

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

LILA WASHINGTON; LAURA
WASHINGTON; RYAN and KRISTIN
BRANDT, husband and wife; KENNETH and
CASANDRA BARRETT, husband and wife, on
behalf of themselves and all others similarly
situated,

Plaintiffs,

v.

LUMBER LIQUIDATORS, INC., a Delaware
corporation,

Defendant.

No. 15-cv-01475-JST

**DECLARATION OF ELISABETH
BLACK, CIH**

DECLARATION OF ELISABETH BLACK

1 I, Elisabeth Black, do hereby declare and state as follows:

2 1. I am a Certified Industrial Hygienist (CIH) and environmental scientist with more than
3 25 years of experience evaluating chemical and physical hazards in the environment, industry, schools,
4 and homes. I maintain my certification with the American Board of Industrial Hygiene (Comprehensive
5 Practice #8088). I have testified regarding matters concerning exposure to and remediation of various
6 toxic chemicals and substances. I am regularly called upon to consult with school districts, government
7 entities, and private businesses to conduct chemical safety audits, investigate and assess actual or
8 potential chemical exposures, prepare health, safety, response, and remediation plans, prepare abatement
9 designs for the removal of toxic substances, and to implement air monitoring programs. A copy of my
10 *curriculum vitae* is attached as Exhibit A.

11 2. I have been asked to evaluate the Lumber Liquidators do-it-yourself formaldehyde test
12 kit and procedures that it has begun providing to its customers following the 60 Minutes expose that
13 aired on March 1, 2015. The 60 Minutes episode found violations of California Air Resources Board
14 (CARB) certifications related to formaldehyde emissions from laminate flooring. In addition, I have
15 been asked to evaluate several of the laboratory reports for Lumber Liquidator products, as featured on
16 the March 1, 2015 60 Minutes episode. My review focuses on the formaldehyde test kit sampling
17 protocol and method for scientific validity and reliability. I have also been asked to give an opinion as to
18 the potential effect on consumers who use and rely on the do-it-yourself test prescribed by Lumber
19 Liquidators to evaluate potential risks related to formaldehyde exposure in their homes.

20 **A. Reference Materials**

21 3. In addition to the materials specifically cited, I reviewed the following materials for my
22 evaluation and in formulating my opinions:

- 23 • ASTM Method D6007-02 (Reapproved 2008). Standard Test Method for
24 Determining Formaldehyde Concentrations in Air from Wood Products
Using a Small-Scale Chamber.
- 25 • ASTM Method D6007-14 Standard Test Method for Determining
26 Formaldehyde Concentrations in Air from Wood Products Using a Small-
27 Scale Chamber.
- 28 • Benchmark International. <http://www.benchmark->

intl.com/carb/deconstructive-formaldehyde-testing/

- California Air Resources Board. Final Regulation Order. 93120. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
- California Air Resources Board. Frequently Asked Questions For Consumers, Composite Wood Products.
- California Air Resources Board. Standard Operating Procedure for Finished Good Test Specimen Preparation Prior to Analysis of Formaldehyde Emissions from Composite Wood Products. September 13, 2013.
- Proposed Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, March 9, 2007.
- Summary of ARB Testing of Laminated Products, Aug. 19, 2013.
- CBS. 60 Minutes episode, March 1, 2015 segment on Lumber Liquidators.
- Environmental Protection Agency, Integrated Risk Information System. DRAFT Toxicological Review of Formaldehyde – Inhalation Assessment. June 2, 2010.
- IAQ Screen Check for Formaldehyde. Sampling Instructions.
- Indoor Air Test.com. Frequently Asked Questions (FAQs) for Lumber Liquidators Customers.
- National Institute of Occupational Safety and Health. NIOSH Manual of Analytical Methods, Methods 3500 – Formaldehyde.
- Declaration of Kristin Brandt and attached materials.

B. Formaldehyde Health Data Summary

4. Health hazards related to formaldehyde exposure are well-researched and documented. Formaldehyde is known to cause respiratory irritation, headaches, coughing, dizziness, and nausea at levels as low as 0.1 ppm. Eyes are especially sensitive to formaldehyde and will burn even at low levels of exposure.¹

¹ Golden R. Identifying an indoor air exposure limit for formaldehyde considering both irritation and cancer hazards. *Critical Reviews in Toxicology*. 2011;41(8):672-721. doi:10.3109/10408444.2011.573467.

1 5. Several agencies have set health-based guidelines as recommendations for safe
2 residential environments. The level of formaldehyde in the air that is considered to be safe has become
3 more conservative over the last 25 years. In 1991, CARB set indoor formaldehyde levels at 0.10 ppm as
4 an action level and at 0.05 ppm as a target value.² The “action level” refers to the level of formaldehyde
5 that, when exceeded, should cause residents to undertake efforts to reduce indoor formaldehyde levels to
6 the “target level” 0.5 ppm or lower.³ In 2005, the California Office of Environmental Health Hazard
7 Assessment (OEHHA) lowered these values. OEHHA recommended that Formaldehyde levels not
8 exceed 0.076 ppm for acute exposure, 0.027 ppm for 8-hour exposure, and 0.002 ppm for chronic
9 exposure.⁴ As of 2010, the Environmental Protection Agency (“EPA”) toxicological data indicates a
10 health based indoor air criteria for formaldehyde not to exceed 0.008 ppm in order to minimize cancer
11 risk.⁵

12 6. The CARB, the OEHHA, and the EPA levels above refer to the level of formaldehyde in
13 the air. These should not be confused with the levels CARB set forth in the Airborne Toxic Control
14 Measure (“ATCM”) that set limits based on the composite core in the wood products themselves and
15 dictate that products containing Medium Density Fiberboard (“MDF”) emit no more than 0.11 ppm of
16 formaldehyde, and no more than 0.13 ppm for thin MDF. CARB set these particular limits to ensure
17 that air quality surrounding composite wood products maintains within the safe levels summarized in
18 paragraph 5 above.

19 7. The Environmental Protection Agency (EPA) Integrated Risk Information System
20 (IRIS) published a draft comprehensive toxicological review of formaldehyde via inhalation in 2010.
21 The IRIS report documented seven different non-cancer health effects based on formaldehyde inhalation
22 exposure studies. These non-cancer health effects caused by inhaling formaldehyde in gas form include:
23 1) sensory irritation of the eyes, nose, and throat, 2) upper respiratory tract pathology, 3) pulmonary

24 ² CARB. Formaldehyde in the Home, Indoor Air Quality Guideline No. 1 and Supplement; CARB Research
25 Division: Sacramento, CA, 1991.

26 ³ Salthammer, Tunga, Sibel Mentese, and Rainer Marutzky. “Formaldehyde in the Indoor Environment.” *Chemical
Reviews* 110.4 (2010): 2536–2572. *PMC*. Web. 5 Apr. 2015.

27 ⁴ *Id.*

28 ⁵ Environmental Protection Agency, Integrated Risk Information System. DRAFT Toxicological Review of
Formaldehyde – Inhalation Assessment. June 2, 2010.

1 function, 4) asthma and atopy, 5) neurologic and behavioral toxicity, 6) reproductive and developmental
2 toxicity, and 7) immunological toxicity.⁶

3 8. The EPA IRIS 2010 report also documents that human epidemiological evidence is
4 sufficient to conclude a causal association between formaldehyde exposure and nasopharyngeal cancer,
5 nasal and paranasal cancer, all leukemias (myeloid leukemia and lymphohematopoietic cancers as a
6 group).⁷

7 9. The World Health Organization (WHO) International Agency for Research on Cancer
8 (IARC), a leading research institution into the causes of cancer and the classification of carcinogens, has
9 classified formaldehyde as “carcinogenic to humans” based on evidence of a link between formaldehyde
10 exposure and nasopharyngeal cancer and myeloid leukemia⁸.

11 10. Composite wood products like the MDF that Lumber Liquidators sell and that is at issue
12 in this case are among the highest emitting formaldehyde products used in everyday applications due to
13 the concentration of formaldehyde in resins used to bond the wood pulp or fibers that make up the
14 MDF.

15 **C. Test Kit Evaluation**

16 11. I have been asked to evaluate the Lumber Liquidators formaldehyde test kit and
17 procedures provided to its customers following the 60 Minutes expose that aired on March 1, 2015. A
18 copy of the test kit instructions I evaluated along with the web page containing answers to “Frequently
19 Asked Questions” that is referenced in those instructions are attached as Exhibit B. The test kit and
20 procedures I evaluated are identical to what is shown in the picture attached as Exhibit A to the
21 Declaration of Kristin Brandt. My review focused on the formaldehyde test kit sampling protocol and
22 method for scientific validity and reliability. A sampling method is considered valid if it accurately
23 measures the parameter that it was intended to measure. A sampling method can be considered reliable
24 if the test can be repeated and the same result obtained.

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26 ⁶ Environmental Protection Agency, Integrated Risk Information System. DRAFT Toxicological Review of
27 Formaldehyde – Inhalation Assessment. June 2, 2010.

