ZONING ADJUSTMENTS BOARD

MEMORANDUM

FOR BOARD ACTION
APRIL 27, 2023

# 2900-20 Shattuck Avenue

**Use Permit #ZP2022-0116 to demolish a commercial building and construct a 10-story (110 feet, 4 inches), 113,948-square-foot, mixed-use building with 221 dwelling units (including 22 Very Low-Income Density Bonus qualifying units), 4,090 square feet commercial space, and nine parking spaces.**

## Recommendation for Continuance

The ZAB Secretary is recommending continuance of the hearing for Use Permit #ZP2022-0116, 2900-20 Shattuck Avenue to a date uncertain, to allow for the preparation of an Initial Study for the project proposal, in order to satisfy State requirements under the California Environmental Quality Act (CEQA).

It has come to staff's attention that the project site is a Hazardous Waste Site that is listed on a State "Cortese List" (pursuant to Government Code Section 65962.5). Staff has confirmed that the project site appears on the State Water Board's GeoTracker database of sites that contain a Leaking Underground Storage Tank (LUST), and is associated with Case #T0600101310, Southwick Chrysler Plymouth, 2900 Shattuck Avenue. The LUST cleanup case was declared closed by the City of Berkeley on October 17, 1995.

Pursuant to Government Code section 15300.2(e), a categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code. Consequently, staff recommends that the project undergo an Initial Study pursuant to CEQA to determine whether an Environmental Impact Report is required. When the CEQA review is complete, staff will schedule the date for the continued hearing for a decision on the use permit.

## Jacob, Melinda

**From:** Zoning Adjustments Board (ZAB)
**Subject:** FW: Comments re: ZAB Meeting, Item No. 10, 2900-20 Shattuck Avenue - Apr. 27, 2023 ZAB Meeting
**Attachments:** 2023.04.25 LIUNA Comment w Attachments - Final.pdf

**From:** Michael Lozeau <michael@lozeaudrury.com>
**Sent:** Tuesday, April 25, 2023 3:14 PM
**To:** Zoning Adjustments Board (ZAB) <Planningzab@cityofberkeley.info>
**Cc:** Hannah Hughes <hannah@lozeaudrury.com>
**Subject:** Comments re: ZAB Meeting, Item No. 10, 2900-20 Shattuck Avenue - Apr. 27, 2023 ZAB Meeting



Dear Zoning Adjustments Board Secretary,

Attached please find comments submitted on behalf of Laborers International Union of North America, Local Union 304 regarding the 2900-20 Shattuck Avenue project being considered by the ZAB at this Thursday's meeting. If you could please confirm receipt of these comments would be appreciated. Thank you for considering this input.

Sincerely,

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April 25, 2023

Land Use Planning Division
Attn: Zoning Adjustments Board Secretary
1947 Center Street, 2nd Floor
Berkeley, CA 94704
zab@cityofberkeley.info

Re: Comments on Application for Use Permit #ZP2022-0116 for 2900-2920 Shattuck Avenue Zoning Adjustments Board, April 27, 2023 Meeting, Item No. 10; Request for Notice of Decision

Dear Members of the Berkeley Zoning Adjustments Board,

I am writing on behalf of the Laborers International Union of North America, Local Union 304 and its members living in Alameda County and/or the City of Berkeley ("LIUNA"), regarding the proposed ten-story mixed-use project proposed for 2900-2920 Shattuck Avenue ("Project"). LIUNA is concerned with staff's proposal that the Project is exempt from environmental review under the California Environmental Quality Act ("CEQA") based on the application of a Class 32 infill exemption, CEQA Guidelines § 15332. Our review of the available documents in the Project file indicates that this determination is in error.

First, the Project site is listed on the State's Cortese List. Any project proposed on a site listed on the Cortese List is forbidden by CEQA from applying any categorical exemption, including the Class 32 infill exemption. Given the site's recorded history of contamination concerns, a CEQA process with the more robust public participation afforded by a mitigated negative declaration or environmental impact report must be used to review the Project.

Second, the Project cannot meet the terms of the Class 32 infill exemption because the City has not shown that the Project will not have any significant air quality or noise impacts. These determinations, based on substantial evidence, are a prerequisite to applying the Class 32 exemption.

Third, the proposed Project includes several unusual circumstances that may have significant environmental effects, including the extraordinary height of the proposed building compared to the maximum five-story height allowed by the applicable zoning and anticipated by the City in prior CEQA documents. Likewise, the Project's circumstances are unusual relative to the in-fill exemption given the Project's immediate proximity to along its western property line to single- and two-story residences which proximity will preclude the full mitigation of the Project's construction noise impacts, especially on such a tall structure, as well as health risks from diesel emissions during construction. The additional height of the propose building also will have significant indoor air pollution and shadow impacts which also evidence the presence of unusual circumstances precluding the Class 32 infill exemption.

