Pace Analytical Services, Inc.
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www.pacelabs.com

*LABORATORY ANALYSIS REPORT*

| | | | |
|---|---|---|---|
| ***DATE:*** | *11-Jul-2007* | ***PAGE:*** | *2 Of 8* |
| | | ***PROJECT NO.:*** | *4740* |
| ***CLIENT:*** | *Harmsco Filtration Products* | ***REPORT NO.:*** | *4740-CYS* |
| | *7169 North 49th Terrace* | ***COLLECTED BY:*** | *IBR* |
| | *West Palm Beach, FL 33407* | ***PROJECT REC'D:*** | *21-May-2007* |
| | | ***PRODUCT DESC:*** | *Harmsco Drinking Water Filtration Systems (4 Types of Filters in Housings)* |
| ***CONTACT:*** | *Ms. Cyndi Benson* | | |

***NSF/ANSI Standard 53 - 2007 Cyst (CYS) Reduction***

***Test Unit: 4740-2***

| Sample Point | Particle Size Microns | Influent (Particles/mL) | Effluent (Particles/mL) | Percent Reduction | Pressure Drop (PSIG) | Flow Rate (GPM) | Volume Treated (Gallons) |
|---|---|---|---|---|---|---|---|
| Flush/Condition | 3 | - | <1 | - | 5.5 | 15 | - |
| 8th Cycle | 3 | 127,000 | 99 | 99.92 | 5.5 | 15 | 1,200 |
| 25% Reduction | 3 | 113,000 | 57 | 99.95 | 5.3 | 11 | 2,180 |
| 50% Reduction | 3 | 183,000 | 77 | 99.96 | 5.6 | 6.0 | 3,610 |
| 75% Reduction | 3 | 135,000 | 73 | 99.95 | 5.5 | 3.0 | 4,790 |

***Test Unit: 4740-6***

| Sample Point | Particle Size Microns | Influent (Particles/mL) | Effluent (Particles/mL) | Percent Reduction | Pressure Drop (PSIG) | Flow Rate (GPM) | Volume Treated (Gallons) |
|---|---|---|---|---|---|---|---|
| Flush/Condition | 3 | - | <1 | | 4.8 | 15 | - |
| 8th Cycle | 3 | 127,000 | 98 | 99.92 | 4.8 | 15 | 1,200 |
| 25% Reduction | 3 | 113,000 | 44 | 99.96 | 4.7 | 11 | 2,190 |
| 50% Reduction | 3 | 183,000 | 64 | 99.97 | 4.6 | 6.0 | 3,620 |
| 75% Reduction | 3 | 135,000 | 55 | 99.96 | 4.5 | 3.0 | 4,780 |

***General Water Characteristics***

| Parameters | Specifications | Results |
|---|---|---|
| pH | 7.0 ± 0.5 su | 7.7 su |
| Temperature | 20 ± 2.5 °C | 21 °C |
| Hardness | ≤ 170 mg/L | 160 mg/L |
| Total Dissolved Solids | 200 – 500 mg/L | 316 mg/L |
| Turbidity | <1 NTU | 0.23 NTU |

*Note:* *Operating Cycle:* *10 minutes on / 10 minutes off.*
*Contaminant:* *Polystyrene Latex Microspheres, (size = 3.00 ± 0.15 um)*
*Testing Date:* *8-Jun-2007 to 12-Jun-2007*

*4740-2 = Harmsco Filtration Products drinking water filter PP-HC-40-1 in housing, received 21-May-2007.*
*4740-6 = Harmsco Filtration Products drinking water filter PP-HC-40-1 in housing, received 21-May-2007.*

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*LABORATORY ANALYSIS REPORT*

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|---|---|---|---|
| ***DATE:*** | *31-Mar-2009* | ***PAGE:*** | *1 Of 4* |
| ***CLIENT:*** | *Harmsco Filtration Products*<br>*7169 N. 49th Terrace*<br>*West Palm Beach, FL 33407* | ***PROJECT NO.:***<br>***COLLECTED BY:***<br>***DATE RECEIVED:***<br>***PROJECT DESC:*** | *5093-CYS Rev. 1*<br>*IBR*<br>*17-Feb-2009*<br>*2 Hurricane 40-HP housing with PPFS-40-1 Cartridge* |
| ***CONTACT:*** | *Ms. Cyndi Benson* | | |

Dear Ms. Benson:

Enclosed, please find our revised final laboratory report regarding the evaluation of **2 Hurricane 40-HP filter housings with PPFS-40-1 cartridges** for **Cyst Reduction (CYS) (See revision notes on page 4)**. Two systems were tested simultaneously referencing protocol published in NSF/ANSI Standard 53-2007a, with the exception of allowing the backpressure to monitor the pressure drop across the system as the flow rate decreased to 75% reduction.

Pace Analytical Services, Inc. appreciates the opportunity to provide you with this product testing service. If you have any questions or comments, please feel free to call me at 612.656.1102; fax 612.656.1181, or email tim.shannon@pacelabs.com.