28 ⁷ *Id.*

⁸ <http://monographs.iarc.fr/ENG/Monographs/vol100F/mono100F-29.pdf>

11. Lumber Liquidators claims to have developed a system where a customer who purchased certain types of Lumber Liquidators' laminate flooring can request a formaldehyde test kit from its website. The customer then receives the test kit and one page of instructions via mail. Lumber Liquidators has selected the IAQ Screen Check for Formaldehyde test kit, which is a passive diffusion badge sampling product manufactured by IAQ Check. These test kits are available for purchase at retail stores for approximately \$95. The test kit is described on the website as "idiot proof". Once the customer collects the sample, the customer mails it to a laboratory for analysis. My evaluation focuses on the test kits and the instructions for collecting the air samples. Evaluating the laboratory methodology is beyond the scope of my evaluation.

12. Lumber Liquidators states that the formaldehyde test is "idiot proof". It may be true that it is easy to collect an air sample using this test, but it is misleading in that it is usually quite difficult to collect a scientifically valid sample that accurately measures the true degree of risk related to the presence of formaldehyde containing flooring in the home. It is unlikely that a user will be able to collect a valid and useful sample using this oversimplified test protocol.

13. Hazard assessment is not a one-size-fits-all procedure. A qualified professional trained in environmental science, industrial hygiene, or toxicology should be employed to design a sampling strategy and collect sample data that will accurately and reliably represent the degree of risk for homeowners with formaldehyde-containing laminate flooring. A competent professional would design a custom process to account for various conditions in an effort to collect samples that represent worst-case conditions in order to be protective for all conditions.

14. A number of factors must be considered when collecting valid and reliable air samples where the results will be used to assess whether the level of formaldehyde present in a home is safe. A qualified professional would take these factors into account when designing a sampling strategy. The IAQ Screen Check for Formaldehyde test kit does not adequately account for at least the factors listed below. It falls short of collecting a scientifically valid sample for at least the following reasons:

a. Number of samples

It is my understanding that Lumber Liquidators only provides one or two diffusion badges per request from the consumer. In designing a valid air

1 sampling protocol, the number of samples collected for each residence
2 would be dictated by the size of the home, number of rooms, the layout,
3 the ventilation in particular rooms, use of the rooms, and other factors.
4 One or two samples allow for only one or two sets of conditions for a
5 limited period of time. It cannot be considered representative of worst-
6 case conditions in the home.

7 A single sample could be appropriate for a single room in a home, but it
8 would also likely be useful to evaluate formaldehyde in adjoining rooms.
9 One or two samples would not be sufficient where the Lumber Liquidators
10 flooring covers most of the living space. Only a competent professional
11 would be qualified to design a sampling strategy and assign the number of
12 samples to adequately assess airborne formaldehyde exposures in either
13 situation.

14 **b. Location of sample**

15 The information sheet provided with the Lumber Liquidators test kit
16 instructs the user to hang the badge at four feet above ground in the center
17 of the room. A professional conducting the sampling would likely look
18 for the most sensitive or "worst case" receptor in each sample location.
19 For example, if a room were occupied by a toddler or infant, I would
20 likely place the badge at 6 to 18 inches above the floor. In homes with
21 elderly or infirm residents, I would place the badge at three feet from the
22 floor to capture the breathing zone of the sitting or reclined occupant.
23 Finally, if pets are present in the home, it may be best to place an
24 additional badge near the floor to capture their exposures. Household pets
25 are sensitive to formaldehyde, as well as the human residents. A
26 competent professional would design the sampling strategy to target the
27 most sensitive receptor.

28 **c. Duration of sample**

The information sheet provided with the Lumber Liquidators test kit
instructs the user to collect the sample over a period of 24 hours. That
instruction is designed to capture the fluctuation of chemical off-gassing
that will occur over a day and night. A professional conducting the
sampling should design the sample duration to capture the time period
only when the space is occupied or when it is occupied by a sensitive
individual, or only when ventilation is in use. Many factors would be
considered in specifying sample duration.

d. Volume of space

1 A professional would consider the volume of a space in selecting sample
2 locations. For example, a small children's bedroom with low ceilings will
3 likely accumulate a higher concentration of formaldehyde than the large
4 family room with vaulted ceilings. Formaldehyde will become diluted by
5 air in a room with a large air volume or concentrated in air in a small
6 space with the same surface area of laminate flooring.

7 **e. Ventilation**

8 The ventilation provided in each sample location must be considered.
9 Kitchens and bathrooms may have a higher degree of ventilation, which
10 would result in frequent air changes and dilution of the indoor breathing
11 air. Also, areas of the home with heavy use or many entrances may have a
12 greater degree of air mixing and dilution of formaldehyde. A small
13 bedroom may have a lower degree of ventilation and less movement in
14 and out of the space, allowing for a higher accumulation of formaldehyde
15 from building material off-gassing.

16 Because the professional is seeking to collect a sample representing the
17 worst case scenario, air conditioning or ceiling fans should not be operated
18 during the test period. The answers to the online FAQ referenced in the
19 instructions, however, suggests that people operate air conditioning and
20 ceiling fans as they normally would during the test period. This is
21 inconsistent with accepted methodology and would likely result in under-
22 reporting the readings of actual formaldehyde levels.

23 **f. Barometric pressure**

24 Barometric pressure during the sample duration can also impact the
25 results. Air samples collected during periods of high atmospheric pressure
26 tend to contain lower concentrations of a contaminant off-gassing from
27 building materials relative to samples collected during conditions of low
28 atmospheric pressure. A professional collecting the samples would
consider this in interpreting the air monitoring results. Results obtained
during the winter and spring months of March and April may differ
significantly from August, in that the formaldehyde levels are likely to be
higher in the hotter months. A competent professional seeking to obtain
an accurate measure of the formaldehyde content would likely collect a
second round of samples during the hotter months.

29 **g. Temperature and humidity**

30 Temperature and humidity can affect the results obtained from air
31 monitoring for formaldehyde. Formaldehyde is water-soluble and reacts

to temperature changes. As temperature and humidity rise, so does the amount of formaldehyde off-gassing from the product. Formaldehyde concentrations in an indoor space will be lower during cold periods and higher during high temperature periods.

h. Personal habits

Some personal habits will impact indoor formaldehyde levels. Formaldehyde is released by combustion activities, such as smoking, heating, cooking, or candle and incense burning. Some pet products, foods, and other building materials also contain formaldehyde. It is unclear how Lumber Liquidators will control for other sources of formaldehyde in the air samples.

i. Sensitive populations

Some populations will be sensitive to even low levels of formaldehyde in indoor air. These populations include, but are not limited to, infants, toddlers, asthmatics, elderly, people with emphysema, chronic obstructive pulmonary disease (COPD), and people who are otherwise immune compromised. A competent professional would consider the presence of these sensitive populations in applying an acceptable concentration of formaldehyde in an indoor living space.

15. All of these conditions should be considered in implementing a sampling strategy to measure indoor formaldehyde concentrations. Likewise, a trained professional would consider all of these variables in interpreting the results. Without these considerations, it is my opinion that the testing cannot be considered valid. The air monitoring will not test for what it is intended to test for, which in this case is safety of the condition of formaldehyde off-gassing in residential spaces. A simple test kit used by the homeowner is likely not an accurate assessment. As CARB stated in its FAQ document on composite wood products:

It is possible to have flooring properly tested for formaldehyde emissions, but these tests are difficult and expensive.⁹

Potential Consequences of Using Do-It-Yourself Air Testing Kits

16. Lumber Liquidators has selected the cheapest possible way to test formaldehyde in its customers' homes, at the expense of valuable data. Even when the test kit is used as directed, the results

⁹ California Air Resources Board. Frequently Asked Questions For Consumers, Composite Wood Products.

1 will not likely be valid because the air sampling failed to account for existing conditions. In many
 2 cases, using invalid and unreliable sampling strategy and will likely provide a false negative - a test
 3 result indicating that the dwelling is safe, when in fact it is not. The resident then may feel that the issue
 4 is resolved and may delay or forgo the steps that should be taken immediately to eliminate or reduce
 5 formaldehyde exposures.

6 17. Where competent testing identifies an unsafe condition based on the degree of hazard
 7 (level and extent of formaldehyde in the home), sensitivities of the occupants, and dynamics of the space
 8 and environment, a qualified professional would provide the homeowner with a remediation plan to
 9 *immediately* mitigate formaldehyde exposure.¹⁰ The standard of care for remediation of an airborne
 10 hazard related to off-gassing of building materials in the home would include the following options:

- 11 a. removing and replace the flooring;
- 12 b. developing a plan for accelerated off-gassing. This typically involves isolating and
 13 vacating the space (moving out), increasing temperature and ventilation, maintaining the building space
 14 under negative pressure, and venting the building space air to the outdoors. The space needs to be
 15 retested following the attempt to drive off the formaldehyde to assure the home environment has been
 16 restored to an acceptable condition. Accelerated off-gassing can take a few days for a small space with
 17 lower levels to several weeks or longer for a larger space with higher levels; or
- 18 c. creating a pressure differential in the home that diverts the formaldehyde-containing air
 19 away from the living space. This is the alternative least likely alternative to be effective as it is not an
 20 actual remedy to immediately mitigate the formaldehyde, but it may reduce formaldehyde
 21 concentrations to acceptable levels. This option is also difficult to achieve and in an active living space.

