

# TEST REPORT

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**Report Number:** 1270-09001

**Report Issued:** July 2, 2009

**Project No.:** 16070

**Client:** Halifax Vogel Group.  
Rhinotanks  
24-26 Drynan St  
Bayswater, 6053  
Australia  
Contact: John Wood

**Source of Samples:** The samples were sent to IAPMO R& T Lab by Halifax Vogel Group on April 21, 2009 and was received in good condition.

**Date of Testing:** May 02, 2009 to July 1, 2009.

**Sample Description:** Hydroliner Cloth with Metalloence Film.

**Scope of Testing:** The purpose of testing was to determine if the samples tested of Halifax Vogel Group Hydroliner Cloth with Metalloence Film met the requirements of ANSI/NSF 61 – 2008, section 5.

**Conclusion:** **The samples tested of the Halifax Vogel Group Hydroliner Cloth with Metalloence Film COMPLIED with ANSI/NSF 61 – 2008, section 5. Please refer to page 2 to 9 for more detailed findings.**

By our signatures below we certify that all the testing and sample preparation for this report was performed under continuous, direct supervision of IAPMO R&T Lab

Tested By,

Reviewed By,

A handwritten signature in black ink, appearing to read 'Lin Nguyen', written over a horizontal line.

Lin Nguyen, Chemist

A handwritten signature in black ink, appearing to read 'Michael N. Briggs', written over a horizontal line.

Michael N. Briggs, Manager, Chemical Testing

**Primary Standards:** ANSI/NSF-61-2008, section 5:

### **Preparation of Test Samples**

Test samples were rinsed and conditioned as described in ANSI/NSF61-2008, Sections 5.5.2.1 and 5.5.4

### **Conditioning and Exposure**

The materials were conditioned as described in section 5.5.4. The exposure water was made as described in Table B15. One (1) sample with a surface area of 117 in<sup>2</sup> was exposed to the 100ml pH 5 exposure water for metal contaminants. One (1) sample with a surface of 117 in<sup>2</sup> was exposed to the 100ml pH 10 water for metal contaminants. Two (2) sample with a surface area of 117 in<sup>2</sup> was exposed to pH 8 water with no chlorine for organic contaminants. The back side of the fabric was exposed to water and evaluated for cold water applications only.

### **Exposure and Normalization**

Following conditioning, the sample was exposed to extraction water according to the applicable scheme detailed in section 5.5.5 and Table 5.2.

The concentration of extracted contaminants were normalized for all other end uses section 5.7.2. The laboratory concentration was normalized using the equation of:

Normalized contaminant concentration = Lab contaminant concentration x (SAF/VF) x (VL/SAL) x 24h/hours of exposure.

Where

SAF/VF = Surface area to volume ratio for the smallest specified tank capacity (largest SAF/VF ratio) as defined in table 5.4

SAL = Surface area exposed in the laboratory

VL = Volume of extraction water used in the laboratory

Final exposure = 24 hours.

### **Extraction Water**

The extraction water was prepared as described in ANSI/NSF61-2008, Table B15

### **Collection/Preservation of Extraction Water**

Immediately following the exposure period, extraction waters collected for analysis were poured into previously prepared sample containers for storage until analysis, as specified in annex B, Section B.6 and Table B8.

Samples for metal analysis were preserved with nitric acid as described in EPA protocols

Samples for volatile organic contaminants were preserved with sodium thiosulfate and HCl as outlined in EPA 524.2 protocol.

Samples for semi-volatile organic contaminants were preserved with sulfuric acid as described in EPA 525.2 and SW-846 protocol.

## Evaluation of Contaminant Concentrations

Metal concentrations were determined as a single point analysis and normalized as specified. The most conservative normalization factors were used as outlined in the standard. The resulting level for each extraction water were compared to the MCL, TAC, AL as appropriate. To comply with the standard the leachate from both exposure waters for metals must meet levels described in the standard.

Organic evaluations were determined on a single point sample. Following appropriate sample preparations organic contaminants were compared to the contaminants TAC or MCL as appropriate.

### Analytical methodology

Metal determinations:	EPA 200.8, Metal determinations by ICP/MS
Volatile organic contaminants:	EPA 524.2, Volatile organic determinations by Purge and Trap, GCMS.
Semi-volatile contaminants:	EPA 8270, EPA525.2 Semi-volatile organic determinations by liquid/liquid extraction followed by GC/MS determinations.

