Benchmark

LABORATORY TEST REPORT

Submitted to:

ambient™

Original Issue: July 8th, 2024; Revised: July 12th, 2024

Benchmark International • 2710 West 5th Ave. • Eugene, Oregon 97402 • Tel: 1.541.484.9212 • Fax: 1.541.344.2735 // www.benchmark-intl.com

Ambient Building Products
8230 Preston Court
Jessup, MD 20794
Phone: +1 (866) 710-7070

RE: Laboratory Test Report for VOC Emissions Test Services

1) INTRODUCTION:

Benchmark International, LLC (BMI) was commissioned by Ambient (hereinafter "Client") to evaluate the VOC emissions of submitted luxury vinyl flooring planks.

2) TEST SAMPLES:

a. CUSTOMER-SUPPLIED PRODUCT AND SAMPLE DATA:

Samples were identified by Client as follows. Samples were assigned a laboratory number upon receipt at the BMI laboratory which was used to identify and trace the samples throughout the test specimen preparation, analysis, and reporting processes.

BMI-Assigned Lab Number:	2024-0505
Product Name/Description:	Luxury Vinyl Flooring
Product Code/SKU:	Not Specified (N/S)
Manufacturer Name:	N/S
Supplier Name (if different from manufacturer):	N/A
Lot/Batch Number:	N/S
Production Date:	N/S
Sample Collection Date:	N/S
Other Information:	N/A

b. SAMPLE SELECTION:

Samples were collected by the Client and submitted to Benchmark International, LLC for analysis. Samples were not independently collected and submitted by Benchmark International, LLC or its employees, Affiliates, or subcontractors.

Samples were received at the test laboratory on April 25, 2024. Samples were received in good condition.

3) EVALUATION AND TEST METHODS:

Testing was performed according to the following sample preparation and/or test methods:

- California Department of Public Health (CDPH), Environmental Health Laboratory Branch (EHLB), *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers*, Version 1.2, January 2017 (hereinafter "CDPH-EHLB v1.2-2017" or "test method").

This test project was conducted for informational purposes only, and no certification or other declaration of conformity to other product standards shall be construed. While the specimen conditioning and test process was conducted according to the standard test method, there were several deviations from the standard relevant to sample collection and shipping as outlined below (all referenced section numbers below refer to sections of the CDPH-EHLB v1.2-2017 test method).

a. DEVIATIONS FROM STANDARD:

- Section 2.1.2.2 specifies that sample collection personnel shall be adequately trained in relevant practices and techniques or be under the supervision of someone so trained. This laboratory has no knowledge of the training of the individual(s) involved in collecting the samples which are the subject of this report.
- Section 2.1.6.1 specifies samples shall be collected at the point of production. Section 2.1.9.2 further specifies that flooring samples that are tightly stacked in consumer packages shall be collected within seven days of production. The samples that are the subject of this report were collected from Client inventory. Elapsed time between production and sample collection is unknown.
- Section 2.1.6.3 specifies that testing shall commence within five weeks of production date. Time elapsed between production and testing is unknown.

Test specimen preparation and testing were completed by Materials Analytical Services, LLC (MAS), 3945 Lakefield Court, Suwanee, GA 30024, an ISO/IEC 17025-accredited test laboratory (A2LA Accreditation 2925.01). Test dates, parameters, and conditions are provided in Appendix A of this test report.

4) SAMPLE CONDITIONING AND TEST ENVIRONMENT:

Specimen preparation and testing was performed as described in the MAS test report provided in Appendix A (MAS Project No. 2400367) of this laboratory report.

5) TEST RESULTS:

Test results are presented in Appendix A of this laboratory report.

Services performed for this project have been conducted with a level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar conditions and constraints. No warranty, expressed or implied, is made.

