

August 27, 2004

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P.O. Box 2815  
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**Re: Comments on California ARB Draft Report - Indoor Air Pollution in California**

Dear Ms. Shimer:

The Formaldehyde Council, Inc. (FCI) appreciates the opportunity to comment on the *Draft for Public Review of the Report to the California Legislature: Indoor Air Pollution in California* (Draft Report or Report), issued by the California Air Resources Board (ARB) in June 2004. FCI is a trade association of leading producers and users of formaldehyde that is dedicated to promoting the responsible use and benefits of formaldehyde and ensuring its accurate scientific evaluation.<sup>1</sup> Thus, FCI has a unique focus on formaldehyde, and our comments relate to the discussion of formaldehyde in the Draft Report.

**I. Introduction & Summary**

Under the mandate of Assembly Bill 1173 (AB 1173), ARB is required to provide the Legislature:

a statewide report on indoor air pollution . . . to determine the public health hazards caused by indoor air contaminants and potential mitigation measures to resolve those hazards. . . .

summarizing . . . the best scientific information available on indoor air pollution, the potential adverse effects of indoor air pollution on public health in the state, readily available information about the effects of existing regulations, and current industry practices in mitigating those exposures, and listing the biological and radiological substance work performed by other state and federal entities.

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<sup>1</sup> For more information about FCI, visit <http://www.formaldehyde.org>. Members of the Council include: Borden Chemical, Celanese, DuPont, Dynea and Georgia-Pacific.

According to the Draft Report, the “high risk” pollutants identified by the California ARB include environmental tobacco smoke (ETS), radon, particulate matter (PM), and volatile organic chemicals (VOCs), while “medium risk” pollutants include carbon monoxide and lead.<sup>2</sup> The Report acknowledges that “[h]undreds of substances representing a range of chemical, physical, and biological species have been identified as indoor air pollutants.”<sup>3</sup> Despite this broad identification of pollutants, formaldehyde is repeatedly referenced as a key indoor air pollutant and heavily discussed in the Draft Report. Building materials and furnishings that contain formaldehyde are identified in the Report as the top priority for “mitigation” and the reduction of formaldehyde in various products is a key focus of the section entitled, *Prioritization of Sources and Pollutants Based on Exposure and Adverse Impacts*.<sup>4</sup>

FCI is troubled by this significant and largely unexplained emphasis on the presence of formaldehyde in indoor air. Assuming that the health effects characterizations in the draft Report are correct, this emphasis is unsupported by ARB’s own analysis. According to the draft Report, all the selected VOCs (benzene, chloroform, formaldehyde, methylene chloride, paradichlorobenzene, perchloroethylene, phtalates, styrene, etc.) collectively account for roughly 2% of total indoor air costs and impacts. From a priority setting perspective, if all VOC’s constitute only 2% of the impact, focusing on any one VOC will address less than 1% of the overall issue. Overall, the report appears to focus 98% of its time and energy on 2% of the problem. This is hardly appropriate for a document that the Legislature requested to help it understand the issues and properly direct state resources. From an impact and resource allocation perspective, all VOCs merit, at most, a footnote based on ARB’s own cost benefit projections.

We believe, however, that even this assessment radically overstates the projected impact because the health effects of formaldehyde are repeatedly mischaracterized or mistaken. At typical exposure levels presented in the Draft Report, adverse effects are unlikely to occur. On this basis, FCI respectfully submits that the Draft Report does not

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<sup>2</sup> Draft Report, p. 22.

<sup>3</sup> Draft Report, p. 27 (emphasis added).