### Analytical Instrumentation

Metal determinations:	Thermo Electron X7 ICP/MS with CCT
Volatile organic determinations:	Thermo Electron DSQ GC/MS with Tekmar Velocity Purge and Trap system.
Semi-volatile organic determinations:	Thermo Electron DSQ GC/MS with AS2000 auto sampler.

### Discussion

The material that is tested in this report is hydroliner cloth with metallocene film. Its formulation is confidentially obtained from the manufacturer. A copy of its formulation, its MSDS and its physical testing data have been appended with the report.

This material contains polyethylene and polyethylene copolymerization. Section 3, Table 3.1 analytes for PE (VOCs, regulated metals, phenolics) were monitored on the appropriate retained exposure water samples.

Pigment green 36, titanium oxide and nickel compound are in the formulation. However these chemicals are only in the green side of the material and do not contact to water.

Carbon black is used in the material. PNA compounds, nitro-PNA compounds may be present in carbon black. These compounds can be detected by semi volatile GC/MS.

Calcium carbonate is used in this material. Regulated metal was monitored on the appropriate retained exposure water sample for possible heavy metal contaminant from this chemical.

Poly(4-hydroxy-2,2,6,6-tetramethyl-1-piperidine ethanol-alt-1,4-butanedioic acid) (CAS# 65447-77-0) is used in this formulation. Unreacted monomer 4-hydroxy-2,2,6,6-tetramethyl-1-piperidine ethanol and butanedioic acid may migrate into the leaching water and partition into methylene chloride and can be detected by semi-volatile GC/MS.

(2,4 tert-butylphenyl) phosphate (CAS # 31570-04-4) is in this formulation. This chemical is slightly soluble in water but it can possible degrade to di tert-butylphenol. Both compounds should partition into methylene chloride and may be monitored by GC/MS.

Pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate) (CAS# 6683-19-8) is used in this formulation. This chemical is slightly soluble in water but it can possible degrade to t-butylphenol which along with any of the parent compound that might migrate into the exposure water should partition into methylene chlotride and be monitored by GC/MS.

To verify the compliance of this PE liner fabric, regulated metals, volatile and semi-volatile were monitored on the appropriate retained exposure water

To comply with the standard, the metals that migrate into both exposure waters must be less than the acceptance criteria set in the standard. The observed normalized metal concentrations were all less than the acceptance criteria set in the standard.

VOC compounds were monitored by GC/MS. 2-Butanone and tetrahydrofuran were the only target analytes observed in the resulting volatile GC/MS analysis at normalized concentrations well below the TAC levels set in the standard. No non-target analytes were observed in the resulting volatile GC/MS chromatogram.

Semi-volatile organics were monitored by GC/MS. 2-Phenyl-2-propanol, bis(2-ethylhexyl)phthalate, caprolactam and diethylphthalate were the only target analytes observed in the resulting GC/MS analysis at normalized concentrations well below the TAC or MCL levels set in the standard as appropriate. One (1) non-target analyte was observed in the resulting semi-volatile GC/MS chromatogram at RT 11.21 and was identified as phenol, 2-4-bis(1,1-dimethylethyl)-6-methyl- (CAS# 616-55-7). There is no specific acceptance criteria for phenol, 2-4-bis(1,1-dimethylethyl)-6-methyl- set in the standard; however, Annex A provides guidance for establishing acceptance criteria by performing a risk assessment. A risk assessment was performed by TOXservices which concludes that phenol, 2-4-bis(1,1-dimethylethyl)-6-methyl- is not likely to be a significant health risk at a TAC level of 10 ppb or less. The estimate normalized concentration is well below this TAC level.

**Metal Evaluations at Room Temperature (23°C)**

Metal	MCL (ug/L)	pH5 Analytical Data @ 23°C (ug/L)	pH5 Static Normalized @ 23°C (ug/L)	pH10 Analytical Data @ 23°C (ug/L)	pH10 Static Normalized @ 23°C (ug/L)	Test Methods
Antimony	6	0.108	0.004	0.046	0.002	EPA 200.8
Arsenic	10	ND (< 0.0950)	ND (< 0.0033)	0.096	0.003	EPA 200.8
Barium	2000	0.698	0.024	ND (< 0.0786)	ND (< 0.0027)	EPA 200.8
Beryllium	4	ND (< 0.0925)	ND (< 0.0032)	0.795	0.027	EPA 200.8
Cadmium	5	ND (< 0.1083)	ND (< 0.0037)	ND (< 0.1083)	ND (< 0.0037)	EPA 200.8
Chromium	100	ND (< 0.1738)	ND (< 0.0060)	0.228	0.008	EPA 200.8
Copper	1300 (AL)	12.700	0.439	6.802	0.235	EPA 200.8
Mercury	2	0.029	0.001	ND (< 0.0191)	ND (< 0.0007)	EPA 200.8
Nickel	100 (TAC)	0.603	0.021	0.287	0.010	EPA 200.8
Selenium	50	0.471	0.016	ND (< 0.2911)	ND (< 0.0101)	EPA 200.8
Thallium	2	ND (< 0.0461)	ND (< 0.0016)	ND (< 0.0461)	ND (< 0.0016)	EPA 200.8
Zinc	3000 (TAC)	21.950	0.758	3.184	0.110	EPA 200.8
Lead	15 (AL)	1.595	0.055	0.154	0.005	EPA 200.8

