California Environmental Protection Agency

Air Resources Board

Final Statement of Reasons for Rulemaking
Including Summary of Comments and Agency Responses

PUBLIC HEARING TO CONSIDER ADOPTION OF THE PROPOSED AIRBORNE TOXIC CONTROL MEASURE TO REDUCE FORMALDEHYDE EMISSIONS FROM COMPOSITE WOOD PRODUCTS

Public Hearing Date: April 26, 2007
Agenda Item No.: 07-4-3

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State of California
AIR RESOURCES BOARD

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I. GENERAL

On April 26, 2007, the Air Resources Board (CARB or Board) conducted a public hearing to consider an Airborne Toxic Control Measure (ATCM) to reduce formaldehyde emissions from composite wood products. The Staff Report: Initial Statement of Reasons for Proposed Rulemaking, entitled "Proposed Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" (ISOR) was made available to the public beginning March 9, 2007. This ISOR, which is incorporated by reference herein, contains a description of the rationale for the proposed ATCM. At the hearing, the Board approved the proposed ATCM with various modifications to the original proposal. These modifications were made available for public comment beginning January 31, 2008, for a period of 15 days (15-day comment period).

In accordance with section 11346.9(a)(1), this Final Statement of Reasons for Rulemaking (FSOR) updates the ISOR by identifying and explaining the modifications that were made to the original proposal. The FSOR also summarizes the written and oral comments received during the 45-day comment period preceding the April 26, 2007 hearing; comments received at the public hearing on April 26, 2007; and comments received during the 15-day comment period. Agency responses to the comments are also included.

Economic and Fiscal Impacts. The CARB Executive Officer has determined that the proposed regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(5) and 11346.5(a)(6), in federal funding to the state. However, the Executive Officer has determined that the proposed regulatory action will create costs to state agencies, and local agencies, but not school districts, whether or not reimbursable by the state pursuant to part 7

(commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary savings to state or local agencies.

The proposed regulatory action will impose a mandate upon and create costs for local air districts. Under State law, air districts are required to implement and enforce ATCMs which are adopted by CARB, or adopt and enforce their own rules that are at least as stringent. However, such administrative costs to the air districts are recoverable by fees that are within the air district's authority to assess (see Health and Safety Code sections 42311 and 40510). Therefore, the Executive Officer has determined that the proposed regulatory action imposes no costs on local agencies that are required to be reimbursed by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, and does not impose a mandate on local agencies that is required to be reimbursed pursuant to Section 6 of Article XIII B of the California Constitution.

On March 9, 2007, staff released a public hearing notice which included an assessment of costs to State agencies. At the time of the public hearing notice, staff determined that the proposed regulatory action would impose a mandate upon and create costs for one State agency: the California Prison Industries Authority (PIA). The PIA is a major fabricator of industrial and office furniture with a projected 2006-2007 fiscal year manufacturing revenue exceeding $100 million. As a fabricator of composite wood finished products, the PIA will be required to work with composite wood product suppliers to ensure that they use compliant products and comply with the recordkeeping and labeling requirements of the ATCM. The California PIA would also pay more for the composite wood products used to make furniture, as described below.

Since the release of the public hearing notice, staff has conducted a more detailed evaluation of the costs to State agencies. In addition to PIA's expected cost increase of $460,000 to $570,000, staff determined that the proposed regulatory action will also impose costs for the California Department of Transportation (CDOT) ranging from $530,000 to $600,000 and additional costs for the California Department of Recreation and Parks (CDRP) ranging from $100,000 to $120,000. As with PIA, both the CDOT and the CDRP will incur higher costs for the composite wood products they currently use for new projects, maintenance and services throughout California.

The Department of General Services (DGS) was also considered in the assessment of cost impacts to state agencies because of its role in purchasing office systems for state agencies throughout California. It is estimated that the incremental cost increase to DGS for purchases of new office systems and workstations containing composite wood products (i.e., particleboard) will be approximately $260,000 per year.

Lastly, cost increases are anticipated for the implementation of the Airborne Toxic Control Measure by CARB. Additional staff will be needed to review the

applications from manufacturers and third party certifiers, inspect businesses involved with the sale, supply, or use of composite wood products, and for enforcement-related product emissions testing. Additional equipment and contract funds will be needed for field-screening tests by CARB inspectors and for operating and maintaining the composite wood products emissions testing complex and sample preparation laboratory. The total cost for staff and equipment to enforce the regulation is $1,240,000.

The Board's Executive Officer has also determined that pursuant to Government Code section 11346.5(a)(5), the ATCM will affect small businesses. Staff estimates that profitability for these businesses could decline from 1 to about 65 percent in order to comply with the proposed amendments. A detailed description of these impacts is included in the ISOR. The adopted regulations are considered "major regulations" within the meaning of Health and Safety Code section 57005 (enacted by Senate Bill 1082: Stats. 1993, ch. 418). No reasonable alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the regulatory action was proposed, or would be as effective and less burdensome to affected private persons or businesses, including small businesses, than the action taken by the CARB.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the proposed reporting requirements of the ATCM which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

II. MODIFICATIONS TO THE ORIGINAL PROPOSAL

Various modifications to the original proposal were made to address comments received during the 45-day comment period preceding the April 26, 2007 hearing; comments received at the April 26, 2007 hearing; and to clarify the regulatory language. These modifications are described below. A "Notice of Public Availability of Modified Text," together with a copy of the modified sections of the ATCM, was mailed on January 31, 2008, to each of the individuals described in subsections (a)(1) through (a)(4) of section 44, title 1, California Code of Regulations (CCR), including all people who submitted written or oral comments. Additionally, this notice was made available on CARB's website on the same date. By these actions, the modified ATCM was made available to the public for a supplemental comment period from January 31, 2008 to February 15, 2008. After the close of the 15-day comment period, the Board's Executive Officer determined that no additional modifications should be made to the ATCM. The Executive Officer subsequently issued Executive Order R-08-001, which adopted the ATCM. Following is a summary of the modifications made to the originally proposed regulation.

Summary of Proposed Modifications

1. Compliance testing flexibility for ultra-low-emitting formaldehyde (ULEF) resins has been added. Section 93120.3 has been revised so that manufacturers of composite wood products with ULEF resins that can demonstrate consistent average emissions below Phase 2 standards will not be required to conduct emission tests of their products as frequently as otherwise required. Section 93120.7 and Appendix 2 of the ATCM have been modified to clarify labeling and testing requirements associated with ULEF resin use.

2. More specificity and flexibility has been added to the quality assurance requirements for manufacturers contained in Appendix 2 of the ATCM.

3. More specificity and clarity has been added to the requirements for third party certifiers contained in Appendix 3 of the ATCM.

4. Producers of architectural plywood and fabricators that apply a laminate to a composite wood product that complies with the applicable emission standards are proposed to be considered collectively as fabricators of "laminated products." These fabricators only need to comply with the requirements of section 93120.7 by verifying that they use complying core materials. In section 93120.1, the definition of architectural plywood has been deleted and a definition of "laminated products" has been added.

5. In section 93120.1, a number of definitions have been added or modified.

6. In section 93120.1(a)(8), the definition of "composite wood products" has been modified to clarify which products do not fall under the definition of "composite wood products" and to include "composite wood products" used inside of new recreational vehicles.

7. In section 93120.2(a), the Phase 2 implementation date for hardwood plywood with a veneer core (HWPW-VC) has been changed from January 1, 2011 to January 1, 2010. The sell-through dates in Appendix 1 of section 93120.12 have been modified to be consistent with this change.

8. In section 93120.3(c), specificity has been added to the special provisions for manufacturers of composite wood products that use no-added formaldehyde based resins, including the information required to apply for approval to use such resins and emissions performance criteria.

9. In section 93120.3(g), additional recordkeeping requirements were added for manufacturers that use no-added formaldehyde based resins or ULEF resins.

10. In section 93120.4, criteria was added to allow third party certifiers to re-apply to continue to be an approved certifier.

11. In section 93120.7, exemptions have been added for local governments and school districts; and for exterior doors and garage doors that contain composite wood products. Requirements were clarified for fabricators that manufacture composite wood products for use by the fabricator in making finished goods.

12. In section 93120.7(d), additional product labeling requirements have been added for fabricators.

13. In section 93120.9, additional language has been added to allow the use of a secondary test method by third party certifiers in developing correlations with quality control test methods used by composite wood product manufacturers. Also, the section was modified to allow ARB to use the secondary test method for enforcement purposes.

14. In section 93120.12, Appendix 1, the sell-through dates were changed for manufacturers of raw boards from one month to three months, for importers of raw boards from five months to three months, and for fabricators of finished goods from twelve months to eighteen months.

15. In addition to the modifications described above, various modifications to the regulatory text have been made to improve clarity.

III. SUMMARY OF COMMENTS AND AGENCY RESPONSES

The Board received written and oral comments during the 45-day public comment period for the proposed ATCM, at the April 26, 2007 public hearing, and during the 15-day comment period. A combined list of commenters is provided in subsection A below. Subsection B is a list of abbreviations used in the comments. Subsection C contains the comments, grouped by subject, and agency responses.

In subsection C, a summary of the recommendations made regarding the proposed ATCM (i.e., Comment), along with an explanation of how the proposed ATCM has been changed to accommodate the recommendation, as appropriate, or the reason why no change was made (i.e., Agency Response) is provided. Each comment and agency response is marked with identification information in brackets to denote:

- the number of comment letter or testimony as listed in subsection A;
- the person(s) responsible for submitting/presenting the comment(s);

- the date the comment(s) was/were submitted or presented (i.e., 070314 [yymmdd] indicates the comment was submitted on 14 March 2007); and
- the organization(s) that submitted or presented the comment.

For example, comments submitted from the comment letter number 1 in subsection A are marked as: [1-Davis-070314-Regal AQ].

A. Combined List of Commenters

Written Comments Submitted During the 45-day Comment Period Before April 26, 2007 Public Hearing

1. Davis, Charles – 14 March 2007 (Regal Air Quality, Inc.)
2. Levin, Hal – 28 March 2007 (Building Ecology Research Group)
3. Hetzel, Joseph – 4 April 2007 (Door & Access System Manufacturers Assn.)
4. Sherman, Tom – 9 April 2007 (Cabinet Shop Owner)
5. Rink, Andrew – 13 April 2007 (Jeld-Wen)
6. Harmon, David – 13 April 2007 (Hexion Specialty Chemicals, Inc.)
7. Landry, Brock – 16 April 2007 (California Wood Industries Coalition)
8. Rose, Leah – 16 April 2007 (Formaldehyde Council)
9. Haikala, Juhani – 16 April 2007 (Plywood & Door Manufacturers Group)
10. Higgins, Tom – 16 April 2007 (Formaldehyde-free Coalition)
11. Higgnis, Tom – 17 April 2007 (City of Los Angeles)
12. Higgins, Tom – 17 April 2007 (Support Letter)
13. Lent, Tom – 17 April 2007 (Healthy Building Network)
14. Titus, Richard – 19 April 2007 (Kitchen Cabinet Manufacturers Assn.)
15. Alexeeff, George – 19 April 2007 (Office of Environ. Health Hazard Assess.)
16. Overgard, Gail and Altman, Bill – 19 April 2007 (Hardwood Plywood & Veneer Assn.)
17. Whalen, Elizabeth – 19 April 2007 (Columbia Forest Products)
18. Smith, Daniel– 19 April 2007 (Smith & Fong Company)
19. Cooper, Tom – 20 April 2007 (Kaiser Permanente)
20. Stensland, Jan – 20 April 2007 (Health Effects Expert)
21. Parker, Steven – 20 April 2007 (Architect)
22. Whalen, Elizabeth – 20 April 2007 (Columbia Forest Products)
23. Zimmerman, Michael – 23 April 2007 (Sauder Woodworking Co.)
24. Landry, Brock – 23 April 2007 (California Wood Industries Coalition)
25. Hubbard, Reginald – 23 April 2007 (Darlington Veneer Co.)
26. Stoler, Steve – 23 April 2007 (Boise Wood Products)
27. Rush, Jim – 24 April 2007 (Temple Inland)
28. Maultsby, John P. – 24 April 2007 (Florida Plywoods, Inc.)
29. Couture, Pierre-Yves – 24 April 2007 (CDM Décor Papers)
30. Hardy, Kelly – 24 April 2007 (Children Now)
31. Warberg, Will – 24 April 2007 (Plum Creek MDF)
32. Savage, Elliott – 24 April 2007 (SeeMac)
33. Wijnbergen, Peter – 24 April 2007 (Norbord Industries)
34. Keeling, Darrell – 24 April 2007 (Roseburg Forest Products)
35. Guay, Phill – 24 April 2007 (Columbia Forest Products)
36. Perdue, Bill – 24 April 2007 (American Home Furnishings Alliance)
37. Sein, Antonio – 24 April 2007 (Rexcel Particleboard)
38. Morgan, Suzanne – 24 April 2007 (International Wood Products Assn.)
39. Maher, Gregory – 24 April 2007 (Composite Panel Assn.)
40. Smith, Michel (for James Hogg) – 24 April 2007 (Great Lakes MDF)

41. Chaffin, John – 24 April 2007 (International Wood Products Assn.)
42. Gustafson, Stanley – 24 April 2007 (Woodwork Institute)
43. Raymer, Robert – 24 April 2007 (California Building Industry Assn.)
44. Julia, Tom – 24 April 2007 (Composite Panel Assn.)
45. Gregory, Wade – 24 April 2007 (SierraPine Composite Solutions)
46. Gonyea, Joseph H., III – 24 April 2007 (Timber Products)
47. Steenson, Bruce and Dorries, Simon – 24 April 2007 (Australian Wood Panels Assn. and Engineered Wood Products Assn. of Australasia)
48. Zeldin, Mel – 25 April 2007 (California Air Pollution Control Officers Assn.)
49. Levin, Hal – 25 April 2007 (Building Ecology Research Group)
50. Leverenz, Russell – 25 April 2007 (No Affiliation)
51. Watson, Scott – 25 April 2007 (IPMG, Inc.)
52. Lent, Tom – 25 April 2007 (Healthy Building Network)
53. Cassman, Joan and Howard, Ed – 25 April 2007 (Hanson Bridgett Marcus Vlahos & Rudy)
54. Knox, James – 25 April 2007 (American Cancer Society)
55. Theg, Jill – 25 April 2007 (No Affiliation)
56. Carmichael, Tim – 25 April 2007 (Coalition for Clean Air)
57. Young, Jonathan – 25 April 2007 (Concerned Citizen)
58. Blicker, David – 25 April 2007 (No Affiliation)

<u>Written Comments Submitted at the April 26, 2007 Public Hearing</u>

59. Taylor, Carole (Veneer Products, Inc.)
60. Cassman, Joan (Hanson Bridgett Marcus Vlahos & Rudy)
61. Demorest, Harry (Columbia Forest Products)
62. Whalen, Elizabeth (Columbia Forest Products)
63. Li, Kaichang (Oregon State University)
64. Guay, Phill (Columbia Forest Products)
65. Royce, Richard (Hercules Inc.)
66. Mullen, Dave (Hercules Inc.)
67. Livingston, Gene (California Wood Industries Coalition)
68. Shull, Lee (California Wood Industries Coalition)
69. Murray, Jay (Formaldehyde Council, Inc.)
70. Woods, Ed (Columbia Forest Products)
71. Hunt, Jeff (Plywood & Lumber Sales)
72. Robson, Mike (Association of Woodworking & Furnishings Suppliers)
73. Chappell, Gene (Columbia Forest Products)
74. Bradley, Doug (General Veneer Manufacturing Co.)

Oral Testimony Delivered at the April 26, 2007 Public Hearing[1]

75. Carmichael, Tim (Coalition for Clean Air) – p. 110-113
76. Robson, Mike (Assn. of Woodworking & Furnishings Suppliers) – p. 113-114
77. Natz, Betsy (Formaldehyde Council, Inc.) – p. 114-117
78. Murray, Jay (Formaldehyde Council, Inc.) – p. 117-121
79. Marsh, Gary (Formaldehyde Council, Inc.) – p. 121-123
80. Shull, Lee (California Wood Industries Coalition) – p. 123-126
81. Gregory, Wade (California Wood Industries Coalition) – p. 126-129
82. Julia, Tom (Composite Panel Assn.) – p. 129-132
83. Warberg, Will (Plum Creek MDF) – p. 132-135
84. Keeling, Darrell (Roseburg Forest Products) – p. 135-137
85. Altman, Bill (Hardwood Plywood & Veneer Assn.) – p. 137-138
86. Compton, Charlie (Hambro Forest Products) – p. 138-141
87. Perdue, Bill (American Home Furnishings Alliance) – p.141-144
88. Elias, Edward (APA – The Engineered Wood Assn.) – p. 144-145
89. Zimmerman, Mike (Sauder Woodworking Co.) – p. 145-148
90. Titus, Dick (Kitchen Cabinet Manufacturers Assn.) – p. 148-150
91. Raymer, Bob (California Building Industry Assn.) – p. 150-152
92. Landry, Brock (California Wood Industries Coalition) – p. 152-155
93. Livingston, Gene (California Wood Industries Coalition) – p. 155-158
94. Dopico, Pablo (Georgia-Pacific Chemicals, LLC) – p. 158-160
95. Kable, Mark (Setzer) – p. 160-164
96. Morgan, Suzanne (International Wood Products Assn.) – p. 164-167
97. Chaffin, John (International Wood Products Assn.) p. 167-169
98. Schroeder, Kelly (Wood Molding & Millwork Producers Assn.) – p. 169-173
99. Watson, Scott (Plywood salesman) – p. 173-176
100. Harmon, David (Hexion Specialty Chemicals) – p. 176-178
101. Korthof, Doug (No Affiliation) – p. 178-180
102. Higgins, Tom (Formaldehyde Free Coalition) – p. 180-181
103. Demorest, Harry (Columbia Forest Products) – p. 181-187
104. Woods, Ed (Columbia Forest Products) – p. 187-189
105. Whalen, Elizabeth (Columbia Forest Products) – p. 189-192
106. Guay, Phill (Columbia Forest Products) – p. 192-195
107. Cassman, Joan (Hanson Bridgett Marcus Vlahos & Rudy) – p. 195-196
108. Li, Kaichang (Oregon State University) – p. 196-198
109. Grabiel, Charles (United Soybean Board) – p. 198-200
110. Royce, Richard (Hercules Inc.) – p. 200-202
111. Mullen, David (Hercules Inc.) – p. 202-206
112. Uhland, Jerry (CalAg MDF) – p. 206-208
113. Hooper, Pat (HooperWolfe) – p. 208-211
114. Fields, Rick (Neil Kelly Cabinets) – p. 211-213
115. Hunt, Jeff (Plywood & Lumber Sales) – p. 213-214
116. Gitt, Brian (Build It Green) – p. 214-217
117. Cooper, Tom (Kaiser Permanente) – p. 217-220

118. Lent, Tom (Environmental Analyst) – p. 220-223
119. Makus, Eli (Children Now) – p. 223-225
120. Pung, Steve (Columbia Forest Products) – p. 225-226
121. Bradway, Dennis (Mannington) – p. 226-230
122. Schutfort, Erwin (Professional Services Industries, Inc.) – p. 230-233

(1) Page numbers taken from transcript at:
http://www.arb.ca.gov/board/mt/2007/mt042607.txt
(Accessed: 08 February 2008)

Written Comments Submitted During the 15-Day Comment Period –
31 January - 15 February 2008

1. Davis, Charles - 03 February 2008 (Regal Air Quality Inc.)
2. Pardy, Linda - 05 February 2008 (No Affiliation)
3. Anderson, Michael - 12 February 2008 (Eastman Kodak Company)
4. Hard af Segerstad, Krister - 13 February 2008 (IKEA NA Services, LLC)
5. Pitts, Eddie - 14 February 2008 (Bernhardt)
6. Lantman, Chris - 14 February 2008 (SRI International)
7. Perdue, Bill - 14 February 2008 (American Home Furnishings Alliance)
8. Titus, Dick – 14 February 2008 (Kitchen Cabinet Manufacturers Assn.)
9. Earnshaw, Scott – 14 February 2008 (Hexion, New Zealand)
10. Mann, Timothy – 15 February 2008 (IBM)
11. Zimmerman, Michael – 15 February 2008 (Sauder Woodworking Co.)
12. Fernandez, Sebastian – 15 February 2008 (Arauco)
13. Morgan, Suzanne – 15 February 2008 (International Wood Products Assn)
14. Julia, Thomas – 15 February 2008 (Composite Panel Assn.)
15. Wald, Matt – 15 February 2008 (Recreational Vehicle Industry Assn.)
16. Harmon, David – 15 February 2008 (Hexion, Inc.)
17. Rabe, Jim – 15 February 2008 (Masonite Corp.)
18. Macedo, Sarah – 15 February 2008 (Formaldehyde Council, Inc.)
19. Miller, Brad – 15 February 2008 (Business & Institutional Furniture Manufacturers Assn.)
20. Bradway, Dennis – 15 February 2008 (Mannington Mills)
21. Cleet, Chris – 15 February 2008 (Information Technology Industry Council)
22. Howlett, Kip – 15 February 2008 (Hardwood Plywood & Veneer Assn.)
23. Hodgson, Alfred – 15 February 2008 (Berkeley Analytical Associates)
24. Dennis, Patrick – 15 February 2008 (Gibson, Dunn, and Crutcher)
25. Clark, Randy – 15 February 2008 (Jeld-Wen, Inc.)

B. Abbreviations Used in the Comments and Agency Responses

AB	(California) Assembly Bill
ACH	Air Changes Per Hour
ACS	American Cancer Society
ADH	Alcohol Dehydrogenase
AHFA	American Home Furnishings Alliance
ANSI	American National Standards Institute
AOEC	Association of Occupational and Environmental Clinics
APA	The Engineered Wood Association
ARB	(California) Air Resources Board
ASTM	American Society for Testing and Materials
ATCM	Airborne Toxic Control Measure
ATSDR	Agency for Toxic Substances and Disease Registry
AuWPA	Australian Wood Panels Association
AWFS	Association of Woodworking & Furnishings Suppliers
BACT	Best Available Control Technology
BBDR	Biologically Based Dose-response (model)
BfR	(German) Federal Institute for Risk Assessment
BERG	Building Ecology Research Group
BIFMA	Business & Institutional Furniture Manufacturers Assoc.
BMD	Benchmark Dose
Boise	Boise Wood Products
Build It Green	Build It Green
^{14}C	(Radioactive) Carbon-14
CalAg	CalAg MDF
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CBIA	California Building Industry Association
CC	(Hardwood Plywood) Composite Core
CCA	Coalition for Clean Air
Children Now	Children Now
CDC	Centers for Disease Control
CDMDP	CEM Décor Papers
CEGL	Continuous Exposure Guidance Level
CFR	(or C.F.R.) Code of Federal Regulations
CHPS	Collaborative for High Performance Schools
CI	Confidence Interval
CICAD	Concise International Chemical Assessment Document
CIIT	Chemical Industries Institute of Toxicology
CO	Carbon Monoxide
CoLA	City of Los Angeles
Columbia	Columbia Forest Products
CPA	Composite Panel Association

cREL	Chronic Reference Exposure Level
CSF	Cancer Slope Factor
CWIC	California Wood Industries Coalition
DASMA	Door & Access System Manufacturers Association
days/week	Days per week
Darlington	Darlington Veneer Co.
DNA	Deoxyribonucleic Acid(s)
DNPH	Dinitrophenylhydrazine
DPX	DNA-protein crosslinks
E1	(European) E1 (Formaldehyde Emission Standard)
E 1333	ASTM E 1333 (Emission Test Procedure)
ECBI	European Chemicals Bureau (report)
e.g.	exempli gratia (for example)
EPA	(U.S.) Environmental Protection Agency
ES	Executive Summary
et al.	et alii (and others)
ETS	Environmental Tobacco Smoke
EU	European Union
EWPAA	Engineered Wood Products Association of Australasia
F☆☆☆☆	(Japanese) F☆☆☆☆ (Formaldehyde Emission Standard)
FCI	Formaldehyde Council, Inc.
FETEG	Formaldehyde Epidemiology, Toxicology and Environmental Group
FEV_1	Forced Expiratory Volume in 1-second
FFC	Formaldehyde-free Coalition
FloPly	Florida Plywoods, Inc.
FRIM	Forest Research Institute of Malaysia
FSC	Forest Stewardship Council
ft^2/ft^3	Square Feet per Cubic Foot
FVC	Forced Vital Capacity
GC-MS	Gas Chromatography-Mass Spectrometry
g/L	Grams per liter
GP	Georgia-Pacific Chemicals, LLC
Great Lakes	Great Lakes MDF
GVM	General Veneer Manufacturing Co.
^3H	(Radioactive) Tritium
H_2S	Hydrogen Sulfide
Hambro	Hambro Forest Products
HBMVR	Hanson Bridgett Marcus Vlahos & Rudy
HBN	Healthy Building Network

HCHO	Formaldehyde
Hercules	Hercules Inc.
Hexion	Hexion Specialty Chemicals, Inc.
HooperWolfe	HooperWolfe
HPVA	Hardwood Plywood & Veneer Association
hr/day	Hours per day
HUD	U.S. Dept. of Housing and Urban Development
HWPW	Hardwood Plywood
HWPW-VC	Hardwood Plywood-Veneer Core
IARC	International Agency for Research on Cancer
IBM	International Business Machines Corp.
i.e.	id est (that is)
IgE	Immunoglobulin E
INRS	Institut National de Recherche et de Securite
IPCS	International Programme on Chemical Safety
IPMG	IPMG, Inc.
IRIS	Integrated Risk Information System
IRRST	Institute of Research Robert-Sauve en santé et en securite du travail
ISOR	Initial Statement of Reasons
ITI	Information Technology Industry Council
IWPA	International Wood Products Association
Jeld-Wen	Jeld-Wen
Kaiser	Kaiser Permanente
KCMA	Kitchen Cabinet Manufacturers Association
kg	Kilogram
LEED	Leadership in Energy and Environmental Design
LLC	Limited Liability Corporation
m	Meter
MACT	Maximum Achievable Control Technology
Mannington	Mannington
MD	(State of) Maryland
MDI	Methylene Diisocyanate
MDF	Medium Density Fiberboard
mg/kg	Milligrams per kilogram
mg/m^3	Milligrams per cubic meter
ml/m^3	Milliliters per cubic meter
Mn	Manganese
MOA	Mode of Action
MUF	Melamine Urea-formaldehyde (resin)

NA	No Affiliation (provided)
NAC	National Advisory Committee
NAF	No-added Formaldehyde (resin)
NCI	National Cancer Institute
Neil Kelly	Neil Kelly Cabinets
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NIH	National Institutes of Health
NIOSH	National Institute for Occupational Safety and Health
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
Norbord	Norbord Industries
NPC	Nasopharyngeal Cancer
NRC	National Research Council
NTP	National Toxicology Program
NZE	Near-zero Emissions
OAQPS	(USEPA) Office of Air Quality Planning and Standards
OAR	(USEPA) Office of Air and Radiation
OECD	Organisation for Economic Co-operation and Development
OEHHA	Office of Environmental Health Hazard Assessment
OEM	Original Equipment Manufacturer
OR	Odds Ratio
OSU	Oregon State University
PB	Particleboard
PDMG	Plywood & Door Manufacturers Group
PEC	Priority Existing Chemical
PEF	Peak Expiratory Flow
PF	Phenol-formaldehyde (resin)
PLS	Plywood Lumber & Sales
Plum Creek	Plum Creek MDF
ppb	Parts per billion
ppm	Parts per million
PSI	Professional Services Industries, Inc.
p-trend	p-trend (statistic)
PVA	Polyvinylacetate (resin)
RAST	Radioallergosorbent Test
ref.	Reference
Regal AQ	Regal Air Quality, Inc.
REL	(or RELs) Reference Exposure Level
Rexcel	Rexcel Particleboard
RNA	Ribonucleic Acid(s)
Roseburg	Roseburg Forest Products
RR	Relative Risk

SB	(California) Senate Bill
S&F	Smith & Fong Co.
Sauder	Sauder Woodworking Co.
SeeMac	SeeMac
Setzer	Setzer
SIDS	Screening Information Data Set
SierraPine	SierraPine Composite Solutions
SMR	Standardized Mortality Ratio
SRA	Society for Risk Analysis
SRP	Scientific Review Panel for Toxic Air Contaminants
TAC	(or TACs) Toxic Air Contaminant(s)
Temple Inland	Temple Inland
Timber	Timber Products
TWA	Time-weighted Average
UF	Urea-formaldehyde (resin)
Uniboard	Uniboard, Inc.
URE	(Cancer) Unit Risk Estimate
URF	(Cancer) Unit Risk Factor
U.S.	(or US) United States (of America)
USA	United States of America
USB	United Soybean Board
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
VC	(Hardwood Plywood) Veneer Core
Veneer	Veneer Products, Inc.
VOC	Volatile Organic Compound(s)
vs.	Versus
WHO	World Health Organization
WMMPA	Wood Molding & Millwork Products Association
WWI	Woodwork Institute
x	Multiplied by
x 10^{-5}	Multiplied by 0.00001
x 10^{-6}	Multiplied by 0.000001
x 10^{-7}	Multiplied by 0.0000001
x 10^{-8}	Multiplied by 0.00000001
x 10^{-9}	Multiplied by 0.000000001
µg	Microgram(s)
µg/g	Micrograms per gram
µg/kg	Micrograms per kilogram
µg/m^3	Micrograms per cubic meter

µM	Micromolarity
>	Greater Than
≥	Greater Than or Equal To
<	Less Than
=	Equal(s)
’	Feet or Foot (e.g., 4’)
”	Inch(es) (e.g., ½”)
$	U.S. Dollar
%	Percent
&	And

C. Comments and Agency Responses: 45-day Comment Period

DRAFT REGULATION

APPLICABLE PRODUCTS and EXEMPTIONS

1) Comment [3-Hetzel-070404-DASMA]: "… we ask that garage doors be specifically excluded from the proposed regulation. … garage doors are typically made with a variety of materials intended to meet exterior element resistance needs. These materials, also utilized in siding, soffits, and fascia boards, are typically low emitters of formaldehyde."

   Agency Response [3-Hetzel-070404-DASMA]: We agree. An exemption has been added for exterior doors and garage doors (see section 93120.7(b)(2)).

2) Comment [5-Rink-070413-Jeld-Wen]: Modify the exemption for windows and garage doors.

   Agency Response [5-Rink-070413-Jeld-Wen]: We agree. Exemptions have been provided for windows and exterior doors (see sections 93120.7(b)(1) and 93120.7(b)(2)).

3) Comment [7-Landry-070416-CWIC]: Section 93120(d) – Applicability. We believe the wording of this new section for products destined out-of-state presents some unintended consequences: "This ATCM does not apply to plywood, PB, MDF, and finished goods made from these materials, that are manufactured, sold, offered for sale, or supplied for shipment and use outside of California." (emphasis added). It is not clear that the clause "for shipment and use" applies to all of the antecedents. Read literally, this exempts all covered products manufactured outside of the state. See also Section 93120.2(b)(1) which has similar language exempting products from the emission requirements.

   Agency Response [7-Landry-070416-CWIC]: We disagree. As written, the ATCM does not apply to plywood, PB, MDF, and finished goods made from these materials, that are manufactured for shipment and use outside of California. In comparison, the language in Section 93120.2 (b)(1) reads: "The emission standards in section 93120.2(a) do not apply to composite wood products or finished goods containing these materials that are manufactured, sold, offered for sale, or supplied for shipment and use outside of California." We believe that both sections convey the same point – that goods manufactured for shipment and use outside of California are not subject to the requirements of the ATCM.

4) Comment [7-Landry-070416-CWIC] [14-Titus-070419-KCMA]: Section 93120.1(a) – Definition of "Fabricator." We submit that school districts and local government agencies should not be exempted from the "fabricator" definition.

Agency Response [7-Landry-070416-CWIC] [14-Titus-070419-KCMA]: We agree that the point made by the commenter is appropriate and modified the "fabricator" definition. In addition, pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, the State is required to reimburse school districts for costs imposed by state mandates. Other than incremental costs incurred from the use compliant materials, we anticipate that school district costs may increase due to our recordkeeping and labeling requirements. Therefore, we modified section 93120.7 to exempt school districts from the recordkeeping and labeling requirements, unless finished goods are being sold, offered for sale, or manufactured for sale in California. School districts will still be subject to the emission standard-related requirements for composite wood product panels and finished goods containing those materials.

5) Comment [7-Landry-070416-CWIC]: Section 93120.2(b)(2) – the HUD exemption. We have pointed out in several previous submissions that under the current wording of the proposed regulation, a manufacturer of mobile home decking not meeting the CARB emission requirements would be in violation when the product was offered for sale or sold in the state. The CARB exemption only applies when the product is installed in the manufactured home. This regulation is preempted by federal law with respect to this application.

The following is our earlier commentary on this subject: "It is undeniable that the regulation of formaldehyde emissions from materials used in manufactured homes is preempted by federal occupation of the area [42 U.S.C. section 5403(d). The federal occupation of this regulatory area by HUD is comprehensive and relates to all regulatory provisions, not just emission standards.] The draft includes a suggestion from Columbia Forest Products and the Formaldehyde-free Coalition that the HUD exemption for composite wood products used in manufactured homes be limited to materials "… when installed in manufactured homes…" Although the language may have been derived from the HUD regulation itself, it does not work in the ARB regulation. One must remember that HUD regulates manufactured homes, and therefore its regulation addresses components, as and when installed. In California, the ATCM would apply to manufacturers of composite wood products who would be selling their products to manufactured home producers prior to inclusion of the products in the structures. Under the current draft, these manufacturers would be in violation when non-ARB complying product was manufactured, offered for sale and sold within the state."

We suggest the following language for the statutorily required HUD exemption: “The regulatory provisions in this ATCM do not apply to composite wood products [panels] intended for use in and sold or offered for sale for incorporation in manufactured homes subject to regulations of the federal Department of Housing and Urban Development (24 C.F.R. section 3280.308).”

Agency Response [7-Landry-070416-CWIC]: We agree that points raised by the commenter are appropriate. The language in the previous draft regulation was modified to make it clear that for the stated application – producing manufactured homes, HUD-compliant HWPW and PB may be used.

6) Comment [9-Haikala-070416-PDMG]: “… Reading the regulation, it would appear that hardwood plywood panels used in formwork would be regulated but that softwood plywood panels would not be. This would create an uneven playing field without improving public health. I hope that all panel products would fall under the regulation, if adopted.”

Agency Response [9-Haikala-070416-PDMG]: We disagree -- it would not create an uneven playing field. Based on our survey and the emission test data presented on page 18 of the ISOR, due to the use of PF resins, the resultant HCHO emissions from softwood plywood are much lower than for HWPW, PB, and MDF, which are typically made with UF resins. We did not feel that it was necessary to set new emission standards for products currently being made with low-emitting resins. Those products will continue to be low-emitting and setting new standards would not provide significant additional benefits.

7) Comment [16-Overgard-070419-HPVA]: “The architectural plywood exemption is the wrong approach to exempt small business. Our preference would be for a small business exemption based on production. Accordingly, HPVA would recommend a small business exemption set at ≤ 500,000 ft^2 per month.”

Agency Response [16-Overgard-070419-HPVA]: In the revised regulation, the definition of architectural plywood has been deleted, and replaced by a broader concept referred to as manufacturers of “laminated products,” who are considered to be fabricators and subject to the requirements in section 93120.7. Using this approach, the platform materials would have to comply with the ATCM, but manufacturers of laminated products would not be required to have third party certification. Under the HPVA recommendation, the public could be exposed to very high levels of formaldehyde because HPVA proposed a full exemption for small manufacturers.

8) Comment [42-Gustafson-070424-WWI]: "… under the proposed changes, composite wood products would potentially not comply with the current requirements for seismic fabrication…"

Agency Response [42-Gustafson-070424-WWI]: We disagree. Information contained on pages 73-82 of the ISOR indicates that panel products meeting the lower HCHO emission levels will continue to meet the current requirements for seismic fabrication.

9) Comment [74-Bradley-070426-GVM]: "Consider the direct economic impact in California of restricting aircraft-grade plywood sales based on HCHO emissions. Most of the aircraft-grade plywood is used in cargo holds. The planes we sell plywood for cannot be legally flown unless all the parts on them are delivered certified to federal standards. An extensive bureaucracy and reams of paperwork support this, along with decades of specifications and regulatory framework. General Veneer Manufacturing Co. recently has sold plywood to Boeing in Long Beach (the former McDonnell Douglas) for use in an on-going C-130 retrofit program. This program amounts to millions of dollars and hundreds of jobs in Long Beach. The retrofit could equally be done by other companies and/or in other locations, but Boeing brought these jobs here to Southern California. If the wood for the cargo decks (one element of an extensive retrofit) cannot be bought and installed in Long Beach, it makes more sense to send the planes elsewhere for the retrofit, and the jobs with them."

Agency Response [74-Bradley-070426-GVM]: We agree the point raised by the commenter are appropriate and have provided an exemption for composite wood products used in aircraft.

10) Comment [74-Bradley-070426-GVM]: "By comparison to the amount of wood stocked in a single Home Depot, the amount of wood going into these huge cargo planes is tiny. If the wood is not delivered to be installed in California, California's benefit, in terms of reduced HCHO emissions, is miniscule. But the cost of dozens of jobs, months of labor, and long-term program viability, adds up very quickly and has a direct and wide-reaching impact on Long Beach, Lakewood, and surrounding areas. I encourage your staff to eliminate all transport plywood from the ATCM."

Agency Response [74-Bradley-070426-GVM]: We agree that the point raised by the commenter is appropriate and have provided an exemption for wood products used in transport vehicles.

11) Comment [99-Watson-070426-NA]: "Another part of this that was interesting was the HUD standard, the mobile home and RV standard,

which as I understand it is the only U.S. standard on the emissions of HCHO, it's exempted from the CARB regulation or proposal. And that says to me we've already got a functioning standard. But all you folks are in a difficult position, because of this noble pursuit. I support the idea of trying to limit the HCHO emissions. But I'd like us to do it in a fashion that makes sense. If HUD is exempt, that means it's good enough, apparently."

Agency Response [99-Watson-070426-NA]: The only reason that the HUD emission standards are upheld for manufactured homes is because state law cannot preempt federal law. It is not an endorsement of the HUD standard nor an affirmation of its safety. The HUD standard is less stringent than existing standards in other countries. Technology is available to manufacture composite wood products to lower emission standards than the HUD standard (see pages 101 to 107 of the ISOR). For clarification, the HUD standard does not apply to recreational vehicles. Recreational vehicles are subject to the ATCM.

DEFINITIONS

12) Comment [5-Rink-070413-Jeld-Wen]: Reinstate the definition for "hardboard."

Agency Response [5-Rink-070413-Jeld-Wen]: We agree that the point raised by the commenter is appropriate and have included it in the revised regulation (see section 93120.1(a).

13) Comment [5-Rink-070413-Jeld-Wen]: Clarify the definition for "no-added formaldehyde resins."

Agency Response [5-Rink-070413-Jeld-Wen]: We agree that the point raised by the commenter is appropriate and have included it in the revised regulation (see section 93120.1(a)).

14) Comment [7-Landry-070416-CWIC]: Section 93120.1(a) – Definition of composite wood products – softwood plywood. Changes have been made from previous drafts to indicate that "structural plywood, structural panels, structural composite lumber…" are not included. CARB staff indicated that they could not reference to the new PS-1 standard, since they did not have a copy of the new version. Inclusion of the reference to the product standards for exempted products would add clarity.

Agency Response [7-Landry-070416-CWIC]: We agree that the point raised by the commenter is appropriate and have amended the definition for composite wood products to read: "… Composite wood products" does

not include … Structural Plywood (PS 1-07)…" We have also included "PS 1-07. Voluntary Product Standard – Structural Plywood. National Institute of Standards and Technology, 2007," as a reference in section 93120.10.

15) Comment [7-Landry-070416-CWIC]: Section 93120.1(a) – Definition of "hardwood plywood." This section defines the product as "… a composite wood product, panel, or other building material …" [Note the first comma separation.] CARB removed the previous reference to structural building material and also deleted "molding," but problems remain. There are now three separate and distinct approaches to this language in the definitions for HWPW, MDF ("… a composite wood product, panel, molding, or other building material…") and PB ("… a composite wood product panel, molding, or other building material…") [Note, no comma between product and panel.]. We recommend that there be a consistent and straightforward language for all three products: "… means a composite wood panel composed of …"

If "composite wood product" stands alone, separated by a comma from "panel," it literally suggests that any composite product made of veneers, etc. is covered. Similarly, any "other building material" made of veneers would similarly be within the definition. This concept is directly at odds with the definition of "finished goods" in section 93120.1(a) – "any good or product, other than a panel, containing HWPW, PB, or MDF." "Composite wood product" and "other building materials" would fit under both the product definition and finished good definition.

Agency Response [7-Landry-070416-CWIC]: We agree that points raised by the commenter are appropriate and that there should be consistent and straightforward language for all three products. The present definition of HWPW specifies what a HWPW panel is when it is manufactured at a certified plywood plant. Unless the panel, as defined, is modified, it is a panel and not a finished good. The revised regulation includes consistent and straightforward language for all three products.

16) Comment [7-Landry-070416-CWIC]: Section 93120.1(a) – definition of "medium density fiberboard" and "particleboard." In the current draft, the word "molding" was removed from the definition of HWPW, but not from the definitions of MDF or PB. The reference for MDF should be to the new standard -- ANSI A208.2-2002. This change should also be made in the References in section 93120.10.

Agency Response [7-Landry-070416-CWIC]: We agree that points raised by the commenter are appropriate, and have deleted the reference to moldings within the definition of MDF and PB. To help assess the issue of molding, staff consulted with the Composite Panel Association and the

Hardwood Plywood and Veneer Association and upon investigation by staff, it appeared as though MDF molding was mainly produced from cutting and shaping of MDF panels. Moldings are finished goods that should be fabricated for the California market from compliant MDF panels. In addition, the reference to ANSI A208.2 was updated to 2002 as suggested.

17) Comment [36-Perdue-070424-AHFA]: "Since we are introducing a new term in the suggested language, it will be necessary to define "component part" and include that definition in 93120.1 (Definitions). Component part … a manufactured part that could have in its construction one or more composite wood products used in the assembly of finished goods."

Agency Response [36-Perdue-070424-AHFA]: We agree that the point raised suggested by the commenter is appropriate and have included a similar definition in the 26 April 2007 version of the draft regulation (see section 93120.1(a)).

18) Comment [38-Morgan-070424-IWPA]: "Section 93120.1(a)(17) We would ask for a clearer, more inclusive definition of vehicles as reference in this paragraph which defines "hardwood plywood"…"

Agency Response [38-Morgan-070424-IWPA]: We agree that the point raised by the commenter is appropriate. More clarity is provided in section 93120.1(a) of the 26 April 2007 draft regulation order in the "composite wood products" definition.

19) Comment [74-Bradley-070426-GVM]: "Architectural plywood means a custom-made finished product … "Finished," in woodworking, has a specific meaning. It means something has had a finish applied to it. I would recommend removing that word from this definition to make the intent clear. I think the operative words in this definition are "custom-made" and "special-order" and "to be used as produced." I understand that within the context of the regulation "finished" means something else, but it might be confusing here."

Agency Response [74-Bradley-070426-GVM]: We agree that the point made by the commenter is appropriate. In addressing the issue of "architectural plywood", it became evident to staff that this definition had a broader implication. Initially, the concern was over the production of decorative flat panels that resemble hardwood plywood, but are always sold as finished goods, such as aesthetic panels used inside elevators, hotel lobbies and libraries. Upon investigation by staff, it was apparent that these products are not only architectural plywood, but also would include any fabricated product that is made from a composite wood

product and is laminated with a veneer, such as furniture and cabinetry components.

Thus, staff concluded that the most practical approach for these products is to group them all into one reference related to "laminated products." The reference to architectural plywood has been deleted, and replaced by "laminated products," which are finished goods that are produced by fabricators and do not require third party certification. However, if a fabricator buys composite wood products to be used as a platform for the laminated products, then those composite wood products need to be third party certified by the manufacturer.

20) Comment [74-Bradley-070426-GVM]: "… to be used as produced. Everything, in one way or another, is meant to be used as produced. I think what's intended here is "… on a special order basis intended to be installed or assembled on site with minor modifications from the form in which the fabricator delivers it." In other words, our customer will probably apply a finish to our product; they're likely to drill for hinges and knobs (if it's a door), cut holes for switch plates (if it's a wall panel), and so on. In the case of a custom cabinet shop, they're likely to deliver the panels in finished sizes, with edge-banding and so on, but not assembled. Someone on site will have to add hinges, handles, drawer tacks, etc. It's surprisingly common, when a contractor receives a door that was built to a specific size, for him to find he needs to trim it a bit before it fits the opening it's intended for. So this gives us latitude for reasonable changes. I'm switching "produced" to "delivered," because when we (or most custom cabinet shops) press a panel, it's oversize – as a fabricator, we're not sure whether that's considered the "produced" product, or whether it's considered "produced" after we trim it to size, or after we sand it, or if it needs to be finished with hardware attached … so "delivered" clarifies the form we're talking about. This wording, I think, will better match common practice in the industry. And I don't think it changes the meaning intended."

Agency Response [74-Bradley-070426-GVM]: In the revised regulation, the definition of architectural plywood has been deleted, and replaced by a broader concept referred to as "laminated products." Laminated products are made by fabricators and subject to the requirements in section 93120.7.

21) Comment [74-Bradley-070426-GVM]: "Composite wood products … or composite wood products used inside of vehicles. I'd tweak this a bit. Best bet: "used in transportation." In other words, not in buildings. If that's too broad, I'd consider "used inside of vehicles, boats, or aircraft." At General Veneer Manufacturing Co. we're specifically concerned with aircraft, but someone pointed out that boats are another hot topic with lots

of rules and specifications already operating. I'm not sure my second suggestion would cover train cars, but I think you'd want it too. Train cars typically are governed by federal rules because they're part of interstate commerce. And yes, they've been known to use plywood, sometimes rather nice stuff."

Agency Response [74-Bradley-070426-GVM]: We agree that the point made by the commenter is appropriate and modified the definition of "composite wood products" accordingly.

22) Comment [74-Bradley-070426-GVM]: "Hardwood plywood … or military specified plywood (MIL-P-6070). I'd add "et al." because there are too many archaic military plywood specifications to include them all. Annual usage is de minimis, but frequently one 24" x 48" piece of plywood built to a certain specification is essential to operating a plane legally and safely. I feel confident that HCHO out-gassing from a piece that size is not enough to create a public health crisis. Examples of some other specifications that might get called out: Our company has recently quoted customers pricing on MIL-DTL-6070C, and we've sold parts to that spec within the last year. There also are Lockheed specs that are generally derived from MIL-P-6070 and used in military transports. We've recently quoted pricing for LAC27-903, which I believe gets used in the same C-130s that flew rescue missions to Indonesia after the tsunami (actually, it's probably worth calling out MIL-DTL-6070 and LAC27-903 specifically, not just lumping them into "et al."). Late last year we quoted PS-1-83 – an unusual one. No matter how hard we try to come up with all the military specs, we'll miss a few. So I'd add "MIL-DTL-6070, LAC27-903, et al." and then you're covered for military specified plywood. I think that still meets your intent."

Agency Response [74-Bradley-070426-GVM]: We agree that the point made by the commenter is appropriate and modified the definition of "composite wood products" to exempt military specified plywood.

23) Comment [121-Bradway-070426-Mannington]: "And finally, in terms of section 93120.1, the definition number 20, what we would suggest is or ask for clarification is that it includes flooring. And what we're thinking and our position is that finished product flooring really puts us more into the category of a fabricator, not in terms of a manufacturer of composite products. And really would ask for that clarification. And the only thing that would be required would be to simply remove that one word, flooring, out of that definition and then it would basically describe hardwood plywood."

Agency Response [121-Bradway-070426-Mannington]: The definition of hardwood plywood has been revised to state that it includes "hardwood

plywood' panels used in making flooring." If flooring is made as a laminated product, it would need to be made using compliant platforms (e.g., PB).

REGULATORY AUTHORITY

24) Comment [10-Higgins-070416-FFC]: "Does CARB have the necessary authority to implement the proposed reforms with the improvements suggested by the Coalition? Yes, and we would argue the obligation as well."

Agency Response [10-Higgins-070416-FFC]: We agree that the point made by the commenter is appropriate and that ARB has the authority to adopt the ATCM. The basis of CARB's regulatory authority is explained in detail in Chapter I of ISOR, pages 1-5.

25) Comment [42-Gustafson-070424-WWI]: "I was surprised to hear Ms. Catherine Witherspoon agree with me (on February 5, 2007) that the proposed ATCM standard may be outside of CARB's legal authority to enforce… How can CARB compromise an entire industry based on a whim?"

Agency Response [42-Gustafson-070424-WWI]: Catherine Witherspoon was the Board's Executive Officer during the development of the ATCM and when the ATCM was brought before the Board in April 2007. While we are not sure what statements the commenter is referring to, Catherine Witherspoon does not agree with the commenter, and does believe that ARB has the authority to adopt and enforce the ATCM.

26) Comment [53-Cassman-070425-HBMVR]: "After a comprehensive review of the record, we easily conclude that the Board's adoption of this ATCM, if it chooses to do so, will rest on solid legal authority."

Agency Response [53-Cassman-070425-HBMVR]: We agree.

27) Comment [60-Cassman-070426-HBMVR]: "In short, the statutory authority for the Board to adopt the proposed regulations is clear and unequivocal. Indeed, we are convinced that the Tanner Act directs and requires this Board to adopt the recommendation before it or adopt even more stringent regulations, given the factual predicates in the record."

Agency Response [60-Cassman-070426-HBMVR]: We agree that CARB has clear legal authority to adopt the ATCM.

28) Comment [74-Bradley-070426-GVM]: "I still have grave concerns about the effect of the rule on the industry we work in, and I have my doubts about the legitimacy of the rule based on indoor/outdoor air issues and the fundamental medical justification for the rule."

Agency Response [74-Bradley-070426-GVM]: The medical justification for this ATCM is contained in Chapter VII of the ISOR and in the responses to the comments in the subsection on Public Health. Regarding "legitimacy," the authority of ARB to adopt the ATCM is explained in Chapter I of the ISOR.

29) Comment [107-Cassman-070426-HBMVR]: "In short, statutory authority for this Board to adopt the proposed regulations is clear and unequivocal. Indeed, it is our opinion and we are convinced that the Tanner Act directs and requires this Board to adopt the recommendation that is before it or to adopt even more stringent regulations given the factual predicates in this record…"

Agency Response [107-Cassman-070426-HBMVR]: We agree and believe that our ATCM is consistent with the intent of the Tanner Act.

SELL-THROUGH PROVISIONS

30) Comment [7-Landry-070416-CWIC]: Appendix 1 – Sell-through for importers. There is substantial discontinuity of sell through time for importers, which if implemented, would lead to a tremendous dumping of non-complying products at a time when domestic products must meet the new standards. This is an extraordinarily important issue that must be addressed. The sell through periods set forth in the rule as drafted are as follows:

Affected Party	Proposed Rule	CWIC Proposal[1]
(a) Manufacturers of panels	1 month	3 months
(b)(1) Distributors of panels	5 months	
(b)(2) Distributors of finished goods	18 months	
(c)(1) Importers of panels	5 months	3 months
(c)(2) Importers of finished goods	18 months	18 months
(d) Fabricators of finished goods	12 months	18 months
(e)(1) Retailers of panels	12 months	
(e)(2) Retailers or finished goods	18 months	

(1) See comment on "sell through timing."

There are two fundamental problems with this schedule. Imported panels, not meeting the standard will be able to be sold in the market for four months after the domestic panels have to be in compliance. Compare (a)

with (c)(1). By any measure the cost of complying with this rule will be huge. The retention of this advantage for imports will lead to an even greater cost advantage than what is currently enjoyed by foreign producers. It will lead to a flooding of the market with non-complying panels for this grace period. It must be changed.

The second discontinuity relates to finished goods. American furniture and cabinet makers will be forced to use higher priced complying panels within 12 months of the respective deadlines. Their Chinese and other foreign competitors will have an extra six months – a full 18 months after the deadlines to continue to use non-complying components in their products. The impact of this provision would be devastating. A surge of dumped goods would be inevitable. The provision must be changed.

Agency Response [7-Landry-070416-CWIC]: We agree that the points made by the commenter are appropriate. The sell-through periods have been modified and we have made the changes requested by the commenter.

31) Comment [7-Landry-070416-CWIC] [16-Overgard-070419-HPVA] [24-Landry-070423-CWIC] [25-Hubbard-070423-Darlington] [46-Gonyea-070424-Timber]: Appendix 1 – Sell-through timing. Although clearly the equivalency of treatment of domestic and foreign interests is of most importance, some modifications of the sell-through periods are recommended. First, given the multiplicity of SKU's for many composite wood products, we suggest that a 90-day sell through be permitted for both manufacturers and importers of these items. Similarly, we suggest that fabricators and importers of finished goods be allowed to sell inventory for 18 months. The multiplicity of styles, finishes, and designs is even more notable in this industry sector.

Agency Response [7-Landry-070416-CWIC] [16-Overgard-070419-HPVA] [24-Landry-070423-CWIC] [25-Hubbard-070423-Darlington] [46-Gonyea-070424-Timber]: We agree that the points made by the commenter are appropriate and have made changes reflecting the requested modifications.

32) Comment [14-Titus-070419-KCMA] [36-Perdue-070424-AHFA]: "Finally, the sell-through provisions in the ATCM require U.S. fabricators of cabinets to be in compliance within 12 months while importers are granted 18 months to come into compliance. This is very unfair to U.S. manufacturers and should be changed. This provision alone could force many U.S. companies out of business."

Agency Response [14-Titus-070419-KCMA]: We agree that the point made by the commenter is appropriate. The sell-through provisions, as

also recommended by CWIC [7-Landry-070416-CWIC], are now the same for both U.S. fabricators and importers of finished goods – 18 months.

33) Comment [38-Morgan-070424-IWPA]: "Section 93120.12(c) – Sell through dates that apply to importers of HWPW, PB, and MDF … we believe the proposed regulation should extend the sell-through period for importers from the proposed 5 months to a minimum of 12 months for the following reasons…"

Agency Response [38-Morgan-070424-IWPA]: We disagree. The rulemaking does not take effect until 2009; we believe that this is sufficient time for the importers to prepare for compliance.

34) Comment [38-Morgan-070424-IWPA]: "Importers purchase goods on speculation … importers can be stuck with a large inventory of slow-moving product, many times having to carry inventory in select items for a year or longer… twelve months is the minimum sell-through that should be allowed…"

Agency Response [38-Morgan-070424-IWPA]: We disagree. We believe a three month sell-through period for panels and an 18 month sell-through period for finished goods is sufficient. We cannot afford to delay the requirement as it is important to introduce the use of lower emitting products into California at the earliest practicable date. Moreover, importers will still be able to sell those products to customers outside of California.

35) Comment [42-Gustafson-070424-WWI]: "… How can anyone think it is acceptable to allow California woodworkers only 30 days to comply with this measure, while foreign business gets 18 months to comply?"

Agency Response [42-Gustafson-070424-WWI]: We disagree – the stated comparison is inaccurate. The comment compares the sell-through periods for manufacturers of panels and for imported finished goods. Panel manufacturers, domestic and foreign, would have 90-days to sell their inventories of non-compliant products. At the retail level, retailers would have 18-months to sell their inventories of non-compliant finished goods made by either domestic or foreign fabricators.

36) Comment [42-Gustafson-070424-WWI]: "… there is no "grandfather clause" to protect the businesses that will have millions of dollars in current product inventory…"

Agency Response [42-Gustafson-070424-WWI]: We have addressed this concern by including sell-through provisions that allow sufficient time for

businesses to clear their inventories. In addition, the first of the Phase 1 standards do not take effect until January 2009.

37) Comment [46-Gonyea-070424-Timber]: "In addition, we believe that the sell through dates for importers and domestic manufacturers of panels should be exactly the same…"

Agency Response [46-Gonyea-070424-Timber]: We agree the point raised by the commenter is appropriate. The ATCM was modified to reflect this change.

38) Comment [74-Bradley-070426-GVM]: "Appendix 1. Sell-through Dates… I'm going to let the Woodwork Institute tackle this; they've been doing the research and I think have recently sent you folks some data. I'd make an observation: the back stock of particleboard that we have on our floor, if it's 45 days old, might still be emitting more HCHO than this regulation calls for. But material we've had in stock for 5 years, or 15 years (this is real stuff I'm talking about, not hypothetical), should have breathed out several half-lives of HCHO long ago, according to the charts in ARB's presentation, so it should be safe to use again, even if it wasn't produced under this regulation. I'd ask you to bear in mind as you work through the question of sell-through dates. I'm aware that your intent is to prevent people from stockpiling particleboard in advance of the regulation's effective date."

Agency Response [74-Bradley-070426-GVM]: We have addressed this concern by including sell-through provisions that allow sufficient time for businesses to clear their inventories. In the case of this commenter, who is also a fabricator, the commenter would have 18-months to clear old stocks, which is a reasonable amount of time. In addition, the first of the Phase 1 standards do not take effect until January 2009.

39) Comment [96-Morgan-070426-IWPA]: "The other concern we have is with the sell-through dates that apply to importers. We believe that they should be extended and not decrease like they have been in the past couple of days to a twelve-month period, not three months. Imported hardwood plywood goes through a series of stages before it reaches the U.S. shores. The order is placed. Material is produced overseas, if not already in inventory. Material is then shipped. And that means there has to be vessels available to be loaded and shipped. Material arrives in the U.S. That could be after four to five weeks in transit, longer if it's delayed or if it's break bulk shipping container. Material is then held at a U.S. port. And in most cases, it's outside of California until it is cleared by the U.S. government which could be one week or longer depending upon the backup… Material will be held at a warehouse and then it will be sent to a distributor. So you have to understand the difference between importers

and domestic manufacturers in this case, because importers do buy on speculation. And we request that the sell-through period be increased to twelve months…"

Agency Response [96-Morgan-070426-IWPA]: We disagree – to provide parity we would have to allow domestic manufacturers the same sell-through which would delay the sale of lower emitting products to the California market and the associated health benefits. Importers are aware of this ATCM. They have had time to plan. We provide sell-through periods for panels and finished goods. Also, the first of the Phase 1 standards do not take effect until January 2009.

FABRICATORS

CHAIN-OF-CUSTODY and LABELING

40) Comment [14-Titus-070419-KCMA]: "… The certification requirements and so-called "paper trail" contained in the ATCM and required through the cabinet manufacturing/distributor chain should provide the necessary information for enforcement and notice purposes."

Agency Response [14-Titus-070419-KCMA]: We disagree – more is needed than what is currently required through the present cabinet manufacturing/distributor chain. We need more information to be able to definitively link products back to manufacturers and emissions data on the materials that were used to fabricate the product. In our view, we must add a sufficient amount of rigor to the enforcement program to ensure that those who attempt to sell non-compliant products can be readily identified and subjected to the appropriate penalties.

41) Comment [14-Titus-070419-KCMA]: "… The proposed ATCM has the potential to disrupt existing supply chain relationships, contribute to possible material shortages in the future, impose a significant paperwork burden on all manufacturers, and greatly increase liability for cabinet manufacturers and their suppliers…"

Agency Response [14-Titus-070419-KCMA]: We do not believe that transitioning from HUD-compliant to Phase 1 and Phase 1 to Phase 2 will pose problems with supply chain relationships. We consulted extensively with industry to develop the detailed sell-through provisions to address this concern. In addition, we are conducting a comprehensive outreach effort, and emphasis is being placed on helping people understand the concept of sell-through. In terms of material shortages, we feel that there is enough lead-time for businesses to clear their inventories of old products. We do not expect the additional paperwork to be significant, as records of

this kind are currently being maintained. The ATCM goes a step further in that verifications of purchases of compliant materials and deliveries to customers will need to be supplied upon request. As the ATCM requires cabinet manufacturers and their suppliers to document their purchases of compliant materials and sales of compliant products to customers that request them, their liability does increase.

42) Comment [14-Titus-070419-KCMA] [36-Perdue-070424-AHFA]: We believe that requiring both product labeling and written notice on contracts or bills-of-lading (93120.7 (d)(1) and (2)) is duplicative and imposes an unnecessary additional paperwork burden, particularly on smaller companies. We suggest that the labeling requirement, with the option to present the required information on the cardboard boxes in which cabinets most often are shipped, is the best alternative."

Agency Response [14-Titus-070419-KCMA] [36-Perdue-070424-AHFA]: We disagree that requiring both product labeling and a written notice on bills-of-lading are duplicative. However, we agree that the option to label the cardboard boxes in which finished goods are shipped is a good alternative and have included it as an option for the labeling requirement.

43) Comment [23-Zimmerman-070423-Sauder]: "Enforcement: … It is common, especially in Asian companies, to employ a network of sub-suppliers each producing certain components that are then assembled into the finished product. Trying to police and certify such a vast network of industry participants does not seem feasible given the test methods and associated costs."

Agency Response [23-Zimmerman-070423-Sauder]: We disagree. Fabricators will need to obtain verification from their suppliers that they are being supplied with compliant products. For example, if we inspect an importer and ask to see a statement of compliance for a product, to verify that compliant materials were used, we would contact the fabricator of the product and ask for statements showing that compliant wood products were used to make the product. If the statements appear questionable, we would contact the third party certifier of the manufacturer that produced the wood products used for the component parts.

44) Comment [36-Perdue-070424-AHFA]: "The AHFA realizes that the details of the chain of custody mechanism have not been detailed and additional work remains to bring clarity. However, we don't want the "straw man" language of (i) to incorrectly become the working language of a possible enforcement protocol. We welcome the opportunity to work with staff to "flesh out" the details of the chain of custody mechanism and recognize the necessity of the "place holder" in the proposed rule… We suggest that this actually become Appendix 4 of the document. This would better

secure it as a “place holder” in the rule and provide a clear home for this important compliance mechanism.”

Agency Response [36-Perdue-070424-AHFA]: After consultation with stakeholders, the ATCM was modified in various areas to require a statement of compliance to ensure traceability of products in commerce that compliments the chain-of-custody process in use today.

45) Comment [36-Perdue-070424-AHFA]: “… Chain-of-custody with a labeling requirement is an adequate approach to prevent “cheating” and ensure compliance… While there are clearly some hurdles to overcome, we believe the playing field is level and the ATCM clearly provides an adequate mechanism to ensure and demonstrate compliance…”

Agency Response [36-Perdue-070424-AHFA]: We agree – no response necessary.

46) Comment [38-Morgan-070424-IWPA]: “Modify chain-of-custody requirement to use existing paperwork. … The bill of lading is already identified in section 93120.6 (c)(2)(B) as an option for product labeling for modified finished goods containing hardwood plywood.”

Agency Response [38-Morgan-070424-IWPA]: We disagree. The current requirements of the ATCM are already based on currently used commercial documentation. Specific requirements for chain-of-custody are a major element of the enforcement program, to help attest that finished products are compliant as they make their way through the commercial chain.

47) Comment [87-Perdue-070426-AHFA]: “We’re also very concerned about the enforcement mechanism within this particular rule. We know that there’s a lot of work that’s been accomplished and progress made during the last four-and-a-half years. There are a lot of unanswered questions and details to work through. As Ms. Berg indicated, we too are very reliant upon the chain-of-custody and feel the chain-of-custody will become one of the most important aspects of this particular enforcement protocol.”