<sup>4</sup> Draft Report, p. 123.

meet the requirements of AB 1173. In addition, the Report fails to properly recognize the various stewardship efforts of the formaldehyde industry that have, for over twenty years, resulted in a significant reduction of formaldehyde emissions, improvement in indoor air quality and a more accurate assessment of formaldehyde's toxicological properties. As described in more detail below:

- No irritation effects would likely occur at current average indoor exposure levels. Typical indoor exposure levels to formaldehyde cited in the Report range from 13 to 18 parts per billion (ppb) in conventional homes, schools and offices, to 37 ppb for manufactured homes. A conservative level for the threshold for irritation is 100 ppb. Current indoor exposure levels are clearly below this level by a substantial margin. Thus, references to formaldehyde's irritant properties should either be removed from the final report or edited to make clear that no irritation effects would be expected to occur in these indoor environments.
- Contrary to the Report's characterization, formaldehyde exposure has not been demonstrated to cause asthma. To be consistent with the conclusions of both the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Academy of Science (NAS) Institute of Medicine, the references to formaldehyde and asthma should be removed from the Report.
- One of the most significant advances in formaldehyde science is the cancer risk assessment methodology developed by the CIIT Centers for Health Research. Quantitatively, CIIT predicted that cancer risk is negligible until exposures reach a level in the range of 600 to 1000 ppb. The World Health Organization (WHO), the Organization for Economic Cooperation and Development (OECD), Health Canada and others, including the U.S. Environmental Protection Agency's (EPA) Office of Air and Radiation, have endorsed the CIIT approach by incorporating it in their own assessments. Therefore, the low part per billion concentrations recommended in the Draft Report are inappropriately conservative and do not reflect the "best scientific information available." Because the Report ignores established science, it fails to meet the statutory criteria embodied in A.B. 1173.
- The Report mischaracterizes potential human health effects by not linking information on the exposure levels with the potential health effects of concern. For example, the California chronic REL (2.4 ppb) is less than average ambient air concentrations and the California Interim REL is extraordinarily low and below the value at which any health effect are observed.

## I. The Draft Report Overstates or Mischaracterizes Potential at Existing Exposure Levels

### A. Irritation

The Draft Report states that “[f]ormaldehyde vapors are highly irritating to the eye, nose, throat, and respiratory tract.”<sup>5</sup> However, irritation is a threshold event. Thus, the document should reflect toxicity with the corresponding appropriate dose. In controlled chamber studies, individuals begin to sense eye irritation at about 500 to 1,000 ppb, with greater certainty for sensory irritation occurring at 1,000 ppb and above.<sup>6</sup> These levels for formaldehyde greatly exceed what appears to be the overly conservative values included in the Report.

Furthermore, a panel of experts reviewed over 150 published studies to determine an appropriate occupational exposure level for formaldehyde, and found that eye irritation does not become significant until around 1,000 ppb, and moderate to severe eye, nose, and throat irritation occurs at 2,000 to 3,000 ppb.<sup>7</sup> While some agencies have used a level as low as 100 ppb as a threshold for irritation,<sup>8</sup> the expert panel found that a level of 300 ppb would protect against nearly all irritation. In fact, the expert panel found that a level of 1,000 ppb would avoid eye irritation – the most sensitive endpoint – in 75-95% of all people exposed.<sup>9</sup>

Typical indoor exposure levels to formaldehyde cited in the Report are 14 ppb in conventional homes, 18 ppb in schools, 13 ppb in offices and 37 ppb in manufactured homes.<sup>10</sup> These are low levels, comprising less than a third of the very conservative

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<sup>5</sup> Draft Report, p. 34.

<sup>6</sup> Joel Bender, The Use of Noncancer Endpoints as a Basis for Establishing a Reference Concentration for Formaldehyde, *Reg. Toxicology and Pharmacology* 35:23, 29 & 30 (Feb. 2002). Due to the subjective nature of individual responses, it is difficult to measure levels at which irritation begins. *Id.* at 23 & 30. For most people, irritation is temporary and reversible. Dennis Paustenbach *et al.*, A Recommended Occupational Exposure Limit for Formaldehyde Based on Irritation, *J. Toxicology and Env'tl. Health* 40:217, 248-252 (1997).

<sup>7</sup> Organization for Economic Cooperation and Development (OECD), SIDS Initial Assessment Profile at 1 (Apr. 2002); Paustenbach *et al.*, *supra*, at 252.

<sup>8</sup> The American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) has established a 100 ppb maximum continuous air concentration guideline for indoor air levels of formaldehyde. We reference this guideline but do not endorse it.

