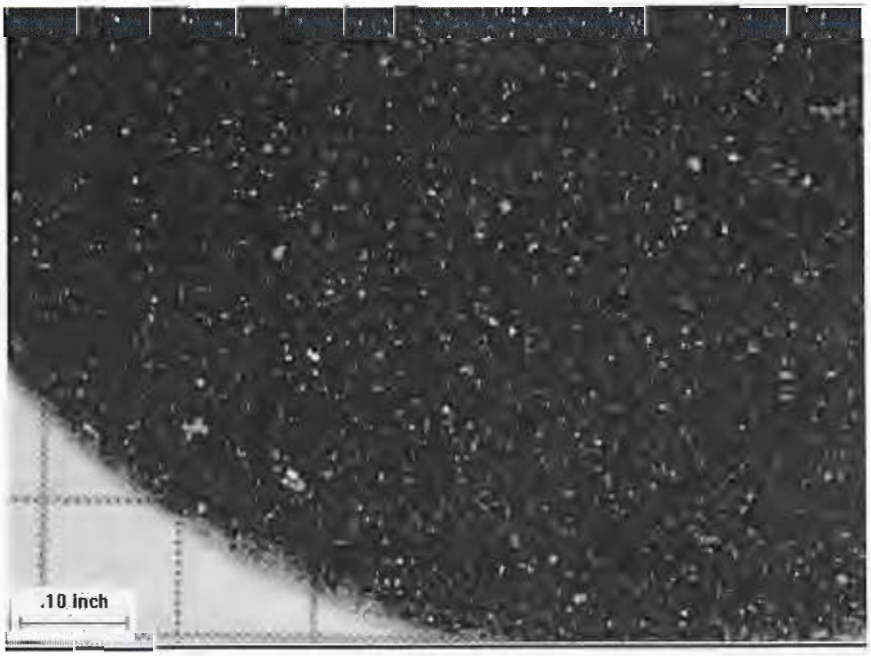

Figure 8: This photograph shows part of the patch from Return filter.
Magnification: Approx. 7.5x

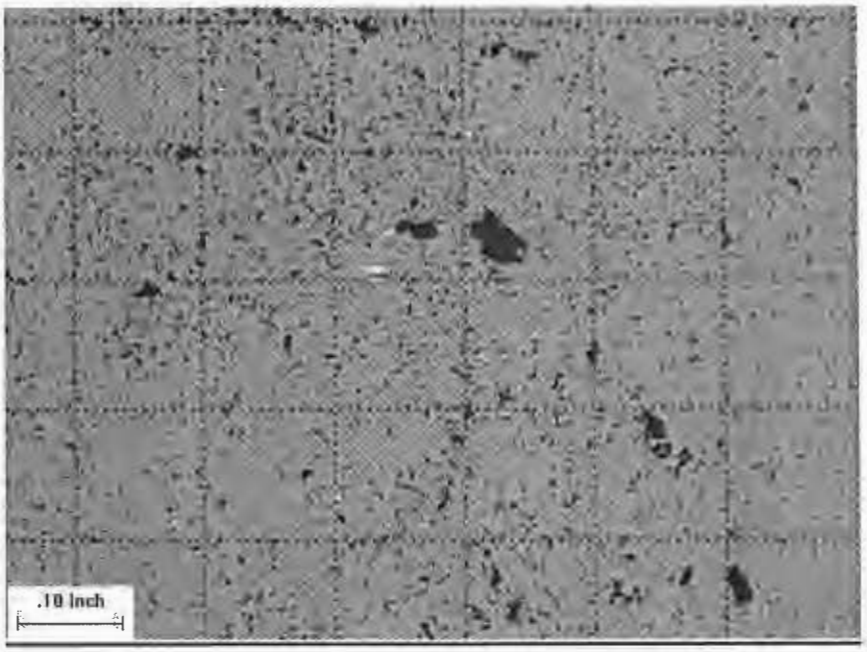

Figure 9: This photograph shows part of the patch from the fluid sample from Return. ***Magnification: Approx. 7.5x***

