

# Dynamic Small-Scale Chamber Emissions Testing

Compliance Report per  
California Department of  
Public Health Standard Method  
Version 1.1

SanFoot® Natural Wood  
Veneer Wallcovering



Prepared for:

*Jacaranda, Inc.* The Different Veneer Company

16301 Northwest 15<sup>th</sup> Avenue  
Miami, FL 33169

Submitted by:

Materials Analytical Services, LLC  
3945 Lakefield Court  
Suwanee, Georgia 30024



Testing Cert. #2925.01

November 23, 2011

MAS Project No: 1101312



November 23, 2011

Tom Whittelsey  
Jacaranda, Inc.  
16301 Northwest 15<sup>th</sup> Avenue  
Miami, FL 33169



**Subject:       Dynamic Small-Scale Chamber Emissions Testing  
                  Compliance Report per California Dept. of Public Health Standard Method  
                  Version 1.1  
                  Jacaranda, Inc. SanFoot® Natural Wood Veneer Wallcovering  
                  MAS Project No.: 1101312**

Dear Mr. Whittelsey:

Materials Analytical Services, LLC (MAS) is pleased to submit this report for emissions testing relative to potential VOC off-gassing from a sample of SanFoot® Natural Wood Veneer Wallcovering submitted in November 2011. This report summarizes our testing procedures and results of analytical measurements.

This project was conducted in general accordance with the emission testing guidelines specified under ASTM D 5116-10. Specific testing parameters and VOC emission limits were based on the California Department of Public Health (CDPH) *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Test Chambers Version 1.1* (Section 01350). This testing protocol was implemented to bracket a broad range of similarly formulated, lower emitting products under a single test contained herein.

Based on our test results summarized herein, the SanFoot® Natural Wood Veneer Wallcovering is **compliant** with the performance standards established for low-emitting wallcovering by CDPH, and as such is compliant with the California Collaborative for High Performance Schools (CHPS) and the LEED 2009 for Schools programs. Qualified project uses of the SanFoot® Natural Wood Veneer Wallcovering and all bracketed products may be eligible for CHPS and LEED credits under their respective Ceiling and Wall Systems Programs. Further, by successful conformance with the CHPS & LEED standards, the SanFoot® Natural Wood Veneer Wallcovering also meets the criteria of the **MAS Certified Green®** Program.

MAS is pleased to have been of service to you. If you have any questions or comments, or if we can be of further assistance to you, please do not hesitate to contact us.

Sincerely,

**MATERIALS ANALYTICAL SERVICES, LLC**

Robert D. Schmitter  
Manager, Emissions Group

William R. Stapleton  
Senior Chemist

Appendices:   Appendix A – Chain-of-Custody  
                  Appendix B – List of Bracketed Products  
                  Appendix C – Testing Parameters and Data

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# COMPLIANCE EMISSIONS TEST

By California Department of Public Health Standard Method Version 1.1  
 Wallcovering Evaluation  
 MAS Project No.: 1101312

## SAMPLE DESCRIPTION & TESTING PARAMETERS

On November 2, 2011, Jacaranda, Inc. of Miami, Florida submitted an exemplar of their SanFoot® Natural Wood Veneer Wallcovering to MAS for emissions testing (refer to photos below).

The sample was delivered to our Suwanee, Georgia office in a sealed airtight Mylar bag and shipped within an outer cardboard box. The manufacturer and sample specifics as described in the accompanying chain-of custody (see Appendix A) and a timeline of milestones dates relative to sampling and analysis are summarized below.

