AIR QUALITY SCIENCES

December 16, 2008

Armourcoat, USA
Mr. Henry "Sandy" Andrew
3411 Brinkerhoff Road
Kansas City, KS 66115

AQS Report: 16191-01

Dear Mr. Andrew:

Thank you for choosing Air Quality Sciences, Inc. (AQS), an ISO 9001:2000 registered and ISO 17025 accredited testing laboratory, for your analytical needs. Armourcoat, USA's "Fellert Ecoustic, Acoustical Ceiling Plaster System" product was tested by our laboratory for low emitting materials.

Testing was conducted in small environmental chambers following the principles of ASTM D5116 with defined product specific test protocols of IAQ emission requirements of California's Section 01350. The test data obtained on these specific products were evaluated relative to the emission requirements in Section 1350 of the Material Specification for schools (http://www.chps.net/manual/documents/Sec_01350.doc) and offices.

Calculations were performed using the parameters below to estimate the concentrations of VOCs of concern for use in a classroom environment and in an office environment.

Ventilation Rate	*Room Volume*	**Surface Area Product Covers**
CLASSROOM		
0.90 air changes per hour (ach)	12.19 m x 7.32 m x 2.59 m = 231.1 m^3 (40 x 24 x 8.5 ft = 8,160 ft^3)	89.2 m^2
OFFICE		
0.75 air changes per hour (ach)	3.05 m x 3.66 m x 2.74 m = 30.6 m^3 (10 x 12 x 9.0 ft = 1,080 ft^3)	11.1 m^2

The product mentioned above as received and tested meets the Section 1350 requirements for use in a classroom or in an office with the above parameters.

The product mentioned above as received and tested meets all of the Section 1350 requirements for use in a classroom with the above parameters.

If you have any questions or concerns about the test results, please contact your Account Manager, Scott Steady at (678) 444-4056.

Sincerely,

Stephany I. Mason, Ph.D.
Technical Director

AIR QUALITY SCIENCES

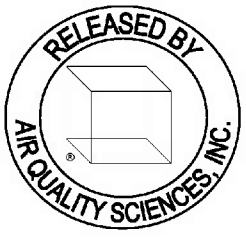
INDOOR AIR QUALITY EVALUATION OF ACOUSTICAL CEILING PLASTER – CALIFORNIA

Following Requirements of the CA/DHS/EHLB/R-174 "Standard Practice for the Test of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers"

FELLERT ECOUSTIC, ACOUSTICAL CEILING PLASTER SYSTEM

prepared for

ARMOURCOAT, USA



December 16, 2008
Date

AQS Report No. 16191-01

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EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Air Quality Sciences, Inc. (AQS), an ISO 9001:2000 registered and ISO 17025 accredited testing firm, presents the results of its indoor air evaluation of an acoustical ceiling plaster identified as "Fellert Ecoustic, Acoustical Ceiling Plaster System" submitted by Armourcoat, USA. AQS conducted this study using a product evaluation test protocol following the guidance of ASTM Standard D 5116 (1), and requirements of California's Special Environmental Requirements, Specifications Section 01350 (2). The product was delivered to AQS on November 24, 2008 by the customer. The Fellert Ecoustic, Acoustical Ceiling Plaster System and documentation sheet is provided in Appendix 1. The acoustical ceiling plaster was conditioned for a 10 day period and then tested for 96 hours. Testing parameters are given in Table 1.

The acoustical ceiling plaster was monitored for emissions of total volatile organic compounds (TVOC), individual volatile organic compounds (IVOC), formaldehyde and other aldehydes over the test period. Air samples were collected following installation of the floor assembly in the chamber. Measurements were made and predicted exposures were calculated according to California's Section 01350 protocol. As specified in this protocol, results at 96 hours, after 10 days of conditioning, were compared to ½ (one-half) the current Chronic Reference Exposure Levels (Chronic RELs), as adopted from the California OEHHA list, February 2005 (3). All identified VOCs were also compared to the California-EPA OEHHA Proposition 65 list (4) and the California-EPA Air Resource Board list of Toxic Air Contaminants (TACs) (5).