22 18. The Lumber Liquidators formaldehyde test kit procedure will likely provide some
 23 consumers with poor data that give them a false sense of security. The result could be years of
 24 additional exposure to formaldehyde above the health-based criteria ending up with health issues,
 25 ranging from respiratory disease to cancer.

26
 27 ¹⁰ To my knowledge, Lumber Liquidators has not stated what formaldehyde levels it will
 28 consider safe or acceptable, or what remedial actions it will recommend if the test kits identify
 conditions above those levels.

1 19. Finally, it is worth noting that the test kits provided by Lumber Liquidators cannot be
 2 considered an independent assessment of formaldehyde exposures. Lumber Liquidators has selected the
 3 test method, has contracted with the analytical laboratory, and will likely determine which criteria to use
 4 for evaluation. A scientifically valid test method should be selected, the sampling protocol defined, and
 5 the analytical laboratory contracted by a truly independent laboratory in order to reduce potential
 6 conflicts of interest.

7 **D. Specific Product Result Review for CARB, Phase 2 Compliance**

8 20. I reviewed the following analytical reports that were featured along with others in the
 9 CBS 60 Minutes episode that aired on March 1, 2015. I have provided a review of the analytical
 10 methods and results as presented in laboratory reports for those products to determine if they were
 11 analyzed in accordance with the methods specified by the California Air Resources Board (CARB) for
 12 CARB-2 finished products.

13 21. The laboratory reports reviewed include:

- 14 a. Benchmark International. Report #: 07215-04-3. KM Glacier Peak Poplar
 15 12 mm. November 5, 2014.
- 16 b. HPVA Laboratories. Test ID#: FSC495. Test Report on Formaldehyde
 17 Emissions from Wood Products, Kensington 12 mm Imperial Teak Vinyl
 18 Laminate Flooring. October 28, 2014.
- 19 c. HPVA Laboratories. Test ID#: FSC496. Test Report on Formaldehyde
 20 Emissions from Wood Products, Ispiri 12 mm American Mission Olive
 21 LAM Vinyl Laminate Flooring. October 28, 2014.
- 22 d. Benchmark International. Report #: 0721504-8. KM Warm Springs
 23 Chestnut 12 mm. November 5, 2014.

24 22. All the lab reports indicate that the analysis was conducted in accordance with ASTM
 25 D6007, CARB regulation 93120, and the CARB Standard Operating Procedure for sample preparation
 26 (attached as Exhibit C). Samples analyzed by HPVA Laboratories have a note of "core exposed",
 27 which indicates that the sample was deconstructed prior to analysis. For the one sample analyzed by
 28 Benchmark International, the analytical report states "CARB Deconstructed Laminate". This is

consistent with the CARB SOP and with the Summary of ARB Testing of Laminate Products. All the analytical reports indicate compliance with CARB requirements for sample preparation and analysis.

23. Each of the reports I reviewed regarding Lumber Liquidators materials tested indicate that the samples exceeded the CARB requirements, as follows:

Lumber Liquidators Product	Testing Laboratory	Analytical Result (formaldehyde in ppm)	CARB, Phase 2 Compliance Criteria (formaldehyde in ppm)
Kensington Manor Glacier Peak Poplar (Exhibit D)	Benchmark Holdings LLC	0.312	0.11
Kensington Manor Imperial Teak (Exhibit E)	HPVA Laboratories	0.37	
Ispiri Collection American Mission Olive (Exhibit F)	HPVA Laboratories	0.72	
Kensington Manor Warm Springs Chestnut (Exhibit G)	Benchmark Holdings LLC	1.473	

24. Based on my review of the reports provided, the results of all tests listed above are valid and all samples exceeded CARB, Phase 2 criteria. All the lab reports state that the analysis was conducted in accordance with ASTM D6007. This appears to be correct as the reports are consistent with the ASTM protocol, with CARB regulation 93120, and with the CARB Standard Operating Procedure for sample preparation. The reports indicate that:

- both labs properly identified the material tested by product identifier and date of manufacturing.
- both labs conducted the proper chamber conditioning for the specified time, temperature, relative humidity, and background formaldehyde.
- Samples analyzed by HPVA Laboratories have a note of “core exposed”, which indicates that the sample was deconstructed prior to analysis. The Benchmark International reports state “CARB Deconstructed Laminate”. All reports therefore indicate compliance with CARB requirements for sample preparation and analysis.
- both labs specified and corrected for temperature and relative humidity.
- both labs provided air change rate, flow rate, and sample collection time.
- both labs used the proper small chamber test scenario.
- both labs provided the method loading ratio, sample size, and specific surface information.
- both labs adhered to the ASTM chain of custody and reporting requirements.

1 25. In short, the laboratories appear to have conducted their analysis of Lumber Liquidators
2 composite wood laminate flooring in strict compliance with the ASTM method and with CARB requirements.
3 The results indicate formaldehyde levels several times (and as high as thirteen times) the CARB Phase 2
4 allowable limit for laminate flooring. Knowing that the CARB Phase 2 limit was developed to control indoor
5 formaldehyde exposures for homeowners, it is likely that customers with any of the laminate flooring with
6 formaldehyde levels indicated by these tests have an increased risk of formaldehyde exposure in their homes and
7 associated health risks. I would strongly recommend proper testing by an industrial hygienist or other qualified
8 professional and immediate remediation, if deemed necessary based on the results.

9
10 I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true
11 and correct to the best of my knowledge.

12 Executed this 8th day of April, 2015 in Lynnwood, Washington.

13 E. Black
14 Elisabeth Black CIH
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Exhibit A



ELISABETH BLACK, CIH

Elisabeth Black has more than 25 years of experience in industrial hygiene and environmental science consulting in the Pacific Northwest. Elisabeth has managed projects for hazardous building materials identification, plans, specifications, removal, and disposal for federal and commercial clients. She is an experienced project manager and technical specialist in manufacturing environments, focusing on hazard assessment, program development, chemical and noise exposure assessments, and training. Elisabeth also conducts assessments for indoor air quality in Port facilities, schools, and non-industrial workspaces. She has acted as the health and safety manager on a large number of hazardous waste site operations.

EDUCATION

1996 M.S. Environmental Health and Industrial Hygiene, University of Minnesota, Minneapolis
1988 B.A. Psychology, Whitman College, Walla Walla, Washington

EMPLOYMENT HISTORY

CERTIFIED INDUSTRIAL HYGIENIST AND OWNER

EMB CONSULTING LLC

OCTOBER 2010 - PRESENT

In 2010, Elisabeth Black started her own consulting firm to provide industrial hygiene services to the Puget Sound community. Her clients include school districts, port authorities, industrial manufacturing facilities, and environmental consulting firms. She continues to provide services on hazardous waste cleanups, hazardous building materials, industrial hygiene exposure assessment, program development, and indoor air quality. EMB Consulting also provides expert witness research and support in cases involving health and safety and chemical hazards.

CERTIFIED INDUSTRIAL HYGIENIST

ARGUS PACIFIC, INC.

JULY 2005 – OCTOBER 2010

Elisabeth acted as industrial hygiene department manager and technical lead on all industrial hygiene projects at Argus Pacific. The position required management and mentoring a staff of junior industrial hygienists and environmental scientists. Industrial hygiene projects included chemical and noise exposure assessment, regulated building material services, indoor air quality, spill response, program development, and expert witness support during litigation. Major clients included the Port of Seattle, Port of Tacoma, Seattle Pacific University, Snohomish County, City of Seattle, several school districts, and numerous private industrial clients.

ASSOCIATE INDUSTRIAL HYGIENIST/CORPORATE HEALTH AND SAFETY MANAGER

HART CROWSER

OCTOBER 1996 – JUNE 2005

As a member of the technical staff at Hart Crowser, Elisabeth acted as project manager and technical specialist on projects involving industrial hygiene, environmental site assessment, environmental history, and hazardous building material surveys. Her clients included the military, ports, and private industry. As Corporate Health & Safety Manager for Hart Crowser, duties included overseeing health and safety programs for up to 350 employees nationwide, developing site-specific health and safety plans for a variety of field assignments and monitoring for hazardous conditions during field activities.

INDUSTRIAL HYGIENE INTERN

HONEYWELL

JANUARY 1995 - MAY 1996

While attending graduate school, Elisabeth conducted a large noise exposure assessment at Honeywell. The study was presented to Honeywell management and University of Minnesota faculty as Elisabeth's graduate thesis.

ENVIRONMENTAL SCIENTIST

PACIFIC TESTING LABORATORIES

1990 – 1994

Acted as environmental scientist on a large number of Phase I and Phase II environmental property assessments for due diligence. Worked with regulatory agencies and became familiar with sampling and analysis methods.

**RESEARCH ASSISTANT****ROSS & ASSOCIATES**

1988-1990

Acted as research associate for an environmental policy firm.