MCL: Maximum Contaminant Level  
TAC: Total Allowable Concentration  
AL: Action Level

Note: Normalized Contaminant Concentration = Lab contaminant concentration\*  
SAF/VF\*VL/SAL\*24h/hour of exposure  
Where  
SAF/VF = Surface area to volume ratio for specified tank capacity as defined  
as 40.4 in<sup>2</sup>/L  
VL = Volume of extraction water in the lab = 0.1ml  
SAL = Surface area exposed in the laboratory = 117in<sup>2</sup>

**Test Result of Organics:**

<b>Target Analyte</b>	<b>Test Method</b>	<b>Result</b>	<b>Normalized</b>
<b>Volatile Organic Compounds:</b>	<b>EPA 524.2</b>	<b>(ug/L)</b>	<b>Result (ug/L)</b>
Difluorodichloromethane		ND < 0.3	ND < 0.0104
Chloromethane		ND < 0.3	ND < 0.0104
Vinylchloride		ND < 0.3	ND < 0.0104
1,3-Butadiene		ND < 0.3	ND < 0.0104
Bromomethane		ND < 5.0	ND < 0.1726
Chloroethane		ND < 0.3	ND < 0.0104
Trichlorofluoromethane		ND < 0.3	ND < 0.0104
1,1-Dichloro-1-fluorethane		ND < 0.3	ND < 0.0104
1,1-Dichloroethene		ND < 0.3	ND < 0.0104
Carbon disulfide		ND < 0.3	ND < 0.010
Dichloromethane		ND < 0.3	ND < 0.0104
t-Butanol		ND < 0.3	ND < 0.0104
MtBE		ND < 0.3	ND < 0.0104
trans-1,2-Dichloroethene		ND < 0.3	ND < 0.0104
Acrylonitrile		ND < 0.5	ND < 0.0173
Vinylacetate		ND < 0.3	ND < 0.0104
1,1-Dichloroethane		ND < 0.3	ND < 0.0104
2,2-Dichloropropane		ND < 0.3	ND < 0.0104
cis-1,2-Dichloroethene		ND < 0.3	ND < 0.0104
2-Butanone		11.5	0.395
Tetrahydrofuran		12.4	0.428
Bromochloromethane		ND < 0.3	ND < 0.0104
Chloroform		ND < 0.3	ND < 0.0104
1,1,1-Trichloroethane		ND < 0.3	ND < 0.0104
Carbon tetrachloride		ND < 0.3	ND < 0.0104
1,1-Dichloropropene		ND < 0.3	ND < 0.0104
Isopropylacetate		ND < 0.3	ND < 0.0104
Benzene		ND < 0.3	ND < 0.0104
1,2-Dichloroethane		ND < 0.3	ND < 0.0104
Trichloroethene		ND < 0.3	ND < 0.0104
Methylmethacrylate		ND < 0.3	ND < 0.0104
1,2-Dichloropropane		ND < 0.3	ND < 0.0104
Dibromomethane		ND < 0.3	ND < 0.0104
Bromodichloromethane		ND < 0.3	ND < 0.0104
cis-1,3-Dichloropropene		ND < 0.3	ND < 0.0104
Toluene		ND < 0.3	ND < 0.010
Ethylmethacrylate		ND < 0.3	ND < 0.0104
trans-1,3-Dichloropropene		ND < 0.3	ND < 0.0104

