Comments of Johns Manville (JM) on proposed changes to California Green Building Code (Code)

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http://www.documents.dgs.ca.gov/bsc/prpsd_chngs/documents/2009/BSC-03_09-ET-Pt11-2nd-45-day.pdf

Section A5.504 addresses Pollutant Control for non-residential building and proposes the following provisions:

> **A5.504.4.8 Thermal insulation, Tier 1.** Comply with Chapter 12-13 in Title 24, Part 12, the California Referenced Standards Code, and with the VOC-emission limits defined in 2009 CHPS criteria and listed on its Low-emitting Materials List, www.chps.net/manual/lem_table.htm.
>
> **A5.504.4.8.1 Thermal insulation, Tier 2.** Install No-Added Formaldehyde thermal insulation in addition to meeting the 2009 CHPS criteria and listed on its Low-Emitting Materials List.

JM supports these changes and would encourage even further changes that would require no-added formaldehyde thermal and acoustical building insulation in both residential and non-residential environments. Such additional measures would best serve the Section 101.2 purpose of the Code to

> . . . improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact, or positive environmental impact and encouraging sustainable construction practices . . .

As support for the above-referenced provisions and for extending a requirement for no-added formaldehyde thermal and acoustical building insulation, JM offers the following:

Source Elimination Is The Best Way To Address Indoor Air Pollution

While energy efficiency is important, gains in energy efficiency, especially in new homes, should not come at the expense of deterioration of indoor air quality and corresponding adverse health impacts. As new homes grow increasingly tighter to achieve ever higher levels of energy efficiency, potential indoor air pollution also increases since many conventional building materials emit volatile organic compounds like formaldehyde.

The best way to address indoor air pollution is through aggressive source elimination and control. The Pollution Prevention Act established the national policy that pollution should be prevented or reduced at the source whenever feasible. Preventing pollution offers important economic benefits, as pollution never created avoids the need for expensive investments in waste management

or cleanup. State and federal pollution programs typically follow the Pollution Prevention Act's hierarchy of how pollution – whether outdoors or indoors – is to be addressed. Specifically, the decision pathway is as follows:

- as an overriding first priority, pollution should be avoided and prevented
- pollution that cannot be prevented should be minimized
- pollution that cannot be minimized should be treated
- only such pollution that remains after prevention, minimization and treatment can be diluted

This hierarchy underlies every EPA substantive program including, without limitation, the Clean Air Act, the Clean Water Act, and CERCLA. As an example, the Clean Water Act standard of performance for new sources for fiber glass manufacturing is ". . . no discharge of process waste water pollutants to navigable waters." 40 CFR 426.15.

Fiber glass insulation made without formaldehyde is a cost effective way to help prevent indoor formaldehyde pollution. And by reducing overall formaldehyde exposure, the home, office or classroom can be made healthier and safer. Such insulation is also market-ready; it is literally off-the-shelf technology and formaldehyde-free forms of insulation are made by all major manufacturers and are available nationwide.

Some additional information on formaldehyde in fiber glass insulation can be found at http://www.healthybuilding.net/healthcare/Fiberglass-insulation-formaldehyde-emissions-090116.pdf.

Relying On Ventilation-Dilution To Address Indoor Air Pollution Is Not Effective

Relying in the first instance on dilution of pollution via ventilation is not only clearly contrary to pollution prevention policies, dilution has been shown to be an ineffective way to address indoor air pollution. The recent Offerman study demonstrated how difficult it is to achieve high levels of fresh air ventilation in the residential environment:

> Consideration should be given to regulating the emissions of air contaminants from building materials. To this end, in April 2007 the California Air Resources Board (2007) adopted an airborne toxics control measure (ATCM) to reduce formaldehyde emissions from composite wood products. ***Emission rate reductions from other indoor sources of formaldehyde will also be needed to provide healthful indoor air quality.***

http://www.energy.ca.gov/pier/conferences+seminars/2008-10-29+30_energy_and_air_quality_conference/session_02-Building_Characteristics_Indoor_Environmental_Quality/1%20BudOffermann1.pdf?bcsi_scan_7909DC0819E730E8=0&bcsi_scan_filename=1%20BudOffermann1.pdf at page 31. Emphasis added. At a workshop where his results were presented, the principal investigator advised that indoor air pollution source elimination and reduction were the first choice in dealing with indoor air pollution. http://www.arb.ca.gov/research/seminars/offermann/offermann.htm.