Sincerely,

Tim Shannon
Project Manager

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## LABORATORY ANALYSIS REPORT

**DATE:** 31-Mar-2009

**PAGE:** 2 Of 4

**CLIENT:** Harmsco Filtration Products
7169 N. 49th Terrace
West Palm Beach, FL 33407

**PROJECT NO.:** 5093-CYS Rev. 1
**COLLECTED BY:** IBR
**DATE RECEIVED:** 17-Feb-2009
**PROJECT DESC:** 2 Hurricane 40-HP housing with PPFS-40-1 Cartridge

**CONTACT:** Ms. Cyndi Benson

### NSF/ANSI Standard 53 – 2007a Cyst (CYS) Reduction

Test Unit 5093-3

| Sample Point | System Pressure (psi) | Differential Pressure (psid) | Influent (Particles/L) | Effluent (Particles/mL) | Percent Reduction | Flow Rate (GPM) | Volume Treated (Gallons) |
|---|---|---|---|---|---|---|---|
| Flush | 56.7 | 13.8 | - | 0 | - | 15 | - |
| 8th Cycle | 57.1 | 12.6 | 87000 | 6 | 99.999 | 15 | 1050 |
| 25% Flow Red. | 64.2 | 39.7 | 149500 | 165 | 99.890 | 11 | 6000 |
| 50%Flow Red. | 67.2 | 52.6 | 103500 | 130 | 99.874 | 8 | 7425 |
| 75%Flow Red. | 69.6 | 63.3 | 172500 | 699 | 99.595 | 4 | 9425 |

Test Unit 5093-4

| Sample Point | System Pressure (psi) | Differential Pressure (psid) | Influent (Particles/mL) | Effluent (Particles/mL) | Percent Reduction | Flow Rate (GPM) | Volume Treated (Gallons) |
|---|---|---|---|---|---|---|---|
| Flush | 56.7 | 14.8 | | 0 | - | 15 | - |
| 8th Cycle | 57.1 | 13.5 | 87000 | 4 | >99.999 | 15 | 1050 |
| 25% Flow Red. | 64.2 | 40.9 | 149500 | 81 | 99.946 | 11 | 6030 |
| 50%Flow Red. | 67.2 | 53.6 | 103500 | 69 | 99.933 | 8 | 7455 |
| 75%Flow Red. | 69.6 | 64.1 | 172500 | 1013 | 99.413 | 4 | 9455 |

Note: Operating Cycle: 10 minutes on / 10 minutes off.
Contaminant: Polystyrene Latex Microspheres, (size = 3.00um) and 0-5 micron test dust for loading.
Test Date: 9-Mar-2009 – 16-Mar-2009
Neither pressure drop nor flow rate was adjusted during the test.

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*LABORATORY ANALYSIS REPORT*

| | | | |
|---|---|---|---|
| ***DATE:*** | *31-Mar-2009* | ***PAGE:*** | *3 Of 4* |
| ***CLIENT:*** | *Harmsco Filtration Products*<br>*7169 N. 49th Terrace*<br>*West Palm Beach, FL 33407* | ***PROJECT NO.:***<br>***COLLECTED BY:***<br>***DATE RECEIVED:***<br>***PROJECT DESC:*** | *5093-CYS Rev. 1*<br>*IBR*<br>*17-Feb-2009*<br>*2 Hurricane 40-HP housing with PPFS-40-1 Cartridge* |
| ***CONTACT:*** | *Ms, Cyndi Benson* | | |

***General Test Water Characteristics***

| *Parameters* | *Specifications* | *Results* |
|---|---|---|
| *pH* | *7.5 ± 0.5 su* | *7.6 su* |
| *Temperature* | *20 ± 2.5 °C* | *18.9 °C* |
| *Total Dissolved Solids* | *200-500 mg/L* | *304 mg/L* |
| *Hardness* | *<170 mg/L* | *80 mg/L* |
| *Turbidity* | *<1 NTU* | *0.13 NTU* |

***u*** *= standard units*
***UV*** *= Unit Volumes*
***GPM*** *= Gallons Per Minute*
***NTU*** *= Nephelometric Turbidity Unit*
***mg/L*** *=Milligrams Per Liter, or Parts Per Million (ppm)*
*Cyst Reduction was subcontracted to Interbasic Resources in Grass Lake, MI.*

***Bubble Point Test per ASTM F316-03***

*Test Unit 5093-3*

*First bubble net Pressure: 43psi**

*Test Unit 5093-4*

*First bubble net pressure: 45psi**

*Note: Test Fluid: Water (Approximately 69 dynes/cm$^2$)*
*Temperature: Ambient*
*Test Date: 17-Mar-2009*
**Samples bubbled from filter media only. No bubbles from the seals or endcaps*