RESULTS

The product "Fellert Ecoustic, Acoustical Ceiling Plaster System " meets the IAQ emission requirements of California's Section 01350. Expected concentrations at 96 hours for classrooms and offices were calculated using the parameters specified in California Section 01350 as shown in the table below:

Ventilation Rate	Room Volume	Surface Area Product Covers
CLASSROOM		
0.90 air changes per hour (ach)	12.19 m x 7.32 m x 2.59 m = 231.1 m^3 (40 x 24 x 8.5 ft = 8,160 ft^3)	89.2 m^2
OFFICE		
0.75 air changes per hour (ach)	3.05 m x 3.66 m x 2.74 m = 30.6 m^3 (10 x 12 x 9.0 ft = 1080 ft^3)	11.1 m^2

Comparison of the data to CA Section 01350 requirements is given in Table 2. The ten most abundant identified individual VOCs and/or aldehydes are given in Table 3. Those VOCs identified which were found to be present on lists covering CA Proposition 65, CA Toxic Air Contaminants, and CA Chronic RELs are given in Table 4.

PRODUCT EVALUATION METHODOLOGIES

ENVIRONMENTAL CHAMBER

The acoustical ceiling plaster was tested in a small sized environmental chamber 0.0944 m^3 in volume, and chemical emissions were analytically measured. Environmental chamber operation and control measures used in this study complied with ASTM Standard D 5116 and the CA/DHS/EHLB/R-174 practice. The chamber used is manufactured from stainless steel, and its interior is polished to a mirror-like finish to minimize contaminant adsorption. Air flow through the chamber enters and exits through an aerodynamically designed air distribution manifold also manufactured of stainless steel. Supply air to the chamber is stripped of formaldehyde, VOCs, and other contaminants, so that any contaminant backgrounds present in the empty chamber fall below strict levels (< 10 $\mu g/m^3$ TVOC, < 10 $\mu g/m^3$ total particles, < 2 $\mu g/m^3$ formaldehyde, < 2 $\mu g/m^3$ for any individual VOC). AQS chambers are process controlled and are equipped with a continuous data acquisition system for verification of the operating conditions of air flow, temperature, and humidity.

Air supply to the chamber was maintained at a temperature of 23ºC ± 2ºC and relative humidity at 50% ± 5%. The air exchange rate was 1.00 ± 0.05 air change/hour (ACH). Environmental chamber study parameters are presented in Table 1.

ANALYTICAL MEASUREMENTS

Selected Aldehydes

Emissions of selected aldehydes including formaldehyde were measured following ASTM D 5197 and USEPA IP-6A, measurement by HPLC, or high performance liquid chromatography (6, 7). Solid sorbent cartridges with 2,4-dinitrophenylhydrazine (DNPH) were used to collect formaldehyde and other low-molecular weight carbonyl compounds in chamber air. The DNPH reagent in the cartridge reacted with collected carbonyl compounds to form the stable hydrazone derivatives retained by the cartridge.

The hydrazone derivatives were eluted from a cartridge with HPLC-grade acetonitrile. An aliquot of the sample was analyzed for low-molecular weight aldehyde hydrazone derivatives using reverse-phase high-performance liquid chromatography (HPLC) with UV detection. The absorbances of the derivatives were measured at 360 nm. The mass responses of the resulting peaks were determined using multi-point calibration curves prepared from standard solutions of the hydrazone derivatives. Measurements are reported to a quantifiable level of 0.1 ug based on a standard air volume collection of 45 L.

Volatile Organic Compounds

VOC measurements were made using gas chromatography with mass spectrometric detection (GC/MS). Chamber air was collected onto a solid sorbent which was then thermally desorbed into the GC/MS. Instrumentation included a sample concentrator (Perkin Elmer Model ATD 400 or Model Turbo Matrix ATD), a Hewlett-Packard 5890 Series II or 6890 Series Gas Chromatograph and a Hewlett-Packard 5971 or 5973 Mass Selective Detector (GC/MS). The

sorbent collection technique, separation, and detection analysis methodology has been adapted from techniques presented by the USEPA and other researchers. The technique follows USEPA Method IP-1B and ASTM D 6196 and is generally applicable to C_6 - C_{16} organic chemicals with boiling points ranging from 35ºC to 250ºC (7-11). Measurements are reported to a quantifiable level of 0.04 µg based on a standard air volume collection of 18 L.

Individual VOCs were separated and detected by GC/MS. The TVOC measurements were made by adding all individual VOC responses obtained by the mass spectrometer and calibrating the total mass relative to toluene. Individual VOCs, if analyzed, were quantified (using authentic calibration standards where available, or relative to toluene as a standard, if not) and identified using AQS' specialized indoor air mass spectral database. Other compounds were identified with less certainty using a general mass spectral library available from the National Institute of Standards and Technology (NIST). This library contains mass spectral characteristics of more than 75,000 compounds as made available from NIST, the USEPA and the National Institutes of Health (NIH). A match is first sought in the AQS database, which includes data for the gas chromatographic retention time of the compound in addition to the mass spectrum. This additional information, along with the use of spectra generated on AQS equipment, makes confidence in identifications made from the AQS database higher than in identifications made using only the NIST/USEPA/NIH mass spectral library.