<sup>9</sup> Paustenbach *et al.*, *supra*, at 252.

<sup>10</sup> Draft Report, pp. 192, 195, and 196.

100 ppb level sometimes used as a threshold for irritation. These exposure levels are equal to or less than the conservative levels cited by ARB in the Report as the range of formaldehyde exposure that can cause sensitivity in individuals (37 – 3,000 ppb).<sup>12</sup>

The Draft Report incorrectly implies that a mere presence of low levels of formaldehyde in inhaled air (indoor or outdoor) would result in irritation or any other health effects. Such a statement is unsupported by a strong body of scientific evidence. References to formaldehyde's irritant effects should either be removed from the final report or edited to make it clear that no irritation would be expected to occur at concentrations present in these indoor environments.<sup>13</sup> Clearly, there are no references in the Report to support actual complaints or problems in this regard.

### A. Asthma

With respect to formaldehyde and asthma, the Draft Report confusingly concludes at various points that formaldehyde:

- causes the "worsening of asthma;"<sup>14</sup>
- shows "Limited or Suggestive Evidence of an Association;"<sup>15</sup> or
- presents "Possible but Insufficient Evidence."<sup>16</sup>

The Report provides little explanation of how it reaches these conclusions and briefly discusses a 2002 study<sup>17</sup> published by Ralph Delfino that "identifies several links between asthma symptoms and indoor air pollutants, especially formaldehyde."<sup>18</sup>

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<sup>11</sup> Draft Report, p. 50. These estimations are also discussed in a different section of the Report, which is confusing.

<sup>12</sup> Our reference to these sensitivity ranges is not intended to be an endorsement.

<sup>13</sup> *E.g.*, "Formaldehyde is a pungent smelling gas emitted from numerous indoor air sources." (p. 29) This is misleading because typical end uses that rely on formaldehyde chemistry do not emit formaldehyde in perceptible amounts.

<sup>14</sup> Draft Report, p. 28 (Table 2.1, *Sources and Potential Health Effects of Major Indoor Air Pollutants*).

<sup>15</sup> Draft Report, p. 29 (Table 2.2, *Indoor Exposures and Exacerbation of Asthma*).

<sup>16</sup> Draft Report, p. 30 (Table 2.3, *Indoor Exposures and Development of Asthma*).

<sup>17</sup> Ralph Delfino, Epidemiological Evidence for Asthma and Exposure to Air Toxics: Linkages Between Occupational, Indoor, and Community Air Pollution Research, *Envtl Health Perspectives* 110:4, 573-589 (2002).

<sup>18</sup> Draft Report, pp. 4, 31.

Formaldehyde exposure has not been demonstrated to cause asthma. Even Delfino admits in his 2002 study that "there are little available non-occupational data on the risk of asthma onset from formaldehyde," although he cites studies that purportedly show a relationship between asthma in children to formaldehyde. Moreover, Dr. Delfino's studies are unreliable in that there is a lack of statistical rigor applied and there is a lack of dose response. One enclosure to these comments provides a more thorough analysis of Delfino's study and discusses other important studies that have examined formaldehyde exposure and observed no association with asthma.<sup>19</sup>

The Draft Report's conclusion with regard to formaldehyde and asthma is also at odds with the Agency for Toxic Substances and Disease Registry (ATSDR), the National Academy of Sciences (NAS) and the Organization for Economic Cooperation and Development (OECD). ATSDR states that investigations into formaldehyde and asthma provide very limited evidence of an association.<sup>20</sup> A report by the NAS Institute of Medicine similarly found inadequate evidence of any association between formaldehyde exposure and asthma induction.<sup>21</sup> Several clinical investigations of asthma cases suspected to be due to formaldehyde failed to confirm even a single case based on inhalation challenge tests.<sup>22</sup> OECD, consisting of regulators from thirty countries including the U.S., reviewed formaldehyde under its Existing Chemicals program and concluded that "[m]ost studies show no effect on lung function in either asthmatics or non-asthmatics."<sup>23</sup> The ARB Scientific Review Panel (SRP) on Toxic Air Contaminants considered the relationship between formaldehyde and asthma based on a presentation

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<sup>19</sup> Letter of December 10, 2002, from Mr. Stewart Holm, Formaldehyde Epidemiology, Toxicology, and Environmental Group, Inc. (FETEG), FCI's predecessor, to Annie Jarabek, U.S. EPA. FETEG was a predecessor of FCI.