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| | | | |
|---|---|---|---|
| ***DATE:*** | *31-Mar-2009* | ***PAGE:*** | *4 Of 4* |
| ***CLIENT:*** | *Harmsco Filtration Products*<br>*7169 N. 49th Terrace*<br>*West Palm Beach, FL 33407* | ***PROJECT NO.:***<br>***COLLECTED BY:***<br>***DATE RECEIVED:***<br>***PROJECT DESC:*** | *5093-CYS Rev. 1*<br>*IBR*<br>*17-Feb-2009*<br>*2 Hurricane 40-HP housing with PPFS-40-1 Cartridge* |
| ***CONTACT:*** | *Ms. Cyndi Benson* | | |

*Revision 1*

*The 75% flow reduction point data for Test Unit 5093-4 was revised to add the system pressure of 69.6 psi and move the remaining numbers one column to the right.*

*This report has been reviewed for technical accuracy and completeness. The analyses were performed using EPA or other approved methodologies and the results were reported on an "as received" basis unless otherwise noted. These results relate only to the items tested.*

END OF DOCUMENT

HARMSCO®
FILTRATION PRODUCTS

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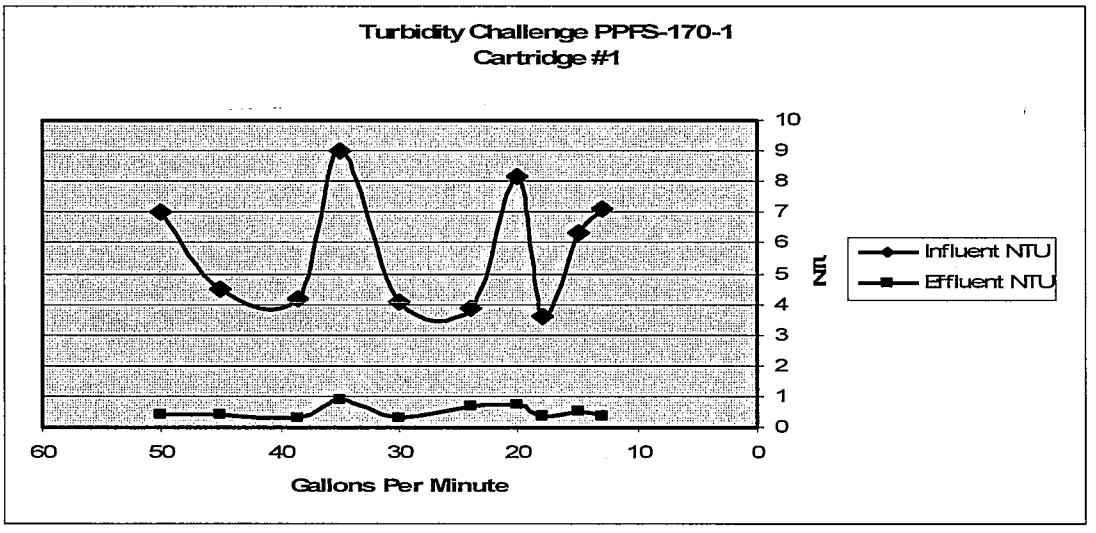
**To Send a PO (561) 845-2474**
**E-Mail cbenson@harmsco.com**

Turbidity for the PPFS-170-1 Cartridge
Tested in the HUR-170-HP Housing
Cartridge #1

Tested Using Arizona Fine Test Dust

| Flow Rate GPM | Influent NTU | Effluent NTU | ΔP PSI |
|---|---|---|---|
| 50 | 7 | 0.43 | 5 |
| 45 | 4.5 | 0.42 | 6 |
| 38.5 | 4.2 | 0.31 | 7 |
| 35 | 9 | 0.88 | 10 |
| 30 | 4.09 | 0.34 | 12 |
| 24 | 3.88 | 0.68 | 15 |
| 20 | 8.19 | 0.71 | 17 |
| 18 | 3.59 | 0.36 | 19 |
| 15 | 6.35 | 0.51 | 21 |
| 13 | 7.14 | 0.39 | 27 |



Turbidity for the PPFS-170-1 Cartridge
Tested in the HUR-170-HP Housing
Cartridge #2

| Flow Rate GPM | Influent NTU | Effluent NTU | ΔP PSI |
|---|---|---|---|
| 50 | 9.27 | 1.19 | 5 |
| 45 | 4.34 | 0.42 | 6 |
| 40 | 7.15 | 0.41 | 6 |
| 38.5 | 4.55 | 0.46 | 8 |
| 35 | 5.54 | 0.69 | 10 |
| 28 | 17.4 | 1.08 | 13 |
| 25 | 3.04 | 0.68 | 15 |
| 23 | 3.42 | 0.3 | 16 |
| 20 | 3.8 | 0.56 | 18 |
| 18.5 | 10.5 | 0.93 | 20 |
| 15 | 4 | 0.3 | 23 |
| 12.5 | 5.11 | 0.43 | 26 |