Respectfully Submitted,

Aaron Malsch
Laboratory Manager
Benchmark International, LLC (BMI)

TEST REPORT VERSION HISTORY

Version:	Change Summary:	Reviewed/Approved by:	Date Approved:
0	Initial Release	Aaron Malsch	July 8, 2024
1	Revised to correct Client Name	Aaron Malsch	July 12, 2024

APPENDIX A: VOC EMISSIONS TEST REPORT
MAS Project Number: 2400367

June 12, 2024

Mr. Aaron Malsch
Laboratory Manager
Benchmark International
2710 West 5th Avenue
Eugene, OR 97402

Subject: **VOC Emissions Testing Report per California Department of Public Health Standard Method Version 1.2**
#2024-0505 Luxury Vinyl Flooring
MAS Project No.: 2400367

Dear Mr. Malsch:

Materials Analytical Services, LLC is pleased to submit this report with results of VOC emissions testing from an application of Luxury Vinyl Flooring #2024-0505.

MAS conducted this test 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 1.2*. This report has been forwarded to the MAS Certified Green® Program for evaluation of compliance with Program certification criteria.

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, please contact us.

Sincerely,

Materials Analytical Services, LLC

Christina Le
Digitally signed by Christina Le
DN: cn=Christina Le, c=US, email=cle@mastest.com
Date: 2024.06.12 09:00:07 -04'00'

Analytical Chemist

William R. Stapleton
Digitally signed by William R. Stapleton
DN: cn=William R. Stapleton, c=US, o=Materials Analytical Services, LLC, ou=Senior Chemist, email=rstapleton@mastest.com
Date: 2024.06.14 12:01:15 -04'00'

Senior Analytical Chemist

Appendices: Appendix A – General Testing Parameters and Data
Appendix B – Chain-of-Custody

ACCREDITED
Testing Cert. #2925.01

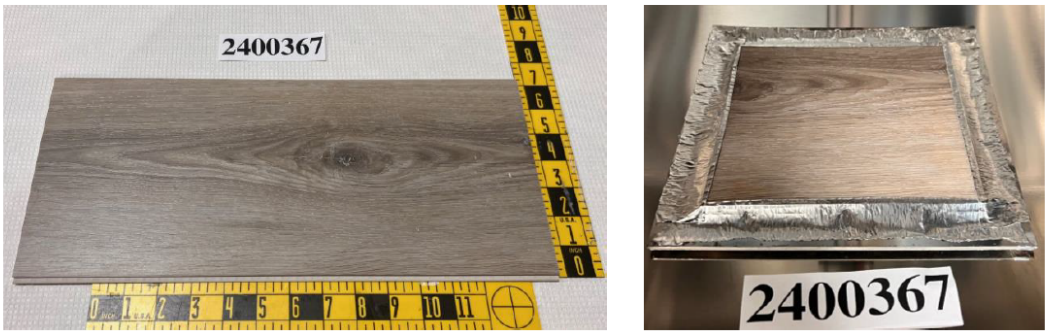
Materials Analytical Services, LLC
3945 Lakefield Court · Suwanee, GA 30024
(770) 866-3200 · Fax (770) 866-3259

EMISSIONS TESTING REPORT

California Department of Public Health Standard Method Version 1.2
Flooring Evaluation

SAMPLE DESCRIPTION & TESTING PARAMETERS

Product Name: Luxury Vinyl Flooring	**MAS Assigned ID:** 2400367
Manufacturer: Unknown China	**Product Description:** PVC tile with cork underlayment Approx. 16 ¾" x 7 ¼"
Manufacture Date: Unknown	**Testing Period:** May 23, 2024 – June 6, 2024
Collection Date: May 10, 2024	**In-Chamber Sampling Dates:** June 3 @ 24 hrs.; June 4 @ 48 hrs.; June 6 @ 96 hrs.
Shipping Date: May 10, 2024	**Date of Sample Analysis:** June 9 and June 10, 2024
Laboratory Arrival Date: May 15, 2024	



Luxury Vinyl Tile 2024-0505 as received (left) and tested (right)

To prepare the sample for chamber testing, the sample was cut into a six-by-six-inch piece, and then taped onto a stainless-steel plate with approximately ¼" overlap. The sample was then placed inside one of MAS's small-scale emissions chambers.

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 1.2*. Test results are provided with reference to the maximum emission limits established by CDPH. Appendix A presents general testing parameters and data.