<b>Product Name:</b> SanFoot® Natural Wood Veneer Wallcovering	<b>MAS Assigned ID:</b> 1101312
<b>Manufacturer:</b> Hokusan LTD 1-7-6 Shin Kiba Koto-Ku Tokyo, Japan	<b>Product Description:</b> Red Oak Elite 70 veneer on paper wallcovering with high sheen (Elite 70) polyurethane finish. 5-ply construction.
<b>Manufacture Date:</b> October 31, 2011	<b>Testing Period:</b> Nov. 4 – 18, 2011
<b>Collection Date:</b> October 31, 2011	<b>In-Chamber Sampling Dates:</b> Nov. 15 @ 24 hrs; Nov. 16 @ 48 hrs; and Nov. 18 @ 168 hrs
<b>Shipping Date:</b> November 2, 2011	<b>Date of Sample Analysis:</b> November 18, 2011
<b>Laboratory Arrival Date:</b> November 3, 2011	



Jacaranda, Inc. SanFoot® Natural Wood Veneer Wallcovering as submitted (left) and tested (right)



## SAMPLE HANDLING & EMISSIONS TESTING

The wallcovering was prepared for testing by cutting a 15 cm x 15 cm section from the submitted sample, which was then placed in a stainless steel holder “face-up” and loaded inside one of MAS’s small-scale (53 liter) stainless steel emissions chambers on the chamber floor beneath a fan to facilitate even air circulation around the sample.

Off-gassed emissions from the subject sample were sampled and analyzed in general accordance with ASTM D 5116-10 *Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products*. The specific parameters for sample conditioning, collection of samples and analysis of compounds of interest were conducted in accordance with the California Department of Public Health (CDPH) *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.1*, for comparison to the Leadership in Energy and Environmental Design (LEED) 2009 for Schools standard, and the Collaborative for High Performance Schools (CHPS) criteria for Low Emitting Materials; and **MAS Certified Green®** Program standard chamber emissions testing procedures. Details of testing protocols and parameters are presented in Appendix C.

## TESTING RESULTS

In order to compare the chamber derived data to the standards established under CDPH Standard Method Version 1.1 and the CHPS criteria for Low Emitting Materials a predicted emission concentration for the tested sample is calculated based on the 96 hour data. This predicted concentration is then modeled to the defined parameters of that product in a typical school classroom and private office environment accounting for the specified room sizes and ventilation rates.

CDPH modeling parameters define a typical classroom as having a total wall surface area of approximately 1,018 square feet, and a typical private office as having a total wall surface area of approximately 360 square feet, after subtracting out a CDPH-specified area of one door and two windows. For purposes of this report, a typical application was assumed to be the wall areas only. The results of the modeling data are presented on the following page in Table I.



**Table I**  
**Emission Factors and Predicted 96-Hour Airborne Concentrations for the**  
**SanFoot® Natural Wood Veneer Wallcovering in Typical Building Environments**

VOC Name	Calculated Emission Factor (µg/m <sup>2</sup> /hr)	Predicted Airborne Concentration (µg/m <sup>3</sup> )		Reference OEHHA ½ CREL Values (µg/m <sup>3</sup> )	Testing Comment
	96 <sup>th</sup> hour (4 days)	Classroom*	Private Office**		
Total VOCs (TVOC)	120	60	190	NA	NA
formaldehyde	<3.6	<1.8	<5.8	16.5	PASS
acetaldehyde	<3.2	<1.6	<5.3	70	PASS
isopropanol	<3.1	<1.6	<5.0	3500	PASS
1,1-dichloroethylene	<3.1	<1.6	<5.0	35	PASS
methylene chloride	<3.1	<1.6	<5.0	200	PASS
carbon disulfide	<3.1	<1.6	<5.0	400	PASS
MTBE	<3.1	<1.6	<5.0	4000	PASS
vinyl acetate	<3.1	<1.6	<5.0	100	PASS
hexane	<3.1	<1.6	<5.0	3500	PASS
chloroform	<3.1	<1.6	<5.0	150	PASS
2-methoxyethanol	<3.1	<1.6	<5.0	30	PASS
1,1,1-trichloroethane	<3.1	<1.6	<5.0	500	PASS
benzene	<3.1	<1.6	<5.0	30	PASS
1-methoxy-2-propanol	<3.1	<1.6	<5.0	3500	PASS
carbon tetrachloride	<3.1	<1.6	<5.0	20	PASS
1,4-dioxane	<3.1	<1.6	<5.0	1500	PASS
trichloroethylene	<3.1	<1.6	<5.0	300	PASS
epichlorohydrin	<0.79	<0.40	<1.3	1.5	PASS
2-ethoxyethanol	<3.1	<1.6	<5.0	35	PASS
n,n-dimethylformamide	<3.1	<1.6	<5.0	40	PASS
toluene	<3.1	<1.6	<5.0	150	PASS
2-methoxyethanol acetate	<3.1	<1.6	<5.0	45	PASS
tetrachloroethylene	<3.1	<1.6	<5.0	17.5	PASS
chlorobenzene	<3.1	<1.6	<5.0	500	PASS
ethylbenzene	<3.1	<1.6	<5.0	1000	PASS
m & p-xylene	<3.1	<1.6	<5.0	350	PASS
styrene	<3.1	<1.6	<5.0	450	PASS
o-xylene	<3.1	<1.6	<5.0	350	PASS
phenol	<3.1	<1.6	<5.0	100	PASS
1,4-dichlorobenzene	<3.1	<1.6	<5.0	400	PASS