Agency Response [87-Perdue-070426-AHFA]: The ATCM requires statements of compliance to be transferred from point-to-point in the commercial chain to ensure traceability of products, which compliments the existing chain-of-custody process. We believe that this is a crucial element of the enforcement program that is critical to maintaining the integrity of the ATCM.

48) Comment [98-Schroeder-070426-WMMPA]: “Second, procedures on how compliance will be carried out is questionable to us. My membership is

also concerned there is not sufficient staff in place to oversee and enforce the testing and compliance procedures of the proposed regulations of all products coming into California. Our major concern and focus is finished moldings from off-shore manufacturing plants shipped to the California marketplace. We are of the mind that a piece of paper stating compliance is easy to come by in China without a certification process ever taking place."

Agency Response [98-Schroeder-070426-WMMPA]: We appreciate the comment and will conduct a comprehensive enforcement program to identify and penalize unscrupulous manufacturers. We also affirm our commitment to work with industry, and to be proactive in terms of outreach and education about how the rulemaking will be enforced. In addition, samples will be obtained by our inspectors to verify the emissions performance of composite wood products and finished goods.

ECONOMIC IMPACTS

49) Comment [14-Titus-070419-KCMA]: "It appears that the cost estimates both for cabinet manufacturers and home buyer/remodelers have been underestimated by 20% or more… cabinet manufacturers typically are able to achieve approximately 80% efficiency from the composite panel products used to produce the requisite cabinet parts; not the 100% yield assumed in the staff report."

Agency Response [14-Titus-070419-KCMA]: We disagree. Our estimates are based on calculations made by commercially available software used by people in the industry, which to our knowledge do not assume that 100% of every panel can be used to make a cabinet. The point being made is that the cost of composite wood products used to build kitchen cabinets, etc. is a small cost driver in projects of this kind. For projects costing in the tens of thousands of dollars, we do not believe that an estimated increase in material costs of less than $100 would be an overriding factor in who the project is awarded to or long-term economic viability (see page 215 of the ISOR).

50) Comment [14-Titus-070419-KCMA]: "… The industry is concerned that without the benefit of additional pilot studies or adequate time to effectively gauge the performance characteristics of the substitute products against the real-life conditions typical for our products, the hard-won reputation for durable, fashionable and long-lasting cabinetry could be lost or damaged…"

Agency Response [14-Titus-070419-KCMA]: We do not believe additional studies are needed. In Chapter V of the ISOR, staff describes current

resin technologies already being used to produce composite wood products for the cabinetry industry that meet the Phase 1 limits in the ATCM (see pages 101 to 107). We believe that the two-phase implementation schedule provides the industry with sufficient lead-time to ensure that the changes they elect to make to produce lower emitting products will still allow them to make products of the same quality that their customers have come to expect.

51) Comment [23-Zimmerman-070423-Sauder]: "Compliance cost: … While it is impossible to accurately predict the price elasticity of consumers, there is no doubt that there will be a negative impact on sales volume. The result of higher retail prices will be a contraction within the industry and a significant net loss of jobs…"

Agency Response [23-Zimmerman-070423-Sauder]: We disagree that there would be a significant net loss of jobs due to higher retail prices. As we discussed in Chapter VIII of the ISOR, the overall costs to fabricators will depend on increases in material costs and needed improvements in their recordkeeping systems. Overall, we do not expect a major economic impact from this rule since all competitors are mandated to meet the same emission standards. As mentioned in Chapter VIII, the overall cost to consumers of finished goods will be very low (pages 213 to 216). See also the response to comment #54.

52) Comment [42-Gustafson-070424-WWI]: "… A good portion of our membership is made up of small businesses that would be severely impacted by the regulation…"

Agency Response [42-Gustafson-070424-WWI]: We disagree that small businesses (which are mainly fabricators under the regulation) will be severely impacted. The rulemaking applies to all fabricators, in-state or out-of-state, that choose to sell products to California. Because all entities need to use compliant products, small businesses in California will compete on an equal footing and should not be disproportionately affected.

During the rulemaking process, staff addressed many issues related to small fabricator businesses, including the main issue of fabricated components that are laid up similar to hardwood plywood. As required by the regulation, hardwood plywood producers need to be third party certified and this would have included fabricators who lay up certain finished good components. To address this concern, the reference to "architectural plywood" was removed from the originally proposed regulation and replaced by "laminated products" under section 93120.1(25). The regulation was clarified to state that laminated products refer to finished good components that are produced by fabricators for finished goods and therefore, do not need third party certification. The

regulation was also modified to clarify that if laminated products contain composite wood product substrates, then those substrates will need to be third party certified. This clarification greatly reduced the burden on small fabricators. Because of these reasons stated, we do not believe that small businesses will be adversely affected.

53) Comment [87-Perdue-070426-AHFA]: "We are a very price point sensitive industry. Our margins are thin. You've heard a lot of these folks talk behind me about the potential cost increase that will be incurred. We will then in turn have to pass that along to the consumer. We are very concerned with how the consumer will react and respond to this price increase, especially if material costs force our members to be moved out of price point. By moving one of our manufacturers out of price point, you will put them out of business. This is a real concern of ours."

Agency Response [87-Perdue-070426-AHFA]: We appreciate the comment. In the event that price points shift for the California market relative to the rest of the nation, this will likely affect all manufacturers that choose to sell products to California to the same degree. However, it is our understanding that some fabricators will opt to produce California grade finished goods available to the entire U.S.

54) Comment [89-Zimmerman-070426-Sauder]: "You've heard a lot about cost. And I don't want to dwell on it, but the CARB document did not state fully an $8 roll-up on a bookcase would not be true. If you had a 30% cost in panel increase, cost to us, it would be a 15% cost to the consumer. As you know, increasing prices decreases demand. It would certainly shrink our markets drastically. A good example of this, last year 2006, we had a dramatic increase in board prices. We had units selling for $300 at Office Depot and went to $315, 5% increase. We saw a dramatic reduction in sales of our products. So going back to the less fortunate people who have to buy these products, they will be impacted greatly. Economic impact of enforcing the regulation is dramatic. The impact of ineffective enforcement is devastating to us."

Agency Response [89-Zimmerman-070426-Sauder]: We agree with the commenter that the composite wood product price increase may dampen the demand for the affected products in the short run. However, we believe that the impact will not be as severe as stated by the commenter for two reasons. First, the regulation affects all composite wood products sold in California, and therefore, manufacturers and marketers are likely to incur similar cost increases for producing compliant products. Thus, the changes in prices for all products would be comparable before and after the regulation if manufacturers are able to pass on the cost increase to the consumer. This limits the ability of consumers to substitute the product of one manufacturer or marketer for another. Thus, the limited supply of

good substitutes (i.e., products that can be used in place of PB, MDF, or HWPW) to compliant products from all manufacturers will likely restrict consumer reaction to any price increase in the short run. In the long run, however, the increase in disposable income will likely increase the demand for the affected products, negating the impact of the regulatory price increase. Second, our enforcement program will be strong and comprehensive, thus providing a level playing field for all manufacturers and marketers of these products in California. Again, the strong enforcement will limit the ability of consumers to substitute an unregulated product for a regulated product, thus; restricting the consumer reaction to the price increase. Our enforcement program includes independent certification, chain-of-custody documentation, recordkeeping, and testing validation.

55) Comment [90-Titus-070426-KCMA]: "We think take into account these CWIC numbers. They are our suppliers. We have worked with them closely. I supplied you with the information that our product's, surprisingly enough, the highest on the list of what lasts in the kitchen, 15 years. We have developed that because of our close relationships with our suppliers and the materials we use. It is for a reason that we use the urea formaldehyde glues with the way they have performed for us. There has been no discussion in this of performance. We're all focused on emissions, rightly so. But let's keep in mind so what's the performance. How is the marketplace going to react to it? And still green products, we are making progress in that area with our own ESP program, environmental stewardship program, to move forward with our industry. But it's still a niche product. So we need time and we need to do it in a way that we won't have these serious negative impacts on an important part of the state's economy…"

Agency Response [90-Titus-070426-KCMA]: We agree that performance is important, but believe that panels with lowered HCHO emissions can be made without compromising the performance that fabricators require (see Chapter V of the ISOR). Even after implementation of the regulation, particleboard, medium density fiberboard, and hardwood plywood will still meet the voluntary performance specifications contained within ANSI 208.1, ANSI 208.2, and ANSI/HPVA PS-1, respectively. Also, there are existing products that comply with ATCM standards that perform as well as products that have higher formaldehyde emissions than that required by the ATCM.

56) Comment [90-Titus-070426-KCMA]: "… Much of the impact you have heard on small business, we are terribly concerned about that. You've heard numbers. We know of at least 1,200 small cabinet establishments in California. And anything that changes their supply chain, their margins

could mean the end of the business for them. So I implore you to take that into account as you look at it."

Agency Response [90-Titus-070426-KCMA]: We agree that points raised by the commenter are appropriate. It is not our intent to put small cabinet establishments in California out of business. We believe that the requirement that all finished products manufactured for sale in California be made with complying products does not confer a competitive advantage for any particular supplier. We have added a definition of "laminated products" under section 93120.1(25) to clarify that fabricators of finished good component parts do not need third party certification. This clarification greatly reduces the economic burden on small fabricator businesses.

ENFORCEMENT and FAIR COMPETITION

57) Comment [14-Titus-070419-KCMA]: "Key elements of the enforcement phase remain vague and incomplete…"

Agency Response [14-Titus-070419-KCMA]: We agree that at the time of the comment, some areas of the enforcement program required further clarity. Since then, the regulation was modified to add clarity and more specificity to the TPC requirements to ensure transparency and effectiveness. Round robin testing requirement was added to assess TPC laboratory capabilities. Likewise, chain-of-custody requirements and additional recordkeeping requirements were added to aid in an enforcement investigation. Furthermore, CARB's enforcement test method will be operated consistent with the secondary test method, which will allow CARB to generate much more precise measurements of field samples to strengthen any finding of non-compliance.

58) Comment [23-Zimmerman-070423-Sauder] [89-Zimmerman-070426-Sauder]: "Enforcement: … Even if reliable test methods were available, the sheer volume of products and sources would make effective auditing and enforcement extremely difficult…"

Agency Response [23-Zimmerman-070423-Sauder] [89-Zimmerman-070426-Sauder]: Reliable test methods are available and required to be used in the ATCM. We believe that the ATCM puts in place an effective enforcement program which includes third party certification of panels, chain-of-custody, labeling, and recordkeeping requirements.

59) Comment [23-Zimmerman-070423-Sauder]: "Enforcement: … It is entirely possible that a piece of furniture that is compliant as a whole could have individual components that are non-compliant…"

Agency Response [23-Zimmerman-070423-Sauder]: We disagree, since compliance is not determined through testing of a piece of furniture "as a whole." Our program requires that compliant materials be used to make finished goods such as furniture; hence, it is not possible for furniture made with non-compliant components to be legal for sale in California.

60) Comment [23-Zimmerman-070423-Sauder]: "Compliance cost: … Problematic testing and ineffective enforcement will significantly tilt the playing field. Companies that comply voluntarily will be at a significant disadvantage to those who are able to "get around the system."…

Agency Response [23-Zimmerman-070423-Sauder]: We disagree because CARB will implement an effective enforcement program. Reliable test methods are available and required to be used in the ATCM. We believe that the ATCM puts in place an effective enforcement program which includes third party certification of panels, chain-of-custody, labeling, and recordkeeping requirements.

61) Comment [36-Perdue-070424-AHFA]: "As part of the enforcement protocol, CARB staff has suggested a field screening method and finished product testing to verify the validity of chain of custody… recommend that the use of the field screening method for enforcement is not considered. Field screening should be used as a pass/fail "bright line" that would trigger further investigation of the chain of custody…"

Agency Response [36-Perdue-070424-AHFA]: We agree that the field screening method should not be considered for enforcement. The enforcement test method in the ATCM will be used to enforce the emission standards on panels and finished goods. The field screening method will complement the enforcement program for the ATCM and be used to identify gross violations, but will not be used for enforcement violation purposes.

62) Comment [36-Perdue-070424-AHFA] [87-Perdue-070426-AHFA]: "… The AHFA encourages CARB staff to stay engaged with key stakeholders and work on the enforcement mechanism with the same focus and attention to detail used to establish the "front end" of the ATCM. There is simply too much at stake and the potential impact too great to relax and develop a marginal and ineffective enforcement program. Let's stay the course and be as diligent on the "back end" of the ATCM."

Agency Response [36-Perdue-070424-AHFA] [87-Perdue-070426-AHFA]: We believe the ATCM contains all the requirements needed for an effective enforcement program and will continue to work with stakeholders on implementation. See also the response to comment #60.

63) Comment [36-Perdue-070424-AHFA]: “AFHA is concerned that the Board will be voting on a proposed regulation that clearly has not defined the scope or details of an enforcement strategy… we feel clarification is needed to ensure that the compliance demonstration does not require the tracking of individual component parts manufactured with composite wood products in finished goods… We would suggest that the language of (i) be changed to the following: “… made with complying composite wood products to verify through the distribution chain that the composite wood products used in the manufacture of component parts used in the assembly of finished goods comply with the appropriate emission standards.”

Agency Response [36-Perdue-070424-AHFA]: We believe that the ATCM contains all the requirements needed for an effective enforcement program. See also the response to comment #60. For fabricators, the compliance demonstration does not require the tracking of individual component parts, but rather requires that they be able to document their purchases of compliant materials used in their finished goods.

64) Comment [90-Titus-070426-KCMA]: “And enforcement, we want to compliment the staff -- this has been an open process. They’ve listened. I compliment them. They put a lot of work into this. But as with everything, there are holes. And we think enforcement is a place where we will work with them. There needs to be some serious work done there. The questions that you have raised are great. I think you’re heading to the point – I would tell you that.”

Agency Response [90-Titus-070426-KCMA]: We appreciate the comment but believe the ATCM contains all the requirements needed for an effective enforcement program. See response to comment #60.

EXEMPTIONS

65) Comment [5-Rink-070413-Jeld-Wen]: Jeld-Wen proposed an exemption for exterior doors and garage doors.

Agency Response [5-Rink-070413-Jeld-Wen]: Exterior doors and garage doors are made with water resistant resins that emit very low levels of formaldehyde. We added an exemption to section 93120.7 for exterior doors and garage doors in response to this comment.

FINISHED PRODUCT TEST METHOD

66) Comment [5-Rink-070413-Jeld-Wen]: "… For this reason, and to the extent HCHO emission levels are regulated, JELD-WEN advocates an ATCM that regulates the HCHO emission levels for a finished product. Such a performance-based regulation for finished products would ease the testing, compliance and enforcement burdens on the state, while having a measurable impact on air quality in California."

Agency Response [5-Rink-070413-Jeld-Wen]: We disagree. This ATCM will achieve significant reductions in surface emissions from composite wood products. The Health and Safety Code requires CARB to achieve the lowest emissions possible for a toxic air contaminant with no identifiable safe level of exposure. Thus, the emission standards are reducing formaldehyde emissions at the source, the composite wood panels used to make a finished good. The ATCM sets emission limits for panels that are used to make finished goods like furniture. Under the commenter's approach, high emitting panels could be used in finished goods and covered with paint or a laminate. However, at some point, the finished good will be scratched allowing formaldehyde to escape.

67) Comment [23-Zimmerman-070423-Sauder]: "Testing: … Realistically, the only way to have any level of confidence that a component is in compliance with the regulation would be to run a series of tests on the same component and look for a correlation within the results…The scientific foundation for determining whether a non-compliant finding is due to the composite panel or due to any of a number of other sources of HCHO has not been firmly established."

Agency Response [23-Zimmerman-070423-Sauder]: We have revised the regulation and included requirements for demonstrating equivalence between the primary and secondary emission test methods and for round-robin testing, as well as specifying that CARB will use the secondary test method for enforcement purposes. Testing a majority of finished goods will be straightforward since many composite wood products used in finished goods are only covered on one side. For two-sided laminated products, staff is developing the appropriate protocols under the schedule presented in Table VI-7 on page 127 of the ISOR. See also the response to comment #73.

68) Comment [24-Landry-070423-CWIC]: "… What is inside that piece of furniture or cabinet, and behind the paint or high pressure laminate? To check compliance, one will have to essentially destroy the piece of furniture – to "deconstruct" it down to the panel itself. Determining non-compliance in this setting is extremely difficult as deconstruction will likely alter the physical nature or the underlying panel. There is great

uncertainty in this regard since the full enforcement program will not be available until after the regulation is promulgated."

Agency Response [24-Landry-070423-CWIC]: Yes it is correct that finished products must be deconstructed to test for compliance. But, we disagree that there is great uncertainty in the enforcement program. Deconstructive testing is needed for finished goods to verify compliance with the emission standards. We are currently developing the sample preparation and testing protocols that we will use to enforce the ATCM (see page 127 of the ISOR). The sample preparation and emission testing protocol we use to enforce the ATCM will be technically sound and will be more than adequate to identify non-compliant composite wood products found in finished goods for California.

69) Comment [27-Rush-070424-Temple Inland]: "… Temple-Inland strongly recommends that the following be done: a level playing field is required for all domestic and import players… that all finished products be tested in its final state (as used), not with the surface removed, that all resin systems be qualified based on performance of the emission rate tests, not on its class or perception… that minor emission test excursions be allowed that fall into the precision variation of the large scale test…"

Agency Response [27-Rush-070424-Temple Inland]: We agree that a level playing field is required for domestic and import players, but disagree that products be tested in their final state. Finished product testing would require an inordinate number of standards for the full range of finished products sold to California and not workable from an enforcement standpoint. We believe that our public health goals are best served by requiring the use of low emitting panel products to be used to make finished goods. Measures of this kind also address HCHO emissions once a product is disposed of – there are less emissions, in total, if finished products are made with low emission panel products. See also the responses to comments #66 and #68.

70) Comment [36-Perdue-070424-AHFA]: "There has been a lot of discussion about how CARB staff would verify the use of compliant board in finished goods. We support the idea of employing a deconstructive small chamber test of finished goods to accomplish this. It is imperative that an accurate correlation be established with this test and the large chamber…"

Agency Response [36-Perdue-070424-AHFA]: We agree that the point raised by the commenter is appropriate. This is why the ATCM was modified to allow for the use of the small chamber under ASTM D 6007-02, as a secondary test method, and to demonstrate equivalence to the large chamber as measured under ASTM E 1333-96 (2002).

71) Comment [36-Perdue-070424-AHFA]: “AFHA agrees with CARB staff that the focus of the proposed ATCM is on the “raw board” used to make composite wood component parts and not on finished goods (furniture). It is important to realize that all furniture will contain a mixture of various composite wood component parts. The complexity of design and diverse mix of component parts does not lend itself to finished product testing.”

Agency Response [36-Perdue-070424-AHFA]: We agree that there are too many variables to finished product testing that would require us to establish separate standards for a large number of products. It is more effective to limit the emissions of the components and require their use in finished products instead.

72) Comment [74-Bradley-070426]: The enforcement test method for finished goods is worded poorly and should be reworded to say “emission testing of samples of HWPW, PB, and MDF contained in finished goods . . .”

Agency Response [74-Bradley-070426]: We agree that the point raised by the commenter is appropriate and modified the wording in the enforcement test method.

73) Comment [88-Elias-070426-APA]: “The other concern we also have is the ability to actually recognize and identify products in composite or secondary materials such as furniture or cabinetry that are finished goods and how you actually deconstruct those products and be able to identify the products that are nonconforming. I think this is very onerous, very ambitious activity to try to pursue. As a participant in the California Wood Industry Coalition, we offer our support to the previous testimony by the Coalition members…”

Agency Response [88-Elias-070426-APA]: The ATCM requires specific test methods to be used. In the ISOR, we committed to developing a sample preparation method for laminated products to address this comment. See page 126 in the ISOR.

74) Comment [89-Zimmerman-070426-Sauder]: “Our main concern is enforcement, as has been discussed much here. Although we recognize that CARB has tried to maintain a level playing field, we have grave concerns about the measurement and enforcement of the proposed regulation. The enforcement test method for finished products is complicated. It’s unproven. Our furniture is finished on one or multiple sides all within the same unit. Formaldehyde can be found in the paper. It can be found in the environment. It can be found in our adhesives. It can be found in all levels throughout our production. Composite panels can act as a sink and absorb HCHO from the surrounding environment. It becomes virtually impossible (to tell) whether or not HCHO came from the

non-compliant panel or from the environment. It concerns us no work has been done to validate the finished product that's being proposed."

Agency Response [89-Zimmerman-070426-Sauder]: See the response to comment #73.

IMPORTERS and IMPORTED PRODUCTS

CHAIN-OF-CUSTODY

75) Comment [38-Morgan-070424-IWPA]: "Paperwork and new database systems. New systems will need to be developed to track the burdensome new paperwork requirements for chain-of-custody documentation that do not currently exist in the marketplace…"

Agency Response [38-Morgan-070424-IWPA]: The ATCM does require recordkeeping for products used, sold, or supplied to California, however, we do not believe that this will create significantly more paperwork than what must already be maintained. To our knowledge, records of purchases and sales must already be maintained for a variety of reasons, for example, bills of lading and invoices are already routinely used. Thus, the addition of new recordkeeping requirements should not require a complete overhaul of existing database and tracking systems.

76) Comment [41-Chaffin-070424-IWPA]: "The chain of custody documentation requirement is unworkable for the imported plywood industry… A significant percentage of the imported plywood is sold to wholesalers and distributors who consider the identity of their importer to be proprietary."

Agency Response [41-Chaffin-070424-IWPA]: The ATCM does not require wholesalers or distributors to divulge the name of their importer. Section 93120.3 and 93120.7 require labeling of panels and finished goods, respectively. Sections 93120.5(c) and 6(c) state that if products or finished goods are not modified by the distributor or the importers, no additional labeling is required. This assumes that the label from the manufacturer or fabricator will remain on the product or finished good throughout the commercial chain to the retailer. The response to comment #77 describes why the manufacturer or fabricator (as opposed to the importer) must be known.

77) Comment [97-Chaffin-070426-IWPA]: "The chain of custody documentation is also difficult for importers and doesn't take into account the difference between domestic plywood business and imported plywood business. Imported plywood changes hands numerous times in between

the time it's produced and by the time it reaches its ultimate customer. Generally, importers consider their source as proprietary information. They don't want to share that information with their customers. And their customers, the distributors and wholesalers, don't want to share the name of their supplier to their customers. This is a unique feature with regard to imported business. In conclusion, I would ask that the Board seriously consider direction to the staff to spend some time before acting on this regulation to find out something about how the imported plywood business works…"

Agency Response [97-Chaffin-070426-IWPA]: The ATCM requires a strict chain-of-custody program to allow us to enforce the program effectively. Staff does understand how the imported plywood business works, but the integrity of the enforcement program depends on being able to trace a product or finished good back to its manufacturer or fabricator through chain-of-custody documentation. Thus, the identity of the manufacturer or fabricator must be known. See also the response to comment #76.

78) Comment [98-Schroeder-070426-WMMPA]: "When seeking this raw material, Mr. Morrison was confronted by the President of the Chinese company that said "whatever certification that you need or piece of paper that you require, fax me a copy and we will make sure that you have your paperwork." Mr. Morrison went on to explain the process would have to come from the Forest Stewardship Council and they would have to be inspected. The President of the Chinese company explained "No. No. No. Sir, all we need is what you need from us. Send us a copy -- we will get you the paperwork." That right there in itself scares us out of our wits. Being able to ship on shore into California without having the certification in place of an FSC certified wood product and selling it as such is taking place right now. Without the certification being taken from Chinese on the Chinese side – I'm just lost…"

Agency Response [98-Schroeder-070426-WMMPA]: We are aware of violations to the voluntary FSC certification program, which has very little enforcement. ARB will put into place a vigorous enforcement program for the ATCM, including the construction of laboratory test chambers to conduct product emission testing verification as a major aspect of the enforcement program. The ATCM also includes third party certification of panels, chain-of-custody, labeling, and recordkeeping requirements. Overall, we believe that the enforcement program will deter the type of conduct identified by the commenter.

ECONOMIC IMPACTS

79) Comment [38-Morgan-070424-IWPA]: "Some of the items not properly valued in the staff report include: Construction of new laboratories, development, and training of new third party certifying businesses. New overseas laboratories and additional testing capacity, including the hiring and training of new staff, would now be required in every country interested in selling products to California."

Agency Response [38-Morgan-070424-IWPA]: Many third party certifiers already exist in most parts of the world, so no additional expenses are necessary for these companies. The basis for the cost analysis for the Phase 1 and Phase 2 emission standards relate to the resin technologies used as the main cost driver (see pages 205 to 209 of the ISOR). On a per board production cost, certification cost is a very small part. Additionally, certification costs are already a part of today's per board cost in North America as 85 percent of US mills are certified under the Composite Panel Association's Grademark Program.

80) Comment [38-Morgan-070424-IWPA]: "Inventory costs. This regulation effectively doubles the required inventory for U.S. importers. These companies will now need to maintain duplicate inventory for material destined for California and product available for sale to the rest of the U.S., Canada, and Mexico."

Agency Response [38-Morgan-070424-IWPA]: We agree that multiple inventories may need to be maintained in some cases. This is a business decision that must be made by the affected party as to whether to maintain dual inventories and sell to California, or not. However, many domestic fabricators have indicated their plan to only produce CARB-compliant products for the entire U.S. market.

81) Comment [41-Chaffin-070424-IWPA]: "The staff report does not adequately address the impact of this regulation on importers and overseas mill suppliers…" "The Board should postpone action on these regulations until there has been further adequate study and reporting of the impacts on importers . . ."

Agency Response [41-Chaffin-070424-IWPA]: We disagree that more time is necessary or that more analysis of impacts are needed. As all manufacturers will be required to meet the same product emission standards, they will have to make the necessary modifications to achieve that specified level of product quality. To stem the flow of high emitting panel products into California, we feel that it is important to require stringent quality control practices to provide assurances that California

receives products that meet its standards. Overseas manufacturers must make a business decision on whether to continue selling to California.

82) Comment [41-Chaffin-070424-IWPA]: ". . . This regulation will result in adverse impacts on business and consumers and the possible benefit will not be measureable."

Agency Response [41-Chaffin-070424-IWPA]: We disagree. California law requires CARB to reduce public exposure to formaldehyde as much as technically feasible while considering costs. The ISOR has a full evaluation of impacts on business (see pages 178 to 216). The ISOR also has a discussion of risk reduction benefits. See Chapter VII, pages 157-159, the ATCM will achieve significant reductions in cancer cases.

ENFORCEMENT and FAIR COMPETITION

83) Comment [4-Sherman-070409-NA]: "The proposal will still allow the importation of non-compliant panels for use in fabrication of products whose eventual destination is outside of the state. Just as there are unlicensed, uninsured shops in operation … these same shops will likely find ways to procure and use these non-compliant panels for in-state distribution. Not only does this have the potential to undercut the small shops with whom these noncompliant shops would be in competition with, but we compliant shops will be squeezed from the other side as well, sharing the costs of inspection/compliance/enforcement…"

Agency Response [4-Sherman-070409-NA]: We disagree. We will have an active enforcement program that includes collecting samples of products for testing. If these tests show a violation of the emission standards, we can identify the shops making non-compliant products and in-state purchasers of non-compliant products through the ATCM chain-of-custody requirements. Upon inspection of these shops, if statements of compliance cannot be produced, the buyers and suppliers would both be in violation of the ATCM and subject to appropriate penalties.

84) Comment [29-Couture-070424-CDMDP]: "… we are concerned about the potential of non-conforming imports landing in California from offshore. The new rules will make it even harder for our industry to defend against offshore manufacturers. This will lead to … the erosion of a strong industry solidly entrenched particularly in the West coast."

Agency Response [29-Couture-070424-CDMDP]: We disagree. Currently, there are no restrictions of any kind on the HCHO emissions of wood products from offshore, so long as they are not used in manufactured home construction. The ATCM sets limits beginning in 2009 that will

create uniformity for all manufacturers, both foreign and domestic, since they must all meet the new emission limits, and CARB inspections will be made to ensure that those products are being sold to the California market. In addition, many domestic producers currently have their products third party certified, and the ATCM requires that all manufacturers, including offshore manufacturers, to go through the expense of being third party certified.

85) Comment [38-Morgan-070424-IWPA]: "Database of exempted adhesives… In addition to maintaining an online database of approved certifying testing agencies and laboratories, ARB's compilation of all exempted adhesives will allow companies to better understand compliance options."

Agency Response [38-Morgan-070424-IWPA]: While the commenter makes good suggestions, we may not have the resources to effectuate all of them. We will post all approved third party certifiers on our website, thereby providing transparency. In addition, we will likely post the Executive Orders issued to manufacturers using either NAF or ULEF based resins.

86) Comment [38-Morgan-070424-IWPA]: "Enforcement – include de minimis clause exemption: … there needs to be a de minimis exemption that eliminates liability from companies that have shown they have undertaken best practices but end up with a small amount of non-compliant material…"

Agency Response [38-Morgan-070424-IWPA]: We disagree with a de minimis clause exemption. Upon determination of a violation, liability will be evaluated on a case-by-case basis. Liability will depend on the particular circumstances and factors, such as whether there was any willful misconduct, or simply a minor inventory error.

87) Comment [41-Chaffin-070424-IWPA]: "… These regulations represent an unauthorized, non-tariff trade barrier with regard to foreign suppliers and importers."

Agency Response [41-Chaffin-070424-IWPA]: We disagree. The ATCM is designed to protect public health by reducing formaldehyde emissions from composite wood products sold, supplied, or offered for sale in California. See the response to comment #43 in Section D, Comments and Agency Responses: 15-day Comment Period, which explains why the ATCM is not an "unauthorized, non-tariff trade barrier."

88) Comment [45-Gregory-070424-SierraPine]: "Without adequate enforcement, the flood of imported products made with non-compliant

foreign MDF and PB will increase significantly… This will have the unintended affect of actually worsening the environmental impact, as many foreign producers do not comply with any local clean air regulations from their operations and emit significant amounts of greenhouse gasses…"

Agency Response [45-Gregory-070424-SierraPine]: We agree that points raised by the commenter are appropriate. That is why we have developed a comprehensive enforcement program. We will enforce the rulemaking on both foreign and domestic manufacturers. Initially, we expect that the ATCM will stem the flow of high emitting products to California, which should lower emissions in the state. See also the response to comment #60.

89) Comment [51-Watson-070425-IPMG]: "… Under this proposal, we will still allow the materials to come through the ports of California and be stored there, as long as the material is to be sold out of state… If the objective is to reduce the amount of HCHO through California, then why not ban it from arriving in the first place? Banning the importation to the port of a dangerous substance altogether would make a lot more sense to me."

Agency Response [51-Watson-070425-IPMG]: Health and Safety Code section 39666 mandates CARB to develop ATCMs that are based on feasible control technologies. Banning the import of products containing HCHO may provide greater health benefits, but it is not commercially feasible and would be too disruptive to the viability of the composite wood products industry and the businesses that rely on an adequate supply of these products.

90) Comment [64-Guay-070426-Columbia]: "We think your implementation plan to focus on the importer is an excellent start. It will only take a few loads being rejected or heavy fines and the unscrupulous importer will begin specifying to the new levels. After all, the offshore suppliers build to an order specification, rarely to inventory. When you control the importer and their direction to the manufacturers you will ultimately affect a huge change in the industry."

Agency Response [64-Guay-070426-Columbia]: We agree – no response necessary.

91) Comment [72-Robson-070426-AWFS]: "CARB staff has not effectively addressed how finished products manufactured overseas and shipped into the state will be inspected and enforced."

Agency Response [72-Robson-070426-AWFS]: We disagree. The enforcement program is based on third party certification, chain-of-custody,

and verification emissions testing. The enforcement program is well documented in the ATCM. For overseas goods, our initial focus will be on importers, who will be responsible for securing the documentation that verifies that the panels and/or finished products from overseas meet California standards.

92) Comment [72-Robson-070426-AWFS][76-Robson-070426-AWFS]: "The problems with enforcement will benefit imported goods and their suppliers – further jeopardizing jobs in California. There are thousands of California based small businesses engaged in cabinet making – all of whom are buying machinery and equipment from AWFS® companies. If these cabinet makers cannot compete with finished products from overseas, then they will go out of business and our companies will no longer have customers who can buy new machinery and hardware."

Agency Response [72-Robson-070426-AWFS][76-Robson-070426-AWFS]: We disagree that jobs in California will be jeopardized due to the ATCM. We will implement a robust enforcement program to prevent non-compliant products from being sold in California. There are many pressures on small businesses. The ATCM will create a level playing field so no advantage to foreign producers will occur.

93) Comment [81-Gregory-070426-CWIC]: "You can regulate us as our doors are open. We've worked with staff throughout this process. You can come in and get your products or you can go to Home Depot and buy our products. The products such as ours or products that are fabricated with products like ours overseas where HCHO is not a concern -- that concerns me. Because if we go away, then you're at the mercy of those people and products that are harder to control. And you can – eventually, the situation could even become worse than what it is today."

Agency Response [81-Gregory-070426-CWIC]: We disagree. By enforcing the rulemaking on all manufacturers, fabricators, distributors, importers, and retailers, we believe that compliant products will be sold in California, and the situation with respect to HCHO exposure will improve rather than get worse relative to today.

94) Comment [88-Elias-070426-APA]: "However, as you've heard from the previous speakers, the American composite wood panel industry remains very concerned over the ceiling levels that are being proposed for Phase 2 and the timing of these measures and particularly how these measures will be equitably applied to both the domestic manufacturers and those of the imported panel producers. Particularly, imported panel products that actually come to these shores with misleading or fraudulent marking indicating compliance to these standards."

Agency Response [88-Elias-070426-APA]: See the responses to comments #60 and #91.

95) Comment [91-Raymer-070426-CBIA]: "On the other hand, you've got an unscrupulous foreign-based supplier of product, who knows full well that their product represents a few grains of sand in that beach of shipping containers entering the country. Eventually, these unscrupulous individuals can expect to get caught. But what about the short-term, the next two to three years after the standards kick in? Consequently, it's not overreaching to suggest there will be a great deal of lower cost, noncompliant product that will have to be competing with California manufacturers who have gone forward and made the upgrades necessary to comply with ARB's proposal. And therein lies the problem. Over the long haul, it will work out. The Contractor's State License Board has had very public enforcement actions. These have been immensely effective over the years of getting people to play straight, get the proper licenses, etc. But it always takes time to do that. If you're an out-of-country manufacturer, you can depend on the fact that it will take time to gear-up for California's enforcement action to really kick in."

Agency Response [91-Raymer-070426-CBIA]: We appreciate the comment and will take whatever action is appropriate to provide a level playing field in the initial years of the regulation. However, we believe that unscrupulous practices will be rare. When the emission standards go into effect and the sell-through periods have expired, our inspectors will go to retail stores to collect products to test. These stores sell both imported and domestic products (i.e., Home Depot). Therefore, we do not agree that there will be any lag time in being able to enforce against unscrupulous foreign suppliers who may be competing against California-based manufacturers. In addition, the ATCM requires importers to purchase products that meet the emission standards and to add additional assurance to their supply chain management practices to ensure that their products will comply. Also, foreign producers are subject to third party certification to ensure compliance with the emission standards, as products leave the manufacturing plant and before they arrive in California.

96) Comment [106-Guay-070426-Columbia]: "… Keep in mind the same factories that are sending this unsafe plywood to California are supplying most of Europe's E1 and nearly all of Japan's F3 and F4 star. It can be measured, complied, and enforced. Those two parts of the world get their plywood from China using standards that are dramatically different from those in the United States. We think your implementation plan to focus on the importer and the manufacturer is an excellent start. It will only take a few rejected loads of panels for the unscrupulous importer to begin to specify the new levels. After all, the off-shore suppliers build to order specifications, rarely to inventory. When you control the importer and their

directions to the manufacturers, you will ultimately affect a huge change on this industry off-shore. It can be done. It's happening today. We strongly encourage you to act today to stop this unnecessary dumping of unhealthy imports in California by adopting the proposal as amended…"

Agency Response [106-Guay-070426-Columbia]: We agree – no response needed.

THIRD PARTY CERTIFICATION

97) Comment [38-Morgan-070424-IWPA]: "Eliminate third party testing requirement. … IWPA urges ARB to reconsider the requirement for third-party testing and chain of custody…"

Agency Response [38-Morgan-070424-IWPA]: We strongly disagree. These are critical enforcement elements in the ATCM.

98) Comment [38-Morgan-070424-IWPA]: "As previously mentioned, this regulation places a significant requirement for third-party certification – a requirement that does not currently exist in any widespread form anywhere around the globe."

Agency Response [38-Morgan-070424-IWPA]: We disagree. Third party certification around the globe is taking place in various forms and to ensure fair competition in the marketplace, this is a practice that needs to be implemented and enforced. We believe it is crucial for the integrity of this rulemaking.

99) Comment [38-Morgan-070424-IWPA]: "Furthermore, the requirements for third party certifiers – as detailed in 93120.4 (b)(1) – show evidence of past field experience is not workable given that there was not a need for this volume of third-party certifiers prior to the ATCM…"

Agency Response [38-Morgan-070424-IWPA]: We believe the field experience is necessary to demonstrate how applicants will be able to perform the requirements of the ATCM for third party certifiers. In some cases, it may be necessary for a candidate third party certifier to contract out the product verification element of third party certification to another entity with the proper experience.

100) Comment [38-Morgan-070424-IWPA]: "… develop a database of existing laboratories with sufficient facilities for testing to the standards of the new regulation…"

Agency Response [38-Morgan-070424-IWPA]: We agree that the point raised by the commenter is appropriate. We will develop a listing of approved third party certifiers in the future and post on our website.

101) Comment [38-Morgan-070424-IWPA]: "… eliminate the previous work experience requirement for third party certifiers… It is unreasonable to expect these new businesses to have past work experience."

Agency Response [38-Morgan-070424-IWPA]: The ATCM requires third party certifiers to work closely with manufacturing mills to establish operating parameters for the mill. Therefore, third party certifiers need to have working knowledge regarding composite wood product manufacturing. See also the response to comment #99.

102) Comment [41-Chaffin-070424-IWPA]: "… The majority of the mills confirmed the HCHO levels required could be met but the third party certification would be a major impediment to meeting all of the regulations. More time is needed than set out in the regulations to comply."

Agency Response [41-Chaffin-070424-IWPA]: We disagree. All manufacturers must be third party certified and this is critical to ensuring fair competition in the marketplace. We believe sufficient time has been provided to comply with the ATCM.

103) Comment [41-Chaffin-070424-IWPA]: "There are inadequate third party certifiers available for overseas mills… large chamber testing facilities are extremely rare in other plywood producing countries such as Malaysia and Indonesia."

Agency Response [41-Chaffin-070424-IWPA]: We disagree that there will be an insufficient number of third party certifiers (TPCs). Staff estimates that about a dozen TPCs will be needed internationally to certify all California composite wood products. To date, we have developed a list of about 30 reputable international organizations who are interested in applying to CARB to be an approved TPC. Therefore, we believe that a sufficient number of TPCs will be available to meet global demands.

During the development of the ATCM, however, CARB staff received numerous comments from manufacturers and prospective TPCs that indicated that a lack of large chamber testing facilities would present a significant testing bottleneck, which could negatively impact the implementation of the ATCM. To address these comments, staff investigated several alternative testing methods that could be used to augment large chamber (i.e., primary method) availability. Staff determined that a suitable smaller dynamic chamber method, ASTM D 6007-02, should be considered as a secondary method. In order to be

acceptable, however, the secondary method would need to perform equivalently to the large chamber. Consultation with industry and academic experts familiar with dynamic chamber tests confirmed that chamber tests will yield the same results, as long as the chambers are operated under similar test conditions. The ATCM was revised to include this second testing option. Concise statistical criteria were developed that must be used to demonstrate that the primary and secondary methods are equivalent. The statistical criteria are based on an evaluation entitled "Supplemental Analysis Supporting the Test for Demonstrating Equivalence between Primary and Secondary Methods for Measuring Formaldehyde Emissions from Composite Wood Products", dated January 2008. The necessary modifications were made to 93120.9(a) and the document above was made available for public review and comment during the 15-day comment period.

104) Comment [47-Steenson-070424-AuWPA]: "… Either the requirement for certification should be applied to products with "no added formaldehyde" (NAF) or more preferably panels with low emissions regardless of binder type should qualify for exemption from the proposed rule."

Agency Response [47-Steenson-070424-AuWPA]: We believe that the most effective approach in the long run is to promote the use of NAF products, which is pollution prevention. There are inherent risks associated with the continued use of binders with HCHO in terms of meeting the ATCM standards, and it becomes a business decision, in our view, if manufacturers want to use those binders or switch to NAF resins. We have revised the regulation to allow an exemption from third party certification to manufacturers using formaldehyde-containing resins (ULEF), if they can demonstrate consistently low emission values.

105) Comment [96-Morgan-070426-IWPA]: "We have submitted written comments, but I'd like to touch on a couple things. We urge ARB to reconsider the requirement for third-party testing and chain of custody. This regulation can be judged on its effectiveness as a performance-based standard only. In other words, give us a standard. We will meet it. And if we do not meet the standard – if we do meet a standard and we do not have the third party testing requirement or the documentation, then we will be considered not in compliance. We still feel like that is a tall order to achieve… But if we do have to meet the requirement of third party testing and certification and chain of custody documentation, we urge that you push back the effective dates to: Phase 1 – January 1, 2010; and Phase 2 – January 1, 2012, so that we might become on line."

Agency Response [96-Morgan-070426-IWPA]: We disagree – the third party certification and chain-of-custody requirements are critical elements of the enforcement program. We believe that the availability of third party

certifiers will be sufficient to meet the needs of manufacturers worldwide and do not see a need to push back the effective dates of the emission standards in the ATCM.

106) Comment [97-Chaffin-070426-IWPA]: "The next concern was with regard to third party certifiers. It is difficult at this point to determine who will do third party certification for mills in, for example, Malaysia. We assume the third party certifier has to be someone in country, and there are not enough third party certifiers in Malaysia today to handle the requirements of this particular proposal."

Agency Response [97-Chaffin-070426-IWPA]: We disagree. We know that there are a number of testing laboratories with an international presence that will expand their present capabilities to service the needs of manufacturers worldwide. See also the response to comment #103.

MANUFACTURERS

ENFORCEMENT and FAIR COMPETITION

107) Comment [6-Harmon-070413-Hexion]: "It should be specified in the regulation that screening testing and enforcement testing will be conducted on all products equally, including those granted exemption under applicable sections of the regulation order."

Agency Response [6-Harmon-070413-Hexion]: We agree that all products in the ATCM are subject to enforcement testing. NAF products are not exempt from enforcement testing in the ATCM. Rather, because of the exemption from third party certification afforded these products if the ATCM criteria are met, they will be subject to enforcement testing just like products made with formaldehyde-containing resins.

108) Comment [24-Landry-070423-CWIC]: "Furniture imports have increased dramatically over the last decade… The chance for mischief is too high to risk the severe impact on domestic manufacturers."

Agency Response [24-Landry-070423-CWIC]: See the response to comment #60.

109) Comment [34-Keeling-070424-Roseburg][82-Julia-070426-CPA]: "Enforcement creates a competitive disadvantage for domestic producers. … It seems unreasonable to promulgate such a rule without the details of enforcement fully understood by all under which there is opportunity to cheat the system in imported finished goods." "CPA supports . . . rigorous enforcement . . ."

Agency Response [34-Keeling-070424-Roseburg][82-Julia-070426-CPA]: See the response to comment #60.

110) Comment [43-Raymer-070424-CBIA]: "… CBIA is especially concerned with the enforcement aspects related to the proposed regulation. It seems highly likely that the referenced proposal will, for at least the short-term, create an un-level playing field for those manufacturers located within California with those located outside our state borders (especially those located in other countries)."

Agency Response [43-Raymer-070424-CBIA]: We disagree. We have had extensive contact with manufacturers in other countries regarding the ATCM. See also the response to comment #95.

111) Comment [45-Gregory-070424-SierraPine][51-Watson-070425-IPMG]: "The enforcement division has assured us they will be able to enforce this regulation on all producers of MDF and PB worldwide… We do not share this optimism … particularly due to the emphasis on implementing and enforcing AB 32." Enforcement "will make very little difference."

Agency Response [45-Gregory-070424-SierraPine][51-Watson-070425-IPMG]: We disagree. The Enforcement Division has the resources to enforce the ATCM and the ATCM contains stringent requirements that are the critical elements of the enforcement program. See also the response to comment #60.

112) Comment [59-Taylor-070426-Veneer]: "Also, why would businesses – in other states and countries – be allowed to bring plywood – made into furniture – into California and not have to adhere to the same standards as the manufacturers in California?"

Agency Response [59-Taylor-070426-Veneer]: To clarify, businesses outside of California that sell their products in California must comply with the regulations, same as for businesses in California.

113) Comment [72-Robson-070426-AWFS]: "While CARB staff believes the regulation is economically feasible for the industry, it appears the economic analysis does not take into account the added costs to California business of trying to compete against non-compliant, cheaper products from overseas that will still make their way into the market place."

Agency Response [72-Robson-070426-AWFS]: The ATCM requirements apply to all manufacturers including the requirement for third party certification. Regarding enforcement of the ATCM requirements on products manufactured overseas, see the response to comment #84.

114) Comment [92-Landry-070426-CWIC]: “I’d also like to talk very briefly about the incentive for mischief by the unscrupulous. The people you’ve been talking to, they’re going to find a way somehow to do this. Phase 2 is going to be incredibly hard. But with these kinds of cost differentials, there is an incredible incentive for people to try to avoid it.”

Agency Response [92-Landry-070426-CWIC]: We appreciate the comment and will be aggressive in enforcing the ATCM. We believe the ATCM enforcement program is comprehensive and will greatly reduce malicious cheating. In addition, our testing capabilities will allow us to verify the emissions performance of composite wood products and finished goods. See also the response to comment #60.

115) Comment [95-Kable-070426-Setzer]: “We started out in business as a wooden box manufacturer, and now our sole product is MDF moldings. Our raw material, the MDF boards, come 100 percent from domestic MDF board plants. And without these board plants, we will be out of business. We have tried to diversify our supply using internationally made boards. But in all cases, what we have found these manufacturers want to support their own domestic molding plants and have declined to sell us outright or charge us more for the board than they would charge us for the finished product. I believe you may be creating an uneven playing field for domestic MDF board manufacturers, because the enforcement approach suggested by ARB will not effectively verify compliance by the off-shore suppliers.”

Agency Response [95-Kable-070426-Setzer]: We disagree. It is our intent to inspect chain-of-custody information and test products made both domestically and from overseas to prevent the sale of non-compliant products in California. In addition, overseas manufacturers of MDF must be third party certified and have their emissions performance verified even before they reach California.

116) Comment [95-Kable-070426-Setzer]: “I also believe the rules will allow domestic distributors to stock and sell cheaper non-performing foreign products for longer period of time than domestic MDF plants can manufacture the similar performing products, further making domestic plants less competitive compared to international plants. The CARB Board must make sure that they don’t inadvertently favor international MDF board plants over domestic board plants. For if they do, this will clearly affect their customers, and put our Sacramento MDF molding plant out of business.”

Agency Response [95-Kable-070426-Setzer]: We agree that the point raised by the commenter is appropriate and made changes to the sell-

through provisions so that importers and panel manufacturers have the same amount of time. Previously, the panel manufacturers had one month and the importers had five months.

117) Comment [122-Schutfort-070426-PSI]: "… And I recommend to the Board to look into what worked in the European system, what worked in the Japanese system and what failed in those systems."

Agency Response [122-Schutfort-070426-PSI]: We agree that points raised by the commenter are appropriate and did research those programs as shown in the ISOR (see Appendix H).

FORMALDEHYDE EMISSIONS STANDARDS

118) Comment [2-Levin-070328-BERG]: "The target levels of formaldehyde emissions for this regulation are far too high. … Further reduction is technically feasible and should not be dismissed as the preferable option."

Agency Response [2-Levin-070328-BERG]: We disagree. The ATCM's Phase 2 emission standards are the most stringent production-based standards in the world. We have, however, written incentives into the ATCM that allows NAF and ULEF resin users who meet certain criteria to be exempt from third party certification or to have a reduced testing requirement (see sections 93120.3 (c) and (d)).

119) Comment [2-Levin-070328-BERG]: "State office buildings (Capitol Area East End Project) have been built during the past five years where far lower criteria were used for formaldehyde emissions. Proportional reductions of more than a factor of three would be appropriate based on the standards used for the State's own office buildings."

Agency Response [2-Levin-070328-BERG]: We appreciate the comment. The East End Project was specified as a "green building" under state law. The legislation required very strict HCHO standards and the standard was not intended to be applicable to all buildings in California. The Phase 2 standards are most stringent production based standards in the world. In response to comments, the Board moved up the effective date for HWPW-VC by one year from January 1, 2011 to January 1, 2010.

120) Comment [7-Landry-070416-CWIC]: "We are particularly concerned with the ceiling values for Phase 2, which do not take into account that industry products must be manufactured substantially below the regulatory ceilings because of the significant variability in raw materials, processing equipment and test methods – and hence emissions."

Agency Response [7-Landry-070416-CWIC]: The ceiling values for Phase 2 take into account the factors that contribute to variability that are mentioned by the commenter. Differences lie, between our estimates and those of industry, insofar as the amounts that these factors contribute to consistently producing products that meet the standards. We believe that the established ceiling values are eminently feasible.

121) Comment [10-Higgins-070416-FFC]: "Is this rulemaking necessary? Yes… California law clearly obligates the CARB to regulate HCHO emissions from composite wood products. Currently we lag behind virtually every other developed nation in the world in this important matter of public health."

Agency Response [10-Higgins-070416-FFC]: We agree that points raised by the commenter are appropriate. The ATCM enables California to be on par with other countries in terms of regulating high HCHO emissions from composite wood products.

122) Comment [10-Higgins-070416-FFC]: "Does the proposed ATCM go far enough? Regrettably no… We recommend moving to background levels immediately in veneer-core hardwood plywood products and adopting an aggressive timeline that reaches background levels in all composite products no later than 2010."

Agency Response [10-Higgins-070416-FFC]: We disagree. For the industries other than HWPW-VC, moving to background levels should remain as a goal, but at this point in time, not realistic given the economic hardship it could cause. In response to the comment, however, the Board moved up the effective date for HWPW-VC from January 1, 2011 to January 1, 2010. The two-phases of standards in the ATCM give manufacturers the time to make the required reductions and achieve the greatest overall public health benefit.

123) Comment [11-Higgins-070417-CoLA]: City of Los Angeles Resolution in support of the "… California Air Resources Board's proposal to regulate HCHO emissions from composite wood products, reducing emissions to zero by the year 2010."

Agency Response [11-Higgins-070417-CoLA]: We disagree. "Zero (HCHO) emissions" is an unachievable goal because there are natural HCHO emissions from wood. The Board moved up the effective date for HWPW-VC by one year from January 1, 2011 to January 1, 2010.

124) Comment [12-Higgins-070417-FFC]: "… We strongly support the CARB staff proposal to regulate HCHO emissions from composite wood products rapidly and bring them as close to zero as technically possible by 2010."

Agency Response [12-Higgins-070417-FFC]: The ATCM will bring HCHO emissions from HWPW, PB, and MDF as close to zero as technically possible by 2012. We believe the extra time is needed for all the manufacturers worldwide to comply with the ATCM. See also the response to comment #123.

125) Comment [13-Lent-070417-HBN]: "… That said, I urge the Board to not only accept the ATCM concept presented by the staff, but to direct them to return to earlier stricter proposals for final HCHO levels in Phase 2… the technology is already available to move more rapidly than proposed toward much more stringent levels."

Agency Response [13-Lent-070417-HBN]: In response, the Board moved the effective date of HWPW-VC from January 1, 2011 to January 1, 2010. See also the response to comment #122.

126) Comment [13-Lent-070417-HBN]: "… We see no valid reason to set levels higher than the 0.03 ppm ambient and urge you not under any circumstances to accept any proposed endpoint over 0.05 ppm."

Agency Response [13-Lent-070417-HBN]: We disagree. In our research, a 0.03 ppm standard is extremely difficult to meet consistently, even with no-added formaldehyde resins because wood itself contains some formaldehyde. We did not set an endpoint standard higher than 0.05 for HWPW.

127) Comment [13-Lent-070417-HBN]: "… The historical chart prepared by staff of the static nature of HCHO emissions since the HUD standard was set in 1985 is telling. It is time to move the bar again. That is why the EU and Japan decided years ago not to wait and hope that the market would sort it out and that is why we support your efforts to do the same."

Agency Response [13-Lent-070417-HBN]: We agree. From a public health protection standpoint, there are clear benefits that can be realized from reducing HCHO emissions from composite wood products from today's levels.

128) Comment [13-Lent-070417-HBN]: "… Significant improvement in what we and our children are exposed to can only come by clear appropriate regulatory action that places the same expectations on all manufacturers."

Agency Response [13-Lent-070417-HBN]: We agree. The ATCM sets standards that must be met by all manufacturers, foreign and domestic.

129) Comment [13-Lent-070417-HBN]: "We certainly agree with the industry that enforcement is important and something that should be worked on earnestly by all parties – but in parallel, not as a delaying tactic to the overdue bar setting…"

Agency Response [13-Lent-070417-HBN]: We agree and believe there are strong enforcement elements in the ATCM.

130) Comment [13-Lent-070417-HBN]: "… It is time for the industry to stop complaining and get to work on how to best make this transition toward lower emitting products. Industry leaders like Columbia Forest Products have shown how to do this in a cost neutral way. There is no excuse for the rest of the industry not to follow."

Agency Response [13-Lent-070417-HBN]: We agree and set the emission standard effective dates accordingly. We believe that the effective dates in the ATCM allow enough time for high quality low-emitting products to be manufactured and sold to the California marketplace.

131) Comment [13-Lent-070417-HBN]: "We strongly urge you to guide the staff to return to earlier stronger approaches to this regulation and keep levels at or near ambient."

Agency Response [13-Lent-070417-HBN]: We disagree. There are limits to panel manufacturing technology and what costs the industry can assume. To move too far too quickly will only hurt the industry and jeopardize the public health benefits that would be realized by a timely transition to lower emitting products.

132) Comment [16-Overgard-070419-HPVA]: "We propose that the appropriate Phase 2 emissions levels should be 0.06 ppm rather than 0.05 ppm [for HWPW] proposed in the current version of the rule."

Agency Response [16-Overgard-070419-HPVA]: We disagree. There are presently two cost-competitive options for manufacturing Phase 2 compliant HWPW – PVA and Purebond™ that are available for immediate use, and other options are likely to be developed in the near-term. In our view, this supports the feasibility of the Phase 2 emission standards for HWPW (see p. 101 to 103 in the ISOR).

133) Comment [17-Whalen-070419-Columbia]: Recommended combining the standards for HWPW-VC and HWPW-CC with the following effective dates: Voluntary Phase 1 standard of 0.07 ppm on January 1, 2008; Mandatory Phase 1 standard of 0.07 ppm on January 1, 2009; and mandatory Phase 2 standard on January 1, 2010.

Agency Response [17-Whalen-070419-Columbia]: We disagree with combining the standards and effective dates for HWPW-VC and HWPW-CC. We believe that the distinction between the two products should be preserved, as HWPW-CC contains core materials (i.e., particleboard or MDF) that are allowed to have higher formaldehyde emission limits in the ATCM. As such, we believe that it is important to allow lower emitting particleboard and MDF products to be available for use by manufacturers of HWPW-CC to meet the Phase 1 and Phase 2 standards. The Board did, however, move up the Phase 2 effective date for HWPW-VC from January 1, 2011 to January 1, 2010.

134) Comment [17-Whalen-070419-Columbia]: "California is already at risk of becoming a toxic dumping ground for high-fuming, formaldehyde-based composite wood panels that cannot be sold into other global markets…"

Agency Response [17-Whalen-070419-Columbia]: We agree that the point raised by the commenter is appropriate. This is why we elected to set our standards in two phases. One important benefit of the timing of the Phase 1 standards is to prevent high emitting products from being sold in California – absent an emissions standard, products with emission values higher than the HUD standard can be sold legally in California since they may not be for use in manufactured homes.

135) Comment [17-Whalen-070419-Columbia]: "… Critics of the implementation timelines as "too swift" should be ignored – California's intention to rid the air of HCHO toxic air contaminants has been the "handwriting on the wall" since 1992."

Agency Response [17-Whalen-070419-Columbia]: We agree that the point raised by the commenter is appropriate. We held our first public workshop in 2001 and indicated our intention to regulate HCHO emissions from composite wood products. It is clear that some parties did not believe that action would be taken and elected to continue with business as usual.

136) Comment [24-Landry-070423-CWIC]: "This ATCM is unlike any other that CARB has developed. It is not simply a "content" regulation measuring the amount of a chemical in a container – it restricts dynamic emissions from a range of panel products and similarly from a host of household objects such as furniture and cabinets that are made from them. The emissions do not necessarily relate to the amount of HCHO in the product."

Agency Response [24-Landry-070423-CWIC]: We disagree – HCHO emissions from HWPW, PB, and MDF are related to the amount of free, unreacted HCHO within a panel product and is derived from the resin used to bind the product.

137) Comment [24-Landry-070423-CWIC][26-Stoler-070423-Boise]: "The use of ceiling values requires manufacturers to produce at substantially lower emission targets because of the inherent variability in the raw materials, production processes and repeatability of the compliance test itself. Assurance of compliance is essential. Modest changes in the range of $1/100^{th}$ to $2/100^{th}$ of a ppm are absolutely essential in the Phase 2 ceiling levels. Even with those changes the CARB rule would be the most comprehensive, toughest HCHO control measure in the world."

Agency Response [24-Landry-070423-CWIC][26-Stoler-070423-Boise]: While we recognize that the emission standards will be the toughest HCHO control measure in the world, the standards are based on the use of viable resin technologies. Therefore, we disagree that the additional "$1/100^{th}$ to $2/100^{th}$ of a ppm" are absolutely essential to meeting the Phase 2 ceiling levels. As indicated in Chapter V of the ISOR, resin options are available for manufacturers to meet the standards in the ATCM. We believe that the Phase 2 emission standards are feasible, achievable, and necessary.

138) Comment [24-Landry-070423-CWIC]: "The proposal represents the toughest comprehensive standard in the world… Unlike international standards that apply only in certain situations, but not others, the ATCM applies to all applications… The test used by CARB is a pass/fail ceiling limit with no exceedances or reclassification possible. There are very harsh penalties for non-compliance."

Agency Response [24-Landry-070423-CWIC]: We agree – no response necessary.

139) Comment [24-Landry-070423-CWIC][67-Livingston-070426-CWIC]: "CWIC carefully evaluated the manufacturing processes, available technology, needed product properties and the significant production variables in developing recommended levels for emission limits… Although CWIC's proposals vary slightly from those proposed by CARB, those differences are essential and would still result in the toughest standard in the world."

Agency Response [24-Landry-070423-CWIC][67-Livingston-070426-CWIC]: We disagree that "those differences are essential." We have identified more than one option for meeting the Phase 2 standards and believe that the use of any of the specified options will allow manufacturers to consistently meet the limit. We also set the Phase 2 effective dates between January 1, 2011 and July 1, 2012 to allow time for all the manufacturers to meet the limits (see pages 103 to 107 of the

ISOR). Raising the standards only reduces the public health benefit that would be achieved following implementation of the ATCM.

140) Comment [24-Landry-070423-CWIC]: "The changes in Phase 2 numbers are necessitated by the variability of emissions from the products as well as the lack of precision of the test method. For instance, to comply with the proposed Phase 2 limit for PB of 0.09 ppm, we estimate that production will have to be targeted in the 0.04-0.05 ppm level or lower, to allow for the compounding variability of the test method and product…"

Agency Response [24-Landry-070423-CWIC]: We disagree. The numerical values of the standards considered our engineering judgment of the variability that may result from the products and the test method (see pages 103 to 105 of the ISOR). We believe the target ppm level will be higher than what industry has stated.

141) Comment [26-Stoler-070423-Boise] [27-Rush-070424-Temple Inland] [31-Warberg-070424-Plum Creek] [32-Savage-070424-SeeMac] [33-Wijnbergen-070424-Norbord] [37-Sein-070424-Rexcel] [40-Smith-070424-Uniboard] [44-Julia-070424-CPA] [45-Gregory-070424-SierraPine] [46-Gonyea-070424-Timber] [67-Livingston-070426-CWIC][81-Gregory-070426-SierraPine][86-Compton-070426-Hambro]: ". . . we support the California Wood Industries Coalition (CWIC) recommendation to adjust the Phase II . . . limits . . ." "The meeting of these levels recommended by industry by 2011-2012 would represent the most substantial emission reduction by the North American composite panel industry at any time in its history." "Even with the changes recommended by industry, the ARB rule will still be the most comprehensive, toughest HCHO control measure in the world thanks to its rigorous enforcement protocols."

Agency Response [26-Stoler-070423-Boise] [27-Rush-070424-Temple Inland] [31-Warberg-070424-Plum Creek] [32-Savage-070424-SeeMac] [33-Wijnbergen-070424-Norbord] [37-Sein-070424-Rexcel] [40-Smith-070424-Uniboard] [44-Julia-070424-CPA] [45-Gregory-070424-SierraPine] [46-Gonyea-070424-Timber] [67-Livingston-070426-CWIC][81-Gregory-070426-SierraPine][86-Compton-070426-Hambro]: We believe that resin technology allows for greater emission reductions than industry suggests, which would allow for achieving the greatest public health benefit that we can as required by state law (Safety Code sections 39665-39666). See also pages 101 to 107 of the ISOR.

142) Comment [36-Perdue-070424-AHFA]: "… we are concerned that Phase 2 is overreaching and suggest the "de-listing" of current UF resin technologies without evidence of feasibility and benefit… We strongly advocate the common sense approach of conducting a "Technical and Feasibility Review" of Phase 1 with all concerned stakeholders before

implementing Phase 2. This would give CARB staff the opportunity to do an informed analysis of best available control technology (BACT) and evaluate the impact of Phase 1."

Agency Response [36-Perdue-070424-AHFA]: We disagree. We believe the Phase 2 standards are technologically feasible and do not constitute a de-listing of current UF technologies. New formaldehyde based resin systems have shown promise insofar as meeting the Phase 2 standards for some composite wood products. Given the current availability of no-added formaldehyde resin systems for all three products subject to the ATCM, we are confident that the Phase 2 standards can be met in the timeframe specified. Decisions will need to be made as to what the most cost-effective solution is for a given manufacturer. See also pages 101 to 107 of the ISOR.

143) Comment [38-Morgan-070424-IWPA]: "Proposed regulation implementation dates must be delayed: Phase 1 to July 1, 2010 and Phase 2 to January 1, 2012. … outreach to foreign governments regarding implementation of new regulations and policies suggest that the time window for implementation of this regulation is much too quick."

Agency Response [38-Morgan-070424-IWPA]: We disagree. Many foreign manufacturers and importers participated in the development of the ATCM. We believe sufficient time to meet the standards has been provided.