As result, the ZAB should refrain from approving the Project and instead instruct staff to prepare an initial study to determine whether a mitigated negative declaration or environmental impact report must be prepared for the Project.

## LEGAL STANDARD

To achieve its objectives of environmental protection, CEQA has a three-tiered structure. (14 CCR § 15002(k); *Committee to Save the Hollywoodland Specific Plan v. City of Los Angeles* (2008) 161 Cal.App.4th 1168, 1185-86.) First, if a project falls into an exempt category, or it can be seen with certainty that the activity in question will not have a significant effect on the environment, no further agency evaluation is required. (*Id.*) Second, if there is a possibility the project will have a significant effect on the environment, the agency must perform an initial threshold study. (*Id.*; 14 CCR § 15063(a).) If the study indicates that there is no substantial evidence that the project or any of its aspects may cause a significant effect on the environment the agency may issue a negative declaration. (*Id.*; 14 CCR §§ 15063(b)(2), 15070.) Finally, if the project will have a significant effect on the environment, an EIR is required. (*Id.*)

The classes of projects which are exempt from the provisions of CEQA are called categorical exemptions. (14 CCR §§ 15300, 15354.) "Exemptions to CEQA are narrowly construed and '[e]xemption categories are not to be expanded beyond the reasonable scope of their statutory language.' [Citations]." (*Mountain Lion Foundation v. Fish & Game Com.* (1997) 16 Cal.4th 105, 125.) The determination as to the appropriate scope of a categorical exemption is a question of law subject to independent, or de novo, review. (*San Lorenzo Valley Community Advocates for Responsible Education v. San Lorenzo Valley Unified School Dist.*, (2006) 139 Cal. App. 4th 1356, 1375 ["[Q]uestions of interpretation or application of the requirements of CEQA are matters of law. [Citations.] Thus, for example, interpreting the scope of a CEQA exemption presents 'a question of law, subject to de novo review by this court.' [Citations]."].)

The Class 32 infill exemption provides:

> Class 32 consists of projects characterized as in-fill development meeting the conditions described in this section.
>
> (a) The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.
> (b) The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.
> (c) The project site has no value, as habitat for endangered, rare or threatened species.
> (d) Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.
> (e) The site can be adequately served by all required utilities and public services.

(14 CCR § 15332.)

A number of important exceptions apply to categorical exemptions, including the Class 32 infill exemption.

First, projects located on a site included on any list in Govt C §65962.5 (lists of hazardous waste and substance facilities and sites, and public drinking wells with organic contaminants) may not be exempted from CEQA. (Pub Res C §21084(d); 14 Cal Code Regs §15300.2(e).) As section 21084(c) of CEQA states:

> No project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code [Cortese List] shall be exempted from this division pursuant to subdivision (a) [categorical exemptions].

(PRC § 21084(c).) The CEQA Guidelines also include this exception. 14 CCR §15300.2(e) [a categorical exemption "shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code].) "The provisions in Government Code Section 65962.5 are commonly referred to as the 'Cortese List'" A Cortese listing can be effected for "underground storage tanks for which an unauthorized release report is filed pursuant to Section 25295 of the Health and Safety Code." Govt. Code § 65962.5(c)(1). The GeoTracker list is one of the lists in the Cortese List.

Second, under Guidelines section 15300.2(c), "[a] categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances." In *Berkeley Hillside Preservation v. City of Berkeley*, the California Supreme Court explained that there are two ways a party may invoke the unusual circumstances exception. First, "a party may establish an unusual circumstance with evidence that the project *will* have a significant environmental effect. That evidence, if convincing, necessarily also establishes 'a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.'" (*Berkeley Hillside Preservation v. City of Berkeley* (2015) 60 Cal.4th 1086, 1105 [emph. added].)