isophorone	<3.1	<1.6	<5.0	1000	<b>PASS</b>
naphthalene	<1.6	<0.81	<2.6	4.5	<b>PASS</b>

\* Assumes a classroom size of 24' x 40' x 8.5' with a total wall area of 1,018 square feet accounting for the area of one door and two windows, and a ventilation rate of 0.82 h<sup>-1</sup> as defined by CDPH Standard Method V.1.1

\*\* Assumes a private office size of 10' x 12' x 9' with a total wall area of 360 square feet and a ventilation rate of 0.68 h<sup>-1</sup> as defined by CDPH Standard Method V.1.1

## CONCLUSIONS

Based on the emissions test data, MAS offers the following findings and conclusions:

- None of the California Department of Public Health regulated compounds were measured above laboratory detection limits in the Jacaranda, Inc. SanFoot® Natural Wood Veneer Wallcovering (sample 1101312) at the 14 day test end point. Predicted air concentrations of these compounds in both a classroom and private office environment are **compliant** with the CDPH-specified California Office of Environmental Health Hazard Assessment (OEHHA) ½ CREL limit.
- Based on the findings summarized in Table I, the Jacaranda, Inc. SanFoot® Natural Wood Veneer Wallcovering tested in November 2011 **meets** the performance standards established for low-emitting materials under the California Collaborative for High Performance Schools (CHPS) and the LEED for Schools programs. As such, qualified project uses of the subject wallcovering may be eligible for credit points under CHPS EQ2.2.6 for Ceiling and Wall Systems, and IEQ Credit 4.6 for Ceiling and Wall Systems under the LEED 2009 for Schools Program. Further, by successful conformance with the CHPS & LEED standards, the subject wallcovering also meets the criteria of **MAS Certified Green®** Program.

## LIMITATIONS

This report is intended for the use of Jacaranda, Inc. only. If other parties wish to rely on this report, please have them contact us so that a mutual understanding and agreement of the terms and conditions for our services can be established prior to their use of this information. This report shall not be reproduced, except in full, without the written approval of Materials Analytical Services, LLC.

It should be noted that emissions generally decay over time; as such the representativeness of the analytical data reported is directly dependant upon the age and conditions under which the tested sample was received.

All MAS-issued certifications for product emissions testing are valid for a period of one year from the date of a MAS issued Emissions Testing Compliance Report. Compliance certifications are strictly limited to only the referenced product tested and/or specific variations explicitly referenced in this report.