TEST RESULTS

To compare the chamber-derived data to the standards established under CDPH Standard Method emission factors for the targeted compounds are calculated based on the 96-hour test point data following ten days of in-chamber conditioning. These emission factors are used to predict airborne concentrations of target compounds in a CDPH-defined classroom with a floor area of 89.2 square meters, and a typical private office with a floor area of 11.1 square meters. Table I presents the results of the modeled data.

Table I
Emission Factors and Predicted 96-Hour Airborne Concentrations and CDPH Concentration Limits in Typical Building Environments

VOC Name	Calculated Emission Factor ($\mu g/m^2hr$)	Predicted Airborne Concentration ($\mu g/m^3$)*		Maximum Concentration Limits ($\mu g/m^3$)
		Classroom	Private Office	
Total VOCs (TVOC)	41	20	22	NA†
Formaldehyde[1,2]	<3.1	<1.5	<1.7	9
Acetaldehyde[1,2]	<4.2	<2.0	<2.3	70
Isopropanol	<2.8	<1.3	<1.5	3500
Dichloroethylene (1,1)	<2.8	<1.3	<1.5	35
Methylene chloride[2]	<2.8	<1.3	<1.5	200
Carbon disulfide[1,2]	<2.8	<1.3	<1.5	400
MTBE[2]	<2.8	<1.3	<1.5	4000
Vinyl acetate[2]	<2.8	<1.3	<1.5	100
Hexane (n-)[2]	<2.8	<1.3	<1.5	3500
Chloroform[1,2]	<2.8	<1.3	<1.5	150
2-methoxyethanol[1]	<2.8	<1.3	<1.5	30
1,1,1-trichloroethane[2]	<2.8	<1.3	<1.5	500
Benzene[1,2]	<2.8	<1.3	<1.5	1.5
1-methoxy-2-propanol	<2.8	<1.3	<1.5	3500
Carbon tetrachloride[1,2]	<2.8	<1.3	<1.5	20
Ethylene glycol[2]	<2.8	<1.3	<1.5	200
Dioxane (1,4-)[1,2]	<2.8	<1.3	<1.5	1500
Trichloroethylene[1,2]	<2.8	<1.3	<1.5	300
Epichlorohydrin[1,2]	<1.4	<0.67	<0.75	1.5
2-ethoxyethanol[1]	<2.8	<1.3	<1.5	35
Dimethylformamide (n,n-)[2]	<2.8	<1.3	<1.5	40
Toluene[1,2]	<2.8	<1.3	<1.5	150
2-methoxyethanol acetate[1]	<2.8	<1.3	<1.5	45
Tetrachloroethylene[1,2]	<2.8	<1.3	<1.5	17.5
Chlorobenzene[2]	<2.8	<1.3	<1.5	500
Ethylbenzene[1,2]	<2.8	<1.3	<1.5	1000
Styrene[1,2]	<2.8	<1.3	<1.5	450
2-ethoxyethyl acetate[1]	<2.8	<1.3	<1.5	150
Phenol[2]	<2.8	<1.3	<1.5	100
Dichlorobenzene (1,4-)[1,2]	<2.8	<1.3	<1.5	400
Isophorone[2]	<2.8	<1.3	<1.5	1000
Naphthalene[1,2]	<1.4	<0.67	<0.75	4.5
Xylenes, (m-,o-,p-xylene combined)[2]	<2.8	<1.3	<1.5	350

* Assumes a 24' x 40' x 8.5' classroom with a ventilation rate of 0.82 h^{-1} and a 10' x 12' x 9' private office with a ventilation rate of 0.68 h^{-1} as defined by CDPH/EHLB/Standard Method v.1.2
† TVOC is not included as a target compound in the CDPH Standard, but is reported as part of the requirements of the Standard.
1 Compound included on Cal/EPA OEHHA Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) list
2 Compound included on Cal/EPA ARB list of Toxic Air Contaminants (TAC)

LIMITATIONS

This report is for the exclusive use of Materials Analytical Services, LLC's client, Benchmark International, and is provided pursuant to the agreement between MAS and its client. MAS's responsibility and liability are limited to the terms and conditions of the agreement. If other parties wish to rely on this report, please contact MAS so an agreement on the terms and conditions for its use can be established prior to the use of this information. MAS assumes no liability to any party, other than the client in accordance with the agreement, for any loss, expense or damage caused by the use of this report. This report shall not be reproduced, except in full, without written approval from Materials Analytical Services, LLC. The observations and test results contained in this report are relevant only to the sample tested.