<sup>20</sup> Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Formaldehyde at 71* (1999).

<sup>21</sup> National Academy of Sciences, Institute of Medicine, *Clearing the Air: Asthma and Indoor Air Exposures*, at 246 (2000), at <http://www.nap.edu/books/0309064961/html>.

<sup>22</sup> See, e.g., Evangelo Frigas *et al.*, Bronchial Challenge with Formaldehyde Gas: Lack of Bronchoconstriction in 13 Patients Suspected of Having Formaldehyde-Induced Asthma, *Mayo Clinic Proceedings* 59:295 (1984); L.C. Grammer *et al.*, Evaluation of a Worker with Possible Formaldehyde-Induced Asthma, *J. Allergy Clin. Immunol.* 92 (1 Pt. 1): 29-33 (1993); Krakowiak *et al.*, Airway Response to Formaldehyde Inhalation in Asthmatic Subjects with Suspected Respiratory Formaldehyde Sensitization, *A. J. Ind. Med.* 33:274-281 (1998).

<sup>23</sup> Organization for Economic Cooperation and Development (OECD), SIDS Initial Assessment Profile, at 4. The report also notes: "Formaldehyde induced asthma as been studied and findings from detailed clinical evaluations of suspected subjects suggest that it is rare, if it exists at all." *Id.*, at 16.

by Supervising Toxicologist Melanie Marty, who represented the Office of Environmental Hazard Assessment. The Panel's deliberations reflect the following conclusions:

- There is no experimental evidence that asthmatics are more sensitive to the irritant effects of formaldehyde than non-asthmatics.
- Because there is negative human data suggesting differential responsiveness among people with airway hyper-responsiveness, it is difficult to invoke the argument that formaldehyde is worse for asthmatics or worse for children.
- There is a biological plausibility issue in trying to associate formaldehyde with an asthmatic response.<sup>24</sup>

Thus, the Draft Report also conflicts with SRP's 2001 consideration of this issue, and there is no new data to suggest that the SRP's conclusion would be any different today. The weight of the scientific evidence supports a lack of association between formaldehyde and asthma. As such, the references to formaldehyde and asthma should be removed from the Report.

## **II. The CIIT Risk Assessment for Formaldehyde Reflects the Current Best Science**

The cancer risk assessment discussed in the Draft Report is based on an upper-bound risk technique that does not incorporate current scientific understanding of formaldehyde's mode of carcinogenic action and is, therefore, inappropriate. More importantly, the risk assessment is based on overly conservative projections that ignore the best science and are not reflective of actual risk, if any. The basis for this comment is detailed in the attached petitions that were submitted to California in 2002 and 2004.<sup>25</sup> A great deal of evidence regarding formaldehyde's potential carcinogenicity, and its mode of action, in particular, has been developed over the past five years that should be acknowledged in the Report.

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<sup>24</sup> Transcript of the June 15, 2001, meeting of the Scientific Review Panel on Toxic Air Contaminants, California Air Resources Board, pp. 122-126 (Reported by James Ramos, Peters Shorthand Reporting Corporation).

<sup>25</sup> The FCI petition was submitted on April 23, 2004, and a petition by FETEG was submitted on April 11, 2002. While the state declined to act on those petitions, that action was partly based on the incorrect assumption that the CIIT work had not been peer reviewed or accepted. This aspect is addressed later in this section of our comments.