# **APPENDIX A**

## Chain-of-Custody



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**Materials Analytical Services LLC**

3945 Lakefield Court  
Suwanee, Georgia 30024  
Phone: 770-866-3200  
Fax: 770-866-3259

Collaborating Department of  
**Public Health**

Standard Method (section 01350)

Emission Testing

Chain-of-Custody

Client Information
Company: WWP - Jacaranda
Street Address: 16301 Northwest 15th Avenue
City/State: Miami, Florida
Zip/Postal Code: 33169
Country: USA
Contact Name: Tom Whittelsey
Title: President
Phone Number: (800) 225-6384
Fax Number: (305) 621-2022
Email Address: Twhittelsey@aol.com

Manufacturer Information (if different than client)
Company: Hokusan LTD
City/State/Country: 1-7-6 Shin Kiba Koto-Ku Tokyo, Japan
Contact Name/Title: Mr. H. Tomibe
Phone Number: 011-81-3-3521-21111

Sample Details
Unique Sample ID (if applicable):
Product Name & Catalog #:
Product Type: Ceiling/Wall Panels <input type="checkbox"/> , Flooring <input type="checkbox"/> , Trim <input type="checkbox"/> , Wall Paint <input type="checkbox"/> , Wall Coverings X, Thermal Insulation <input type="checkbox"/> , Adhesives <input type="checkbox"/> , Ceiling Tiles <input type="checkbox"/> , Other <input type="checkbox"/>
Date of Product Manufacturing Completion:
Sample Location: Factory <input type="checkbox"/> , Warehouse <input type="checkbox"/> , Production Stack/Roll <input type="checkbox"/> , Container <input type="checkbox"/>
Sample Submitted by:
Date of Sample Shipment:
Number of Boxes or Pallets:

Shipping Details
Packed By:
Shipping Date:
Carrier/Airbill Number:

Testing Specifications (per MAS) check appropriate test below
<input type="checkbox"/> R&D (custom): Specify Details
<input type="checkbox"/> 24-hour Comparative R&D Test
<input type="checkbox"/> 72-hour Comparative R&D Test
<input checked="" type="checkbox"/> 14-day CDPH Compliance Test

Construction Details (as applicable)
Covering Type: Fabric <input type="checkbox"/> (Primary Fiber type: _____), Vinyl <input type="checkbox"/> , Leather <input type="checkbox"/>
Plastic Type(s): Nylon <input type="checkbox"/> , PVC <input type="checkbox"/> , PE <input type="checkbox"/> , PP <input type="checkbox"/> , PU <input type="checkbox"/> , PS <input type="checkbox"/> , PC <input type="checkbox"/> , ABS <input type="checkbox"/> , Acrylic <input type="checkbox"/> , Lexan <input type="checkbox"/>
Substrate Type(s): MDF <input type="checkbox"/> , Particle Board <input type="checkbox"/> , Plywood <input type="checkbox"/> , Solid Wood <input type="checkbox"/> , Other X veneer on paper
Outer Finish Type(s): Oil Base <input type="checkbox"/> , Water Base <input type="checkbox"/> , Catalyzed/Conversion Var <input type="checkbox"/> , Polyurethane X, Plastic Laminated <input type="checkbox"/> , Melamine <input type="checkbox"/> , UV <input type="checkbox"/> , Other <input type="checkbox"/>
Foam Type: Polyurethane <input type="checkbox"/> , Memory <input type="checkbox"/> , Latex <input type="checkbox"/> , Evlon <input type="checkbox"/> , High Resilience <input type="checkbox"/> , High Density <input type="checkbox"/>
Paint Type: Latex <input type="checkbox"/> , Oil <input type="checkbox"/> , Low VOC <input type="checkbox"/> , No VOCs <input type="checkbox"/> , PowderCoat <input type="checkbox"/> , Chrome <input type="checkbox"/>

Special Notes or Comments from Manufacturer:

Laboratory Receipt (to be completed by Laboratory Representative)
Received By:
Received Date:
Condition of Shipping Package:
Condition of Sample:
Remarks:

Sample Handling				
Relinquished By	Company	Received By	Company	Date/Time
		<i>Nancy Sears</i>	MAS	11-3-11

coc rec'd 11-4-11



Second chain-of-custody provided by Jacaranda with additional product details.