144) Comment [39-Maher-070424-Great Lakes]: "Specifically, we support the CWIC recommendation to adjust the Phase 2 emission level limits as follows:

- Particleboard – a ceiling of 0.10 ppm rather than 0.09 recommended by agency staff
- MDF – a ceiling of 0.13 ppm rather than 0.11 as recommended by agency staff
- Thin MDF – a ceiling of 0.15 ppm rather than 0.13 as recommended by agency staff…"

Agency Response [39-Maher-070424-Great Lakes]: We disagree with the recommendation. The emission standards approved by the Board achieve the lowest practicable emissions in consideration of costs. See response to comment #141.

145) Comment [39-Maher-070424-Great Lakes]: "… we urge the Board to amend the Phase 2 limits as presented above to assure that the proposed regulation accomplishes its objective without placing unrealistic and unnecessary mandates on industry."

Agency Response [39-Maher-070424-Great Lakes]: We disagree. We believe the Phase 2 standards are reasonable and achievable, and would not place an unrealistic and unnecessary mandate on industry. See response to comment #141.

146) Comment [46-Gonyea-070424-Timber]: "… We continue to advocate the adoption of the 0.06 ppm for Phase 2 [for HWPW]."

Agency Response [46-Gonyea-070424-Timber]: We understand the commenter's position on this matter, but disagree on what the numerical value of the standard for HWPW should be. As pointed out in Chapter V of the ISOR, it is technologically feasible to achieve the standard adopted by the Board in the timeframe specified.

147) Comment [47-Steenson-070424-AuWPA]: "We recommend that the board adopt an emission standard that reflects the internationally accepted standard of E1."

Agency Response [47-Steenson-070424-AuWPA]: We disagree – in doing so we would not be able to achieve the maximum health protection possible as required by the Health and Safety Code.

148) Comment [49-Levin-070425-BERG]: "I do not believe that the final regulatory targets in years 2011 and 2012 of 0.11 and 0.13 ppm for MDF and thin MDF, respectively, are sufficiently protective of the population… I believe the limit should be based on a target concentration no higher than that established by OEHHA for workplace exposure which is only intended to protect workers during a 40-hour work week…"

Agency Response [49-Levin-070425-BERG]: We disagree. We believe that these limits provide an important public health benefit that is technologically achievable in the specified timeframe and in consideration of cost. The Phase 2 emission standards for MDF are about half of emissions from current-day products. This does not preclude setting more stringent standards in future years. If technological advances are made that would allow for lower emission limits to be met for those products we can return to the Board with amendments to the ATCM.

149) Comment [49-Levin-070425-BERG]: "… An emission rate (for MDF) far below the proposed limits will be required to provide protection in energy efficient residential environments with typical ventilation rates below 0.5 ach. Even at 0.5 ach, concentrations of 100 ppb or above are simply unacceptable given the health effects data on formaldehyde exposure."

Agency Response [49-Levin-070425-BERG]: We believe that the approved emission standards for composite wood products fulfill the

requirement of Health and Safety Code section 93666, are technology-forcing and represent the maximum achievable emission reductions, in consideration of cost. See response to comment #148.

150) Comment [56-Carmichael-070425-CCA]: "… We support the stringency of the standards and the "cap approach" proposed by staff but we strongly believe the industry can and should meet these standards sooner… At a minimum, the Board should accelerate the portion of the regulation that covers hardwood plywood – veneer core and hardwood plywood – composite core."

Agency Response [56-Carmichael-070425-CCA]: While the effective date for the Phase 2 standard for HWPW-VC was moved by the Board from January 1, 2011 to January 1, 2010, we believe that the standard for HWPW-CC cannot be moved up. It is necessary to allow for lower emitting particleboard and MDF products, produced to comply with the Phase 2 standards, to become available as core materials used in HWPW-CC products. See also the response to comment #133.

151) Comment [61-Demorest-070426-Columbia]: "At the same time, because of what we know about the industry, we urge CARB to be more aggressive in establishing a California "background standard" and a swift implementation timeline – requiring a transition to low and no-formaldehyde resin innovations before the end of this decade."

Agency Response [61-Demorest-070426-Columbia]: In our present view, a requirement of this kind is not practical for PB and MDF because natural wood can emit HCHO above background levels, but is achievable for HWPW-VC. However, the ATCM provides incentives for manufacturers to utilize no-added HCHO resins or ultra low emitting resins, which over time, we expect will assume a major market share for products sold to California. See also the response to comment #123.

152) Comment [64-Guay-070426-Columbia]: "One of the effects of the decline of domestic manufacturing is that the U.S. and California have become a dumping ground for products with high UF emission levels. Products that cannot be sold anywhere else in the developed world. I cannot emphasize that enough. California has become a dumping ground."

Agency Response [64-Guay-070426-Columbia]: We agree. Due to the lack of HCHO standards for composite wood products, it is currently legal to purchase low cost, high HCHO emitting products. However, with the ATCM's emission standards and comprehensive enforcement program, we believe that the flow of high emitting products into California will be curtailed upon implementation of the ATCM.

153) Comment [64-Guay-070426-Columbia]: “At Columbia, we regular(ly) test for UF emissions of imports. In the tests submitted in the record, the imports ranged from 0.29 ppm to 3.0 ppm. Keep in mind the very same factories that are sending this unsafe plywood here are supplying most of Europe’s E1 plywood, nearly all of Japan’s F☆☆☆☆ and E1 for their own country. They dump here because they can. But they can easily manufacture at lower emission levels.”

Agency Response [64-Guay-070426-Columbia]: We agree and the ATCM requires that the products meet lower emission standards by specified dates.

154) Comment [65-Royce-070426-Hercules]: “…We see these proposed regulations both as what consumers want and practical.”

Agency Response [65-Royce-070426-Hercules]: We agree – no response necessary.

155) Comment [70-Woods-070426-Columbia “In 2005, we began the commercialization of PureBond and have now successfully converted all seven of our North American plywood operations to this UF-free resin technology. In the recent weeks, we have offered to license this patented resin technology to others in the hardwood plywood industry, and are currently in discussions with two manufacturers. In addition, we are now offering to sell PureBond veneer core blanks to competing stock panel manufacturers, and have already started shipping these PureBond blanks to smaller architectural plywood producers. Subsequent to PureBond’s commercialization, at least one major competitor, Timber Products, is now advertising its own “no-added UF” hardwood plywood line, utilizing yet another soy resin system offered by Hexion. So now, there are at least four different non-UF resin approaches for hardwood plywood, all available in the marketplace today and all are Phase 2 compliant for veneer core construction. The CARB staff also recognizes this, and has appropriately moved Phase 2 implementation for veneer core hardwood plywood to January 2010. We predict that the emission testing data that CARB will be collecting following implementation will further motivate you to continue to strengthen this regulation.”

Agency Response [70-Woods-070426-Columbia]: We appreciate the information and support. We agree that if data collected following implementation shows that more stringent emission limits can be met, then that information can be used to propose amendments to the ATCM at a point in the future.

156) Comment [72-Robson-070426-AWFS]: “Phase 2 standard to be implemented in 2011 for most products that is not commercially feasible

for the wood product industry (Phase 2 levels are being achieved today, but for niche applications at a premium cost/price)."

Agency Response [72-Robson-070426-AWFS]: We disagree. The availability of low emitting niche products in the U.S. and the production of E1 and F☆☆☆☆ products in other countries is a strong indication that wide-scale production of comparable products for the California market is feasible. See also the response to comment #132.

157) Comment [72-Robson-070426-AWFS][76-Robson-070426-AWFS]: "We are not opposed to a workable standard and the Wood Industry Coalition has proposed a workable standard."

Agency Response [72-Robson-070426-AWFS][76-Robson-070426-AWFS]: We disagree that the Wood Industry Coalition proposal is a workable standard. We believe that the industry is capable of meeting more stringent standards than what they proposed. See also the response to comment #141.

158) Comment [82-Julia-070426-CPA]: "But at the end of the day, CPA must oppose the rule as it's drafted. As overreaching and unwarranted on the basis of the facts, specifically Phase 2 emission levels are premised on erroneous assumptions about what is necessary and feasible and what it costs. The recommendations are based on technology that in some cases do not exist for all regulated products and in other cases on those that are cost prohibitive on a mass production basis. You are about to put in place the toughest production standard in the world for emissions from composite panel products. And that's if you adopt the levels proposed by the CPA and CWIC. The Phase 2 levels that we proposed, so close to what the staff proposed, would result in the most dramatic reduction in HCHO emission from our products ever over the next few years. They would stretch us to expand our R&D and to innovate still further.

Agency Response [82-Julia-070426-CPA]: We appreciate the comment, but disagree that the Phase 2 levels are premised on erroneous assumptions. We have carefully reviewed the literature and information received from stakeholders. Chapter V and VIII of the ISOR discuss the technological feasibility and costs associated with the ATCM, which conclude that the standards are feasible and of reasonable cost. Factoring in the lead time provided in the rulemaking, we believe that cost-competitive Phase 2 compliant products will be available for sale in California.

159) Comment [83-Warberg-070426-Plum Creek]: "These might look very close to you. However, even at these levels, a 0.01 ppm change is huge when it comes to a manufacturer. And to get to the CARB Phase 2 numbers, we

as a manufacturer believe we are going to have to implement a complete change in the resin technology we use and the way it's delivered."

Agency Response [83-Warberg-070426-Plum Creek]: We appreciate the comment, but feel that modifications to existing UF resin systems can be made to produce Phase 2 compliant products. From our discussions with domestic resin manufacturers, we believe that they will be able to offer cost-competitive modified UF resins that can be used to produce compliant products in the 2010-2012 timeframe. In addition, the ATCM now contains incentives for the use of ultra low emitting formaldehyde (ULEF) resins, which may likely include modified UF resins (see pages 73 to 83 of the ISOR).

160) Comment [92-Landry-070426-CWIC]: "Consider this if you will. The base test for this regulation, E1333, has a section that says the repeatability of the test is 0.03. Various tests that have been made on raw wood, various studies find in some species the HCHO content naturally occurring is 0.02. And then you put on that the variability that Mr. Warberg talked about different species in urban wood and how resins interact with those. Please keep that in mind."

Agency Response [92-Landry-070426-CWIC]: We appreciate the comment and understand that manufacturers will need to contend with some variability due to HCHO emissions from natural wood, manufacturing process and test methods. The test methods in the ATCM account for this variability (see page 107 of the ISOR); the major factor is the use of the DNPH method for quantifying formaldehyde in place of the more widely used chromotropic acid-based test. The use of the DNPH method greatly improves test sensitivity. As for natural wood, some studies suggest HCHO emissions of 0.02 ppm. However, this has little impact on the HCHO emissions of manufactured composite wood products because the wood is dried during the manufacturing process. By drying the wood, the HCHO in wood is driven off, and the resultant wood has very low HCHO emissions.

161) Comment [93-Livingston-070426-CWIC]: "As a consequence, when we sat down with your staff five-and-a-half years ago to start talking about the development of this rule, we had a lot of information, data, and experience to share, and we shared it all. And when it came time to develop a proposed standard, we convened scientists, engineers, panel manufacturers, resin producers to talk about the lowest feasible standards that we can come up with that can reasonably be achieved. We put together a number, not to negotiate, but we put together a number to implement what staff said was its stated intent, to allow panel manufacturers to continue using their existing resin systems and equipment."

Agency Response [93-Livingston-070426-CWIC]: We appreciate the information that CWIC has shared with us during the rulemaking process. We concluded that there were opportunities for greater emission reductions than what was being suggested by the industry and were open about our view that more could and needed to be done to reduce public exposures to HCHO (see pages 101 to 107 of the ISOR). We did not accept or suggest that we would propose industry's recommendation as the basis for the ATCM. See the response to comment #141 regarding the technical feasibility of the ATCM's emission standards.

162) Comment [93-Livingston-070426-CWIC]: "Unfortunately, after we proposed our numbers, staff came up with lower numbers. And the matrix that I handed out that hopefully you have before you sets out the numbers staff has proposed, and juxtaposed to that are the numbers that industry has proposed. As you'll see, we have virtual agreement in Phase 1. The problem does exist in Phase 2."

Agency Response [93-Livingston-070426-CWIC]: The open literature and advertisements by Hexion, Sierra Pine, Flakeboard, Roseburg, Dynea, Columbia Forest Products and others suggest that solutions are already commercially available (see Tables V-22, V-24, and V-26 on pages 103 to 106 of the ISOR). See the response to comment #141 regarding the technical feasibility of the ATCM's emission standards.

163) Comment [93-Livingston-070426-CWIC]: "… We would urge you to amend the regulation to reflect the numbers that CWIC has proposed for Phase 2 and to do that with the recognition that if technology evolves and in years in the future you can see that there is a way to lower the numbers even further, you can come back and take another look at this regulation. On the other hand, if we're right and if we have to expend those enormous sums of money to try to achieve this, then as you have heard, there are many people whose businesses are jeopardized during that process, and there's no opportunity for us to come back."

Agency Response [93-Livingston-070426-CWIC]: The ATCM emissions standards for Phase 2 and the economic impacts of the regulation are discussed in Chapters V and VIII of the ISOR. We found that the production cost increases were reasonable and that the standards were achievable in the timeframe specified. See also the response to comment #158.

164) Comment [51-Watson-070425-IPMG][99-Watson-070426-NA]: "Adopt the HUD regulation . . ." "So here's my proposal for you folks today. If the HUD standard is acceptable – because what we're fighting about here is we're fighting about off-gassing limits of HCHO. And we're fighting about

the regulation of it. And I want both. I say the regulation. I should say the enforcement. Excuse me. Adopt the HUD standard. Let CARB prove to us that they can truly regulate it. And let's table the final decision for the required levels of compliance."

Agency Response [51-Watson-070425-IPMG][99-Watson-070426-NA]: We disagree. Adopting the HUD standard would be inconsistent with the requirements of Health and Safety Code section 39666. See the response to comment #141 regarding the technical feasibility of the ATCM's emission standards.

165) Comment [100-Harmon-070426-Hexion]: "Then there is another very real consideration is if there is a need and usually is to obtain an operating permit to run the manufacturing for the resin and for the composite wood panel products, again that is no less than a two year process. So we have some very real constraints that we have to look forward to as we judge whether the proposed regulation is doable in the time frames if it pushes things into brand-new territory."

Agency Response [100-Harmon-070426-Hexion]: We believe that the timetable for implementation is achievable since most composite wood product manufacturers will utilize "drop in" technology to meet the Phase 1 standards. These technologies are discussed in Chapter V of the ISOR (pages 101 to 104). Meeting the Phase 2 standards could take longer and so the ATCM has effective dates further into the future than for Phase 1.

166) Comment [102-Higgins-070426-FFC]: "First of all, this is not a new issue. It has been around since 1992. More recently, in 2004, as you heard earlier in the staff presentation, there has been ample time for the industry to address this concern. I think you'll hear that it's imminently doable now in the market. That's one of the reasons why the Council, despite the fact that we have a great deal of admiration for the work product of the staff, the time, care, and attention they put into this proposed measure, we have nothing but praise for. Notwithstanding that, however, on the crucial issue of timing, we believe it is imminently doable now, accessible now to move the timing forward. And we believe there is an urgency to do that, as the previous speaker alluded to. When you have a known carcinogen with deleterious effects on the environment and the safety and the health of Californians, then I think its incumbent on us to take all responsible measures to advance this timetable responsibly. And we believe that that can be done. Indeed, we believe that the solutions which are affordable, accessible, and market competitive are here today. So we certainly believe we could advance this to 2008 and we think Phase 2 can be completed by 2010."

Agency Response [102-Higgins-070426-FFC]: We appreciate the support, but disagree that the timing of the rulemaking can be accelerated for all of the products. It will take some time to develop resins for PB and MDF given the technological challenges associated with production variables. See Chapter V of the ISOR on the technological feasibility of the Phase 2 standards (pages 101 to 107). See also the response to comment #122.

167) Comment [103-Demorest-070426-Columbia]: "We believe the staff report presents overwhelming evidence for their conclusion. But at the same time, because of what we know about the industry, we urge CARB to be more aggressive in establishing a California background standard and swift implementation time line before the end of this decade."

Agency Response [103-Demorest-070426-Columbia]: We appreciate the support, but feel that we have recommended an aggressive timeline in the ATCM. See Chapter V of the ISOR on the technological feasibility of the Phase 2 standards (pages 101 to 107).

INDUSTRY-WIDE COSTS

168) Comment [7-Landry-070416-CWIC]: "We are concerned about the cost of this rule. The cost of implementation was estimated at $127 million a year in the agency's ISOR, but we believe the cost will be many times that amount. A full evaluation of economic impacts reveals that the impact of this proposed rule on the economy, composite wood manufacturers… will exceed $2.5 billion a year…"

Agency Response [7-Landry-070416-CWIC]: We disagree. The assumptions in the economic impacts analysis by CWIC reflect an extreme worse case scenario that vastly overestimates the potential impacts of the ATCM. For example, it assumes that all products will be made to comply with the California standards, which we do not believe is the only option for manufacturers, especially those that do not currently produce products for sale in California.

169) Comment [10-Higgins-070416-FFC]: "Will these regulations have a positive effect on California's business climate and economic development? Yes. The overall effect on the California economy will be beneficial… (California) is being flooded with wood products produced in China that have such high levels of formaldehyde emissions that they cannot even be sold in China… If California takes the lead in the U.S., it will give a tremendous boost to the entire green movement in the state and attract new design and building professionals."

Agency Response [10-Higgins-070416-FFC]: We agree – no response necessary.

170) Comment [24-Landry-070423-CWIC] [27-Rush-070424-Temple Inland] [92-Landry-070426-CWIC]: "We believe that it is the most expensive ATCM in terms of cost per pound of reduced emission that CARB has ever promulgated. Even by CARB's very conservative assumption, the cost would be $127 per pound, $254,000 per ton! We believe the actual cost is more likely to be four times that amount. The health benefits to the people of California from this extraordinarily costly regulation will be virtually nil."

Agency Response [24-Landry-070423-CWIC] [27-Rush-070424-Temple Inland] [92-Landry-070426-CWIC]: We disagree. On a per pound basis, this is not the most expensive ATCM ever promulgated. We believe our economic analyses accurately project the costs of the ATCM in contrast to the $2.5-billion per year estimated by CWIC's consultant. The health benefits, based on the use of OEHHA's unit risk factor, are not "virtually nil," as described in Chapter VII of the ISOR. For a projected 127 million dollars per year, the Phase 2 emission standards will reduce excess adult cancer cases in California between 35 to 97 excess cancer cases per million as pointed out in Chapter VII, page 158 of the ISOR.

171) Comment [24-Landry-070423-CWIC]: "Why the significant difference from the $127 million estimated by CARB? First, this rule will have nationwide impact, not just costs to the California producers as assumed in the ISOR. Manufacturers of panels and finished products can't effectively maintain multiple inventories, particularly when their out-of-California customers, such as furniture makers in North Carolina and Michigan, have to use compliant products… The ISOR equates manufacturing costs with prices and assumes that this static number applies through the channel. This ignores commercial reality."

Agency Response [24-Landry-070423-CWIC]: We disagree. While the rule may have a nationwide impact, this is not certain. Given that niche products and products to meet other worldwide standards are being made to order, manufacturers already have the capability to maintain multiple inventories, unless the same resins and furnishes are being used to make all of the above products. Market forces will dictate what portion of the cost increases will be passed on from manufacturer-to-distributor and so forth. We did not feel that applying an estimated increase in cost with each transfer in the distribution chain would provide a more accurate projection of what costs would be at other points in the distribution chain.

172) Comment [46-Gonyea-070424-Timber][51-Watson-070425-IPMG]: "The costs . . .especially in Phase 2, have been significantly underestimated."

"… To put it in other words, I am flabbergasted at the explanations that CARB staff has offered as fact. These are not facts – these are opinions based upon assumptions."

Agency Response [46-Gonyea-070424-Timber][51-Watson-070425-IPMG]: We disagree. We support, with analysis, our judgments of what we believe is achievable and of reasonable cost (see Chapter VIII of the ISOR, pages 205 to 209). The ISOR sets the technical rationale for the proposed regulation (see Chapter V, pages 101 to 107).

173) Comment [51-Watson-070425-IPMG]: "Lastly, the cost of this program I had seen in the staff reports is estimated to swell from 154 million dollars per year to over 1.5 billion if I recall correctly… An expenditure of this size I would hope would require greater oversight by the state budget process."

Agency Response [51-Watson-070425-IPMG]: We disagree. We estimate the cost of the ATCM to be $127 million per year for Phase 2, which we believe is an upper end estimate (see Chapter VIII, pages 205-209). With time and improvements in resin technology and the manufacturing process, we expect that the cost could be lower in 2010-2012.

174) Comment [62-Whalen-070426-Columbia] [105-Whalen-070426-Columbia]: "One of the primary arguments the opposition has brought forth relates to the economic devastation this regulation will have on California's wood products fabricators and consumers' pocketbooks. Your staff did not believe these claims, and neither should you. Based on Columbia's extensive experience manufacturing and selling formaldehyde-free hardwood plywood, we contend that any cost increases driven by this regulation will be negligible at best."

Agency Response [62-Whalen-070426-Columbia] [105-Whalen-070426-Columbia]: We agree. Our analyses indicate that the projected cost increases are considerably lower than that estimated by CWIC. See Chapter VIII of the ISOR.

175) Comment [62-Whalen-070426-Columbia]: "The staff report has more than adequately addressed the economic impact of this regulation on the industry and there is ample testimony in the record that this regulation will have a negligible economic impact on consumers."

Agency Response [62-Whalen-070426-Columbia]: We agree – no response necessary.

176) Comment [85-Altman-070426-HPVA]: "I will call your attention to a slide that you've seen that says the change in owners' equity averages 11.6 percent. I call your attention to a table on page 187 of the staff report that

reflects that the reductions in owner equity for hardwood plywood as a product is 64 percent, again, indicative of the financial burden that's borne by hardwood plywood products. It is unfair after considerable time and rule development to have a last-minute acceleration of the one year for Phase 2 requirements. And we respectfully request that the Phase 2 0.05 ppm emission level requirements be returned to January 1, 2011."

Agency Response [85-Altman-070426-HPVA]: We appreciate the comment, but feel that with the present commercial availability of two no-added HCHO resin systems (at a 15% cost increase), the Phase 2 standard for HWPW-VC can be met with cost-effective resins by January 1, 2010. See also comment #155 and page 206 of the ISOR.

177) Comment [86-Compton-070426-Hambro]: "I urge you to . . . simplify compliance, reduce cost . . ."

Agency Response [86-Compton-070426-Hambro]: We believe the compliance elements are essential for the regulation to be fair, workable, and enforceable, and we believe the cost is not unfair to any particular industry sector. See also the response to comments #60 and #88.

178) Comment [92-Landry-070426-CWIC]: "We have proposed or submitted an economic model based on the Department of Commerce, Bureau of Economic Analysis Input/Output model. We believe the true cost for California alone will be over $500 million a year and that nationwide it will be much higher."

Agency Response [92-Landry-070426-CWIC]: We disagree. We do not agree with a number of the assumptions used in the industry analysis and favor our own analysis as more representative of the actual cost to the industry (see pages 205 to 209 of the ISOR).

PANEL COSTS

179) Comment [14-Titus-070419-KCMA]: "Considering the huge additional cost and questionable ability of composite wood producers to meet the extremely low emission levels of Phase 2 of the proposed ATCM, we request the Board to lower the Phase 2 ceiling values to achievable levels requested by the California Wood Industry Coalition."

Agency Response [14-Titus-070419-KCMA]: We disagree. We do not believe the cost of producing lower emitting products will be excessive or that wood producers cannot meet the Phase 2 standards. See also the response to comment #176.

180) Comment [34-Keeling-070424-Roseburg]: "Proposed ATCM Phase 2 will dramatically increase manufacturing costs. Our experience with manufacturing low emission composite panels validates the claims of dramatically higher costs of compliance with the proposed ATCM. In fact, we have found that low emission panels cost at least 60% more to manufacture than panels made with commonly used urea-formaldehyde resins…"

Agency Response [34-Keeling-070424-Roseburg]: We disagree. We estimate that cost increases will be less than 60% (see pages 205 to 209 of the ISOR). As more experience is gained and competition increases, the estimated increases may not be as great as originally projected.

181) Comment [38-Morgan-070424-IWPA]: "… Even though it is our view that the staff report grossly underestimates the total cost to the industry, a 30-percent increase in cost is not insignificant…"

Agency Response [38-Morgan-070424-IWPA]: We appreciate the comment, but disagree that the total cost to industry is grossly underestimated. The rulemaking principally applies to panel manufacturers and the costs that they may incur as a result of complying with the emission standards. The projected 30% production cost increase is an upper-end estimate representing the greatest projected increase in price. In light of projected costs, the Board accepted the costs as reasonable given the anticipated health benefits. In addition, future resin technology innovation, as discussed in Chapter V of the ISOR (p. 101 to 106), will likely mitigate compliance costs.

182) Comment [45-Gregory-070424-SierraPine]: "The cost differential is a reality and leads me to my next concern. Passing on higher costs to our customers will further put them in an uncompetitive situation, particularly when foreign suppliers will be able to import products that are not ARB compliant… The kitchen cabinet industry may be next."

Agency Response [45-Gregory-070424-SierraPine]: We disagree. Upon implementation of the standards, both domestic and foreign manufacturers will both need to comply, therefore, no cost advantage will exist. See also the response to comment #88.

183) Comment [62-Whalen-070426-Columbia] [105-Whalen-070426-Columbia]: "Our business records confirm the increased cost for PVA plywood compared to UF plywood represents a cost increase of no more than 15 percent to our distributor customers. When we use PVA glues to achieve formaldehyde-free, our average UF panel price was $38. With this cost increase, a PVA panel would sell for $44, a $6 per panel increase. Translating that into a consumer impact, the average kitchen remodel is

about $25,000. And new cabinets use on average 15 panels to build these. At $6 more per panel, the cost impact of those 15 panels on this kitchen remodel would be only $90. This represents less than a one percent increase for the entire kitchen remodel. The staff report corroborates our figures from their own research on PVAs as an alternative to urea-formaldehyde. And these figures don't take into consideration the economies of scale or manufacturing advantages to switching from UF resins. For example, Columbia reduced air emissions by as much as 95 percent at our mill locations, negating the need for additional pollution equipment to convert to formaldehyde-free manufacturing."

Agency Response [62-Whalen-070426-Columbia] [105-Whalen-070426-Columbia]: We agree and fully expect that the cost impact of the ATCM to be less than the high-end estimate we presented in Chapter VIII of the ISOR (pages 205 to 209).

184) Comment [73-Chappell-070426-Columbia]: "Claims. As the leader of the Monday meetings on production sales, I was privy to the problems that were asserted by customers and distributors regarding the PureBond product. Claims were significantly higher than when UF resins were being used, one settlement in the high five figures. Several customers changed to other suppliers. Also our internal reject rate increased from around 5% to almost 8% during 2006."

Agency Response [73-Chappell-070426-Columbia]: We appreciate the information – no response necessary. See also the response to comment #185.

185) Comment [84-Keeling-070426-Roseburg]: "We worked together with the resin supplier and formulated a product that we thought had a market appeal for a very small niche. And in fact, if you look at our total production today, our Sky Blend product, Sky Ply, accounts for two percent of our product. That is all the demand we have. We would make more, but the market demand is just simply not there."

Agency Response [84-Keeling-070426-Roseburg]: We appreciate the comment, but believe that a requirement to purchase and use low emitting products will increase the demand for Phase 1 and Phase 2 compliant products as those standards become effective. The existence of the niche product demonstrates that such products are commercially viable; a requirement to produce and sell lower emitting products in California will create the demand for products like Sky Ply.

186) Comment [84-Keeling-070426-Roseburg]: "The cost of this product is very high. Our cost premium for the product is 60 percent. The resin is 70

percent higher in cost. Manufacturing process slows down at least 40 percent. That's on a good day. Our business and wood product business in general is a low margin business. An example of that is look at the exodus of public companies from wood products in the wood products business. There's only two public companies left."

Agency Response [84-Keeling-070426-Roseburg]: We appreciate the comment, but disagree on the magnitude of the difference in cost (see pages 205 to 209 of the ISOR). Other representatives from Columbia Forest Products have stated that the product is cost-neutral to products made with urea-formaldehyde resin. Staff believes that the exodus of public companies from the wood products business should have improved the profitability of the remaining businesses.

187) Comment [98-Schroeder-070426-WMMPA]: "But, first, as presented earlier, moving this regulation forward will increase the cost of MDF moldings and millwork. MDF molding manufacturers are asking themselves how Phase 2 of the proposed regulations will be met and have pressed their suppliers for answers. The response is alternative resins during the manufacturing process of the MDF board at significantly higher cost to the MDF manufacturer. MDF molding manufacturers will lose their competitiveness in the market against solid wood moldings immediately. MDF molding and millwork was born in the marketplace years ago as a high quality economical alternative product to solid wood. The cost associated with new regulations will disseminate the advantages of MDF moldings to compete on the open market."

Agency Response [98-Schroeder-070426-WMMPA]: We disagree. While we project that the price of Phase 2 compliant MDF will be more expensive than it is today (see pages 205 to 209 of the ISOR), competition among suppliers is likely to keep prices as low as possible. We believe that the price of MDF moldings will further decline as resin technology improves over time. Thus, we expect that MDF moldings will remain as an economical alternative to solid wood moldings. See also the response to comment #189.

188) Comment [103-Demorest-070426-Columbia]: "So you know that 40 percent of our industry is compliant with Phase 2 standards right now. And the next step that we have taken is we've offered to the rest of our industry that we will sell them our resin system at a nominal cost above what they're paying now, certainly less than a dollar a panel. So I'm here to tell you that our industry, the hardwood plywood industry, can be 100 percent compliant before the end of this year if they choose to do so."

Agency Response [103-Demorest-070426-Columbia]: In response to this comment, the Board moved the effective date of the HWPW-VC standard

from January 1, 2011 to January 1, 2010. We conclude that the hardwood plywood industry as a whole needs more time to evaluate and test resin systems, including the use of Columbia's no-added formaldehyde resin system. Therefore, we did not believe that the HWPW standards could be moved to January 1, 2008. See also the response to comment #133.

189) Comment [112-Uhland-070426-CalAg]: "I'm here today to lend my support to CARB's comp wood ATCM as a composite panel manufacturer. When the CalAg plant opens in 2008, we will produce a true MDF using a formaldehyde-free MDI adhesive that can be sold at a price that is competitive with conventional wood-based MDF, a product that's currently manufactured with urea-formaldehyde. We have read and heard a great deal of testimony that CARB's comp wood regulations will cause MDF prices to skyrocket. And I'm here today to tell you that CalAg will set formaldehyde-free MDF at a price that is very competitive to its urea-formaldehyde based counterparts. Distributors, fabricators, and customers will not be significantly affected, if affected at all, by production costs."

Agency Response [112-Uhland-070426-CalAg]: We appreciate the information – no response needed.

PANEL EMISSIONS TESTING

190) Comment [1-Davis-070314-Regal AQ]: "I think the preferred Japanese test method is the JIS A 1901 (chamber method), not the desiccator method JIS A 1460. … The JIS A 1901 can also be more directly compared with the ASTM E1333 and EN 717-1. … I have not tried to account for differences in the way the edges of the samples are treated. … The only way this can accurately be done is to run side by side tests with the same system."

Agency Response [1-Davis-070314-Regal AQ]: We agree that points raised by the commenter are appropriate. The Japanese are moving toward a surface emission test for their products, and it (JIS A 1901) is more directly comparable to the ASTM E1333 test. However, an exact comparison between the ATCM's standards and the Japanese standards can only be achieved with side-by-side testing. In estimating what an equivalent ASTM E1333 value would be for the Japanese standards based on the JIS A 1901 test, we estimate that a "F☆☆☆" panel would be 0.01 to 0.05 ppm (which agrees with Regal Air Quality, Inc.), and a "F☆☆☆☆" panel would be < 0.01 ppm. While this would lead one to conclude that the "F☆☆☆" standard is slightly more stringent than our proposed standards, the JIS A 1901 allows for edge sealing, since edge emissions would not be "… the surface from which formaldehyde shall be

emitted into the interior of a room …" (Building Center of Japan, 2004). If you assume a 33 to 67% increase in emissions from edges (not quantified due to uncertainties in how much material is used in a JIS A 1901 test), the ASTM E1333-equivalent test value would be about 0.07 to 0.09 ppm – comparable to Phase 2 standard for PB, but lower than the Phase 2 standard for MDF. (Literature Cited: (The) Building Center of Japan. 2004. Performance testing and evaluation manual for emission rate of formaldehyde from building materials. Report No. BR-BO-11-02. 10 pp. Revised: 19 April 2004.) See also Appendix H of the ISOR.

191) Comment [7-Landry-070416-CWIC]: Section 93120.9(a) – Compliance test methods. Three acceptable compliance test methods are provided in this section: "… conducted using either (A) the ASTM E-1333-96 (large chamber test method) or (B) a test method correlated to ASTM E-1333-96. An alternate test procedure may also be used as specified in sections 93120.9(a)(1) through 93120.9(a)(3)."

What is the difference between the method allowed in (B) and the method "also" allowed in the following sentence? Indeed, section 93120.9(a)(1), which is referenced in the second sentence, requires such correlation.

We recommend that the language be changed to read: "… conducted using either (A) the ASTM E-1333-96 (large chamber test method) or (B) a test method correlated to ASTM-E-1333-96 and approved as specified in sections 93120.9(a)(1) through 93120.9(a)(3)." The whole regulation is premised on the E-1333 test. All alternate test methods should be shown to correlate.

Methods other than the large chamber may be used for compliance testing if they can show "equivalent results." What is the measure of equivalence?

Agency Response [7-Landry-070416-CWIC]: We agree that points raised by the commenter are appropriate. The final regulation order was modified to clarify the use of compliance test methods. Section 93120.9(a) has been revised to allow the use of a secondary method, demonstrated to be equivalent to the large chamber method. In addition, specific criteria have been added to outline how equivalency can be demonstrated.

192) Comment [16-Overgard-070419-HPVA]: "We recommend that industrial panels and wall panels be tested at the industrial panel loading rate of 0.13 ft^2/ft^3."

Agency Response [16-Overgard-070419-HPVA]: We disagree. The long record established using the prescribed loading rates would be

compromised by such a change. The hardwood plywood industry has developed many years of certification emissions data based on the prescribed loading rates. Furthermore, staff used this data to establish the HWPW emission standards. Therefore, any change to the loading rates would necessitate a corresponding change to the emission standards. Since no data exist based on the requested 0.13 ft^2/ft^3 loading rate, the standard cannot be adjusted.

193) Comment [22-Whalen-0704020-Columbia]: "None of the panels tested would have even passed under the U.S. HUD standard formaldehyde emission threshold of 0.30 ppm"

Agency Response [22-Whalen-0704020-Columbia]: Commenter was referring to independent testing that revealed high emissions from imports. We appreciate the information about imported plywood panels, which illustrates the need to curtail high emitting imports.

194) Comment [22-Whalen-0704020-Columbia]: "A panel which was represented as E-1 from China did test out at 0.105 ppm"

Agency Response [22-Whalen-0704020-Columbia]: We appreciate the information to further support our intent to address high emitting imports with our enforcement program.

195) Comment [24-Landry-070423-CWIC]: "… The homogeneity of the furnish, generally and particularly in the faces of panels, directly impacts the emission profiles."

Agency Response [24-Landry-070423-CWIC]: We agree that the point raised by the commenter is appropriate. It is our understanding that differences in furnish homogeneity are overcome in large part by using different resins in the face and core layers of a panel. The ATCM's emission standards in 93120.2(a) already account for process and testing variability.

196) Comment [38-Morgan-070424-IWPA]: "Equivalent test methods are important… Overseas product that meets the requirements of this proposed regulation should not be discriminated against due to language or procedure."

Agency Response [38-Morgan-070424-IWPA]: We disagree. As there is no formal agreement among testing agencies as to the "equivalency" of different test methods, the test methods in the ATCM must be used to demonstrate compliance with the emission standards. If overseas products meet the ATCM's emission standards, then they would not be

discriminated against. However, all panel products must be third party certified using referenced test methods.

197) Comment [47-Steenson-070424-AuWPA]: "We proposed that the board consider recognition of other internationally recognized product certification schemes… In these schemes, emissions are monitored and products are stamped according to their emission class. If recognition protocols were established, this would alleviate the need for wasteful multiple certifications."

Agency Response [47-Steenson-070424-AuWPA]: We disagree. While this might work for Phase 1, other internationally recognized product certification schemes do not require that products meet emission limits comparable to the low Phase 2 standards and do not contain as comprehensive an enforcement structure as the ATCM. In the mean time, multiple certifications are necessary.

198) Comment [47-Steenson-070424-AuWPA]: "We are also concerned by the reliance of the rule on the emissions based on ASTM E1333, which is not readily available internationally. It would be useful to allow other international standards to be recognized… allowing the use of already established international testing facilities."

Agency Response [47-Steenson-070424-AuWPA]: We agree that the points raised by the commenter are appropriate. Staff evaluated the assertion that insufficient large chambers were available internationally. While some countries like China and Indonesia did have large chambers due to the HUD requirements, most of those facilities were not in operation. According to import statistics, the top exporting countries into California are China, Canada, Malaysia, Indonesia and Brazil. While we are aware of some companies interested in being third party certifiers in those countries, the demands on the large chamber would be very substantial given the number of individual mills that currently supply California.

To address this concern, staff evaluated current test methods to determine precision and concluded that certain small chambers could achieve a very high correlation to the large chamber when tested in accordance with ASTM D 6007-02. Based on this, staff has included an allowance to use a "secondary" test method that can be demonstrated to provide equivalent results to the "primary" or large chamber test method. This will dramatically reduce the dependence on the primary test method and add to the effectiveness of third party certifiers since the small chamber test is shorter to run and involves much smaller samples. In addition, international test methods may be used as alternative test methods if

these methods are shown to be equivalent, as provided by the ATCM. See also the response to comment #103.

199) Comment [49-Levin-070425-BERG]: "ASTM Standard E1333 is inappropriate for the regulation… DNPH is included as an alternate in the standard, but it should be the required method. There is an ASTM standard for the DNPH method."

Agency Response [49-Levin-070425-BERG]: Third party certifier laboratories have the option, under the primary or secondary test method, to use the DNPH method to ensure the sensitivity and accuracy of their quarterly tests to show compliance with the Phase 2 emission standards. For the Phase 2 standards, we believe that laboratories will favor the use of the DNPH method due to the low emission levels that must be met.

200) Comment [74-Bradley-070426-GVM]: "93120.9(c) Enforcement Test Method … The latest ATCM draft says "Emission testing of samples of finished goods containing HWPW, PB, and MDF shall be conducted …" I believe what the writers meant to say was "Emission testing of samples of HWPW, PB, and MDF contained in finished goods…" In other words, if there's MDF in a chair back, you want to test a sample of the MDF, not a sample of the finished chair, with steel, fabric, plastic, etc."

Agency Response [74-Bradley-070426-GVM]: We agree that the point raised by the commenter is appropriate and have modified section 93120.9(c) to clarify that HWPW, PB and MDF contained in finished goods will be tested for emissions.

201) Comment [85-Altman-070426-HPVA]: "Errors in the H1 loading rate table of the staff report make it clear that the emission reductions in Phase 1 for hardwood plywood is 77 percent rather than the 53 percent reported in the staff report. In Phase 2, the reduction is 86 percent rather than the 71 percent as reported. These are dramatic changes and they're difficult goals to meet."

Agency Response [85-Altman-070426-HPVA]: The loading rate for hardwood plywood in Table H-1 is 0.425 m^2 m^{-3} while the factor in ASTM E 1333-96 is 0.43 m^2 m^{-3}. Use of 0.43 m^2 m^{-3} in place of 0.425 m^2 m^{-3} does not result in the magnitude of change suggested by the commenter.

We believe that the Phase 2 standard for hardwood plywood can be met with existing soy and PVA-based resin systems, and that it may even be achieved with modified UF resins that will require mill-testing in the coming years. See also pages 101 to 103 of the ISOR.

202) Comment [121-Bradway-070426-Mannington]: "… If you're dealing with ASTM standards, the review process says you need to review it within five years. If it's not updated within eight years, it's out the door. So it just needs to really be reflected to say being E1333 and leave off the year so it defaults to the most current version…"

Agency Response [121-Bradway-070426-Mannington]: We disagree. It is necessary to add the year designation to the ASTM E 1333-96 because the requirements of the regulation must be specific and not subject to change when ASTM updates the test method. If ASTM updates the test method, then CARB staff must evaluate the changes to determine the appropriateness of proposing a regulatory amendment for a updated test method reference.

203) Comment [121-Bradway-070426-Mannington]: "In terms of, you know, one of the things that has been brought up in terms of enforcement was being able to use the FLEC to then screen to be able to then use the small chamber for determination in terms of compliance. What we would ask for is since obviously that correlation to the large chamber E1333 must exist whether or not that would remove the requirement to go ahead and ask for that correlation. So if it would allow the small chamber – and we heard earlier the testimony that said with what is going on with CHPS, the California High Performance School systems, there are several products that are complying to lower thresholds and they are using the small chamber. They are third party certified. What we are asking is basically if that would provide the compliance considerations to the E1333."

Agency Response [121-Bradway-070426-Mannington]: We agree that the points raised by the commenter are appropriate and have modified the regulation to allow the use of small chambers (ASTM D 6007-02) as a secondary method by third party certifiers. For quality control programs, a correlated small chamber provides the most reliable data in terms of verifying the manufacture of compliant composite wood products.

PROCESS MODIFICATIONS and OPERATING COSTS

204) Comment [14-Titus-070419-KCMA]: "…The regulation is certain to increase manufacturing cost, likely more than estimated by the CARB staff, and therefore, is a major cause of concern when global competition threatens all U.S. manufacturing. Today, cabinet manufacturing remains a predominantly North American industry. That could change."

Agency Response [14-Titus-070419-KCMA]: We disagree because compliance with the HCHO emission standards will be achieved mainly through "drop in" technology. However, we do expect that manufacturing

costs will increase to some degree (see pages 205-209 of the ISOR). We do not believe that costs will be higher than we estimated, as the estimates in the ISOR represent what we believe to be the upper limit cost increases. Rigorous enforcement is the key to ensuring fair competition in the marketplace and it is our intent to carry out an effective program to provide fair competition. See also the response to comment #84.

205) Comment [14-Titus-070419-KCMA]: "The Board needs to understand that the ATCM will become a *de facto* national standard. KCMA members with production outside the state but who market in California will be forced to use only ATCM compliant materials in order to insure compliance… I am aware of no company, other than those operating in California, that could dedicate an entire plant's operations exclusively to products for the California market and remain competitive."

Agency Response [14-Titus-070419-KCMA]: We disagree. It will take time for states and/or USEPA to evaluate our analyses and decide whether to adopt similar measures. Niche products are currently being made in response to the growing demand for Green Building products which suggests that multiple product lines are currently being produced and maintained. Also, as pointed out on page 215 of the ISOR, an average kitchen remodel will increase the cost by only about 1%. It will be an individual business decision to carry two inventories or just one.

206) Comment [24-Landry-070423-CWIC]: "… The composition of the resin is the factor that can be best controlled – these compounds are mixed in reactors with good quality control on inputs. Downstream, however, the control is more difficult. For example, the furnish that goes into the production of PB and MDF can vary greatly… wood supply is a growing problem for the industry."

Agency Response [24-Landry-070423-CWIC]: We agree that resin composition is the best controlled factor and that downstream control is more difficult. We believe that an adequate amount of lead time was provided before the emission standards take effect to allow manufacturers to identify what actions need to be taken to ensure that the furnish (i.e., wood particles and fibers used to make particleboard and MDF, respectively) can be used to make low emitting products. The use of no-added HCHO resins may be a cost-competitive option for manufacturers to consider given their concerns over wood supplies. Also, future resin technologies such as fortified melamine-urea-formaldehyde resins may contain effective scavengers to mitigate formaldehyde emissions from natural wood. See also pages 101 to 107 of the ISOR where we discuss in detail our assessment of best available control technology.

207) Comment [25-Hubbard-070423-Darlington]: "The proposed Phase 2 ceiling limits for HCHO emissions should be higher to allow for the fact that the industry's products must be manufactured significantly below the regulatory ceiling to allow for variability in the raw materials, processing equipment and test methods… Additionally, it appears that the costs to comply with Phase 2 are extremely unreasonable."

Agency Response [25-Hubbard-070423-Darlington]: We disagree. The Phase 2 limits take into account variability in raw materials, testing and processing (see page 2 of Appendix D in the ISOR). As pointed out in Chapter VIII of the ISOR, the compliance cost estimates consider changes in resin formulations and other costs that could affect the panel production cost (pages 205-209). However, the resin formulations used for the cost estimate were examples of expensive resin systems that would actually achieve much lower emissions than the Phase 2 standards. For example, the MDF cost analysis assumed the use of methylene diisocyanate (i.e., the most expensive no-added formaldehyde resin option), which would achieve emissions at around 0.03 ppm well below the 0.11 ppm Phase 2 emission standard. Therefore, the cost estimates are conservative.

208) Comment [59-Taylor-070426-Veneer]: "All of our plywood is made from PB or MDF as core – these cores contain very small amounts of formaldehyde – but under the new regulations could not be used in our product. If this measure passes, it WILL put us out of business."

Agency Response [59-Taylor-070426-Veneer]: We disagree. Those materials can be used in a composite core product so long as the plywood panel achieves a test value that meets the ATCM's standards. In our view, the probability of producing a plywood panel that meets the ATCM's emissions standards is likely to be greater if lower emitting core materials are used, but this does not prevent manufacturers from using whatever core materials they choose to. If your products are to be sold to California, comparable products must also meet the ATCM's emission standards and would not confer a competitive advantage to other businesses insofar as the cost of core materials.

209) Comment [62-Whalen-070426-Columbia]: "And these figures don't take into consideration economies of scale or the manufacturing advantages to switching from UF resins. For example, Columbia reduced air emissions by as much as 95% at our mill locations, negating the need for additional pollution equipment upgrades."

Agency Response [62-Whalen-070426-Columbia]: We appreciate the information – no response necessary.

210) Comment [66-Mullen-070426-Hercules]: “Yes – Hercules has successfully converted several hardwood plywood mills cost neutral to urea-formaldehyde adhesives.”

Agency Response [66-Mullen-070426-Hercules]: We appreciate the information. We accounted for the cost-neutral assertions made by Columbia Forest Products in developing the Phase 2 emission standards for HWPW and also in recommending to the Board at the hearing that the Phase 2 emission standard effective date for HWPW-VC be moved from 2011 to 2010.

211) Comment [72-Robson-070426-AWFS]: “California and other domestic wood product manufacturers will spend time and money trying to comply with the regulation, or go out of business trying. The added costs of compliance will affect every business in the wood products supply chain, including machinery companies and fabric and filling companies.”

Agency Response [72-Robson-070426-AWFS]: While we agree that there will be added costs of compliance for manufacturers of raw composite wood product panels, we do not believe that every business will be similarly affected.

212) Comment [83-Warberg-070426-Plum Creek]: “And recognizing that there is a small market for ultra-low emission products, we as a company set out to evaluate what might be required to operate below the CARB Phase 2 numbers just to see what it would take. And because of the variability in our process – and this is a very important point. We have variations in wood species, wood moisture content. We have various temperatures in our manufacturing process. There are a number of things that create variability.”

Agency Response [83-Warberg-070426-Plum Creek]: We appreciate the information. If there are requirements to purchase and use low-emission products, the demand for these products will increase. We are aware of industry concerns related to process and wood species variability and believe that adjustments in manufacturing controls and improvements in resin systems will allow for products to be made that consistently comply with the standards. See also the response to comment #160.

213) Comment [83-Warberg-070426-Plum Creek]: “And also it creates operational concerns. It will significantly create capital challenges to put in the equipment to store, to convey, and to apply phenol resins to our production process. And it will require much higher press and dryer temperatures, which means burning more natural gas, more emissions. We believe it will lead to press temperatures under operations that will

significantly increase the risk of fire in our plants and increase the risk of safety."

Agency Response [83-Warberg-070426-Plum Creek]: We appreciate the comment, and as pointed out on pages 75 and 78 of the ISOR, the use of hardeners or accelerators may allow for lower cure times for phenol-formaldehyde resins. It is our understanding that PF resins are currently being used to manufacture products sold in the U.S. and the increased risk of fire was not brought to our attention. Furthermore, future ultra low emitting formaldehyde (ULEF) resins may offer more options in the future to meet the prescribed emission performance levels of both no-added formaldehyde (NAF) resins and ULEF resins.

214) Comment [86-Compton-070426-Hambro]: "Both of our plants have probably the greatest experience running alternative resin systems of anybody in the United States. The Arcata plant at one time in the mid-seventies developed Red X, which was a PF bonded product. We discontinued it in the '80s because of the instability of the product and continuing product claims. At Crescent City, we developed a product called Cres X. That was developed in about 2000. We discontinued it in 2006 because of instability and product claims. Both of those products, the production rates were 50 percent longer, which means we would have a 50 percent reduction in our production capacity. The resin costs were 50 percent higher. It was only for niche markets. We could not operate our plant running those products. We would be out of business today based on the CARB proposal."

Agency Response [86-Compton-070426-Hambro]: We appreciate the comment. In Chapter VIII of the ISOR (pages 205-209), our estimates for the cost increases to produce panels meeting the Phase 1 and Phase 2 standards were lower than the estimates provided. The estimates in the ISOR were upper-end estimates, representing what we believe to be the greatest projected increase in price.

215) Comment [92-Landry-070426-CWIC]: "We would submit, however, that the proposal is tremendously overstated for a number of reasons. First of all, it takes into account only a very limited part of the industry. We believe that industry throughout the country will not be able to create double inventories when they're selling, for instance, to furniture manufacturers in North California who would be selling their product back into North Carolina. The purpose of enforcement would drive many manufacturers whether in California or not to have one approach, and therefore higher costs."

Agency Response [92-Landry-070426-CWIC]: We disagree. California accounts for about 11 percent of the U.S. population. Therefore, it is likely

that some east coast markets will exist, which do not require the use of CARB compliant composite wood products. A business choice to comply with the rulemaking is an economic decision that they must decide for themselves. Multiple inventories are presently being maintained for niche products, and it does not seem unreasonable that this kind of approach could be used for purposes of complying with the rulemaking. Our understanding is that some domestic composite wood product manufacturing plants will opt to continue to meet voluntary industry formaldehyde standards established by the American Standards for Testing and Materials (ASTM), which are higher than the ATCM emissions standards, while others will switch to CARB compliant products.

216) Comment [93-Livingston-070426-CWIC]: "And you may ask what is the significance and the difference between, for example, in particleboard, 0.09 vs. 0.1. As Mr. Landry has just pointed out, the variability will require manufacturers to aim much lower than that standard. So what you may be looking at is what's the difference between a 0.05 and 0.06? Well, the number is very small in terms of emissions and probably will make no difference at all as you have heard in terms of public health. It has a significant technical complexity and a great increase in cost. In fact, our conclusion is that panel manufacturers will not be able to continue to use the existing resin systems and equipment. And you saw some very, very large numbers about what mills will have to invest in order to achieve the Phase 2 levels."

Agency Response [93-Livingston-070426-CWIC]: We appreciate the comment, but disagree that the amount of variability in panel emissions will remain at the same level that they presently are. We understand that the emission results that a manufacturer may obtain for their products will exhibit some degree of variability. From submitted plant data, it appears that variability is a function of both test method and process variability. We understand that there is ample opportunity to reduce the test method variability by using more precise test methods. We believe that the resins used to produce products compliant with Phase 2 standards will have lower absolute variability given the lower amount of HCHO used to make them. We do not agree that the operating margins will be as large as what manufacturers have stated they will be.

217) Comment [120-Pung-070426-Columbia]: "First on the conversion costs or what you call the tooling cost. We paid a lot of money to tool up our mills. But most of that cost I'll attribute to the cost of education. It was a learning experience. It was development cost. We know so much more today than we knew three years ago. And now we can implement systems much less expensively than we did in our first efforts. You heard Dave Mullen from Hercules mention second generation. There are some formulations that

are now coming along that are going to take that capital cost down even further."

Agency Response [120-Pung-070426-Columbia]: We appreciate the information and the opportunity created for other manufacturers that choose to use no-added formaldehyde resins.

218) Comment [120-Pung-070426-Columbia]: "The second is operating costs. All our seven hardwood plywood plants are running soy-based adhesives today. One of these locations is running on a cost neutral basis with UF. The other six are all running at costs below current UF operating costs. So I am not suggesting all the alternatives can be as cost effective as this. I guess my point is it's possible. And we've done it. We've shown it can be done…"

Agency Response [120-Pung-070426-Columbia]: We appreciate the information indicating that the cost of the ATCM will be in-line with the estimates made in Chapter VIII of the ISOR.

QUALITY ASSURANCE

219) Comment [5-Rink-070413-Jeld-Wen]: "… Rather than simply setting forth the emission limits for particular products, the proposed regulation dictates compliance methods and mandates certain employment functions within manufacturing facilities. The current draft even dictates the chain-of-command within the manufacturing facility…"

Agency Response [5-Rink-070413-Jeld-Wen]: The ATCM's requirements and specificity are needed to achieve product compliance. This would apply to HWPW, PB, and MDF that Jeld-Wen makes for its own use, which we believe is necessary to ensure that panel emissions can be traced back to its corresponding in-plant and primary/secondary method test results.

220) Comment [5-Rink-070413-Jeld-Wen]: Jeld-Wen provided suggested language with regard to modifying the record keeping requirement, quality control facilities, quality control personnel, and testing frequency.

Agency Response [5-Rink-070413-Jeld-Wen]: We agree that points raised by the commenter are appropriate and modified the final proposed regulation order to address these points. See sections 93120.1 (a), 93120.3 (g), 93120.7 (b), and Appendix 2 (d), (e), and (g).

221) Comment [6-Harmon-070413-Hexion]: "Specifically, it is proposed to establish a common, performance-based category for third party

certification exemption eligible “near-zero” formaldehyde emission products [“NZE”] as those having an ASTM E1333 measured or extrapolated formaldehyde emission meeting the applicable Phase 2 emissions limit or some percentage thereof. This would replace the currently defined “no-added formaldehyde resins” in the body of the proposed regulation order, and would be exemption eligible under application and performance terms as otherwise stated.”

Agency Response [6-Harmon-070413-Hexion]: We agree that the point raised by the commenter is appropriate and now describe special provisions for the use of ultra-low-emitting formaldehyde (ULEF) resins, with reduced testing requirements in section 93120.3(d)(1). In addition, we now include criteria in section 93120.3(d)(2) that permits an exemption from third party certification for products manufactured with ULEF resin upon satisfactory demonstration that the criteria are met.

222) Comment [6-Harmon-070413-Hexion]: “We recommend that a level playing field be established for all adhesives (and panel products produced from those adhesives) that is performance-based and technology encouraging. A potential solution is to require all adhesive categories to comply with the testing protocol outlined in the regulation and grant a panel manufacturer exempt status only once the third party certified data obtained in accordance with 93120.3 (b) indicates that the combination of adhesive system and panel processing conditions yields the desired results (for example, achieving the applicable proposed Phase 2 level defined in the regulation or a percentage thereof)…”

Agency Response [6-Harmon-070413-Hexion]: We agree that the point raised by the commenter is appropriate. The final regulation order has been modified to add sections 93120.3(c) and (d) to allow the use of NAF and ULEF resins systems. The ATCM specifies the formaldehyde emissions performance levels for ULEF and NAF resins in order for manufacturers to qualify for reduced testing or exemption status from third party certification. The emission performance standards were based on staff analyses of the emission data reported for the low-emission panel products in Tables V-22, V-24, and V-26 in the ISOR.

223) Comment [7-Landry-070416-CWIC]: Appendix 2 (g)(7) – Treatment of non-complying lots. The CPA Grademark program allows for the use of a sealant as an approved method of treating non-complying lots. This is a useful technique and we recommend its inclusion: “Production which has failed the small scale test may be retested for certification if each panel is treated with a scavenger, sealant or handled by other means of reducing formaldehyde emissions (e.g., aging)…”

Agency Response [7-Landry-070416-CWIC]: Section 93120.12, Appendix 2 (f)(3)(B)(3) allows the use of scavenger treatment to mitigate the emissions from non-complying lots in order to bring product emissions to compliant levels. Manufacturers still have the option of using a scavenger or handled by other means of reducing formaldehyde emission such as aging their products before retesting non-complying lots.

224) Comment [7-Landry-070416-CWIC]: Appendix 2 (g)(8)(C) – Small scale retesting. The current CPA program allows for an average when retesting and we suggest that be included in the Appendix as well: "The average of the three representative samples must test at or below the TOL."

Agency Response [7-Landry-070416-CWIC]: The allowance for averaging was already allowed for under the staff's original proposal, which is appendix A of the ISOR. The language is contained within section 93120.12, Appendix 2 (g)(8)(C).

225) Comment [7-Landry-070416-CWIC]: Appendix 2 (i) – Chain of custody – organization. This critical aspect of enforcement is stuck away in the appendix for Quality Assurance for manufacturers almost as an after thought. We suggest it be a separate section or appendix that elaborates on the several features of this chain of custody at the various levels of the supply chain.

Agency Response [7-Landry-070416-CWIC]: We believe that the critical elements of chain of custody are covered by requirements for product labeling and statements of compliance (sections 93120.3 (e) and 93120.3 (f)) and deleted Appendix 2 (i) in the revised draft regulation.

226) Comment [7-Landry-070416-CWIC]: Appendix 2 (i) – Chain of custody – certification number. There is also, we believe, an inadvertent drafting error in this appendix. As written, a third party certification number would have to appear not only on composite wood products (HWPW, PB, and MDF) "… and goods made with complying composite wood products…" As incorporated into each piece. These panel products would likely come from different sources and thus have been certified by different third parties. Having furniture and cabinet manufacturers put multiple third party certifier numbers on a piece would not be helpful. The representation of the third party is simply that they are using "compliant products." This system is similar to the provisions of the USEPA's wood furniture MACT in which furniture makers must aver that they are using "complying coatings" and keep records on them.

Agency Response [7-Landry-070416-CWIC]: We agree that the point raised by the commenter is appropriate, and have removed Appendix 2(i). Also, we have specified what information is needed regarding product

labeling requirements for fabricators (section 93120.7(d)). Fabricators do not need to provide the TPC number to downstream customers. Fabricators must indicate the date of manufacture and affirm that the product meets CARB Phase 1 and/or Phase 2 emission requirements.

227) Comment [94-Dopico-070426-GP]: "We believe that a discrepancy remains between the intent of this regulation based on emissions testing and third-party certification and its language with regards to the exemption from on-going quality assurance through third party verification that is available to boards made with no added HCHO binders and which is not equally available to boards made with HCHO based binders regardless of their emissions level. We believe that this discrepancy may have an unintended consequence, as it incents the use of non-formaldehyde binders without on-going quality assurance even if the emissions from boards made with those binders are higher than the emissions of boards made with formaldehyde-based binders."

Agency Response [94-Dopico-070426-GP]: We disagree. If there is no HCHO in the resin then whatever amount of natural HCHO from the wood used to make the product, will not be enough to exceed the emission standards. We believe that the use of no-added HCHO resins is aligned with our public health goals, as well as the use of ULEF resins over the typical urea-formaldehyde containing resin systems that have a greater potential for exceeding the emission standards. The ATCM does limit the exemption from third party certification for both NAF and ULEF based resins. Manufacturers may reapply for approval, but the application must include test results and the chemical formulation of the resin (see section 93120.3 (c)).

228) Comment [94-Dopico-070426-GP]: "Furthermore, the language in the regulation that would create the exemption does not specifically require demonstration of compliance with the regulation based on a CARB-approved third party certifier. We proposed a level playing field be established for all binders which is based on emissions performance. And we believe such a level playing field would encourage technology developments. Specifically, we recommend that the no-added HCHO language be removed from the regulation. And we propose if an exemption from ongoing third-party quality assurance is available in the regulation that it be based on emissions performance and not on adhesive formulation. We also propose that qualifying for such an exemption should require the same high standards of quality of data based on CARB approved third-party certifiers that are upheld as in the regulation."

Agency Response [94-Dopico-070426-GP]: We agree that the point raised by the commenter to base any third party certification testing flexibility on resin emissions performance standards is appropriate. We do not agree

that the no-added formaldehyde language should be removed from the ATCM. We want to encourage the use of either no-added formaldehyde resins or ultra low emitting formaldehyde resins to improve the health benefits of the ATCM. The ATCM has been modified in sections 93120.3(c) and (d) to establish emissions performance criterion and to require that all data be generated via CARB approved third party certifiers when applying for NAF or ULEF use as recommended by the commenter. Based on the level of emissions NAF and ULEF resins may qualify for reduced testing or full exemption from third party certification.

RESIN COSTS

229) Comment [6-Harmon-070413-Hexion]: "… The additional costs for formaldehyde-based resin bonded products due to QA testing requirements, third party certification, and the liability of penalties for non-compliance that are not equally imposed on the no-added formaldehyde products may very well drive board manufacturers to select the no-added formaldehyde option even though the performance criteria could be met with a formaldehyde-based resin (which is thereby "deselected")."

Agency Response [6-Harmon-070413-Hexion]: We disagree. The "costs" for using a formaldehyde containing resin, as outlined above, are to some degree balanced by the "cost" of using a resin that has no-added formaldehyde. As it is impractical to ban the use of wood or wood by-products (e.g., veneers, particles, or fibers) in composite wood products, which would be the only source of HCHO from no-added formaldehyde wood products, requiring the same degree of testing seems unnecessary and a potential deterrent to the use of those resins. Individual manufacturers will have to decide for themselves, if the cost savings incurred by using a lower per-pound formaldehyde containing resin makes economic sense vs. using a potentially higher per-pound no-added formaldehyde resin that does not require third party certification and in-plant quality assurance testing. Provisions for reduced testing and an exemption from third party certification have been included for manufacturers that use ULEF based resins (section 93120.3 (d)).

230) Comment [10-Higgins-070416-FFC]: "Would the ATCM give a monopoly to any manufacturer? Emphatically no… And the leading supplier of formaldehyde free products for the hardwood plywood veneer market, Columbia Forest Products, has offered to license its resin technology at a reasonable cost to any other supplier."

Agency Response [10-Higgins-070416-FFC]: We agree that the point raised by the commenter is appropriate. For HWPW-VC, with Columbia Forest Products' offer to license its resin technology, there are at least two

no-added formaldehyde options for HWPW manufacturers to consider with respect to meeting the Phase 2 standard for HWPW-VC in 2010. To our knowledge, there is no monopoly in terms of using PVA resin, and it will be a business decision as to how manufacturers will choose to produce products that meet the Phase 2 standard.

231) Comment [24-Landry-070423-CWIC]: "The 0.05 ppm level for PB represents a technological "tipping point," at or below which manufacturers would have to go to much different, non-UF based resin systems that would likely require different plant and equipment setups at substantial capital investment, present totally different cost structure for the resins, slow production cycles, and increase energy costs and CO_2 emissions. CARB estimates a 30-40% cost increase from their Phase 2 proposal; based on extensive experience we believe it would be 50% to 60%..."