With input from U.S. EPA, Health Canada, and peer reviewers, a team of researchers at the Chemical Industry Institute of Technology (CIIT) published a thorough evaluation of potential cancer risk from formaldehyde in 1999, incorporating over 20 years of research and integrating various toxicological, mechanistic, and dosimetric data.<sup>26</sup>

Quantitatively, CIIT predicted that cancer risk is negligible until exposures reach a level associated with cytotoxicity, which is in the range of 600 to 1,000 ppb. The CIIT model predicts assuming 80 years of continuous exposure to formaldehyde at 100 ppb, an increased risk of developing cancer of  $2.7 \times 10^{-8}$  for non-smokers.<sup>27</sup> A series of papers have been published using the CIIT model. The most recent, in July 2004, provides an analysis of human respiratory tract cancer risks of inhaled formaldehyde.<sup>28</sup> The paper concludes that cancer risks associated with inhaled formaldehyde are *de minimis* ( $10^{-6}$  or less) at relevant human exposure levels, and protection from the non-cancer effects of formaldehyde should be sufficient to protect from its potential carcinogenic effects. As discussed above, non-cancer effects are not expected at current exposure levels.

#### **B. Peer Review of the CIIT Report**

During its development, the CIIT Report underwent extensive review by U.S. EPA, Health Canada, and other peer reviewers. U.S. EPA and Health Canada representatives participated regularly in advising CIIT and reviewing the work during the development of the CIIT Report. Dr. John Overton (in U.S. EPA's National Health and Environmental Effects Research Laboratory) prepared two sections of the report: one section entitled "Human Respiratory Tract Dosimetry for Formaldehyde," and another section concerning the "Mathematical Model for Mass Transport." U.S. EPA's Dr. Vanessa Vu and Annie Jarabek provided advice to CIIT, as did Bette Meek of Health Canada. U.S. EPA and Health Canada sponsored a peer review workshop on the draft

<sup>26</sup> CIIT, *Formaldehyde: Hazard characterization and dose-response assessment for carcinogenicity by the route of inhalation* (revised ed. 1999).

<sup>27</sup> This quantitative estimate of risk differs from the current U.S. EPA IRIS value. We hope that this will be corrected when U.S. EPA completes its IRIS update of formaldehyde.

<sup>28</sup> RB Conolly, JS Kimbell, D Janszen, PM Schlosser, D Kalisak, J Preston, and FJ Miller, Human Respiratory Tract Cancer Risks of Inhaled Formaldehyde: Dose-Response Predictions Derived From Biologically-Motivated Computational Modeling of a Combined Rodent and Human Dataset, *ToxSci* Advance Access at <http://www.toxsci.oupjournals.org>. (2004).

version of the CIIT Report in 1998.<sup>29</sup> Several U.S. EPA and Health Canada staff members attended and participated in this workshop, and their comments were incorporated into the final version of the CIIT Report. The Workshop reviewers unanimously agreed that the model provided in the CIIT Report “offers considerable improvement over the default methodology adopted in previous assessments.”<sup>30</sup> Further, the peer reviewers “strongly endorsed” the use of the CIIT model after the refinements suggested by the review group were incorporated, noting that the model provides “the opportunity to use a broader database for risk assessment for formaldehyde and should reduce the overall uncertainty.”<sup>31</sup>

Thus, CIIT analysis overcomes problems that exist in the application of “standard” risk-assessment methods result in incorrect projections. One situation is exemplified by chemicals, such as formaldehyde, which humans are exposed to low levels on a daily basis as part of normal cellular metabolism and for which humans are physiologically well-equipped to handle. In conducting an assessment for such a chemical, the assessor should consider, as in the case of formaldehyde, the fact that it is a normal component of metabolism, with multiple pathways existing for its conversion into a usable carbon source (*i.e.*, formate). Formaldehyde should be regarded differently, therefore, than an agent that has no role in normal physiology. This is one of the limitations in standard risk assessment that the CIIT model overcomes.

### C. U.S. and International Recognition of the CIIT Model

The CIIT risk assessment has been used by the U.S. EPA Office of Air and Radiation in the development of various rules issued under the Maximum Achievable Control Technology (MACT) provisions of the federal Clean Air Act. These include MACT rules for plywood, can manufacturing, and combustion turbines.<sup>32</sup> In addition, several

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<sup>29</sup> For more information see Report of Health Canada/U.S. EPA External Peer Review on Formaldehyde, Ottawa, Ontario (Mar. 18-20, 1998).