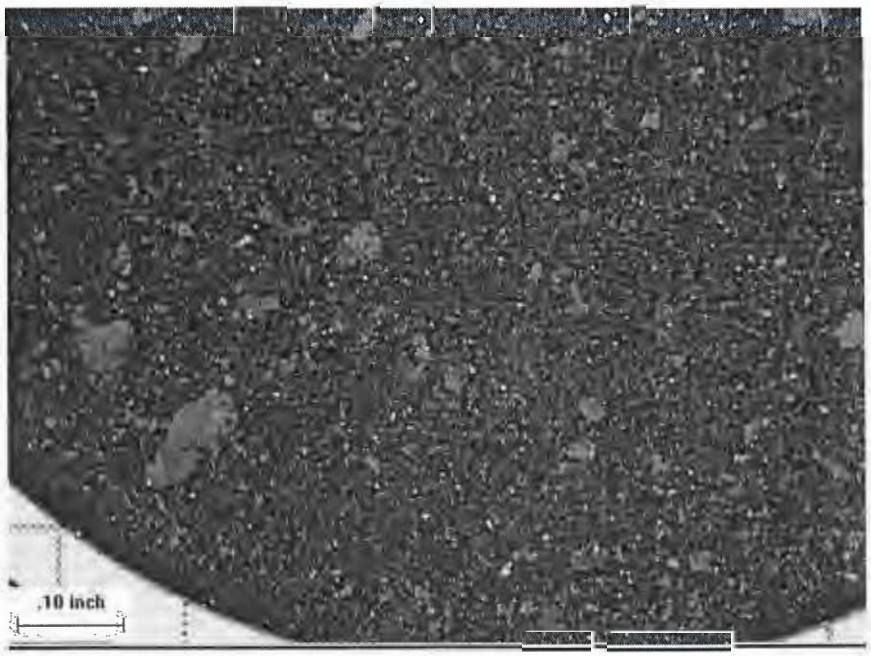

Figure 10: This photograph shows part of the patch from Case Drain filter.
Magnification: Approx. 7.5x

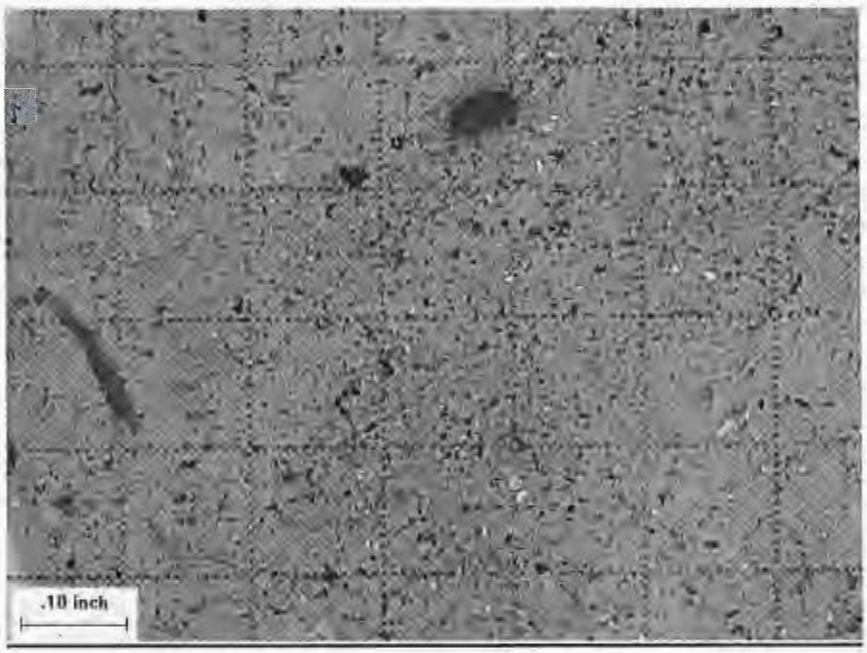

Figure 11: This photograph shows part of the patch from the fluid sample from Case Drain. ***Magnification: Approx. 7.5x***

Parker

M & P

LABORATORY REPORT -- CONTAMINATION - RSI 097 - MULTI-PROGRAM

J/N R742179 P/N 308570-1007 S/N 04648

Fluid Skydrol Sys/N _____ Program 145

Date 04-18-11 Time 12:31 PM ☐ Other Test Stamp

Sample Taken From RETURN ☒ CSD ☐ CSO ☐ OGD

Sample ☑ Receiving ☐ Shipping ☐ Board Clearance ☐ Pre-Test ☐ Dynamic Leakage ☐ Evaluation

Specification RSI 097 Class _____

____ H20 ____ Chlorine ____ Monthly ____ Weekly Comments NTSB INVESTIGATION

C-95-4541 R8/00

Particle Count Per ☐ _____ mL. ☒ 100 mL. (50 mL x 2)