QUALITY CONTROL PROCEDURES FOR ENVIRONMENTAL CHAMBER EVALUATIONS

Air Quality Sciences, Inc. is an ISO 9001:2000 registered and ISO 17025 accredited testing firm. AQS' quality control/assurance plan is designed to ensure the integrity of the measured and reported data obtained during its product evaluation studies. This QC program encompasses all facets of the measurement program from sample receipt to final review and issuance of reports. As an ISO 9001:2000 and ISO 17025 accredited registered firm, AQS' product control, testing, data handling, and reporting protocols and procedures are standardized and controlled.

One of the most critical parameters in AQS' product evaluations is the measurement of ultratrace levels of gaseous chemicals, typically in the ppb air concentration range. This necessitates a very rigidly maintained effort to control background contributions and contamination. These contributions must be significantly less than those levels being measured for statistically significant data to be obtained. AQS addresses this control in many directions including chamber construction materials, air purification and humidification, sampling materials and chemicals, sample introduction, and analysis.

Supply air purity is monitored on a weekly basis, using identical methodology to the chamber testing. The supply air is assured to contain less than 10 $\mu g/m^3$ TVOC, < 10 $\mu g/m^3$ total particles, < 2 $\mu g/m^3$ formaldehyde, and < 2 $\mu g/m^3$ for any individual VOC. Preventative maintenance ensures supply air purity, and corrective action is taken when any potential problems are noted in weekly samples. Supply air filter maintenance is critical for ensuring the purity of the chamber supply air. Chamber background samples are obtained prior to product exposure to ensure contaminant backgrounds meet the required specifications prior to product exposure. Results of this monitoring are maintained at AQS and available for on-site inspection.

All environmental chamber procedures are in accordance with ASTM D 5116 and meet the data quality objectives required.

Various measures are routinely implemented in a product's evaluation program. These include but are not limited to:

appropriate record keeping of sample identifications and tracking throughout the study;

calibration of all instrumentation and equipment used in the collection and analysis of samples;

validation and tracking of all chamber parameters including air purification, environmental controls, air change rate, chamber mixing, air velocities, and sample recovery;

analysis of spiked samples for accuracy determinations;

duplicate analyses of 10% of all samples evaluated and analyzed;

multi-point calibration and linear regression of all standardization;

analysis of controls including chamber backgrounds, sampling media, and instrumental systems.

Precision of TVOC and aldehyde analyses is assessed by the relative standard deviation (%RSD) from duplicate samples, defined as the standard deviation of each data set divided by the mean multiplied by 100. VOC accuracy is based on recovery of toluene mass spiked onto sorbent material. QC data on TVOC measurements conducted for the 12 month period ending November 30, 2008, showed an average precision measurement of 5.2% RSD based on duplicate measurements and 101% recovery based on toluene spikes. Aldehyde accuracy is based on Workplace Analysis Proficiency Scheme (WASP) formaldehyde proficiency test results. QC data on total aldehyde measurements (including formaldehyde) for the 12 month period ending November 30, 2008, showed an average precision measurement of 3.0% RSD based on duplicate measurements and an average accuracy of 3.6% RPD based on WASP results. Performance audits have been conducted on-site at AQS by the U.S. Environmental Protection Agency for several industry test programs. They are favorable and are open for review at AQS. Third party proficiency and round robin testing for low level VOCs for national and international programs are continuously conducted and reported in AQS' quarterly quality report, available to all customers.

Quality assurance is maintained through AQS' computerized data management system (ADM). An electronic "paper trail" for each analysis is also maintained and utilized to track the status of each sample, and to store the results.

TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS
PREPARED FOR: ARMOURCOAT, USA

PRODUCT 16191-010AA

Product Description:	CEILING SYSTEMS; Fellert Ecoustic, Acoustical Ceiling Plaster System (one-sided area = 0.0853 m^3)
Product Loading:	0.90 m^2/m^3
Test Conditions:	1.00 ± 0.05 ACH 50% RH ± 5% RH 23° C ± 2° C
Test Period:	11/25/2008 – 12/09/2008
Pollutant Emissions Evaluated:	Total Volatile Organic Compounds Individual Volatile Organic Compounds Target List Aldehydes, including Formaldehyde
Test Description:	The product was received by AQS on 11/24/08 as packaged and shipped by the customer. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Prior to loading, the product was unpackaged, prepared for the required loading, and placed in a conditioning chamber for 10 days. At the end of the conditioning period, the product was placed inside the environmental chamber, and tested according to the specified protocol.

