


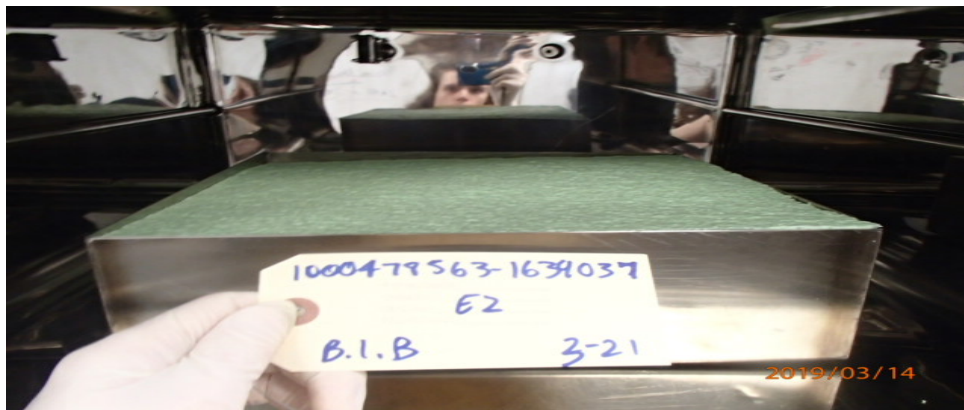


GREENGUARD CERTIFICATION TEST REPORT					
Customer Information	GENYK YVES RONDEAU 1701, 3E AVENUE GRAND-MERE QC G9T 2W6 CANADA				
Product Description	BOREAL Nature				
Test Group	Closed Cell Insulation - 01				
Category	Building Products				
Test Type	Certification	Year 2			
Test Method	UL 2821 "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers"				
	Environment	TVOC	Formaldehyde	Total Aldehydes	CREL/TLV
GREENGUARD	Office	✓	✓	✓	✓
GREENGUARD Gold	Office	✓	✓	✓	✓
	Classroom	✓	✓	✓	✓
✓ - meets criteria; X - over criteria					
Laboratory Approval	 Allyson M. McFry Chemistry Laboratory Director				

MODELING FOR PREDICTED AIR CONCENTRATION						
Certification Program	Environment Basis	Modeling Basis	Surface Area (m ²)	Room Volume (m ³)	ACH (1/hr)	
GREENGUARD and GREENGUARD Gold Office	CDPH/EHLB/Standard Method	wall	28.1	30.6	0.68	
GREENGUARD Gold Classroom	CDPH/EHLB/Standard Method	wall	94.6	231	0.82	

Note that certain environments and/or modeling scenarios may prevent assessment of low level CREL and TLV analytes due to the emissions being below the lower LOQ (0.04 µg). For example, benzene ½ CREL is 1.5 µg/m³.

PHOTOGRAPH OF SAMPLE



GREENGUARD RESULTS SUMMARY

Product Description		BOREAL Nature	
GREENGUARD Acceptable IAQ Criteria		168 Hour Product Measurement	Product Compliance for IAQ
TVOC ^a	≤ 0.5 mg/m ³	< 0.003 mg/m ³	Yes
Formaldehyde	≤ 0.05 ppm	< 0.002 ppm	Yes
Total Aldehydes ^b	≤ 0.10 ppm	0.002 ppm	Yes
Individual VOCs	all ≤ 1/10 TLV	----- ^c	Yes
^a “TVOC” is the sum of all VOCs measured via TD/GC/MS which elute between n-hexane (C ₆) and n-hexadecane (C ₁₆) quantified using calibration to a toluene surrogate. ^b “Total Aldehydes” is the sum of all measured normal aldehydes from formaldehyde to nonanal, plus benzaldehyde. Heptanal through nonanal are analyzed using TD/GC/MS. The remaining aldehydes are analyzed using HPL/UV methodology. All aldehydes are quantified to authentic standards. ^c All individual VOCs detected met the criteria of less than 1/10 the ACGIH established threshold limit values (TLVs).			

PROJECT DESCRIPTION

This study was conducted using a UL Environment's GREENGUARD test method following the requirements of GREENGUARD Certification program. The product was monitored for emissions of total volatile organic compounds (TVOC), formaldehyde, target list aldehydes, and other individual volatile organic compounds (VOCs) over a 168 hour exposure period. These emissions were measured and the resultant air concentrations were determined for each of the potential pollutants. Determination of compliance is based on predicted air concentrations modeled using the GREENGUARD program room loading.