REPRESENTATIVE PROJECT EXPERIENCE**EVERETT SCHOOL DISTRICT, INDOOR AIR QUALITY AND MOLD INVESTIGATIONS, 2008 TO PRESENT**

Elisabeth Black has supported the Everett School District on several indoor environmental quality and mold/moisture investigations since 2008. One recent investigation involved water intrusion to an elementary school library when a construction contractor did not secure a roof opening. The leak was responsible for damage and mold growth within walls, on bookshelves, and impacting almost 1,000 books. EMB Consulting guided the remediation to identify damaged books and building materials to bring the library back to a condition without mold hazards or water-impacted materials.

SNOHOMISH COUNTY, INDUSTRIAL HYGIENE SERVICES, 2006 TO PRESENT

Ms. Black has been providing industrial hygiene services to Snohomish County since 2006, conducting work in County buildings, transfer stations, and at the Moderate Risk Waste Facility. The type of work includes indoor environmental quality assessments, noise dosimetry, air monitoring, and environmental management reviews. In 2013, Elisabeth conducted an exposure assessment for lead for the Range Master, SWAT Team, and other shooters at the Snohomish County Sheriff's Department firing range. Elisabeth also provided input on firing range ventilation system, range operations, lead waste handling practices, and medical monitoring with the overall goal of reducing lead exposure for workers using the range. In 2014, Elisabeth conducted formaldehyde air monitoring for the Snohomish County Medical Examiner.

AECOM AND FARALLON CONSULTING, TOWN OF SKYKOMISH, SKYKOMISH, WA 2006 TO PRESENT.

Years of railroad operations left a contaminant plume under the town of Skykomish, Washington. The Burlington Northern Santa Fe (BNSF) Railway is working to remediate the entire town site. As the project's industrial hygienist, Elisabeth has designed the air-monitoring program to protect the town residents and project workers from exposure to potentially harmful dusts and vapors. This project entails coordination with the prime environmental consulting firm, the Department of Ecology, and the City and residents of Skykomish.

ASBESTOS ABATEMENT SUPPORT. TACOMA, WA, PORT OF TACOMA, 2004 TO PRESENT. Project Manager and technical lead to develop asbestos specifications and support during abatement for building and pier renovation and demolition projects.

INDUSTRIAL HYGIENE SERVICES, KORRY ELECTRONICS, SEATTLE, WA, 1999 TO PRESENT. Provided on-call support to electronics manufacturer to assist with a range of industrial hygiene issues, to include program development and updates, hazard assessments, training, and consulting for compliance with regulatory standards to include, respiratory protection, hazard communication, hearing conservation, and personal protective equipment. Provided on-going consulting services to recognize, evaluate, and control worker exposures to physical and chemical hazards in the workplace. Provided emergency response services for asbestos issues and a chemical fire.

SOUND TRANSIT, LINK LIGHT RAIL, ODOR INVESTIGATION, 2012 TO 2014

In 2011, Sound Transit began receiving complaints from passengers of a "sewer" or "gunpowder" odor at the Beacon Hill Station. The Beacon Hill Station is located midway along the Beacon Hill Tunnel, 167 below street level. EMB Consulting was procured to conduct an odor investigation. Analysis consisted of air sampling for hydrogen sulfide and related sulfur compounds; ozone; and



fungal growth. Standing water in the tunnel was also sampled. The source of the odor was determined to be low-level sulfur compounds that emanated from sulfur-reducing bacteria present in groundwater that infiltrated into the tunnel. Although the sulfur compounds detected were well below levels that cause concern to human health, the odor was problematic for a public facility. EMB Consulting has also been involved in other similar Sound Transit projects in the new UW section of the tunnel.

CRETE CONSULTING, PORT OF SEATTLE TERMINAL 117, HAZARDOUS WASTE OPERATIONS, 2012 TO 2014

The Port of Seattle is in the process of remediating a former asphalt manufacturing site (Terminal 117) as part of the Lower Duwamish Waterway Superfund cleanup. The remediation will take place in phases over several years. EMB Consulting is tasked with preparation of site-specific health and safety plans for the project and development of a community health and safety plan to minimize impacts to the surrounding community from site contaminants and nuisance hazards. EMB Consulting is also responsible for all aspects of regulated building materials management, from survey to project design and demolition oversight. Finally, Elisabeth Black is responsible for development and implementation of an air monitoring program to ensure that site contaminants do not migrate into the surrounding community.

STRIDER CONSTRUCTION, MERCURY REMEDIATION SAFETY CONSULTING, 2013

Strider Construction was awarded the contract to remediate free-phase mercury contamination on the Georgia-Pacific facility in Bellingham, Washington. Elisabeth was responsible for prescribing safety equipment and protocols, air monitoring, and biological monitoring.

CRETE CONSULTING, TARGA SOUND TERMINALS EXPANSION PROJECT, 2012

EMB Consulting provided industrial hygiene support during the Targa Sound Terminals expansion project. The project first involved conducting hazardous building material inspections of four buildings on site to identify asbestos and other materials that would have to be managed or removed prior to demolition. Next, EMB Consulting prepared an abatement design for removal of regulated wastes and conducted a bid walk with prospective abatement contractors. EMB Consulting also assisted Targa with permits and notifications associated with regulated building materials abatement and building demolition. Finally, under separate contract, EMB Consulting prepared a site-specific health and safety plan and conducted air monitoring for worker protection during excavation of metal-contaminated soils.

CONFIDENTIAL CLIENT, INDUSTRIAL HYGIENE FACILITY AUDIT, 2011

To support a decision to purchase, EMB Consulting conducted a thorough chemical safety audit of a specialty glass manufacturing facility. The facility stored and worked with large quantities of highly toxic metals, including thallium, lead, beryllium, cadmium, and copper. In addition, the raw stock material, products, and process equipment were extremely valuable. The project required strict confidentiality and adherence to high levels of security processes. The facility was evaluated for safe work practices, chemical storage, vessel integrity, biological monitoring practices, and vulnerability to theft.

MARTEN LAW, LITIGATION SUPPORT, NORTHWEST TERRITORIAL MINT V. AUBURN VALLEY CAPITAL, 2010 TO 2012

Elisabeth Black provided expert witness support during a tenant-landlord dispute related to metal dust from minting operations remaining in a leased space.

HORIZON LINES, CHEMICAL EXPOSURE ASSESSMENT, 2009

On separate occasions, two Horizon Lines workers experienced health symptoms that they associated with chemical odors from a neighboring facility operation. Both workers suffered lung dysfunction with some level of persistent disability. Elisabeth Black led an investigation to determine



the source and identity of the chemical. The investigation included interviews with Horizon workers, review of existing data, and air sampling and analysis. Ms. Black was able to detect airborne acetaldehyde in a sample on the property perimeter, downwind of a neighboring facility. Acetaldehyde is a potent lung toxin, associated with the types of lung damage reported by the Horizon workers. Based on the data obtained by Elisabeth Black, Horizon Lines was able to pursue a legal claim against the neighboring facility.

WASHINGTON STATE DEPT OF HEALTH, CLANDESTINE DRUG LAB WORK GROUP, 2008

Ms. Black was asked to participate on the Washington State Department of Health Clandestine Drug Lab (CDL) Advisory Workgroup to refine the current Washington regulations on CDLs in accordance with Chapter 64.44 RCW. The workgroup grappled with changing the current cleanup standard and defining an independent third party sampler to comply with the RCW. As an industrial hygienist, Elisabeth Black provided input on sampling methodologies and appropriate cleanup standards for a residential setting.

CONFIDENTIAL CLIENT, MERCURY SPILL RESPONSE, 2008

In November of 2008, Elisabeth Black managed an emergency response to a five-pound mercury spill in a local college dormitory. Elisabeth Black responded within 15 minutes of receiving the initial notification, coordinating with EPA Region X and King County Public Health, ordering sampling equipment, and beginning the process of hiring an environmental abatement contractor. The response required the evacuation and isolation of affected areas of the building, communications with concerned staff and students, and directing the environmental cleanup contractor. Elisabeth Black worked evening hours and into a holiday weekend to ensure the response progressed to provide a safe environment for college residents. Within one week of the spill, the mercury had been cleaned up and confirmatory air sampling indicated that the rooms were safe to reoccupy according to EPA and ATSDR guidelines.

KING COUNTY DEPARTMENT OF TRANSPORTATION, ODOR COMPLAINT RESPONSE, 2008

During a record-breaking heat wave, King County Department of Transportation reported escalating odor complaints from neighbors surrounding the Brugger's Bog Stormwater Decant Station in Shoreline, Washington. Elisabeth Black used direct read instruments to rule out any immediately dangerous conditions, such as high hydrogen sulfide, methane, or volatile organic compound concentrations on the site or migrating off site. Elisabeth Black collected samples to rule out hazardous chemical constituents in the decant station ponds that might be detected by laboratory analysis. Ms. Black prepared a report with analytical results that demonstrated that, although unpleasant, the odors did not present a health hazard. By the time the analytical results were received, the foul smelling stormwater had been removed to provide some relief to the neighborhood. The quick response time and immediate communication helped King County reach a quick and thorough remedy to the situation and provided effective communication with concerned neighbors.