Environmental chamber test following ASTM D 5116 in a 0.09 ± 0.005 m^3 chamber.

TABLE 2

COMPARISON OF DATA TO CA SECTION 01350 REQUIREMENTS (FOLLOWING 10 DAYS OF CONDITIONING)

PREPARED FOR: ARMOURCOAT, USA
PRODUCT 16191-010AA; FELLERT ECOUSTIC, ACOUSTICAL CEILING PLASTER SYSTEM

Compound Name	CAS Number	Prop. 65 Chemical	ARB TAC	½ Chronic Inhalation REL(µg/m^3)	Emission Factor (µg/m^2 •hr)			Classroom: 96-hr Modeled Concentration (µg/m^3)**	Office: 96-hr Modeled Concentration (µg/m^3)**	VOCs Exceed ½ CREL (Classroom / Office)
					24 Hr	48 Hr	96 Hr			
Acetaldehyde	75-07-0			9.0****			BQL			
Acrylonitrile*	107-13-1			2.5			BQL			
Benzene	71-43-2			30			BQL			
Butadiene*	106-99-0			10			BQL			
Carbon tetrachloride*	56-23-5			20			BQL			
Carbon disulfide*	75-15-0			400			BQL			
Chlorinated dioxins & Dibenzofurans	1746-01-6			0.00002			BQL			
Chlorobenzene	108-90-7			500			BQL			
Chloroform*	67-66-3			150			BQL			
Chloropicrin*	76-06-2			0.2			BQL			
Cresol mixtures*	1319-77-3			300			BQL			
Dichlorobenzene (1,4-)	106-46-7			400			BQL			
Dichloroethylene (1,1) *	75-35-4			35			BQL			
Diethanolamine*	111-42-2			1.5			BQL			
Dimethylformamide (N,N-)	68-12-2			40			BQL			
Dioxane (1,4-)	123-91-1			1500			BQL			

Compound Name	CAS Number	Prop. 65 Chemical	ARB TAC	½ Chronic Inhalation REL(µg/m^3)	Emission Factor (µg/m^2 •hr)			Classroom: 96-hr Modeled Concentration (µg/m^3)**	Office: 96-hr Modeled Concentration (µg/m^3)**	VOCs Exceed ½ CREL (Classroom / Office)
					24 Hr	48 Hr	96 Hr			
Epichlorohydrin*	106-89-8			1.5			BQL			
Epoxybutane (1,2-)*	106-88-7			10			BQL			
Ethylbenzene	100-41-4			1000			BQL			
Ethyl chloride*	75-00-3			15000			BQL			
Ethylene dibromide*	106-93-4			0.4			BQL			
Ethylene dichloride*	107-06-2			200			BQL			
Ethylene glycol	107-21-1		✓	200			6.8	3.2	3.7	No/No
Ethylene glycol monoethyl ether*	110-80-5			35			BQL			
Ethylene glycol monoethyl ether acetate*	111-15-9			150			BQL			
Ethylene glycol monomethyl ether*	109-86-4			30			BQL			
Ethylene glycol monomethyl ether acetate*	110-49-6			45			BQL			
Formaldehyde	50-00-0	✓	✓	16.5***	33	32	29	14	16	No/No
Glutaraldehyde*	111-30-8			0.04			BQL			
Hexane (n-)	110-54-3			3500			BQL			
Isophorone*	78-59-1			1000			BQL			
Isopropanol	67-63-0			3500			BQL			
Maleic anhydride*	108-31-6			0.35			BQL			
Methanol *	67-56-1			2000			BQL			
Methyl bromide*	74-83-9			2.5			BQL			
Methyl chloroform*	71-55-6			500			BQL			
Methyl t-butyl ether	1634-04-4			4000			BQL			
Methylene chloride*	75-09-2			200			BQL			