<sup>30</sup> *Id.* at 4.

<sup>31</sup> *Id.*

<sup>32</sup> “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 formaldehyde 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.” 69 Fed. Reg. 18333-34 (Apr. 7, 2004) (emphasis added).

international groups have updated their characterizations of formaldehyde to state that formaldehyde is likely to be carcinogenic in humans only at doses that cause cell proliferation, and not at low doses. These widely respected organizations drew heavily on the CIIT approach.

- In its review of formaldehyde under its Existing Chemicals program, the OECD issued a SIDS Initial Assessment Report, which found that “[t]aking into account the extensive information on its mode of action, formaldehyde is not likely to be a potent carcinogen to humans under low exposure conditions.”<sup>33</sup> OECD found no further research on human health was needed.
- In an updated assessment of formaldehyde, Health Canada stated that it considered the CIIT 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.”<sup>36</sup>
- In finalizing the Concise International Chemical Assessment Document on Formaldehyde,<sup>37</sup> in March 2002, the World Health Organization relied on the CIIT cancer risk assessment for formaldehyde and concluded that formaldehyde exposure poses a carcinogenic hazard only under conditions that both induce toxicity and cause sustained regenerative proliferation.
- The German MAK Commission, which sets occupational exposure values, reviewed formaldehyde 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 formaldehyde plays no or at most a minor part in its carcinogenic potential so that no significant contribution to human cancer risk is expected.”<sup>38</sup> This conclusion is supported by the results of a risk assessment which, for persons exposed to concentrations of 0.3 ml/m<sup>3</sup> (0.37 mg/ m<sup>3</sup>) at the workplace for 40 years, yielded a very low additional cancer risk for non-smokers of 1.3 x 10<sup>-8</sup> and for smokers of 3.8 x 10<sup>-7</sup> (CIIT 1999).<sup>39</sup>

<sup>33</sup> Organization for Economic Cooperation and Development (OECD), SIDS Initial Assessment Profile, at 2.

<sup>34</sup> German MAK Commission, Formaldehyde (Official English Translation), at 193 (3001).

<sup>35</sup> MAK Commission on Formaldehyde, at 193.

<sup>36</sup> Environment Canada and Health Canada, Existing Substances Evaluation, Assessment Report -- Formaldehyde, at 68 (2002), at <http://www.ec.gc.ca/substances/ese/eng/psap/final/formaldehyde.cfm>.

<sup>37</sup> The CICAD is available at <http://www.inchem.org/documents/cicads/cicads/cicad40.htm>.

<sup>38</sup> German MAK Commission, Formaldehyde (Official English Translation), at 193 (3001).

<sup>39</sup> MAK Commission on Formaldehyde, at 193.

### III. The Final Report Should Clarify the Basis for Concern and the Relationship Between Potential Health Effects and Exposure Levels

In some places, the Report makes blanket statements about the health effects of formaldehyde exposure that are inaccurate and lack any reference to well-established health benchmarks. For instance:

- “A reduction in pollutants from [the building materials and furnishings category] (formaldehyde being the most predominant) would benefit all indoor environments and has potential for significant health benefits due to reduced incidence of asthma exacerbation, cancer, and eye, nose and throat irritation.”<sup>40</sup>
- “Formaldehyde is listed as Toxic Air Contaminant and a Proposition 65 substance, based on its potential carcinogenicity. It is also an upper respiratory tract irritant that produces eye, nose, and throat irritation and exacerbates asthma.”<sup>41</sup>

These effects are not associated with formaldehyde or not expected to occur at projected exposure levels. The Report mischaracterizes the potential human health effects by not linking information on the exposure levels with the potential health effects of concern.<sup>42</sup> For example, the Report states that “[i]ndoor levels of formaldehyde, a pungent smelling gas, *nearly always* exceed health-based guideline levels.”<sup>43</sup> This is clearly untrue with regard to the California Interim REL (27 ppb), if, as cited in the Report, typical average exposure levels to formaldehyde in conventional homes, schools, and offices are 14 ppb, 18 ppb, and 13 ppb, respectively. The statement is also contradicted by a separate conclusion in the Report that “[p]eople vary substantially in their sensitivity to formaldehyde. For most individuals these effects typically occur at exposure levels between 37 ppb and 3000 ppb.”<sup>44</sup> Thus, if formaldehyde is not associated with asthma, and no irritation or chronic effects are expected at typical exposure levels based on a best science analysis, the Draft Report should acknowledge this clearly or delete these discussions entirely.