Report Outline:

Table 1	Environmental Chamber Study Parameters
Table 2	Emission Factors and Predicted Air Concentrations
Table 3	Chamber Concentrations of Identified VOCs
Table 4	Emission Factors of Identified VOCs
Table 5	Chamber Concentrations of Target List Aldehydes
Table 6	Emission Factor of Target List Aldehydes
Table 7	Supplemental Emissions Information
Chain of Custody	Chain of Custody
Appendix 1	GREENGUARD Gold Results Summary

For UL Environment's technical references and resources [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Technical-references-and-resources.pdf>

For Product Evaluation Methodologies information [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Product-Evaluation-Methodologies-GG.pdf>

For Quality Control Program or Environmental Chamber Evaluations information [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Quality-Control-Procedures.pdf>

For RSD, Quality Assurance Report or other quality documents, [Request](#) here or contact ULE.

TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS	
Product Description	BOREAL Nature
Product Manufacture Date	March 5, 2019
Product Collection Date	March 5, 2019
Product Shipping Date	March 5, 2019
Date Received	March 8, 2019
Accredited Laboratory Location*	ULE - Marietta
Test Description	The product was received by UL Environment as packaged and shipped by the customer. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Just prior to loading, the product was unpackaged, prepared for the required loading, and placed in a tray to expose the top surface side only. The sample was placed inside the environmental chamber, and tested according to the specified protocol.
Test Period	3/14/2019 - 3/21/2019
Area	one-sided area = 0.0853 m ²
Chamber Volume	0.0868 m ³
Product Loading	0.98 m ² /m ³
Test Conditions	1.00 ± 0.05 ACH 50% RH ± 5% RH 22.1°C - 23.4°C

The temperature range specification is 23°C ± 1°. The actual temperature range listed above may vary slightly. If the range is outside this specification, data was reviewed to ensure a negative impact did not occur.

*Accredited Laboratory Locations	
Location	Address
ULE – Marietta	UL Environment 2211 Newmarket Parkway, Marietta, GA 30067-9399 USA
ULE – Guangzhou	UL Verification Services (Guangzhou) 1-3F & Room 501, Building 2 (R&D Center A1), No. 25, South Huanshi Avenue, Nansha District, Guangzhou 511458, China
ULE - Cabiato	UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9, I – 22060 – Cabiato (Como), Italia
UL - Shimadzu	Shimadzu Techno-Research, Inc. 1, Nishinokyo-Shimoaicho Nakagyo-ku, Kyoto 604-8436 Japan
KCL	Korea Conformity Laboratories #805, I-Valley, 149 Gongdan-ro Gunpo-si, Gyeonggi-do, 15849 Korea

This test is accredited under the laboratory's ISO/IEC 17025 accreditation issued by ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation AT-1297.

TABLE 2

Product Description		BOREAL Nature		
TVOC CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration** $\mu\text{g}/\text{m}^3$	
0 (Background)	BQL	BQL	---	
6	6.5	6.6	9	
24	5.0	5.1	7	
48	2.3	2.3	3	
72	BQL	BQL	< 3	
96	BQL	BQL	< 3	
168	BQL	BQL	< 3	
1 st Order Exponential Decay Constant = $k_T = 0.033$				
FORMALDEHYDE CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration**	
			$\mu\text{g}/\text{m}^3$	ppm
0 (Background)	BQL	BQL	---	---
6	7.0	7.1	10	0.008
24	2.8	2.9	4	0.003
48	BQL	BQL	< 3	< 0.002
72	BQL	BQL	< 3	< 0.002
96	BQL	BQL	< 3	< 0.002
168	BQL	BQL	< 3	< 0.002
TARGET LIST ALDEHYDES CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration**	
			$\mu\text{g}/\text{m}^3$	ppm
0 (Background)	BQL	BQL	---	---
6	14.6	14.9	20	0.013
24	7.8	7.9	10	0.007
48	4.6	4.7	7	0.004
72	4.3	4.4	6	0.003
96	4.0	4.1	6	0.003
168	3.9	4.0	4	0.002
Power Law Decay Constant = $k_A = 0.433$				

*Exposure hours are nominal (± 1 hour).

BQL = Below quantifiable level of 0.04 μg based on a standard 18 L air collection volume for VOCs and 0.1 μg based on a standard 45 L air collection volume for aldehydes.

**Predicted Air Concentrations are based on GREENGUARD modeling predicted concentration parameters. For more information [click here](#).