Alternatively, "[a] party invoking the exception may establish an unusual circumstance without evidence of an environmental effect, by showing that the project has some feature that distinguishes it from others in the exempt class, such as its size or location." *Id.* Where substantial evidence shows that an unusual circumstance is present, "to render the exception applicable, the party need only show a reasonable possibility of a significant effect due to that unusual circumstance." (*Id.*; *see also IBC Bus. Owners for Sensible Dev. v. City of Irvine* (2023) 88 Cal.App.5th 100, 132.) "The two elements are reviewed under different standards of review. The first is reviewed for substantial evidence, while the second is examined under the fair argument standard." (*Id.*)

> Under the latter standard, we "review[ ] the evidence to see if there is a fair argument of a reasonable possibility the project will have a significant effect on the environment. [Citation.] If there is substantial evidence of a reasonable possibility the project will have such an effect, the agency may not rely on the exemption even if there is evidence to the contrary." (*Protect Tustin Ranch v. City of Tustin* (2021) 70 Cal.App.5th 951, 962, 285 Cal.Rptr.3d 775.) "The fair argument standard creates a low threshold favoring future environmental review and differs markedly from the

deferential substantial evidence standard of review normally enjoyed by agencies." (*Citizens for a Sustainable Treasure Island, supra*, 227 Cal.App.4th at p. 1049, 174 Cal.Rptr.3d 363.)

## DISCUSSION

### I. The Class 32 Exemption Cannot be Relied on by the City Because the Project Site is Listed on the Cortese List.

The presence of the Project site precludes the City's application of the Class 32 infill exemption. The site is included on the Cortese list. *See* attachments at Exhibit A. *See also* Pangea, Phase I Environmental Assessment, pp. 14, 15, 20 (Feb. 9, 2017) (included in Project application). As a result, CEQA prohibits the City from utilizing the Class 32 infill exemption for this Project. Instead, the City must prepare an initial study, followed by either a mitigated negative declaration or EIR for the Project.

### II. The City Cannot Support With Substantial Evidence Findings Pursuant to CEQA Guidelines 15332 That Approval of the Project Would Not Result in Any Significant Effects Relating to Air Quality and Noise.

#### a. There is no Substantial Evidence That the Project Will Not Have Significant Air Quality Impacts from Indoor Air Emissions.

Certified Industrial Hygienist, Francis Offermann, PE, CIH, conducted a review of the proposed Project. Indoor Environmental Engineering Comments (April 24, 2023). Mr. Offermann is a leading expert on indoor air quality and odors and has published extensively on the topics. Mr. Offermann's comment letter and CV are attached as Exhibit B and his comments are summarized here.

Mr. Offermann concludes that the Project will expose residents of the Project to significant impacts related to indoor air quality, and in particular, emissions of the cancer-causing chemical formaldehyde. Mr. Offermann's comments constitute substantial evidence that the Project will result in significant effects relating to air quality, therefore the Class 32 Exemption cannot apply. (*See*, 14 CCR § 15332(d).)

As Mr. Offermann explains, many composite wood products used in building materials and furnishings commonly found in offices, warehouses, residences, and hotels contain formaldehyde-based glues which off-gas formaldehyde over a very long time period. He states, "[t]he primary source of formaldehyde indoors is composite wood products manufactured with urea-formaldehyde resins, such as plywood, medium density fiberboard, and particleboard. These materials are commonly used in building construction for flooring, cabinetry, baseboards, window shades, interior doors, and window and door trims." (Ex. B, pp. 2-3.)

Formaldehyde is a known human carcinogen. Mr. Offermann states that residents of the Project likely will be exposed to a cancer risk from formaldehyde of at least 120 per million ***even assuming*** all materials are compliant with the California Air Resources Board's formaldehyde airborne toxics control measure. (Ex. B, p. 4.) This is far above the Bay Area Air Quality

Management District's ("BAAQMD") CEQA significance threshold for airborne cancer risk of 10 per million. Mr. Offermann's cancer risk calculation of 120 in a million assumes the Project will use current "CARB-compliant" materials. (Ex. B, p. 4.)

In addition to residential exposure, the employees of the commercial space are also expected to experience work-day exposures. (Ex. B, pp. 4-5.) This exposure for employees would result in "significant cancer risks resulting from exposures to formaldehyde released by the building materials and furnishing commonly found in retail buildings." (*Id*.) Assuming eight-hour work days, five days per week for 50 weeks per year, an employee would be exposed to a cancer risk of 17.7 per million, which is nearly double the 10 per million CEQA threshold. (Ex. B, p. 5.)

Mr. Offermann concludes that this significant environmental impact should be analyzed pursuant to CEQA and mitigation measures should be imposed to reduce the risk of formaldehyde exposure. Ex. B, p. 5.) Mr. Offermann identifies mitigation measures that are available to reduce these significant health risks, including the installation of air filters and a requirement that the applicant use only composite wood materials (e.g. hardwood plywood, medium density fiberboard, particleboard) for all interior finish systems that are made with CARB approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins in the buildings' interiors. (Ex. B, pp. 5, 12-13.)