ROBERTSON, MONAGLE, AND EASTAUGH, LITIGATION SUPPORT, JANSSEN V. COLMAN, ANCHORAGE, AK, 2007. Provided expert opinion on a case involving asbestos-containing dust in a public school building.

PUGET SOUND ENERGY, SNOQUALMIE FALLS HYDROELECTRIC POWER FACILITY, SNOQUALMIE, WA 2007. Managed the inspection of 20 buildings and structures for hazardous building materials, to include asbestos, lead, and miscellaneous hazardous building materials.

SEATTLE DEPARTMENT OF TRANSPORTATION, FREMONT BRIDGE LEAD HAZARD ASSESSMENT, 2006

Elisabeth Black conducted an airborne lead exposure assessment and surface lead sampling to determine bridge operator exposure to lead during maintenance activities at the Fremont Bridge in Seattle, Washington. The bridge had lead-containing coatings, which was released during



maintenance activities. Air monitoring was conducted to verify that workers were not exposed above applicable occupational exposure limits. Surface dust sampling was conducted using wipe methods to ensure that lead could not be picked up by workers on hands or clothing, creating another possible route of exposure through accidental ingestion.

SEATTLE HOTEL PROPERTY, SEATTLE, WA, 2005-2006. Project Manager for hazardous building materials surveys, air monitoring, specifications, abatement oversight and industrial hygiene support during the renovation of hotel. Managed regulatory citations, mitigated exposure problems, and reduce the regulatory liabilities of the client during a 176-room hotel remodeling project. Made notifications to employees in English and Spanish and provided asbestos operations and monitoring training to maintenance staff.

HAZARDOUS BUILDING MATERIAL SURVEY AND ABATEMENT SUPPORT. AMGEN/HELIX PROJECT, SEATTLE, WA, AMGEN, 2003-2005. Project Manager and technical lead on survey and abatement of industrial buildings to support demolition at Amgen's Magnolia campus.

HAZARDOUS BUILDING MATERIAL SURVEYS, FAIRCHILD AFB, SPOKANE, WA, ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT, 2003. Project Manager for demolition-level surveys for asbestos-containing materials, lead in demolition debris, lead-based paint, and miscellaneous other hazardous building materials for eight hangars on the flight line of Fairchild Air Force Base. The work required sensitivity to a high-security area on an active military flight line.

HAZARDOUS BUILDING MATERIAL SUPPORT SERVICES, HISTORIC BUILDING RESTORATION, AREA 600, FORT VANCOUVER, WA, ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT, 2003. Project Manager for full hazardous building material surveys for 11 historic buildings. Preparation of abatement plans and specifications with the goal of removing hazardous building materials while preserving historic components and building integrity.

HAZARDOUS BUILDING MATERIAL SURVEYS, AIR FORCE HOUSING, MOUNTAIN HOME AFB, ID, ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT, 2002. Scoped and managed a project to conduct hazardous building material inventories for asbestos, lead, PCBs, and other hazardous building materials in housing to be demolished.

WORKER HEALTH & SAFETY HAZARD ASSESSMENTS AND PROGRAM DEVELOPMENT, COOS BAY, OR, ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT, COOS BAY FIELD OFFICE, 2002. Conducted hazard assessments for operations at the Corps Coos Bay Field Office to evaluate potential noise exposures, respiratory hazards, and personal protective equipment requirements. At project completion, provided the field office with a Hearing Conservation Program, Respiratory Protection Program, and Personal Protective Equipment Program. The Programs were designed to be self-administering to require limited additional services by outside contractors.

HAZARDOUS BUILDING MATERIAL SURVEYS, NAVAL AIR STATION WHIDBEY ISLAND, WA, BERGER/ABAM. 2002. Project Manager and Technical Lead for asbestos, lead, and other HBM surveys at Naval Air Station Whidbey Island. Responsible for client management, field and laboratory coordination, and report writing.

ENVIRONMENTAL CHARACTERIZATION/REMEDIAL ACTIONS, GORST LANDFILL, GORST, WA, EFA-NW, 2001. Manager for multi-year, multi-phase project. Executed work from initial PRP search to develop a history of site activities, to a Site Hazard Assessment according to state regulatory guidelines, and a focused RI/FS. Established a strong relationship with the U.S. Navy and regulators at Ecology, as evidenced by a pilot database program involving the three parties. Successfully assembled and managed a diverse technical team, including hydrogeology, toxicology, civil engineering, regulatory compliance, environmental history, and field services.



AIR QUALITY LITIGATION SUPPORT, DIESEL EXHAUST EXPOSURE ASSESSMENT, STATE OF ALASKA, AK, 2000. Managed a diesel exhaust exposure assessment of Alaska Marine Highway System ferries to support the State of Alaska in defense of a worker wrongful injury/wrongful death claim. Prepared a sampling and analysis plan and organized sampling during the period of peak ferry activity. The project involved an extensive air sampling and analysis program on several different ferry runs to assess the diesel exhaust exposure to workers. Results contributed to dismissal of the claim.

CHEMICAL WARFARE MATERIAL HISTORY RESEARCH, UNITED STATES ARMY CORPS OF ENGINEERS, ALASKA DISTRICT, 2000. Acted as the research task leader on a large project to determine the fate of potentially hazardous materials used by a Department of Defense agency in four Pacific regions over approximately 50 years. Project responsibilities included management of a research team and budget tracking. Also developed a research manual to guide research and assisted in the development of a database to track and organize research materials. Finally, historic research was conducted for more than one year at agency and military history offices and in national and regional document repositories. Research results were provided to the client in interim and final reports.

ENVIRONMENTAL HISTORY REVIEW AND INVESTIGATION, NAVAL AMMUNITION DEPOT, PORT HADLOCK, WA, EFANW, 1999. Project Manager and Environmental Historian during an investigation of a Navy site to determine the potential for contamination based on past activities. The project was completed in two phases, consisting of an environmental history review and a site investigation. The first phase consisted of development of a site history using available aerial photographs and interviews with current and former employees of the site. The findings of the environmental history research were used to guide the site investigation during the second phase of the project, providing a better understanding of potential types and locations of contamination on site.

OIL SPILL RESPONSE TRAINING, NAVAL AIR STATION WHIDBEY ISLAND (NASWI), OAK HARBOR, WASHINGTON. EFA-NW, 1999. Produced training materials and conducted training to prepare NASWI for an oil spill response drill. Training included health and safety requirements during an oil spill response. Other responsibilities included participating as a controller in the drill, analysis of the drill, and production of a final report.

BENZENE RELEASE INVESTIGATION, JACKSON PARK HOUSING COMPLEX, KITSAP COUNTY, WA, EFA-NW, 1998. Conducted investigation to determine the source of benzene contamination in seep water discharging to Ostrich Bay of the Puget Sound. The investigation included field sampling of soil, groundwater, and seep water. Additional phases of the project included use of ground penetrating radar and in-pipe video tracking devices to develop an understanding of subsurface conditions in the vicinity of the seeps. Elisabeth organized and oversaw field investigations and writing of draft and final reports.

LEAD-BASED PAINT RISK ASSESSMENTS, MILITARY HOUSING UNITS, FORT RICHARDSON AND FORT WAINWRIGHT, AK, ARMY CORPS OF ENGINEERS, ALASKA DISTRICT, 1997. Field manager for assessment of approximately 140 housing units. Field work included sampling and sample database administration. Also responsible for writing the final report, including methods, results, conclusion, and recommendations for abatement.

PRE-DEMOLITION SURVEYS, SAFECO FIELD, SEATTLE, WA, 1997. Conducted hazardous building material inventories to include asbestos, lead, PCBs, and other chemical products at the site of the new baseball stadium for the Seattle Mariners. Fieldwork included an AHERA survey, sampling, and sample database administration.



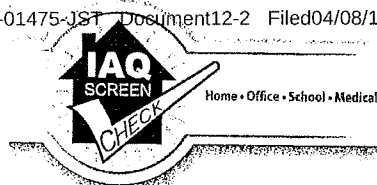
PROFESSIONAL CERTIFICATIONS

- American Board of Industrial Hygienists, Certified Industrial Hygienist, since 2001
- AHERA Building Inspector, 1991/Refresher, 2008
- AHERA Project Designer, 2002/Refresher, 2007
- Lead Inspector, 1996
- Lead-Based Paint Risk Assessor, 1996
- Hazardous Waste Operations and Emergency Response, 1990/Refresher, 2015
- ISO 14000 Lead Auditor Training, 1998

PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association, Pacific Northwest Section

Exhibit B



Do-It-Yourself, Indoor Air Quality Screening Is The Smart, Inexpensive Way To Be Pro-Active. Learn More At IndoorAirTest.com Today!

• Mold	• Organic Vapor	• Mycotoxin
• Fiberglass	• Bacteria	• FAST
• Dust Mite	• Staph	• RAPID
• Formaldehyde	• Fungal	• and More!