TABLE 3

Product Description		BOREAL Nature						
CHAMBER CONCENTRATIONS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ³)						
		0 (BG)	6	24	48	72	96	168
156-60-5	Ethene, 1,2-dichloro-, (E)*	BQL	25.2	16.0	14.7	12.5	10.9	8.8
123-91-1	1,4-Dioxane [†]	BQL	12.2	9.3	8.1	6.4	5.6	4.0
2781-01-3	1,3,6-Trioxocane, 2-methyl-*	BQL	3.1	2.4				

TABLE 4

Product Description		BOREAL Nature						
EMISSION FACTORS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ² •hr)						
		6	24	48	72	96	168	
156-60-5	Ethene, 1,2-dichloro-, (E)*	25.7	16.3	14.9	12.7	11.1	9.0	
123-91-1	1,4-Dioxane [†]	12.4	9.5	8.3	6.5	5.7	4.1	
2781-01-3	1,3,6-Trioxocane, 2-methyl-*	3.1	2.5					

*Indicates NIST/EPA/NIH best library match only based on retention time and mass spectral characteristics.

[†]Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

Quantifiable level is 0.04 µg based on a standard 18 L air collection volume.

TABLE 5

Product Description		BOREAL Nature						
CHAMBER CONCENTRATIONS OF TARGET LIST ALDEHYDES								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ³)						
		0 (BG)	6	24	48	72	96	168
4170-30-3	2-Butenal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
75-07-0	Acetaldehyde	BQL	5.6	5.0	4.6	4.3	4.0	3.9
100-52-7	Benzaldehyde	BQL	BQL	BQL	BQL	BQL	BQL	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-72-8	Butanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
590-86-3	Butanal, 3-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
50-00-0	Formaldehyde	BQL	7.0	2.8	BQL	BQL	BQL	BQL
66-25-1	Hexanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
110-62-3	Pentanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-38-6	Propanal	BQL	2.0	BQL	BQL	BQL	BQL	BQL

TABLE 6

Product Description		BOREAL Nature						
EMISSION FACTORS OF TARGET LIST ALDEHYDES								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ² ·hr)						
		6	24	48	72	96	168	
4170-30-3	2-Butenal	BQL	BQL	BQL	BQL	BQL	BQL	
75-07-0	Acetaldehyde	5.7	5.1	4.7	4.4	4.1	4.0	
100-52-7	Benzaldehyde	BQL	BQL	BQL	BQL	BQL	BQL	
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL	BQL	BQL	BQL	BQL	
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL	BQL	BQL	BQL	BQL	
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL	BQL	BQL	BQL	BQL	
123-72-8	Butanal	BQL	BQL	BQL	BQL	BQL	BQL	
590-86-3	Butanal, 3-methyl	BQL	BQL	BQL	BQL	BQL	BQL	
50-00-0	Formaldehyde	7.1	2.9	BQL	BQL	BQL	BQL	
66-25-1	Hexanal	BQL	BQL	BQL	BQL	BQL	BQL	
110-62-3	Pentanal	BQL	BQL	BQL	BQL	BQL	BQL	
123-38-6	Propanal	2.0	BQL	BQL	BQL	BQL	BQL	

BQL = Below quantifiable level of 0.1 µg based on a standard 45 L air collection volume.

TABLE 7

SUPPLEMENTAL EMISSIONS INFORMATION

The table below represents this product's identified chemical emissions found on certain regulatory lists. This list only provides a statement regarding possible health effects associated with this compound and not the relative risks of exposure. Proper interpretation of the risks associated with exposure to a given regulated compound requires a more detailed evaluation of toxicological activity. Certain purchasing programs may require this information be submitted.

Product Description		BOREAL Nature					
CAS Number	Compound	√() = FOUND IN LISTING (CLASS)					
		CAL PROP. 65	NTP	IARC	CAL AIR TOXICS	CREL	TLV
123-91-1	1,4-Dioxane [†]	√(1)	√(2B)	√(2B)	√(IIA)	✓	✓
75-07-0	Acetaldehyde	√(1)	√(2B)	√(2B)	√(IIA)	✓	✓
156-60-5	Ethene, 1,2-dichloro-, (E)						✓
50-00-0	Formaldehyde	√(1)	√(2A)	√(1)	√(IIA)	✓	✓
123-38-6	Propanal				√(IVA)		✓

[†]Denotes quantified using multipoint authentic standard curve

CAL Prop. 65: California Health and Welfare Agency, Proposition 65 Chemicals

1 = known to cause cancer

2 = known to cause reproductive toxicity

NTP: National Toxicology Program

2A = known to be carcinogenic to humans

2B = reasonably anticipated to be carcinogenic to humans

IARC: International Agency on Research of Cancer

1 = carcinogenic to humans

3 = unclassifiable as to carcinogenicity to humans

2A = probably carcinogenic to humans

4 = probably not carcinogenic to humans

2B = possibly carcinogenic to humans

California Air Toxics

I = Substances identified as Toxic Air Contaminants, known to be emitted in California, with a full set of health values reviewed by the Scientific Review Panel.