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<sup>40</sup> Draft Report, p. 123.

<sup>41</sup> Draft Report, p. 50.

<sup>42</sup> While these comments largely address toxicological issues, we also suggest that ARB review its exposure characterizations. For example, the Draft Report claims that carpet is a source of formaldehyde. We understand that at the July 2004 CARB hearing, Robert Peoples of the Carpet and Rug Institute (CRI) stated that formaldehyde has not been in carpet for years.

<sup>43</sup> Draft Report, p. 7 (emphasis added).

<sup>44</sup> Draft Report, p. 50.

#### IV. The Limited Projected Impact from Formaldehyde Shows that it is Low Priority

The Draft Report understates the degree that industry has helped reduce indoor air levels of formaldehyde over the years. Great strides have been made since consumer complaints in the early and mid-1980's when levels of formaldehyde were much higher than they are today. For example, while the Draft Report states that current average indoor air levels are between 13 – 37 ppb (for conventional homes, manufactured homes, offices, and schools), typical levels in the early 1990's were about 70-80 ppb in mobile homes and 50 ppb in conventional homes.<sup>45</sup> Over the years, and mostly due to voluntary industry efforts, resin formulations and wood product manufacturing techniques have been modified to reduce emission levels in the finished product. In 1997 the U.S. Consumer Product Safety Commission (CPSC) found that “[m]anufacturers have reduced formaldehyde emissions from pressed wood products by 80-90% from the levels of the 1980's.” As a result of these various product modifications and reduction of formaldehyde emissions, consumer complaints have largely abated.

#### V. Conclusions

Due to good product stewardship, formaldehyde is one of the most extensively studied industrial chemicals. Although the Draft Report recognizes that formaldehyde, along with radon, asbestos, cigarette smoke, and mold have received a “substantial amount of study,”<sup>46</sup> it fails to discuss, in a complete manner, the continually-advancing science of formaldehyde. Thus, it misses its mandate under AB 1173 to provide the “best scientific information available” on formaldehyde.

Given the fact that average formaldehyde levels in indoor air are considerably lower than very conservative health benchmarks for irritation or the CIIT cancer risk level, formaldehyde does not warrant extensive discussion and mitigation recommendations in the final Report. We respectfully request that the noted errors be corrected so that

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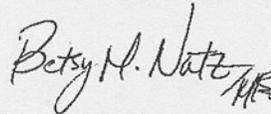
<sup>45</sup> California ARB, Indoor Air Quality Guideline, Sept. 1991. In addition the 1992 ARB *Final Report on the Identification of Formaldehyde as a Toxic Air Contaminant* states that mean concentrations of office/public buildings were identified as 24 ppb, conventional homes were 50 ppb, and mobile homes were 72 ppb.

<sup>46</sup> Draft Report, p. 27.

the California legislature and the general public are not misled about the seriousness of the current level of indoor exposures to formaldehyde. In conjunction with our comments, we also endorse the comments submitted by the California Wood Industry Coalition (CWIC).

Given the current course and direction of the marketplace, as well as the layers of existing regulations and guidelines, the FCI believes that the state's efforts and resources should be very carefully considered and directed accordingly. We also ask California ARB to seriously consider the message it sends to industry if scientific advances in toxicology and risk assessment, as well as manufacturing innovation and investments designed to lower emissions, are marginalized and treated as inconsequential or irrelevant.

Respectfully yours,

A handwritten signature in black ink that reads "Betsy M. Natz" with a stylized flourish at the end.

Betsy M. Natz  
Executive Director

Enclosures