Sampling Instructions

Read Carefully Before Continuing

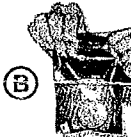
1. Remove test kit materials from clam shell, and from the protective zip-top bag, then from the secondary zip-top bag. Save both bags. (Figure A)



2. For ambient room monitoring, hang from a location that is central in the room, at least 4 feet off the ground. To ensure accurate results, do not place on floor and keep badge away from household sources of formaldehyde, including emissions from cooking, cigarette or fireplace smoke, fuel or natural gas burning appliances, or composite wood furniture.

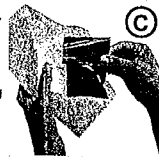
IMPORTANT: Do not obstruct the white membrane. Keep badge away from the direct path of moving air (e.g. Open window, ceiling fan, air vent)

3. Record "Start Time" on Chain of Custody.
4. Leave the Bio-Badge exposed for 24 hours.
5. Record "Stop Time" on Chain of Custody. Accurate recording of start and stop times is very important.
6. Place the exposed Bio-Badge back into the clear secondary zip-top bag and seal, then place into the protective zip-top bag. Then seal making sure to close the zip-top seal completely. (Figure B)



7. Place in enclosed Tyvek envelope (Figure C) and mail to EDLab/ADChem for analysis at:

4911 Creekside Drive, Suite C,
Clearwater, FL 33760
Postage is prepaid.



NOTE: For overnight shipping sent via UPS or FedEx the additional costs are at the expense of the sender.

8. Your results are sent to you 7-10 days after EDLab receives your sample. Results are delivered via e-mail (a hard copy is available upon request).

Questions on sampling? Visit IndoorAirTest.com/LL

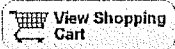

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- | | |
|----------------------------|------------------------|
| • Indoor Air Quality FAQ's | • Online Store |
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Welcome to the IAQ Test Kit Center

F.A.Q.

Frequently Asked Questions (FAQ's) for Lumber Liquidators' Customers

- Home
- Products
- About EDL
- IAQ Links
- About Us
- Customer Reviews
- Contact Us



Frequently Asked Questions for Lumber Liquidators' Customers

Q. How do I hang the test badge?

A. The ideal location for the badge is suspended 48 inches from the finished floor in the center of the room. However, placing the badge in such location is often not practical. The badge may be placed on a flat surface, between 28 and 48 inches from the finished floor and 48 inches away from any door. Avoid placing the test badge on top of any furniture that is recently varnished or that is constructed from composite wood products (i.e. particleboard, plywood, or fiberboard).

Q. If I place the badge on a flat surface, what side should be facing up?

A. If you place the badge on a surface, place it with the blank

Q. What if I left the badge out for longer than 24 hours?

A. The ideal test period is 24 hours, but as long as you properly record the start and stop time, the laboratory should be able to generate a proper result. However; the exposure time should not exceed 48 hours.

Q. I was sent two (or more) test kits. How do I use them?

A. If you have two or more test kits, you likely have laminate flooring in more than one room or have a space large enough that two badges were advisable. Place each badge in a different room that contains laminate flooring. Please ensure that you mark the location and the start and stop time for each badge separately and that you follow the instructions for each test kit. F.A.Q Frequently Asked Questions (FAQ's) for Lumber Liquidators' Customers

Q. How long will it take to get results?

A. Once the badge is received by our lab, you should receive your results via e-mail within 7

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side up. The serial numbers on the badge should be facing down.

Q. What other potential sources of Formaldehyde may be in my home that can affect the results and what should I do?

A. Eliminate all other sources that may contain formaldehyde such as adhesives, caulking, paints, wood sealers and varnishes, liquid polyurethane, household cleaners, personal and pet care products, combustion appliances, etc. Also avoid using air purifiers and ozone generators during the test period.

Q. How should I operate the Heating and air-conditioning and ceiling fans for the test period?

A. If you have heating and air-conditioning it should operate at a set point of your choice within the comfort range of 68 to 79 °F. If you have ceiling fans, operate them as you ordinarily would.

Q. Can I open my windows during the test period?

A. If your home is provided with heating and cooling, windows and exit doors should remain closed for the duration of the test period. You may enter and exit your home any time but avoid keeping the doors open for extended periods of time (i.e. 5 minutes). If you normally rely on natural ventilation, for comfort, you can open windows and/or doors as needed to maintain a comfortable environment.

to 10 calendar days. This means that it could be up to 15 days from when your badge is mailed depending on the speed of the U.S. Postal Service. If you have not received your results via e-mail within 15 days, make sure to check your e-mail spam filters and then contact the laboratory at HCHO@indoorairtest.com

Q. I have more questions. How do I contact you?

A. EDLab and BHC LLC, can be reached at the HCHO Hotline toll free at 1-855-982-9797 or HCHO@indoorairtest.com and we will do our best to respond to you as quickly as possible.

Q. If this is about my flooring, why shouldn't I place the badge on the floor?

A. This test is designed to measure indoor air quality, not specific formaldehyde emissions from a particular source.

Lumber Liquidators' customer care can be reached at:

LLCustomerRelations@Lumberliquidators.com or 1-800-366-4204. Please remember that we cannot offer health or medical advice regarding formaldehyde or any information regarding Lumber Liquidators' flooring products.

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Exhibit C

California Environmental Protection Agency

Air Resources Board

**Standard Operating Procedure for
Finished Good Test Specimen Preparation
Prior to
Analysis of Formaldehyde Emissions from Composite
Wood Products**

**Consumer Products Enforcement Section
Vehicle, Parts, and Consumer Products Enforcement Branch
Enforcement Division**

9/13/2013

DISCLAIMER: Mention of any trade name or commercial product in this Standard Operating Procedure does not constitute endorsement or recommendation of this product by the Air Resources Board. Specific brand names and instrument descriptions listed in the Standard Operating Procedures are equipment used by the ARB. Any functionally equivalent instrumentation can be used.

1. SCOPE

This Standard Operating Procedure (SOP) is to be used to prepare a finished good for laboratory testing to determine if the finished good complies with the ATCM to Reduce Formaldehyde Emissions from Composite Wood Products. This SOP describes a procedure for preparing or deconstructing finished goods made with composite wood panels and preparing specimens prior to laboratory testing according to the requirements of ARB's Monitoring and Laboratory Division SOP "Sampling and Analysis of Formaldehyde Emissions from Composite Wood Products."

2. SUMMARY OF METHOD

Finished goods contains pieces of composite wood panels and include such items as cabinets, furniture, flooring, doors, picture frames, and toys. Panels in finished goods often are veneered, laminated, coated, or otherwise manipulated such that the formaldehyde emission characteristics of the original panels may have been changed on one or both sides of the component part. Deconstruction is the process of separating or cutting the finished good into component parts so that pieces of the underlying panel may be accessed in order to remove the coating or laminate to achieve a test specimen that can be sent to a lab for formaldehyde emissions testing. This process includes removing coatings from hardwood plywood and removing laminates (synthetic or wood veneer) from laminated products to access the underlying composite wood products. For finished goods that consist of a laminated product in which one side is not laminated or coated, the product may be cut and tested as a panel with a surface coating on one side (see SOP for composite wood panels).

The key activity in the deconstruction process is the removal of the surface layer of a specimen using a thickness planer or sander to expose the underlying composite wood panel. This SOP defines how a panel surface is to be removed in order to provide reliable data.

The regulation requires a minimum of one specimen to test the formaldehyde emissions of a composite wood product in a finished good. Specimen size is determined by the laboratory to meet the air flow and surface area requirements as defined in the ASTM D6007. Specimen size can vary among laboratories due to differences in equipment, air flow rates, etc. Cut and labeled specimens are stored in resealable bags made of 6-mil plastic or equivalent.

Deconstruction can occur on either one or both sides of the test specimen. If only one side is deconstructed, then two pieces are then placed back to back (deconstructed sides exposed) with the edges taped to make one test specimen. A specimen with both sides deconstructed is also tested with the edges taped and both sides exposed.

3. INTERFERENCES/LIMITATIONS

Emissions decay, or the loss of formaldehyde from exposure to the atmosphere, will cause lower formaldehyde emission results than an otherwise fresh sample. Heat can also increase emissions decay. When handling or storing samples, avoid heat and exposure when practical.

4. EQUIPMENT AND CONDITIONS

A. MATERIALS

Plastic sheeting (as sold for painting or landscaping), thickness = 6 mils
Masking tape
Pencils, #2
Formaldehyde free permanent markers
Sample Bags, Resealable made of 6-mil plastic

B. EQUIPMENT

Panel Saw
Table Saw
Band Saw
Jig Saw
Circular Saw
Drum Sander, Performax 10-20+, with 120 grit sandpaper
Thickness Planer, Dewalt DW735, 13-inch
Sandpaper, 120 grit
Micrometer, +/- .001 inches

5. ACQUISITION OF SAMPLES

Finished goods or component parts can be acquired in a number of ways including purchase or donation from a retailer, distributor, importer, or manufacturer or from a fabricator of finished goods.