IIA = Substances identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.

IIB= Substances NOT identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.

III = Substances known to be emitted in California and are NOMINATED for development of health values or additional health values.

IVA = Substance identified as Toxic Air Contaminants, known to be emitted in California and are TO BE EVALUATED for entry into Category III.

IVBA =Substance NOT identified as Toxic Air Contaminants, known to be emitted in California and are TO BE EVALUATED for entry into Category III.

V = Substance identified as Toxic Air Contaminants, and NOT KNOWN TO BE EMITTED from stationary source facilities in California based on information from the AB 2588 Air Toxic "Hot Spots" Program and the California Toxic Release Inventory.

VI = Substances identified as Toxic Air Contaminants, NOT KNOWN TO BE EMITTED from stationary source facilities in California, and are active ingredients in pesticides in California.




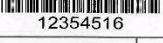

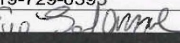
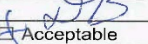

CREL: California Office of Environmental Health's Hazard Assessment (OEHHA), Chronic Reference Exposure Levels

✓ = Found in Listing

ACGIH TLV American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents.

✓ = Found in Listing.

CHAIN OF CUSTODY

INTERNAL Use Only			
Project #	 1000478563	<h1 style="font-size: 2em; margin: 0;">1639037</h1>	 1639037
Product #	 1639037	Description BOREAL Nature	
Order #	 12354516	Customer: Genyk	
Task Line	1.1	UL BU	Received Date: 2019-MAR-08 02:50:44 PM Aurora Project No.: 1000478563 Order No.: 12354516 Oracle Project No.:
of _____		1 of 4	
<input type="checkbox"/> Rush Request – Subject to upcharge. Customer must confirm with UL prior to submitting product.			
GREENGUARD Test Information			
Test Type	<input checked="" type="checkbox"/> Certification Test • Annual/Initial Year 2 <input type="checkbox"/> Quarterly Test • Year Quarter		<input type="checkbox"/> Out-of-Scope Test <input type="checkbox"/> Profile Study Test
Service Line	<input checked="" type="checkbox"/> GREENGUARD <input checked="" type="checkbox"/> GREENGUARD GOLD <input type="checkbox"/> Other		
Test Group	Closed Cell Insulation - 01		
Product Category	Insulation	Subcategory	Polyurethane Spray Foam Insulation System
Application	<input type="checkbox"/> Floor/Ceiling <input type="checkbox"/> Panel <input type="checkbox"/> Wall	<input type="checkbox"/> Work Surface <input type="checkbox"/> Other:	
Wet Products Only	Coverage Rate	Density	Specific Gravity
Product and Company Information			
Product Description	BOREAL Nature		
Manufacture ID#			
Company Name	Genyk	Date Manufactured	3/5/2019
Address	1701, 3 rd Avenue	Contact Name	Yves Rondeau
	Shawinigan, Qc	Job Title	P r e s i d e n t
	G9T 2W6	Contact Phone	819-729-0395
		Contact Email	yvesrondeau@genyk.com
Collection Information			
Collector Name	Yves Rondeau	Date Collected	3/5/2019
Collector Phone	819-691-5010	Time Collected	1:00 PM
Collector Signature		Collection Location	Shawinigan, Qc
Shipping Information			
Carrier	UPS		
Shipper Name	Eve Laflamme	Date Shipped	3/5/2019
Shipper Phone	819-729-0395	Time Shipped	3:00 PM
Shipper Signature		Air Bill #	12E2074041294892107
Sample Submitted to			
<input checked="" type="checkbox"/> UL Environment (Marietta) 2211 Newmarket Pkwy Suite 106 Marietta, GA 30067, USA	<input type="checkbox"/> UL Verification Services (Guangzhou) Building A1, 3F, Nansha Science and Technology Innovation Cir. No. 25, South Huanshi Avenue, Nansha District, Guangzhou 511458, China	<input type="checkbox"/> UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9 I - 22060 - Cabiante (Como), Italia	<input type="checkbox"/> Other
Post Testing Sample Disposition			
(Sample will be disposed of 30 days after report is issued if information below is not provided)			
Return Shipping Co.		Customer Shipping Acct #	
Internal Use Only – Receiving Information			
Receiver Name		Receiver Signature	
Condition Upon Arrival	<input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Not Acceptable	Receive Date	3/8/19
Condition Notes		Receive Time	12:08 PM
Completed By	ULE	Based On	Program Testing Schedule
		Date	02/22/2019