**Test Result of Organics:**

<b>Target Analyte</b>	<b>Test Method</b>	<b>Result</b>	<b>Normalized</b>
<b>Volatile Organic Compounds:</b>	<b>EPA 524.2</b>	<b>(ug/L)</b>	<b>Result (ug/L)</b>
1,1,2-Trichloroethane		ND < 0.3	ND < 0.0104
Tetrachloroethene		ND < 0.3	ND < 0.0104
Butylacetate		ND < 0.3	ND < 0.0104
1,3-Dichloropropane		ND < 0.3	ND < 0.0104
Dibromochloromethane		ND < 0.3	ND < 0.0104
1,2-Dibromoethane		ND < 0.3	ND < 0.0104
Chlorobenzene		ND < 0.3	ND < 0.0104
Ethylbenzene		ND < 0.3	ND < 0.0104
1,1,1,2-Tetrachloroethane		ND < 0.3	ND < 0.0104
m and p - Xylenes		ND < 0.3	ND < 0.0104
o-Xylene		ND < 0.3	ND < 0.0104
Styrene		ND < 0.3	ND < 0.0104
Tribromomethane		ND < 0.3	ND < 0.0104
Isopropylbenzene		ND < 0.3	ND < 0.0104
Cyclohexanone		ND < 0.3	ND < 0.0104
1,1,2,2-Tetrachloroethane		ND < 0.3	ND < 0.0104
Propylbenzene		ND < 0.3	ND < 0.0104
Bromobenzene		ND < 0.3	ND < 0.0104
1,2,3-Trichloropropane		ND < 0.3	ND < 0.0104
1,3,5-Trimethylbenzene		ND < 0.3	ND < 0.0104
2-Chlorotoluene		ND < 0.3	ND < 0.0104
4-Chlorotoluene		ND < 0.3	ND < 0.0104
t-Butylbenzene		ND < 0.3	ND < 0.0104
1,2,3-Trimethylbenzene		ND < 0.3	ND < 0.0104
sec-Butylbenzene		ND < 0.3	ND < 0.0104
p-Isopropyltoluene		ND < 0.3	ND < 0.0104
1,3-Dichlorobenzene		ND < 0.3	ND < 0.0104
1,4-Dichlorobenzene		ND < 0.3	ND < 0.0104
n-Butylbenzene		ND < 0.3	ND < 0.0104
1,2-Dichlorobenzene		ND < 0.3	ND < 0.0104
1,2-Dibromo-3-chloropropane		ND < 0.3	ND < 0.0104
1,2,4-Trichlorobenzene		ND < 0.3	ND < 0.0104
Hexachlorobutadiene		ND < 0.3	ND < 0.0104
Naphthalene		ND < 0.3	ND < 0.0104
1,2,3-Trichlorobenzene		ND < 0.3	ND < 0.0104

No non-target analytes observed in the chromatogram

**Test Result of Organics:**

<b>Target Analyte</b>	<b>EPA 8270/EPA 625</b>	<b>Result</b>	<b>Normalized</b>
<b>Semi-Volatile Organics</b>	<b>C.A.S. Number</b>	<b>(ug/L)</b>	<b>Result (ug/L)</b>
1,2,4-Trichlorobenzene	120-82-1	ND < 0.50	ND < 0.0173
1,3-Dichlorobenzene	541-73-1	ND < 0.50	ND < 0.0173
1,4-Dichlorobenzene	106-46-7	ND < 0.50	ND < 0.0173
1,2-Dichlorobenzene	95-50-1	ND < 0.50	ND < 0.0173
2,3,4,6-Tetrachlorophenol	58-90-2	ND < 0.50	ND < 0.0173
2,4,5-Trichlorophenol	95-95-4	ND < 1.20	ND < 0.0414
2,4,6-Trichlorophenol	88-06-2	ND < 1.00	ND < 0.0345
2,4-Dichlorophenol	120-83-2	ND < 0.50	ND < 0.0173
2,4-Dimethylphenol	105-67-9	ND < 0.50	ND < 0.0173
2,4-Dinitrophenol	51-28-5	ND < 10.00	ND < 0.3453
2,4-Dinitrotoluene	121-14-2	ND < 0.50	ND < 0.0173
2,6-Dichlorophenol	87-65-0	ND < 0.50	ND < 0.0173
2,6-Dinitrotoluene	606-20-2	ND < 0.50	ND < 0.0173
2-Chlorophenol	95-57-8	ND < 0.50	ND < 0.0173
2-Chloronaphthalene	91-58-7	ND < 0.50	ND < 0.0173
2-Ethylhexylmethacrylate	688-84-6	ND < 0.50	ND < 0.0173
2-Methylphenol	95-48-7	ND < 0.50	ND < 0.0173
2-Nitrophenol	88-75-5	ND < 10.00	ND < 0.3453
2-Phenyl 2-Propanol	617-94-7	0.55	0.0190
3-and 4-Methylphenol	108-39-4, 106-44-5	ND < 1.00	ND < 0.0345
4,6-Dinitro-2-methylphenol	534-52-1	ND < 0.70	ND < 0.0242
4-Bromophenylphenylether	101-55-3	ND < 0.50	ND < 0.0173
4-Chloro-3-methylphenol	59-50-7	ND < 0.50	ND < 0.0173
4-Chlorophenyl phenyl ether	7005-72-3	ND < 0.50	ND < 0.0173
4-Nitrophenol	100-02-7	ND < 10.00	ND < 0.3453
Acenaphthene	83-32-9	ND < 0.50	ND < 0.0173
Acenaphthylene	208-96-8	ND < 0.50	ND < 0.0173
Acetophenone	98-86-2	ND < 0.50	ND < 0.0173
Anthracene	120-12-7	ND < 0.50	ND < 0.0173
Azobenzene	103-33-3	ND < 0.50	ND < 0.0173
Benzo(a)anthracene	50-32-8	ND < 0.50	ND < 0.0173
Benzo(a)pyrene	56-55-3	ND < 0.50	ND < 0.0173
Benzo(b)fluoranthene	205-59-2	ND < 0.50	ND < 0.0173
Benzo(ghi)perylene	191-24-2	ND < 0.50	ND < 0.0173
Benzo(k)fluoranthene	207-08-9	ND < 0.50	ND < 0.0173
Benzylbutylphthalate	85-68-7	ND < 5.00	ND < 0.1727