Panels and finished goods can be cut to ease handling and transportation. Before cutting, mark each item with a pencil or formaldehyde free permanent marker in such a way that the original orientation of the cut boards can be restored prior to cutting sample specimens.

Each finished good is assigned an identification number and labeled using a pencil or formaldehyde free permanent marker. The identification number consists of the date in the form yymmdd, two letters (normally inspector initials), and two digits to differentiate samples collected on a given day. An example could be 110704FJ02. This data is included in a chain of custody document that accompanies the sample on its way to the laboratory and is updated as necessary.

Finished goods are to be transferred to CARB facilities in their original packaging, if any, and when practical. Panels that are coated or modified are to be handled in the same way as raw panels.

ASTM Method D-6007 allows for alternative ways of collecting samples. "When testing wood products that are not newly manufactured such as after original application, installation or use, the method of packaging and shipping the products shall be fully described. Information on the age and history of the product shall be detailed in the test report."

6. STORAGE

Panels, finished goods, component parts and specimens must be stored in a locked area with restricted access in a manner that prevents cross contamination and preserves sample integrity.

7. PREPARATION OF SAMPLES

- A. Sample Layout: Due to the variety of shapes and sizes of finished goods, it is not possible to define a sample layout. Only one specimen is required to test one panel type in the finished good. Additional specimens may also be tested. If the quantity of a composite wood panel type in a finished good is large, space specimens to provide a representative sampling. If the quantity of a composite wood panel type in a finished good is small, pieces may be assembled into a test specimen representative of the panel type. When possible, specimens should be prepared to represent each panel type found in the finished good.
- B. Micrometer: Use a micrometer to measure the initial thickness of the specimen to within 0.002 inches.
- C. Thickness Planer and Drum Sander Operation: Testing by ARB has shown that use of either a thickness planer or a drum sander to remove surface layers will produce specimens with comparable formaldehyde emissions characteristics.

Selection of a planer or a sander can be made based on operator preference or other constraints such as sample size or thickness.

a. Thickness planer operation:

- i. Maintain the planer in good operating condition including sharp blades, proper blade alignment, and removal of excess dust buildup.
- ii. Pass the board thru the planer, trimming small amounts (less than .02" per pass is recommended) until the desired coating or laminate and glue line has been removed (typically 0.005" to 0.03"). At the final thickness, pass the board thru one time in each direction to achieve a more uniform thickness.
- iii. When a board is fed through a planer, the ends are often thinned to an incorrect thickness. This is known as snipe. Samples to be planed must be long enough to account for snipe. Cut off and discard any snipe to produce a test specimen with uniform thickness. Snipe is typically 3 inches long on each end of a board fed through the CARB thickness planer.

b. Drum sander operation:

- i. Maintain the sander in good operating condition including fresh sandpaper free of clogs or heavy wear, proper drum alignment, proper feed belt adjustment, and removal of excess dust buildup.
- ii. Pass the board thru the sander, trimming small amounts (about .003" to .01" per pass is recommended) until the desired coating or laminate and glue line has been removed (typically 0.005" to 0.03"). At the final thickness, pass the board thru one time in each direction to achieve a more uniform thickness.
- iii. Snipe is uncommon when using the CARB drum sander. Check specimen thickness near the leading and trailing edges for snipe and cut off and discard any snipe to produce a test specimen with uniform thickness.

D. Testing the Core of MDF Core and Particle Board Core Products: These composite core products must have a compliant core that meets the regulation's formaldehyde emission limits.

- a. Select one side of the board and remove surface coatings of paint, stain, varnish, or laminate one thin layer at a time by planing or sanding (as described in section 3 above) until the surface coatings have been removed and a clean smooth surface of MDF or PB remains.
- b. Measure and record the thickness of the remaining board.
- c. If there is a sufficient quantity of the test board, the operator can cut two pieces to the required size and label both unaltered sides with the sample

- number plus a specimen identifier such as A1, B1, C3, etc. Both pieces of the pair are given the same specimen identifier.
- d. Alternatively, repeat steps a and b on the opposite side of the board to test both sides of the specimen. Cut to size and label with the sample number plus a specimen identifier such as A1, B1, C3, etc.
 - e. Place the specimen in a resealable bag made of 6-mil plastic or equivalent. The specimen label should be facing outward so that the label is legible thru the plastic bag. Alternatively, label the bag.
 - f. Record specimen identification numbers, descriptions, and preparation details along with the date in the wood shop log book. Include a description of the original finished good.
 - g. Update the chain of custody document.
- E. Testing the Outer Veneer of Veneer Core and Composite Core Products: These are prepared for testing by removing any paint, stain, coating, or covering while leaving the veneer in place.
- a. Select one side of the board and remove surface coatings of paint, stain, or varnish one thin layer at a time by planing or sanding until the surface coatings have been removed and a clean smooth surface of wood veneer remains. Use care not to sand or plane all the way thru the outer veneer into the glue line. Specimens with the glue line exposed cannot give reliable compliance test results.
 - b. Measure and record the thickness of the remaining board.
 - c. If there is a sufficient quantity of the test board, the operator can cut two pieces to the required size and label both unaltered sides with the sample number plus a specimen identifier such as A1, B1, C3, etc. Both pieces of the pair are given the same specimen identifier.
 - d. Alternatively, repeat steps a and b on the opposite side of the board to test both sides of the specimen. Cut to size and label with the sample number plus a specimen identifier such as A1, B1, C3, etc.
 - e. Place the specimen in a resealable bag made of 6-mil plastic or equivalent. The specimen label should be facing outward so that the label is legible thru the plastic bag. Alternatively, label the bag.
 - f. Record specimen identification numbers, descriptions, and preparation details along with the date in the wood shop log book. Include a description of the original finished good.
 - g. Update the chain of custody document.
- F. Small Samples: Small items may require procedure modifications to prepare enough material for testing.
- a. If the surface coatings must be removed from both sides of a specimen, remove one side first and then measure the thickness. Remove the

coating from the other side and measure the thickness again. The key step here is to determine the thickness removed from each side.

- b. Sometimes the sample is narrower than the specimen dimensions require (a picture frame for example). First, prepare the surfaces as described in steps D or E. Then cut into strips that can be laid side by side and assembled into a specimen with the test surfaces exposed as required for step G.

G. Specimen Size: Test specimen dimensions are determined by the laboratory to meet the air flow and surface area requirements as defined in the ASTM D6007. Specimen size can vary among laboratories due to differences in equipment, air flow rates, etc.

- a. For the CARB MLD laboratory, the following sample surface areas are specified:
 - i. MDF, 49 square inches
 - ii. Particle board, 78.75 square inches
 - iii. Hardwood plywood, 78.75 square inches
 - iv. Hardwood plywood wall paneling, 174 square inches

These surface areas can be achieved by testing one specimen with both sides exposed and the edges taped. Alternatively, two specimen pieces can be cut and arranged face-to-face or back-to-back with edges taped to achieve the same surface area. ASTM D6007 allows this for nonstandard testing of products with a single surface exposed. This is often done if one side of the panel has a surface coating.

- b. To achieve these required surface areas, CARB specimens are normally cut to the following dimensions:
 - i. MDF, 7 inches by 3.5 inches
 - ii. Particle board, 7 inches by 5 5/8 inches
 - iii. Hardwood plywood, 7 inches by 5 5/8 inches
 - iv. Hardwood plywood wall paneling, 7 inches by 12 3/8 inches

The dimensions of the finished good sometimes necessitates that the specimen dimensions vary somewhat from the norm. This is acceptable as long as the specimen surface area complies with the requirements of paragraph G.a.

H. Specimen Handling:

- a. Cut and labeled specimens are placed in resealable bags made of 6-mil plastic or equivalent. Specimens are labeled with a pencil, black or silver formaldehyde free permanent marker.
- b. Record specimen identification numbers, descriptions, and preparation details along with the date in the wood shop log book.
- c. Update the chain of custody document.

Exhibit D

**CBS News**

Attn: Mr. Sam Hornblower
524 West 57 Street
New York, New York 10019
USA

CARB Deconstructed Laminate

Report Date:	11/5/2014
Project #:	0721504
Report Of:	CARB Deconstructed Laminate
Report #:	0721504-3
Sample #:	7218
Reporting Lab:	Benchmark Holdings, LLC 2710 West 5th Avenue, Eugene, OR 97402 USA Phone: 541/484-9212 - Fax: 541/344-2735

ASTM D6007 Determining Formaldehyde Emissions Using Small Chamber

Chamber Results	
	Impinger
	#1
Observed Flow Rate (l/m):	1.000
Corr. Vol. of Air Sample:	30.575
Raw Absorbance Values:	0.148
	0.144
	0.144
Average Absorbance:	0.145
Unadjusted PPM:	0.315
Temp. Correction Factor 77°F:	0.99
R.H. Correction Factor 50% RH:	1.00
Standardized Concentration PPM:	0.312
Maximum PPM: Phase 2 = 0.11	

Production Data			
	KM Glacier Peak Poplar 12mm		
	10024140		
Product:	12GP-Z/1011		
Mill Code:	DWP	Prod Date:	6-Jul-14
Prod Group:	MDF*	Control Date:	NS
Test Date:	4-Nov-14	Coll. Date:	15-Oct-14

CHAMBER ID#:	4
Chamber Conditions	
Barometric Pressure (in):	30.50
Dry Bulb Temp (°F):	77.10
Relative Humidity (%):	50.00
Length of Test (minutes):	30.00

Comments: Sample does not pass CARB Phase 2 standard. Sample was a laminate, deconstructed per ARB methodology. Initial thickness: 0.475", -Face: 0.461", -Back: 0.448"

Parameters:			
Loading Ratio:	0.260	Volume =	.1191863m ³
Chamber Dimensions:	.49213m x .49213m x .49213m		
Air Exchange Rate:	0.50 ± 0.05 air changes per hour		

*The chamber is activated under positive pressure. The air sampling rate was 1.0 liters per minute at 30 ± 2 minutes.