Emissions generally decay over time, and the representativeness of the analytical data reported is directly dependent upon the age and conditions under which the tested sample was received.

APPENDIX A

GENERAL TESTING PARAMETERS AND DATA

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

- 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 ± 2°C and a relative humidity of 50% ± 15%.
- For quality assurance purposes the emission chamber was cleaned and air purged prior to testing. 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 180 cc/min for VOCs and 150 cc/min for aldehydes.
- Tenax TA® tubes are used for VOC analysis 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 performed using high performance liquid chromatography (HPLC) using a modified NIOSH 2016 method. All samples are drawn and analyzed in duplicate.
- Instrument calibration, analysis of quality control samples and quantitation of the CDPH target list of 35 chemicals of concern, and reporting and speciation of top 10 tentatively identified compounds.
- All data, including but not limited to raw instrument files, calibration fits, and quality control checks used to generate the test results are available to the client upon request.

The operating parameters for the small-scale emissions chamber used for this project included:

Parameter	Value	Parameter	Value
Chamber Volume	0.053 m^3	Area Specific Flow Rate	2.28 m/h
Loading Factor	0.438 m^2/m^3	Temperature	23 ± 1 °C
Air Exchange Rate	1.0 ± 0.05 h^{-1}	Relative Humidity	50 ± 5%

Total volatile organic compounds (TVOC) are defined as the compounds eluting between hexane (*n*-C_5) and hexadecane (*n*-C_{17}) and in this protocol quantified as toluene. Table A-I presents the measured concentration and emission factor of TVOC at each of the three sampling points.

Table A-I
Total Volatile Organic Compounds (TVOC) between n-C_5 and n-C_{17} Measured by GC/MS*

Sample Interval (hours)	TVOC Concentration (µg/m^3)	TVOC Emission Factor (µg/m^2 h)
24	29	67
48	24	56
96	18	41

*TVOC values are background corrected

Table A-II presents measured concentrations and emission factors of formaldehyde at each of the three sampling points.

Table A-II
Formaldehyde Concentrations and Emission Factors as Measured by HPLC

Sample Interval hours	Target Compound	Concentration (µg/m³)	Emission Factor (µg/m² h)
24	Formaldehyde	<1.4	<3.1
48	Formaldehyde	<1.4	<3.1
96	Formaldehyde	<1.4	<3.1

Table A-III present the individual volatile organic compounds (IVOC) identified by GC/MS after 96 hours.

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

CAS Number	Tentatively Identified Compounds	Concentration (µg/m³)	Emission Factor (µg/m² h)
141-63-9	pentasiloxane, dodecamethyl-	3.8	8.7
108-94-1	cyclohexanone	2.3	5.2
105-46-4	acetic acid, 1-methylpropyl ester	2.1	4.8
No other IVOCs were detected above the laboratory's Limit of Quantitation.			

*All IVOCs detected were identified using the average response factor of toluene calibration standards. The sum concentration of IVOC's does not necessarily correlate with the TVOC concentration under the analytical conditions.

APPENDIX B

Chain-of-Custody

Materials Analytical Services LLC
3945 Lakefield Court
Suwanee, Georgia 30024
Phone: 770-866-3200
Fax: 770-866-3259

Public Health

Standard Method (section 01350)

Emissions Testing
Chain-of-Custody

2400367

Client Information	
Company:	Benchmark International
Street Address:	2710 West 5th Ave
City/State:	Eugene, OR
Zip/Postal Code:	97402
Country:	USA
Contact Name:	Aaron Malsch
Title:	Laboratory Manager
Phone Number:	541-484-9212
Fax Number:	
Email Address:	aaron.malsch@benchmark-intl.com