**Materials Analytical Services LLC**

3945 Lakefield Court  
Suwanee, Georgia 30024  
Phone: 770-865-3200  
Fax: 770-969-3258

Contracting Department of  
Public Health

Standard Method (section 01350)

Emission Testing  
Chain-of-Custody

Client Information
Company: Jacaranda, Inc.
Street Address: 16301 Northwest 16th Avenue
City/State: Miami, Florida
Zip/Postal Code: 33169
Country: USA
Contact Name: Tom Whittelsey
Title: President
Phone Number: 800-225-8384
Fax Number: 305-621-2022
Email Address: Twhittelsey@aol.com

Testing Specifications (per MAS) check appropriate test below
<input type="checkbox"/> R&D (custom): Specify Details
<input type="checkbox"/> 24-hour Comparative R&D Test
<input type="checkbox"/> 72-hour Comparative R&D Test
<input checked="" type="checkbox"/> 14-day CDPH Compliance Test

Manufacturer Information (if different than client)
Company: HOKUSAN LTD
City/State/Country: TOKYO, JAPAN 136-0082
Contact Name/Title: Mr. H. Tomibe
Phone Number: 011-81-3-3521-21111

Construction Details (as applicable)
Covering Type: Fabric <input type="checkbox"/> (Primary Fiber type: _____), Vinyl <input type="checkbox"/> , Leather <input type="checkbox"/>
Plastic Type(s): Nylon <input type="checkbox"/> , PVC <input type="checkbox"/> , PE <input type="checkbox"/> , PP <input type="checkbox"/> , PU <input type="checkbox"/> , PS <input type="checkbox"/> , PC <input type="checkbox"/> , ABS <input type="checkbox"/> , Acrylic <input type="checkbox"/> , Lexan <input type="checkbox"/>
Substrate Type(s): MDF <input type="checkbox"/> , Particle Board <input type="checkbox"/> , Plywood <input type="checkbox"/> , Solid Wood <input type="checkbox"/> , Other X
Outer Finish Type(s): Oil Base <input type="checkbox"/> , Water Base <input type="checkbox"/> , Catalyzed/Conversion Var <input type="checkbox"/> , Polyurethane X, Plastic Laminates, Melamine <input type="checkbox"/> , UVc, Other <input type="checkbox"/>
Foam Type: Polyurethane <input type="checkbox"/> , Memory <input type="checkbox"/> , Latex <input type="checkbox"/> , Evlon <input type="checkbox"/> , High Resilience <input type="checkbox"/> , High Density <input type="checkbox"/>
Paint Type: Latex <input type="checkbox"/> , Oil <input type="checkbox"/> , Low VOC <input type="checkbox"/> , No VOCs <input type="checkbox"/> , Powder Coat <input type="checkbox"/> , Chrome <input type="checkbox"/>

Sample Details
Unique Sample ID (if applicable): <u>RED OAK ELITE 70</u>
Product Name & Catalog #: <u>Sanfoot Wood Veneer Wallcovering</u>
Product Type: Ceiling/Wall Panels <input type="checkbox"/> , Flooring <input type="checkbox"/> , Trim <input type="checkbox"/> , Wall Paint <input type="checkbox"/> , Wall Coverings X, Thermal Insulation <input type="checkbox"/> , Adhesives <input type="checkbox"/> , Ceiling Tiles <input type="checkbox"/> , Other <input type="checkbox"/>
Date of Product Manufacturing Completion: <u>Oct 31, 2011</u>
Sample Location: Factory <input type="checkbox"/> , Warehouse <input type="checkbox"/> , Production Stack/Roll <input type="checkbox"/> , Container <input type="checkbox"/>
Sample Submitted by: <u>HIROSHI MITSUMATA</u>
Date of Sample Shipment: <u>NOV. 1, 2011</u>
Number of Boxes or Pallets: <u>1</u>

Special Notes or Comments from Manufacturer:

Shipping Details
Packed By: <u>HISASHI TOMIBE</u>
Shipping Date: <u>NOV. 2, 2011</u>
Carrier/Airbill Number: <u>?</u>

Laboratory Receipt (to be completed by Laboratory Representative)
Received By: _____
Received Date: _____
Condition of Shipping Package: _____
Condition of Sample: _____
Remarks: _____

Sample Handling				
Relinquished By	Company	Received By	Company	Date/Time
HIROSHI MITSUMATA	HOKUSAN FACTORY	HISASHI TOMIBE	HOKUSAN LTD	NOV. 2011 77:00
				NOV 13, 2011 11:00

## **APPENDIX B**

List of Bracketed LEED and CHPS Compliant  
Jacaranda, Inc. Wallcovering Products

# **Scope of LEED for Schools and CHPS Emissions Testing & Bracketing Program for Jacaranda, Inc.**

## **Qualified Products and Options**

*Effective December 2011 – November 2012*

### **SanFoot<sup>®</sup>, Natural Wood Veneer Wallcovering\***

*Inclusive of all wood species, stains, and SanFoot Standard, Elite 30 and Elite 70 finishes*

- RealTec<sup>®</sup> Technically Enhanced Wood Veneer
- FineTec<sup>®</sup> Natural Wood Veneer

### **SanPly<sup>®</sup>, Wood Veneer**

*Inclusive of all wood species*

- SanPly-3<sup>®</sup> Flexible Wood Veneer
- SanPly-4<sup>®</sup> Architectural Wood Veneer
- RealTec<sup>®</sup> Technically Enhanced Wood Veneer
- FineTec<sup>®</sup> Natural Wood Veneer

### **Arbor Series<sup>™</sup> Wood Wallcovering**

*Inclusive of all wood species, stains, and Standard, Ultra 30, and Ultra 70 finishes*

\*SanFoot<sup>®</sup> Natural Wood Veneer Wallcovering tested as worst case product

# **APPENDIX C**

## General Testing Parameters and Data

## GENERAL TESTING PARAMETERS AND DATA

Under the provisions of the testing method referenced in this report, testing consisted of the following procedural steps:

- Specific procedures for specimen receiving, handling, and preparation.
- Storage of test specimens in original shipping containers prior to emissions testing for up to 10 days in a ventilated and conditioned room maintained at a temperature of  $23 \pm 2^\circ\text{C}$  and a relative humidity of  $50\% \pm 15\%$ .
- For quality assurance purposes the emission chamber was purged and the interior thoroughly cleaned to remove residual compounds prior to all new product tests. In addition, air samples were collected and analyzed from the chamber exhaust prior to loading to establish background levels.
- Collection of air samples at method-specified intervals from the chamber exhaust port utilizing mass flow controllers calibrated at 200 cc/min for VOCs and at 300 cc/min for aldehydes.
- Tenax TA® tubes (drawn in duplicate) are used for VOC analysis which is performed by thermal desorption gas chromatography/mass spectrometry (TD-GC/MS) using a modified EPA TO-17 method. Samples are also collected on DNPH tubes for aldehyde analysis which is performed using high performance liquid chromatography (HPLC) using a modified NIOSH 2016 method.
- Instrument calibration, analysis of quality control samples and quantitation of the of the CDPH target list of 35 chemicals of concern.
- Reporting and speciation of top 10 tentatively identified compounds.

No additions to, deviations from, or exclusions from the test method referenced in this report were made.

The operational parameters for the small-scale emission chamber utilized for this project included:

Parameter	Symbol	Units	Value
Chamber Volume	V	$\text{m}^3$	0.053
Loading Factor	L	$\text{unit}/\text{m}^3$	0.425
Air Exchange Rate	a	$\text{h}^{-1}$	$1.0 \pm 0.05$
Area Specific Flow Rate	$q_A$	$\text{m h}^{-1}$	2.4
Temperature	T	$^\circ\text{C}$	$23 \pm 1$
Relative Humidity	RH	%	$50 \pm 5$

The emissions testing protocol is designed to measure the release of volatile organic compounds from a given material over time. The results of the emissions testing are summarized in the tables presented on the following pages. The actual emissions measured are characterized as a concentration in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and as an emission factor in micrograms emitted per square meter of material per hour ( $\mu\text{g}/\text{m}^2/\text{hr}$ ).