*The samples were conditioned for seven days prior to testing at 70° to 80° F and 45% to 55% relative humidity. During conditioning, the formaldehyde background level was 0.01 parts per million or less.

*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 restraints. No warranty, expressed or implied, is made.

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Respectfully Submitted,

Benchmark Holdings LLC

Travis R. Snapp
Managing Director / COO
Benchmark International LLC

Exhibit E



HPVA Laboratories

1825 Michael Faraday Drive, Reston, VA 20190-5350
PHONE 703-435-2900 FAX 703-435-2537



TEST REPORT ON FORMALDEHYDE EMISSIONS FROM WOOD PRODUCTS

Test Method: ASTM D6007-02 (2008)

Analytical Procedure: Modified NIOSH 3500

CUSTOMER INFORMATION	SAMPLE IDENTIFICATION
CBS News 524 West 57th St. New York, NY 10019	Test ID#: FSC495 Date of Test: 10/28/2014 Customer Sample ID: SKU#10029601, Leesburg, VA Adhesive: N/A

SAMPLE DESCRIPTION			
Product Type:	Kensington, 12mm Imperial Teak Vinyl Laminate Flooring	Sample Thickness:	12mm
Core Type:	MDF/HDF	Sample shipped/stored in:	Original Packaging
Sample Condition:	OK	Date Selected:	N/A
Date of Manufacture:	5/24/14	Date Received:	10/14/2014
Date Conditioned:	10/20/2014	Selected by:	Client
Date Tested:	10/28/14	Sample Plan:	HPVA

CONDITIONING DATA	Value	Units
Temperature: (range)	74.0;(74.1-73.9)	°F
Relative Humidity: (range)	50.5;(51.5-49.5)	% RH
Conditioning Background HCHO:	BLQ	ppm
Conditioning Time:	169	hours
Chamber Background HCHO:	BLQ	ppm

TEST DATA	Value	Units
Test Chamber:	2	n/a
Chamber Location:	Reston	n/a
Test Chamber Volume :	2.31	ft ³
Loading Ratio (ft ² /ft ³) :	0.64	ft ² /ft ³
# of Specimens in Test:	6	n/a
Sample Size:	5 5/8" x 6.22"	inches
Total Surfaces Exposed:	6	surfaces (core exposed)
Edges Sealed:	Yes	n/a
Test Temperature: (range):	75;(74.9-75.1)	°F
Relative Humidity: (range):	47.55;(43.3-53.3)	% RH
Air Change Rate:	4	AC/h
Sample Flow Rate:	1.00	L/min
Sample Collection Time:	60	Min.
TEST RESULT: (At Test Conditions)	0.31	ppm
TEST RESULT: (Corrected to 77°F & 50%RH)	0.37	ppm
UNCERTAINTY (+/-):		n/a

NOTES:
(including any deviations from the ASTM procedure or sample defects)

Josh Hosen
Josh Hosen
Manager of Certification Services

This is a factual report of the results obtained from laboratory tests of sample products. The results may be applied only to the products tested and should not be construed as applicable to other similar products of the manufacturer. The HPVA does not verify the description of the materials and products when the description is provided by the client. This report is not a recommendation or a disapprobation by the HPVA of the material or product tested. While this report may be used for obtaining product acceptance, it may not be used in advertising.

Exhibit F



HPVA Laboratories

1825 Michael Faraday Drive, Reston, VA 20190-5350
PHONE 703-435-2900 FAX 703-435-2537



TEST REPORT ON FORMALDEHYDE EMISSIONS FROM WOOD PRODUCTS

Test Method: ASTM D6007-02 (2008)

Analytical Procedure: Modified NIOSH 3500

CUSTOMER INFORMATION	SAMPLE IDENTIFICATION
CBS News 524 West 57th St New York, NY 10019	Test ID#: FSC496 Date of Test: 10/28/2014 Customer Sample ID: SKU#10029392, Leesburg, VA Adhesive: N/A

SAMPLE DESCRIPTION			
Product Type:	Isplit 12mm American Mission Olive LAM Vinyl Laminate Flooring	Sample Thickness:	12mm
Core Type:	MDF/HDF	Sample shipped/stored in:	Original Packaging
Sample Condition:	OK	Date Selected:	N/A
Date of Manufacture:	12/28/13	Date Received:	10/14/2014
Date Conditioned:	10/20/2014	Selected by:	Client
Date Tested:	10/28/14	Sample Plan:	HPVA

CONDITIONING DATA	Value	Units
Temperature: (range)	74.0;(74.1-73.9)	°F
Relative Humidity: (range)	50.5;(51.5-49.5)	% RH
Conditioning Background HCHO:	BLQ	ppm
Conditioning Time:	169	hours
Chamber Background HCHO:	BLQ	ppm

TEST DATA	Value	Units
Test Chamber:	3	n/a
Chamber Location:	Reston	n/a
Test Chamber Volume :	2.31	ft ³
Loading Ratio (ft ² /ft ³) :	0.64	ft ² /ft ³
# of Specimens in Test:	6	n/a
Sample Size:	5' x 7.056"	inches
Total Surfaces Exposed:	6	surfaces (core exposed)
Edges Sealed:	Yes	n/a
Test Temperature: (range):	75.2;(75.1-75.34)	°F
Relative Humidity: (range):	48;(43.7-52.3)	% RH
Air Change Rate:	4	AC/h
Sample Flow Rate:	1.00	L/min
Sample Collection Time:	60	Min.
TEST RESULT: (At Test Conditions)	0.62	ppm
TEST RESULT: (Corrected to 77°F & 50%RH)	0.72	ppm
UNCERTAINTY (+/-):		n/a

NOTES:

(including any deviations from the ASTM procedure or sample defects)

Josh Hosen
Josh Hosen
Manager of Certification Services

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Exhibit G



CBS News
Attn: Mr. Sam Hornblower
524 West 57 Street
New York, New York 10019
USA

CARB Deconstructed Laminate

Report Date:	11/5/2014
Project #:	0721504
Report Of:	CARB Deconstructed Laminate
Report #:	0721504-8
Sample #:	7224
Reporting Lab:	Benchmark Holdings, LLC 2710 West 5th Avenue, Eugene, OR 97402 USA Phone: 541/484-9212 - Fax: 541/344-2735

ASTM D6007 Determining Formaldehyde Emissions Using Small Chamber

Chamber Results	
	Impinger #1
Observed Flow Rate (l/m):	1.000
Corr. Vol. of Air Sample:	30.557
Raw Absorbance Values:	0.671
	0.673
	0.669
Average Absorbance:	0.671
Unadjusted PPM:	1.459
Temp. Correction Factor 77°F:	0.98
R.H. Correction Factor 50% RH:	1.03
Standardized Concentration PPM:	1.473
Maximum PPM: Phase 2 = 0.11	

Production Data			
	KM Warm Springs Chestnut 12mm 10024384		
Product:	12WS/1011		
Mill Code:	CSD	Prod Date:	20-May-14
Prod Group:	MDF*	Control Date:	NS
Test Date:	4-Nov-14	Coll. Date:	15-Oct-14

CHAMBER ID#:	5
Chamber Conditions	
Barometric Pressure (in):	30.50
Dry Bulb Temp (°F):	77.40
Relative Humidity (%):	48.50
Length of Test (minutes):	30.00

Comments: Sample does not pass CARB Phase 2 standard. Sample was a laminate, deconstructed per ARB methodology. Initial thickness: 0.470", -Face: 0.447", -Back: 0.430"

Parameters:			
Loading Ratio:	0.260	Volume =	.1191863m³
Chamber Dimensions:	.49213m x .49213m x .49213m		
Air Exchange Rate:	0.50 ± 0.05 air changes per hour		

*The chamber is activated under positive pressure. The air sampling rate was 1.0 liters per minute at 30 ± 2 minutes.

*The samples were conditioned for seven days prior to testing at 70° to 80° F and 45% to 55% relative humidity. During conditioning, the formaldehyde background level was 0.01 parts per million or less.

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Respectfully Submitted,

Benchmark Holdings LLC

Travis R. Snapp
Managing Director / COO
Benchmark International LLC