Testing Specifications (per MAS) check appropriate test below
☐ **R&D (custom)**: Specify Details
☐ **24-hour Comparative R&D Test**
☐ **72-hour Comparative R&D Test**
☒ **14-day CDPH Compliance Test**
☐ **VOC Content Testing via EPA Method 24**
Quotation ID: RDS05062024-03

Manufacturer Information (if different than client)	
Company:	Unknown
City/State/Country:	China
Contact Name/Title:	
Phone Number:	

Construction Details (as applicable)
Covering Type: Fabric ☐ (Primary Fiber type: _____), Vinyl ☒, Leather ☐
Plastic Type(s): Nylon ☐, PVC ☒, PE ☐, PP ☐, PU ☐, PS ☐, PC ☐, ABS ☐, Acrylic ☐, Lexan ☐
Substrate Type(s): MDF ☐, Particle Board ☐, Plywood ☐, Solid Wood ☐, Other ☒
Outer Finish Type(s): Oil Base ☐, Water Base ☐, Catalyzed/Conversion Var ☐, Polyurethane ☐, Plastic Laminate ☐, Melamine ☐, UV ☐, Other ☐
Foam Type: Polyurethane ☐, Memory ☐, Latex ☐, Evlon ☐, High Reslience ☐, High Density ☐
Paint Type: Latex ☐, Oil ☐, Low VOC ☐, No VOCs ☐, PowderCoat ☐, Chrome ☐

Sample Details	
Unique Sample ID (if applicable):	2024-0505
Product Name & Catalog #:	Luxury Vinyl Flooring
Product Type: Ceiling/Wall Panels ☐, Flooring ☒, Trim ☐, Wall Paint ☐, Wall Coverings ☐, Thermal Insulation ☐, Adhesives ☐, Ceiling Tiles ☐, Other ☐	
Date of Product Manufacturing Completion:	Unknown
Sample Location: Factory ☐, Warehouse ☐, Production Stack/Roll ☐, Container ☐	
Sample Submitted by:	Aaron Malsch
Date of Sample Shipment :	5/10/24
Number of Boxes or Pallets:	

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:

Shipping Details	
Packed By:	Aaron Malsch
Shipping Date:	5/10/24
Carrier/Airbill Number:	

Sample Handling

Relinquished By	Company	Received By	Company	Date/Time
A Malsch	Benchmark	S Ayers	FedEx	5/10/24

APPENDIX B: BENCHMARK CHAIN OF CUSTODY DOCUMENTS

Benchmark — VOC SAMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

NOTE: A SEPARATE FORM IS REQUIRED FOR EACH SAMPLE SUBMITTED FOR TESTING

SECTION 1: CLIENT INFORMATION (REQUIRED)

CONTACT NAME:	Oksana Tsybenko	COUNTRY:	USA
COMPANY NAME:	Ambient Building Products	PHONE NUMBER:	866-710-7073
STREET ADDRESS:	8230 Preston Court, Suite C	E-MAIL ADDRESS(ES):	oksana.t@ambientbp.com,
CITY, STATE/PROVINCE, POST CODE:	Jessup, MD 20794		kim.d@ambientbp.com

SECTION 2: SAMPLE INFORMATION (REQUIRED IF DIFFERENT THAN CLIENT)

PRODUCT NAME/DESCRIPTION:	Luxury Vinyl Flooring
SKU/PRODUCT NUMBER:	
MANUFACTURER NAME:	
MANUFACTURER CITY:	
MANUFACTURER STATE/PROVINCE:	
MANUFACTURER COUNTRY:	China
DATE MANUFACT. COMPLETED:	
DATE SAMPLE COLLECTED:	
SAMPLE COLLECTED BY:	
UNIQUE SAMPLE ID: (if applicable)	

PRODUCT TYPE: (SELECT ONE)
- [X] FLOORING
- [ ] CEILING PANELS
- [ ] WALL COVERINGS
- [ ] ADHESIVES/PAINTS/SEALANTS
- [ ] THERMAL INSULATION (specify if Wall, Ceiling, or Wall/Ceiling in Special Instructions below)
- [ ] FURNITURE/CABINETRY COMPONENT
- [ ] RIGID PANEL (e.g. Particleboard, MDF, OSB, etc.)
- [ ] Other (Please Specify):