The City has a duty to investigate issues relating to a project's potential environmental impacts, especially those issues raised by an expert's comments. (*See Cty. Sanitation Dist. No. 2 v. Cty. of Kern*, (2005) 127 Cal.App.4th 1544, 1597–598 ("under CEQA, the lead agency bears a burden to investigate potential environmental impacts")). In addition to assessing the Project's potential air quality impacts to residents and workers, Mr. Offermann identifies the investigatory path that the City should be following in developing an MND or EIR to evaluate the Project's future formaldehyde emissions and establishing mitigation measures that reduce the cancer risk below the BAAQMD level. (Ex. B, pp. 6-10.) Such an analysis would be similar in form to the air quality modeling and traffic modeling typically conducted as part of a CEQA review.

The failure to address the project's formaldehyde emissions is contrary to the California Supreme Court's decision in *California Building Industry Ass'n v. Bay Area Air Quality Mgmt. Dist.* (2015) 62 Cal.4th 369, 386 ("*CBIA*"). At issue in *CBIA* was whether the Air District could enact CEQA guidelines that advised lead agencies that they must analyze the impacts of adjacent environmental conditions on a project. The Supreme Court held that CEQA does not generally require lead agencies to consider the environment's effects on a project. (*CBIA*, 62 Cal.4th at 800-801.) However, to the extent a project may exacerbate existing adverse environmental conditions at or near a project site, those would still have to be considered pursuant to CEQA. (*Id*. at 801 ["CEQA calls upon an agency to evaluate existing conditions in order to assess whether a project could exacerbate hazards that are already present].) In so holding, the Court expressly held that CEQA's statutory language required lead agencies to disclose and analyze "impacts on ***a project's users or residents*** that arise ***from the project's effects*** on the environment." (*Id*. at 800 [emphasis added].)

The carcinogenic formaldehyde emissions identified by Mr. Offermann are not an existing environmental condition. Those emissions to the air will be from the Project. Residents will be users of the residential units, and employees will be users of the building. Currently, there is

presumably little if any formaldehyde emissions at the site. Once the Project is built, emissions will begin at levels that pose significant health risks. Rather than excusing the City from addressing the impacts of carcinogens emitted into the indoor air from the project, the Supreme Court in *CBIA* expressly finds that this type of effect by the project on the environment and a "project's users and residents" must be addressed in the CEQA process.

The Supreme Court's reasoning is well-grounded in CEQA's statutory language. CEQA expressly includes a project's effects on human beings as an effect on the environment that must be addressed in an environmental review. "Section 21083(b)(3)'s express language, for example, requires a finding of a 'significant effect on the environment' (§ 21083(b)) whenever the 'environmental effects of a project will cause substantial adverse effects *on human beings*, either directly or indirectly.'" (*CBIA*, 62 Cal.4th at 800 [emphasis in original].) Likewise, "the Legislature has made clear—in declarations accompanying CEQA's enactment—that public health and safety are of great importance in the statutory scheme." (*Id*. [citing e.g., §§ 21000, subds. (b), (c), (d), (g), 21001, subds. (b), (d)].) It goes without saying that the hundreds of future residents and employees at the Project are human beings and the health and safety of those workers is as important to CEQA's safeguards as nearby residents currently living near the project site.

It also is noteworthy that, assuming the Project would be built in accordance with the most recent California Green Building Code ("CALGreen") would not resolve the potential indoor air pollution impacts. CalGreen specifies that composite wood products (such as hardwood plywood and particleboard) meet the requirements for formaldehyde as specified in the California Air Resources Board's ("CARB") Air Toxic Control Measures ("ATCM"), Mr. Offermann has advised that "the median lifetime cancer risk is still 120 per million for homes built with CARB compliant composite wood products." (Ex. B, p. 3.) In other words, compliance with CALGreen does not reduce the impact of formaldehyde emissions to less-than-significant levels. Even if the building materials for the Project comply with CALGreen criteria, the City still must prepare an MND or EIR which analyzes and mitigates the impact of formaldehyde emissions to less-than-significant levels.

Because the City has not gathered any substantial evidence to support a determination pursuant to CEQA Guideline § 15332(d) that the Project would not result in any significant effects on air quality that will be breathed by hundreds of future residents, the City cannot rely on that Class 32 infill exemption.