Total volatile organic compounds (TVOC) are defined as the compounds eluting between hexane ( $n\text{-C}_5$ ) and hexadecane ( $n\text{-C}_{17}$ ) and in this protocol quantified as toluene (*note that there are no specific TVOC limits specified under CDPH*). The measured concentration of total volatile organic compounds (TVOC) obtained at each of the three sampling intervals is presented in Table C-I.

**Table C-I****Total Volatile Organic Compounds (TVOC) between n-C<sub>5</sub> and n-C<sub>17</sub> Measured by GC/MS\***

Sample ID#	Sample Interval in hours	TVOC Concentration in $\mu\text{g}/\text{m}^3$	TVOC Emission Factor in $\mu\text{g}/\text{m}^2 \text{ h}$
1101312	24	61	140
	48	59	140
	96	50	120

\*TVOC values are background corrected

The measured concentrations of aldehydes (formaldehyde, acetaldehyde) obtained at each of the three sampling intervals are presented in Table C-II. This data indicates low levels of formaldehyde and acetaldehyde which decrease slightly over the sampling period, but are generally indicative of steady state.

**Table C-II****Formaldehyde and Acetaldehyde Concentrations as Measured by HPLC**

Sample ID#	Sample Interval in hours	Target Compound	Concentration in $\mu\text{g}/\text{m}^3$	Emission Factor in $\mu\text{g}/\text{m}^2 \text{ h}$
1101312	24	Formaldehyde	1.7	4.0
	48	Formaldehyde	1.5	3.6
	96	Formaldehyde	1.5	3.4
	24	Acetaldehyde	1.4	3.3
	48	Acetaldehyde	4.4	10
	96	Acetaldehyde	1.4	3.3



The eight individual volatile organic compounds (IVOC) identified by GC/MS after 96 hours of off-gassing from the tested wallcovering emitting in concentrations above detection limits are presented in Table C-III.

**Table C-III**  
**Speciation of all Tentatively Identified IVOCs\* by GC/MS after 96 hours**

Sample ID#	CAS Number	Tentatively Identified Compounds	Library Match %	Concent. ( $\mu\text{g}/\text{m}^3$ )	Emission Factor ( $\text{mg}/\text{m}^2\text{h}$ )	Match Quality
1101312	123-86-4	n-butyl acetate	NA	9.5	22	Confirmed
	108-65-6	1-methoxy-2-propyl ester of acetic acid	91	12	29	Good
	108-10-1	MIBK	NA	1.3	3.1	Confirmed
	67-63-0	isopropanol	NA	1.3	3.1	Confirmed
	36839-67-5	pentane, 3-methoxy-	90	7.7	18	Good
	141-78-6	ethyl acetate	NA	1.3	3.1	Confirmed
	64-19-7	acetic acid	91	2.0	4.7	Good
No other IVOCs were identified above detection limits						

\*All IVOCs detected were identified using the average response factor of toluene calibration standards. Match qualities of less than **85%** are not considered to be proof of chemical identity per EPA protocols.

Please note, that in Table C-III, the Library Match Percent is a comparison of mass spectra by the library search algorithm of the Chemstation G1701DA mass spectrometry software package with the Wiley and NBS 75K mass spectral database. The search methods that we use apply a “match quality” to the search result, based upon a scale of 100%. MAS tentatively identifies compounds with a minimal match quality of  $\geq 85\%$ , and anything less than that value is flagged in **red**. Please note the sum concentration of the IVOC’s does not necessarily correlate with the TVOC concentration under the analytical conditions.