SAMPLING LOCATION:
- [ ] FACTORY
- [ ] WAREHOUSE STOCK
- [ ] PRODUCTION STACK/ROLL
- [ ] CONTAINER
- [ ] Other (Please Specify):

SECTION 3: PRODUCT DESCRIPTION DETAILS (SELECT ALL AS APPLICABLE TO THE PRODUCT)

SUBSTRATE TYPE(S): [ ] SOLID WOOD [ ] SOLID BAMBOO [ ] PLYWOOD [ ] MDF [ ] PARTICLEBOARD [ ] LUMBER CORE [X] VINYL [ ] WOOD-PLASTIC COMPOSITE [X] Other (Please Specify): STONE PLASTIC COMPOSITE

OUTER SURFACE/FINISH TYPE(S): [ ] OIL BASE [ ] WATER BASE [ ] CATALYZED/CONVERSION VAR. [ ] POLYURETHANE [ ] PLASTIC LAMINATE [ ] MELAMINE [ ] UV [ ] Other (Please Specify):

PLASTIC TYPE(S): [ ] NYLON [X] PVC [ ] POLYETHYLENE [ ] POLYPROPYLENE [ ] POLYSTYRENE [ ] POLYCARBONATE [ ] ABS [ ] ACRYLIC [ ] LEXAN [ ] Other (Please Specify):

FOAM TYPE(S): [ ] POLYURETHANE [ ] MEMORY [ ] LATEX [ ] EVLON [ ] HIGH RESILIENCE [ ] HIGH DENSITY [X] Other (Please Specify): NATURAL CORK

PAINT TYPE(S): [ ] LATEX [ ] OIL [ ] LOW VOC [ ] NO VOC [ ] POWDER COAT [ ] CHROME [ ] Other (Please Specify):

COVERING TYPE(S): [ ] FABRIC PRIMARY FIBER TYPE: [X] VINYL [ ] LEATHER [ ] Other (Please Specify):

SECTION 4: TEST METHODS REQUESTED (REQUIRED)

TEST METHOD REQUESTED (CHECK ONLY ONE):
- [X] 14-day CDPH EHLB/CA 01350 Compliance Test
- [ ] 72-hour CDPH-EHLB/CA 01350 Comparative R&D Test
- [ ] 24-hour CDPH-EHLB/CA 01350 Comparative R&D Test
- [ ] ANSI/BIFMA M7.1 7-Day Intermediate Chamber Test
- [ ] ANSI/BIFMA M7.1 7-Day Mid-Scale Chamber Test
- [ ] ANSI/BIFMA M7.1 7-Day Large-Scale Chamber Test
- [ ] R&D CUSTOM TEST (Specify Details in Special Instructions)

SPECIAL INSTRUCTIONS:

SECTION 5: SHIPPING AND SAMPLE TRANSFER DETAILS (REQUIRED)

PACKED BY: Oksana Tsybenko
SHIPPING DATE: 4/24/2024 4/24/2024
CARRIER/AIRBILL NUMBER:

No.	RELINQUISHED BY NAME:	COMPANY NAME:	RECEIVED BY NAME:	COMPANY NAME:	DATE/TIME OF TRANSFER:
1	Oksana Tsybenko	Ambient	A Malsch	Shipping Co	4/25/24
2		Shipping Co		BMI	4/25/24
3	A Malsch	BMI		FedEx	5/10/24
4					
5					

FOR LAB USE ONLY

DATE RECEIVED:	4/25/24	RECEIVED BY:	[signature]	LAB ID NUMBER:	2024-0505
SAMPLE WRAP METHOD:				Condition of Shipping Package:	Good

FORM 477 REV 3 Benchmark International, LLC (BMI), 2710 West 5th Avenue, Eugene, OR 97402, USA PHONE: +1 (541) 484-9212 FAX: +1 (541) 344-2735 PAGE 1 OF 1

END OF REPORT