Agency Response [24-Landry-070423-CWIC]: We disagree. The Phase 2 standard for PB is 0.09 ppm. Staff estimates that manufacturers will need to target an operating level of 0.06 ppm to ensure compliance. UF resins can be used to meet the Phase 2 standards, but their market share may be reduced if manufacturers choose to use no-added HCHO resins which are exempt from third party certification. Therefore, if manufacturers choose to use UF based resin systems, then plant-level costs could be more economical (see pages 196 to 201 in the ISOR). As noted in the ISOR (page 104), the use of accelerators or hardeners is a well-known practice that will likely be tested as a means to reduce production cycle-times for some resin types such as phenol-formaldehyde resin systems. In spite of the costs, the Board approved the regulation at the April 26, 2007 public hearing due to the need to realize the intended health benefit.

232) Comment [27-Rush-070424-Temple Inland]: "The emission rates in Phase 2 are not required to meet safe indoor air quality and should be abandoned… they: are cost prohibitive… exclude UF resins from use, there are no replacement resins that can compete with UF resins in regard to quantity available… costs, and the ease and simplicity of use."

Agency Response [27-Rush-070424-Temple Inland]: We disagree. The Phase 2 standards will reduce total daily average exposures by about 40% and provide much needed improvements in indoor and ambient air quality. While there will be increases in the cost to produce compliant panels, we do not believe that the cost is prohibitive and would not exclude the use of UF based resins. Presently, replacements exist that in time, are expected to be competitive with UF in terms of cost, ease, and simplicity of use (see page 105 of the ISOR). Sierra Pine advertises Arreis medium density fiberboard product, which is made with methylene diisocyanate resin and is cost competitive in comparison to UF based resins (see page 106 of the ISOR).

233) Comment [39-Maher-070424-Great Lakes]: "The economic feasibility of alternative resin systems has been ignored by ARB… In the end this dependence on alternative resin systems and unrealistic emission levels will harm the one group you are working very hard to protect and that is the consumer."

Agency Response [39-Maher-070424-Great Lakes]: We disagree. Our analyses indicate that the Phase 2 standards are reasonable and achievable in the time frames provided (see pages 101-107 of the ISOR). The reduction in HCHO emissions provides a long-term health benefit to consumers, who we expect will continue to buy the products subject to the ATCM. Increased costs to consumers were estimated to be minor for new home construction and remodeling projects (see pages 214-215 of the ISOR).

234) Comment [59-Taylor-070426-Veneer]: "We have managed to stay in business, even with the influx of Asian products, by being able to buy core at competitive prices. But if we must go to no formaldehyde – then there is no competitive pricing – only one source. This will drive our prices up and we will not be able to compete with plywood manufacturers in other states and other countries – who are not having to follow the same regulations."

Agency Response [59-Taylor-070426-Veneer]: We disagree. First, compliance with the emission standards does not necessarily require NAF resins. For products sold to California, all manufacturers, foreign and domestic, must meet the same standards, thus we do not believe that any manufacturer has an unfair competitive advantage over an in-state producer. Furthermore, resin suppliers are now developing ultra low emitting formaldehyde (ULEF) resin systems which will offer other choices rather than NAF resins (see pages 103-106 of the ISOR).

235) Comment [61-Demorest-070426-Columbia]: "As a businessman, the issue is very simple: urea-formaldehyde is a dangerous, toxic air contaminant. There is no safe threshold for exposure to this known carcinogen. And we know how to eliminate it from the products we make … with negligible costs to the consumer. So we just have to do it."

Agency Response [61-Demorest-070426-Columbia]: We appreciate the comment – no response necessary.

236) Comment [83-Warberg-070426-Plum Creek]: In order to achieve the 0.11 ppm ceiling imposed by CARB Phase 2, we're going to have to average operating rates of 0.06 to 0.07 ppm, extraordinarily low numbers. And the only resin formulation that we're able to use achieve this is phenol

formaldehyde. And here are the results that we got from actual production trials. It did slow our press speeds down by 25 percent or more. It did nearly double our resin costs of not readily available resin formulation. It did result in quality and performance issues that were not resolved, primarily water absorption in the panels. And it did result in a 70 percent plus increase in our manufacturing costs that we'll be forced to pass along to our customers and our consumers."

Agency Response [83-Warberg-070426-Plum Creek]: We appreciate the information, but disagree on the extent of impacts to production rates and cost. It is likely that modified UF resins (example of a ULEF resin) will also be commercially available for producing Phase 2 compliant products (see pages 103 to 106 of the ISOR) possibly even more economically than staff projections as stated in Chapter VIII of the ISOR (see pages 201-202). See also the response to comment #213.

237) Comment [109-Grabiel-070426-USB]: "Because of the growing demand for soybean oil as a substitute for petroleum in biodiesel fuels, soybean production is expected to increase, thereby providing additional supplies of soy meal. And the ensuing over-supply of soy meal will serve to maintain a low price for the soy meal. As I stated at the outset, the adequate supply and the low price of soy meal in the future is indeed assured."

Agency Response [109-Grabiel-070426-USB]: We appreciate the information – no response needed.

238) Comment [111-Mullen-070426-Hercules]: "Yes, Hercules has successfully converted several hardwood plywood mills, cost neutral to urea-formaldehyde adhesives. Yes, we have developed and validated a second generation adhesive that is sprayable and effective for the particleboard composite panel. Minimal capital investment is required for second generation technology. Commercial particleboard results are positive, and we are close to meeting all performance targets. We are committed to achieving a minimal cost premium vs. urea-formaldehyde."

Agency Response [111-Mullen-070426-Hercules]: We appreciate the information – no response needed.

THIRD PARTY CERTIFICATION

239) Comment [16-Overgard-070419-HPVA]: "The current version of the rule has significantly underestimated the cost to the hardwood plywood industry, especially in the area of third-party certification and in-plant quality control testing."

Agency Response [16-Overgard-070419-HPVA]: We disagree. The rulemaking estimated that there would be additional costs for third party certification for selected manufacturers. However, the major cost of the ATCM will be the necessary technology for compliance with the standards for those HWPW manufacturing facilities that use UF resins. As indicated on pages 205-206 of the ISOR, about 40 percent of HWPW produced for California already complies with Phase 2 emission standards. For manufacturers that use UF resins, they will likely need to improve their manufacturing processes, utilize scavenger technology, use lower mole ratio UF resins, or co-blend their base UF resins with very low mole ratio (e.g., < 1.0) resins.

As indicated on page ES-7 of the ISOR, the incremental production cost of Phase 1 compliance will be about 1 percent. The incremental production cost of Phase 2 compliance is estimated to range from 8 percent to 19 percent. This would depend on the resin type used, whether UF, ULEF or NAF resin systems.

240) Comment [25-Hubbard-070423-Darlington]: "I believe the current version of the rule has significantly underestimated the additional costs to domestic hardwood plywood manufacturers like our company… hardwood plywood manufacturers like us will have to set up a quality control laboratory, purchase testing equipment and find or train additional personnel to conduct the testing that will be required. I estimate those costs to be more than $100,000 in the first year and at least 70% of that amount each year thereafter…"

Agency Response [25-Hubbard-070423-Darlington]: We believe that the overall costs will not be significant on a per panel basis. The major cost of compliance relates to the technology used to meet the formaldehyde emission standards (see pages 203-204 and 205-206 of the ISOR). On a per panel basis, the cost of third party certification will be less significant. Furthermore, if a manufacturer opts to use a ULEF or NAF resin then they may avoid any expenditure to set up testing facilities since they could apply and be given an exemption from third party certification.

241) Comment [51-Watson-070425-IPMG]: "Secondly, the cost to administer this program as well as the reduced production cycles and third party administration costs are going to be enormous. These factors have not been addressed in my opinion and added to the cost models that CARB staff is providing…"

Agency Response [51-Watson-070425-IPMG]: We disagree. Reduced production cycles and third party certification costs were considered in our economic analysis (see page 198 of the ISOR).

MISCELLANEOUS

AIR DISTRICT CONCERNS

242) Comment [48-Zeldin-070425-CAPCOA]: "The ATCM as proposed is very complex and would be very difficult to enforce at the air district level due to the diverse and diffuse nature of the product."

Agency Response [48-Zeldin-070425-CAPCOA]: There are a very limited number of manufacturers in California, but a large number of importers, distributors, fabricators, and retailers. For districts, the initial focus may likely be retailers, fabricators, and importers, to determine if statements of compliance and compliant products are being used, purchased and/or sold to consumers. There are a number of potential enforcement actions that a district may opt to take which are not overly complex, but may require coordination with CARB enforcement staff. Some actions could include procurement of samples or retailer and/or fabricator labeling and recordkeeping audits. CARB staff briefed the California Air Pollution Control Officers Association (CAPCOA) Enforcement Managers group regarding this new ATCM on November 8, 2007. CARB enforcement staff intends to continue working with the CAPCOA Enforcement Managers group to help facilitate any district enforcement efforts.

243) Comment [48-Zeldin-070425-CAPCOA]: "If air districts are to enforce this ATCM, compliance evaluations would likely have to be structured similar to the architectural coatings rule, with inspectors focusing on noting labeling at retail and wholesale sale points."

Agency Response [48-Zeldin-070425-CAPCOA]: We agree that the point raised by the commenter is appropriate. We believe that retailers and wholesalers may likely be the initial focus for inspection efforts. If a particular district has laboratory capabilities, sample testing could also be done at the district level. Interested districts would need to work with CARB to ensure use of accredited laboratories.

244) Comment [48-Zeldin-070425-CAPCOA]: "Enforcement at manufacturing facilities and at ports is also possible; however, only a few air districts have such facilities within their jurisdiction."

Agency Response [48-Zeldin-070425-CAPCOA]: We agree that the point raised by the commenter is appropriate. Only those air districts with ports and manufacturing facilities will need to be involved in those enforcement efforts at the ports.

245) Comment [48-Zeldin-070425-CAPCOA]: “There are no provisions in the ATCM for district funding to enforce the regulation; enforcement by districts is not possible without funding to support it. Given this, and the fact that this is a consumer product typically regulated by ARB, it seems most appropriate for ARB to enforce the ATCM.”

Agency Response [48-Zeldin-070425-CAPCOA]: We understand the basis for this comment. Under state law, local districts are mandated to adopt CARB approved ATCMs for implementation within their respective districts. As mentioned in other comment responses, CARB will enforce the regulation as with consumer products, so districts can decide their appropriate level of enforcement.

246) Comment [48-Zeldin-070425-CAPCOA]: “It is also likely that most air districts would be unfamiliar with the laboratory testing method required in the ATCM and would not be able to perform this test, with the possible exception of the South Coast AQMD.”

Agency Response [48-Zeldin-070425-CAPCOA]: We agree that the point raised by the commenter is appropriate. We are in the process of developing an enforcement plan, which will include more information about sample collection and laboratory testing. As we anticipate that most air districts may choose to not establish their own wood product testing laboratories. However, CARB would have the necessary sampling and testing expertise to be able to consult with interested districts.

247) Comment [48-Zeldin-070425-CAPCOA]: “It is unclear how SB 509 (Simitian), if adopted and signed, will affect implementation of this regulation.”

Agency Response [48-Zeldin-070425-CAPCOA]: As SB 509 has been withdrawn from consideration it will not affect the implementation of this regulation.

CONSUMER COSTS

248) Comment [4-Sherman-070409-NA]: “On page 215, under the subsection titled “Remodeling Project,” you suggest that the panel costs for a $25,000 kitchen are $600. This subsection refers to Tables VIII-18 and VIII-19, which appear to have been omitted from the proposal. Using Table VIII-17 as a reference, one can extrapolate that a $25,000 kitchen, using ¾” maple plywood pre-compliance pricing of $38, should only require 15 ¾” sheets of plywood for the entire job, including countertops. Both the price per sheet and the number of sheets are understated here, likely by around

20-25% at a guess. This obviously understates, then, the cost impact of the subsequent implementation of Phase 2 standards."

Agency Response [4-Sherman-070409-NA]: We acknowledge the omission of Tables VIII-18 and VIII-19 in the ISOR. These omissions do not alter the conclusions presented on page 215, but rather omit the details showing how our estimates were calculated. The data in Table VIII-17 provides estimates of per panel production cost increases for HWPW, PB, and MDF in a range of panel thicknesses, following the effective date of their applicable Phase 2 standards. Data of this kind were used to estimate the increase in material cost after implementation of the Phase 2 standards for remodeling projects in site-built 800 ft^2 and 2,000 ft^2 homes.

Detailed information on the amounts of composite wood products that would be needed to fabricate the cabinets, countertops, shelving, and doors in the two site-built homes are listed in Appendix E, Tables F-4 and F-5 (these tables are a modified version of the omitted Tables VIII-18 and VIII-19). To develop an estimate of the remodeling project of a kitchen, we used a building plan for a two bedroom, one bath house (800 ft^2) and a four bedroom, three bathroom (2000 ft^2) home (Dream Home Source, Not Dated) along with a commercially available software program (Cabnetware) to calculate the amount of composite wood material that would be used to remodel a kitchen. In doing this calculation, we also consulted with cabinet shops (e.g., Silver Walker Studios, Richmond, CA), and received guidance from industry representatives including the Kitchen Cabinet Manufacturers Association (KCMA).

To calculate the increase in cost for composite wood product materials used in a remodeling project, we calculated the total present-day cost for the materials listed in Tables F-4 and F-5 using current-day prices, and applied average estimated cost increases of 30% for PB, 40% for MDF, and 15% for HWPW to calculate the increase in material cost after the Phase 2 standards take effect. This information was derived from typical pricing information based on composite wood product prices of standard-size panels sold in 2006/2007 (Pittsburgh Forest Products Company, 2007 and Random Lengths 2007). Depending on the size of the site-built house, the present-day cost of composite wood product materials used to fabricate the cabinets, countertops, shelving and doors was calculated to be $400 to $600. In a remodeling project of this kind, we assumed that the greater portion of costs would result from labor, appliances, insurance, non-wood materials, and overhead, and that the cost of the composite wood materials only, would be about $600. This portion, for the composite wood products used in the project, is about 2.5% of the total project cost. The increase in material cost after the Phase 2 standards was determined to be $104 to $160, depending on the size of the site-built home. In the

context of a $25,000 remodeling project, an increase in material cost of $160 represents an increase of less than 1 percent.

While we agree that there is price variation per sheet of composite wood products, even the 20-25% increase in the incremental cost the commenter suggested would still be at or less than a 1% increase to the cost of a remodeling project. Please also note that in our estimates, we assumed that a typical kitchen remodel would be comprised of particleboard (50-55%), medium density fiberboard (25-30%), and hardwood plywood (15-20%), which would translate into approximately 20-25 sheets of composite wood products panels, which in turn is in accordance with KCMA's and other independent cabinet shop's suggestion.

249) Comment [10-Higgins-070416-FFC]: "Is the cost impact on consumer negligible? Yes… Even for manufacturers who make the switch in resins, the cost increase is reasonable (from 5-15% without taking into consideration economies of scale and other manufacturing advantages to be achieved) and, for the future sustainability of their markets, if necessary."

Agency Response [10-Higgins-070416-FFC]: We agree that the point raised by the commenter is appropriate. For HWPW-VC, our analyses indicate that the potential cost increase would be about 15%. With time, manufacturing processes will improve and costs are likely to go down (see page 188 of the ISOR).

250) Comment [14-Titus-070419-KCMA]: "It was difficult to fully address this issue since two tables (VIII-18 and VIII-19, p. 215) referenced in the report were not available for review…"

Agency Response [14-Titus-070419-KCMA]: We apologize for the typographical error. The two tables were used in a previous version, and were deleted from the staff report that was released on March 9, 2007. See also the response to comment #248.

251) Comment [17-Whalen-070419-Columbia]: "… As our real-world examples of kitchen-remodeling costs show [additional costs to an average kitchen would be $40.35], industry claims of 40-50% up-charges are completely unfounded."

Agency Response [17-Whalen-070419-Columbia]: We agree. We have not received a complete description of how the industry costs were calculated but our own estimates are aligned with those presented by the commenter.

252) Comment [23-Zimmerman-070423-Sauder]: “Compliance cost: CARB acknowledged that there would be a cost increase at the panel manufacturing level as well as the product manufacturing, and retail levels as a result of the proposed regulations. However, CARB did not accurately reflect the cost build-up and ultimate impact on the increased cost at the consumer or retail level.”

Agency Response [23-Zimmerman-070423-Sauder]: We disagree. Market forces will dictate how much of the costs can be passed on from manufacturer-to-distributor and so forth. Rather than offer an estimate that could not be determined with a large degree of certainty, we assumed that there would be a 20% increase in panel cost at the retail level on top of what was incurred at the production level (see page 213 of the ISOR).

253) Comment [117-Cooper-070426-Kaiser]: “We have an active campaign to reduce HCHO in the furniture, fabricated casework, and building insulation we use in our facilities. However, the cost of many of the alternative materials is significantly higher than those products containing HCHO. We find this primarily due to the fact that these alternatives do not have a significant enough market share to be cost competitive with those products that pose a health risk…”

Agency Response [117-Cooper-070426-Kaiser]: We appreciate the comment and agree with the commenter. Current pricing on low emitting composite wood products are higher due to its “niche” market status. As more manufacturers comply with the Phase 2 emission standards of the ATCM by using NAF or ULEF resins systems, the marketplace will have more options available (see pages 103 to 106 of the ISOR for lists of currently available niche products). We believe this ATCM promotes the availability of cost-competitive low emitting products that could be used to reduce toxic exposures in Kaiser-Permanente facilities.

ECONOMIC IMPACTS

254) Comment [2-Levin-070328-BERG]: “The economic analysis is flawed in that it does not take into account the cost of ventilation necessary to reduce airborne concentrations of formaldehyde by dilution ventilation to achieve levels that could be achieved more effectively at the one-time first cost of lower emitting CWP. This ventilation has an impact not only on operating costs but also on carbon emissions due to electric power plant operation and emissions. … significantly increased ventilation would be necessary to provide the same protection to the public as would be provided by a reduction in the initial source strength of formaldehyde emissions.”

Agency Response [2-Levin-070328-BERG]: As indicated in Chapter VIII of the ISOR, the economic analysis of the proposed regulation was primarily based on reducing the "source" of composite wood product HCHO emissions by imposing technology forcing emission standards, commensurate with the approach suggested by the commenter. Higher ventilation is not considered as a control option for this regulation and is therefore not included in the ISOR cost calculations.

255) Comment [2-Levin-070328-BERG]: "… While energy cost and carbon emission limitations are important to current and future constraints on energy consumption to ventilate and to heat and cool outdoor air used for ventilation, the incentives for source strength reduction are likely to increase considerably in the coming years in order to achieve a given level of general population exposure to indoor source pollutants."

Agency Response [2-Levin-070328-BERG]: We agree that the point raised by the commenter is appropriate. This ATCM could lead to incentives for source strength reductions. We do not have a comprehensive understanding of the relative contributions of dilution ventilation, etc., so we are not able to assess what differences in energy costs that may result and at what point source strength reductions would be examined as an approach for lowering energy usage.

256) Comment [2-Levin-070328-BERG]: "CARB has had a relatively forward-looking guideline and target for indoor formaldehyde concentrations for many years now. This proposed regulation is far less stringent than what would be necessary to achieve that target. CARB should take more effective action now on this well-known and widely distributed substance to reduce the future costs of reduction by ventilation or removal and replacement of strong sources, especially the widely used CWP.

Agency Response [2-Levin-070328-BERG]: We disagree. The proposed regulation, if adopted, will significantly reduce formaldehyde emissions and achieve important health benefits. As mandated under section 39666(c) of the Health and Safety Code, ATCMs are to be developed to achieve lowest levels achievable in consideration of costs. We believe that this ATCM achieves the lowest HCHO levels achievable in consideration of projected advancements in resin technology and manufacturing processes. If lower emitting technologies are developed and used in future years, we have the authority to pursue further emission reductions, as warranted, and return to the Board with amendments to the ATCM.

257) Comment [51-Watson-070425-IPMG]: "These products are commodities. Their value is determined by only two things – supply and demand… As demand increases for the product so does the price… What is behind this

effort is perhaps a sense of goodwill to reduce HCHO emissions, but in my opinion it is really about profit…"

Agency Response [51-Watson-070425-IPMG]: We disagree. The intent is to reduce emissions of a known human carcinogen to the lowest extent practicable, in consideration of technology and cost.

258) Comment [59-Taylor-070426-Veneer]: "If you look at the MSDS's (material safety data sheets) that we are required to keep on file, you will see that particleboard and MDF have only 0.1% of formaldehyde – that is 1/10 of 1% -- very minimal – but that minimal amount can put us out of business."

Agency Response [59-Taylor-070426-Veneer]: We disagree. The HCHO content within the MSDS relates to HCHO in proportion to total weight of wood furnish in the particleboard panel. It does not have a direct relationship to potential health effects from exposure to HCHO surface emissions associated with particleboard products. The proposed emission standards provide an emission rate that will reduce public exposure by 40% from composite wood products. Furthermore, if the plywood panel is measured to have an ASTM E1333 value that complies with the standards, the PB and MDF that the commenter has can be used as platforms to make hardwood plywood composite core panels that are legal for sale in California.

259) Comment [72-Robson-070426-AWFS]: "And of course without customers, the AWFS® companies will have no reason to hire the thousands of young people who graduate from industry sponsored Career and Technical Education programs in our public high schools and community colleges."

Agency Response [72-Robson-070426-AWFS]: We believe that the minor cost increases to consumers (see pages 213 to 215 of the ISOR) will not decrease the amount of customers.

EMISSION SOURCES

260) Comment [4-Sherman-070409-NA]: "I recently read an article in one of the trade journals (I will be happy to hunt this up and send it along to you, although I suspect you already have it) which contends that the average person emits more formaldehyde from his body than do all the wood products combined in his residence. I mention this, assuming it is true, as a point of interest and reference."

Agency Response [4-Sherman-070409-NA]: While it may be true that people emit formaldehyde, if you fill a room with people and measure the formaldehyde concentration in the room versus an empty room, there

would be little difference in measured formaldehyde concentration between the crowded and empty rooms. In contrast, if you compare the formaldehyde concentration in a room filled with particleboard vs. one without any, there would be a marked difference in formaldehyde concentration. This is not consistent with statements claiming that an average person emits more formaldehyde than all the wood products in his residence.

261) Comment [90-Titus-070426-KCMA]: "For example, I think the question was raised about low end and impact on low volume. I would just tell by a study that we've done, a laminated cabinet as you have in the report give the lowest emissions. And I mean the lowest, from anything you heard about, the green cabinets, etc. This is lower. And we perform the tests, same standards, etc. I give you a little reinforcement on the numbers."

Agency Response [90-Titus-070426-KCMA]: We appreciate the comment; however, lamination does not address the root problem of unacceptable amounts of HCHO in the resins and gradual releases to air over time. By lowering the amount of HCHO in the resins, fewer releases to air can occur, regardless of whether the product is laminated.

GREEN BUILDING PRODUCTS

262) Comment [13-Lent-070417-HBN]: "… The sustainable building industry is growing and hungry for formaldehyde free product but the industry is resisting providing it. We need the help of the regulatory mechanism to get the industry moving."

Agency Response [13-Lent-070417-HBN]: We agree that the point raised by the commenter is appropriate. While we developed the ATCM for reasons of public health protection, if market forces increase and sustain the demand for low-emitting composite wood products, the health benefits of the proposed regulation may be even greater than we projected due to accelerated market penetration.

263) Comment [13-Lent-070417-HBN]: "These design and construction firms understand that HCHO is causing harm now to the health of their workers and their customers. They also know that a steadily increasing number of their customers are seeking safer materials in their buildings and there are technologies available that work – but that they aren't going to have the selection of products they need while manufacturers continue to view healthy building materials as just another green building niche market."

Agency Response [13-Lent-070417-HBN]: We believe that manufacturers will choose to meet the standards in the ATCM using different approaches,

and the array of products available to design and construction firms will likely increase. In California, low-emission composite wood products will no longer be a niche product, but rather the baseline product in the 2009-2012 timeframe.

264) Comment [56-Carmichael-070425-CCA]: "The bottom line is that various private sector wood product firms are currently capable of – or already producing and marketing – formaldehyde free products. In the best interests of California, formaldehyde free products should no longer be a small, niche market; these building materials should be made widely available."

Agency Response [56-Carmichael-070425-CCA]: We have listed the low emission products we are aware of on pages 103 to 106 of the ISOR. With the incentives for reduced testing and exemption from third party certification in the revised regulation, Phase 2 compliant products may be available before the effective dates for all three panel products (see section 93120.3 (c) and (d)).

265) Comment [71-Hunt-070426-PLS]: "Arreis is manufactured using a proprietary formaldehyde-free binding system and contains 100 percent recycled wood fiber from sustainable forestry operations. It is certified by Emeryville, California-based Scientific Certification Systems, is an Environmentally Preferable Product, has passed the California CHPS 01350 test, and provides LEED credit support for Materials & Resources and Indoor Environmental Quality" (Eco-Structure, April 2007).

Agency Response [71-Hunt-070426-PLS]: We appreciate the information – no response necessary.

266) Comment [71-Hunt-070426-PLS]: "Greener Plywood: Three kinds of plywood panels manufactured by Timber Products Co. reportedly meet or exceed requirements of the primary green building programs, including LEED. Green T Arreis is a MDF core product produced with a formaldehyde-free adhesive and 100% post industrial recycled wood fiber…" (Eco-Structure, April 2007).

Agency Response [71-Hunt-070426-PLS]: We appreciate the information – no response necessary.

267) Comment [71-Hunt-070426-PLS]: "Hardwood Plywood is Eco-friendly: Timber Products Co. has introduced its environmentally friendly line of Green T panels that meet requirements of the Sustainable Forestry Initiative, LEED and KCMA Environmental Stewardship Program, as well as federal and state requirements for HCHO emissions. The hardwood

plywood panels are manufactured using an innovative, no-added urea formaldehyde resin" (Eco-Structure, April 2007).

Agency Response [71-Hunt-070426-PLS]: We appreciate the information – no response necessary.

268) Comment [71-Hunt-070426-PLS]: "FSC, Formaldehyde-free Flooring to Hit Market: Danville, Virginia-based Columbia Commercial Flooring plans to roll out formaldehyde-free, FSC-certified engineered hardwood flooring to the commercial segment in 2007. Available by special order at first with plans for a wholesale conversion of its engineered hardwood flooring plant in Danville, Columbia Commercial Flooring will market the flooring as PureBond, the brand created by parent company Columbia Forest Products, Portland Oregon" (Eco-Structure, April 2007).

Agency Response [71-Hunt-070426-PLS]: We appreciate the information – no response necessary.

269) Comment [112-Uhland-070426-CalAg]: "I'm telling you to make this point, that sustainable environmentally friendly manufacturing is not only socially responsible, but economically viable. As a side bar, this first CalAg plant will operate producing one-tenth of the air pollutants produced by a conventional wood-based MDF plant of similar size. And I'm not talking about HCHO emissions. By using 120,000 acres of rice straw each year, we'll be preventing 120,000 tons of methane gas from being freely released into the atmosphere."

Agency Response [112-Uhland-070426-CalAg]: We appreciate the information – no response necessary.

270) Comment [112-Uhland-070426-CalAg]: "As for product performance, CalAg MDF has exceeded wood-based MDF standards in every end use application everywhere MDF is used. This is molding, cabinetry, laminate flooring, millwork, office, home furniture, everything. To approve this, Metsil Panel Board, the world's largest equipment supply company within the forest products industry, is guaranteeing with their balance sheet that this plant produce such a product. California currently consumes approximately 400 million square feet of MDF annually. Our plant will produce 150 million square feet representing approximately 30% of the California market."

Agency Response [112-Uhland-070426-CalAg]: We appreciate the information – no response necessary.

271) Comment [113-Hooper-070426-HooperWolfe]: "The commercial design market is already driving the demand for low-emitting composite wood

products. There are composite wood products out on the market that do meet their specifications, but there is not enough. And you have heard from some manufacturers earlier today that it's a small niche. The commercial designers are struggling to find products to meet their specifications. This rulemaking will create a large number of products in which they can specify cost competitively."

Agency Response [113-Hooper-070426-HooperWolfe]: We agree – no response necessary.

272) Comment [114-Fields-070426-Neil Kelly]: "… I'm one of those poor little cabinet makers everybody is trying to defend today. But I can tell you that we pioneered green and healthy cabinetry back in 1998. And our company is now seven times larger than it was before. We've signed up an OEM manufacturer down the street from us in Oregon, and I'm on my way to the east coast to find capacity there. We have never had in these nine years a warranty issue or health liability issue using the formaldehyde-free PureBond products and other alternative supplies available in my industry. The growth is absolutely phenomenal. And the suppliers of these materials are sitting in this room, some on the other side of the argument, which I have a hard time understanding why they manufacture and advertise those products and I'm making money at it. So there is some part of that argument we need to re-study."

Agency Response [114-Fields-070426-Neil Kelly]: We appreciate the information – no response necessary.

273) Comment [114-Fields-070426-Neil Kelly]: "Neil Kelly has shown sustainable, environmentally friendly, and healthy cabinetry is not only feasible but readily available today. I urge the Board to impose the highest standards in pulling your timelines, and let's get started fixing up not only California, but the rest of the United States as they follow your trail…"

Agency Response [114-Fields-070426-Neil Kelly]: We agree – no response necessary.

274) Comment [115-Hunt-070426-PLS]: "I just want to say that we have not had trouble in getting supply from most of the large companies. Most of the large companies that are making plywood today are also advertising they have formaldehyde-free products and they're selling it to people like me…"

Agency Response [115-Hunt-070426-PLS]: We appreciate the information – no response necessary.

275) Comment [116-Gitt-070426-Build It Green]: “So there is immense demand for this product out there. I can speak to that, because we have our pulse on the ground of what’s going on in California. Talking with consumers directly, talking with architects and builders. We get hundreds – actually thousands of calls. We have a hot line. We have serviced over 5,500 calls just in the last couple years of people asking for products such as this. And oftentimes, you know, there’s a few companies that are doing it. I found it interesting that a couple of companies here talking on the other side actually are selling compliant products today that meet the quality. Supervisor Hill asked a really relevant question earlier. Do you sell a product today that complies? And the answer was yes. If they’re selling product today, they’re meeting the quality standards in those issues that are there. They’re not having those kinds of quality problems. So you know, home builders, cabinet makers, manufacturers are to benefit by this regulation.”

Agency Response [116-Gitt-070426-Build It Green]: We appreciate the information – no response necessary.

276) Comment [118-Lent-070426-NA]: “In our green guide for health care, over 110 pilot projects participated last year. In piloting this, three-quarters of them took the action of going no-added formaldehyde-free in the products they installed in their building. The concern is deep and wide for the issues that are raised by this action, and you’ll get a lot of support for doing it. Last year, in the course of just a couple of weeks, I circulated a letter of support for this action. In very short time, we had 84 organizations sign on to that letter that was submitted to you earlier. These represented a wide range of industry and public support including 56 firms that design, construct, and sell buildings. These are the users of these products that you’re about to regulate. They’re the ones that are going to pay the most for the cost of these regulations and they want to see the regulation happen.”

Agency Response [118-Lent-070426-NA]: We appreciate the information – no response necessary.

OUTREACH

277) Comment [38-Morgan-070424-IWPA]: “… work with the U.S. Department of State, overseas embassies, and other appropriate organizations on an education campaign to inform foreign governments, foreign trade associations, and foreign laboratory testing facilities on the process to become an ARB-approved certifier…”

Agency Response [38-Morgan-070424-IWPA]: We agree that points raised by the commenter are appropriate. We will follow-up on as many opportunities as possible to provide information to offshore parties about the rulemaking. CARB staff visited China and Malaysia in fall 2007 to inform the Asian wood industry of the newly approved CARB formaldehyde regulation. In addition, fact sheets are available in five languages to assist in outreach efforts.

278) Comment [38-Morgan-070424-IWPA]: "… conduct training sessions for overseas auditors to bring these companies up to speed on the requirements of the ATCM…"

Agency Response [38-Morgan-070424-IWPA]: We agree that this would be helpful but cannot commit to undertake this work because we do not have the budget to do this. Furthermore, this training is likely better supplied by private companies who already currently provide product certification services. We do, however, respond to all public inquiries on the requirements of the ATCM routinely.

279) Comment [38-Morgan-070424-IWPA]: "… translate the regulation and staff report into, at a minimum, Mandarin, French, Spanish, Portuguese, and Japanese…"

Agency Response [38-Morgan-070424-IWPA]: Fact sheets on the ATCM are now available in Spanish, English, Chinese, Portuguese, Indonesian and Russian. We will consider translating the final ATCM, but must be assured first that the translations accurately reflect the ATCM requirements.

280) Comment [48-Zeldin-070425-CAPCOA]: "It is likely that most air districts are unfamiliar with the technical aspects of the ATCM requirements, such as Japan F standards, HUD standards, ppm levels in raw vs. finished products, etc."

Agency Response [48-Zeldin-070425-CAPCOA]: We agree that the point raised by the commenter is appropriate, and this is why CARB staff conducted focused outreach to districts via the California Air Pollution Officers Association to explain the ATCM requirements as they were developed. Additional outreach to the air districts will address a range of technical issues that may arise.

281) Comment [86-Compton-070426-Hambro]: "One of the things we've been disappointed in is nowhere during the process of review and development of the proposal has anybody on the CARB staff contacted our company to discuss with us our experience, the results of these runs, nor our opinions on this issue. And yet, we're a California based organization."

Agency Response [86-Compton-070426-Hambro]: We disagree. Hambro has participated in public workshops and we extended an open invitation to any stakeholder that wanted to share information or discuss issues with us. Until now, we have no record of Hambro contacting our staff or requests to meet with us on issues.

282) Comment [97-Chaffin-070426-IWPA]: "… We did reach out to importers and ask questions about how this would affect them. We received resounding responses that even though they could over time meet the requirements with regard to HCHO levels, Phase 1 and Phase 2, the chain of custody, labeling, and the third party certification was indeed a difficult task. So we've asked the Board to spend some – direct the staff to spend some time talking to importers and overseas suppliers and get a realistic approach for that."

Agency Response [97-Chaffin-070426-IWPA]: We appreciate the information. We have had a number of meetings and conference calls with IWPA and will continue to work with the affected parties to educate them on the specific requirements of the ATCM. See also the responses to comments #33 and #143.

RESIN TECHNOLOGY

283) Comment [2-Levin-070328-BERG]: "Alternative (non-formaldehyde based) adhesives are also available for the proposed regulated products in which formaldehyde is widely used. It is difficult to justify continued population exposure to formaldehyde at the levels contemplated in the proposed regulation in light of this fact and the carcinogen status of formaldehyde."

Agency Response [2-Levin-070328-BERG]: We agree that the point raised by the commenter is appropriate. Alternative adhesives are available, but it will take time and additional testing to ensure a timely and effective transition to those adhesives on an industry wide basis. We did not accelerate, any further, with the exception of HWPW-VC, the effective date(s) of the standards to allow industry enough time to adequately test and assure that future compliant products would achieve the projected emission reductions and health benefits. Upon full implementation, the ATCM will achieve major reductions in formaldehyde emissions, especially in indoor settings, where people spend the major part of their daily lives. See also the response to comment #151.

284) Comment [6-Harmon-070413-Hexion]: "… Given that California consumes about 10% of the products made with UF-based resins, this translates into about 300 million pounds to meet current market demands – not counting

imports. There is not enough existing resin manufacturing capacity, especially among NAF sources, to replace this volume. Even converting existing UF manufacturing capacity to manufacture the performance-equivalent replacement amount of PF production would be highly unlikely in the timeframe allowed under the proposed regulation order…"

Agency Response [6-Harmon-070413-Hexion]: We disagree. Manufacturers have several options for meeting the standards in the ATCM (see pages 101 to 106 in the ISOR). Currently, resin companies and research facilities are developing new resin systems for composite wood manufacturing which could offer the market even more choices (see pages 83-100 of the ISOR). For soy resins, Columbia Forest Products has offered to license its resin technology at a reasonable cost to any other supplier (see comment #230). Several polyvinyl acetate resins are currently available from Franklin International (see page 89 of the ISOR).

285) Comment [10-Higgins-070416-FFC]: "Can manufacturers meet more aggressive timelines? Yes… CARB regulations should boldly drive technology – giving businesses and consumers clear signals about California's intention to lead in ridding the air of this carcinogen."

Agency Response [10-Higgins-070416-FFC]: We agree that some manufacturers can meet more aggressive timelines but many can't. In our view, manufacturers of HWPW-VC are in the best position to make the technology-forcing changes in the ATCM and we have moved up the effective date of the Phase 2 standard for this product. See also the response to comment #151.

286) Comment [14-Titus-070419-KCMA]: "We question the wisdom of a regulatory approach that rewards unproven or questionable substitute adhesives, many of which have safety and health issues of their own… there have been reports of de-lamination problems from formaldehyde-free soy substitute touted in several of the public workshops…"

Agency Response [14-Titus-070419-KCMA]: We disagree. While not all of the resin formulations specified as "BACT" in the ISOR are being used on an industrial-scale, all have been used to either produce niche products (e.g., PVA and MDI) or share similar compositions to resins used to produce exterior grade products (e.g., PF or MUF resins). We are aware of workplace related safety issues associated with some of the products, but to our knowledge, for those products that have known safety concerns, occupational regulations assure worker safety. Moreover, all the substitutes would have significantly lower HCHO emissions, a known human carcinogen, after they were produced than products made with UF resins. We believe de-lamination occurs to some degree regardless of the resin system used and is a cost that all manufacturers must bear. There

is no evidence to suggest that the rate of delamination of soy composite wood panels is any higher than typical UF based composite wood panels.

287) Comment [17-Whalen-070419-Columbia]: "… Industry claims that these (low or no-formaldehyde resin) alternatives, which meet the CARB rule, are not readily available are not to be believed."

Agency Response [17-Whalen-070419-Columbia]: We agree. We believe that some are already available and some will take a few years to refine and mill test to meet the proposed Phase 2 standards.

288) Comment [22-Whalen-0704020-Columbia]: "PVA-constructed fir/pine VC panels tested below the CARB phase II VC threshold of 0.03 ppm"

Agency Response [22-Whalen-0704020-Columbia]: We appreciate the information – no response necessary.

289) Comment [22-Whalen-0704020-Columbia]: "UF bonded MDF with PVA decorative veneers also passed CARB Phase II CC threshold of 0.05 ppm"

Agency Response [22-Whalen-0704020-Columbia]: We appreciate the information – no response necessary.

290) Comment [22-Whalen-0704020-Columbia]: "Emissions levels could conceivably be driven lower by using PF-bonded plywood platforms and PF-bonded particleboard cores laminated with decorative veneers using PVA adhesives"

Agency Response [22-Whalen-0704020-Columbia]: We agree. There are a variety of ways that plywood manufacturers could reduce their use of HCHO-containing resins to meet the emission standards.

291) Comment [26-Stoler-070423-Boise] [27-Rush-070424-Temple Inland] [31-Warberg-070424-Plum Creek] [32-Savage-070424-SeeMac] [33-Wijnbergen-070424-Norbord] [37-Sein-070424-Rexcel] [40-Smith-070424-Uniboard] [44-Julia-070424-CPA] [45-Gregory-070424-SierraPine] [46-Gonyea-070424-Timber]: "…Simply put, soy adhesive technology is incompatible with MDF and is commercially unproven for particleboard."

Agency Response [26-Stoler-070423-Boise] [27-Rush-070424-Temple Inland] [31-Warberg-070424-Plum Creek] [32-Savage-070424-SeeMac] [33-Wijnbergen-070424-Norbord] [37-Sein-070424-Rexcel] [40-Smith-070424-Uniboard] [44-Julia-070424-CPA] [45-Gregory-070424-SierraPine] [46-Gonyea-070424-Timber]: We disagree. On page 86 of the ISOR, Westcott and Frihart used a soy-PF resin to make oriented strand board

and postulated that sprayable soy resins of this kind may have applications to producing low-emitting PB and MDF. There are reportedly PB and MDF products being made with the Ecobind® soy/PVA resin (see pages 104-106 of the ISOR) and Columbia Forest Products reported the availability of Purebond™ particleboard in 2007 (see page 98 of the ISOR). See also comment #295.

292) Comment [28-Maultsby-070424-FloPly]: Meeting the Phase 2 limits with its not-to-exceed levels basically says no HCHO may be added to the product."

Agency Response [28-Maultsby-070424-FloPly]: We disagree. There are advertised UF based resins with catcher systems that reportedly can be used to meet the Japanese F☆☆☆☆ standard (see page 104 of the ISOR). These products could likely be used to meet the Phase 2 standards.

293) Comment [28-Maultsby-070424-FloPly]: "… The soy resin used by Columbia Forest Products has its limitations, especially for PB where it has not been proven. And even so, it is not available to other plywood manufacturers…"

Agency Response [28-Maultsby-070424-FloPly]: Based on the work by Westcott and Frihart, we believe that sprayable forms of soy-based resins could potentially be used to make PB (see pages 85-86 of the ISOR). At the public hearing on 26 April 2007 in Sacramento, Columbia indicated their willingness to provide the Purebond™ technology to their competitors at a modest cost. In addition, other resin technologies can be used to meet the standards in the ATCM (see pages 103 to 105 of the ISOR). See also comment #295 and the response to comment #291.

294) Comment [34-Keeling-070424-Roseburg]: "No suitable resin substitute is available to meet proposed standards… The reality of the situation is there is not enough phenolic, soy flour or PVA resin to satisfy current production levels under Phase 2 of the proposed ATCM…"

Agency Response [34-Keeling-070424-Roseburg]: We disagree. Franklin International offers several types of PVA resins that could be used to meet the Phase 2 standards (see page 89 of the ISOR). At the April 26, 2007 Board hearing, we heard from the United Soybean Board that there is an ample supply of soy to meet the needs of the wood products industry (see pages 108-110 of the transcript for the Board Hearing). In the case of phenol, a petroleum-based resin system, we have not heard that shortages exist or if there are concerns about supply in the coming years. In addition, with the inclusion of ULEF resin exemptions, their

development may be accelerated to meet the Phase 2 emission standards (see page 75 of the ISOR). See also comment #295.

295) Comment [35-Guay-070424-Columbia]: "… To the contrary, we are regularly moving railcar quantities of PB from our single PB mill in Canada to our HWPW mills and customers throughout North America… Several distributors and end users of those products will testify at the Board meeting Thursday about their satisfaction with the performance of our products."

Agency Response [35-Guay-070424-Columbia]: We appreciate your response on this issue. This addresses questions regarding the commercial utility of soy resins in the manufacture of PB.

296) Comment [61-Demorest-070426-Columbia]: "Regrettably, some members of our industry have a high degree of resistance to the proposed ATCM and will go to great lengths to delay or derail it – already they have undertaken a campaign to actively discredit products made from non-formaldehyde-based resins. Their claims are simply false. The real question remains – if they are desperate enough to make these phony statements about our products, can you believe anything they say?"

Agency Response [61-Demorest-070426-Columbia]: We have listened to stakeholders, conducted a survey and literature search – all sources were considered in the development of the ATCM (see Chapter II of the ISOR).

297) Comment [63-Li-070426-OSU]: "… Wood composite panels bonded with our adhesive have excellent strength properties and excellent water resistance. Our soy-based adhesive is able to bond virtually all woody materials. It doesn't matter whether these woody materials are in the form of veneer, particles, or fibers. For example, our soy-based adhesive can bond pine to pine very well while urea-formaldehyde resins cannot. Our soy-based adhesive is a very robust and versatile adhesive technology."

Agency Response [63-Li-070426-OSU]: We appreciate the comment – no response necessary.

298) Comment [63-Li-070426-OSU] [108-Li-070426-OSU]: "I still remember what my department head told me about three years ago when we had (a) successful application of our soy-based adhesive in a mill scale. He said we would be very lucky if our adhesive technology could hold the technology advantage for five years. He was absolutely right. In less than three years, many wood composite panels bonded with other formaldehyde-free adhesives from different companies already flood the market. This tells you how fast the adhesive technology can be advanced

and how well the wood composite industry can respond (to) CARB's potential regulation on formaldehyde emission(s)."

Agency Response [63-Li-070426-OSU] [108-Li-070426-OSU]: We have shown in the ISOR (pages 101 to 107) that the composite wood industry, manufacturers and resin producers, will be able to meet the standards in the recommended time frame using resin systems known today and under development.

299) Comment [65-Royce-070426-Hercules] [110-Royce-070426-Hercules]: "This soy-based adhesive requires a curing agent which is well known, well understood, and has been widely used commercially for 50 years. Although, Hercules invented this curing agent, currently we are only one of several suppliers. The point here is that there is a readily available supply chain."

Agency Response [65-Royce-070426-Hercules] [110-Royce-070426-Hercules]: We appreciate the information – no response necessary.

300) Comment [65-Royce-070426-Hercules]: "These resins afforded the industry proven and well documented benefits, in terms of both paper properties and paper machine productivity gains that have gone far beyond simply the elimination of formaldehyde. We are seeing similar trends today in hardwood plywood, where again, these resins in combination with soy, are providing not only the elimination of formaldehyde, but also the potential to improve both board properties and plant productivity. Based on worldwide availability of these curing resins and their nearly 50 year history of widespread use and commercial acceptance, our industry is well positioned to meet the needs of the wood composite industry."

Agency Response [65-Royce-070426-Hercules]: We appreciate the comment – no response necessary.

301) Comment [66-Mullen-070426-Hercules] [111-Mullen-070426-Hercules]: "Yes – Hercules soy-based adhesives can be successfully utilized. To date, we have produced over 15 million panels of decorative hardwood plywood that has been accepted commercially. Word is out and we receive numerous inquiries weekly from the global wood products community. Further development is underway to ensure that this technology can be transferred to particleboard and other composite panel segments."

Agency Response [66-Mullen-070426-Hercules] [111-Mullen-070426-Hercules]: We appreciate the information – no response necessary.

302) Comment [66-Mullen-070426-Hercules]: “Yes – we have developed and validated a 2nd generation adhesive that is sprayable and cost effective for the particleboard market. Commercial particleboard results are positive as we are close to meeting all performance targets. We are committed to achieving a minimal cost premium vs. UF.”

Agency Response [66-Mullen-070426-Hercules]: We appreciate the information – no response necessary.

303) Comment [66-Mullen-070426-Hercules] [111-Mullen-070426-Hercules]: “I want to very clear here. Contrary to the rumors, Hercules intends to make soy adhesive technology available to the entire global wood products market. Initial validation of the technology with a key industry leader was critical to insure its long term viability in this industry. With 23 production sites around the world, Hercules has more than enough capacity to handle our global customer needs, including China.”

Agency Response [66-Mullen-070426-Hercules] [111-Mullen-070426-Hercules]: We appreciate the information – no response necessary.

304) Comment [73-Chappell-070426-Columbia]: “I also understand that various test results including Type I glue bond tests were submitted. This is totally inappropriate for a water resistant resin such as urea formaldehyde. Internal bond test or IB tests should be performed on this adhesive system.”

Agency Response [73-Chappell-070426-Columbia]: We appreciate the information. We did not consider the test results for the reason suggested by the commenter.

305) Comment [100-Harmon-070426-Hexion]: “I think something that we haven’t really gone into very much is what kind of resin product volumes are we talking about that are available in North America being used now and may come under impact by this proposed regulation. There’s around three billion pounds of UF resin and around five billion pounds of phenol-formaldehyde resin. Depending upon how far this proposed regulation would domino, it could impact 10, 25 percent, I don’t know. Depends on the business response to it. Trying to replace that magnitude of product volume currently available with available manufacturing capacity and technology is truly a formidable undertaking, huge capital investments. Could be foreseen if there were a need to undergo a major shift.”

Agency Response [100-Harmon-070426-Hexion]: We disagree. It is our understanding that the demand for composite wood product resins can be met by existing sources worldwide. Most likely, manufacturers will comply

with the Phase 2 emission standards by using a combination of various NAF, ULEF or modified UF resin systems.

306) Comment [104-Woods-070426-Columbia]: "So now there are at least four different non-UF resin approaches for hardwood plywood, all available in the marketplace today and all are Phase 2 compliant for veneer core hardwood plywood. So the CARB staff appropriately recognized this and moved Phase 2 implementation for veneer core hardwood plywood to January 2010. And we predict that the emission testing data that CARB will be collecting starting with Phase 1 will further motivate you to continually strengthen this long-awaited regulation…"

Agency Response [104-Woods-070426-Columbia]: We appreciate the support and plan to monitor emissions data when it becomes available.

307) Comment [109-Grabiel-070426-USB]: "Now, you've had testimony submitted into the record which tries to cast doubt on the availability of the soy beans as an alternative adhesive. I stand here to assure you that the amount of soybeans available is fully ample to supply these adhesive requirements. Manufacture of all composite wood panels with a soy adhesive would require 80 million bushels… Current U.S. production is 3,200 million bushels. That's over 3,000 million bushels a year. U.S. consumption is about 2,000 million, and the other 1,000 million is exported. In other words, only 8% of the exported beans would be required for the total adhesive market. So there is no shortage of soybeans to supply the adhesive market."

Agency Response [109-Grabiel-070426-USB]: We appreciate the information – no response necessary.

308) Comment [110-Royce-070426-Hercules]: "The key point is that in the paper industry, this curing agent replaced both urea and melamine formaldehyde chemistry several decades ago, although the industry also dealt with similar change issues we're looking at today. By the mid-1980's, resins based on this curing agent had all but replaced UF resins in those markets for wet strength and paper at equal to or lower costs. Those new resins afforded the industry proven and well-documented benefits in terms of paper properties and paper machine productivity gains that have gone far beyond simply elimination of HCHO. We're seeing similar trends today, even in the early stages. In hardwood plywood where these new resin systems in combination with soy are providing not only the elimination of HCHO, but also the potential to improve both water properties and plant productivity."

Agency Response [110-Royce-070426-Hercules]: We appreciate the information – no response necessary.

309) Comment [110-Royce-070426-Hercules]: “Based on the worldwide availability of these curing resins and their nearly 50-year history of widespread use and commercial acceptance, our industry is well positioned to meet the needs of the wood composite industry…”

Agency Response [110-Royce-070426-Hercules]: We appreciate the information – no response necessary.

310) Comment [111-Mullen-070426-Hercules]: “… Hercules has 23 sites around the world with enough capacity to handle our global customer needs, including China. Hercules looks forward to our global reach to make an impact in California and the wood-based community…”

Agency Response [111-Mullen-070426-Hercules]: We appreciate the information – no response necessary.

SUPPORT FOR RULEMAKING

311) Comment [18-Smith-070419-S&F]: “Today, we produce a coconut palm flooring and panel good product with zero added formaldehyde and all our flooring and bamboo panels meet and exceed the phase II standards for HWPW proposed by CARB… In conclusion, we support and applaud CARB’s work in advancing the interests of a cleaner and healthier environment for our children and for generations to come.”

Agency Response [18-Smith-070419-S&F]: We appreciate the support – no response necessary.

312) Comment [20-Stensland-070420-NA]: “Given that there are no formaldehyde exposure standards in the U.S. for children, the proposed effort by CARB is a major move forward in the realm of prevention in children’s should be applauded.”

Agency Response [20-Stensland-070420-NA]: We appreciate the support – no response necessary.

313) Comment [30-Hardy-070424-Children Now]: “Children Now earnestly encourages CARB to put in place HCHO emissions reduction regulations as an overdue health prevention measure, to protect all people, including our children.”

Agency Response [30-Hardy-070424-Children Now]: We appreciate the encouragement – no response necessary.

314) Comment [35-Guay-070424-Columbia]: "… some of the flawed assertions, misrepresentations and outright falsehoods contained in the CWIC submittal dated April 23, 2007, require an immediate response."

Agency Response [35-Guay-070424-Columbia]: We appreciate the information on the accuracy of the comments from CWIC.

315) Comment [50-Leverenz-070425-NA]: "… I expect that over time, the cost of HCHO free material will decrease as economies of scale and new technologies are developed, further benefiting the consumer. Stay with the highest and best standard. It ultimately is the best result for consumers, manufacturers and materials producers."

Agency Response [50-Leverenz-070425-NA]: We appreciate the information – no response necessary.

316) Comment [54-Knox-070425-ACS]: "The Society believes that reducing exposure to HCHO is desirable and that reduced emissions will benefit public health. We support the proposed formaldehyde ATCM, and commend the Board for its actions to protect the health of all Californians."

Agency Response [54-Knox-070425-ACS]: No response necessary.

317) Comment [57-Young-070425-NA]: "Please support the measure to reduce formaldehyde emissions."

Agency Response [57-Young-070425-NA]: No response necessary.

318) Comment [58-Blicker-070425-NA]: "Do the right thing. Adopt the regulations to establish new low emitting standards. Thank you."

Agency Response [58-Blicker-070425-NA]: No response necessary.

319) Comment [60-Cassman-070426-HBMVR]: "We have carefully reviewed the staff report and applaud the manner in which the CARB staff has ably and comprehensively addressed the applicable legal as well as the policy issues for this ATCM. We have submitted for the record a letter brief that reinforces the staff's legal findings and demonstrates how the salient facts in the record support these findings."

Agency Response [60-Cassman-070426-HBMVR]: We appreciate the comments – no response necessary.

320) Comment [61-Demorest-070426-Columbia]: "We believe that your staff report presents overwhelming evidence that the proposed ATCM is the

right path for California's future – achieving meaningful environmental benefits, with proven and readily-available technology."

Agency Response [61-Demorest-070426-Columbia]: We appreciate the comment – no response necessary.

321) Comment [116-Gitt-070426-Build It Green]: "CARB under its legislative mandate, as you all know, has to impose the strictest regulations possible to limit and ultimately eliminate the dangerous and unnecessary toxics from kitchen cabinets and other composite wood products. That's why we're here today, and that's what I'm urging you to do." "I would urge the Board to actually shorten that time frame for implementation."

Agency Response [116-Gitt-070426-Build It Green]: We appreciate the support and have made a recommendation that we feel is technology-forcing and essential to reducing public exposure to formaldehyde. While we accelerated the compliance date for Phase 2 HWPW-VC, we did not believe it was appropriate to shorten the implementation for the other products. See also the response to comment #151.

PUBLIC HEALTH

COST OF HEALTH CARE

322) Comment [19-Cooper-070420-Kaiser] [117-Cooper-070426-Kaiser]: "If we look at the larger picture and include the health care cost to the State as a whole in treating cancer patients and others whose condition may be impacted by their exposure to HCHO, then the cost of inaction is far greater to all of us. We urge CARB to adopt stricter guidelines for HCHO levels as this sets the climate for manufacturers to develop formaldehyde-free alternatives that will be competitive in the marketplace. As a large purchaser in California, we can't make this market change to safer materials without your support…"

Agency Response [19-Cooper-070420-Kaiser]: We appreciate the comment – no response necessary.

323) Comment [62-Whalen-070426-Columbia]: "Moreover, there is abundant evidence and testimony demonstrating that the cost to public health by not regulating this known carcinogen will be far greater and should be the primary concern."

Agency Response [62-Whalen-070426-Columbia]: We agree that the health risk from exposure to composite wood products is substantial. See pages 157-159 of the ISOR.

324) Comment [101-Korthof-070426-NA]: “So what we’re really talking about here is the voided cost that these people are looking for -- the cheapest possible manufacturing are skirting. They’re avoiding the health care costs. They’re avoiding some of the other costs connected with the HCHO leaking. Now we’ve heard conflicting testimony that HCHO is good for you. It really isn’t that bad. Cancer isn’t such a bad thing. This is something you have to consider. But it’s clearly HCHO does not exist in nature in this same way. And I think it’s legitimately something you have to regulate. I think if it’s difficult to regulate, put more resources on it. This is the kind of thing we want the Board to do as the general public.”

Agency Response [101-Korthof-070426-NA]: See the response to comment #323 and the health effects discussion in Chapter VII of the ISOR.

HEALTH EFFECTS and RISK ASSESSMENT

325) Comment [2-Levin-070328-BERG]: It is difficult to justify continued population exposure to HCHO at the levels contemplated in the proposed regulation in light of this fact and the carcinogen status of formaldehyde.

Agency Response [2-Levin-070328-BERG]: We agree with the point raised by the commenter – no response necessary.

326) Comment [4-Sherman-070409-NA]: I recently read an article in one of the trade journals (I will be happy to hunt this up and send it along to you, although I suspect you already have it) which contends that the average person emits more HCHO from his body than do all the wood products combined in his residence. I mention this, assuming it is true, as a point of interest and reference.

Agency Response [4-Sherman-070409-NA]: Many normal products of metabolism in plants, fungi, and animals are in fact toxic – being natural does not mean being non-toxic or even less toxic than synthetic chemicals. Furthermore, many toxic chemicals are also constituents of living systems including nickel, a known human carcinogen which happens also to be an essential trace nutrient.

Formaldehyde is indeed a natural constituent found in cells being produced during normal human intermediary metabolism, and as a result of certain disease processes such as lipid peroxidation. But HCHO is still a carcinogen and additional exposure should be avoided. Organisms have evolved ways to handle HCHO produced during intermediary metabolism to control the reactive compound in our cells. However, these

protective mechanisms may be overwhelmed with exogenous HCHO from the air we breathe. In addition, it is recognized that some human disease such as cancer may result from our "carbonyl" body burden of which HCHO is a component. It should be noted that there are data to suggest that an elevated HCHO body burden may occur due to human disease states such as cancer and diabetes.

Formaldehyde in cells is mostly bound to a cofactor or enzyme during intermediary metabolism and is not free in the cell. Endogenously produced HCHO is in the aqueous phase and therefore hydrated (demonstrably less harmful than inhaled from external sources, although not necessarily harmless). In both cases, this is not chemically the same as free vapor-phase HCHO. Finally, most recent and reliable methodology indicates HCHO levels in breath in the low ppb range in healthy people: higher levels appear to be associated with disease states such as inflammation or cancer which enhance lipid peroxidation. The values from Moser (1.2 to 72.7 ppb; median = 4.26 ppb) for human breath are compared with values CARB has for conventional homes of 13.9 ppb on average, with the maximum greater than 200 ppb (Moser et al., 2005).

327) Comment [7-Landry-070416-CWIC]: "Last, but most importantly, we are extremely disappointed that CARB did not even evaluate the substantial and highly regarded new science that has been conducted around the world on formaldehyde – research that has been endorsed by regulatory officials around the world including by the USEPA and Health Canada. The research shows that there is virtually no risk to the population of California from industry products in the manner they are produced and used by consumers."

Agency Response [7-Landry-070416-CWIC]: USEPA retains its original risk assessment as the official IRIS assessment. While their assessment is currently undergoing re-review, they have not in fact endorsed the model proposed by the Chemical Industries Institute of Toxicology (CIIT). Only one group in the USEPA has used CIIT's model. The document by Health Canada was written in conjunction with CIIT and does not represent an independent assessment. OEHHA evaluated the CIIT model document as part of the established petition process and rejected the utility of the model for risk assessment due to model uncertainty (also see response to comment #341).

328) Comment [8.1-Rose-070416-FCI]: Formaldehyde is a ubiquitous and natural constituent of all living systems, from bacteria and fish to rodents and humans. As such, HCHO is essential to basic metabolic processes and, as a consequence, is naturally present in the human body with blood concentrations of approximately 1-2 ppm and is a natural part of exhaled breath. Similar concentrations are found in monkeys and in rats.

Agency Response [8.1-Rose-070416-FCI]: Many normal products of metabolism in plants, fungi, and animals are in fact toxic – being natural does not mean being non-toxic or even less toxic than synthetic chemicals. Furthermore, many toxic chemicals are also constituents of living systems including nickel, a known human carcinogen which happens also to be an essential trace nutrient.

Formaldehyde is indeed a natural constituent found in cells being produced during normal human intermediary metabolism, and as a result of certain disease processes such as lipid peroxidation. But HCHO is still a carcinogen and additional exposure should be avoided. Organisms have evolved ways to handle HCHO produced during intermediary metabolism to control the reactive compound in our cells. However, these protective mechanisms may be overwhelmed with exogenous HCHO from the air we breathe. In addition, it is recognized that some human disease such as cancer may result from our "carbonyl" body burden of which HCHO is a component. It should be noted that there are data to suggest elevated HCHO body burden due to human disease states such as cancer and diabetes.

Formaldehyde in cells is mostly bound to a cofactor or enzyme during intermediary metabolism and is not free in the cell. Endogenously produced HCHO is in the aqueous phase and therefore hydrated (demonstrably less harmful than inhaled from external sources, although not necessarily harmless). In both cases, this is not chemically the same as free vapor-phase HCHO. Finally, most recent and reliable methodology indicates HCHO levels in breath in the low ppb range in healthy people: higher levels appear to be associated with disease states such as inflammation or cancer which enhance lipid peroxidation. The values from Moser (1.2 to 72.7 ppb; median = 4.26 ppb) for human breath are compared with values CARB has for conventional homes of 13.9 ppb on average, with the maximum greater than 200 ppb (Moser et al., 2005).

329) Comment [8.2-Rose-070416-FCI]: Exposure of humans, monkeys or rats to HCHO by inhalation has not been found to alter the concentration of HCHO in the blood.

Agency Response [8.2-Rose-070416-FCI]: Alteration of the concentration of HCHO in blood after inhalation appears to be the case for the average effect, as shown by Heck and Casanova (2004) (i.e., cited by FCI in their comment letter of 16 April 2007). See also the response to comment #338. However, one would not expect inhalation of low levels of HCHO to affect systemic blood concentrations, and this is nowhere argued as a factor in the mechanism of the observed adverse health effects of inhaled HCHO. Formaldehyde traveling across the respiratory epithelium does

damage to the cells lining the respiratory tract and does not need to be absorbed into the systemic circulation to damage the respiratory tract.

The estimation of the acute and chronic Reference Exposure Levels (cREL) determined by OEHHA were based on locally observed effects in the respiratory system after inhalation, not on systemic effects. In the summary of the non-cancer health effects of inhaled HCHO presented in the ISOR (pages 133 to 142), the focus was on local effects.

330) Comment [8.3-Rose-070416-FCI]: Solid wood inherently emits very low, but detectable, HCHO because of natural metabolic processes in trees. Ignoring the scientific reality of endogenous chemicals and determinations by the USEPA, the World Health Organization (WHO) and European governments, the staff report concludes that "there is no known safe threshold exposure level for formaldehyde" (see p. ES-2 in the ISOR). In contrast, the WHO 2004 Guidelines for drinking-water quality sets a tolerable daily intake of 150 µg /kg of body weight, which would be 9,000 µg for a person weighing 60 kg (123 pounds). USEPA's Office of Air Quality Planning and Standards (OAQPS) tabulated the dose-response values used in the risk assessment of hazardous air pollutants. OAQPS' chronic inhalation cancer risk assessment of exposure to HCHO is 5.5 $\mu g/m^3 \times 10^{-9}$. Based on this unit risk factor, the benchmark ambient concentration for HCHO, a concentration representative of an additional lifetime cancer risk of 1 in 1,000,000 (1×10^{-6}) is 0.1497 ppm (183 $\mu g/m^3$). USEPA relied on a biologically based dose-response model (BBDR model) in its updated estimate of formaldehyde's chronic inhalation risk for in the development of two rules issued under the Maximum Achievable Control Technology (MACT) provisions of the federal Clean Air Act.

Agency Response [8.3-Rose-070416-FCI]: The value for the unit risk factor mentioned herein is based on the unit risk factor developed by the CIIT Centers for Health Research (CIIT), not by USEPA. Although USEPA used the CIIT model in their recent MACT rule (a risk management measure), this is not currently accepted as a consensus value for risk assessment. Therefore, the assertion herein that it was developed by USEPA is incorrect. The USEPA's current consensus unit risk value is 1.3×10^{-5} as published on IRIS. This number is much closer to (and slightly higher than) the Cal/EPA value for the potency of HCHO. The USEPA is officially re-evaluating HCHO, but a final reassessment is not expected to be completed for another two years.