Micron Size Range	Particle Count	Maximum Allowable [per 100mL]	Particle Count
5 - 10	47064	128,000	
10 - 25	13,238	42,000	
25 - 100	1394	7,500	
Over 100	4	92	
Fibers	N/A	15	

Water (PPM)		
Specific Gravity		
Viscosity		
Neutralization		
Chlorine (PPM)	1.9	

REMARKS _____

ACCEPT REJECT ☐

M&P TECH: _____ STAMP: _____ DATE: 04-18-11

LTF 129.3, Rev N/C

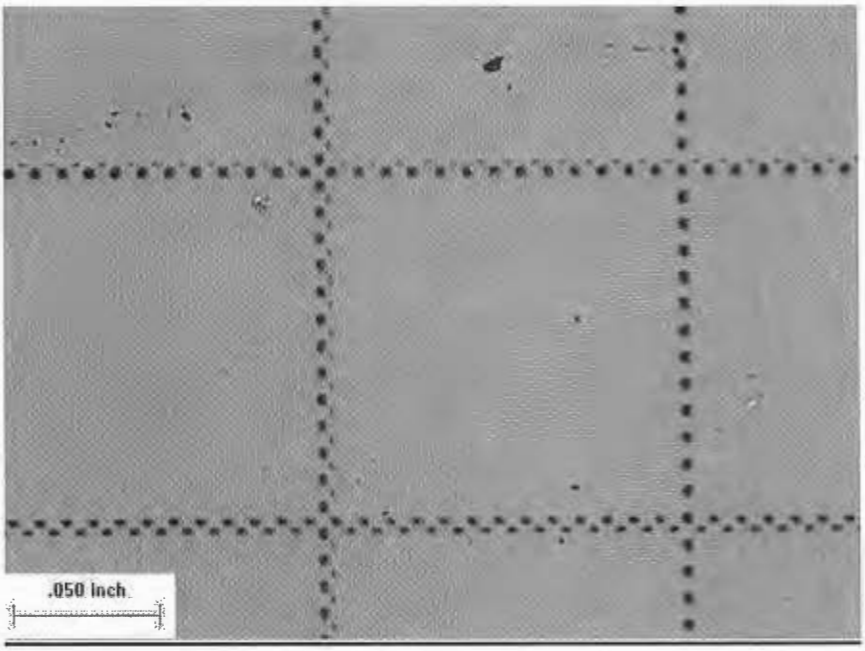

Figure 12: This photograph shows a small area of the patch from the fluid sample of Skydrol. ***Magnification: Approx. 20x***

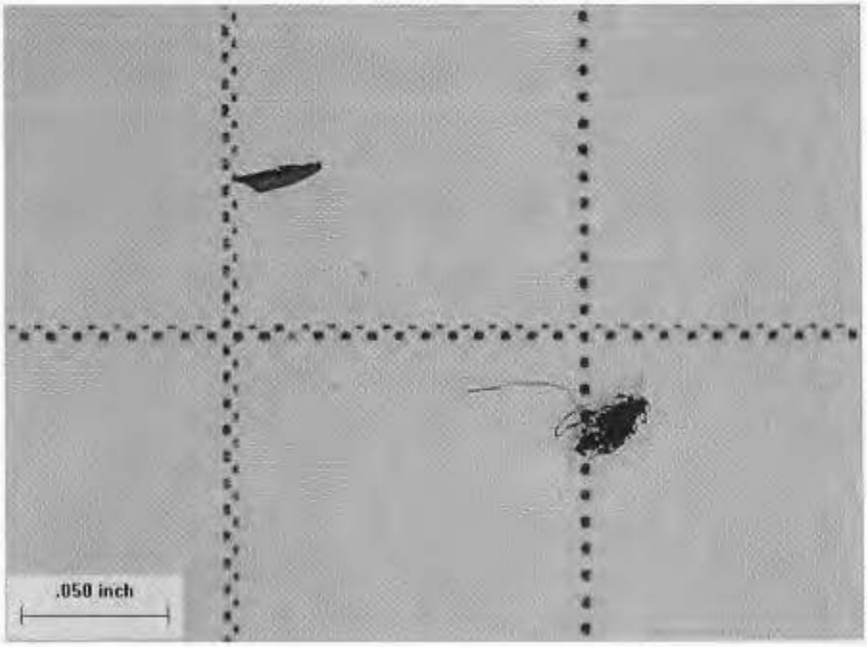

Figure 13: This photograph shows the 2 particles from the alcohol sample. ***Magnification: Approx. 20x***