Relying On "Low-Emitting" Certifications Is Likewise Not Effective

Relying on so-called "low-emitting" certifications from organizations like Greenguard is likewise ineffective for the residential environment. Greenguard assumes an unrealistically high fresh air dilution rate in making its certification decisions. Specifically, Greenguard uses ASHRAE 62.1 ventilation rates for ***commercial buildings*** (http://www.greenguard.org/Default.aspx?tabid=109) or the California ES-1350 ventilation rates for ***school classrooms*** (http://www.greenguard.org/Default.aspx?tabid=110). Such ventilation rates are approximately one air change per hour (ACH), depending on the size of the building and the number of people to be present. But typical ventilation rates in new homes are much lower – closer to 0.25 for a new single family home. http://www.berkeleyanalytical.com/UserFiles/File/BAA_WP_07-02_Residential_Exposure_Scenarios_092007.pdf . This means that the actual indoor air concentration of formaldehyde from a Greenguard certified product could be up to four times the certification level. This is important as even Greenguard has recognized that formaldehyde can cause health impacts at low concentrations:

> Because studies show that irritation may occur at very low levels (8 parts per billion or less in the air), government agencies and standards setting organization placed limits on acceptable levels.

Indoor Air Guardian, Greenguard Environmental Institute (February 20, 2008) – E-mail edition.

The California Department of Public Health recently proposed a true residential scenario for its ES-1350 product emissions impact analysis methodology. The proposed single family residential scenario reflects a more realistic ventilation rate of 0.23 ACH. http://www.cal-iaq.org/VOC/CDPH_Standard_Method_1-1_draft_2009-10-19.pdf

Incidental Benefits From Requiring Formaldehyde-Free Building Materials Complement Other Important EPA Policies

Requiring formaldehyde-free building materials for Code-compliant homes also strongly complements important and related US EPA and CalEPA policies. First, when manufacturers switch away from formaldehyde-based formulations, factory worker formaldehyde exposures are greatly reduced or eliminated. This makes for a healthier worker population. Second, factory emissions of formaldehyde can be substantially reduced or eliminated if a switch is made to formaldehyde-free formulations. This is certainly true for JM as US EPA formally recognized in writing that JM's plants making building insulation are exempt from the hazardous air pollutant MACT regulations applicable to the rest of the industry.

Second, many formaldehyde-based binder systems require large-scale refrigeration of stored binder components. This is because the phenol-formaldehyde binder is highly reactive at room temperature and must be kept cold before use to prevent premature cure. By switching to a non-formaldehyde binder, JM has eliminated the need for this refrigeration and has thereby substantially reduced its carbon footprint.

Other Agencies Recommend Formaldehyde-Free Building Materials

The California Air Resources Board (CARB) has published recommendations on formaldehyde exposure from building materials. Specifically, CARB first published its Fact Sheet entitled "Reducing Your Exposure to Formaldehyde" (Aug. 2004) at http://www.arb.ca.gov/research/indoor/formaldfs08-04.pdf . Because CARB had previously declared formaldehyde a Toxic Air Contaminant, based on its potential to contribute to cancer risk, CARB explained that removing or reducing the formaldehyde sources in the home will reduce the risks to home occupants. One of the steps CARB recommended is to use formaldehyde-free insulation. CARB then published its Indoor Air Quality Guideline entitled "Formaldehyde in the Home" (Aug. 2004), at http://www.arb.ca.gov/research/indoor/formaldGL08-04.pdf . The IAQ Guideline notes that formaldehyde emitted from insulation materials installed in the ceiling or walls can enter living spaces in the home. Accordingly, CARB recommends formaldehyde-free building materials.

These CARB recommendations were made in the wake of the June 2004 action by the International Agency for Research on Cancer (IARC) to move formaldehyde from a Group 2A probable carcinogen to a Group 1 known carcinogen based on nasopharyngeal cancer. http://www.iarc.fr/en/media-centre/pr/2004/pr153.html. On November 3, 2009, IARC extended its Group 1 known carcinogen determination to leukemia. http://monographs.iarc.fr/ENG/Monographs/vol100fintro/100F-introduction.pdf and http://monographs.iarc.fr/ENG/Monographs/vol100f/Summary%20of%20Evaluations%20-%20Master%20set%20posted%20online.pdf.