There are major uncertainties in the predictions of the CIIT model depending on choice of input parameters (see response to comment 8.4). An extensive review of the strengths and weaknesses of that model by OEHHA was performed and reviewed by the Scientific Review Panel on Toxic Air Contaminants (SRP) in 2004, which led to the recommendation

by the SRP not to change the California potency estimate. The California potency estimate is not a typical default model and OEHHA considered several model types, including inclusion of cell proliferation data. Publications since that date have not added significantly to the information provided in the (then unpublished) report considered in that review.

The International Agency for Research on Cancer (IARC) recently reconsidered the status of HCHO and upgraded it to a Group 1 – known human carcinogen. The listing basis by IARC was nasopharyngeal cancer – not confined to the very specific site evaluated in the rat study and the CIIT model. Several other sites (especially lung cancer and leukemia) are also of substantial concern. Risks at other sites in the respiratory system (mechanistically plausible in humans due to different nasal geometry), and for leukemia raises the question of whether the CIIT model (which arbitrarily assumes a number of key parameters are the same in humans and rats, including the exact site of tumorigenesis) is relevant to human cancer risk.

Several of the citations of other national and international authorities endorsing the CIIT model are in fact quoting the same authors, and in some cases the same document, and are not independent or disinterested comments.

331) Comment [8.4-Rose-070416-FCI]: The German Federal Institute for Risk Assessment (BfR) concluded in 2006: "Concerning the tumors in the upper respiratory tract, the steps in the induction of tumors are understood and include non-genotoxic mechanisms, which in the low concentration range are the most critical events. Hence, it seems well founded that a safe level can be derived despite the fact that genotoxicity also plays a role in tumor formation. Our analysis of the available human data suggests that a level of 0.1 ppm HCHO is "safe" for the general population." A July 2005 classification dossier prepared by France and lodged with the European Commission (EC Environment 2005) concludes: "In rats, tumour induction is associated with cytotoxicity and regenerative cell proliferation as a predominant feature with a clear threshold and it should therefore be noted that a threshold is also likely in humans." Both the USEPA and WHO positions are consistent with and based on the leading and internationally-accepted model for formaldehyde cancer risk assessment (BBDR model), which predicts no additional risk of cancer risk from exposures of about 1 ppm. In stark contrast to this global consensus, the staff report claims that reductions from 16 or 42 µg/m^3 to 9 to 25 µg/m^3 will reduce cancer.

Agency Response [8.4-Rose-070416-FCI]: Formaldehyde is a genotoxic known human carcinogen. With regard to the carcinogenicity of HCHO, the ISOR relied on IARC's extensive review of the literature in their re-

evaluation of HCHO in 2004. IARC addressed all the arguments with regard to the current literature and use of current models and concluded that HCHO is a proven, known human carcinogen.

With regard to the model by CIIT mentioned in the response to comment #330, the model developed by CIIT does not assume a threshold but indicates a hockey-stick shape for the dose-response curve. The inflection point of the hockey stick is highly dependent upon assumptions that are not well characterized. Changing those assumptions changes the risks below 1 ppm by several orders of magnitude. These issues were considered at length by OEHHA in its evaluation of the petition by the Formaldehyde Epidemiology, Toxicology and Environmental Group in 2002, and the Scientific Review Panel on Toxic Air Contaminants endorsed OEHHA's conclusion that CIIT's model was not reliable for determining cancer risk at low exposure concentrations of HCHO.

The USEPA has not accepted this value as Agency consensus, contrary to the position portrayed in this comment. Furthermore, scientists at USEPA recently presented data at scientific meetings which supports our conclusion that the CIIT model has a very uncertain inflection point.

Environmental levels of HCHO are low but not zero (CARB measures up to about 5 ppb ambient – maybe a lot higher in buildings and vehicles) – so any substantial increment in ambient concentration of HCHO may be adverse.

332) Comment [8.5-Rose-070416-FCI]: Regarding asthma and immune system effects, the ISOR (p. 134-135) continues to assume an association with low-level formaldehyde exposure. In doing so, it ignores conflicting comments submitted by OEHHA in 2004 on the draft indoor air report.

Agency Response [8.5-Rose-070416-FCI]: The comments submitted by OEHHA on the indoor REL are not in conflict with what is presented in the ISOR. The comments on the draft indoor air report point out to CARB that at the time of the draft report, the data on whether lower exposures to HCHO result in immune sensitization were limited. Thus, OEHHA suggested a change to a sentence in the indoor air report that was too definitive. There were a few reports in the literature and now more studies since the indoor air report was drafted suggesting that lower environmental exposure to HCHO may exacerbate response to allergens, increase atopy in children, exacerbate asthma symptoms, or result in formaldehyde-specific IgE (Wantke et al., 1996; Garrett et al., 1999; Smedje and Norback, 2001a; Rumchev et al., 2002). Thus, there is no conflict between the comments by OEHHA on the CARB's indoor air report and what is in Chapter VII of the ISOR.

333) Comment [8.6-Rose-070416-FCI]: The following end points and associated thresholds, which result from expert reviews, should be used. *Sensory Irritation* – The weight of the evidence supports a level of 0.75 to 1.0 ppm. *Skin Sensitization Threshold* – As ATSDR (1999) concluded, exposure-response relationships for skin irritation and dermal allergic responses from acute exposure are well characterized (under patch testing conditions) in both normal and sensitized individuals, indicating that 1% solutions are not expected to be irritating to most people, and it is likely that dose-response relationships for dermal irritation from acute exposure may not be widely different from relationships for intermediate and chronic-duration exposures. *Odor Threshold* – The USEPA and ATSDR concluded that the odor threshold for HCHO is approximately 1 ppm.

Agency Response [8.6-Rose-070416-FCI]: OEHHA developed acute and chronic RELs, which underwent public comment and peer review by the Scientific Review Panel on Toxic Air Contaminants (TACs) before being adopted for use by OEHHA. These RELs are based on irritancy (acute REL) (OEHHA, 1999) and histological damage to the nasal epithelium (chronic REL) (OEHHA, 2000). Odor threshold is irrelevant to the development of a REL for HCHO. In addition, the sensory irritation threshold does not account for the tissue damage from long-term exposure to HCHO observed in workers, and this is not an appropriate endpoint to use in developing a REL for chronic exposure.

334) Comment [8.7-Rose-070416-FCI]: Based on an estimated population of 35 million people in California and OEHHA's estimate of a reduction of 35 cancer cases per million people over a 70-year lifetime, OEHHA's estimated number of cancer cases prevented per year in California is 18. In contrast, using the cancer potency factors of the other agencies, the estimated number of cancer cases prevented per year in California ranges from 0.0005 to 0.008 (Table 1). In other words, the estimated time required to prevent *one* case of cancer in the entire population of California after implementing Phase 2 ranges from 125 to 2,000 years. OEHHA's estimated cancer potency for HCHO is 2,250-36,000 times greater than that of the other agencies. Either OEHHA has greatly overestimated the risk or USEPA, Health Canada, WHO, and Australia all have greatly underestimated the risk.

Agency Response [8.7-Rose-070416-FCI]: As detailed in the responses to comments #330 and #331, several of the citations of other national and international authorities endorsing the CIIT model are quoting the same authors, and in some cases the same document, and thus are not independent or disinterested comments.

As mentioned in the response to comment #331, the USEPA has not, in fact, accepted this value as agency consensus, contrary to the position portrayed in these comments. Well respected scientists from the USEPA recently presented data at scientific meetings which supports our conclusion that the CIIT model has a very uncertain inflection point. See comments below on the cancer potency factor proposed by the FCI and CIIT (see also the responses to comments #340 and #341).

335) Comment [8.8-Rose-070416-FCI]: FCI recognizes that there may be social values or preferences that support the reduction of HCHO emissions. For the purposes of these comments, FCI has not undertaken a comprehensive review of California law and precedent to determine whether the staff proposal could be justified in some other fashion under state law. We are certain, however, that the reasons articulated as the health bases for the current proposal arise from a skewed presentation of the scientific literature that cannot be reconciled with an objective review or accepted science. This, in turn, leads to an inaccurate, if not misleading, characterization of HCHO health risks. FCI does not expect any health effects, including cancer avoidance, pre-phase 1 or after phase 1 or 2. From a health-basis there are no differences in the proposed changes. FCI promotes good product stewardship and is aware of the large body of scientific literature indicating that HCHO exposure at sufficiently high levels can cause serious or severe acute and chronic effects. But, based on the vast differences between prevailing science on HCHO health effects and the positions presented in the ISOR, the Board should direct CARB staff to make extensive revisions to the ISOR so that it is consistent with current science and current risk assessment practices. The Board has an obligation to ensure that final agency decisions are based on a sound and objective evaluation of requisite quality and quantity.

Agency Response [8.8-Rose-070416-FCI]: The health effects of exposure to formaldehyde were well documented in 1992 when the Board identified it as toxic air contaminant (TAC). The health effect findings from 1992 were reaffirmed in 2005. Because of the health effects related to formaldehyde exposure, the Board approved the ATCM to require the use of best available control technology for composite wood products. As further background, the TAC Program is purposely divided into two phases. As defined by legislation (AB 1807; Tanner 1983) and regulations (Health and Safety Code section 39660 et seq.), the first phase involves identification of TACs, and the second phase evaluates necessary controls.

During the identification of TACs, OEHHA develops a risk assessment of the candidate TAC which undergoes public review and review by the Scientific Review Panel on TACs (SRP). The SRP evaluates the adequacy of the science behind the risk assessment. They reviewed and

approved the CARB and OEHHA report initially in 1992, and again recently, following a petition by FETEG for re-review of the risk assessment, they approved OEHHA's analysis and recommendation for denial of the petition.

Once a substance is listed formally in regulation as a TAC, the second phase of the TAC program applies. In the second phase, CARB adopts appropriate regulations, such as this ATCM, to control TAC emissions. Health and Safety Code section 39665 (5) requires that a report on the need for control discuss the magnitude of risks posed by the substance as reflected by the amount of emissions, and the reduction in risk which can be attributed to each ATCM. The risk assessment prepared in the first phase of the TAC program contains health values that are used by CARB staff in the second phase of the program to characterize the risk reductions which can be attributed to the ATCM as required by the Health and Safety Code. The review of the health effects and basis of the cancer potency estimate in the ISOR is provided as background on how estimates of risk are derived. It is not a formal reevaluation of the risk assessment prepared in the first phase of the TAC program that is the legal basis for a TAC listing. See also the response to comment #336.

336) Comment [8.9-Rose-070416-FCI]: The only seeming consistency in the ISOR is that CARB staff appears to have actively sought to reach findings of adverse effects at any level. This is reflected, for example, in the ISOR's reliance on an outdated OEHHA assessment of carcinogenicity, while simultaneously rejecting OEHHA's comments that HCHO is not associated with asthma and immune effects at anticipated exposure levels. The differences between the prevailing science and the ISOR science rationale are so great that a rule based on such assumptions would be unscientific, arbitrary, capricious and an abuse of discretion.

Agency Response [8.9-Rose-070416-FCI]: OEHHA's summary on the health effects of HCHO presented in Chapter VII of the ISOR are in accordance with the TAC risk assessment, which found no threshold for formaldehyde's carcinogenic effects, and with current scientific literature, including the IARC (2004a, b) assessment of HCHO and recent publications on HCHO and asthma.

The comments submitted by OEHHA on the indoor REL are not in conflict with what is presented in the ISOR. The comments on the draft indoor air report point out to CARB that at the time of the draft report, the data on whether lower exposures to HCHO result in immune sensitization were limited. Thus, OEHHA suggested a change to a sentence in the indoor air report that was too definitive. There were a few reports in the literature and now more studies since the indoor air report was drafted suggesting that lower environmental exposure to HCHO may exacerbate response to

allergens, increase atopy in children, exacerbate asthma symptoms, or result in formaldehyde-specific IgE (Wantke et al., 1996; Garrett et al., 1999; Smedje and Norback, 2001a; Rumchev et al., 2002). Thus, there is no conflict between the comments by OEHHA on CARB's indoor air report and what is in Chapter VII of the ISOR.

337) Comment [8.10-Rose-070416-FCI]: Formaldehyde is one of the simplest biological forms of carbon. Even the most primitive organisms rely on HCHO as a one-carbon building block for the synthesis of more complex molecules. As a result of its importance in various metabolic processes, HCHO is naturally present in the human body with concentrations of approximately 1 to 2 ppm in the blood. Formaldehyde is exhaled in the breath, with studies suggesting that breath levels may range from the low parts per billion (1.2 to 72.7 ppb) to 0.3 to 1.2 ppm (Moser et al. 2005; Ebeler et al. 1997).

Agency Response [8.10-Rose-070416-FCI]: Formaldehyde, like many other toxic compounds, is indeed a natural constituent found in cells being produced during intermediary metabolism as well as during cell damage via lipid peroxidation. Formaldehyde in cells is usually bound to a cofactor or enzyme during intermediary metabolism and is not free in the cell. Likewise, it is not free HCHO in the blood but rather hydrated in solution. Organisms have evolved ways to handle HCHO produced during intermediary metabolism to control the reactive compound in our cells. However, these protective mechanisms may be overwhelmed with exogenous HCHO, especially via the inhalation route where the surface of the respiratory tract is directly impacted. In addition, it is recognized that some human disease such as cancer may result from our "carbonyl" body burden of which HCHO is a component. It should be noted that there are data to suggest elevated HCHO body burden due to human disease states such as cancer and diabetes.

338) Comment [8.11-Rose-070416-FCI]: Due to the highly efficient activity of a variety of aldehyde dehydrogenase (ADH) enzyme systems, HCHO is rapidly metabolized. For example, blood was collected immediately following exposure of F-344 rats to 14.4 ppm of HCHO for 2 hours. Blood from eight unexposed rats served as controls. Analysis showed HCHO concentrations of 2.24 and 2.25 µg/g blood in exposed and controls, respectively (Heck et al., 1985). Formaldehyde concentrations in human venous blood from four males and two females were determined by analyzing blood samples collected before and after exposure to 1.9 ppm of HCHO for 40 minutes. Average HCHO concentrations before and after exposure were 2.61 and 2.77 µg/g blood, respectively. In neither rats nor humans was there a statistically significant effect of HCHO exposure on the average concentrations in the blood.

In a similar study, three rhesus monkeys were exposed to HCHO at 6 ppm (6 hours/day, 5 days/week for 4 weeks) and the HCHO concentration in the blood measured by gas chromatography - mass spectrometry (GC-MS). The HCHO concentrations immediately after the final exposure in the three exposed and three unexposed animals were 1.84 and 2.42 µg/g blood, respectively. These results demonstrate that sub-chronic inhalation exposure of non-human primates to HCHO has no significant effect on the concentration in the blood, and that the average concentration of HCHO in the blood of monkeys is similar to that observed in human studies (Casanova et al. 1988).

California risk assessments should recognize and account for the status of substances that the body naturally generates and for which there are highly efficient detoxification pathways, in contrast to substances for which metabolic detoxification pathways are absent or limited.

Agency Response [8.11-Rose-070416-FCI]: Formaldehyde is a water soluble reactive compound and so is "scrubbed" by the tissues lining the respiratory passages. This is why cell damage occurs in the nasal epithelium in rodents and humans and further down the respiratory tract in humans (who are not as efficient in scrubbing HCHO from inhaled air as the rodent due to different morphology of the upper respiratory tract). Furthermore, examination of Heck's data in Table 1A for individuals shows that following HCHO exposure, the changes in blood HCHO levels on an individual basis were -29%, +29%, +40%, -26%, +34%, 0% (Heck and Casanova, 2004) (i.e., cited by FCI in their comment letter of 16 April 2007). Thus, due to individual variation, there may be substantial changes in blood HCHO for individuals following inhalation that are masked by the group average effect. In addition, the blood level analyses used GC-MS that reportedly measured free and reversibly bound HCHO. This method would not detect the HCHO bound to cellular macromolecules as stable or less reversible adducts.

In this paper, Casanova reports that there was significant variation in blood levels among monkeys. Again, the average response hides individual variability (Casanova et al., 1988).

Genetic and biochemical variability results in some individuals in whom the detoxification pathways are not highly efficient. Additional, exogenous HCHO further stresses detoxification pathways. Further, DNA protein cross-links (DPX) and DNA mutations seen in genotoxicity tests clearly indicate that not all HCHO is detoxified by aldehyde dehydrogenases.

339) Comment [8.12-Rose-070416-FCI]: In the context of this rule making, it is worth noting that solid, untreated wood emits very low, but detectable, levels of HCHO because HCHO is a metabolism product that is naturally

present (Meyer and Boehm, 1997). Thus, a value of “zero” cannot be attained for HCHO emissions from wood products.

Once HCHO enters the environment, it begins to break down through natural processes and does not persist or bio-accumulate (Chenier, 2003). From a regulatory and public policy perspective, it always is necessary to differentiate and recognize the relative importance of substances that are naturally occurring, biogenic chemical components, especially those that have multiple and highly efficient pathways existing for their conversion into a usable source. Such is the case with HCHO and its conversion to a carbon source, formate. Formaldehyde’s role in our environment is vastly different from substances that have no roles in normal metabolism and physiology.

Agency Response [8.12-Rose-070416-FCI]: The ATCM seeks to reduce HCHO emissions from composite rather than solid wood products. In addition, the ATCM does not seek to achieve a value of “zero”.

It is not clear to what environmental role for HCHO this comment refers. Many substances with normal roles in physiology are recognized as toxic at moderately higher levels (e.g., CO, Mn, and NO). Furthermore, formate is quite toxic and is the metabolite responsible for the ocular toxicity of methanol (see the responses to comments #328 and #329).

340) Comment [8.13-Rose-070416-FCI]: Formaldehyde is one of the most studied chemicals, with literally hundreds of studies on metabolism, toxicity and effects in animals and humans. Formaldehyde is a well-known sensory irritant to the eyes, nose, and throat. Controlled studies demonstrate that the general irritation threshold in a normal population is around 1.0 ppm. With the discovery in 1979 that HCHO caused nasal cancer in rats following lifetime exposure to very high levels, an extensive effort was undertaken, and continues today, to understand better the potential for similar effects in humans. After decades of serious study, the state of the science is robust. Highly regarded experts in the field of toxicology have concluded that HCHO is not likely to be carcinogenic to humans under low exposure conditions, specifically, those exposures that do not cause cytotoxic effects. Lacking sufficient evidence showing cancer in humans exposed to HCHO, assessors have historically made predictions of hypothetical cancer risk posed by low-dose HCHO exposure using the highly conservative linear multi-stage model and numerous default assumptions to extrapolate potential risks to humans from laboratory animal data. However, estimates of the risk of developing cancer as the result of exposure to HCHO have been lowered over time as new experimental data replaces default assumptions and mathematical models for extrapolating from animals to humans and high doses to low doses have become more sophisticated. Risk estimates associated with

exposure to HCHO have continually decreased as scientific knowledge increased and newer, more complete scientific studies have become available. For example, for a lifetime exposure to 0.1 ppm, the 1987 and 1991 USEPA risk value declined from 1.6 in 1,000 to 3.3 in 100,000. In 1999, the BBDR risk assessment model estimated the risk from the same exposure to be 3.3 in 10,000,000. In other words, as the mode of action became better understood, the risk levels were adjusted to be consistent with this evolving body of knowledge.

Agency Response [8.13-Rose-070416-FCI]: Newer data have been reviewed recently by IARC. This widely-respected scientific agency has developed a system of classifying chemicals as to their carcinogenicity. Previous evaluations by IARC placed HCHO in the category of "probable human carcinogen". The 2004 review resulted in upgrading the classification of HCHO to "known human carcinogen" (IARC, 2004a, b). This is different from the direction described by this comment. This comment only refers to the risk levels based on CIIT's BBDR model, which is the model presented in the FCI petition to re-open the TAC risk assessment. As noted above in the response to comments #330, #331, #334, #336, #341, and #343, there is considerable model uncertainty.

341) Comment [8.14-Rose-070416-FCI]: In promulgating the National Emissions Standard for Hazardous Air Pollutants for Plywood and Composite Wood Products, the USEPA stated: We believe that the CIIT modeling effort represents the best available application of the available mechanistic and dosimetric science on the dose-response for portal of entry cancers due to HCHO exposures. The CIIT model incorporates state-of-the-art analysis for species-specific dosimetry, and encompasses more of the available biological data than any other currently available model. FCI supports this scientific decision by USEPA, which is also consistent with the USEPA position in the gas turbine MACT rulemaking.

The BBDR model has been accepted and used by several international and national standards-setting bodies and is widely respected. These widely respected organizations, listed below, draw heavily on the BBDR approach and several characterizations state that HCHO is likely to be carcinogenic in humans only at doses that cause cell proliferation, not at low doses.

The National Academy of Sciences (2004) endorsed the BBDR risk assessment, over USEPA's 1987 Integrated Risk Information System (IRIS) number, in its review of indoor air contaminants on submarines. A subcommittee of the National Research Council (NRC) developed exposure guidance levels for HCHO (assuming an exposure of 24 hours per day for several weeks at a time). The report contains a thorough discussion of the literature discussing the relevant epidemiologic and

toxicologic studies on HCHO, and, with regard to cancer endpoints, states, "The more recent CIIT assessment results in a theoretical cancer risk well below the U.S. Department of Defense "acceptable" risk level of 1 in 10,000, even for a lifetime exposure at the 0.3 ppm 90-day continuous exposure guidance level (CEGL). The subcommittee concluded that the CIIT assessment more *accurately reflects the scientific weight of the evidence for formaldehyde than does EPA's approach*." (Emphasis added.)

In its review of HCHO under its Existing Chemicals program, the Organization for Economic Cooperation and Development (OECD, 2002) issued a Screening Information Data Set (SIDS) Initial Assessment Report which stated: "The increasing severity of damage in higher concentrations is a function of the concentration. Another way of expressing this result is that HCHO toxicity is independent of the total dose (c x t) but that it depends on the dose rate [(c x t)/t = c] or concentration. This can be explained by saturation of detoxification pathways for HCHO at high concentrations. Strong non-linearity in the induction of cell proliferation, DNA-protein-cross-links, cytotoxic effects and carcinogenicity are observed (CIIT, 1999). The observed non-linearity is likely attributable to a large extent to mechanisms present in biological systems to deal with low levels of HCHO" (OECD, 2002). In sum, the report found that "[t]aking into account the extensive information on its mode of action, HCHO is not likely to be a potent carcinogen to humans under low exposure conditions" (OECD, 2002). OECD found no further research on human health was needed.

In an updated assessment of HCHO, Environment Canada and Health Canada stated that it considered the BBDR dose-response model "to provide the most defensible estimates of cancer risk, on the basis that it encompasses more of the available biological data, thereby offering considerable improvement over default" (Environment Canada and Health Canada, 2002).

In finalizing the Concise International Chemical Assessment Document on Formaldehyde (CICAD), the WHO (2002) relied on the BBDR cancer risk assessment for HCHO and concluded that HCHO exposure poses a carcinogenic hazard only under conditions that both induce toxicity and cause sustained regenerative proliferation.

Agency Response [8.14-Rose-070416-FCI]: As noted above, the current consensus value for cancer potency factor at USEPA is their unit risk factor of 1.3×10^{-5} as published on IRIS, consistent with and actually higher than the value developed by OEHHA. OEHHA does not agree that the CIIT model is the appropriate model for estimating cancer risk to humans at low levels of exposure. USEPA scientists have further

evaluated the CIIT model and express the same concern with the low dose predictions as noted by OEHHA.

The document by Health Canada was written in conjunction with CIIT and does not represent an independent assessment. OEHHA did not use a default model in our HCHO risk assessment. Rather our model evaluated some of the same parameters as CIIT, namely DNA-protein cross-links and cellular proliferation. Finally, as noted in the other responses (e.g., comments #331 and #335), both OEHHA and the Scientific Review Panel on Toxic Air Contaminants considered the CIIT model and rejected it as a basis for protecting public health.

Regarding WHO and the CICAD, CIIT wrote the risk assessment portion of the WHO (2002) report. It was not an independent assessment as implied by the comment.

342) Comment [8.15-Rose-070416-FCI]: The German MAK Commission, which sets occupational exposure values, reviewed HCHO and concluded: "In the low dose range, which does not lead to an increase in cell proliferation, the Commission therefore considers that the genotoxicity of HCHO plays no or at most a minor part in its carcinogenic potential so that no significant contribution to human cancer risk is expected" (German MAK Commission, 2001). This conclusion is supported by the results of a risk assessment which, for persons exposed to concentrations of 0.3 ml/m^3 (0.37 mg/m^3) at the workplace for 40 years, yielded a very low additional cancer risk for non-smokers of 1.3×10^{-8} and for smokers of 3.8×10^{-7} (CIIT, 1999; German MAK Commission, 2001).

In November 2006, the Australian National Industrial Chemicals Notification and Assessment Scheme (NICNAS) issued a final Priority Existing Chemical (PEC) Assessment Report on Formaldehyde.[6] NICNAS was formed in 1990 to "provide a national notification and assessment scheme to protect the health of the public, workers and the environment from the harmful effect of industrial chemicals; and assesses all chemicals new to Australia and assesses those chemicals already used (existing chemicals) on a priority basis, in response to concerns about their safety on environmental grounds." The formaldehyde PEC provides a summary of the BBDR model, on which the report relies.[7]

Collectively, these applications of the BBDR risk assessment model reflect its broad, international acceptance among expert agencies. The results of the BBDR model and the human implications indicate that: (1) cancer risks associated with inhaled HCHO are de *minimis* (i.e., one in a million or less) at relevant human exposure levels, and (2) protection from the non-cancer irritant effects of HCHO also should be sufficient to protect for any potential carcinogenic effects. There is widespread agreement in the

scientific community that the BBDR model represents the future of biologically-based cancer risk assessment. Like any new methodology, particularly one with this degree of complexity, there are opportunities for improving the certainty of the modeled predictions. This is already underway with research to elucidate additional details concerning the mode of action of formaldehyde-induced tumors and developing better data for use in the model. The results of these studies, the most recent of which we discuss below, should result in even greater confidence that the BBDR model provides the best and most scientifically defensible methodology for determining whether HCHO poses an increased risk of cancer to humans at levels that are protective for its well-characterized irritant effects.

With input from USEPA, Health Canada, and peer reviewers, a team of researchers at the CIIT Centers for Health Research published a thorough evaluation of potential cancer risk from HCHO in 1999, incorporating over 20 years of research and integrating various toxicological, mechanistic, and dosimetric data (CIIT, 1999). That evaluation was refined and restated in 2004. A list of references supporting or comprising the body of knowledge underlying the CIIT work appears at the end of these comments.

CIIT used the detailed understanding about how HCHO causes cancer in animals to construct a biologically-based model to describe these effects. Combined with the data on the similarities and differences between animals and humans, findings in animals can be extrapolated to humans with increased confidence. Biologically-based modeling greatly minimizes the need for the unfounded assumptions and uncertainties inherent in currently used regulatory approaches for carcinogens (i.e., the so-called no threshold model), which assumes (based on no data whatsoever) that cancer risk is linear to zero. The model developed by CIIT for formaldehyde-induced upper respiratory tract tumors is the best model to predict the doses of HCHO required to produce tumors in animals and in humans.

The most recent application of the BBDR model combines animal data with human respiratory tract cancer to smokers, non-smokers, and a mixed population of non-smokers and smokers to predict the likelihood of cancer occurring in humans at various levels of HCHO exposure. When the animal data were used in one way, the model predicted no additional risks of respiratory tract cancer up to about 1 ppm HCHO for all three cases. When the animal data were used in an even more conservative way, the estimate of additional cancer risk was up to 1,000 times less than estimates based on presently used methods for extrapolating animal data to humans.

Even when elevated breathing rates due to different levels of physical activity were put into the model (which could lead to increased uptake of HCHO), this did not make large differences in predicted additional risks. As shown below in Figure 1, the evolution of predicted cancer risks associated with exposure to 0.1 ppm HCHO for 6 hr/day, 5 days/week has dramatically decreased as the scientific basis for using the animal data to predict potential risks to humans has improved. The BBDR model shows that cancer risk is negligible until HCHO exposures reach levels associated with cytotoxicity and resulting cellular proliferation. Assuming 80 years of continuous exposure to HCHO at 100 ppb, the BBDR model predicts an increased risk of developing cancer at 3.3×10^{-7} (i.e., 3.3 in 10,000,000) for non-smokers, well below the one in a million risk level typically used by regulators to establish an acceptable level of exposure. The same model predicts a risk of 5.3×10^{-6} in smokers.

Agency Response [8.15-Rose-070416-FCI]: OEHHA evaluated the CIIT model document as part of the established petition process under the TAC Program. See the response to comment #335. The model used a more complex analysis of the likely carcinogenic dose-response based on analysis of deposition of HCHO in the rodent nasal cavity, and the role of DNA damage and cell proliferation. OEHHA reviewed the materials submitted by the petitioner and presented our conclusions to the Scientific Review Panel on Toxic Air Contaminants (SRP). The SRP declined to recommend reconsideration of OEHHA's 1992 HCHO unit risk factor. This was largely due to the uncertainties in the model surrounding the HCHO concentration at which, according to the CIIT model, the unit risk "switched" from low to high. This modeled inflection point could vary considerably depending on the choice of some poorly characterized input parameters, and might reasonably be low enough that environmental and indoor exposures were in the "high potency" range. OEHHA concluded that this model was not adequate to protect public health. OEHHA reported that the model produced a dose-response that was flat at the low-end and that the model was flawed. This report was submitted to the SRP. The CIIT model was used by one group within USEPA, but there was not an agency consensus. Well respected scientists from USEPA recently presented data at scientific meetings which supports our conclusion that the CIIT model has a very uncertain inflection point and is therefore unsuitable for low dose risk estimation.

In addition, IARC states that some epidemiological and experimental studies indicate that different agents may act at different stages in the carcinogenic process, and several different mechanisms may be involved. The aim of the *Monographs* has been, from their inception, to evaluate evidence of carcinogenicity at any stage in the carcinogenesis process, independently of the underlying mechanisms. Information on mechanisms may, however, be used in making the overall evaluation. As mechanisms of carcinogenesis are elucidated, IARC convenes international scientific

conferences to determine whether a broad-based consensus has emerged on how specific mechanistic data can be used in an evaluation of human carcinogenicity.

343) Comment [8.16-Rose-070416-FCI]: In a state-of-the-art, three-week inhalation study at CIIT that was sponsored by FCI, F344 rats were exposed to provide information on the time-course and concentration dependence of genomic changes produced by HCHO in tissues of the upper respiratory tract of the rat. Exposures were conducted at three concentrations plus controls. The concentrations mirrored the lower concentrations in the Monticello study (0.7, 2.0, and 6.0 ppm) to provide further biological information concerning the pathology changes that begin at the upper end of this dose regime. Genomic evaluations (four animals per concentration/time point) were conducted at four time-points: 6 hours, 24 hours (6 hours plus 18 hours recovery), 5 days, and 19 days. The initial genomic evaluation focused on respiratory and transitional epithelium from the anterior nose, the region of the highest tumor frequency.

The CIIT study was intended to provide initial information on dose-response trends for genes or gene families and to associate these changes with toxicity, metaplasia, and proliferation in these nasal tissues. The following points summarize the preliminary findings of the CIIT study. A longer-term study (sub-chronic, 90-day) is expected to be conducted in 2007 at CIIT to link this short-term work with the results from the 2-year Monticello results.

Gene changes were noted for a variety of genes at the 6 hour, 5-day and 19-day sampling times for some, but not all dose levels. The pattern of gene transcription changes and the groups of genes significantly affected by exposure differed markedly for the four sampling times. Immediately after the first exposure, up-regulation (i.e., increased activity) and down-regulation (decreased activity) was noted for many genes at 6 ppm, while only a few genes showed changes at 2 ppm, and there were no gene changes observed at 0.7 ppm. At 6 ppm, up-regulation was observed for a gene associated with oxidative stress signaling and a gene associated with inflammatory signaling, while down-regulation was noted with several kinase and phosphatase genes. At the 24 hour sampling time, representing an 18 hour recovery after a single 6 hour exposure, no evidence of any gene change was noted at any concentration. Immediately after the exposure on day 5, there were more changes in genes at the 2 ppm exposure level than at 6 ppm. Again, no changes were observed at 0.7 ppm. A preliminary gene ontology analysis showed significant enrichment in genes associated with cell adhesion (i.e., the ability for cells to stay together). Positive trends were also seen for several genes involved in the degradation of the extra-cellular matrix and the inflammatory response. The changes in cell adhesion and

inflammatory signaling genes are likely reflections of cellular alterations associated with adaptive responses and tissue toxicity. Immediately after the exposure on day 19, response trends were consistent with those observed after the first exposure. No statistically significant gene changes were observed at either 0.7 ppm or 2 ppm, while significant gene changes were again observed at 6 ppm.

This research represents a first attempt to evaluate the genomic alterations occurring upon single and repeated exposures to HCHO in the rat. While a more robust analysis (i.e., 90-day sub-chronic) is being planned to better understand these changes in relation to toxicity, proliferation, and metaplasia, this initial study shows a pattern of changes in a variety of genes and gene families. In this preliminary evaluation, pathological changes were restricted to the 2 ppm and 6 ppm concentrations and primarily consisted of inflammation and hyperplasia, with some squamous metaplasia observed at the highest concentration. The three types of endpoints show relatively consistent dose-response gene expression patterns for the 3 week exposure period evaluated, with no changes noted at 0.7 ppm, primarily transient changes at 2 ppm, and more notable changes at 6 ppm.

In summary, the results of this study of genomic changes indicate a highly concentration and time dependent response. An immediate response in a number of genes was observed at 6 ppm, and a similar response was still observed after 3 weeks suggesting that cells had adapted to this exposure concentration. In contrast, the response at 2 ppm was highest after one week of exposure, but was no longer observed at 3 weeks. No consistent genomic responses were observed at 0.7 ppm at any time point suggesting a clear biological threshold for formaldehyde-related effects.[9]

Agency Response [8.16-Rose-070416-FCI]: Genomics provide a potentially useful tool to look at mechanism of action (although to a large degree, this is still under development), but not to determine levels that produce effects. Also, these studies were done in rats and require extrapolation to humans. Furthermore, changes in gene transcription following acute exposure do not suggest a clear biological threshold for HCHO effects or whether or not hyperplasia may occur at chronic low levels of exposure.

This report (i.e., CIIT (1999) cited by FCI in their comment letter of 16 April 2007) describes rates of transcription of genes into RNA. As such it probably represents the activity of genes involved in adaptive responses and repair following tissue damage by inhaled HCHO. Although interesting from the biological point of view this does not appear to add any new information for risk assessment purposes beyond what has already been learned from the earlier histological and cell proliferation

data. Many of the same limitations (sensitivity, limited time scale of treatment and lack of follow-up over longer time periods) apply. Further, the study does not translate into a "threshold" for biological activity as the reported changes in gene expression are quite removed from tumor formation, and says nothing about responses following chronic exposure in humans.

344) Comment [8.17-Rose-070416-FCI]: The German Federal Institute for Risk Assessment (BfR) prepared a Toxicological Assessment of Formaldehyde in 2006. While FCI does not endorse the entire analysis, the conclusions in BfR (2006) are noteworthy. Concerning the tumors in the upper respiratory tract, the steps in the induction of tumors are understood and include non-genotoxic mechanisms, which in the low concentration range are the most critical events. Hence, it seems well founded that a safe level can be derived despite the fact that genotoxicity also plays a role in tumor formation. Our analysis of the available human data suggests that a level of 0.1 ppm HCHO is "safe" for the general population. The proposed level of 0.1 ppm is 2-fold lower than the level derived from animal data by applying appropriate safety factors. In the literature, a physiologically based model has been reported which has been applied to the animal data. From the reported calculations and their extrapolation to the human situation a level of 1 ppm, 10 times the level proposed by us, was considered to be safe. Therefore, the recommended level of 0.1 ppm seems to be a conservative estimate.

A classification dossier prepared by the Toxicology Unit of INRS (France) for the Commission of the European Communities Environment (DG XI)[Classification and Labelling of Dangerous Substances (ECBI/38/05)(July 2005)](EC Environment 2005) also conflicts with the conclusion of the ISOR with regard to the question of whether a threshold exists for toxicological effects from HCHO exposure. With regard to animal data, the dossier states (italics added): Experimental results and mechanistic data therefore *support a threshold type dose-response* for induction of nasal tumours with regenerative cell proliferation being the predominant feature in the carcinogenic process. The mechanism of tumour induction through chronic persistent irritation, cytotoxicity and regenerative proliferation is clearly identified. Finally, there is no convincing evidence of a carcinogenic effect at distant sites or via other routes of exposure.

With regard to human and animal data, the dossier concludes that: tumors are only found at the site of direct contact (i.e. in the nasal tissue of rats), nasal tumors were only significantly increased in rats, in mice there was no significant response and in hamsters no tumors were observed at all, and tumor formation after inhalation exposure to HCHO only occurs at

doses with massive cytotoxicity leading to a clear increase in regenerative cell proliferation.

With regard to the mode of action and its relevance for humans, such as mutagenicity, cytotoxicity with growth stimulation, tumors are only to be expected at dose levels with massive cytotoxicity in conjunction with growth stimulation (regenerative cell proliferation) and mitogenesis. Such high doses cannot be tolerated by humans under any realistic conditions because such irritation will not be tolerated. This threshold identified in animals and by mechanistic experiments is also likely to be operative in humans. "In rats, tumour induction is associated with cytotoxicity and regenerative cell proliferation as a predominant feature *with a clear threshold and it should therefore be noted that a threshold is also likely in humans*" (p. 43, italics added).

Non-genotoxic chemicals such as chloroform have had mode of action (MOA) risk assessments completed (Golden et al., 1997; Lipscomb and Kedderis, 2006). A challenge in the risk assessment of HCHO has been to understand how best to perform a dose-response assessment of a chemical that has both inflammatory or cytotoxic and mutagenic or clastogenic properties. Traditional approaches to risk assessment separate these endpoints for non-cancer versus cancer evaluation. However, for HCHO, the MOA is likely dependent on, and secondary to the cytotoxicity of the chemical. For chemicals such as HCHO, an appropriate assessment is based on systems biology and a detailed understanding of the biochemical events leading to toxicity, which describes and relies on a common MOA to integrate the various observed endpoints of toxicity. The MOA approach can serve as a platform to harmonize approaches to non-cancer and cancer toxicity at the point of contact (i.e., no significant entry into the body). The harmonized risk characterization is based on an evaluation of the dose-response continuum and relies on epithelial changes that have recognized prognostic value for more overt toxicity and that should be recognized as sentinel information, applicable to both cancer and non-cancer effects. These observations are necessary to conclude that a sufficiently robust understanding of the mode of action exists, based upon the explicit criteria spelled out in USEPA's most recent guidelines for Carcinogen Risk Assessment (USEPA, 2005).

Agency Response [8.17-Rose-070416-FCI]: OEHHA evaluated the CIIT model document as part of the established petition process under the TAC Program. See also the responses to comments #327, #330, and #331. The model used a more complex analysis of the likely carcinogenic dose-response based on analysis of deposition of HCHO in the rodent nasal cavity, and the role of DNA damage and cell proliferation. OEHHA reviewed the materials submitted by the petitioner and presented our

conclusions to the Scientific Review Panel on Toxic Air Contaminants (SRP). The SRP declined to recommend reconsideration of OEHHA's 1992 HCHO unit risk factor. This was largely due to the uncertainties in the model surrounding the HCHO concentration at which, according to the CIIT model, the unit risk "switched" from low to high. This modeled inflection point could vary considerably depending on the choice of some poorly characterized input parameters, and might reasonably be low enough that environmental and indoor exposures were in the "high potency" range. OEHHA concluded that this model was not adequate to protect public health. OEHHA reported that the model produced a dose-response that was flat at the low-end and that the model was flawed. This report was submitted to the SRP. The CIIT model was used by one group within USEPA, but there was not agency consensus. Well respected scientists from USEPA recently presented data at scientific meetings which supports our conclusion that the CIIT model has a very uncertain inflection point and is therefore unsuitable for low dose risk estimation.

In addition, IARC states that some epidemiological and experimental studies indicate that different agents may act at different stages in the carcinogenic process, and several different mechanisms may be involved. The aim of the *Monographs* has been, from their inception, to evaluate evidence of carcinogenicity at any stage in the carcinogenesis process, independently of the underlying mechanisms. Information on mechanisms may, however, be used in making the overall evaluation. As mechanisms of carcinogenesis are elucidated, IARC convenes international scientific conferences to determine whether a broad-based consensus has emerged on how specific mechanistic data can be used in an evaluation of human carcinogenicity.

345) Comment [8.18-Rose-070416-FCI]: Additionally, HCHO is naturally produced and an important component of various metabolic processes. As a result, it is a constituent of living systems, from bacteria and fish to rodents and humans. Because there are naturally evolved, highly efficient detoxification pathways to manage HCHO, it should be assessed differently than an agent that has no role in normal metabolism and physiology. Standard risk assessment methodology does not account for this important distinction. In contrast, the BBDR risk assessment model, used by USEPA in the plywood MACT, overcomes this limitation. This biologically-based model has garnered broad recognition from national and international expert agencies as the best available science for evaluating the chronic health effects of HCHO. Risk assessments should recognize the biochemical and physiological implications of substances that are naturally generated in the body and for which highly efficient metabolic pathways have evolved.

Agency Response [8.18-Rose-070416-FCI]: As mentioned above, HCHO, like many other toxic compounds, is indeed a natural constituent found in cells being produced during intermediary metabolism as well as during cell damage via lipid peroxidation. Formaldehyde in cells is usually bound to a cofactor or enzyme during intermediary metabolism and is not free in the cell. Likewise, it is not free HCHO in the blood but rather hydrated in solution. Organisms have evolved ways to handle HCHO produced during intermediary metabolism to control the reactive compound in our cells. However, these protective mechanisms may be overwhelmed with exogenous HCHO by the inhalation route. In addition, it is recognized that some human disease such as cancer may result from our "carbonyl" body burden of which HCHO is a component. It should be noted that there are data to suggest elevated HCHO body burden due to human disease states such as cancer and diabetes.

With respect to the use of CIIT's BBDR model, for reasons mentioned earlier (see responses to comments #330 and #331), OEHHA concluded that this model was not adequate to protect public health. While the USEPA used this model in their recent MACT rule, it was not used to develop their current consensus risk value. The model was used to identify low risk facilities which would be exempt from the MACT rules. However, the USEPA was sued regarding the use of the CIIT model and lost the lawsuit. An analysis of the CIIT model by scientists at USEPA notes that the model has a very uncertain inflection point that substantially affects the dose-response curve making the model unsuitable for predictions at low doses.

346) Comment [8.19-Rose-070416-FCI]: There is a robust database on the dose-response characteristics of HCHO induced sensory irritation. Reviews of the HCHO literature have noted that the most sensitive endpoints reported are for eye and upper respiratory tract irritation (USEPA/NAC, 2003; Arts et. al., 2006). A concentration of 1 ppm appears to be the approximate threshold for complaints of symptoms ranging from none to mild to moderate with no clear concentration-response relationship or increase in complaints among exposed subjects compared with controls.

For example, a study in asthmatics (Harving et al., 1990) found no association between subjective ratings of sensory irritation and increasing HCHO exposures at concentrations of 0, 0.01, 0.1, and 0.69 ppm. USEPA/NAC (2003) identified 0.9 ppm as the highest exposure concentration at which the responses of subjects whose eyes were sensitive to formaldehyde were not significantly different from controls. Even at 3 ppm, however, the majority of subjects reported only mild (typically defined as present but not annoying) to moderate (annoying) irritation.

Agency Response [8.19-Rose-070416-FCI]: The ISOR summarizes some of the sensory irritation effects of HCHO (pages 134-135). Sensory irritation is irrelevant to consideration of the non-cancer health effects of concern, which are based on histological changes in the upper respiratory tract, not sensory responses. In determination of a cREL for the non-cancer effects of HCHO, irritation was not used as the endpoint of concern. Short-term experiments do not provide adequate information on long-term chronic effects of HCHO exposure. Sensory irritation and odor threshold, although important, are not relevant to OEHHA's derivation of a cREL for HCHO (OEHHA, 2000).

The discussion of sensory irritation in the comments from FCI revolves around articles developed for the purpose of evaluating and setting occupational standards of workers to avoid moderate eye irritation. Occupational standards are not relevant to community exposures due to the presence of children, the elderly, etc., in the general population. OEHHA agrees that sensory irritation is a sensitive endpoint. OEHHA is concerned with the protection of sensitive subpopulations, including children and asthmatics. Other studies have also reported complaints of irritation at doses less than 1 ppm. ATSDR (1999) reported at concentrations as low as 0.4 ppm sensory irritation was observed in humans. Several studies, including Gorski et al. (1992) showed respiratory or irritative properties of HCHO at 0.4 ppm. Arts et al. (2006) states "In literature, a concentration as low as 0.24 ppm has been reported to be irritating to the respiratory tract in humans."

Beyond the irrelevancy, chamber studies are insensitive due to small sample size, population selection (not necessarily sensitive people in the sample), inability to evaluate prior and concurrent exposure which is important in a community setting, and inability to evaluate longer term exposures.

Most importantly, the threshold for changes in the nasal epithelium in workers exposed to HCHO appears to be lower than the alleged sensory threshold. Nasal epithelial damage occurs in long-term occupational exposures, and sensory irritation is not relevant to this endpoint. It should be noted that many irritants including HCHO are not only sensory irritants but also cause tissue damage. Sensory irritants can also cause irritation via other mechanisms and can damage tissue. Finally, HCHO is not purely a sensory irritant.

347) Comment [8.20-Rose-070416-FCI]: In only one study, again in asthmatics at 3 ppm, did any subject rate the eye irritation as severe (1 of 180 subjects) (Sauder et al., 1987). This same study (Sauder et al., 1987) illuminates why well conducted studies are necessary in order to properly

understand and quantify the irritant properties of HCHO. In this study, 22% of subjects exposed to air containing no HCHO reported eye irritation, and 33% reported nose or throat irritation. Such a large incidence of false positive reporting would likely have an influence on any study for which it was not accounted.

Agency Response [8.20-Rose-070416-FCI]: The study by Sauder et al. (1987) had only 9 subjects, not 180 as indicated in this comment. Thus, one person out of nine indicating severe eye irritation is a much larger proportion of the responses than one in 180 would be. While it is true that false positives may be a concern in studies of this size and nature, given the confusion in the comment, it is not clear how the mentioned percentages of false positives were derived.

348) Comment [8.21-Rose-070416-FCI]: Many of the controlled inhalation studies included potentially sensitive individuals. These studies either excluded less sensitive individuals (e.g., those without complaints of eye irritation at 1.3 to 2.2 ppm or smokers) or focused on potentially sensitive individuals (e.g., asthmatic individuals and those with formaldehyde-related contact dermatitis or previous HCHO sensitivity). As summarized by USEPA/NAC (2003), Bender (2002), and Paustenbach et al. (1997), the results of these studies indicate that sensitive individuals might experience eye irritation at 1 ppm.

Below 3 ppm, the chemical appears to be rapidly eliminated in the upper airways, because asthmatics (who normally react to mid-and lower-respiratory airway irritants) engaging in moderate exercise showed no decrements in several pulmonary function parameters when exposed at concentrations up to 3 ppm. Thus, asthmatics exposed to airborne HCHO at exposure concentrations at or below 3 ppm do not appear to be at greater risk of suffering airway dysfunction than non-asthmatics. In addition, the short-term chamber studies indicate that adaptation or accommodation to irritation can develop over time (NRC, 2004). These studies support that HCHO irritancy does not follow Haber's law (concentration x exposure time = response) for extrapolating between short-term and long-term time periods. Generally, concentrations that do not produce short-term sensory irritation also do not produce sensory irritation after repeated exposure. Consequently, conventional safety factors applied to a non-cancer risk assessment for HCHO are unnecessary.

Agency Response [8.21-Rose-070416-FCI]: OEHHA agrees that HCHO does not follow Haber's Law. The comments by FCI argue that sensory irritation does not follow Haber's Law and consequently non-cancer risk assessment should not use conventional safety factors for HCHO. Sensory effects do not follow Haber's law over periods of more than a few

minutes at most. But histological damage does, and histological damage is the basis for OEHHA's chronic REL.

349) Comment [8.22-Rose-070416-FCI]: There are several explanations for reported eye irritation levels by HCHO below 1.0 ppm, the primary one, however, is associated with the substance's odor. Formaldehyde has a pungent odor and the odor of HCHO is detected and/or recognized by most human beings at concentrations below 1.2 mg/m^3 (1 ppm) (IPCS, 1989). In general, odor detection is not regarded as a toxicologically relevant endpoint -- annoyance does not represent a sensory or psychological effect, but rather a psychological discomfort from the presence and increasing concentration of an odor (Arts et al., 2006b).

Foul odors are detected by both olfactory and trigeminal stimulation. The olfactory stimulation relays messages to the brain using the first cranial nerve for odor perception while trigeminal stimulation is responsible for sensing the ocular and nasal irritation of a chemical using the fifth cranial nerve (Paustenbach and Gaffney 2006). In other words, olfactory receptors detect odor threshold, while trigeminal nerve endings in the cornea and nasal mucosa signal sensory irritation thresholds in the eyes and upper respiratory tract, respectively. Olfactory receptors respond to chemical stimuli usually at lower concentrations and with greater selectivity than do the trigeminal endings and are responsible for the discrimination of different odorous substances (Arts et al., 2006b). Although anatomically distinct, both pathways help people to distinguish and characterize inhaled air.

Studies have shown that even a pure odorous substance, lacking any trigeminal stimulation, elicited reports of sensory irritation (van Thriel, 2006). For the majority of chemicals, odor has a zero correlation with actual exposure risk, but odor may have a substantial correlation with perceived exposure risk. However, as Paustenbach and Gaffney (2006) note: "detection of odors by workers may tap into the person's aversions to unpleasant odors, in general." Because the vast majority of volatile chemicals stimulate the olfactory system at concentrations well below that at which they will elicit trigeminal activation, the evaluation of irritation from volatiles is often confounded by the perception of odor (Arts et al., 2006b). Formaldehyde is not an irritant at its odor threshold; however, much of the public immediately perceives the substance and its odor as harmful, which strongly influences individuals to indicate irritation where only odor exists. Thus, the results of measurements of sensory irritation can strongly be biased by subjective feelings and interpretations, in many instances caused by the odor of the compound. Therefore, the perception of odor intensity is an important factor that must be considered when evaluating a substance for an occupational exposure limit, especially substances that like HCHO have odors perceived as unpleasant.

Agency Response [8.22-Rose-070416-FCI]: OEHHA recognizes the perception of foul odor as an "effect". Detection of foul odor may lead to other irritant effects even if the discomfort is psychologically-induced. In addition, patho-physiological effects have been seen in response to odor (e.g., by pregnant women and for other chemicals like H_2S). OEHHA does not disagree that odor perception is distinct from trigeminal nerve stimulation. OEHHA is not using odor perception or odor threshold to set a cREL.

Occupational standards are not used to set standards for the general public, which includes infants and children, the elderly, pregnant women, ill people and more sensitive individuals. Occupational standards are recognized to protect some but not all workers and are set at higher risks than environmental standards for the general public. Also, in an occupational setting, workers may be less likely to complain and may be "acclimated" to odor or irritation from low doses (1 ppm or less) of HCHO.

350) Comment [8.23-Rose-070416-FCI]: Several expert reviews have been conducted of the HCHO literature relating to sensory irritation. Based on the reviews by the National Academy of Sciences' National Research Council (NRC, 2004), Arts et al. (2006), Bender (2002), and Paustenbach et al. (1997), the weight of the scientific evidence demonstrates that the threshold for HCHO sensory irritation of the most sensitive endpoint (i.e., eye and respiratory tract irritation) is in the range of 0.75 to 1 ppm.

(a) NRC (2004): In reviewing the exposure of U.S. Navy personnel in submarines to several different contaminants, a subcommittee of the NRC developed exposure guidance levels for HCHO (assuming exposure for 24 hours per day for several weeks at a time). The report contains a thorough discussion of the literature on the relevant epidemiologic and toxicologic studies on HCHO, and concludes: A concentration of 1 ppm appears to be the approximate threshold between complaints of symptoms ranging from none to mild to moderate with no clear concentration-response relationship or increase in complaints among exposed subjects compared with controls (subjects exposed to clean air) and definite symptoms of discomfort in a number of exposed subjects.

(b) Arts et al. (2006a) : Arts et al. (2006a) evaluated literature related to critical health effects of HCHO exposure including sensory irritation and the potential to induce tumors in the upper respiratory tract. The authors reviewed the subjectively measured sensory irritation threshold levels in humans and compared this with findings obtained in animal experiments. In addition, a benchmark dose (BMD) analysis of sensory irritation was used to estimate response incidences at different HCHO concentrations. The BMD method used by the authors takes all individual data into

account by means of a curve based on all the data points.[12] Arts et al. concluded that: when minimal/mild/slight irritation, which is still not annoying, is taken as a cut off level, eye and nasal irritation were found at HCHO levels of ≥ 1 and ≥ 2 ppm, the minimal/mild/slight irritation level would be ≥ 3 ppm HCHO for throat irritation, whereas levels of up to 3 ppm did not result in dyspnoea (chest tightness/discomfort) or cough.[13] The authors were sensitive to the challenge of setting appropriate exposure levels based on sensory irritation. Because human perception of sensory irritation can be influenced strongly by subjective feelings and interpretations, the authors contend that it would be better to base the sensory irritation threshold on objective measurements. In the authors' view, the only study that reported objectively measured eye irritation (but not nasal irritation), viz. an increase in eye blinking frequency at a concentration of 1.7 ppm HCHO (Weber-Tschopp et al., 1977), is in line with minimal/mild/slight eye irritation reported at levels of 1 ppm and higher. It was noted that the increase in eye blinking frequency was not doubled yet at 3.2 ppm (Weber-Tschopp et al., 1977). Collectively, Arts et al.'s review leads to the conclusion that: "Sensory irritation is first observed at levels of 1 ppm and higher. From both human and animal studies it was concluded that at airborne levels for which the prevalence of sensory irritation is minimal both in incidence and degree (i.e. < 1 ppm), risks of respiratory tract cancer are considered to be negligibly low.

(c) Bender (2002): Bender (2002) reviewed whether human sensory irritation data found in controlled/chamber studies and workplace studies are sufficiently robust for use in establishing a Reference Concentration for HCHO. Bender (2002) determined that chamber studies provided the highest quality data for determining the presence of eye, nose or throat irritation at a known level of HCHO. Chamber studies show that individuals began to sense eye irritation at about 0.5 ppm HCHO; 5% to 20% reported eye irritation at about 0.5 to 1 ppm, and greater certainty for sensory irritation appeared at 1 ppm or greater. Bender et al., also evaluated reports of eye irritation among controlled studies, and found that it is not unusual to have a 20 to 30% response rate for eye, nose, or throat irritation associated with controls. Bender et al. concluded that sensory irritation at levels below 1 ppm is often difficult to distinguish from effects that occurred in controls.

(d) Paustenbach et al. (1997): Paustenbach et al. (1997) represents the results of deliberations of this panel of experts convened to review the literature on sensory irritation. The expert panel reviewed approximately 150 published scientific articles and concluded that the most sensitive adverse effect of HCHO is eye irritation. Eye irritation "does not become significant until a concentration of at least 1.0 ppm is reached, and, based on most studies, for most people this level of irritation rapidly subsides.

Moderate to severe eye, nose, and throat irritation does not occur until airborne concentrations exceed 2.0 to 3.0 ppm.

According to the expert panel, the weight of the evidence showed that reports of irritation below 0.3 to 0.5 ppm HCHO were too unreliable to attribute the findings solely to HCHO. Specifically, response rates below 20% were assumed to be too near the background level of irritation among the general population to be able to attribute that level of response to exposure to a specific contaminant. In response to studies that showed irritation response at concentrations below 0.1 ppm, the panel explained: "it is likely that this level of response was attributable to other environmental factors, the background incidence of eye irritation, self-selection bias, or the effects of interviewer interaction.

(e) IRSST (2006): The Québec Institute of Research Robert-Sauvé en santé et en sécurité du travail (IRSST) recently completed a thorough evaluation on the Impacts of a Lowering of the Permissible Exposure Value to Formaldehyde: Impacts of Formaldehyde Exposure on Health. IRSST is a private, non-profit scientific research organization known for the quality of its work and the expertise of its personnel. The Board of Directors is composed of an equal number of trade union and employers' representatives. With respect to the issue of sensory irritation, this evaluation critically considered all available studies with the notable inclusion of a rigorous dose-response analysis of the available data. Unlike other evaluations, based on pre-established criteria, this analysis considered sensory irritation effects (e.g., eye irritation, moderate and severe, and moderate nose and throat irritation), the percentage of workers who might experience such effects, and most importantly, the associated dose-response relationships.

The relationship between acute HCHO exposure and the appearance of effects was established based on the collection of all rough data from each of the studies considered to have a degree of confidence moderately high to high. Hence, these studies are all led in a controlled setting. Moreover, the effects selected for the establishment of a dose-response relationship are the irritating effects to the eyes and airway mucosa (nose and throat) as well as perception of odor. These effects are most frequently reported following an acute exposure to HCHO suggesting that they are the critical effects (those that appear with the lowest concentrations).

For each of the controlled studies, the number of subjects presenting irritating effects, according to the class of exposure and the severity of the effect, was listed. The degree of exposure was fractioned into six distinct classes: from 0 to < 0.3 ppm, from 0.3 to < 0.75 ppm, from 0.75 to < 1.0

ppm, from 1.0 to < 2.0 ppm, from 2.0 to < 3.0 ppm, and > 3.0 ppm (which in fact combined the exposures between 3.0 and 4.0 ppm).

By combining the data from the different controlled studies, a global dose-response relationship was established. More specifically, the total number and the proportion of subjects presenting irritating effects by type of effects, severity of effects and class of exposure were compiled in the form of a table by adding the numbers of the different studies. This data allowed the creation of dose-response curves where the background noise value, that is to say the frequency of irritations in the absence of exposure, was subtracted.

The conclusions of the IRSST review are noteworthy. Our analysis indicates that, for concentrations less than 0.75 ppm, the frequency of irritation in workers exposed to HCHO was about the same as the one observed in individuals without occupational exposure. This means that appearance of irritation at such concentrations can hardly be associated with occupational exposure to HCHO. For concentrations between 0.75 and 3 ppm, the estimated proportion of workers who may experience moderate irritating effects to the eyes, nose, and throat, attributed to HCHO is between 1.6 and 14.9%.

Agency Response [8.23-Rose-070416-FCI]: Occupational standards are not used to set standards for the general public, which includes infants and children, the elderly, pregnant women, ill people and more sensitive individuals. Occupational standards are recognized to protect some but not all workers, and are set at higher risks than environmental standards for the general public. OEHHA recognizes these previous reviews have been performed and have taken into account information found therein. However, OEHHA relies on primary sources of peer-reviewed literature in its non-cancer health risk assessments.

With regard to the National Research Council (NRC) paper mentioned in the above comment, Navy personnel are less likely to complain and may be able to withstand more odor or irritation because of their training, especially those trained to spend months at a time on submarines. They may be acclimated to the many odors found on submarines. Also, Navy personnel on submarines would be of much better health than a “normal” person, and therefore, are not an adequate sample of the general population. The studies mentioned above are of occupational exposure and do not include infants, children, and pregnant women.

The conclusions by Arts et al. (2006) are based on only one paper found in the “historical” literature, which qualified to them as an “objective” endpoint (eye blinking frequency). This one study (Weber-Tschopp et al., 1977) had the limitation that 1 ppm was the lowest dose used. Therefore,

a conclusion that sensory irritation was first observed at levels of 1 ppm and higher is erroneous, if lower doses were not tested. In addition, Arts et al. (2006) states, "…there is not a large discrepancy between subjectively reported symptoms and objectively measured nasal sensory irritation." In any event, the observation of sensory irritation at these levels is not particularly relevant given that hyperplasia has been reported in exposed workers at about 0.26 mg/m^3 (0.2 ppm) in studies by Wilhelmsson and Holmstrom (1992), and Edling et al. (1988). This effect is the basis of the OEHHA cREL.

With regard to the comments on chamber studies mentioned in the Bender review section above, it should be noted that chamber studies typically involve healthy individuals, and so, won't detect effects on sensitive members of the population. In addition, chamber studies are insensitive due to small sample size, population selection (not necessarily sensitive people in the sample), inability to evaluate prior and concurrent exposure which is important in a community setting, and inability to evaluate longer term exposures.

The purpose of the analyses by Paustenbach et al. (1997) and IRSST (2006) was to set occupational exposure limits. OEHHA seeks to protect the general public, including sensitive subpopulations, and occupational standards are not appropriate to use for the general public. In the introduction to the summary of health effects in the ISOR (pages 133-134), OEHHA states that studies have reported the irritant properties of HCHO at 0.25 to 1.39 ppm, not to concentrations below 0.1 ppm. Further, the FCI comments footnote 24 states "Paustenbach notes that 1 ppm for 15 minutes was meant to prevent moderate eye irritation in 75% of workers". This would be totally inappropriate to apply to the general population for longer term exposures.

351) Comment [8.24-Rose-070416-FCI]: While odor is not a toxicological effect, we mention odor because it is sometimes confused with sensory irritation, particularly in self-reporting studies or evaluations. The odor threshold for HCHO is approximately 1 ppm.

In its toxicological profile for HCHO, the ATSDR (1999) states that the odor threshold for HCHO in humans has been reported to be 1 ppm, but others have noted that it may range as low as 0.05 ppm. ATSDR then describes the odor threshold as 0.5 to 1.0 ppm.

USEPA (1988) concluded that the odor threshold for HCHO is 0.83 ppm.

Agency Response [8.24-Rose-070416-FCI]: The odor threshold is irrelevant to the determination of OEHHA's cREL to protect public health.

See also the response to comments #333, #346, and #349 with regard to the issue of odor threshold.

352) Comment [8.25-Rose-070416-FCI]: Total Daily Formaldehyde Exposure as the Basis for Risk Assessment (Page 132). Average and Elevated Formaldehyde Concentrations (Page 132). While exposure assessments appear in the ISOR, FCI does not address the validity of exposure assessments in these comments. We note, however, that in Table VII-1, the 46.7 ppb figure for the high end is doubtful. Additionally, the 17.2 ppb under conventional homes only accounts for newly built homes, which artificially inflates the exposure amounts. There is no discussion of concentrations in an average home. More important, however, is the use of significant number assumptions in the table that give the illusion that these concentrations represent precise measurements when they do not.

Agency Response [8.25-Rose-070416-FCI]: The values referred to in this comment are reported in Table VII-1 of the ISOR as 17.2 $\mu g/m^3$ and 46.7 $\mu g/m^3$, respectively for average and elevated HCHO concentrations. The average value is based on concentrations measured in both newly built and existing homes. The elevated value represents the average concentration measured in newly built homes reported in Sherman and Hodgson (2003). Maximum formaldehyde concentrations in new homes have been reported in the 200 ppb range (CARB, 2005). These concentrations are based on published results in agency reports and peer-reviewed journals; thus, we believe that they are accurate representations of what average and elevated formaldehyde concentrations in a home would be.