APPENDIX 1

GREENGUARD GOLD RESULTS SUMMARY

Product Description		BOREAL Nature		
COMPLIANCE WITH GREENGUARD GOLD STANDARD				
GREENGUARD Gold Acceptable IAQ Criteria		168 Hour Predicted Concentration**		Product Compliance for IAQ
		Office	Classroom	
TVOC	≤ 0.22 mg/m ³	< 0.003 mg/m ³	< 0.001 mg/m ³	Yes
Formaldehyde	≤ 0.0073 ppm	< 0.002 ppm	< 0.001 ppm	Yes
Total Aldehydes	≤ 0.043 ppm	0.003 ppm	0.001 ppm	Yes
1-Methyl-2-Pyrrolidinone	≤ 0.16 mg/m ³	< 0.003 mg/m ³	< 0.001 mg/m ³	Yes
Individual VOCs	≤ 1/100 TLV and ≤ ½ chronic REL	See Below		

**Predicted Air Concentrations are based on GREENGUARD Gold modeling predicted concentration parameters.

TOP TEN MOST ABUNDANT IDENTIFIED VOCs, INCLUDING ALDEHYDES					
CAS Number	Compound	168 Hour Chamber Concentration (µg/m ³)	168 Hour Emission Factor (µg/m ² ·hr)	Predicted Air Concentration** (µg/m ³)	
				Office	Classroom
156-60-5	Ethene, 1,2-dichloro-, (E)*	8.8	9.0	12	4
123-91-1	1,4-Dioxane [†]	4.0	4.1	6	2
75-07-0	Acetaldehyde [‡]	3.9	4.0	5	2

^aAmerican Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati, OH: ACGIH.

^bChronic Reference Exposure Levels (CRELs) adopted by the State of California Office of Environmental Health Hazard Assessment (OEHHA).

[†]Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

[‡]Indicates compound identified and quantified by DNPH derivitization and HPLC/UV analysis with multipoint authentic standard.

*Identification based on NIST mass spectral database only.

**Predicted Air Concentrations are based on modeling predicted concentration parameters shown [above](#).

CHEMICALS OF CONCERN WITH EXISTING TLV, CREL, CA PROP 65 OR CAL TOXIC AIR CONTAMINANT VALUES									
CAS Number	Compound	168 Hour Chamber Concentration (µg/m³)	168 Hour Emission Factor (µg/m²·hr)	168 Hour Predicted Concentration** (µg/m³)		✓ INDICATES PRESENCE ON LIST			
				Office	Classroom	CA PROP 65	CA TAC	CA CREL	ACGIH TLV
123-91-1	1,4-Dioxane [†]	4.0	4.1	6	2	✓(1)	✓(IIA)	✓	✓
75-07-0	Acetaldehyde [‡]	3.9	4.0	5	2	✓(1)	✓(IIA)	✓	✓
156-60-5	Ethene, 1,2-dichloro-, (E)	8.8	9.0	12	4				✓

COMPARISON OF COMPOUNDS FOUND WITH EXISTING TLV AND/OR CHRONIC REL						
CAS Number	Compound	1/100 TLV ^a (µg/m³)	½ CA Chronic REL ^b (µg/m³)	168 Hour Predicted Concentration** (µg/m³)		Product Compliance
				Office	Classroom	
123-91-1	1,4-Dioxane	720	1,500	6	2	Yes
75-07-0	Acetaldehyde	450	70	5	2	Yes
156-60-5	Ethene, 1,2-dichloro-, (E)	7930	---	12	4	Yes

^aAmerican Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati, OH: ACGIH.

^bChronic Reference Exposure Levels (CRELs) adopted by the State of California Office of Environmental Health Hazard Assessment (OEHHA).

[†]Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

[‡]Indicates compound identified and quantified by DNPH derivitization and HPLC/UV analysis with multipoint authentic standard.

*Identification based on NIST mass spectral database only.

**Predicted Air Concentrations are based on modeling predicted concentration parameters shown [above](#).