In 2005 CARB also issued its final report to the California Legislature entitled ***Report on Indoor Air Pollution in California***. In that report CARB noted that virtually all indoor environments exceed California's Office of Environmental Health Hazard Assessment (OEHHA) then existing Chronic Recommended Exposure Level (CREL) of 2.4 ppb for irritant effects and OEHHA's 10-6 excess lifetime cancer risk level of 0.13 ppb.
http://www.arb.ca.gov/research/indoor/ab1173/finalreport.htm

EPA itself had the opportunity in 2005 to comment on the Indoor Air Quality proposal in the US Green Building Council's LEED-NC Version 2.2. USGBC had found it appropriate to cite to the then California chronic reference exposure level (CREL) for formaldehyde of 2.4 ppb as an applicable standard; however, USGBC realized that 2.4 ppb is difficult to achieve and proposed an exception. In its comments, EPA agreed with an interim exception but with a caveat:

> Under potential technologies and strategies we understand the need for the exception to using the CREL for formaldehyde. However, in June 2004 the International Agency for Research on Cancer classified formaldehyde as carcinogenic to humans. Therefore, along with the statement about the exception there should be a sentence about formaldehyde as a carcinogen and that it is best to limit that amount of exposure as much as possible.

Comments of US EPA on LEED-NC Version 2.2; Response to Comments on Draft Standard for Indoor Environmental Quality, Indoor Environmental Quality Prerequisite 1 at pp 71-72, Issue EQc4.3.14 (emphasis added).
http://www.specjm.com/files/pdf/EPAComments_on_LEED_NC.pdf. (It is important to note that the California CREL and 8-hour standard for formaldehyde were recently changed to 7 parts per billion. See below.
http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD1_final.pdf#page=128 .)

Even the formaldehyde trade association, the FCI, continues to recognize the need to reduce exposure: "From a product stewardship perspective, FCI recognizes the general and continuing goal of reduced [formaldehyde] exposure."
http://www.oehha.ca.gov/air/hot_spots/pdf/ResponsesCommentsTSD042408.pdf at page 70.

Requiring Formaldehyde-Free Building Materials Is Consistent With State And Federal And NGO Recommendations On Formaldehyde Exposures

The following are some relevant recommendations from state and federal health and environmental agencies and organizations concerning formaldehyde exposure.

- **16 ppb** – EPA's **Maximum Indoor Air Concentration Standards** for new EPA RTP facilities, ***Leading by Example*: *Two Case Studies Documenting How The Environmental Protection Agency Incorporated Environmental Features into New Buildings*** **(United States Environmental Protection Agency EPA742-R-97-006 December 1997 - Pollution Prevention and Toxics (7409) Environmentally Preferable Purchasing Program),** http://www.epa.gov/epp/pubs/case/grnbldg.pdf at page 54 (pdf page 78); Testing for Indoor Air Quality - http://www.epa.gov/rtp/campus/environmental/018109.pdf at page 3.
- **16 ppb** - National Institute of Occupational Safety and Health (NIOSH) Maximum allowable exposure for an 8-hour period, http://www.cdc.gov/niosh/npg/npgd0293.html .
- **8 ppb** - Agency for Toxic Substances and Disease Registry (ATSDR) Chronic minimal risk level, http://www.atsdr.cdc.gov/mrls/index.html .

In spring of 2008, FEMA also adopted a standard of **16 ppb** for formaldehyde in all future temporary disaster housing it purchases. http://www.fema.gov/news/newsrelease.fema?id=43180 . A FEMA spokeswoman said the formaldehyde reductions called for in the new specification are relatively easy to achieve by removing certain fibers, insulation and other components that generate high formaldehyde readings. Copy attached.

AP report on new FEMA formalde...

Perhaps the most recent action in this area was by OEHHA which adopted new formaldehyde reference levels as follows:

Formaldehyde Acute REL *Reference Exposure Level* **55 µg/m³ (44 ppb)**
Critical effect(s) Mild and moderate eye irritation
Hazard Index target(s) Eye irritation

Formaldehyde 8-Hour REL
Reference Exposure Level **9 µg/m³ (7 ppb)**
Critical effect(s) Nasal obstruction and discomfort, lower airway discomfort, and eye irritation
Hazard Index target(s) Respiratory

Formaldehyde Chronic REL
Reference Exposure Level **9 µg/m³ (7 ppb)**
Critical effect(s) Nasal obstruction and discomfort, lower airway discomfort, and eye irritation
Hazard Index target(s) Respiratory

http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD1_final.pdf#page=128

Conclusion

The state government should encourage the use of safer materials that are now widely available across the country from multiple manufacturers. Homes, offices and classrooms seeking to meet state green building criteria should be more energy efficient as well as healthier and safer for our families, our workers and our students.

Now is the time for the state to follow other green building organizations and environmental agencies and require the use of formaldehyde-free building materials, including building thermal and acoustical insulation. Using such cost-effective, widely available and off-the-shelf products will make our homes healthier and safer for our families, workers and students and help achieve other state pollution prevention goals in and around building materials factories.