353) Comment [8.26-Rose-070416-FCI]: Health Effects Values for Formaldehyde (Page 133). The reference to potential immune function effects is accompanied by few references and should be rewritten with a broader review of the literature. This section has semi-quantitative language, "very low doses" that are simply not useful. The concentrations should be supplied. Are these case reports? The information in this section is scant.

Agency Response [8.26-Rose-070416-FCI]: The Chapter in the ISOR on health effects is meant to be a summary and not a comprehensive review of all the literature on formaldehyde (see pages 133 to 155). In addition, immunological effects are not the focus of our summary and were not the basis for determining OEHHA's cREL.

354) Comment [8.27-Rose-070416-FCI]: Health Effects in Humans (Page 133). In this section, the references stop at 1994. As mention in the first section of these comments, there are several good papers since that time that are available. This section should be updated. The problems with this section

are common throughout. Without controlled studies, the cited outcomes have little probative value and lack the scientific rigor necessary for regulation.

Agency Response [8.27-Rose-070416-FCI]: The last sentence of this section on studies pertaining to the health effects in humans cites a number of studies that are more recent than 1994 (Wantke et al., 1996; Smedje et al., 1997; Garrett et al., 1999; Smedje and Norback, 2001a; 2001b; Delfino et al., 2003). There are other examples throughout the document (Franklin et al., 2000; Kriebel et al., 2001; Rumchev et al., 2002; Erdei et al., 2003; Arts et al., 2006). See also the response to comment #335.

355) Comment [8.28-Rose-070416-FCI]: Respiratory Effects and Irritation – Acute Exposure (Page 134). Regarding asthma and immune system effects, the ISOR fails to address comments by OEHHA in its 2004 comments to CARB on the draft indoor air report. OEHHA commented that "our understanding of the data is that HCHO is not associated with non-occupational asthma. Although the literature is inconsistent, most occupational health scientists would say that high occupational exposures are needed to see formaldehyde-specific asthma." In another section of comments, OEHHA goes on to say: "There is little evidence that allergic sensitization occurs at typical indoor exposures. Any statement on sensitization should be qualified by indicating that sensitization has been described following relatively high occupational exposures." OEHHA also states that "we do not support the statement that concentrations above 27 ppb might result in initiation of an immune response in a sensitive individual. The scientific evidence for initiation of immune response at levels below workplace exposures is not strong." The ISOR should be revised to reflect the OEHHA position or provide a well-articulated basis for a differing conclusion.

The presentation on eye irritation and uncertainty development is not used by the rest of the world or by the NRC (2004). The ISOR basically says that irritation occurs at ambient levels in the home based on calculations. This calculated "finding" is not supported by empirical data.

Average exposures are not very useful unless average and peak exposures are basically identical. In some of the referenced studies, the average concentrations are around 0.2 ppm while peaks can go higher than 20 ppm. The existing knowledge regarding the mode of action for these end points makes the discussion of averages useless.

Agency Response [8.28-Rose-070416-FCI]: With respect to comments OEHHA made to CARB on the draft indoor air report, the comments submitted by the OEHHA on the indoor REL are in fact not in conflict with

what is presented in the ISOR. The comments on the draft indoor air report point out to CARB that at the time of the draft report the data on whether lower exposures to HCHO result in immune sensitization were limited. Thus, a change was suggested to a sentence in the draft indoor air report that we felt was too definitive. There were a few reports in the literature and now more studies since the indoor air report was drafted suggesting that lower environmental exposure to HCHO may exacerbate response to allergens, increase atopy in children, exacerbate asthma symptoms, or result in formaldehyde-specific IgE (Wantke et al., 1996; Garrett et al., 1999; Smedje and Norback, 2001a; Rumchev et al., 2002). Thus, there is no conflict between the comments by OEHHA on the CARB draft indoor air report and what is in Chapter VII of the ISOR on health effects. However, OEHHA recognizes there was a typographical error and the above quote should read, “below 27 ppb”.

Regarding eye irritation, the NRC uses an approach different from OEHHA’s since they are addressing emergency exposures and military situations. In the context of ambient HCHO levels in the home, in the ISOR, OEHHA makes no explicit claim regarding the occurrence of eye irritation at these levels.

356) Comment [8.29-Rose-070416-FCI]: This section has semi-quantitative language, such as "very low doses" (page 135) that is not useful. The concentrations should be supplied. Are these case reports? The information in this section is scant.

Agency Response [8.29-Rose-070416-FCI]: Contrary to the assertion of the use of semi-quantitative language, the next sentence after the mention of “very low doses” states “(e.g., 0.3 ppm)”. Concentrations used in the individual studies are reported in the ISOR clearly.

357) Comment [8.30-Rose-070416-FCI]: Green et al. (1987) is used to claim that there are lung function deficits at 3 ppm; however, there are other papers that show no change in normal or asthmatics at 2 ppm. There are better conducted studies then Green et al. (1987) and the ISOR needs to review the literature with less bias.

Occupational Exposures (Pages 137-138). This section on irritancy studies in workers has the same problems as the preceding home studies. On what basis does one isolate an irritant response for HCHO in pulp mill workers? There is an unstated assumption that HCHO is the only potential occupational irritant at these locations, which is obviously untrue.

The report references Srivastava et al. (1992), which reported worker complaints of a variety of problems that the workers attributed to occupational exposure to HCHO concentrations estimated to be 0.03

mg/m^3 in air as an 8-hour time-weighted average (TWA) and described as 0.025 ppm in the ISOR. First, we note that the reported exposure levels are near those associated with ambient air rather then occupational settings. The exposure levels raise a question as to whether this study really assesses responses to occupational exposure to HCHO. Second, the type of self-reporting involved in this study may be helpful in preparing for objective research, but these subjective evaluations are unreliable. CARB must consider biological consistency and probability in reviewing papers reporting on subjective self-evaluations. The reported symptoms include respiratory, gastrointestinal, musculoskeletal, and cardiovascular problems, suggesting some other agent than HCHO, assuming that the self-evaluations are accurate. The references to this study should be deleted from the ISOR.

The draft report referenced Gorski and Karkowiak (1991) and summarized that study as "showing no significant association between HCHO exposure, pulmonary function (FVC, FEV_1 and PEF) in normal or asthmatic workers, and occurrence of specific IgE antibodies to HCHO" (Draft ISOR at 136). Rather then comparing and contrasting to other studies that show health effects at doses where none should be expected, the ISOR deletes the reference to this study altogether in an apparent decline from scientific review to simple advocacy.

Immunological Effects in Humans (Page 138-139). The discussion on the immune system is flawed and fails to address recent studies using controlled chamber concentrations that contradict most of the historical literature that is referenced. The ISOR does not consider whether these data are the result of HCHO exposure or some other chemical/substance/protocol issue. For example, there is no discussion of any potential confounders, such as mold, in the entire document. On page 139, the report states: "while the human studies are not entirely consistent with each other, and there is a potential for confounding in each, nevertheless, taken together, they suggest that children are more sensitive to HCHO toxicity than adults." The ISOR does not mention the confounding factors, how or why the studies may disagree, or how the staff developed an outcome "taken together."

The section on immune functions contains few references and should be rewritten with a broader review of the literature. Similarly, this section has semi-quantitative language, "very low doses" that is simply not useful. The concentrations should be supplied. Are these case reports? The information in this section is scant.

Agency Response [8.30-Rose-070416-FCI]: With respect to lung function deficits, Green et al. (1987) is only one of the studies cited under respiratory effects (Hendrick and Lane, 1977; Wallenstein et al., 1978;

Burge et al., 1985; Nordman et al., 1985; Kilburn et al., 1989; Kriebel et al., 2001).

Pulp mill workers are but one group that has been studied. OEHHA does not make the assumption that HCHO is the only possible cause of irritation. However, HCHO is a known irritant common to and prominent in the diverse studies mentioned.

OEHHA does not necessarily disagree with the problems raised with the study by Srivastava et al. (1992). The only use of "significant" is with reference to the chest X-rays.

As mentioned previously, Chapter VII in the ISOR on health effects is meant to be a summary and not a comprehensive review of all the literature on HCHO. In addition, immunological effects are not the focus of our summary and were not the basis for determining OEHHA's cREL.

358) Comment [8.31-Rose-070416-FCI]: Reproductive and Developmental Effects in Humans (Page 139). The weight of the evidence demonstrates that HCHO does not result in reproductive and developmental effects. Both the ATSDR and WHO reviews concluded that HCHO is not associated with adverse reproductive and related outcomes. Although some animal and human studies have reported non-specific reproductive or developmental effects (Taskinen et al. 1999; Zeljenkova and Szabova 2004), the weight of available scientific data presents insufficient evidence to conclude that HCHO causes reproductive or developmental effects.

A comprehensive review of all the available data, including the meta-analysis data evaluating the relationship between spontaneous abortions and occupational exposure to formaldehyde, was conducted by Collins et al. (2001). For studies that showed an increased relative risk (RR), some important limitations in study design were highlighted, such as the use of self-reported data or judgment on the level of exposure with no attempt to validate the exposure estimates with measurements. Collins et al. (2001) examined the potential for reproductive and developmental effects from HCHO exposure. The authors note that HCHO is unlikely to reach the reproductive system in humans in concentrations sufficient to cause damage since it is rapidly metabolized and detoxified upon contact with the respiratory tract. While there are effects seen in in-vitro studies or after injection, there is little evidence of reproductive or developmental toxicity in animal studies under exposure levels and routes relevant to humans. Most of the epidemiology studies examined spontaneous abortion and showed some evidence of increased risk (meta-RR = 1.4, 95% CI = 0.9 to 2.1).

We found evidence of reporting biases and publication biases among the epidemiology studies and when these biases were taken into account, we found no evidence of increased risk of spontaneous abortion among workers exposed to HCHO (meta-RR = 0.7, 95% CI = 0.5 to 1.0). The small number of studies on birth defects, low birth weight, and infertility among HCHO workers; the limitations in the design of these studies; and the inconsistent findings across these studies make it difficult to draw conclusions from the epidemiology data alone. However, information from experimental studies and studies of metabolism indicate reproductive impacts are unlikely at HCHO exposures levels observed in the epidemiology studies.

Agency Response [8.31-Rose-070416-FCI]: The ISOR makes it clear that there appear to be no reproductive or developmental effects. Therefore, we do not state anything contrary to this comment.

With respect to confounding, confounders, as reported in individual studies, are included in the study descriptions in the ISOR. OEHHA recognizes that there is more information available, however, this is only a summary and immunological endpoints are not the endpoint used as the basis for the cREL. This summary was taken from existing reviews on HCHO which underwent public comment and were reviewed by the Scientific Review Panel on Toxic Air Contaminants (SRP). In OEHHA (2001), “Prioritization of Toxic Air Contaminants -- Children’s Health Protection Act – Final Report,” confounders are addressed in more detail.

359) Comment [8.32-Rose-070416-FCI]: Infants and Children (Pages 139-142). These studies of infants and children can have many confounding variables, such as environmental tobacco smoke (ETS), mold, etc. The ISOR does not mention any of these potential issues when reviewing the data. In discussing Garrett et al. (1999), the ISOR states that "no evidence of an association between asthma in the children and HCHO levels." Without any substantive explanation, the ISOR jumps to the conclusion that "these data do suggest that HCHO levels commonly found in homes can enhance sensitization of children to common aeroallergens." There is no explanation for this assumption. The staff apparently suggests that HCHO exposure is required prior to an allergic event, an untested and unsupported theory that cannot serve as a basis for regulation. Garrett et al. (1999) is a study of asthmatic and non-asthmatic children in two small towns in Victoria, Australia. This paper does not address differences in adult and children’s responses, since relevant data for adults were not collected.

It does characterize the Wantke et al. (1996) study relevance as “unclear” because the sensitization was not associated with symptoms. Several factors compel caution in relying on this study: The paper likely was based

on a graduate student thesis (the acknowledgements note a postgraduate publication award), and the paper presents extensive multivariate analysis. Of all the analyses performed, the study notes: 1) a crude odds ratio for atopy of about 1.4 with an increase in bedroom levels of HCHO of 10 $\mu g/m^3$ (adjusted for parental asthma and sex); however, the confidence interval for this finding is 0.99 to 2.00; and 2) an adjusted odds ratio of 1.42 for atopy with an increase in the highest recorded HCHO level by 20 $\mu g/m^3$ (confidence interval 0.99 to 2.04). (As the majority of scientists and researchers recognize, odds ratios of 1.4 are generally not considered to be strong evidence of a causal connection.) The study took place in two small towns "surrounded by open-cut brown coal mines and power stations, which provide considerable employment." The authors had difficulty locating non-asthmatic children to participate in the study. Outdoor measurements were taken but not reported.

The authors note there was no significant association between HCHO levels and house age. This is surprising, since any off gassing of HCHO from wood products or other formaldehyde-containing materials would be expected to decline over time. Thus, the accuracy of HCHO measurements could be open to question.

In discussing the implications of their findings, Garrett et al. note the increased prevalence of allergic diseases in many western countries, and suggest that materials emitting HCHO have become increasingly popular at the same time. The authors apparently do not appreciate that HCHO resin technologies have been improved substantially over the last two decades, and that releases of HCHO have been greatly reduced. It is difficult to rule out systematic recall or selection bias in this case-control study. With respect to exposure issues, no personal monitors were used, and there were no associations or trends for levels reported for the bedrooms, which are the one place in the house where some form of continuous exposure is likely to occur. The distribution of results claimed by the investigators hardly seems to be persuasive evidence of a systematic health risk. There was no significant increase in the adjusted risk for either asthma or respiratory symptoms with increasing HCHO exposure. Wantke et al. (1996) studied 62 students in Austria and reported finding IgE specific to HCHO. However, among 24 of the 62 children who had elevated IgE specific to HCHO, only 3 had RAST scores over 2.0. There was no dose-response relationship between HCHO levels and RAST scores. The three classrooms studied had 43, 69 and 75 ppb of formaldehyde measured, respectively. RAST scores were not elevated at 69 ppb compared to the 43 ppb classroom, as shown below. Thus, there does not appear to be dose-response relationship between HCHO and IgE. Moreover, the IgE levels in the study did not correlate with either number or severity of reported symptoms. The authors acknowledge that "IgE-mediated sensitization to HCHO is rare and a matter of controversy."

They further state: “Our data as well as the literature [ref. omitted] do not conclusively explain the clinical relevance of specific IgE against HCHO.” The Wantke et al. study did not compare children and adults, and thus also does not speak to any differential sensitivity.

Franklin et al. (2000) measured exhaled nitric oxide as an indicator of subclinical inflammatory response in 224 Australian children. The authors report increased nitric oxide in the breath of children in homes with over 50 ppb vs. under 50 ppb HCHO. The range and mean exposure values are not provided. There were no measurements of the outdoors or school exposures to these children. The nitric oxide results were independent of atopy, and thus their significance is unclear. The study showed HCHO concentrations in the home had no effect on FVC or FEV_1 measures of pulmonary function in the children. The study does not compare children and adults, since relevant data for adults were not collected.

The same section references Krzyzanowski et al. (1990) for the absence of a "threshold for HCHO effects on ventilatory function in children" and adverse health effects "as low as at 30 ppb in nonasthmatic children" (pages 140-141). In Krzyzanowski et al. (1990), researchers questioned a group of 298 children (ages 6 to 15) and 613 adults using a self-administered respiratory questionnaire. Using regression analysis, the investigators found no significant association between exposures in children and self-reported chronic respiratory symptoms. Prevalence rates of chronic bronchitis or asthma reportedly diagnosed by a physician were significantly higher when residential concentrations of HCHO exceeded 60 ppb, especially in the presence of tobacco smoke. However, the study itself fails to point out an obvious difficulty from the data displayed in Tables 3 and 4 of the study. There was no dose-response relationship with HCHO: More than 83 percent of the subjects in the study lived in homes in which the two-week average HCHO concentrations were less than 4 ppb. The average concentration measured was 26 ppb, with only a few homes exceeding 9 ppb. Thus, average concentrations appear to be driven by a few outliers. Findings of this study are questionable in view of these levels of HCHO found in the home environment. In addition, there were no measurements of allergens, or other agents present in the home. The authors did report greater changes in peak expiratory flow rate in children than in adults. The use of peak expiratory flow rates does not confirm the presence or absence of asthma or bronchitis. This finding is the only data in any of the studies cited in the Public Review Draft document to suggest differential effects in children vs. adults -- hardly a convincing basis for concluding that children are more sensitive to HCHO. In sum, it appears that this study is at odds with the weight of the literature, and should not be relied upon absent some further verification.

In Rumchev, et al. (2002), household HCHO levels were determined by passive sampling in the homes of 88 children aged 6 months to 3 years who were diagnosed at a hospital with asthma, and compared with 104 community controls. Cases had a statistically significant higher mean HCHO exposure compared to controls, 32 ppb (38 µg/m^3) and 20 ppb (24 µg/m^3), respectively. After adjustment for confounding factors, such as indoor air pollutants, relative humidity, indoor temperature, atopy, family history of asthma, age, sex socioeconomic status, pets and ETS, Rumchev et al. (2002) reported that children exposed to HCHO levels of 60 µg/m^3 had a 39% increase in odds of having asthma compared to children exposed to less than 10 µg/m^3 (OR estimated to be approximately 1.4, 95% CI = 1.1 to 1.7 from data presented in a graph). However, considering the marginally increased risk observed, together with the number of potential sources of bias, such as selection bias and validity of diagnosis in the young, this study should not be considered sufficiently robust evidence of an association between HCHO exposure and increased risk of asthma in children or an appropriate basis for regulation or governmental guidance.

In addition, as noted previously, HCHO is exhaled in the breath, with studies suggesting that breath levels may range from 1.2 to 72.7 ppb to 300 to 1,200 ppb (Moser et al. 2005; Ebeler et al. 1997). Based on the existing literature, the exposure levels reported in Rumchev et al. (2002) are in the range of HCHO expected to be found in exhaled breath. This raises questions of causation, association, and how one might reasonably differentiate self-exposure from an exogenous source of exposure at approximately the same concentration.

Those limitations and weaknesses are validated by a second report by Rumchev, et al. (2004), which was not referenced in the ISOR and which raises questions regarding whether Rumchev (2002) is an adequate basis for the derivation of a reference concentration specifically for HCHO. Rumchev et al. (2004) used the same cohort of children and evaluated the same asthma endpoint as Rumchev et al. (2002), but focused on the association with the other chemicals and particulates rather than HCHO. As for HCHO, Rumchev, et al. (2004), found that asthmatic cases were exposed to higher levels of VOCs.

An editorial was published concurrently (Brunekreef, B. 2004) with Rumchev et al. (2004), which focused on NO_2, VOCs, and particulates. The editorial indicates that: (1) diagnosis of asthma in children is "notoriously difficult," and (2) case-control studies, as used by Rumchev, inherently are rife with potential and actual sources of confounding and bias. An example given is that Rumchev et al. (2004) did not attempt to evaluate the impact of recent indoor painting. These issues raise serious questions regarding the adequacy of the study as a sole source for

deriving a reference exposure. As Brunekreef (2004) noted in his comments on Rumchev et al. (2004) and other studies: The issue of whether indoor VOCs are a risk factor for asthma in children therefore seems still to be largely undecided. In view of the methodological difficulties outlined above, prospective studies are more likely to produce progress in deciding whether we need to worry about indoor VOCs as determinants of asthma at the relatively low concentrations typically encountered in the home environment. In view of the issues raised by Rumchev (2004) showing that a number of VOCs were associated with asthma as well as the inherent and broader limitations associated with Rumchev, et al. (2002), Rumchev, et al. (2002) does not provide a reasonable basis for adopting a new level. A careful reading of the studies cited as the basis for concluding that children are differentially sensitive to HCHO shows essentially no support for that proposition. [26]

The ISOR never provides a substantive discussion that shows how the staff collectively interprets or resolves apparently conflicting data through an analysis of the strengths and weaknesses of the studies, such as the Garrett et al. (1999) and Krzyzanowski et al. (1990). These inconsistencies in the data should be explained. Confounders in the Garrett et al. (1999) and Rumchev et al. (2002) studies are listed in the ISOR in the descriptions of the individual studies. With regards to Garrett et al. (1999), the ISOR accurately report the findings of this study by stating: "The risk of atopy increased by 40% with each 10 µg/m^3 increase in HCHO measured in the bedroom. Two measures of allergic sensitization to 12 common environmental allergens, the number of positive skin prick tests and maximum wheal size, both showed linear associations with increasing maximum HCHO exposure levels." Garrett et al. (1999) is not used as the basis for regulation and a significant effect of objective measure (positive skin prick test and maximum wheal size) was observed in this study. The ISOR does not try to compare children and adults based on Garret et al. (1999).

Agency Response [8.32-Rose-070416-FCI]: The ISOR did not state that it was relying on the results of the Wantke et al. (1996) study. The Wantke et al. (1996) study mentioned, "There was a good correlation between symptoms and the HCHO concentrations in the classrooms." The conclusion of the Wantke et al. (1996) study stated, "Gaseous HCHO, besides its irritant action, leads to IgE-mediated sensitization. As children are more sensitive to toxic substances than adults, threshold levels for indoor HCHO should be reduced for children." By itself, the odds ratio referenced above is taken as suggestive of an association. The ISOR does not assert statistical significance associated with this result. However, this study does suggest a strong association. These studies are used as supportive studies not the basis for causal evidence. The p-trend measured in this study was substantive. The study did report that outdoor

measurements were lower than indoor. With respect to the off-gassing of HCHO over time and whether the HCHO measurements are questionable as a result, no supporting evidence is provided for this speculation. Regarding the assertion that HCHO resin technologies have improved over time, OEHHA does not see the relevancy of this statement to the ISOR. The concern about selection and recall bias is not particularly germane as the study was investigating the association between measured levels of HCHO and objective measures of allergic response (atopy, positive skin prick tests and maximum wheal size).

Regarding the assertion that there was no significant increase in adjusted risk for asthma or respiratory symptoms, there is a p-trend for this that, although not statistically significant, indicated a biologically important association. As for the lack of a dose-response, the ISOR's review of the Wantke et al. (1996) study states nothing to the contrary.

Exhaled nitric oxide (NO) is not equal to measurements of atopy. Franklin et al. (2000) states that exhaled NO was used as an indicator of inflammation of the lower airways." The ISOR does not assert that a comparison between adults and children was performed in this study.

In the study by Krzyzanowski et al. (1990), it is mentioned: "The authors note no threshold was found for HCHO effects on ventilatory function in the children, and that a 10% decrease in PEF was associated with exposures as low as 30 ppb in non-asthmatic children with an even larger effect in asthmatic children at 30 ppb." Regarding the absence of a dose-response in this study, we state in the ISOR that no statistically significant association was found in this study. We also noted that the sample size in the 40 to 60 group was small compared to the controls. There was a response in the no ETS group for the greater than 60 ppb group (10%). We accurately summarized the findings of this study including mentioning that the association was not statistically significant. However, there was a significant p-trend reported.

The ISOR lists the confounders mentioned in the Rumchev study ("Estimates of the relative risk for asthma (odds ratios) were adjusted for measured indoor air pollutants, relative humidity, temperature, atopy (hereditary allergy), family history of asthma, age, gender, socioeconomic status, pets, smoke exposure, air conditioning, and gas appliances")(Rumchev et al., 2002) and we recognize the potential for bias. It should be noted that OEHHA does not base its chronic non-cancer REL on this study.

The comment makes extensive remarks about both the paper by Rumchev et al. (2002), which is cited in the staff report, and Rumchev et al. (2004), which was not cited in the ISOR. Neither paper appears in the

list of references provided with the comments, so we are assuming the second citation refers to: Rumchev K, Spickett J, Bulsara M, Phillips M, Stick S, 2004, Association of domestic exposure to volatile organic compounds with asthma in young children, Thorax 59(9):746-51. We are aware of this paper because of our general interest in childhood asthma, but did not cite it in the ISOR because it concerns only volatile organic compounds (VOCs) other than HCHO. The comment misquotes the paper in implying that the finding of links between asthma and VOCs undermine the earlier finding of an association with HCHO. The authors note in the discussion that they specifically examined this question by comparing their VOC data with the previously published HCHO data. They concluded that the two effects were independent.

Regarding the issue of exogenous vs. self exposure, an individual's total exposure includes both. It is possible the variability in individual responses to given ambient levels of HCHO in part reflects individual variation in the amount of HCHO produced endogenously. Regardless of the proportion of endogenous and exogenous sources, the risk of adverse effects increases with increasing ambient HCHO to which exogenous sources contribute.

With respect to risk factors, a risk factor for asthma versus increased risk in asthmatics should be differentiated. The ISOR states that asthmatic children may be at higher risk of adverse effects when exposed to HCHO. Regarding the absence of a substantive discussion of the way in which data were interpreted in the ISOR, it is not the purpose of this Chapter to review the data in detail or undertake a risk assessment, but rather to provide to the Board and the public an outline of background information. See also the response to comment #335.

360) Comment [8.33-Rose-070416-FCI]: Human Carcinogenicity (Page 147): With regard to carcinogenicity, the weight of evidence points to a threshold mode of action, with cytotoxicity/cell replication as the driving force. Formaldehyde is a low potency carcinogen in light of the: (1) relationship of the concentrations leading to tumor formation and pre-tumorigenic changes, and (2) steep sub-linear dose-response curve for various effects associated with the carcinogenic response.

Agency Response [8.33-Rose-070416-FCI]: As more extensively noted in previous responses (see comments #341 to #344, inter alia), OEHHA has previously evaluated these assertions based on CIIT's model and concluded that this is not an appropriate basis on which to assess the risk to public health from formaldehyde.

361) Comment [8.34-Rose-070416-FCI]: Sufficient evidence of a causal relationship or an association with asthma only exists for cats,

cockroaches, house dust mites, ETS (preschoolers), dogs, fungi or molds (Rhinovirus) and high-level exposures to nitrogen oxides, not HCHO or other VOCs. See the National Research Council (2004) *Emergency and Continuous Exposure Guidance Levels for Selected Submarine Contaminants,* p. 87.

Agency Response [8.34-Rose-070416-FCI]: OEHHA does not accept the assertion about sufficiency (or otherwise) of evidence made in this comment. OEHHA has already pointed out (see the response to comment #348) that the NRC's consideration of safety in submarines is of very little value in considering health impacts on the general population, particularly children.

362) Comment [8.35-Rose-070416-FCI]: Genotoxicity (Page 147). The cited studies by Shaham have been further discredited with new published data beyond prior work by Heck. Neither Schmid and Speit nor Heck's work is addressed in this regard, nor is there any discussion relating the human and animal genotoxicity sections of the report. Schmid and Speit (2007) concludes that the data gathered from human bio-monitoring of blood from workers exposed to HCHO and relating this information to systemic genotoxic effects of HCHO is not plausible. Schmid and Speit (2007) demonstrate that the DNA-protein crosslinks, associated with HCHO exposure which is integral to further DNA damage, is quickly reversed in the blood cells. It is only at higher HCHO concentrations (≥ 200 µM) that enough DNA-protein crosslinks were formed resulting in DNA damage and cytotoxicity. Since such high levels of HCHO are not seen in human blood of exposed workers and any DNA-protein crosslinks created as a result of lower HCHO exposure are quickly reversed, the reported effects seen in the sister chromatid exchange tests, in Shaham et al. (1997, 2002), Yager et al. (1986), He et al. (1998) and Ye et al. (2005), are highly unlikely to be related to HCHO exposure.

Agency Response [8.35-Rose-070416-FCI]: OEHHA is aware of the various citations given in this comment, but does not consider that these add any major insight into the issues addressed by the ISOR. The various, possibly conflicting, data on HCHO genotoxicity are clearly complex and subject to various scientific interpretations. It was not the aim of the brief descriptive paragraph in the ISOR to address these problems in detail since that has already been undertaken in previous discussions presented to the Scientific Review Panel on Toxic Air Contaminants (SRP). The observation of formaldehyde-related DNA damage at any site or dose level in humans is clearly of interest since this endpoint (in rodent nasal epithelium) is also the basis of the CIIT model. Studies of such effects by blood bio-monitoring can clearly only provide an indicator of possible impacts. A primary concern is the extent of formaldehyde-caused DNA damage in the epithelial cells of the respiratory tract that are exposed to

HCHO before it enters the bloodstream. The relatively stronger association of HCHO with nasopharyngeal cancer compared with cancers at other sites reflects the higher HCHO concentrations, and hence damage, in the tissues at the site of contact. The observations of DNA-protein cross-links, mutations and chromosomal effects in cells exposed to HCHO in vitro and in vivo which were noted in the original summary are consistent with this concern.

363) Comment [8.36-Rose-070416-FCI]: Nasopharyngeal Cancer (Pages 147-149) A comparison of the ISOR discussion of NPC with the summary presented in the general comments section above reflects a pattern of ignoring newer work, such as that of Marsh et al. (2002, 2004, 2005). The "recent occupational studies" mentioned in this section are 17 years old and are stretched to find "some indication of possible histological change due to HCHO exposure." Marsh et al. (2006) concludes that the NCI analysis was misleading because an important interaction term between the plant group and exposure variable was not taken into account and, due to the low numbers of tumors, there were considerable uncertainties in the risk estimates. Adami and Chang (2006) reviewed the literature on the occurrence of NPC and concluded that, for this specific tumor type, there are several risk factors that may lead to an appreciable increase (e.g., specific diets or familial history). For HCHO, the authors stated that “epidemiologic evidence” is limited.

Cohort studies. In an update of a mortality study of approximately 14,000 British industrial workers from 1941 (Acheson et al., 1984) up to 2000 (Coggon et al., 2003), only one case of NPC was identified in the cohort vs. two expected, although estimated HCHO exposures were highest compared to the other two studies listed below. Coggon et al. (2003) concluded that: ”The evidence for human carcinogenicity of HCHO remains unconvincing.” In an update of a mortality study involving a cohort of approximately 11,000 garment workers in the U.S. from 1955 to 1982 (Stayner et al., 1985; 1988) and then to 1998 (Pinkerton et al., 2004), no cases of NPC were identified (0.96 expected). Pinkerton et al. (2004) states: ”We found no evidence of an association between HCHO exposure and mortality from respiratory cancers.” An update of the largest mortality study of over 25,000 workers in HCHO industries in 10 different plants in the U.S. initially followed up through 1980 (Blair et al., 1986) and now up to 1994 (Hauptmann et al. 2004) is frequently referenced as the "NCI study." In this study, eight cases of NPC compared to four expected, were observed in the exposed workforce. Six of these were located in one single plant (Plant 1) out of the ten plants examined. Later, one of these eight cases turned out to be an oropharyngeal cancer; in addition, there have been two additional NPC cases among the workers employed in these plants but not exposed to HCHO. Even if the misclassified case remains included, NPC rates are not significantly increased compared with

those of the general U.S. population (Standardized Mortality Ratio (SMR) = 2.1; exact 95% CI = 0.91 to 4.14). If this misclassified case would be excluded, the association would be even weaker. Taking all cohort studies with a total of approximately 50,000 exposed workers together, nine cases (only eight being true NPC) have been observed vs. seven expected; not a relevant difference. These three studies are the most relevant, but there is no reason to give particular preference to the NCI study. As early as 1996, Marsh et al. (1996) identified a specific feature of the former NCI-study comprising workers of 10 different plants. There was no even distribution of the observed NPC cases between the different plants; they were concentrated in one plant. Specifically, four of the total of five exposed cases observed arose in one of the 10 plants. A detailed analysis of the "suspected clustering in this one plant" showed that "only one case had any appreciable exposure to HCHO." In a second follow-up (up to 1998) by Marsh et al. (2002), the clustering of NPC was confirmed as three additional cases were found, leading now to seven exposed cases in a single plant. In addition, inconsistencies in the exposure effect relationship were identified pointing against a causal connection with HCHO: The majority of the seven NPC cases in the single plant was found in short-term workers with an exposure duration of less than one year. Only three of seven were exposed to HCHO longer than one year and each had low average intensities of exposure (ranging from 0.02 to 0.60 ppm). Six of the seven NPC cases were hired between 1947 and 1956, again an indication of a cluster. Standardized Mortality Ratios for nasopharyngeal cancer were greater among short-term (< 1 year) than among long-term workers. Marsh and Youk (2005) reevaluated the NPC cases of the new NCI study (Hauptmann et al., 2004). Six of the eight exposed cases came from a single plant, leading to a regional-rate based SMR of 10.32 (95% CI = 3.79 to 22.47). The other two exposed and the two non-exposed cases each came from different plants of the remaining nine plants of the NCI study. For these other nine plants, the SMR was calculated to be 0.65 (0.08 to 2.33). In addition, the exposure association reported by Hauptmann et al. (2004) with peak and average intensity was driven entirely by the data from this single plant. Marsh and Youk (2005) concluded that there was little evidence for a causal association between NPC and HCHO; the NCI conclusion of a possible association was mainly driven by the Wallingford plant; and the large NPC mortality at the Wallingford plant may reflect non-occupational or occupational risk factors associated with employment outside of this specific plant. Overall, the detailed analysis of the NCI findings, especially in relation to the single plant, casts doubt on a causal association indicated by the NCI study between HCHO and NPC development.

Case-control studies. The case-control studies on NPC and HCHO are hampered by weak exposure assessments, in particular for the probably more relevant periods several decades ago. The potential impact of

selection and information bias seems to be even higher than for the cohort studies. Thus, their results in general are not very reliable and far from conclusive: The relative risk in the Olsen et al. (1984) study was non-significantly decreased in men, and non-significantly increased in the much smaller group of women (negative study). Vaughan et al. (1986) found a slightly but not significantly increased risk for occupational HCHO exposure. Besides very weak exposure information there are several limitations of this study (e.g., lack of adjustment even for age, the strongest predictor of cancer). Thus, this study cannot be considered as one supporting an association (non-informative study). Roush et al. (1987) did not find an elevated risk for workers probably exposed for most of their working lives, but a non-significantly elevated risk for the highest exposure category. However, potential selection and information biases as well as very weak exposure information based on resident directories are major shortcomings of this study (non-informative study). West (1993) reported partly significant increases only for selected exposure categories in a study performed in the Philippines. He found even stronger associations for other exposures such as dust and/or exhaust, anti-mosquito coils or herbal medicines. The IARC Working Group (1995) noted with regard to this study that the authors did not control for the presence of Epstein-Barr virus antibodies, which showed a strong association with NPC in another study in the same region (non-informative study). The study of Armstrong et al. (2000) is definitely negative. Hildesheim et al. (2001) report a modest and not significantly increased risk (RR = 1.4; 95% CI = 0.93 to 2.2). However, no dose response was observed with increasing duration or cumulative use (slightly positive). Vaughan et al. (2000) detected a slightly, but not significantly elevated odds ratio of 1.3 (95% CI = 0.8 to 2.1). They observed a significant trend with cumulative exposure, but in contrast to the NCI study not for the maximum exposure concentration. In contrast to other authors, an increased risk for wood dust exposure could not be observed in this study (slightly positive study). Thus, if a positive study is considered as one in which a clear and significant association is demonstrated, none of the case-control studies can be regarded as positive. In summary, the results of these case-control studies should be regarded as equivocal, two of them being clearly negative, three not contributing much information and two showing some slightly elevated risk.

Meta-analyses. The most recent meta-analysis by Collins et al. (1997) is quoted inappropriately as if it would demonstrate a significantly elevated risk. Collins et al. point out the relevance of correcting for underreporting of expected numbers of death when dealing with a rare and frequently underreported cancer such as NPC. After correcting, they calculated a meta-RR of 1.0 (95% CI = 0.5 to 1.8) for the cohort studies and 1.3 (95% CI = 0.9 to 2.1) for the case-control studies. The authors emphasize that it is unlikely that the few cases in the case-control studies had meaningful

HCHO exposures because only a minority of the jobs classified as having it actually entailed such exposure. In their paper, Collins et al. emphasize the weaknesses of the previous meta-analyses leading to conflicting results (see page 648). It is instructive to contrast the short and inaccurate treatment of Collins et al. (1997) in the ISOR with that presented in the November 2006 Priority Existing Chemical Assessment on HCHO prepared by the Australian Department of Aging, National Industrial Chemicals Notification Assessment Scheme (NICNAS), which was previously referenced with regard to NICNAS' use of the BBDR model. In a more recent and comprehensive meta-analysis, Collins et al. (1997) initially considered 47 epidemiology studies. Several of these studies were not included in the analysis, because workers who had HCHO exposure were not evaluated separately or the study only reported relative risks, the study population was included in a more recent study, or the methodology and results were insufficiently described. In total the meta-analysis was based on the results from 11 cohort, three proportionate mortality and 18 case-control studies, and included new data published since Partanen (1993). Furthermore, the authors of studies were contacted to obtain data not included in their publications. The exposure potential of jobs that were classified as having HCHO exposure in the community-based case-control studies was also reviewed, as exposure assessment was much more uncertain in these studies than in cohort studies. When all studies were included, no increased risk of lung cancer was seen with exposure to HCHO (meta-RR = 1.0, 95% CI = 0.9 to 1.0). In cohort studies, a very small borderline, though significant, increased risk was seen for industrial workers (meta-RR = 1.1, 95% CI = 1.0 to 1.2), while no increased risk was seen for pathologists (meta-RR = 0.5, 95% CI = 0.4 to 0.6) or embalmers (meta-RR = 1.0, 95% CI = 0.9 to 1.1). Similarly, no increased risk was seen in the case-control studies (meta-RR = 0.8, 95% CI = 0.7 to 0.9). No increased risk of sinonasal cancers was seen with exposure to HCHO (meta-RR = 1.0, 95% CI = 1.0 to 1.1). Evaluating by study design revealed no increased risk for cohort studies (meta-RR = 0.3, 95% CI = 0.1 to 0.9) but a significantly increased risk for case-control studies (meta-RR = 1.8, 95% CI = 1.4 to 2.3). This increased risk was attributable to a significantly increased risk for the combined six European case-control studies (meta-RR = 2.9, 95% CI = 2.2 to 4.0), whereas no increased risk was seen for the combined five U.S. case-control studies (meta-RR = 1.0, 95% CI = 0.7 to 1.5). Collins et al. (1997) report that it is difficult to reconcile European findings with other findings, unless it is assumed that confounding factors, or bias, were affecting the results. A significantly increased risk of NPC was seen with exposure to HCHO (meta-RR = 1.3, 95% CI = 1.2 to 1.5). However, evaluation of NPC was hampered in some industrial cohort studies, as expected numbers were not reported when there were no observed deaths. To overcome this, the expected number of deaths was estimated based on the ratio of expected lung cancers to NPC in the study by Blair et al. (1986) that reported

nasopharyngeal deaths. Expected numbers were also not reported in the cohort studies of embalmers and medical specialists. Using a similar approach, based on the ratio of expected lung cancers to NPC in the study by Hayes et al. (1990), a non-significant increased risk was found for NPC and exposure to HCHO when all industrial cohort studies were combined (meta-RR = 1.2, 95% CI = 0.4 to 2.5). While no increased risk of NPC was seen for all cohort studies combined (meta-RR = 1.0, 95% CI = 0.4 to 2.5), a non-significant increased risk of such cancers was seen for all case-control studies combined (meta-RR = 1.3, 95% CI = 0.9 to 2.1).[27] Collins et al. (1997) concluded that the data did not provide convincing evidence of a casual relationship between HCHO exposure and NPC. The authors attributed the differences in their results to the two earlier meta-analyses to be mainly due to the inclusion of a number of recently published negative cohort studies. FCI includes this excerpt not because we agree with all of the evaluations in the NICNAS PEC on HCHO. Rather, we reference this passage as an example of the type of summary that allows everyone with an interest to understand how one agency read the study and what elements the agency viewed as notable. This type of summary also serves to distinguish clearly the author's conclusions from those of the reviewing agency.

Summary on epidemiology study evaluation. Recapitulating, the available epidemiological studies on HCHO consistently show no or a minimally increased risk for NPC with one clear exception of the remarkably elevated risk in plant 1 of the NCI study. A serious critique to the Hauptmann (2004) study is the fact that the author disregards the peculiar results at this specific plant. Instead of focusing only on HCHO, it would have been important to try to identify other risk factors, which may have played a relevant role in particular in those three cases exposed to low levels of HCHO for much less than one year.

Local genotoxicity in humans. With regard to possible NPC formation in humans, local genotoxicity observed in workers has to be assessed. There are several investigations on micronuclei formation in nasal and buccal cells in exposed humans with both positive and negative results. These data have to be interpreted with caution since the methods used are still quite investigative and have several methodological problems as noted by Fenech et al. (1999): high variability of the results when the same subjects are tested repeatedly; large differences between healthy subjects; protocols are not yet standardized; problems to differentiate between epithelial cells and leucocytes; and possibility for misinterpretation of degenerative epithelial cells. Therefore such study results cannot be interpreted with confidence presently.

The recent IARC evaluation for NPC basically relies on the outcome of the study of Hauptmann et al. (2004), which has only been carried through up

to 1994 whereas Pinkerton et al. (2004) and Coggon et al. (2003) performed updates up to 1998 and 2000, respectively. Therefore the NCI has decided to carry out a mortality analysis in this cohort up to the most recent years. The results of this latest update are to be expected in 2007. The update will comprise approximately an additional 10 years of mortality experience and lead to a much clearer picture because the significance of mortality data will sharply increase in mortality studies with the aging of the workforce.

In conclusion, the three large industrial worker cohort studies are most relevant for a decision as regards classification for carcinogenicity in humans. There was no significant increase for NPC in association with HCHO exposure in general. The association seen with two of four exposure metrics in the NCI study only is driven by just one of 10 plants (SMR 10.3). For this specific plant there may well be other factors relevant for NPC development apart from HCHO exposure. Even the authors of the NCI study argue cautiously: “In this cohort of HCHO workers, some evidence was found of an exposure-response relation with mortality from NPC (based on small numbers)…” In Siemiatycki et al. (2004), three of the co-authors being affiliated with IARC, the strength of evidence regarding nasopharynx and HCHO has also only been considered as suggestive only but not as strong.

Leukemia (Pages 149-150). The report characterizes Collins and Lineker (2004) as being supportive of an increase risk of leukemia. As discussed above, this is an incorrect reading of the paper. Golden et al. (2005) report that chemically-induced leukemia is a well-studied phenomenon with benzene and a number of cancer chemotherapeutic drugs recognized as capable of causing this effect. Abundant in vitro and in vivo data in animals and humans demonstrate that exposure to sufficient doses of these recognized leukemogens can initiate a cascade of events leading to hematopoietic toxicity and the subsequent development of leukemia. Golden et al. (2005) addresses the biological plausibility that HCHO might be capable of causing any type of leukemia by providing a broad overview of the scientific data that must be considered in order to support or refute a conclusion that a particular substance might be leukemogenic. Data on benzene and selected chemotherapeutic cancer drugs are used as examples and are briefly summarized to demonstrate the similar biological events thought to result in leukemogenesis. These data are compared and contrasted with the available data on HCHO in order to judge whether they fulfill the criteria of biological plausibility that HCHO would be capable of inducing leukemia as suggested by the epidemiological data. Based on the epidemiological data, it is reasonable to expect that if HCHO was capable of inducing leukemia in vivo and in vitro data would offer supporting evidence for biological plausibility. In particular, the authors conclude that there is: (1) no evidence to suggest that HCHO reaches any

target organ beyond the site of administration including the bone marrow, (2) no indication that HCHO is toxic to the bone marrow/hematopoietic system in in vivo or in vitro studies, and (3) no credible evidence that HCHO induces leukemia in experimental animals. As discussed in the review, based on the key biological events that occur in the process of chemically-induced leukemia, there is inadequate biological evidence currently available to corroborate existing weak epidemiological associations. This provides an insufficient database to conclude that there is a causal relationship for HCHO and leukemia risk. Golden et al. (2005) is consistent with Heck and Casanova (2004), in which the authors report the following: The possibility that inhaled HCHO might induce various forms of distant-site toxicity has been proposed, but no convincing evidence for such toxicity has been obtained in experimental studies. This review summarizes the biological evidence that pertains to the issue of leukemia induction by HCHO, which includes: (1) the failure of inhaled HCHO to increase the HCHO concentration in the blood of rats, monkeys, or humans exposed to concentrations of 14.4, 6, or 1.9 ppm, respectively; (2) the lack of detectable protein adducts or DNA-protein cross-links (DPX) in the bone marrow of normal rats exposed to [^{3}H]- and [^{14}C]formaldehyde at concentrations as high as 15 ppm; (3) the lack of detectable protein adducts or DPX in the bone marrow of glutathione-depleted (metabolically inhibited) rats exposed to [^{3}H]- and [^{14}C]-HCHO at concentrations as high as 10 ppm; (4) the lack of detectable DPX in the bone marrow of Rhesus monkeys exposed to [^{14}C]formaldehyde at concentrations as high as 6 ppm; (5) the failure of HCHO to induce leukemia in any of seven long-term inhalation bioassays in rats, mice, or hamsters; and (6) the failure of HCHO to induce chromosomal aberrations in the bone marrow of rats exposed to airborne concentrations as high as 15 ppm or of mice injected intraperitoneally with HCHO at doses as high as 25 mg/kg. Biological evidence that might be regarded as supporting the possibility of leukemia induction by HCHO includes: (1) the detection of cytogenetic abnormalities in circulating lymphocytes in seven studies of human subjects exposed to ambient concentrations in the workplace (but not in seven other studies of human subjects or in rats exposed to 15 ppm); (2) the induction of leukemia in rats in a single questionable drinking water study with HCHO concentrations as high as 1.5 g/L (but not in three other drinking water studies with concentrations as high as 1.9 or 5 g/L); (3) the detection of chromosomal aberrations in the bone marrow of rats exposed to very low concentrations of HCHO (0.4 or 1.2 ppm) (but not in another study at concentrations as high as 15 ppm); and (4) an apparent increase in the fraction of protein-associated DNA (assumed to be due to DPX) in circulating lymphocytes of humans exposed to ambient concentrations in the workplace (1 to 3 ppm). This evidence is regarded as inconsequential for several reasons, including lack of reproducibility, inadequate reporting of experimental methods, inconsistency with other data, or insufficient analytical sensitivity, and

therefore, it provides little justification for or against the possibility that inhaled HCHO may be a leukemogen. In contrast to these inconclusive findings, the abundance of negative evidence mentioned above is undisputed and strongly suggests that there is no delivery of inhaled HCHO to distant sites. Combined with the fact that HCHO naturally occurs throughout the body, and that multiple inhalation bioassays have not induced leukemia in animals, the negative findings provide convincing evidence that HCHO is not leukemogenic.

Lung Cancer (Pages 150-151). The report cites Blair et al. (1986), but seems to have forgotten that there are several updates to this study. Relying on only one of a series of updated studies on the same cohort disregards good practice in evaluating epidemiological studies.

Animal Carcinogenicity (Page 152). During the 1980s, studies demonstrated that HCHO leads to nasal tumors in rats after exposure to concentrations associated with severe irritation and compensatory cell replication in the respiratory epithelium of rats. In mice there was a slight, non-significant nasal tumor response of about 1% at 15 ppm (a concentration that led to approximately 50 % nasal tumor bearing rats; Kerns et al.,1983) while no tumors were found in hamsters at 10 (5days/week) or 36 ppm (1day/week) (Dalbey, 1982). Thus, there is a clear difference in sensitivity for the three species investigated. In vitro, HCHO is genotoxic/mutagenic in various test systems exhibiting high cytotoxicity. In vivo, DPX occur at the site of direct contact (predominantly nasal mucosa), but no genotoxic effects were found at distant sites (i.e., no systemic effects were demonstrated). Over the last 20 years, the large number of scientific studies has not changed the picture for nasal carcinogenicity in rodents. The new data strengthened the evidence that the decisive factor for HCHO carcinogenicity is cytotoxic irritation and compensatory cell proliferation besides genotoxicity as manifested by DNA protein binding. See prior discussion and CIIT report (Sept. 28, 1999); Conolly et al. (2002; 2003; 2004).

Agency Response [8.36-Rose-070416-FCI]: The conclusion that HCHO is carcinogenic in humans was reached by IARC in their 2004 documents. In that document, IARC asserts that genotoxicity and cytotoxicity both play important roles in nasal carcinogenicity. They also note that cell proliferation is stimulated by HCHO and that this appears to amplify the genotoxic effects. With regards to NPC, IARC states that for HCHO, there is *sufficient evidence* in epidemiological studies for NPC, strong but not sufficient evidence for leukemia, and *limited evidence* for sinonasal cancer. The extensive scientific database on the mechanisms by which HCHO can induce nasal-tract cancer in humans is considered. These data provide strong support for the empirical observation of NPC in humans (IARC, 2004a, 2004b).

Furthermore, the IARC (2004a, 2004b) Working Group considered it improbable that all of the positive findings for nasopharyngeal cancer that were reported from the epidemiological studies, and particularly from the large study of industrial workers in the USA, could be explained by bias or unrecognized confounding effects. Overall, the Working Group concluded that the results of the study of industrial workers in the USA, supported by the largely positive findings from other studies, provided sufficient epidemiological evidence that formaldehyde causes nasopharyngeal cancer in humans (IARC, 2004a, 2004b).

An excess of nasopharyngeal cancer was observed in a proportionate mortality analysis for the largest U.S. cohort of embalmers (Hayes et al., 1990) although not statistically significant, and in a Danish study of proportionate cancer incidence among workers at companies which used or manufactured HCHO (Hansen and Olsen, 1995). Hayes et al. (1986) showed a relative risk for nasal tumors of 2.5 (90% CI 1.5-4.3) independent of wood dust exposure, tobacco use, and patient age.

The following will address the comments regarding individual studies. With respect to Coggon et al. (2003), they also noted that a limitation of their analysis was unrecognized losses to follow-up with missed deaths leading to underestimation of risks. Vaughn et al. (1986) adjusted for effects of cigarettes, alcohol, age, sex, socioeconomic status, and race. According to the analysis of this data by Blair et al. (1990), a significant RR was observed in this study. Hauptmann et al. (2004) found an increase in relative risks for nasopharyngeal cancer (nine deaths) increased with average exposure intensity (p-trend = 0.033), cumulative exposure (p-trend = 0.025), highest peak exposure (p-trend < 0.001), and duration of exposure to formaldehyde (p-trend = 0.147). Blair et al. (1990) reviewed the epidemiological evidence and showed that three studies had statistically significant relative risks (RR) for nasopharyngeal cancer: Blair et al. (1987); Roush et al. (1987) and Vaughan et al. (1986).

A review of the epidemiological evidence by Feinman (1988) states three studies show clear dose-response data and provide strong evidence for the association of HCHO with cancer of the nasal sinuses or nasopharynx in humans.

364) Comment [8.37-Rose-070416-FCI]: IV. FORMALDEHYDE AND REGULATORY RISK MANAGEMENT

The Board is considering a proposal to limit formaldehyde emissions from composite wood products. This action is driven by a cancer risk assessment of formaldehyde performed by the OEHHA. This cancer risk assessment of formaldehyde was conducted in 1992 and reissued

essentially unchanged by OEHHA in 2005 as part of the Air Toxics Hot Spots Program.[28] However, more sophisticated and biologically-based risk assessments of formaldehyde by other respected regulatory agencies, including USEPA and Health Canada, conflict with the conclusions of OEHHA's risk assessment. More importantly, these assessments indicate that the proposed reductions in formaldehyde emissions would not produce the reductions in cancer cases in California predicted by OEHHA's risk assessment.

OEHHA performed a conservative cancer risk assessment, designed to estimate the cancer risk to humans at low exposure levels of formaldehyde by extrapolating the results of cancer in laboratory rats at higher levels of exposure. Based on the OEHHA risk assessment using the 95% upper-bound confidence limit, the estimated cancer risk over a 70-year lifetime from the current average exposure to formaldehyde in California is 35 cancer cases per million people (Table 1). CARB also estimated that the benefit of implementing Phases 1 and 2 of the proposal would result in a net reduction of cancer cases of 12 and 35 per million people, respectively, over a 70 year lifetime. Assuming a steady population of 35 million in California, this would amount to reduction in cancer cases of 18 per year in California. If OEHHA's estimates were accurate, the proposed reductions in formaldehyde emissions would have a small (but not insignificant) benefit. By comparison, over 100,000 Californians are expected to die from cancer annually.

Notably, OEHHA's estimates are at odds with more realistic risk assessments by other respected agencies. Since OEHHA conducted its risk assessment in 1992, new and relevant scientific data on formaldehyde has been published, which has not been incorporated in OEHHA's risk assessment despite requests to re-open the risk assessment process. Using this information, a robust, biologically-based approach to estimating the potential cancer risk of formaldehyde to humans was developed and published. Importantly, this approach to assessing the potential cancer risk of formaldehyde has been embraced and adopted by regulatory agencies in the US and internationally, including USEPA (2006)[29], Health Canada (2001)[30], the World Health Organization (WHO, 2002)[31], and the Australian Government (2006)[32].

Table 1 compares the estimated cancer risks of formaldehyde exposure in California using the cancer potency estimates (i.e., the inhalation unit risk per $\mu g/m^3$) for formaldehyde adopted by OEHHA and the other agencies. The cancer potency estimates in Table 1 are all based on the same study of formaldehyde in rats. With the exception of the choice of the cancer potency factor, all assumptions and calculations were exactly the same as those used by OEHHA. So, the only reason for the difference in the results in Table 1 is the different estimates of the cancer potency of formaldehyde.

As noted above, based on OEHHA's estimates of formaldehyde's cancer potency and the average exposure to formaldehyde in California, the implementation of Phase 2 is estimated by OEHHA to prevent 35 cancer cases per million people. In contrast, the other agencies' cancer potency factors, combined with OEHHA's estimates of average exposure to formaldehyde in California, produce an estimated reduction of cancer cases much smaller than one in a million. For example, only 0.001 cancer cases per million people (or one cancer case per *billion* people) would be prevented using the cancer potency factors adopted by Health Canada and WHO (Table 1). Similarly, USEPA's (2006) cancer potency factor predicts a reduction of only 0.016 cancer cases per million people.

Based on an estimated population of 35 million people in California and OEHHA's estimate of a reduction of 35 cancer cases per million people over a 70-year lifetime, OEHHA's estimated number of cancer cases prevented per year in California is 18.[33] In contrast, using the cancer potency factors of the Other Agencies, the estimated number of cancer cases prevented per year in California ranges from 0.0005 to 0.008 (Table 1). In other words, the estimated time required to prevent *one* case of cancer in the entire population of California after implementing Phase 2 ranges from *125 to 2000 years*.

OEHHA's estimated cancer potency for formaldehyde is 2,250 to 36,000 times greater than that of the other agencies. Either OEHHA has greatly overestimated the risk or USEPA, Health Canada, WHO, and Australia all have greatly underestimated the risk. These other agencies have expressed a strong preference for using the risk assessment methodology of Conolly et al. (1999), such as USEPA's decision to use this risk assessment model for formaldehyde when it established emission standards for plywood and composite wood products.

In the case of formaldehyde, we have determined that the cancer potency derived using the approach developed by [Conolly et al., 1999] and peer-reviewed by an independent expert peer review panel sponsored by EPA and the Canadian government represents an appropriate alternative to EPA's current IRIS URE for formaldehyde, and is therefore the best available peer-reviewed science at this time."[34]

The cancer risk assessment of HCHO by OEHHA does not rely on what USEPA calls "the best available peer-reviewed science at this time." In fact, the OEHHA risk assessment of HCHO does not even mention the work upon which USEPA, Health Canada, WHO and Australia rely for their risk assessments of HCHO. CARB should carefully evaluate the proposal to reduce exposure to HCHO in light of the tenuous public health benefits represented by the estimated reduction in cancer cases in

California. If reducing exposure to HCHO will not result in any meaningful reduction in cancer risk in California, the proposed action must be questioned. Given the fact that over 100,000 Californians are expected to die from cancer annually, it is especially important to focus the State's resources on strategies that will result in real reduction in cancer and improvement in public health.

Agency Response [8.37-Rose-070416-FCI]: As described above in comments #341 to #344, OEHHA reviewed CIIT's model and concluded that this model was not adequate to protect public health. The inflection point depends on assumptions put into the model. The outcomes of the model will be different based on these assumptions. Based on this analysis, this model was considered inappropriate as a basis for decisions affecting public health under the Toxic Air Contaminants regulations. This conclusion was reviewed by the Scientific Review Panel on Toxic Air Contaminants. On this basis, Board staff has presented cancer risk/benefit comparisons in the ISOR, on the basis of which they conclude that the control measure provides a significant and worthwhile health benefit, particularly for certain more heavily exposed individuals as opposed to regarding solely the statewide average risk numbers presented in this comment.

365) Comment [8.38-Rose-070416-FCI]: V. CONCLUSION: In these comments, FCI has endeavored to address the proper scientific framework for the health risk assessment for formaldehyde in this rulemaking. FCI and its members have continued to invest heavily in toxicological research to support the scientific community's efforts to better understand the toxicological properties of formaldehyde and refine risk assessment methodologies to continue to protect human the environment with increasing levels of certainty.

The Board has an obligation to ensure that the final agency decisions are based on evidence of requisite quality and quantity and that a reviewing court must enforce that duty. The differences between prevailing science and the ISOR are so severe that a rule based on such assumptions would be arbitrary and capricious and an abuse of discretion.

Agency Response [8.38-Rose-070416-FCI]: OEHHA has been aware of the toxicological studies to which the comment refers for some time, and with the advice of the Scientific Review Panel on Toxic Air Contaminants has given them detailed consideration in the proper forum; specifically, the response to a petition to reconsider the unit risk value for formaldehyde. See also the responses to comments #335 and #341 to #344.

366) Comment [11-Higgins-070417-FFC]: The California Office of Environmental Health Hazard Assessment (OEHHA) has listed

formaldehyde as a known carcinogen on the Proposition 65 list, and the World Health Organization's International Agency for Research on Cancer has classified formaldehyde as a known human carcinogen. In light of these classifications and bearing in mind formaldehyde's asthmagenic effects, there is sufficient reason to be very concerned about the estimated 400 tons emitted by composite wood products each year in California.

Agency Response [11-Higgins-070417-FFC]: We appreciate the comment – no response necessary.

367) Comment [14-Titus-070419-KCMA]: "Absent, however, is reference to the ongoing effort at the U.S. EPA, the National Cancer Institute, and others in the scientific community to better measure and assess the risk from exposure to low levels of formaldehyde."

Agency Response [14-Titus-070419-KCMA]: With reference to the CIIT model, OEHHA evaluated the Chemical Industries Institute for Toxicology (CIIT) model document as part of the established petition process. The model used a more complex analysis of the likely carcinogenic dose-response based on analysis of deposition of formaldehyde in the rodent nasal cavity, and the role of DNA damage and cell proliferation. OEHHA reviewed the materials submitted by the petitioner and presented the conclusions to the Scientific Review Panel on Toxic Air Contaminants (SRP). The SRP declined to recommend reconsideration of OEHHA's 1992 formaldehyde unit risk factor (OEHHA, 2005). This was largely due to the uncertainties in the model surrounding the formaldehyde concentration at which, according to the CIIT model, the unit risk "switched" from low to high. This modeled inflection point could vary considerably depending on the choice of some poorly characterized input parameters, and might reasonably be low enough that environmental and indoor exposures were in the "high potency" range. The model was not developed by the USEPA. The USEPA's current consensus unit risk value is 1.3×10^{-5} as published on IRIS. They are officially re-evaluating formaldehyde but a final reassessment is not expected for at least another year or two. The document by Health Canada was written in conjunction with CIIT and does not represent an independent assessment. See also the responses to comments #341 to #344.

368) Comment [15-Alexeeff-070419-OEHHA]: "Since that time OEHHA has continued to monitor developments in the scientific understanding of HCHO toxicity, regarding both its carcinogenicity, and its non-cancer effects. Concern for the carcinogenicity of HCHO has increased. The IARC held a meeting in June 2004 at which evidence for HCHO carcinogenicity was reviewed and the conclusions and classification were updated… Formaldehyde was upgraded from its previous … status of

probably carcinogenic to humans (Group 2A) to carcinogenic to humans (Group 1), based on the determination that the evidence of carcinogenicity in humans (from epidemiological studies) is now sufficient. OEHHA concurs with this evaluation… Thus, our concerns with the reliability and applicability of the CIIT model, which is not relevant to leukemia in particular, have increased rather than decreased since 2005."

Agency Response [15-Alexeeff-070419-OEHHA]: No response necessary.

369) Comment [15-Alexeeff-070419-OEHHA]: "Finally, OEHHA reviewed and agrees with the risk assessment of HCHO exposure presented in the composite wood ATCM staff report, which utilizes OEHHA's unit risk factor. The risk assessment in the staff report reflects current science on HCHO exposure and risk from composite wood products."

Agency Response [15-Alexeeff-070419-OEHHA]: No response necessary.

370) Comment [17-Whalen-070419-Columbia]: "… Industry claims that there are no ill health-effects from exposure to urea formaldehyde are not to be taken seriously."

Agency Response [17-Whalen-070419-Columbia]: We agree that the point raised by the commenter is appropriate. Formaldehyde is a known human carcinogen and there is clear documentation that unreacted HCHO in UF resins is released to the air.

371) Comment [19-Cooper-070420-Kaiser]: California has recognized that there is no known safe level of formaldehyde, as the Office of Environmental Health Hazards Assessment (OEHHA) determined that the safe reference exposure level (CREL) for formaldehyde was lower than the level of formaldehyde already in the ambient air. Less than three years ago, in 2004, the World Health Organization's International Agency for Research on Cancer (IARC) updated its report on formaldehyde. Based on new information from studies of persons exposed to formaldehyde, IARC changed its position that formaldehyde was a "probable carcinogen" to conclude that formaldehyde is "carcinogenic to humans". And as we all know cancer is one of the leading causes of illness and deaths in California and in the nation. In addition to IARC, other national and international regulatory agencies have determined that formaldehyde is a public occupational concern. The list includes The National Toxicology Program (NTP), The National Institute for Occupational Safety and Health (NIOSH), and The Association of Occupational and Environmental Clinics (AOEC). The EPA Integrated Risk Information System (IRIS) found that formaldehyde is a probable human carcinogen in animal studies. Moreover, the EPA under the Clean Air Act has concluded that formaldehyde is a hazardous air pollutant.

Agency Response [19-Cooper-070420-Kaiser]: We appreciate the comment – no response necessary.

372) Comment [20-Stensland-070420-NA]: Given that there are no formaldehyde exposure standards in the United States for children, the proposed effort by CARB is a major move forward in the realm of prevention in children's should be applauded.

Agency Response [20-Stensland-070420-NA]: We appreciate the comment – no response necessary.

373) Comment [21-Parker-070420]: "I am an architect of public schools here in California and I am very much in favor or any reduction of HCHO emissions. One of the greatest contributors of these emissions in a school classroom is the casework… This problem is exacerbated by the fact that classroom standards require more casework for elementary schools than standards for upper level classrooms…There are many reasons for adopting these reductions but the most important is the benefit it will have for California students."

Agency Response [21-Parker-070420]: We agree that points raised by the commenter are appropriate. The ATCM standards will lower HCHO emissions from the composite wood products typically used to make bookcases, etc.