Compound Name	CAS Number	Prop. 65 Chemical	ARB TAC	½ Chronic Inhalation REL(µg/m^3)	Emission Factor (µg/m^2 •hr)			Classroom: 96-hr Modeled Concentration (µg/m^3)**	Office: 96-hr Modeled Concentration (µg/m^3)**	VOCs Exceed ½ CREL (Classroom / Office)
					24 Hr	48 Hr	96 Hr			
Naphthalene	91-20-3			4.5			BQL			
Phenol	108-95-2			100			BQL			
Phthalic anhydride *	85-44-9			10			BQL			
Propylene	115-07-1			1500			BQL			
Propylene glycol monomethyl ether*	107-98-2			3500			BQL			
Propylene oxide*	75-56-9			15			BQL			
Styrene	100-42-5			450			BQL			
Tetrachloroethylene (perchloroethylene)	127-18-4			17.5			BQL			
Toluene	108-88-3			150			BQL			
Trichloroethylene	79-01-6			300			BQL			
Triethylamine	121-44-8			100			BQL			
Vinyl acetate	108-05-4			100			BQL			
Xylenes(m-, o-, p-)				350			BQL			
TVOC					54	52	38			

BQL denotes below quantifiable level of 0.04 µg for TVOC and any individual VOC based on a standard 18 L air collection volume or 0.1 µg for formaldehyde and other aldehydes base on a standard 45 L air collection volume (instrument calibration using authentic standard, if available).

* Denotes compound is within volatility range of method but no calibration standard was available.

**Prediction based on standard classroom floor usage of 89.2 m^2 in a 231.1 m^3 room with 0.9 ACH or on standard office floor usage of 11.1 m² in a 30.6 m³ room with 0.75 ACH.

*** ½ OEHHA staff recommended indoor air limit for formaldehyde.

****Acetaldehyde allowed the full CREL.

TABLE 3

CHAMBER CONCENTRATIONS, EMISSION FACTORS, AND PREDICTED EXPOSURE CONCENTRATIONS FOR THE TEN MOST ABUNDANT IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS (VOCs) AND/OR ALDEHYDES (AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING)

PREPARED FOR: ARMOURCOAT, USA
PRODUCT 16191-010AA; FELLERT ECOUSTIC, ACOUSTICAL CEILING PLASTER SYSTEM

COMPOUND	CHAMBER CONCENTRATION µg/m^3	CALCULATED EMISSION FACTOR (µg/m^2 •hr)	CALCULATED PREDICTED EXPOSURE CONCENTRATION (µg/m^3)**	
			Classroom	Office
2,6-Di-tert-butyl-4-methylphenol (BHT)†	35	39	18	21
Formaldehyde‡	26	29	14	16
1,2-Ethanediol (Ethylene glycol)†	6.1	6.8	3.2	3.7

Exposure hours are nominal (± 1 hour).
**Prediction based on standard classroom floor usage of 89.2 m^2 in a 231.1 m^3 room with 0.9 ACH or on standard office floor usage of 11.1 m² in a 30.6 m³ room with 0.75 ACH.
VOC data obtained by scanning GC/MS; identification of compound made by retention time and mass spectral characteristics.
*Identification based on NIST mass spectral database only.
†Denotes quantified using multipoint authentic standard curve (post-calibration). Other VOCs quantified relative to toluene.
‡ Indicates compound identified and quantified by DNPH derivitization and HPLC/UV analysis.

TABLE 4

VOC PREDICTED AIR CONCENTRATIONS AND REGULATORY INFORMATION (AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING)

PREPARED FOR: ARMOURCOAT, USA
PRODUCT 16191-010AA; FELLERT ECOUSTIC, ACOUSTICAL CEILING PLASTER SYSTEM

COMPOUND IDENTIFIED	PREDICTED EXPOSURE CONCENTRATION** µg/m³		✓ INDICATES PRESENCE ON LIST		
	Classroom	Office	CHRONIC REL	CAL PROP. 65	CAL TOXIC AIR CONTAMINANT
1,2-Ethanediol (Ethylene glycol)†	3.2	3.7	✓(400)		✓(IIA)
Formaldehyde	14	16	✓(3)	✓(1)	✓(IIA)

†Denotes quantified using multipoint authentic standard curve (post-calibration). Other VOCs quantified relative to toluene.
**Prediction based on standard classroom floor usage of 89.2 m^2 in a 231.1 m^3 room with 0.9 ACH or on standard office floor usage of 11.1 m^2 in a 30.6 m^3 room with 0.75 ACH.

CAL Prop. 65: California Health and Welfare Agency, Proposition 65 Chemicals
1 = known to cause cancer
2 = known to cause reproductive toxicity

CAL Toxic Contaminant:
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.

IVB) 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.

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APPENDIX 1