**b. There is no Substantial Evidence That the Project Will Not Result in Significant Health Risks to the Adjacent Residents From Diesel Particulate Matter Emissions.**

The proposed use permit findings and conditions include an option for the Project to either prepare a health risk assessment for the Project prior to the issuance of building permits or equip all construction equipment with "Tier 2 or higher engines and the most effective Verified Diesel Emission Control Strategies (VDECS) available for the engine type…" and noting parenthetically that "Tier 4 engines automatically meet this requirement." Proposed Use Permit Condition #42. No health risk assessment has been provided in the Project's application or other supporting material available to the public. Given the proximity of the Project's construction site to adjacent homes to the rear of the property, and the absence of an equipment inventory or identification of which

VDECS may be used by the Project, a mere Tier 2 commitment and additional unidentified VDECS is not substantial evidence that the Project's diesel particulate matter emissions will not exceed the health risk screening criteria at the adjacent properties. In addition, given the absence of substantial evidence on this topic, the ZAB also cannot support the requisite finding necessary for the issuance of a use permit that the proposed Project "[w]ill not be detrimental to the health, safety, peace, morals, comfort, or general welfare of persons residing or visiting in the area or neighborhood of the proposed use…." (Berkeley Municipal Code ("BMC") § 23.406.040(E)(1)(A).)

**c. There is no Substantial Evidence That the Project Will Not Result in Significant Noise Impacts to the Adjacent Residents During the Project's Construction.**

There does not appear to be any evidence in the record to substantiate the City's proposed finding that the Project would not have any significant noise effects on the adjacent residents. The proposed use permit calls for the future preparation of a Construction Noise Reduction Program to be reviewed and approved by the Zoning Officer. Proposed Use Permit Condition No. 17. However, the list of measures to be included are each subjective and the overall goal to reduce noise impacts "to the maximum extent feasible" does not suggest that noise impacts will be eliminated by this future plan. In order to support the proposed finding that no noise impacts will result from the Project, the City must already have access to the noise reduction plan and evaluate whether or not the noise levels during construction will nevertheless still be significant, especially on the adjacent properties. In addition, given the absence of substantial evidence on noise levels at the adjacent properties during construction, the ZAB also cannot support the requisite finding necessary for the issuance of a use permit that the proposed Project "[w]ill not be detrimental to the health, safety, peace, morals, comfort, or general welfare of persons residing or visiting in the area or neighborhood of the proposed use…." (BMC § 23.406.040(E)(1)(A).)

## III. The Unusual Circumstances Exception Also Precludes Reliance on the Class 32 Exemption.

The Class 32 exemption also is not available for the Project because of the presence of unusual circumstances.

First, Mr. Offermann's expert evidence of the presence of health risks from the use of CARB-compliant composite wood products and, were the City to perform its own evaluation of this issue by properly investigating and identifying the types of composite wood materials to be used in the Project, the City's analysis would show that the Project will have a significant adverse effect on air pollution and resulting health risks to future residents. This impact is an unusual circumstance in the context of the Class 32 infill exemption.

Likewise, a project of this size and scale being constructed adjacent to the backyards of one- and two-story homes will have noise and vibration impacts during construction. In addition, the unusual height of the Project relative to the adjacent neighborhood and homes will have significant shadow impacts. Given the nature of demolition and construction work, its one year or greater duration for this Project (though no mention of the expected construction schedule is evident in the staff report), and the design looming over the adjacent yards, these inevitable

significant impacts on the adjacent properties is an unusual circumstance in the context of the Class 32 infill exemption.

Second, even assuming that the formaldehyde emissions, noise and shadow impacts may only occur, the additional height of building and the resulting increase in construction duration compared to the adjacent one- and two-story residences is an unusual circumstance. (*See IBC Bus. Owners for Sensible Dev.*, 88 Cal.App.5th at 133 (fact that proposed five- to seven-story structures of project adjacent to lower commercial buildings "would tower over the neighboring buildings" was substantial evidence of unusual circumstance); *see id.* at 113-114.) Likewise, the proposed 10-story building dwarfs the three-story maximum generally envisioned by the City for this parcel in the applicable zoning. That unusual circumstance coupled with a fair argument that the Project may have additional significant noise from the construction of the larger project, additional indoor air emission impacts resulting from the larger resident population, and shadow impacts also preclude the application of the Class 32 infill exemption.

This does not mean that the applicant and the City cannot take advantage of the additional density allowed by the Housing Accountability Act. It merely means that the City cannot add the further unauthorized "benefit" to the applicant of by-passing CEQA's environmental review provisions.

## CONCLUSION

The City cannot rely on a Class 32 infill exemption because the Project site is listed on the Cortese list, the Project does not meet the terms of the exemption, and because the unusual circumstances exception to the exemption applies. Accordingly, the City must prepare an initial study to determine the appropriate level of environmental review to undertake pursuant to CEQA. LIUNA reserves the right to supplement these comments in advance of and during public hearings concerning the Project. (*Galante Vineyards v. Monterey Peninsula Water Management Dist.*, 60 Cal. App. 4th 1109, 1121 (1997).) On behalf of LIUNA, I also hereby request to be sent the Notice of Decision for this Project. Thank you for considering these comments.