374) Comment [24-Landry-070423-CWIC]: The Health Effects Presented Do Not Reflect Current Science. Formaldehyde is one of the most widely studied compounds in the world. It has been seriously mischaracterized in the Initial Statement of Reasons for two principal reasons: (1) major new information adopted by USEPA, Health Canada, Germany and other jurisdictions has been ignored by CARB and OEHHA staff, and (2) high range "statistical bounds" of the OEHHA risk assessment have been deemed "cancer cases reduced" contrary to all professional guidance on the use of risk assessment numbers. The Formaldehyde Council, Inc. will submit detailed information on these topics. It is undeniable that formaldehyde at very high exposure levels (above levels that could be tolerated by humans) results in cancers in laboratory animals. Since the 1992 OEHHA risk assessment, however, major strides have been made in understanding the mechanism of formaldehyde carcinogenicity – its interaction with cell material, its delivered dose to the cells, and the role of cytotoxicity in the process. These and other discoveries have led to new biologically-based risk assessments which show virtually no risk at the levels involved in residences. It has a virtual threshold. Much of the information was developed with the guidance and input of the Environmental Protection Agency and Health Canada. This information

was submitted to CARB several years ago. CARB decided not to consider the new science in its rule-making, arguing that there was nothing new! The USEPA and Health Canada disagree – they have used this new scientific information in rule makings. It has also been endorsed in Germany and other countries. The staff report suggests that its regulation would result in a specific number of "reduced cancer cases." This is a total misuse of risk assessment numbers. The unit risk is based on an upper 95% confidence level expression of a computerized model. The 1992 Final Report identifying formaldehyde as a toxic Air contaminant noted; "These 95 percent upper confidence limits for excess lifetime risks are health-protective estimates; the actual risk may be significantly lower." It is widely accepted that statistical expressions are not appropriate for use as point estimates of risk. These are ranging numbers of risk, the new risk assessments show virtually no risk of exposure to formaldehyde in the indoor environment even using a 95% upper confidence limit.

Agency Response [24-Landry-070423-CWIC]: The value for the unit risk factor mentioned here and in the Formaldehyde Council's comments is based on the unit risk factor developed by the CIIT Centers for Health Research (CIIT), not by the United States Environmental Protection Agency (USEPA). Although USEPA used the CIIT model in their recent MACT rule (a risk management measure), this is not currently accepted as a consensus value for risk assessment at USEPA. Therefore, the assertion that it was developed by the USEPA is incorrect. USEPA's current consensus unit risk value is 1.3×10^{-5} as published on IRIS. This number is much closer to and a bit higher than the Cal/EPA value for the potency of formaldehyde.

The USEPA is officially re-evaluating HCHO but a final reassessment is not expected to be completed for another two years. In fact, the Office of Air Quality Planning and Standards (OAQPS), a sub-division of the Office of Air and Radiation (OAR) within the USEPA, went around the agency's normal process of evaluating cancer potency estimates in its decision to use the industry-sponsored CIIT potency value. Thus, the CIIT model is not the official USEPA position. Well respected scientists from the USEPA recently presented data at scientific meetings which supports our conclusion that the CIIT model has a very uncertain inflection point.

There are major uncertainties in the predictions of the CIIT model depending on choice of input parameters (see response to comment #331). An extensive review of the strengths and weaknesses of that model by OEHHA was performed and reviewed by the Scientific Review Panel on Toxic Air Contaminants (SRP) in 2004, which led to the recommendation by the SRP not to change the California potency estimate. The California potency estimate is not a typical default model and OEHHA considered several model types, including inclusion of cell

proliferation data. Publications since that date have not added significantly to the information provided in the (then unpublished) report considered in that review.

IARC recently reconsidered the status of HCHO and upgraded it to a Group 1 – known human carcinogen. The listing basis by IARC was nasopharyngeal cancer – not confined to the very specific site evaluated in the rat study and the CIIT model. Several other sites (especially lung cancer and leukemia) are also of substantial concern. Concern for risks at other sites in the respiratory system (mechanistically plausible in humans due to different nasal geometry), and for leukemia raises the question of whether the CIIT model (which arbitrarily assumes a number of key parameters are the same in humans and rats, including the exact site of tumorigenesis) is relevant to human cancer risk.

Several of the citations of other national and international authorities endorsing the CIIT model are in fact quoting the same authors, and in some cases the same document, and are not independent or disinterested comments.

With regard to the comment on "the ISOR's reliance on an outdated OEHHA assessment of carcinogenicity," OEHHA's assessment of carcinogenicity for HCHO uses established methods of cancer risk assessment, and in addition included information on HCHO – induced DNA-protein cross linking and evaluated the effect of cell proliferation on the estimates of cancer potency. The risk estimate was peer reviewed and approved by the Scientific Review Panel on Toxic Air Contaminants (SRP) in 1992. In addition, in 2002 the CARB received a petition from the Formaldehyde Council requesting a review of the HCHO risk assessment, based on a model of the cancer potency developed by the CIIT. OEHHA evaluated the materials submitted by the petition and worked with a copy of the model developed by CIIT. After spending many hours working with the model, OEHHA determined that model uncertainty was too great for use in estimating cancer risk to humans from formaldehyde exposure at low levels. The SRP reviewed the OEHHA analysis as well as the materials submitted with the petition. They concluded that the model was not ready for use and also concluded that model uncertainty was a serious problem. They declined to recommend to CARB that the HCHO risk assessment conducted under the Toxic Air Contaminant program be re-opened. Furthermore, USEPA staff recently presented data at scientific meetings which supports the conclusion that the model is overly reliant on poorly characterized parameters that have a major influence on the final slope fits.

375) Comment [27-Rush-070424-Temple Inland]: "… The emission rate reductions in Phase 2 will not improve the health for California residents

and the cancer rates stated are grossly over stated by a factor of about 1000 times…"

Agency Response [27-Rush-070424-Temple Inland]: We disagree. Formaldehyde is a no-threshold carcinogen and emission reductions will lead to reduced exposure and health benefits. The cancer rates in the ISOR were calculated using OEHHA's unit risk factor, which we believe is the correct factor to use for calculations of this kind.

376) Comment [28-Maultsby-070424-FloPly]: Here is the kicker – what real benefit is there to be gained by the change from the Phase I to the Phase II levels? I've seen no sound evidence that exposure to formaldehyde at the proposed Phase I levels poses a risk. I am not aware that any of your referenced studies show this. Older data from people exposed in years past was from when formaldehyde levels were exceptionally high, and these did not show a strong correlation to health issues (weak correlation to nasal cancer I believe?). The limits you consider now are all just supposition and gross overkill.

Agency Response [28-Maultsby-070424-FloPly]: The benefit of the move from Phase 1 to Phase 2 is enhanced protection of health measured in reduction of formaldehyde-related cancer cases. Although not included in these calculations, there are also other potential health benefits associated with the reduction in HCHO exposure such as the reduction in allergy and asthma exacerbation. Based on the estimates provided in the ISOR, implementation of Phase 1 would result in a reduction in HCHO emissions of 180 tons per year which, in turn, is projected to reduce excess cancer cases by 12-35 per million over a 70-year life span. Implementation of Phase 2 is projected to reduce these cancer cases 2-3-fold (35-97 cases per million) over the same life span.

377) Comment [29-Couture-070424-CDMDP]: "… In fact, recent credible research around the world including the USEPA and Health Canada shows that there is virtually no risk to the population of California from industry products in the manner they are produced and used by consumers."

Agency Response [29-Couture-070424-CDMDP]: We disagree. See the responses to comments #341 to #344.

378) Comment [30-Hardy-070427-Children Now]: Children Now earnestly encourages CARB to put in place HCHO emissions reduction regulations as an overdue health prevention measure, to protect all people, including our children.

Agency Response [30-Hardy-070427-Children Now]: We appreciate the comment – no response necessary.

379) Comment [38-Morgan-070424-IWPA]: IWPA applauds the California Air Resources Board's (ARB) intentions to reduce human exposure to toxic air contaminants as mandated by state law.

Agency Response [38-Morgan-070424-IWPA]: We appreciate the comment – no response necessary.

380) Comment [42-Gustafson-070424-WWI]: "I have sat in CARB public meetings and watched scientists and toxicologists tell the CARB board that their needs assessment is potentially flawed and thus their conclusions are potentially based on fallacies…"

Agency Response [42-Gustafson-070424-WWI]: We disagree. The arguments raised by industry toxicologists are subject to interpretation, and there is no consensus interpretation. See also the responses to comments #341 to #344.

381) Comment [47-Steenson-070424-AuWPA]: 1. Underlying Health science. "We support the data and interpretations of the science of the health effects of Formaldehyde presented by the FCI that:

(a) there are safe levels of formaldehyde as modelled by the CIIT.
(b) the most sensitive health end-point for formaldehyde is sensory irritation to the eyes.
(c) at or below the levels where sensory irritation occurs there is adequate protection of human health from other potential health endpoints such as cancer.
(d) there is inadequate evidence to suggest that formaldehyde causes asthma or that asthmatics are more sensitive to formaldehyde.

We therefore recommend to the board that they review their risk assessment based on the most recent science as presented by the FCI.

Agency Response [47-Steenson-070424-AuWPA]: See the responses to comments #341 to #344. OEHHA evaluated the CIIT model under the established process to re-evaluate risk assessments under the Toxic Air Contaminants program, but found it unsatisfactory to predict risks at low levels of exposure. This was largely due to the uncertainties in the model surrounding the HCHO concentration at which, according to the CIIT model, the unit risk "switched" from low to high. This modeled inflection point could vary considerably depending on the choice of some poorly characterized input parameters, and might reasonably be low enough that environmental and indoor exposures were in the "high potency" range.

OEHHA concluded that this model was not adequate to protect public health. OEHHA reported that the model produced a dose-response that was flat at the low-end and that the model was flawed, thus calling into question assertions of the 'safe' level of HCHO. OEHHA agrees that irritancy is a sensitive endpoint for short-term exposure and use it in the development of its acute REL (OEHHA, 1999). However, the sensory irritation threshold does not account for the tissue damage from long-term exposure to HCHO observed in workers, and this is not an appropriate endpoint to use in developing a REL for chronic exposure. For the chronic REL, OEHHA used histological damage to the nasal epithelium (OEHHA, 2000).

382) Comment [52-Lent-070425-HBN]: At the October 23rd public hearing, there was some concern raised about California Air Resources Board's (CARB) reliance on the Office of Environmental Health Hazard Assessment's (OEHHA) position on HCHO, its toxicology and health effects. Members of industry expressed the opinion that the current science shows HCHO is not as great of a concern as OEHHA's 1992 analysis indicates.

As you are probably aware, this is not a new argument from industry. Given the current state of the science on the health effects of HCHO, however, we strongly believe that a careful review of the most updated peer-reviewed science indicates that CARB's reliance on OEHHA's risk assessment on HCHO is well-founded.[1]

Less than three years ago, in 2004, the World Health Organization's International Agency for Research on Cancer (IARC) updated its report on HCHO. Before 2004 (1987 and 1995) based on limited available peer-reviewed studies, IARC concluded HCHO was a "probable carcinogen." In 2004, however, IARC changed its position based on new information from studies of persons exposed to HCHO. In the most recent classification from IARC, the expert working group found that evidence was sufficient to increase the level of concern about HCHO. In 2004, IARC found sufficient evidence to conclude that HCHO is "carcinogenic to humans." In addition to IARC, other national and international regulatory agencies have determined that HCHO is a public occupational concern. The National Toxicology Program (NTP) has classified HCHO as "reasonably anticipated to be a human carcinogen." The National Institute for Occupational Safety and Health (NIOSH) has determined that HCHO is a "potential occupational carcinogen." The Association of Occupational and Environmental Clinics (AOEC) concluded that HCHO is a potential asthmagen. The EPA Integrated Risk Information System (IRIS) found that HCHO is a probable human carcinogen in animal studies. Moreover, the EPA under the Clean Air Act has concluded that HCHO is a hazardous air pollutant. The record is clear. Increased study of HCHO reiterates

concerns about its impact on public and occupational health. Consensus exists in the peer-reviewed science that the risks from HCHO substantiates the basis for the CARB action based on the OEHHA analysis.

We strongly support the CARB staff proposal to regulate HCHO emissions from composite wood products rapidly and bring them as close to zero as is technically possible by 2012 in order to protect public and occupational health. Please continue to press for the most stringent regulations you can implement with a meaningfully rapid timeline.

[1] Much of the industry push to re-evaluate HCHO is spurred by a mathematical model of HCHO toxicity developed by CIIT (Chemical Industry Institute of Toxicology). The CIIT model is limited in a number of significant ways, but, most obviously, it fails to account for the risk of cancers in tissues other than the nose and throat. In particular, the model ignores leukemia risks identified in two robust independent epidemiology studies of exposed workers, by NIH/NCI (Hauptmann M, Lubin JH, Stewart PA, Hayes RB, Blair A. Mortality from solid cancers among workers in formaldehyde industries. Am J Epidemiol. 2004 Jun 15; 159(12):1117-30) and CDC/NIOSH (Pinkerton LE, Hein MJ, Stayner LT. Mortality among a cohort of garment workers exposed to formaldehyde: an update. Occup Environ Med. 2004 Mar; 61(3):193-200.). At a 2004 meeting of IARC's chemical evaluation program, 26 scientists from 10 countries evaluated all the available evidence on the carcinogenicity of HCHO, including the CIIT model and the NCI and NIOSH occupational studies. In addition to definite evidence of nasopharyngeal cancers, IARC also found limited evidence for cancer of the nasal cavity and paranasal sinuses and "strong but not sufficient evidence" for leukemia. (The finding for leukemia reflects the epidemiologists' finding of strong evidence in human studies coupled with an inability to identify a mechanism for induction of leukemia, based on the data available at this time. Press Release No. 153. World Health Organization, June 15, 2004. *IARC Classifies Formaldehyde As Carcinogenic to Humans*.)"

Agency Response [52-Lent-070425-HBN]: We appreciate the comment – no response necessary.

383) Comment [53-Cassman-070425-HBMVR]: The ISOR provides overwhelming evidence regarding the health risks of HCHO exposure given that no safe threshold exposure exists and the diverse sources of emissions from CWP. (See ISOR VII, I, p. 130) As the ISOR notes, Californians are exposed to HCHO emissions in the ambient air from a multitude of sources, including "hot spots," such as near lumber yards, through indoor-outdoor air exchanges, from newly made standing stock of CWP stored at manufacturing facilities, and during transport of CWP by rail, truck, and ship. (See ISOR I.B., p. 3) The ISOR also notes that Californians are exposed to HCHO exposures through indoor air sources, and that CWP such as particleboard and medium density fiberboard panels are subject to regulation not only under the Tanner Act, but also as consumer products under Section 41712. The statewide annual average HCHO concentration in ambient air exceeds the chronic reference exposure level for HCHO that presents a known risk to public health.

(ISOR I.B.) As outlined in Chapter VII.F, the ATCM will have substantial impact in reducing common exposure to HCHO emissions.

Agency Response [53-Cassman-070425-HBMVR]: We appreciate the comment – no response necessary.

384) Comment [54-Knox-070425-ACS]: The Society believes that reducing exposure to HCHO is desirable and that reduced emissions will benefit public health. We support the proposed formaldehyde ATCM, and commend the Board for its actions to protect the health of all Californians.

Agency Response [54-Knox-070425-ACS]: We appreciate the comment – no response necessary.

385) Comment [55-Theg-070425-NA]: I care very deeply about reducing HCHO emissions and urge you take whatever actions you can to reduce HCHO emissions to background levels. This is a health issue of great importance.

Agency Response [55-Theg-070425-NA]: We appreciate the comment – no response necessary.

386) Comment [56-Carmichael-070425-CCA][75-Carmichael-070426-CCA]: The Coalition for Clean Air and the American Lung Association of California support the California Air Resources Board's (CARB) plan to require the wood products industry to develop formaldehyde free and low HCHO products. We support the stringency of the standards and the "cap approach" proposed by staff but we strongly believe the industry can and should meet these standards sooner… Again, we appreciate CARB's work in developing this regulation. To better protect public health we urge an acceleration of the requirements proposed by your staff.

Agency Response [56-Carmichael-070425-CCA][75-Carmichael-070426]-CCA: We appreciate the comment. See also the response to comment #123.

387) Comment [57-Young-070425-NA]: Please support the measure to reduce formaldehyde emissions.

Agency Response [57-Young-070425-NA]: We appreciate the comment – no response necessary.

388) Comment [58-Blicker-070425-NA]: Do the right thing. Adopt the regulations to establish new low emitting standards. Thank you.

Agency Response [58-Blicker-070425-NA]: We appreciate the comment – no response necessary.

389) Comment [68.1-Shull-070426-CWIC] [80-Shull-070426-CWIC]: The introductory statement to Section VII states "This chapter presents an overview of the health risk assessment process…" Chapter VII falls grossly short in presenting a *transparent, clear, consistent and reasonable* overview of CARB's risk assessment. For example, it lacks a standard uncertainty analysis as part of the risk characterization (Step 4) component. Also, it completely excludes any discussion of the current scientific discussion/debate on the cancer slope factor (CSF), which has more influence on estimated cancer risks in humans than any other single factor. In my opinion, it fails all four quality criteria, is biased, and will mislead risk management decision makers.

Agency Response [68.1-Shull-070426-CWIC] [80-Shull-070426-CWIC]: Other than the absence of an uncertainty analysis, it is not clear why the commenter feels that the ISOR falls short in terms of transparency, clarity, consistency or reasonableness. This document was not written to defend the CSF. In responding to FCI's petition to have HCHO re-examined, the Scientific Review Panel on Toxic Air Contaminants effectively endorsed the continued use of the current values. See also the responses to comments #341 to #344.

390) Comment [68.2-Shull-070426-CWIC]: The introductory statement also states that "As HCHO has been identified as a toxic air contaminant (CARB, 1992), there is no threshold exposure level below which adverse health effects are not anticipated." This statement is blatantly wrong, has no scientific basis, and has no basis in either USEPA or Cal/EPA's designation of formaldehyde as a likely human carcinogen.

Agency Response [68.2-Shull-070426-CWIC]: Formaldehyde is a genotoxic carcinogen: all such compounds are considered to be non-threshold carcinogens for TAC regulatory listings. The comment does not suggest a threshold level or the scientific basis for one. See also the responses to comments #335 and #336.

391) Comment [68.3-Shull-070426-CWIC]: Whereas Section 2 of Chapter VII presents a relatively comprehensive, 21-page summary of the toxicology and human epidemiology literature on formaldehyde, no attempt is made to relate the information directly to the proposed ATCM standard.

Agency Response [68.3-Shull-070426-CWIC]: The first part of Chapter VII summarizes studies of the adverse health effects of HCHO, including cancer. In Section F of Chapter VII, OEHHA's unit risk factors are applied to show the effects of reducing HCHO exposures as required by the ATCM. See also the responses to comments #337 and #340.

392) Comment [68.4-Shull-070426-CWIC] [80-Shull-070426-CWIC]: Also, Section 2 of Chapter VII makes no mention of the metabolism of formaldehyde in biological systems including humans. It is a well-known fact that virtually all cells in the body possess aldehyde dehydrogenase enzymes that detoxify formaldehyde at air concentrations less than about 2 ppm. For the CARB report to ignore this fact shows blatant bias and misuse of science (i.e., including the science that supports the proposed ATCM standard and excluding the science that doesn't support the proposed standard).

Agency Response [68.4-Shull-070426-CWIC] [80-Shull-070426-CWIC]: The metabolism of HCHO has been considered in other supporting documents including those in which OEHHA developed reference exposure levels (RELs). The assertion that "…virtually all cells…detoxify HCHO at air concentration less than about 2 ppm" implies that 100% of the HCHO is detoxified before it can cause damage. This has not been demonstrated. This comment also ignores the variability among individuals in the ability to metabolize HCHO, and variations in endogenous HCHO formation.

393) Comment [68.5-Shull-070426-CWIC]: Chapter VII (Section 2) presents no discussion of OEHHA's CSF or Unit Risk Factor (URF), even though this factor affects the risk assessment results as much or more than any other single factor in the assessment. The fact that the CSF is not listed among the seven "factors that affect the outcome of a health risk assessment" (Section C, Chapter VII) shows bias, misleads CARB's risk managers, and is yet another failure of the report to meet the four risk assessment quality standards.

Agency Response [68.5-Shull-070426-CWIC]: The factors listed in Section C are the generic factors that apply to both cancer and non-cancer health risk assessment. The CSF and the URF are determined independently of the ATCM and the factors in Section C. This was conducted under Phase 1, Identification of Toxic Air Contaminants in the TAC program. See also the response to comment #335.

394) Comment [68.6-Shull-070426-CWIC] [77-Natz-070426-FCI]: Chapter VII makes no mention of key reports in the published scientific literature that have challenged the underlying assumptions and scientific bases of OEHHA's CSF; notably Conolly et al. (2004). The scientific controversy associated with the CSF and URF factor for formaldehyde is well known. The complete silence of CARB's report on this important scientific controversy shows bias, misleads CARB's risk managers, and is yet another failure of the report to meet the four risk assessment quality standards.

Agency Response [68.6-Shull-070426-CWIC] [77-Natz-070426-FCI]: It is not clear what underlying assumptions or scientific bases of OEHHA's CSF are challenged by Connolly et al. The ISOR was not written to defend the CSF or URF, but rather to apply these numbers in a risk management context. The mentioned scientific controversy indicates that the evidence is still evolving and, while the evolving evidence may eventually suggest different values, the ISOR uses what OEHHA and the Scientific Review Panel on Toxic Air Contaminants consider to be the best available numbers. See also the responses to comments #335 and #341 to #344.

395) Comment [68.7-Shull-070426-CWIC] [77-Natz-070426-FCI] [80-Shull-070426-CWIC]: Whereas the proposed ATCM standard may reduce exposure of Californians to HCHO to some unknown degree, there is no scientific basis for concluding that a reduction in the incidence of cancer in California will result. The primary reasons are: 1) HCHO is completely detoxified at low levels of exposure; levels currently associated with emissions from composite wood products, and 2) there is no scientific evidence of human carcinogenesis in the already low air concentrations of HCHO that are typically emitted from composite wood products manufactured in California.

Agency Response [68.7-Shull-070426-CWIC] [77-Natz-070426-FCI] [80-Shull-070426-CWIC]: The comment asserts that HCHO is completely detoxified at low levels of exposure, a proposition that has not been demonstrated, and would be difficult to do so. In addition, since HCHO is continuously released from composite wood products into confined spaces, such as homes, it can reach high levels (> 200 $\mu g/m^3$). It thus contributes to an individual's exposure from all sources, and is a significant source for individuals spending the bulk of their time in recently fabricated homes.

396) Comment [69-Murray-070426-FCI] [77-Natz-070426-FCI] [78-Murray-070426-FCI]: Will CARB's Proposal on Formaldehyde Really Reduce Cancer? Summary. The health benefits of CARB's proposal to lower HCHO emissions have been overestimated by a cancer risk assessment that does not use the most current peer-reviewed scientific information. Importantly, more recent and sophisticated risk assessments of HCHO by other respected regulatory agencies, including USEPA, Health Canada, and the World Health Organization (WHO), predict the cancer risk is as much as 36,000 times lower than the estimate relied upon by CARB. These assessments indicate that the proposed reductions in HCHO emissions will not produce any meaningful reduction in cancer cases in California.

CARB's estimate is based on OEHHA's cancer potency factor. CARB estimated the cancer risk of HCHO based on an estimated cancer potency

factor from a 1992 risk assessment by the Office of Environmental Health Hazard Assessment (OEHHA); this assessment was reissued essentially unchanged by OEHHA in 2005 as part of the Air Toxics Hot Spots Program.[1] CARB estimated that the benefit of implementing Phases 1 and 2 of the proposal would result in a theoretical net reduction of 12 and 35 cancer cases per million people, respectively, over a 70-year lifetime. Assuming a steady population of 35 million in California and assuming CARB's estimates are accurate, this would amount to a theoretical reduction in of about 6 and 18 cancer cases per year in California from Phases 1 and 2, respectively.

USEPA, Health Canada, and WHO estimate a dramatically lower cancer potency for HCHO. OEHHA's cancer potency estimate is at odds with more recent risk assessments by USEPA, Health Canada, and WHO. Substituting these cancer potency estimates in CARB's equations indicates that Phase 2 would prevent 0.001-0.016 cancer cases per million people, which is 0.0005-0.008 cancer cases per year in the entire population of California (Table 1). In other words, implementation of Phase 2 is unlikely to prevent one cancer case in the entire population of California in our lifetime.

Why such a big difference in estimates? OEHHA's cancer potency estimate does not rely on what USEPA calls "the best peer-reviewed science at this time. "[2] In fact, the OEHHA risk assessment of HCHO does not even mention the work which USEPA, Health Canada, and WHO relied upon for their risk assessments of HCHO.

OEHHA's estimated cancer potency for formaldehyde is 2,250-36,000 times greater than that of USEPA, Health Canada, and WHO. Formaldehyde does not become 36,000 times more carcinogenic when it crosses the state border. Either OEHHA has greatly overestimated the risk or USEPA, Health Canada, and WHO all have greatly underestimated the risk.

Conclusion: CARB should carefully evaluate the proposal to reduce exposure to HCHO, particularly the extremely low limits proposed in Phase 2, in light of the tenuous public health benefits represented by the estimated reduction in cancer cases in California. If reducing exposure to HCHO will not result in any meaningful reduction in cancer risk in California, the proposed action must be questioned. Given the fact that over 100,000 Californians are expected to die annually from cancer, it is especially important to focus the State's resources on actions that will result in real reduction in cancer and improvement in public health.

Agency Response [69-Murray-070426-FCI] [77-Natz-070426-FCI] [78-Murray-070426-FCI]: As noted in the comment, and unlike the agencies

mentioned, OEHHA does not use the model from CIIT on which the cancer risk described in the comment is based. OEHHA evaluated this model and found it to be interesting and representative of a major effort on the part of CIIT. However, we think this model (1) has not been adequately analyzed for model uncertainty, and (2) has important yet not well characterized assumptions that influence the estimate of risk at low levels of exposure. This model does not adequately protect public health. The Scientific Review Panel on Toxic Air Contaminants agreed with OEHHA's assessment and declined to recommend to the CARB that the risk assessment be re-opened. Based on the numbers from OEHHA, the proposed reductions in HCHO are expected to result in meaningful reductions in cancer cases. Regarding Table 1, CIIT wrote the section of the WHO and the USEPA documents. And, EPA's consensus potency values are on IRIS and still have their 1991 value. They are officially re-evaluating but are about two years out from a final reassessment. Finally, scientists at USEPA recently presented data at scientific meetings which supports the conclusion that the CIIT model has a very uncertain inflection point. See also the responses to comments #341 to #344.

397) Comment [77-Natz-070426-FCI]: "The members of the Formaldehyde Council are concerned that with this proposed HCHO rule, CARB is embarking down a path that is completely out of sync with the current and best available science on formaldehyde's potential human health effects. Today, you will be hearing from experts who will point out the flaws in both the analyses and the drafting of this proposed rule. Simply put, we believe that this proposed rule to reduce HCHO in wood products is not based on the best available science and health effects data and will not provide appreciable health protection to the people in California."

Agency Response [77-Natz-070426-FCI]: We disagree. We have consulted with the toxicologists from OEHHA whose work was peer-reviewed by the Scientific Review Panel on Toxic Air Contaminants. See also the responses to comments #341 to #344.

398) Comment [79-Marsh-070426-FCI]: "… our reanalysis of the NCI cohort data do not support their suggestion of a causal association with HCHO and NPC (nasopharyngeal cancer). I believe that the 2004 decision by IARC to reclassify HCHO as a group one substance was premature considering the small number of NPC deaths, the missing evidence from the British and NIOSH cohort studies, NCI's anomalous finding for NPC in a single plant, and now our new evidence that the NPC risk in this very influential plant may be related to not HCHO, but to previous work in the local metal industry."

Agency Response [79-Marsh-070426-FCI]: We disagree. We stand with the decision by IARC to classify HCHO as a known human carcinogen. See also the response to comment #340.

399) Comment [118-Lent-070426-NA]: "So why are they doing this in the face of the blitz of warnings prices are going up for the product? Because they recognize that their workers and their customers are suffering now from the impact of this. These actions as the CARB staff – statistics have shown we're talking about thousands of cancer cases here a wide range of other impacts. And the people who have signed that letter recognize that we're not going to get this change in the industry through the green building movement alone or through individuals concerned. So we have a classic case of market failure here where people don't get to choose the casework that they're exposed to… The ones who pay for health impacts are not the ones necessarily making the most of the decisions. So this is a public health issue that requires your action…"

Agency Response [118-Lent-070426-NA]: We appreciate the comment – no response necessary.

400) Comment [119-Makus-070426-Children Now]: "Recently OEHHA studies suggest that formaldehyde likely presents differential health impacts on infants and children from carcinogenicity to respiratory effects including decreased lung function and exacerbated asthma… What is especially tragic about this disproportionate health impact is that children have very little control over their environment. They seldom exercise any choices to where they live, where to attend school, or what materials are utilized or located in their surroundings. They must breathe in the environment in which others place them."

Agency Response [119-Makus-070426-Children Now]: We appreciate the comment – no response necessary.

401) Comment [119-Makus-070426-Children Now]: "Further, the many children in our state from low-income families are far more likely to be exposed to an environment with higher levels of HCHO emissions which raises the profound issue of environmental justice."

Agency Response [119-Makus-070426-Children Now]: We agree. By requiring the sale and use of lower emitting products in California, HCHO exposures of all Californians will be reduced.

D. Comments and Agency Responses: 15-day Comment Period

1) Comment [1.1-Davis-080203-Regal AQ]: "The process of testing and certifying CWP . . . is a bit complicated. I think a graphic or two showing the various steps that have to be followed . . . would help everyone understand how all the pieces fit together."

   Agency Response [1.1-Davis-080203-Regal AQ]: We appreciate the suggestion and will add a flow chart to our composite wood products web page. No changes are necessary to the regulation.

2) Comment [1.2-Davis-080203-Regal AQ]: "Has there been any thought to the importance of internet sales of finished products made from CWP that do not meet emission standards?"

   Agency Response [1.2-Davis-080203-Regal AQ]: The Internet sale of non-complying finished goods into California will be illegal after the respective effective dates. As part of our enforcement efforts, we may purchase finished goods from the Internet for verification testing and subsequent enforcement investigations, such as is currently done for other ARB regulations (e.g., consumer products).

3) Comment [2-Pardy-080205-NA]: "I support efforts to reduce formaldehyde emissions from composite wood products."

   Agency Response [2-Pardy-080205-NA]: Thank you. No response necessary.

4) Comment [3-Anderson-080212-Eastman Kodak]: "We respectfully request that you and members of the composite wood product implementation team give careful consideration to packaging materials and pallets. We believe that the most logical approach is to exempt these materials from the ARB requirements."

   Agency Response [3-Anderson-080212-Eastman Kodak]: We disagree. While some pallets and shipping crates are used in warehouses away from exposure to the general public, there are many instances in which there is potential for public exposure to formaldehyde emissions from wood used in making such packaging materials and pallets. In addition, all such material will emit into ambient air in California, and it is those emissions and the resultant public exposure to formaldehyde that we are seeking to reduce by the ATCM. Thus, if packaging materials and pallets are made with composite wood products for use in California, the composite wood products will need to comply with the emission standards in the ATCM. Pallets and shipping crates made prior to the effective date

of the emission standards can still be used. For the purposes of the ATCM, pallets and crates are considered finished goods. Pallets made after 2009 will need to be constructed from complying composite wood products and labeled as specified in the ATCM.

5) Comment [4.1-Hard-af-Segerstad-080213-IKEA]: "We would like to suggest that for consumer products which consist of only small surface areas made of composite wood products, there should be a lower limit as to size. Products below this size may be exempted from this regulation." "The risk of contribution of formaldehyde emission from the small objects could reasonably be considered to be insignificant and not motivate the elaborate measures and third party certification schemes which are appropriate for larger panels."

Agency Response [4.1-Hard-af-Segerstad-080213-IKEA]: While we agree that emissions of formaldehyde from a small object made of a composite wood product will contribute little to public exposure, each small object contributes to cumulative public exposure to formaldehyde. Therefore, in lieu of determining the appropriate exemption size, we concluded that it was more fair and comprehensive to not include an exemption based on size. Also, third party certification is required of manufacturers of composite wood products, not of fabricators of finished goods. In this way, when fabricators cut panels into pieces to make finished goods, they'll be assured of using complying composite wood products.

6) Comment [4.2-Hard-af-Segerstad-080213-IKEA]: Curved plywood is not included in the definition of hardwood plywood. "We would suggest to include a definition of the term 'curved plywood' to indicate that this refers to material which is manufactured in a curved form from the outset, i.e. that it does not refer to material which is first manufactured as panels and only thereafter treated to achieve a curved shape."

Agency Response [4.2-Hard-af-Segerstad-080213-IKEA]: After consultation with manufacturers of curved plywood, it is our understanding that most of it is made in a curved press, typically with radio frequency curing. Therefore, since there is a standard method of manufacture, we assume there is a universal understanding of the definition. Hence, we see no need to include a definition.

7) Comment [4.3-Hard-af-Segerstad-080213-IKEA]: "We suggest that this statement (of compliance) can be omitted from the bill of lading and invoice when transferring panels and finished products between units within the one and the same Corporation (group), on the condition that the required statements of compliance can be made available to the enforcement inspector on request."

Agency Response [4.3-Hard-af-Segerstad-080213-IKEA]: There are situations in which a corporate business unit in one part of the country may supply panels or finished goods to a fabricator that is owned by the same corporation, but operated by a manager who needs to know whether the materials comply with California standards. While there may be some situations or supply chains where such knowledge is not necessary, there is no realistic way to craft an exemption that would be appropriately limited to such situations. Also, information on the invoice or bill of lading is necessary for inspectors to effectively enforce the regulation. Therefore, it is not appropriate to change the requirement.

8) Comment [4.4-Hard-af-Segerstad-080213-IKEA]: "As most furniture consists of a mix of materials . . . we suggest allowing the label to state only the 'worst' or most onerous level."

Agency Response [4.4-Hard-af-Segerstad-080213-IKEA]: We agree. We do not expect a fabricator's label on a finished good to identify the emission level for each component part within the finished good, only the least protective. So, for example, if a finished good contained component parts made using Phase 2 composite wood and other component parts made with a ULEF resin, we would expect the label to state that the finished good is made with composite wood that complies with the applicable Phase 2 emission standards. If all of the component parts used in making the finished good are made with a ULEF resin, then the finished good can be labeled as having been made with ULEF resins.

9) Comment [4.5-Hard-af-Segerstad-080213-IKEA]: The commenter interprets Appendix 2 of the regulation to assume "the Quality Control Manager to be a chemist." The commenter suggests that we modify this section to allow the chemistry specialist to be a different individual.

Agency Response [4.5-Hard-af-Segerstad-080213-IKEA]: Appendix 2 requires each manufacturing plant to have adequate facilities and staff to perform routine quality control testing of manufactured composite wood products. Appendix 2 does not specify that the quality control manager or staff need to be chemists, just that they have the experience or training to fulfill the role. Alternatively, the quality control testing can be performed by a contract laboratory.

10) Comment [4.6-Hard-af-Segerstad-080213-IKEA]: The regulation requires that each plant have a "plant test facility. For 'no formaldehyde added systems,' this seems a high cost for very few tests. We suggest allowing the use of an accredited laboratory for the initial testing and for whatever test from production that may be needed."

Agency Response [4.6-Hard-af-Segerstad-080213-IKEA]: Appendix 2 of the regulation already allows for the testing to be conducted by "a contract laboratory or a laboratory operated by an approved third party certifier." Therefore, no change is necessary.

11) Comment [4.7-Hard-af-Segerstad-080213-IKEA]: "We would therefore like to ask for a postponement of the 'Effective Dates' with six months. The main issues necessitating a postponement for our company, as well as presumably for other companies with a large part of production located outside the U.S., are the time needed to implement this particular model for quality assurance as well as the time to get approvals of the third party certifiers."

Agency Response [4.7-Hard-af-Segerstad-080213-IKEA]: For many months, we have been actively conducting outreach to associations and individual companies that represent manufacturers, distributors, importers, fabricators, retailers, and third party certifiers to help inform affected industries of the need to prepare to comply with the regulation by the effective dates. Our understanding is that several organizations are poised to assume certification responsibilities well in advance of the January 1, 2009, effective date. We do not believe that a postponement is necessary.

12) Comment [5.1-Pitts-080214-Bernhardt]: "The way the ruling is drafted it unfairly affects importers of some product." "The furniture importers in the United States who deal with Fabricators in the Far East . . . who buy board from an exponential amount of board manufacturers. These manufacturers are set up to adhere to US, European, Japanese and other board standards. These standards are similar in nature to the phase 1 ruling but have a very different test protocol. The large chamber test requirement without sufficient lab facilities in these areas will create a manufactured demand and bottleneck for procurement."

Agency Response [5.1-Pitts-080214-Bernhardt]: We disagree. We believe that all manufacturers will be affected equally. Also, we modified the originally proposed ATCM to include the option of using the secondary test method to address the potential shortage of large chambers abroad. This should address the issue raised by the commenter.

13) Comment [5.2-Pitts-080214-Bernhardt]: "The cost work that has been provided by the ARB . . . is understated . . . It does not take into consideration the body of work in the fabricators, the importer and the retailer to accommodate the data for chain of custody . . . There will be some board manufacturers who decide that . . . to accommodate one state in another country is not worth the extra effort. When these factors other

than resin cost come into consideration, the real cost will be substantially greater."

Agency Response [5.2-Pitts-080214-Bernhardt]: We disagree and believe that the ISOR accurately identifies the cost of the ATCM, including the costs for out-of-state and out-of-country companies.

14) Comment [5.3-Pitts-080214-Bernhardt]: "There are several companies who maintain a large inventory in Fabricator warehouses in the Far East. There is no good mechanism to allow these inventories to contain specialty products specific to California."

Agency Response [5.3-Pitts-080214-Bernhardt]: There are similar warehouses in the U.S. that also maintain inventories for different geographic areas. The sell-through provisions in the ATCM will apply to all such inventories, regardless of location. Beyond the sell-through periods, all composite wood products and finished goods containing composite wood products must comply with the ATCM. It is up to each individual company to either find a way to modify their current operations to supply complying products to California, or withdraw from the California market.

15) Comment [5.4-Pitts-080214-Bernhardt]: "The chain of custody as stated is going to overwhelm fabricators and retailers alike." "A problem with this flow is the volume of data when the shipment is a container of product that is consolidated with product from various fabricators who have dealt with multiple manufacturers. It would be simpler to support a chain of custody that has added verbiage to the BOL (bill of lading) or invoice identifying product compliance and to let this and the label on the finished goods suffice for the retailer."

Agency Response [5.4-Pitts-080214-Bernhardt]: We disagree. The chain of custody required by the regulation is consistent with documentation currently used in commerce. Furthermore, the retailer must keep records to "document the precautions taken to ensure that the composite wood products and composite wood products contained in finished goods comply with applicable emission standards." Without such records, the retailer will not be able to demonstrate that they have informed their suppliers of the need for products and goods to comply with the ATCM and more weight of enforcement would fall on the retailer rather than the supplier in a situation in which a retailer is found to be selling non-complying products and goods.

16) Comment [5.5-Pitts-080214-Bernhardt]: "The enforcement of the program is always going to be in question." "The enforcement arm is going to raise red flags by using a FLEC device. As of today there is no direct

correlation between the readings of the FLEC cell and the large chamber. You have then said that you will use a deconstructive test protocol for a final judgment." "There is still the chance that the original conditioning period of the board and the secondary test will give inaccurate results." "The number you get for the test will not reflect 'real life' of the finished goods."

Agency Response [5.5-Pitts-080214-Bernhardt]: Published studies exist that show a good correlation between the FLEC and traditional chambers. Our enforcement staff will use the FLEC and a portable formaldehyde analyzer as a screening tool to help decide whether to purchase panels or finished goods for more comprehensive emissions testing at ARB's lab using one of our enforcement test methods (sections 93120.9(c) and (d)). We have studies underway to allow us to develop a protocol for using the FLEC and portable formaldehyde analyzer at manufacturers, distributors, importers, fabricators, and retailers. The results of the FLEC and portable analyzer will not be used as the legal basis for a violation.

17) Comment [5.6-Pitts-080214-Bernhardt]: "They (ARB) could serve humanities interest better by not imposing this ruling as it is stated within the defined time frame. Or even better, by not going alone and to join with the other states and international agencies in defining one acceptable standard that will not create unfair monopolies and actually do the good that was intended."

Agency Response [5.6-Pitts-080214-Bernhardt]: While we agree that there is need for international standardization with regard to formaldehyde emission standards and testing requirements, the need to protect public health dictates that our ATCM process move forward, rather than waiting for other states or countries to reach consensus. We will track international developments that relate to standardizing formaldehyde emission standards and testing requirements, and will modify the regulation at a later date, if warranted due to international standardization.

18) Comment [6-Lantman-080214-SRI]: "As a not-for-profit research institute, we are developing alternative resins and glues to help the composite wood product industry meet these new standards. One example is our new polyketone wood adhesive" "To ensure that our development is aligned with the ATCM and industry needs, we would like to discuss implementation."

Agency Response [6-Lantman-080214-SRI]: Thank you for your letter. We would be happy to meet with the commenter to discuss implementation of the ATCM.

19) Comment [7-Perdue-080214-AHFA]: "AHFA supports the 'Proposed Modifications' as detailed in the '15 Day' version of the ATCM dated 01/31/08."

Agency Response [7-Perdue-080214-AHFA]: We appreciate the support – no response necessary.

20) Comment [8.1-Titus-080214-KCMA]: "We support the revised definition of 'fabricator' . . . the revised definition of 'laminated product' . . . is also supported."

Agency Response [8.1-Titus-080214-KCMA]: We appreciate the support – no response necessary.

21) Comment [8.2-Titus-080214-KCMA]: "Currently, the regulation lacks a clear summary page of the effective dates fabricators must satisfy in order to be in compliance such as was developed for compwood manufacturers. We request that such a chart be developed and added to the regulation or made available as soon as possible to assist companies in developing their compliance strategy."

Agency Response [8.2-Titus-080214-KCMA]: We believe the regulation clearly defines the specific requirements affecting fabricators. To assist in clarity, the regulation is organized by affected businesses such as manufacturers, third party certifiers, fabricators, importers, distributors and retailers. However, we will consider adding a chart to our webpage if we determine that it would be useful for the industry.

22) Comment [8.3-Titus-080214-KCMA]: "It is suggested that the clarification provided in Section 93120.7(b)(3) regarding the responsibilities of local government agencies and school districts clearly be made applicable to all state government agencies."

Agency Response [8.3-Titus-080214-KCMA]: The section is appropriate as worded. It was included to comply with state law regarding the imposition of non-reimbursable costs on local agencies and school districts. At least one state agency (the Prison Industry Authority, PIA) would be affected if we made the requested change. PIA is a large furniture fabricator. Exempting PIA and other state agencies could compromise public health protection.

23) Comment [8.4-Titus-080214-KCMA]: "KCMA generally supports the 18-month sell-through provisions of the regulation."

Agency Response [8.4-Titus-080214-KCMA]: We appreciate the support – no response necessary.

24) Comment [8.5-Titus-080214-KCMA]: "CARB staff deserves recognition for the openness and fairness with which this long and difficult process has been conducted. We anticipate many challenges when the actual enforcement phase begins. Hopefully, the same approach will continue."

Agency Response [8.5-Titus-080214-KCMA]: We appreciate the comment. We fully intend to continue our interactive approach.

25) Comment [9.1-Earnshaw-080214-Hexion-NZ]: "The MDF manufacturers currently export Composite Wood Panels both as raw board and as finished goods to California at E1 emission levels (equivalent to CARB P2). In addition these manufacturers already utilize ULEF resin technology for product exported to Japan. We believe the Board should acknowledge the use of this technology in the new regulations. If there was appropriate recognition these products would be immediately available to Californian consumers, which in turn would drive industry more quickly to the lower emission levels."

Agency Response [9.1-Earnshaw-080214-Hexion-NZ]: We understand that many composite wood products that comply with other international standards may meet the CARB P2 standard and the ATCM does not restrict the use of a particular technology used to produce complying products. However, key components of the ATCM, such as third party certification, quality assurance requirements, and chain of custody, are either lacking or greatly diminished in alternate international certification schemes. Furthermore, the Phase 1 and Phase 2 standards are based on emissions testing conducted in dynamic testing chambers. We strongly believe it is necessary to base certification of composite wood products on dynamic emissions tests, not by static emissions methods or measurements of formaldehyde content as is done in the other programs. See also the Agency Response to comment # 26 in section D of the FSOR.

26) Comment [9.2-Earnshaw-080214-Hexion-NZ]: "The requirement for each plant to provide a correlation for the QC method to the primary or secondary method is costly and unnecessary in many cases, in particular where the QC method is well established and an accepted method documented in a recognised [sic] standard (eg JIS 1460). Our recommendation is that the Board set limit values for these known and accepted QC test methods which form part of national and international standard test methods for composite wood panels. Also to ensure consistency among QC standard methods the manufacturer would conduct a series of tests in conjunction with the third party certifier. We agree that the primary, secondary or alternative secondary methods should be used for compliance testing."

Agency Response [9.2-Earnshaw-080214-Hexion-NZ]: We disagree. There is a need to develop plant by plant correlations to account for process variability. Also, given that violations will be issued for emissions standard exceedances, it is necessary for plants to accurately target their operations limits to ensure compliance. Although we recognize the validity of other test methods (e.g., JIS 1460 or EN- 120), as mentioned in the Agency Response to comment # 25 in section D of the FSOR, the Phase 1 and Phase 2 standards are based on values determined from dynamic chambers, which are operated under different conditions and loading rates. The European EN-120 and the Japanese JIS 1460 are test methods which achieve the intent of their respective certification programs. The ARB regulation limits surface emissions from composite wood products and the dynamic chambers offer the most accurate measure of surface emission rates under realistic testing conditions as they relate to actual exposure. Furthermore, manufacturers can request from ARB the use of alternative QC test methods under 93120.12, Appendix 2 (g)(1)(c).

27) Comment [9.3-Earnshaw-080214-Hexion-NZ]: "We believe that CARB should recognize other product certification schemes that provide for emission specifications lower than the Phase 2 limits. Our belief is that the JIS Mark certification scheme for Particleboard and MDF offers this equivalency and request that CARB offer exemptions from the requirement to have third party certification if a panel product is certified to the JIS Standard F*** and F**** emission levels."

Agency Response [9.3-Earnshaw-080214-Hexion-NZ]: We disagree. If products meet the JIS F*** and F**** rating, then the resin technology will be adequate, so confirmatory testing is all that is necessary. See also the Agency Responses to comments # 25 and 26 in section D of the FSOR.

28) Comment [9.4-Earnshaw-080214-Hexion-NZ]: "The board has made changes to the requirement for exemption to the third party certification scheme and has identified that both NAF and ULEF binders can apply for exemption. We agree with this approach. However we have concerns that the clauses relating to the application approval process and to terms of the exemption for these two classes of binders are different. In the provisions 93120.3 C (1) for exemption from the third party certification requirements for NAF resins the manufacturer has to supply QC data for 3 months demonstrating acceptable emissions. However in the provision 93120.3 d (2) for exemption from third party certification for ULEF resins the manufacturer has to supply 6 months of data. There is a further discrepancy in the wording of provision 93120.3 d for ULEF resins. This section also states that if the exemption from third party certification is granted the manufacturer still has to meet all the other provisions of 93120.3 d (1). This is problematic in two ways. Firstly this is not a

requirement for exempt NAF resins and secondly the meaning is ambiguous given that the requirement in 93120.3 d (1) is for reduction in testing frequency. We believe that there is no justification for this discrimination and request that CARB modify the regulation to have the same requirement for ULEF and NAF resins. There is also a need to clarify what requirements of provision 93120.3 d (1) still apply to manufacturers who are exempt from third party certification if indeed this is the intention of the board."

Agency Response [9.4-Earnshaw-080214-Hexion-NZ]: We disagree that the requirements for exemption discriminate against ULEF resins. First, it must be understood that no-added formaldehyde (NAF) based resins and ULEF resins are chemically distinct and represent different approaches to lowering or eliminating formaldehyde emissions from composite wood products. ULEF resins are subject to more scrutiny for the very fact that they still contain formaldehyde as a major component of the resin mixture. Given this fact, emissions could vary significantly based on factors such as errors in resin formulation by the end user (mill), changes in press times or changes in press temperature. We feel these factors warrant more rigorous qualifying criteria than no-added formaldehyde based resins. With respect to the wording of provision 93120.3(d), the section indicates that "all other requirements of section 93120.3(d)(1) apply," in reference to the requirements other than testing requirements. This reference is in relation to the contents of the ULEF application. In other words, 93120.3(d)(1) applies in that it defines the elements of the application, including a statement of product types, chemical formulation and name of the ARB approved third party certifier.

29) Comment [9.5-Earnshaw-080214-Hexion-NZ]: "It may well be the case that a manufacturer could apply for an exemption from third party certification and we believe that it is unnecessary for manufacturers to include third party certification bodies when applying for exemption. This may be critical in some regions given the potential lack of third party certifiers. However there are likely to be far more laboratories that have the necessary competencies to carry out emission testing to the required primary or secondary testing methods. We therefore request that CARB modify the regulation to allow applications from manufacturers to be exempt from third party certification who provide the required data for formaldehyde emissions that have been analysed [sic] by a laboratory certified by an accreditation body signatory to ILAC 2000. This will provide the board with the requisite assurance that the emission values are valid."

Agency Response [9.5-Earnshaw-080214-Hexion-NZ]: We disagree. Involvement of third party certifiers is a crucial component that adds enforceability to the ATCM. Only third party certifiers that can

demonstrate the ability to generate high quality data will be ARB approved. Given that an approval will exempt manufacturers from independent testing, it is appropriate to require high quality emissions data.

30) Comment [9.6-Earnshaw-080214-Hexion-NZ]: "We also seek clarification or rectification of an apparent error in Appendix 2. In section 4 A the regulation states: '. . . Manufacturers of PB and MDF that use ULEF resins and have received ARB approval under section 93120.3(d) must conduct routine quality control tests at least weekly for each production line for each product type'. This requirement seems at odds with the requirements of section 4B: 'Testing frequency may be reduced to no less frequently than one test per 48-hour production period when the plant or production line demonstrates consistent operations and low variability of test values to the satisfaction of the third party certifier, based on criteria established by the certifier.' "

Agency Response [9.6-Earnshaw-080214-Hexion-NZ]: Section 93120.12, Appendix 2, subsection (g)(4)(A) describes basic testing frequency for PB and MDF, which is once per shift. The subsection also includes the reduced testing frequency for PB and MDF made using ULEF resins, which is at least weekly. Subsection (g)(4)(B) describes reduced testing frequency for PB and MDF made with traditional UF resins. Hence, there is no inconsistency.

31) Comment [9.7-Earnshaw-080214-Hexion-NZ]: "We have concern about the availability of resources to service international manufacturers. Currently there is no indication that there are any third party certifiers in the Asia-Pacific region. This will be a major problem in the ability of manufacturers to meet the requirements of this regulation. The ability to use US resources is impractical (shipping to the US for testing is not an option as the 30 day test period could not be met) and currently there are no chambers compliant with the E1333 method available in our region."

Agency Response [9.7-Earnshaw-080214-Hexion-NZ]: We believe there will be sufficient resources available. It is our understanding that several certified testing facilities exist globally, and we are aware of third party certifiers that have expressed interest in providing services to the Asia-Pacific region. Also, we understand there may be limited availability of large chambers, which is why the regulation was modified to allow the use of a secondary method that is demonstrated as equivalent to the large chamber method. See also the Agency Response to comment # 103 in section C of the FSOR.

32) Comment [9.8-Earnshaw-080214-Hexion-NZ]: "The sell through dates of 1st of April are impractical for importers and overseas manufacturers and

we therefore request that the sell through date of 1 July 2009 be established for these categories."

Agency Response [9.8-Earnshaw-080214-Hexion-NZ]: We disagree. In order to be as fair as possible to both manufacturers and importers of panels, we modified the sell-through periods for manufacturers and importers of panels so that both would have a sell through period of three months. We feel this provides a reasonable compromise, which addresses the concerns of stakeholders that an inconsistency between the sell-through periods for manufacturers and importers would have created unfair advantages for some.

33) Comment [9.9-Earnshaw-080214-Hexion-NZ]: "Compliance testing requires correlations to be determined between alternative secondary methods and the primary method. These correlations are not required for enforcement testing. This is inconsistent. In addition, for enforcement testing of finished goods, the primary method is not applicable and is therefore not included in 93120.9(c). In order for enforcement and compliance to be consistent this would require ARB to demonstrate equivalence between secondary or alternative secondary methods and the primary method. If ARB is required to develop correlations for enforcement testing then it would be recommended that these correlations are published as standards."

Agency Response [9.9-Earnshaw-080214-Hexion-NZ]: The ATCM specifies that the secondary test method or alternate secondary test method may be used for enforcement testing. For a small chamber to be used as a secondary test method, the equivalence requirements of section 93120.9(a) must be met. Because the small chamber used for enforcement testing must be deemed equivalent to the primary method, we deleted the correlation requirement for the enforcement method.

34) Comment [10-Mann-080215-IBM]: "While IBM supports the goals of the ATCM to reduce formaldehyde emissions, we believe that the application of the requirements to pallets and crates . . . will be extremely burdensome . . . and unnecessarily conservative given the expected use and exposures . . . Pallets and crates may be reused many times making it difficult if not impossible to track their original manufacturer . . . pallets and crates used in packaging applications do not become a permanent part of the indoor environment . . . we do not believe that potential emissions from these materials contribute significantly to a person's total daily exposures, and request that they be exempted from the ATCM requirements."

Agency Response [10-Mann-080215-IBM]: We disagree. Although it is true that pallets and crates do not become a permanent part of the indoor

environment, pallets or crates made from composite wood products have the potential for high formaldehyde emissions while they are in California. See also the Agency Response to comment # 4 in section D of the FSOR.

35) Comment [11.1-Zimmerman-080215-Sauder]: "Changes in the language for sell-through for the Fabricator section page 45 may be more confusing . . . This wording change seems to allow a Fabricator to continue using non-complying composite panels in their manufacturing processes till June 30th 2010 and sell into California. Do we as a Fabricator have till June 30th 2010 to comply?"

Agency Response [11.1-Zimmerman-080215-Sauder]: That is correct. The intent of this sell-through provision is to allow fabricators to continue producing goods with their existing stocks of non-complying composite wood products that were produced prior to the Phase 1 and Phase 2 implementation dates. This gives fabricators time to completely deplete their stocks of non-complying product. If a fabricator has non-complying product left over after expiration of their respective sell-through period, they can no longer use that product to produce goods that would be sold in California.

36) Comment [11.2-Zimmerman-080215-Sauder]: "The proposed finished product enforcement testing still lacks validation scientifically . . . it may be impossible to know whether or not a finished composite panel was or was not compliant to the Regulation."

Agency Response [11.2-Zimmerman-080215-Sauder]: We disagree. The finished product enforcement testing will be capable of detecting composite wood products which do not meet our emission standards.

37) Comment [11.3-Zimmerman-080215-Sauder]: "The regulation does not promote the use of lower emitting composite products use by the Fabricators . . . Is there not an off-set possible by reducing the paper work or tracing requirements or recognition?"

Agency Response [11.3-Zimmerman-080215-Sauder]: We appreciate the comment; however, at this time we do not feel it would be prudent to weaken the chain of custody requirements in exchange for the exclusive use of products made with no-added formaldehyde based resins or ULEF resins. Without adequate documentation, fabricators would not be able to provide evidence that they purchased complying composite wood products. In terms of recognition, in addition to the ARB label, fabricators could certainly indicate on a product brochure, tag, or company website that they use exclusively no-added formaldehyde based resins or ULEF resins in the production of their product. If a finished good contains only HWPW, MDF and/or PB that is made from no-added formaldehyde based

resins or ULEF resins, fabricators must label the finished good as such (see section 93120.7(d)(1)).

38) Comment [11.4-Zimmerman-080215-Sauder]: "Will there be more specific labeling requirements, such as font and size and specific wording for the CARB Phase I Compliant? Will there be specific wording for Bill of Lading and Invoices?"

Agency Response [11.4-Zimmerman-080215-Sauder]: The specific details of labeling will be up to the fabricator but the label must be legible and contain, at a minimum, the information specified in section 93120.7(d)(1).

39) Comment [12.1-Fernandez-080215-Arauco]: "We notice that MDF moldings are not considered to be part of the definition of 'Medium density fiberboard (MDF)', thus it is considered to be a 'Finished good' and not a 'Composite wood product.' Therefore, we understand that producers of MDF moldings are considered to be 'Fabricators' and not 'Manufacturers.' "

Agency Response [12.1-Fernandez-080215-Arauco]: A producer of molding is considered to be a fabricator by cutting molding from MDF manufactured by an MDF manufacturer. Conceivably, a company could be both a manufacturer of MDF and a fabricator of molding. In either case, at a minimum the MDF used to make the molding must comply with the emission standards in 93120.2(a).

40) Comment [12.2-Fernandez-080215-Arauco]: "We think the ATCM is not clear enough in describing what a 'Laminated product' is. In the case of our MDF moldings, we use a Jesso coating as a primer for all of them. Should we consider our MDF moldings to be a 'Laminated product' since the primer can be considered to be affixed to our product?"

Agency Response [12.2-Fernandez-080215-Arauco]: We disagree. We feel the ATCM is clear in defining both a "laminate" and a "laminated product." It is our understanding that Jesso is applied as a coating (more like paint) and is not a distinct veneer or other material that is "affixed" to the MDF substrate. As such, manufactures of MDF coated with Jesso would not be considered fabricators of a laminated product.

41) Comment [12.3-Fernandez-080215-Arauco]: "We think that for a fabricator that manufactures composite wood products exclusively to produce laminated products, there is no certainty on whether being required to comply or not with section 93120.3."

Agency Response [12.3-Fernandez-080215-Arauco]: If a fabricator is also a manufacturer of the composite wood substrate, then the fabricator would also be considered a manufacturer and would be required to comply with section 93120.3.

42) Comment [12.4-Fernandez-080215-Arauco]: "For foreign fabricators that manufacture composite wood products used to produce finished goods, we think that it is unnecessary to require these CWP to comply with the ATCM standards. Instead, we think that the standard should apply to the final goods being introduced into California. Formaldehyde emissions are reduced from the time the composite wood products are produced until they are finally transformed into finished goods and shipped . . . Samples are taken before packaging and after the primer is applied, to have a closer estimation of what the final customer will be perceiving. At this stage is where we think the tests should be done, since formaldehyde emissions are known to be reduced in time."

Agency Response [12.4-Fernandez-080215-Arauco]: We disagree. Section 93120.12, Appendix 2, subsection (g) states that "each manufacturing plant shall conduct small scale quality control tests for each product type and production line to ascertain that its certified panels do not exceed the applicable emission standard." Manufacturers of composite wood products are required to comply with the applicable sections of the ATCM. We understand that a significant amount of time may elapse between the production of a composite wood product and its arrival for sale in California. However, off-gassing of product is no guarantee that it will comply with the Phase 1 or Phase 2 standards once it arrives in California. Data show that off-gassing can occur over several months or years. Additionally, the fundamental approach to the regulation is to reduce surface emissions by eliminating the source.

43) Comment [13.1-Morgan-080215-IWPA]: "U.S. importers have no concerns about the ability of overseas manufacturers to meet the ATCM formaldehyde emissions levels. However, none of the other formaldehyde emissions standards in the world have the same certification requirement." "The ATCM places significant new requirements on producers around the world." "Our major concern to IWPA members is the unnecessary, burdensome, costly, and inefficient requirement of third-party testing and certification." "Requiring large-scale and small-scale chamber testing and third-party auditing in all countries supplying hardwood plywood to the U.S. places a significant non-tariff barrier against trade with those countries and raises possible WTO violations." "It is highly unlikely that developing countries that do not have the same economy of scale of larger countries (e.g., China) will still be able to compete and supply these high-quality products to the U.S. market." "The ATCM can be just as effective as a performance-based standard only." "Product can meet the standard, but if

certain chain-of-custody documentation is not met showing third-party testing, then enforcement would still occur. This is specifically why IWPA feels the third-party certification requirement adds cost but not gain for California taxpayers." "If the third-party testing requirement cannot be eliminated, IWPA strongly urges ARB to consider other testing methods." "ARB's standard . . . requiring developing countries to construct large-scale or small-scale chamber tests . . . (which) do not currently exist in all the countries that export to the U.S., requiring significant investment and potentially creating a WTO non-tariff barrier to trade."

Agency Response [13.1-Morgan-080215-IWPA]: This ATCM is designed to address a serious public health concern. We believe that third party certification is essential to ensure that complying composite wood products are sold and used in California. It is therefore not appropriate to eliminate or weaken this requirement. However, the ATCM does allow alternate test methods to be used if approved by the Executive Officer. This should provide flexibility for many manufacturers.

The commenter suggests that the ATCM may violate World Trade Organization (WTO) agreements because it "places a significant non-tariff barrier against trade." We do not agree that the ATCM violates any WTO rules. The ATCM does not discriminate against entities in other countries because all affected parties -- both domestic and foreign -- are subject to the same requirements. While we do not believe that the ATCM constitutes a trade restriction, the WTO recognizes that member nations may adopt their own environmental regulations to protect public health *even if* such regulations restrict trade. Article XX of the General Agreement on Tariffs and Trade (GATT) outlines the general exceptions to WTO rules -- the conditions under which trade restrictions are exempt from legal challenge. Under this Article, WTO members may adopt trade-restrictive measures for a variety of specified reasons, including measures:

> i) necessary to protect human, animal or plant life or health; [and]
>
> ii) relating to the conservation of exhaustible natural resources, if such measures are made in conjunction with restrictions on domestic production and consumption.

Environmental regulations imposed under Article XX must not be "arbitrary or unjustifiable discrimination between countries where the same conditions apply" or "a disguised restriction on international trade." These qualifiers are designed to prevent a nation from imposing environmental regulations that are simply disguised protectionism.

We believe that the ATCM meets these criteria and is a valid regulation under WTO rules. The ATCM has been adopted to protect public health, is based on sound science, and is not a disguised trade restriction. It is worth pointing out that many other WTO member nations (e.g., Japan and European Union countries) have also adopted their own regulations to limit formaldehyde emissions from composite wood products. Since other WTO members have adopted such regulations in recognition of the health problem posed by formaldehyde emissions, it is difficult to argue that a similar regulation adopted in California is an illegal trade barrier under WTO rules.

44) Comment [13.2-Morgan-080215-IWPA]: "ARB staff knows that they are behind in the implementation schedule and recognize the importance of overseas outreach, including translating the standard. However, more than 20 countries supply product to the U.S., and only the ARB Fact Sheets have been translated (not the ATCM) and those Fact Sheets have been translated into only three languages. IWPA strongly urges ARB to delay implementation until twelve months after ARB approves a third-party certifier." "Has ARB officially contacted each country through its embassy and related trade associations to inform them of new requirements? Has ARB determined the existing large-scale chamber capacity in each country? Has ARB developed a timeline for how long it will take to construct/certify acceptable facilities?" "Will the regulation also be translated into foreign languages? Has ARB begun educating composite wood fabricators, customers, and consumers in California about the regulation?" "An alternative for importers could be a moratorium on enforcement of the third-party certification requirement if the product is otherwise compliant. Therefore, product entering California with formaldehyde levels below the emissions levels but not certified would not be considered in violation of the regulation for the first year, through 2009. This would provide more time for third-party certifiers to come on line." "The effective date for Phase 1 is January 1, 2009. Can this target date still be justified given that the regulations are not finalized yet, that no overseas auditors are approved, and that we have no clear understanding for capacity that exists overseas to meeting the standard nor do we know if each country has been informed by ARB of the standard?"