**Test Result of Organics:**

Target Analyte	EPA 8270/EPA 625	Result	Normalized
Semi-Volatile Organics	C.A.S.Number	(ug/L)	Result (ug/L)
Bis(2-Ethylhexyl)adipate	103-23-1	ND < 0.70	ND < 0.0242
bis-2-Chloroethoxy methane	111-91-1	ND < 0.50	ND < 0.0173
bis-2-Chloroethyl ether	111-44-4	ND < 0.50	ND < 0.0173
bis-2-Chloroisopropyl ether	108-60-1	ND < 0.50	ND < 0.0173
bis-2-ethylhexyl phthalate	117-81-7	1.09	0.038
Caprolactam	105-60-2	2.46	0.085
Carbazole	86-74-8	ND < 0.50	ND < 0.0173
Chrysene	218-01-9	ND < 0.50	ND < 0.0173
Dibenz(ah)anthracene	53-70-3	ND < 0.50	ND < 0.0173
Diethylphthalate	84-66-2	0.51	0.018
Dimethylphthalate	131-11-3	ND < 0.50	ND < 0.0173
Di-n-butylphthalate	84-74-2	ND < 1.60	ND < 0.0552
Di-n-octylphthalate	117-84-0	ND < 0.50	ND < 0.0173
Dinoseb	88-85-7	ND < 1.00	ND < 0.0345
Fluoranthene	206-44-0	ND < 0.50	ND < 0.0173
Fluorene	86-73-7	ND < 0.50	ND < 0.0173
Hexachlorobenzene	118-74-1	ND < 0.50	ND < 0.0173
Hexachlorobutadiene	87-68-3	ND < 0.50	ND < 0.0173
Hexachlorocyclopentadiene	77-47-4	ND < 0.50	ND < 0.0173
Hexachloroethane	67-72-1	ND < 0.50	ND < 0.0173
Indeno(1,2,3-cd)pyrene	193-39-5	ND < 0.50	ND < 0.0173
Isophorone	78-58-1	ND < 0.50	ND < 0.0173
Naphthalene	91-20-3	ND < 0.50	ND < 0.0173
Nitrobenzene	98-95-3	ND < 0.50	ND < 0.0173
N-Nitrosodimethylamine	62-75-9	ND < 0.50	ND < 0.0173
N-Nitroso-di-n-propylamine	621-64-7	ND < 0.50	ND < 0.0173
N-Nitrosodiphenylamine	86-30-6	ND < 0.50	ND < 0.0173
Pentachlorophenol	87-86-5	ND < 1.20	ND < 0.0414
Phenanthrene	85-01-8	ND < 0.50	ND < 0.0173
Phenol	108-95-2	ND < 0.50	ND < 0.0173
Pyrene	129-000-0	ND < 0.50	ND < 0.0173

**Semi-Volatile TIC Compounds:**

RT	CAS	ID	Concentration	Normalized Concentration
11.21	616-55-7	Phenol, 2-4-bis(1,1-dimethylethyl)-6-methyl-	4.55	0.16