Sincerely,

Michael R Lozeau

Michael Lozeau
Lozeau | Drury LLP

# EXHIBIT A

STATE WATER RESOURCES CONTROL BOARD
GEOTRACKER

# CASE SUMMARY

REPORT DATE
4/4/1988

HAZARDOUS MATERIAL INCIDENT REPORT FILED WITH OES?

**I. REPORTED BY** -
UNKNOWN

**CREATED BY**
UNKNOWN

**III. SITE LOCATION**

FACILITY NAME
SOUTHWICK CHRYSLER PLYMOUTH

FACILITY ID

FACILITY ADDRESS
2900 SHATTUCK AVE
BERKELEY, CA 94704
ALAMEDA COUNTY

ORIENTATION OF SITE TO STREET

CROSS STREET

**V. SUBSTANCES RELEASED / CONTAMINANT(S) OF CONCERN**
WASTE OIL / MOTOR / HYDRAULIC / LUBRICATING

**VI. DISCOVERY/ABATEMENT**

DATE DISCHARGE BEGAN

| DATE DISCOVERED | HOW DISCOVERED | DESCRIPTION |
|---|---|---|
| 4/4/1988 | Tank Closure | |

| DATE STOPPED | STOP METHOD | DESCRIPTION |
|---|---|---|
| 4/4/1988 | | |

**VII. SOURCE/CAUSE**

SOURCE OF DISCHARGE
Tank

CAUSE OF DISCHARGE
Physc / Mech Damage

DISCHARGE DESCRIPTION

**VIII. CASE TYPE**

CASE TYPE
Soil

**IX. REMEDIAL ACTION**
NO REMEDIAL ACTIONS ENTERED

**X. GENERAL COMMENTS**

**XI. CERTIFICATION**

**I HEREBY CERTIFY THAT THE INFORMATION REPORTED HEREIN IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.**

**XII. REGULATORY USE ONLY**

| LOCAL AGENCY CASE NUMBER | REGIONAL BOARD CASE NUMBER |
|---|---|
| 01-1419 | 01-1419 |

**LOCAL AGENCY**

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BERKELEY, CA 94704

CONTACT DESCRIPTION
City of Berkeley, Planning Dept., Division of Toxics Mgt. Hazardous Materials Specialist II California Registered Geologist California Registered Environmental Assessor I

| PHONE TYPE | PHONE NUMBER | EXTENSION |
|---|---|---|
| Office | (510)-981-7460 | |

**REGIONAL BOARD**

| CONTACT NAME | INITIALS | ORGANIZATION_NAME | EMAIL ADDRESS |
|---|---|---|---|
| Regional Water Board | UUU | SAN FRANCISCO BAY RWQCB (REGION 2) | |

ADDRESS
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OAKLAND, CA 94612

CONTACT DESCRIPTION

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|---|---|---|
| Office | (510)-622-2300 | |
| SCP General Contact | (510)-622-2408 | |
| UST General Contact | (510)-622-3277 | |

# EXHIBIT B

IEE INDOOR ENVIRONMENTAL ENGINEERING IEE
1448 Pine Street, Suite 103 San Francisco, California 94109
Telephone: (415) 567-7700
E-mail: offermann@IEE-SF.com
http://www.iee-sf.com

Date: April 25, 2023

To: Michael Lozeau
Lozeau | Drury LLP
1939 Harrison Street, Suite 150
Oakland, California 94612

From: Francis J. Offermann PE CIH

Subject: Indoor Air Quality: 2900-2920 Shattuck Avenue Project, Berkeley, CA
(IEE File Reference: P-4703)

Pages: 19

## Indoor Air Quality Impacts

Indoor air quality (IAQ) directly impacts the comfort and health of building occupants, and the achievement of acceptable IAQ in newly constructed and renovated buildings is a well-recognized design objective. For example, IAQ is addressed by major high-performance building rating systems and building codes (California Building Standards Commission, 2014; USGBC, 2014). Indoor air quality in homes is particularly important because occupants, on average, spend approximately ninety percent of their time indoors with the majority of this time spent at home (EPA, 2011). Some segments of the population that are most susceptible to the effects of poor IAQ, such as the very young and the elderly, occupy their homes almost continuously. Additionally, an increasing number of adults are working from home at least some of the time during the workweek. Indoor air quality also is a serious concern for workers in hotels, offices and other business establishments.