Agency Response [13.2-Morgan-080215-IWPA]: ARB staff has already given presentations at two IWPA workshops and conferences, and held numerous meetings with member companies for over two years. We will continue our outreach efforts to affected groups, including third party certifiers to facilitate implementation. We believe there should be sufficient capacity for third party certification later this year in advance of the Phase 1 effective date.

45) Comment [13.3-Morgan-080215-IWPA]: "IWPA again requests . . . that ARB lengthens the 'sell-through' period in the ATCM to six months for importers and 12 months for distributors." "Importers need much more time than just a three-month sell-through period to move product."

Agency Response [13.3-Morgan-080215-IWPA]: We disagree. We discussed the length of the sell-through period for importers prior to our Board hearing in April 2007. At that time, the Board decided to provide the same sell-through period for manufacturers and importers of panels: three months. This was done to provide fairness to domestic producers and to accelerate the health benefit from imported composite wood products. The sell-through period for distributors of panels is not subject to comment because it was not modified prior to our Board hearing. Hence, it must remain five months.

46) Comment [13.4-Morgan-080215-IWPA]: "The world measures formaldehyde concentration in water in milligrams (mg) and milliliters (ml)." "Has ARB analyzed the capacity of overseas producers to measure in ppm?" "Is ARB prepared to develop a correlation value for use by world producers? IWPA requests that ARB allow for a measure of formaldehyde concentration in water in milligrams per liter and urges that a specified standard be included in the regulation."

Agency Response [13.4-Morgan-080215-IWPA]: If overseas producers and third party certifiers follow ASTM methods for routine quality control testing and quarterly testing, the results of testing will be in parts per million (ppm), so this should not be an issue. However, section 93120.12, Appendix 2, subsection (g)(1)(C) would allow an overseas producer to be approved by the Executive Officer to use an alternate test method which could measure concentrations in mg or ml. In that case, the third party certifiers will need to work with overseas producers to develop such correlations so the results may be reported to the certifier in ppm for comparison to the emission standards.

47) Comment [13.5-Morgan-080215-IWPA]: "There is a requirement that the bundle or panel must be labeled with the 'Manufacturer name.' IWPA suggests that the regulation be amended so that a code for the manufacturer's name may be used. That code would be maintained by the third-party certifier and the importer."

Agency Response [13.5-Morgan-080215-IWPA]: For the chain of custody system to work for enforcement of the ATCM, the manufacturer must be identified on each panel or bundle of panels. See also the Agency Response to comment # 76 in section C of the FSOR.

48) Comment [14.1-Julia-080215-CPA]: “CPA respectfully requests that the sell-through period for distributors, importers and fabricators of finished goods be established at twelve months rather than the eighteen months.”

Agency Response [14.1-Julia-080215-CPA]: Prior to the Board hearing in April 2007, we were asked to extend the sell-through of finished goods from twelve months to eighteen months. We made that change in the modified regulation that was presented to the Board in light of inventory turnover concerns by fabricators and we see no reason to reduce the period back to twelve months.

49) Comment [14.2-Julia-080215-CPA]: “Accreditation of Third Party certification agencies, may not occur until at least April 22nd.” “ULEF manufacturers need to work with an approved third party agency to collect six months of quality data and conduct two ‘quarterly’ compliance tests, presumably three months apart.” “CPA has three suggestions that could resolve this potential bottleneck. First, grant ‘provisional’ ULEF approval . . . prior to December 31, 2008. Second, shorten the quality control test requirement period to 3 months, matching the requirement for No Added Formaldehyde (NAF) products. Third, require that the full data set of information be submitted for final evaluation and approval within a year of receiving provisional approval. If these suggestions are accepted, similar treatment should also be given to NAF applicants.” “A secondary issue relating to both ULEF and NAF product manufacturers preparing an application for approval regards the frequency of testing . . . Testing frequency for ULEF/NAF products is not set forth in Appendix 2.” “CPA believes that excessive sampling is unnecessary to prove that emissions from these products are very low. We believe quality control testing frequency should be no more often than once per week per production line or once with every new lot of purchased adhesive, whichever is less frequent, as long as at least 6-10 data points are developed.”

Agency Response [14.2-Julia-080215-CPA]: We appreciate the suggestions, but do not believe that granting “provisional” approvals is appropriate. The requirement for quality control data is longer for ULEF (six months) than no-added formaldehyde based resins (three months) because while these are ultra-low emitting resins, the resins still contain formaldehyde. See also the Agency Response to comment # 28 in section D of the FSOR.

It is important to collect adequate data for such resins. Frequency of testing is the same for all manufacturers. The frequency only changes if a manufacturer using ULEF resins is allowed to test less frequently, or a manufacturer using a no-added formaldehyde based resin or ULEF resin is granted exemption from third party certification and routine QC testing. Manufacturers may at their own risk work with reputable potential

candidate third party certifiers prior to ARB approval. If ARB approves the third party certifier, then all data generated by the approved certifier will be acceptable.

50) Comment [14.3-Julia-080215-CPA]: "CARB has . . . inserted . . . provisions for laminated products." "Although we believe that the concept is sound . . . there are four potential problems in the way in which the change has been implemented in Section 93120.7." "The definition of fabricator in Section 93120.1(12) already includes 'producers of laminated products.' The reference to both in the new section (93120.7(a)(2)) is superfluous and potentially confusing." "If lamination is being conducted by the same company that produced the platform, the literal language in Section 93120.7(a) would make the underlying production of the substrate exempt from third party certification. This is a huge loop hole." "Even if one were to favor the exemption from third party certification, the language as drafted is overly broad." "It should be clarified that Subsection 2 does not apply in situations in which the fabricator also manufactures the substrate."

Agency Response [14.3-Julia-080215-CPA]: We believe the definition of a fabricator is clear and that section 93120.7(a)(4) clarifies any possible confusion raised by the wording in section 93120.7(a)(2). Fabricators that manufacture composite wood products for use as a platform must comply with the manufacturer requirements in section 93120.3, except the product labeling requirements. Fabricators that apply a laminate to a platform to make a laminated product do not need to comply with third party certification requirements in section 93120.3(b) for those laminated products.

51) Comment [14.4-Julia-080215-CPA]: The modified regulation states in the definition of "finished goods" that "component parts are not 'finished goods.' " "A potential problem could arise in the situation in which panels are sent to a separate facility for the production of furniture or cabinet components. As a result of the proposed change, such a facility would neither be a manufacturer of composite wood products . . . nor a fabricator of finished goods." "We suggest that this sentence be eliminated."

Agency Response [14.4-Julia-080215-CPA]: We disagree. The regulatory language is clear. The language regarding component parts not being finished goods was added so that intermediate component parts do not need to be labeled, as required for finished goods.

52) Comment [14.5-Julia-080215-CPA]: "There are at least two areas that require immediate attention if there is to be smooth implementation of the rule: accreditation of third party certification programs and the completion of an enforcement testing protocol for rule compliance." "It is therefore

critical to the affected industries that the accreditation of third party certification programs and the completion of an enforcement testing protocol for rule compliance be finalized no later than the end of the second quarter of 2008."

Agency Response [14.5-Julia-080215-CPA]: We are continuing to work with potential third party certifiers to be able to start reviewing their applications to be approved by ARB as soon as possible after the ATCM is codified in the California Code of Regulations. Our Enforcement and Monitoring & Laboratory Divisions continue to prepare for completing an enforcement testing protocol this year. Table VI-7 on page 127 of the ISOR includes an implementation schedule to address this concern. At this time, we are on track to achieve the schedule.

53) Comment [14.6-Julia-080215-CPA]: Regarding section 93120.12, Appendix 2, (f)((3)(A), "CPA submits that there is an unnecessarily large number of chamber tests required in the ATCM." "The daily quality control tests collected every eight to twelve hours will verify that the plant is in control; it should not be necessary to collect more than one quarterly test (randomly sampled) from each plant."

Agency Response [14.6-Julia-080215-CPA]: We believe that it is essential to verify a plant's operations for each product type, rather than just each plant.

54) Comment [14.7-Julia-080215-CPA]: For clarification: "Section 93120.9(a)(2)(A). The second sentence should read: 'In addition, when testing panels the secondary method shall be operated by testing nine specimens representing evenly distributed portions of an entire panel ***or set of panels selected for verification***.' "

Agency Response [14.7-Julia-080215-CPA]: We believe that this is clear as written and that no additional clarification is needed.

55) Comment [14.8-Julia-080215-CPA]: For clarification: "Section 93120.9(a)(2)(B)(2). The first sentence should read: 'For the secondary method, each comparison sample shall consist of testing nine specimens representing evenly distributed portions of an entire panel ***or set of panels selected for verification***.' "

Agency Response [14.8-Julia-080215-CPA]: We believe that this is clear and that no additional clarification is needed.

56) Comment [14.9-Julia-080215-CPA]: For clarification: "Appendix 2(a). The note at the end of the second paragraph should read: 'Note: All panels

must be tested in an unfinished condition, prior to application of a ***laminate, finish*** or topcoat.' "

Agency Response [14.9-Julia-080215-CPA]: The note reads: "prior to application of a finishing or topcoat." In the case of HWPW, a veneer or laminate would have already been applied before it would be considered a panel. We see no need for clarification.

57) Comment [15.1-Wald-080215-RVIA]: "Until very recent drafts of the ATCM, wood products used to fabricate RVs were exempt from the regulation." "The RV industry uses a great deal of very thin and lightweight but durable luan and meranti product that can only be produced from trees that grow in Asia and therefore must be imported from Asia." "Because RVs as a fabricated product are being added to the ATCM so close to the implementation date of the standard, because the RV industry is so dependent on thin Asian wood products and because of the longer sales-cycle of the RV industry especially in today's difficult economic environment, the effective date of the ATCM should be: 1) Delayed for one year or 2) The RV industry should be exempt from the first phase of the implementation and come under the regulation fully compliant at the Phase 2 standards and timetable."

Agency Response [15.1-Wald-080215-RVIA]: We believe that with the sell-through provisions for fabricators, which apply to manufacturers of recreational vehicles, there will be no need for additional time and see no need to delay the implementation date for the RV industry.

58) Comment [15.2-Wald-080215-RVIA]: "The luan and meranti wood is currently certified to meet JIS and/or European E-1 standards . . . CARB should simply accept these equivalent or better standards and certifications rather than insisting all wood products meet the expensive CARB third-party certification requirements." "CARB's recognition and acceptance of equivalent or better international standards such as JIS A1460 without additional third-party testing will allow an efficiency of manufacture, testing and certification for Asian luan and meranti producers that will significantly reduce the RV industry's concerns about adequate supply of compliant wood products used in the RV fabrication process under the ATCM."

Agency Response [15.2-Wald-080215-RVIA]: The enforcement and certification requirements for international formaldehyde standards are less stringent and different from those required in the ATCM. Accepting those standards could weaken the benefits of the ATCM and lead to sale of non-complying wood in California. See also the Agency Response to comment # 25 in section D of the FSOR.

59) Comment [15.3-Wald-080215-RVIA]: "When final stage fabricators such as RV manufacturers in good faith purchase and use wood products that meet the CARB standard and have the required chain of evidence of ATCM compliance, the ATCM should explicitly state that the fabricator is not subject to enforcement should the wood product not live up to the CARB standard for emissions." "While a November 2, 2007, draft of a letter from CARB to fabricators describes minimum record-keeping requirements as guidance for compliance, this type of clear guidance for fabricators is absent in the ATCM itself and should be incorporated."

Agency Response [15.3-Wald-080215-RVIA]: We disagree. Each instance in which non-complying wood products are found will prompt a case-by-case investigation by our enforcement staff. The result of the investigation will determine which entity or entities in the chain of commerce from manufacturer to retailer warrant enforcement action.

60) Comment [15.4-Wald-080215-RVIA]: "Some RV fabricators may choose to fabricate products that do not comply with the CARB standard but not sell or offer for sale those products in California. CARB should explicitly state that the final stage fabricator is not subject to enforcement should an RV dealer or other individual offer such a non-complying product for sale in California without the knowledge of the final stage fabricator."

Agency Response [15.4-Wald-080215-RVIA]: We disagree. Each instance in which non-complying wood products are found will prompt an enforcement investigation to determine which entity or entities receive enforcement action. If a retailer is found to be knowingly selling non-complying products without the knowledge of the fabricator, and the fabricator had not labeled the products as being complying for sale in California, such a retailer will likely be held directly responsible for violations of the emission standards.

61) Comment [16.1-Harmon-080215-Hexion]: In section 93120.1(a)(19), "hardwood plywood," "the inclusion of 'lumber core, special core material and special back material' in this definition exceeds the scope of composite wood products. Further, the formaldehyde emission characteristics of 'lumber core, special core material and special back material' are not adequately addressed in limitations expressed elsewhere in the regulation."

Agency Response [16.1-Harmon-080215-Hexion]: We included those materials in the definition of "hardwood plywood" to improve the completeness of the definition, in response to comments by stakeholders. We see no need to refer to these materials with regard to limitations elsewhere in the ATCM.

62) Comment [16.2-Harmon-080215-Hexion]: Regarding section 93120.1(a)(34), “platform,” “as this ATCM provides emissions limitations only for particleboard, medium density fiberboard and hardboard plywood, it is inappropriate to include lumber core or special core materials in this definition – as there are no guidelines regarding emissions for these exotic combinations. Additionally, no guidance is given in the primary or secondary testing methods to cover these materials.”

Agency Response [16.2-Harmon-080215-Hexion]: Those materials are included in the definition for the completeness of the definition. See also the Agency Response to comment # 61 in section D of the FSOR.

63) Comment [16.3-Harmon-080215-Hexion]: Regarding section 93120.1(a)(36), “plywood,” “for clarity, plywood has been historically made from veneers. Previous definitions have covered the use of particleboard, MDF and other materials (§ 93120.1(a)(4 & 6) in platforms, and it is recommended that reference to adhesively-bonded components other than veneer be eliminated from this definition.”

Agency Response [16.3-Harmon-080215-Hexion]: We believe the definition is sufficiently clear, complete, and appropriate. No change is necessary to the definition.

64) Comment [16.4-Harmon-080215-Hexion]: Regarding section 93120.1(a)(37), “product type,” “it is recommended that this definition be expanded to clarify at this point that the option exists to group individual products by major characteristics. Such regrouping into classes is most commonly based on identifying those products that have similar emission characteristics, based on both QC testing and TPC testing results.” “This is an issue and practice with which the US manufacturers and US TPC agencies are generally accustomed and comfortable. It is reasonable that this be clarified for others.”

Agency Response [16.4-Harmon-080215-Hexion]: We believe this is clear in the testing requirements described in section 93120.12, Appendix 2.

65) Comment [16.5-Harmon-080215-Hexion]: Regarding section 93120.1(a)(43), “third party certifier,” “it is recommended to add to this definition: ‘. . . and operates, and/or contracts testing with, a laboratory that is accredited by a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC, 2000).”

Agency Response [16.5-Harmon-080215-Hexion]: We believe that this is sufficiently clear in the requirements for third party certifiers specified in section 93120.12, Appendix 3.

66) Comment [16.6-Harmon-080215-Hexion]: Regarding section 93120.1(a)(44), “ULEF resins,” “this definition is too restricted to adequately address component influence factors.” “Therefore, it is recommended to modify this definition to include resin system components. This would include base resins, formaldehyde scavenger resins, formaldehyde scavenger additives, catalyst systems and other additives that will (or may) affect overall composite wood product manufacturing processes and/or resulting emission characteristics.”

Agency Response [16.6-Harmon-080215-Hexion]: We believe the current definition is adequate. All of the additional information the commenter is suggesting to include is already required under the criteria for applications in section 93120.3(d)(1).

67) Comment [16.7-Harmon-080215-Hexion]: “It is recommended to add a definition for an ARB-approved and accredited testing laboratory (TPC or contracted).”

Agency Response [16.7-Harmon-080215-Hexion]: ARB will approve third party certifiers, as described in section 93120.4. ARB will not approve testing laboratories. ARB-approved third party certifiers must use accredited laboratories as described in section 93120.12, Appendix 3.

68) Comment [16.8-Harmon-080215-Hexion]: Regarding the footnote to Table 1 in section 93120.2(a), “it is recommended to modify this footnote to read as follows: ‘Based on the primary test method [ASTM E1333-96 (2002)] or equivalent value from the approved secondary test method [e.g. ASTM D6007-02] in parts per million (ppm). . . .’ This would provide clarity and be in conformity with other portions of this regulation.”

Agency Response [16.8-Harmon-080215-Hexion]: The emission standards are related to the concentrations based on the primary test method (the large chamber method). Reference to the secondary method is an option for determination of compliance with the emission standards.

69) Comment [16.9-Harmon-080215-Hexion]: Regarding section 93120.3(d)(7), “it is recommended that already certified mills be allowed the flexibility to perform trials that may involve modifications to their resins, additive systems and/or manufacturing processes. It is recommended that flexibility to accommodate mill trials be incorporated into this section. Product manufactured during those trials would have to be isolated and QC testing performed. If testing results indicate that the emissions from the trial product meet requirements, the material may be certified and sold as such. Obviously, product that does not meet emission requirements cannot be certified.” “Examples of conditions that might require trialing include (but are not limited to) resin modifications to meet seasonal

processing changes, evaluation of a different formulation (same or different supplier), evaluation of a newer (or different) technology resin or scavenger product, influence of other additives on emissions (such as fire-retardant, mold/mildew-resistant additive, termiticide, etc.)."

Agency Response [16.9-Harmon-080215-Hexion]: We believe that trials may be conducted under the current language of the regulation since all composite wood products still need to comply with the applicable emission standards. The intent of section 93120.3(d)(7) applies to a manufacturer that changes to a non-ULEF resin.

70) Comment [16.10-Harmon-080215-Hexion]: Regarding section 93120.3(e)(4), the text states that the ARB assigned number of the approved third party certifier shall be included on the product label, except for "manufacturers using no-added formaldehyde based resins that have obtained ARB approval . . . or products manufactured using ULEF resins as provided in section 93120.3(d)(2)." The commenter states that "this requirement should apply to all, as their verifying data originates under an approved TPC."

Agency Response [16.10-Harmon-080215-Hexion]: The requirement to label products with the number of the ARB-approved third party certifier applies when a manufacturer is undergoing the approval process to use a candidate no-added formaldehyde based resins or for manufacturers using ULEF resins that are applying for an exemption from third party certification for their product types. Once approved, we see no need to require inclusion of the third party certifier's number when such a manufacturer is only working with the certifier for verification data every two years.

71) Comment [16.11-Harmon-080215-Hexion]: Regarding section 93120.3(f), the text states that the manufacturer must include on the bill of lading or invoice the ARB assigned number of the approved third party certifier, "if applicable." The commenter states that "the assigned number . . . should apply to all, as their verifying data originates under an approved TPC."

Agency Response [16.11-Harmon-080215-Hexion]: See the Agency Response to comment # 70 in section D of the FSOR.

72) Comment [16.12-Harmon-080215-Hexion]: Regarding section 93120.3(g)(2)(E), the text states that manufacturers must maintain records, including the name of the ARB approved third party certifier, but that the subsection does not apply to products manufactured with no-added formaldehyde based resins or ULEF resins as specified in section 93120.3(d)(2). The commenter states that "the assigned number of the

approved third party certifier . . . should apply to all, as their verifying data originates under an approved TPC."

Agency Response [16.12-Harmon-080215-Hexion]: Recordkeeping is part of the chain of custody system. Manufacturers need to keep records including the name of the approved certifier. Similarly, certifiers will maintain a list of all manufacturers they certify and will provide that list to ARB on an annual basis. ARB will be aware of manufacturers that use no-added formaldehyde based resins or ULEF resins, because ARB will be approving of those manufacturers' uses of those resins. Therefore, we see no need to further track them or have them keep records of the name of the certifier that they use for their verification data, especially since section 93120.3(g)(1) requires manufacturers to keep documentation to demonstrate approval to use no-added formaldehyde based resins or ULEF resins.

73) Comment [16.13-Harmon-080215-Hexion]: Section 93120.3(g)(2)(F) requires manufacturers using no-added formaldehyde based resins and ULEF resins to maintain records. The commenter states that "there are a number of issues with this subsection requirement description and of several of its specific elements . . ." "It is suggested that the manufacturer be allowed to combine the information under product types, as agreed upon with his respective third party certifier during the performance demonstration data collection period." "At issue is the ability to track use to the individual product level. This is not practical at the mill level." "Individual approved resins used at all points in the manufacturing process is difficult to tie in." "Contact information requirements need to be better defined, considering the shifting economy and fluid nature of the business workforce." "Changes in press time by more than 20 percent record requirements are particularly challenging." "Many mills record elapsed clock time for a press cycle (thin is less and thick is greater) – while other mills record press time in seconds per millimeter of board thickness. The latter method of expressing press cycle would be more amendable for meeting the 20% requirement."

Agency Response [16.13-Harmon-080215-Hexion]: We believe that it is important that such manufacturers use a practical approach to recordkeeping to be able to track production of product types at their plants. The requirement for contact information does not need to be prescriptive, just sufficient to allow tracking to resin manufacturers and suppliers. Recordkeeping with regard to press time can be expressed either as elapsed time or press time per millimeter, so long as that can be related to a percentage change compared to previous press times.

74) Comment [16.14-Harmon-080215-Hexion]: In section 93120.9, the commenter requests that we "clarify that all compliance testing and

performance demonstration testing for NAFs and ULEFs must be done by an ARB-approved TPC using accredited laboratories. Also clarify that mill QC testing does not have to be done by a TPC or an accredited laboratory."

Agency Response [16.14-Harmon-080215-Hexion]: We believe that this is already sufficiently clear as specified in sections 93120.3(c)(1) and (d)(1).

75) Comment [16.15-Harmon-080215-Hexion]: "Large scale chambers (E1333) must be accurately compared to the one used by CARB, as this is the gold standard for both compliance and enforcement testing."

Agency Response [16.15-Harmon-080215-Hexion]: Interlaboratory comparison testing is already required in section 93120.12, Appendix 3. The ARB laboratory will participate in the initial interlaboratory comparison.

76) Comment [16.16-Harmon-080215-Hexion]: "The provisions in 93120.9 for equivalency are potentially appropriate for demonstrating equivalence among large chambers. Use a "C" constant of 0.026 for all emissions measurement ranges. This is absolutely critical to establishing performance capability among those using large chambers."

Agency Response [16.16-Harmon-080215-Hexion]: We are relying on the interlaboratory comparisons, required in section 93120.12, Appendix 3, to establish performance capability, rather than an equivalence demonstration among large chambers. We believe the interlaboratory comparison will provide sufficient evaluation of the performance of large chambers.

77) Comment [16.17-Harmon-080215-Hexion]: "It is recommended to establish a round robin testing of the large chambers using five or six sets during 2008 (or the first year that the TPC lab participates), and following up with two or three sets every year or two thereafter."

Agency Response [16.17-Harmon-080215-Hexion]: Thank you for the suggestion. The ATCM requires that all laboratories operating primary and secondary test methods participate in interlaboratory comparison testing (also referred to as round robin testing) during the first year the laboratory is used by a third party certifier and every two years thereafter. As ARB will participate in the initial interlaboratory comparison, we will work out the specific testing details at a later date.

78) Comment [16.18-Harmon-080215-Hexion]: "Do not need to require a different equivalence demonstration for different product types."

Agency Response [16.18-Harmon-080215-Hexion]: The ATCM does not require a different equivalence demonstration for different product types. Equivalence is required to be demonstrated for emission levels to represent the range in emissions based on the emission standards for composite wood products that a certifier is approved to verify.

79) Comment [16.19-Harmon-080215-Hexion]: "Once equivalence has been demonstrated it is reasonable to demonstrate continued performance on a reduced number of samples per year."

Agency Response [16.19-Harmon-080215-Hexion]: We disagree. Annual equivalence must be demonstrated in the same manner as the initial demonstration. Given that certification could be based on a secondary method, then ARB should appropriately require a high degree of demonstration in lieu of the use of the primary method.

80) Comment [16.20-Harmon-080215-Hexion]: "Small chamber tests do not have to be run in multiple sets to develop a good correlation against a large chamber." "It may not be practical to require a fixed number of samples in two or three different ranges shown."

Agency Response [16.20-Harmon-080215-Hexion]: We believe that the framework we included in the ATCM for the operation of the small chamber as a secondary test method is statistically valid and reducing the number of samples would decrease the validity of the secondary method. The secondary test method is an option that was added to the regulation to facilitate compliance. It is voluntary and third party certification can always be performed using the primary test method (ATSM E 1333-96 (2002)).

81) Comment [16.21-Harmon-080215-Hexion]: "Many of the small scale chambers are operated at or near one air change per hour. Given the chamber volume range requirement (0.02 to 1 m^3) and reviewing the requirements relating air change rates to total exposed specimen surface area per product, it is not highly practical to require three samples per test set. Therefore, it is recommended to edit the above to '. . . In addition, the secondary method will be operated by testing up to three specimen sets. Single or multiple sets shall consist of up to three samples, representing evenly spaced portions of an entire panel. The specimen set(s) shall be tested and averaged (for multiple sample sets) to represent one data point as the panel emission result for comparison with a quality control test result from the same batch of panels tested by a manufacturer. Additionally, the same sample set distribution (and grouping) shall be used in 93120.9(a)(2)(B)2. below.' This modification will thus allow use of both conventional and high air change rate small scale chambers such as the DMC."

Agency Response [16.21-Harmon-080215-Hexion]: The current requirements for testing are appropriate. See the Agency Response to comment # 80 in section D of the FSOR.

82) Comment [16.22-Harmon-080215-Hexion]: In section 93120.9(a)(2)(B) regarding demonstrating equivalence between the secondary method and the primary method, the commenter recommends clarifying the text by adding the following: "Performance equivalence between the secondary method and the primary method must be established and/or updated for each testing laboratory operated or contracted by the third party certifier at a minimum frequency of annually. This will require testing of the small versus large chambers using ten sets during 2008 (or the first year that the TPC lab participates), and following up with five sets every following year. The following parameters must be met in the comparison:"

"For the secondary method, each comparison sample will consist of testing up to three specimen sets. Single or multiple sets shall consist of up to three samples, representing evenly spaced portions of an entire panel. The specimen set(s) shall be tested and averaged (for multiple sample sets) to represent one data point as the panel emission result, and matched to their respective primary method comparison sample result."

Agency Response [16.22-Harmon-080215-Hexion]: We believe that the framework we included in the ATCM for establishing equivalence of the secondary test method is appropriate, statistically valid, and reducing the number of samples would decrease the validity of the secondary method. See also the Agency Response to comment # 80 in section D of the FSOR.

83) Comment [16.23-Harmon-080215-Hexion]: Regarding section 93120.12, Appendix 2, section (a), "Purpose," the commenter states that "it would be appropriate to clarify that manufacturers using no-added formaldehyde based resins and ULEF resins will need to follow these requirements as they develop their performance demonstration data, and until an exemption is granted by the Executive Officer. On granting of an exemption, these provisions are also exempted."

Agency Response [16.23-Harmon-080215-Hexion]: We believe that this is clear in sections 93120.3(c)(1) and (d)(1).

84) Comment [16.24-Harmon-080215-Hexion]: Regarding section 93120.12, Appendix 2, section (b), "Responsibility for Product Performance," the commenter states that "this responsibility exists outside the scope of just this appendix. It would be more appropriate to state this in the main body of the regulation."

Agency Response [16.24-Harmon-080215-Hexion]: This requirement is already stated in section 93120.3(b) of the main body of the ATCM. It is simply reiterated in section 93120.12, Appendix 2, to emphasize the point.

85) Comment [16.25-Harmon-080215-Hexion]: Regarding section 93120.12, Appendix 2, section (f)(2), "Correlation of Primary or Secondary Method and Small Scale Test Values," the commenter asks "is it feasible to allow the use of existing correlations between the mill and their TPC, as long as the TPC becomes ARB-approved? I believe that existing TPCs are already using E1333 large chambers and have established correlations for each of their customer mills. This would allow the mills and TPCs that do not currently have correlations established the priority access of testing facilities, and help assure that compliance timelines are met by the largest possible number of composite panel manufacturers."

Agency Response [16.25-Harmon-080215-Hexion]: This is acceptable now under the ATCM. Therefore, no changes are needed.

86) Comment [16.26-Harmon-080215-Hexion]: Regarding section 93120.12, Appendix 2, section (f)(3)(A)2, quarterly chamber tests are required for hardwood plywood product determined by the third party certifier "*after review of routine quality control data, to have the highest potential to emit formaldehyde.*" The commenter states that "records review and evaluation is covered under the duties of the third party certifier in Appendix 3. It is recommended to eliminate the italicized portion of this section reference."

Agency Response [16.26-Harmon-080215-Hexion]: We believe it is appropriate to include this in the requirements for manufacturers in section 93120.12, Appendix 2, so that it is clear that manufacturers will need to work with certifiers to determine which product has the highest potential to emit formaldehyde for the purpose of sample selection for testing.

87) Comment [16.27-Harmon-080215-Hexion]: Regarding section 93120.12, Appendix 2, subsection (g)(4)(A), basic testing frequency for PB and MDF, the commenter notes that this subsection states manufacturers that use ULEF resins and have received ARB approval must conduct routine quality control tests "at least weekly." The commenter states that "this is addressed in a following section covering reduced testing frequency for PB and MDF. It is also inconsistent with that section, i.e. once per week versus once per 48 hours. Recommend that the above . . . be moved to the appropriate subsection, and reconciled with regard to frequency."

Agency Response [16.27-Harmon-080215-Hexion]: See the Agency Response to comment # 30 in section D of the FSOR.

88) Comment [17.1-Rabe-080215-Masonite]: “Masonite proposes the qualification period for the ‘Exempt ULEF’ status (6 months of QC testing) be made consistent with that required for ‘no added-formaldehyde’ status (3 months of QC tests).”

Agency Response [17.1-Rabe-080215-Masonite]: We disagree. See the Agency Response to comment # 28 in section D of the FSOR.

89) Comment [17.2-Rabe-080215-Masonite]: “Masonite plant personnel are concerned that testing one sample per shift . . . will be too burdensome on production if required to perform this many tests.” “Masonite proposes a reduction in QC test frequency from one per shift to one per day.” Similarly, “the test frequency for standard production for components that do not meet the ULEF standard should be reduced from once per shift to one per day.” “QC test frequency should be reduced for products that attain the ULEF, but not ‘exempt ULEF,’ designation to once per week, rather than once every 48 hours.”

Agency Response [17.2-Rabe-080215-Masonite]: We believe it is crucial that adequate testing frequency is in place to determine whether shift to shift variability in emissions exists, which may result from changes in factors such as operating parameters or resin formulation. That said, the ATCM does provide flexibility with this requirement. Section 93120.12, Appendix 2, subsection (g)(4)(B) allows for a reduction in testing frequency to no less than one test per 48 hour production period once the plant or production line demonstrates consistent operations and formaldehyde emissions values. Per subsection (g)(4)(A), manufacturers of PB and MDF that use ULEF resins and are approved by ARB under section 93120.3(d) will be required to conduct routine QC tests at least weekly.

90) Comment [17.3-Rabe-080215-Masonite]: “Exterior doors can be made with laminated veneer lumber stiles and rails made with hardwood or softwood and capped with finger jointed softwood. Masonite proposes this type of material does not fall under the definition of HWPW and is exempt from the regulations.”

Agency Response [17.3-Rabe-080215-Masonite]: We agree. Such material would not be considered HWPW and would be exempt from the ATCM. In addition, other exterior doors would be exempt as long as the door meets the requirements of section 93120.7(b)(2).

91) Comment [17.4-Rabe-080215-Masonite]: “Masonite proposes that a 2-ply HWPW-CC panel have the same emissions level as thin MDF.”

Agency Response [17.4-Rabe-080215-Masonite]: We disagree. Those are two separate products. As pointed out in pages 42-44 of the ISOR, the manufacturing processes are substantially different for plywood versus MDF, and this would also be true of thin MDF. The Phase 1 emission standards were primarily developed in light of current product emission levels, manufacturing process technology, and resin systems. Our 2003 product survey found an emissions difference among PB, HWPW, and MDF, as discussed on pages 70-74 of the ISOR. This is due to many factors such as wood furnish type (i.e., veneers, particles, or fibers), resin systems, resin application rates, use of catalysts or scavengers, and process variability.

92) Comment [17.5-Rabe-080215-Masonite]: "CARB's definition of a 'window' includes jambs. The definition of a 'door' is not specific as to its components. The definition should be revised to include framing members for pre-hung doors."

Agency Response [17.5-Rabe-080215-Masonite]: We disagree. The definition is sufficiently clear. In developing the door definition, we consulted with window and door industry representatives. We do not agree that we should include "framing members for pre-hung doors" because part of the basis for the door exemption is de minimus use of composite wood products in an exterior door.

93) Comment [17.6-Rabe-080215-Masonite]: Section 93120.7(b)(2) provides an exemption for "exterior doors." The commenter paraphrases this exemption with regard to "if the doors are made for exterior use" and asks for a definition of "exterior use."

Agency Response [17.6-Rabe-080215-Masonite]: The commenter was looking at an old staff working draft of the regulations dated December 21, 2007. The modified regulation that was subject to the comment period was revised and no longer refers to "exterior use."

94) Comment [17.7-Rabe-080215-Masonite]: Section 93120.7(b)(2) provides an exemption for exterior doors if the doors "contain less than three percent by volume of HWPW, PB, or MDF." Masonite requests that "exterior doors be exempt if the HWPW, PB or MDF components make up 15% or less by volume of the finished door, if the component is sealed entirely inside the door or has only one exposed edge. The basis for this is that the smallest components of a door such as composite wood lock blocks are totally encased inside a door and rails which are only exposed on one edge can make up to 15% by volume of the door."

Agency Response [17.7-Rabe-080215-Masonite]: We disagree. The three percent by volume exemption criteria is intended to represent a

de minimus use level for an exterior door, which, because it is made for exterior use, will most likely be made with lower emitting phenol formaldehyde resins. The suggestion by the commenter would allow for an increase in the amount of composite wood products in exterior doors. We do not agree with the suggestion that encasing the composite wood products within the door will control emissions. Encasing the source of the emissions will only delay the formaldehyde emissions.

95) Comment [18-Macedo-080215-FCI]: "While FCI appreciates the refinements that ARB endeavors to achieve in the implementation of the rule, ARB has failed to address the deficiencies in the foundation for the rule itself." "CARB should carefully evaluate the proposal to reduce exposure to formaldehyde in light of the tenuous public health benefits represented by the estimated reduction in cancer cases in California."

Agency Response [18-Macedo-080215-FCI]: The foundation of the ATCM was discussed at the Board hearing in April 2007 and in responses to comments received prior to and at the Board hearing. The foundation of the ATCM was not a subject of the modifications that were out for the 15-day public review.

96) Comment [19.1-Miller-080215-BIFMA]: "BIFMA strongly supports the changes related to laminated products as produced by fabricators . . . BIFMA also strongly supports the exemption for curved plywood."

Agency Response [19.1-Miller-080215-BIFMA]: We appreciate the support – no response necessary.

97) Comment [19.2-Miller-080215-BIFMA]: "Another issue to come forward from one of our members concerned having enough time to meet the California requirements by the end of the year. If no mechanism is in place to find out if that is a widespread reality, we recommend a mid-summer review to determine if an extension is warranted."

Agency Response [19.2-Miller-080215-BIFMA]: We believe that there is enough time for BIFMA members to meet the California requirements by the end of the year. ARB staff found that the necessary resin technology is available to meet the formaldehyde emission standards. ARB staff believes there will be a sufficient number of third party certifiers for manufacturers to certify their products before the end of the year. At this time, staff believes that an extension is not warranted.

98) Comment [19.3-Miller-080215-BIFMA]: "Specific to the testing methods, in section 93120.9 (a)(2)(B), the requirement to demonstrate equivalence between the primary and secondary method every year appears excessive . . . it appears to be a wasteful exercise to repeat the extensive

equivalence determination testing every year. We respectfully suggest it is more efficient to define any changes, which would trigger more frequent determinations of equivalence, but otherwise default to a frequency of every three, four or even five years."

Agency Response [19.3-Miller-080215-BIFMA]: We disagree. While there is limited data to affirm the equivalence of the secondary method to the primary method, we feel that this demonstration must be done on an annual basis until we are certain that the secondary method is performing as expected. The secondary test method is an option that was added to the regulation to facilitate compliance. It is voluntary and third party certification can always be performed using the primary test method (ATSM E 1333-96(2002)). As the public health benefit of the ATCM depends on the sale and use of compliant composite wood products in California, we believe that it is important to have stringent test method requirements to ensure that the projected reductions in formaldehyde emissions are achieved and that the enforcement program has the utmost integrity.

99) Comment [19.4-Miller-080215-BIFMA]: "Similarly, mandating inter-laboratory comparisons be conducted every two years is extremely onerous and expensive, as required in Appendix 3 (b)(1)(F) . . . The requirement for inter-laboratory comparison studies would be much more appropriate if it was required every five years or anytime there was a significant change in the standard testing methods."

Agency Response [19.4-Miller-080215-BIFMA]: We disagree. See the Agency Response to comment # 98 in section D of the FSOR.

100) Comment [20.1-Bradway-080215-Mannington]: "On page 1-58 there is reference to (a) testing method and frequency for hardwood plywood which spells out a specified criteria based upon weekly sq(uare) feet of production. There should be a level of flexibility regarding reduced testing requirements if one can demonstrate statistical compliance at a reduced level of testing burden."

Agency Response [20.1-Bradway-080215-Mannington]: We appreciate the comment, but believe that a reduced level of testing for hardwood plywood cannot provide the level of certainty needed to ensure compliance with the Phase 1 and Phase 2 emission standards.

101) Comment [20.2-Bradway-080215-Mannington]: "A manufacturer should be able to submit a statistically sound sampling and testing scheme utilizing (an) approved methodology in order to demonstrate compliance . . . We would simply request the additional statement below the table under

paragraph ‘C’ on page 1-58: ‘Or sufficient sampling frequency utilizing (an) approved methodology in order to demonstrate compliance.’ ”

Agency Response [20.2-Bradway-080215-Mannington]: We appreciate the comment, but until there is enough data to demonstrate the sufficiency of the required testing scheme, there is no basis for evaluating the sufficiency of other compliance testing regimes. Therefore, we disagree with the suggestion.

102) Comment [20.3-Bradway-080215-Mannington]: “Since the testing methods call for a seven day conditioning time period, I assume even for field compliance verification testing, it would be mandated to follow the same protocol of sampling, appropriate conditioning then testing.”

Agency Response [20.3-Bradway-080215-Mannington]: Conditioning of samples will be done prior to testing. However, only the primary method calls for a seven day conditioning time period. Section 93120.9(a)(2)(A) stipulates that operation of the secondary method, which is the method ARB plans to use as an enforcement test method (sections 93120.9(c) and (d)), will use the conditioning time used to establish equivalence to the primary method.

103) Comment [20.4-Bradway-080215-Mannington]: “To us it would seem appropriate that compliance testing should be on a product or article as sold for point of use and tested in a manner consistent with recommended use (i.e., horizontal, finished side up). Reducing of that product to its component parts to test would render the product non-serviceable and would almost certainly reduce the accuracy and applicability of the test results.”

Agency Response [20.4-Bradway-080215-Mannington]: We disagree because it would require establishing emission standards for an inordinate number of finished products that are sold in the California market. We believe that if products are made with compliant composite wood products, this ensures that the desired reduction in formaldehyde emissions from composite wood product panels and finished goods that contain those materials will be achieved as the source of formaldehyde emissions will be reduced. To determine if compliant materials are being used to make finished goods, we must deconstruct the finished good and test its component parts. Table VI-7 on page 127 of the ISOR includes an implementation schedule. At this time, we are on track to achieve the schedule.

104) Comment [20.5-Bradway-080215-Mannington]: “We believe we should be able to start the exemption application in parallel to the generation of the

data collection process, with approval contingent upon satisfactory demonstration of the data."

Agency Response [20.5-Bradway-080215-Mannington]: We agree. Manufacturers may apply for an exemption while completing their collection of data. However, ARB will not issue an Executive Order until the data requirement is fulfilled and ARB reviews the data. In addition, manufacturers may at their risk work with reputable candidate third party certifiers prior to ARB approval of the certifiers. If ARB approves the certifier, then all data generated while working with the certifier will be acceptable.

105) Comment [21.1-Cleet-080215-ITI]: "Information Technology Institute Council (ITI) members often import products, parts, and components manufactured globally that are packaged in wooden crates or distributed using wood pallets. While ITI supports the goals of the ATCM to reduce formaldehyde emissions, we believe this approach will result in a premature disposition of packaging materials that had many more years of useful life, generating significant amounts of preventable wastes." "Pallets and packaging products do not pose the same risks or exposure pathways as fabricated products containing composite wood products." "In order to avoid the possibility of a noncompliant, reusable pallet or crate being shipped into California, we may be forced to discard the existing inventory and replace it with new packaging. This will result in a premature disposition of packaging materials that had many more years of useful life. In addition to generating waste it would increase shipping costs, as new crates and pallets would have to be purchased to replace the existing inventory." "We believe the most logical approach is to exempt these materials from the requirements to meet the applicable performance standard."

Agency Response [21.1-Cleet-080215-ITI]: We disagree. See the Agency Response to comment # 4 in section D of the FSOR.

106) Comment [21.2-Cleet-080215-ITI]: "ITI also believes that the certification process for home furnishings and furniture is overly burdensome and certification should focus on composite wood products installed as part of a building or structure."

Agency Response [21.2-Cleet-080215-ITI]: We disagree. Formaldehyde emissions need to be reduced from all sources to achieve the public health benefit that we are seeking. In the ATCM, fabricators of home furnishings and furniture are required to exercise reasonable prudent precaution in securing compliant materials from their suppliers. In addition, they must maintain records documenting their purchases of compliant materials and label their products as compliant with the Phase 1 or

Phase 2 standards. We do not believe the additional recordkeeping and labeling requirements are overly burdensome. We believe the requirement is necessary to track a noncompliant product back to the responsible party.

107) Comment [22.1-Howlett-080215-HPVA]: "We continue to object to the exemption that is provided for a 'Fabricator' who applies a face and back to a core (platform) because CARB has arbitrarily defined that product to be a laminated product." "CARB needs to provide simple, straightforward definitions of the products that are covered." "We offered a simple and straightforward recommendation to treat what is the same, identical product under a common and consistent definition but adjust the compliance regime for fabricators to insure that the rule's requirements are met but adjusting some of the compliance requirements. This is accomplished by the use of a 'prototype product' that would use the resins and adhesives that have the same potential to emit formaldehyde without sacrificing very expensive face veneers which some fabricators claimed would be destroyed permanently." " We urge CARB to maintain a single and consistent definition for hardwood plywood as contained in ANSI/HPVA-HP-1 and remove the artifice of 'laminated product' and 'platform' from the rule entirely."

Agency Response [22.1-Howlett-080215-HPVA]: We appreciate the comment, but believe that the definition for hardwood plywood as contained in ANSI/HPVA-HP-1 is too broad, for purposes of the ATCM. We believe that there are substantial differences between the bundles of hardwood plywood panels produced by a hardwood plywood manufacturer versus a fabricated laminated product made by a fabricator for exclusive use in finished goods. The two products are clearly not interchangeable in terms of their intended uses. In addition, the survey of composite wood products that was used as a basis for establishing the emission limits in the ATCM did not include emissions from a fabricated laminated product. If we find in the future that these products are emitting higher levels of formaldehyde than we expect, we can amend the ATCM.

108) Comment [22.2-Howlett-080215-HPVA]: "We also object to an exemption for curved plywood. There is certainly a potential to emit a significant amount of formaldehyde from curved plywood. CARB should initiate an immediate evaluation of the potential for curved plywood to emit formaldehyde to insure there is a level playing field, especially for imports. We understand CARB will evaluate curved plywood for future amendments . . . In the interim, curved plywood should be subject to at least the emission limits established in section 93120.2 (a)."

Agency Response [22.2-Howlett-080215-HPVA]: We appreciate the comment. In discussions with industry stakeholders, it is our

understanding that there are differences between curved plywood and industrial-grade hardwood plywood manufacturing. Typically, curved plywood is produced using urea formaldehyde resins that have been cured with a radio frequency press. Due to a lack of emissions data for curved plywood and because of the difference in the curing process, we decided to exempt curved plywood. If we find in the future that curved plywood is emitting higher levels of formaldehyde than we expect, we can amend the ATCM.

109) Comment [22.3-Howlett-080215-HPVA]: "For the purposes of 93120.12, Appendix 2 (g)(4)(c), which sets out the testing frequency for HWPW, we recommend inserting the word 'each' before 'product type' and 'product line' in the headings of the table on Page 1-58 to make the wording in the table conform with the wording in paragraph C above the table. Depending on the product types being manufactured, the production rates should differentiate between each product type as classified by a manufacturer (consistent with 93120.12, Appendix 2 (f)(3)(A)(2) page 55) and the production volume in square feet, which then determines the frequency of the testing."

Agency Response [22.3-Howlett-080215-HPVA]: We appreciate the comment, but the current regulatory language is sufficiently clear to mean that routine test frequency is based on each product type and each product line.

110) Comment [22.4-Howlett-080215-HPVA]: "It should be clarified that quarterly chamber testing for hardwood plywood is not required for each product type or product line, but only required for the product type or product line determined by the third party certifier to have the highest potential to emit based on routine quality control data (see 93120.12, Appendix 2 (f)(3)(A)(2) on page 1-55)."

Agency Response [22.4-Howlett-080215-HPVA]: We believe that the current regulatory language is sufficiently clear. Section 93120.12, Appendix 2, subsection (f)(3)(A)2. states that a quarterly test "shall be conducted on randomly selected samples of the HWPW product determined by the third party certifier . . . to have the highest potential to emit."

111) Comment [22.5-Howlett-080215-HPVA]: "For hardwood plywood, we recommend simplifying the definition of a batch or lot as the production between one quality control test and the next as stipulated in Definition 26(b) for a lot."

Agency Response [22.5-Howlett-080215-HPVA]: We disagree. Although most lots will likely be defined by production runs between quality control

tests, the simplification would not encompass lots produced by a new manufacturing facility or lots produced prior to having to shut down a facility for an extended time period.

112) Comment [22.6-Howlett-080215-HPVA]: "To require a hardwood plywood manufacturer to keep records with respect to the amount of resin used by volume and weight for a particular product type would be impossible for the following reasons: (1) No measuring device for the resin being applied… (2) The possibility of running numerous adhesive applicators from the same batch mix and the fact that some applicators may be running CARB compliance product and some non-CARB certified product… (3) Difficult, if not impossible, to quantify the amount of resin and adhesive lost due to waste… Accurate records of adhesive application rates, resin content of the adhesive mix and panel production volumes could be used to estimate the resin consumed during a given product run or manufacturing period."

Agency Response [22.6-Howlett-080215-HPVA]: We disagree that it would be impossible to keep records of resin use by product type. As suggested, we believe that records of this kind can be maintained based on accurate records of adhesive application rates, contents of the adhesive mix, and panel production volumes, to estimate the amount of resin consumed during a product run or manufacturing period.

113) Comment [22.7-Howlett-080215-HPVA]: "We object to inclusion of the smallest size chambers allowed in the ASTM D6007 for certification of composite wood products (as small as 0.02 m^3) that would result in testing 'postage size' specimens . . . This change in the regulation was significant and the 15-day comment period did not allow us to evaluate data to recommend a minimum size small chamber . . . We request that the comment period for this aspect of the regulation be extended seven days to give us an opportunity to evaluate minimum chamber size and make a recommendation."

Agency Response [22.7-Howlett-080215-HPVA]: The commenter appears to be concerned with the allowance of small (0.02 m^3) chambers under the secondary test method in section 93120.9(a)(2). The regulation will not result in testing "postage size" specimens. Operation of a small chamber as a secondary method requires following ASTM D 6007-02 (the small chamber method) and is based on specified ratios of the air flow to the surface area of specimens, with the ratios specified in ASTM D 6007-02 by product type. The size of specimens can be increased as long as the air flow is increased to keep the flow to surface area ratio specified in the method.

The regulation provides flexibility with regard to size of small chambers that can be used as secondary methods, in a manner consistent with ASTM D 6007-02, but the regulation also contains strict statistical criteria for demonstrating that a secondary method is equivalent to the primary test method before a small chamber can be used as a secondary method. In addition, the secondary test method is an option that was added to the regulation to facilitate compliance. It is voluntary and third party certification can always be performed using the primary test method (ATSM E 1333-96(2002)).

114) Comment [22.8-Howlett-080215-HPVA]: "Our members are concerned with the potential length of time it takes (up to five months or more) to get CARB approval for the TPC exemption for HWPW manufactured with NAF or ULEF resins. We suggest CARB allow manufacturers to begin the application process before the three-month (NAF) or six-month (ULEF) data collection process is completed, with final approval from the Executive Officer dependent on submission of the full data set. Approval would then be virtually instantaneous, since the data will either show compliance or not."

Agency Response [22.8-Howlett-080215-HPVA]: See the Agency Response to comment # 104 in section D of the FSOR.

115) Comment [22.9-Howlett-080215-HPVA]: "In 93120.12, Appendix 2 (g)(4)(C) that states 'quality control samples shall be analyzed within a period of time specified in the manufacturer's quality control manual to avoid distribution of non-complying lots' (page 1-58). We are concerned that this does not recognize the current industry practice of just-in-time delivery. We recommend that the wording in this section be changed to say if a manufacturer has substantial quality control data indicating compliance with the formaldehyde emission limits, an untested lot may be shipped while the QC test from that lot is being conducted provided there is sufficient time to recall the shipment before it gets into production at the customer's manufacturing facility if this lot fails."

Agency Response [22.9-Howlett-080215-HPVA]: We appreciate the comment, but the regulation is clear regarding this matter. It is up to the manufacturer as to whether to ship an untested lot to a customer, but if a violation occurs, both the manufacturer and the customer may be subject to penalties under the ATCM.

116) Comment [23.1-Hodgson-080215-Berkeley Analytical]: "Are manufacturers of engineered flooring products that contain a composite wood base material considered to be fabricators of laminated products?"

Agency Response [23.1-Hodgson-080215-Berkeley Analytical]: If the engineered flooring products consist of a compliant composite wood platform to which the flooring manufacturer applies a laminate, then the flooring manufacturer would be considered to be a fabricator of laminated products.

117) Comment [23.2-Hodgson-080215-Berkeley Analytical]: "If a fabricator's entire production of a product or product line is made in compliance with the ATCM and records are maintained to demonstrate compliance, is the fabricator still required to individually label each piece and/or shipping box?"

Agency Response [23.2-Hodgson-080215-Berkeley Analytical]: Yes, if the product is sold, offered for sale, supplied, or used in California. Labeling is a critical piece of the enforcement program to identify products subject to the ATCM and to track back to the source any noncompliant products.

118) Comment [23.3-Hodgson-080215-Berkeley Analytical]: "We believe that certain details of how the Secondary Method is to be validated and implemented should be modified to make this pathway more competitive." "The requirement to cut nine specimens evenly distributed over a panel and to test these in groups of three may lead to biased results and may not be necessary . . . The requirement for three pieces to be placed in each chamber results in small specimen sizes to achieve the required loading ratios . . . Compared to single specimens with the equivalent surface area . . . there are about a factor of two additional product edge area that must be sealed. Depending upon the effectiveness of edge sealing, the additional edge areas may lead to increased bias. Nine specimens and even three individual tests may, in fact, not be necessary." "We recommend that the requirement be amended to allow D 6007 testing in triplicate using single specimens randomly selected from a panel. Further, we recommend that the Certifier be allowed to require less than three individual tests per panel if analysis of the validation data for the Secondary Method shows acceptable agreement can be obtained using fewer D 6007 replicate tests of single specimens."

Agency Response [23.3-Hodgson-080215-Berkeley Analytical]: We disagree. We believe that the requirement, as written, provides the level of certainty that we need to ensure that compliant products are being manufactured and sold to the California market. Using nine specimens and then averaging results will provide an accurate average emission rate which can be compared to the large chamber results. Until a demonstration of equivalence between the proposed test procedure and the procedure in the ATCM is achieved, we believe that the test procedure, as written, must be followed. The secondary test method is an option that was added to the ATCM to facilitate compliance. It is voluntary and third

party certification can always be performed using the primary test method. See also the Agency Response to comment # 113 in section D of the FSOR.

119) Comment [23.4-Hodgson-080215-Berkeley Analytical]: "The requirement for annual validation of the Secondary Method is excessive . . . We recommend that the validation of the Secondary Method be conducted once every two or three years unless a significant detail of the Secondary Method is changed (e.g., switching to a different analytical method or chamber size). If such a change is proposed, the laboratory should be required to perform validation tests before being allowed to use the modified method."

Agency Response [23.4-Hodgson-080215-Berkeley Analytical]: We disagree. See the Agency Response to comment # 98 in section D of the FSOR.

120) Comment [23.5-Hodgson-080215-Berkeley Analytical]: "We also recommend that any existing data on the bias and uncertainty of the Primary Method be published as an appendix to the ATCM."

Agency Response [23.5-Hodgson-080215-Berkeley Analytical]: We agree that information of this kind would be insightful and should be shared; however, another mechanism for disseminating this information is needed, as it is not appropriate to include as an appendix to the ATCM.

121) Comment [23.6-Hodgson-080215-Berkeley Analytical]: "To establish the credibility of the ATCM's enforcement function, the ARB and local air district laboratories performing the enforcement tests should meet the same requirements as the laboratories performing Primary or Secondary Method testing including accreditation (ILAC, 2000), validation of Secondary Methods, and participation in inter-laboratory studies. The enforcement test method(s) should be defined and verified prior to implementation of the ATCM as deconstruction of finished goods to determine if core materials meet the ATCM requirements is likely a difficult task subject to considerable uncertainty. The ARB should support research and development of valid enforcement test methods if such methods are not currently available."

Agency Response [23.6-Hodgson-080215-Berkeley Analytical]: We agree. In order for small chambers that ARB plans to use for enforcement to be considered secondary methods, the chambers must be demonstrated to be equivalent to a primary test method. ARB's laboratory also plans to participate in interlaboratory comparison studies with our secondary test method chambers. The integrity of the enforcement program depends on all parties being committed to using the required procedures and following

defined quality assurance protocols. Table VI-7 on page 127 of the ISOR includes an implementation schedule. At this time, we are on track to achieve the schedule.

122) Comment [23.7-Hodgson-080215-Berkeley Analytical]: "Often laboratory accreditation is valid for a two year period with a requirement for an annual audit by the accreditation body . . . The requirement for participation in some inter-laboratory studies is reasonable. However, such studies cannot be approached casually. It is better to focus on efforts on a few quality studies." "The requirement should be modified to state that each laboratory shall maintain a valid accreditation for the relevant methods. The responsibility for inter-laboratory studies should be formalized by identifying a lead organization responsible for planning, coordination, implementation, data analysis, and reporting. The requirement should be scaled back to participation in a single inter-laboratory study every two or three years. The requirement for biennial participation in an inter-laboratory study for each test method and each wood product type should be removed."

Agency Response [23.7-Hodgson-080215-Berkeley Analytical]: We believe that participation in inter-laboratory studies is important. Initially, ARB will lead the first interlaboratory comparison study. Also, we believe that until we have a robust data base on laboratory performance, participation every two years is important.

123) Comment [23.8-Hodgson-080215-Berkeley Analytical]: "Appendix 3 (d)(3): Comment – The wording of this requirement is unclear . . . The wording should be revised to state that 'the third party certifier shall, at its own discretion, have the right to witness any and all parts of tests conducted at a laboratory under contract to the certifier for performance of Primary and Secondary Method tests.' "

Agency Response [23.8-Hodgson-080215-Berkeley Analytical]: We appreciate the comment, but disagree. The wording of Appendix 3 (d)(3), as written, conveys the intent of this comment.

124) Comment [23.9-Hodgson-080215-Berkeley Analytical]: "Attachment 2 . . . This attachment is a scholarly presentation of a somewhat unconventional statistical technique. Many readers may have difficulty following the development of the technique . . . This attachment should be treated as an academic article in order to establish its credibility. The author(s) should be identified, appropriate references to statistical texts and journal articles should be added, and the article should be subjected to review by peers."

Agency Response [23.9-Hodgson-080215-Berkeley Analytical]: The statistical technique was developed in consultation with academic and

industry experts, and the work was subject to peer review under the 15-day comment period. For purposes of the ATCM, we believe that the analysis provides solid technical support as the basis for the demonstration of equivalence between the primary and secondary methods in the ATCM.

125) Comment [24-Dennis-080215-Gibson Dunn Crutcher]: "Virco manufactures a product called Hard Plastic at its Arkansas facility . . . It appears that the definition of 'particleboard' in the Proposed Formaldehyde ATCM does not include Virco's Hard Plastic product, but that is not completely clear . . . The primary ingredients of Hard Plastic are powdered melamine formaldehyde resin and maple wood flour . . . Given that the cellulosic material used in making Hard Plastic is a finely ground and sieved flour, it does not appear to meet the definition of 'particleboard' because the finely ground flour is smaller in size than fibers . . . Given that the Hard Plastic product made by Virco uses a wood flour and not chips or shavings, it does not appear to meet the definition of 'particleboard.' If you concur with our interpretation of the definition of 'particleboard' and that it does not apply to Virco's Hard Plastic, then would like a written confirmation of that . . . Virco only makes individual sheets . . . If CARB staff concludes that Hard Plastic meets the definition of 'particleboard' in the Proposed Formaldehyde ATCM, then we need to either amend Appendix 3 or seek an interpretation as to how it will be applied to Virco's Hard Plastic product . . . Virco believes that its Hard Plastic is not 'particleboard' as that term is used in the Proposed Formaldehyde ATCM and would therefore not be subject to the requirements of the proposed regulations. However, if CARB concludes otherwise, then the testing method in Appendix 3 would need to be amended, or Virco will need an interpretation that would address the impracticablity of a rigid application to those provisions to its product."

Agency Response [24-Dennis-080215-Gibson Dunn Crutcher]: We appreciate the information provided on Hard Plastic, but cannot make a determination as to whether the product is subject to the ATCM based on the information provided. We invite the commenter to meet with us so that we can discuss this product.

126) Comment [25.1-Clark-080215-Jeld-Wen]: "In section 93120.1 (a)(8) the definition for Composite Wood Products states that "hardboard" is an exempted product from this regulation. Definitions (17) and (28) of the same section describe 'hardboard' and 'Medium Density Fiberboard.' These definitions need to be defined further to clearly state a difference between the two product types. If these definitions are left as-is, then it is likely that manufacturers of fiberboard will simply call their product 'hardboard' and state that they do not need to comply with the regulation. JELD-WEN has proposed definitions to CARB in previous correspondence.

Any definition could be used, provided that it includes a statement that 'hardboard' will have emissions less than 0.04 ppm so it meets the same criteria of other products exempted from third party certification."

Agency Response [25.1-Clark-080215-Jeld-Wen]: We disagree that if these definitions are left as-is, that manufacturers will call their products "hardboard" and state that they do not need to comply with the ATCM. We believe that the two products have different intended end-uses and as such, will continue to be separate products. No additional clarification is needed.

127) Comment [25.2-Clark-080215-Jeld-Wen]: "Section 93120.1 (a)(19) has a definition for 'Hardwood Plywood' that includes the statement 'The face veneer may be composed of a hardwood or decorative softwood species.' The phrase '. . . or decorative softwood' should be deleted. If this remains, then the title of the definition should change to include softwood species. This would require several editorial changes throughout the document."

Agency Response [25.2-Clark-080215-Jeld-Wen]: We disagree. It is our understanding that in some cases, decorative softwood veneers are used by hardwood plywood manufacturers to make industrial-grade "hardwood plywood," and the end-product is essentially "hardwood plywood" as we have defined it. Furthermore, ANSI/HPVA HP-1-2004 refers to decorative softwood veneers in the industry specifications for hardwood plywood. We believe that the phrase is needed in the definition to address this contingency.

128) Comment [25.3-Clark-080215-Jeld-Wen]: "The regulation needs a section added to describe how a new start-up plant that uses NAF or ULEF resins can comply with this regulation. There will be instances where a new plant will be built which are very similar to existing manufacturing facilities that already produce products approved by CARB. The products made from this new plant should not have to go through the same requirement of months of QC data and third party certifications to demonstrate compliance. This will delay the ability to sell products into California by a minimum of 3 months. Where appropriate, it should be possible to demonstrate compliance by equivalencies for new plants on an expedited basis, as approved by CARB."

Agency Response [25.3-Clark-080215-Jeld-Wen]: We disagree that a new section needs to be added to the regulation to address new plants. In such cases, we believe that the manufacturer will likely use a no-added formaldehyde (NAF) based resin or ULEF resin with a proven track record at existing facilities. While it is a manufacturer's prerogative to produce products for California, approval to be designated as a manufacturer using NAF or ULEF resins will be decided on a case-by-case basis by the

Executive Officer. If a new start up plant uses a NAF or ULEF resin, then resultant production should have emissions that will be well below the Phase 2 emission standards. Therefore, quality control data would support certification by an approved third party certifier. A new plant will be able to sell Phase 2 compliant panels using a NAF or ULEF resin. After the required quality control emissions data are collected, then an application can be submitted for an approved Executive Order for reduced testing or an exemption from third party certification.

129) Comment [25.4-Clark-080215-Jeld-Wen]: "Section 93120.3 (d)(7) should be clarified. Currently it states that any change in the resin system requires the manufacturer to comply with section 93120.3 (b). This would require the manufacturer to complete six months of QC testing before the product with the modified resin can be sold to California. If this is not the intent of this section, it should be modified to state that the manufacturer must demonstrate that the change in the resin system will still produce a product that continues to meet the ULEF requirements to be exempt from third party certification."

Agency Response [25.4-Clark-080215-Jeld-Wen]: We understand the comment. The intent of section 93120.3(d)(7) applies to a manufacturer that changes to a non-ULEF resin. Operational flexibility for ULEF resins will be addressed through the conditions applied to an approved ARB Executive Order. The current regulatory language is sufficiently clear.

130) Comment [25.5-Clark-080215-Jeld-Wen]: Regarding the requirements for retailers, the commenter states that "section 93120.8 is vague and should be clarified to provide an advantage for NAF products. This section of the regulation should provide for less onerous labeling and recordkeeping requirements for NAF products."

Agency Response [25.5-Clark-080215-Jeld-Wen]: We disagree. Because of the advantages already being afforded to products made with no-added formaldehyde based resins and the contribution these products are estimated to provide from a public health standpoint, we believe that rigorous requirements for recordkeeping and labeling are needed to ensure that those products are in fact what manufacturers claim they are. Recordkeeping is also essential for enforcement to allow tracing non-complying products back to the fabricator or manufacturer. See also the Agency Response to comment # 15 in section D of the FSOR.