The concentrations of many air pollutants often are elevated in homes and other buildings relative to outdoor air because many of the materials and products used indoors contain and release a variety of pollutants to air (Hodgson et al., 2002; Offermann and Hodgson,

2011). With respect to indoor air contaminants for which inhalation is the primary route of exposure, the critical design and construction parameters are the provision of adequate ventilation and the reduction of indoor sources of the contaminants.

**Indoor Formaldehyde Concentrations Impact**. In the California New Home Study (CNHS) of 108 new homes in California (Offermann, 2009), 25 air contaminants were measured, and formaldehyde was identified as the indoor air contaminant with the highest cancer risk as determined by the California Proposition 65 Safe Harbor Levels (OEHHA, 2017a), No Significant Risk Levels (NSRL) for carcinogens. The NSRL is the daily intake level calculated to result in one excess case of cancer in an exposed population of 100,000 (i.e., ten in one million cancer risk) and for formaldehyde is 40 µg/day. The NSRL concentration of formaldehyde that represents a daily dose of 40 µg is 2 µg/m$^3$, assuming a continuous 24-hour exposure, a total daily inhaled air volume of 20 m$^3$, and 100% absorption by the respiratory system. All of the CNHS homes exceeded this NSRL concentration of 2 µg/m$^3$. The median indoor formaldehyde concentration was 36 µg/m$^3$, and ranged from 4.8 to 136 µg/m$^3$, which corresponds to a median exceedance of the 2 µg/m$^3$ NSRL concentration of 18 and a range of 2.3 to 68.

Therefore, the cancer risk of a resident living in a California home with the median indoor formaldehyde concentration of 36 µg/m$^3$, is 180 per million as a result of formaldehyde alone. The CEQA significance threshold for airborne cancer risk is 10 per million, as established by the Bay Area Air Quality Management District (BAAQMD, 2017).

Besides being a human carcinogen, formaldehyde is also a potent eye and respiratory irritant. In the CNHS, many homes exceeded the non-cancer reference exposure levels (RELs) prescribed by California Office of Environmental Health Hazard Assessment (OEHHA, 2017b). The percentage of homes exceeding the RELs ranged from 98% for the Chronic REL of 9 µg/m$^3$ to 28% for the Acute REL of 55 µg/m$^3$.

The primary source of formaldehyde indoors is composite wood products manufactured with urea-formaldehyde resins, such as plywood, medium density fiberboard, and

particleboard. These materials are commonly used in building construction for flooring, cabinetry, baseboards, window shades, interior doors, and window and door trims.

In January 2009, the California Air Resources Board (CARB) adopted an airborne toxics control measure (ATCM) to reduce formaldehyde emissions from composite wood products, including hardwood plywood, particleboard, medium density fiberboard, and also furniture and other finished products made with these wood products (California Air Resources Board 2009). While this formaldehyde ATCM has resulted in reduced emissions from composite wood products sold in California, they do not preclude that homes built with composite wood products meeting the CARB ATCM will have indoor formaldehyde concentrations below cancer and non-cancer exposure guidelines.

A follow up study to the California New Home Study (CNHS) was conducted in 2016-2018 (Singer et. al., 2019), and found that the median indoor formaldehyde in new homes built after 2009 with CARB Phase 2 Formaldehyde ATCM materials had lower indoor formaldehyde concentrations, with a median indoor concentrations of 22.4 µg/m$^3$ (18.2 ppb) as compared to a median of 36 µg/m$^3$ found in the 2007 CNHS. Unlike in the CNHS study where formaldehyde concentrations were measured with pumped DNPH samplers, the formaldehyde concentrations in the HENGH study were measured with passive samplers, which were estimated to under-measure the true indoor formaldehyde concentrations by approximately 7.5%. Applying this correction to the HENGH indoor formaldehyde concentrations results in a median indoor concentration of 24.1 µg/m$^3$, which is 33% lower than the 36 µg/m$^3$ found in the 2007 CNHS.

Thus, while new homes built after the 2009 CARB formaldehyde ATCM have a 33% lower median indoor formaldehyde concentration and cancer risk, the median lifetime cancer risk is still 120 per million for homes built with CARB compliant composite wood products. This median lifetime cancer risk is more than 12 times the OEHHA 10 in a million cancer risk threshold (OEHHA, 2017a).

With respect to 2900-2920 Shattuck Avenue Project, Berkeley, CA, the buildings consist of residential spaces and commercial spaces.

The residential occupants will potentially have continuous exposure (e.g. 24 hours per day, 52 weeks per year). These exposures are anticipated to result in significant cancer risks resulting from exposures to formaldehyde released by the building materials and furnishing commonly found in residential construction.

Because these residences will be constructed with CARB Phase 2 Formaldehyde ATCM materials, and be ventilated with the minimum code required amount of outdoor air, the indoor residential formaldehyde concentrations are likely similar to those concentrations observed in residences built with CARB Phase 2 Formaldehyde ATCM materials, which is a median of 24.1 $\mu g/m^3$ (Singer et. al., 2020).

Assuming that the residential occupants inhale 20 $m^3$ of air per day, the average 70-year lifetime formaldehyde daily dose is 482 µg/day for continuous exposure in the residences. This exposure represents a cancer risk of 120 per million, which is more than 12 times the CEQA cancer risk of 10 per million. For occupants that do not have continuous exposure, the cancer risk will be proportionally less but still substantially over the CEQA cancer risk of 10 per million (e.g. for 12/hour/day occupancy, more than 6 times the CEQA cancer risk of 10 per million).

The employees of the commercial spaces are expected to experience significant indoor exposures (e.g., 40 hours per week, 50 weeks per year). These exposures for employees are anticipated to result in significant cancer risks resulting from exposures to formaldehyde released by the building materials and furnishing commonly found in offices, warehouses, residences and hotels.

Because the commercial spaces will be constructed with CARB Phase 2 Formaldehyde ATCM materials, and be ventilated with the minimum code required amount of outdoor air, the indoor formaldehyde concentrations are likely similar to those concentrations observed in residences built with CARB Phase 2 Formaldehyde ATCM materials, which is a median of 24.1 $\mu g/m^3$ (Singer et. al., 2020)

Assuming that the employees of commercial spaces work 8 hours per day and inhale 20 $m^3$ of air per day, the formaldehyde dose per work-day at the offices is 161 µg/day.

Assuming that these employees work 5 days per week and 50 weeks per year for 45 years (start at age 20 and retire at age 65) the average 70-year lifetime formaldehyde daily dose is 70.9 µg/day.

This is 1.77 times the NSRL (OEHHA, 2017a) of 40 µg/day and represents a cancer risk of 17.7 per million, which exceeds the CEQA cancer risk of 10 per million. This impact should be analyzed in an environmental impact report ("EIR"), and the agency should impose all feasible mitigation measures to reduce this impact. Several feasible mitigation measures are discussed below and these and other measures should be analyzed in an EIR.

In addition, we note that the average outdoor air concentration of formaldehyde in California is 3 ppb, or 3.7 µg/$m^3$, (California Air Resources Board, 2004), and thus represents an average pre-existing background airborne cancer risk of 1.85 per million. Thus, the indoor air formaldehyde exposures describe above exacerbate this pre-existing risk resulting from outdoor air formaldehyde exposures.

Appendix A, Indoor Formaldehyde Concentrations and the CARB Formaldehyde ATCM, provides analyses that show utilization of CARB Phase 2 Formaldehyde ATCM materials will not ensure acceptable cancer risks with respect to formaldehyde emissions from composite wood products.

Even composite wood products manufactured with CARB certified ultra-low emitting formaldehyde (ULEF) resins do not insure that the indoor air will have concentrations of formaldehyde the meet the OEHHA cancer risks that substantially exceed 10 per million. The permissible emission rates for ULEF composite wood products are only 11-15% lower than the CARB Phase 2 emission rates. Only use of composite wood products made with no-added formaldehyde resins (NAF), such as resins made from soy, polyvinyl acetate, or methylene diisocyanate can insure that the OEHHA cancer risk of 10 per million is met.

The following describes a method that should be used, prior to construction in the environmental review under CEQA, for determining whether the indoor concentrations resulting from the formaldehyde emissions of specific building materials/furnishings selected exceed cancer and non-cancer guidelines. Such a design analyses can be used to identify those materials/furnishings prior to the completion of the City's CEQA review and project approval, that have formaldehyde emission rates that contribute to indoor concentrations that exceed cancer and non-cancer guidelines, so that alternative lower emitting materials/furnishings may be selected and/or higher minimum outdoor air ventilation rates can be increased to achieve acceptable indoor concentrations and incorporated as mitigation measures for this project.

Pre-Construction Building Material/Furnishing Formaldehyde Emissions Assessment

This formaldehyde emissions assessment should be used in the environmental review under CEQA to assess the indoor formaldehyde concentrations from the proposed loading of building materials/furnishings, the area-specific formaldehyde emission rate data for building materials/furnishings, and the design minimum outdoor air ventilation rates. This assessment allows the applicant (and the City) to determine, before the conclusion of the environmental review process and the building materials/furnishings are specified, purchased, and installed, if the total chemical emissions will exceed cancer and non-cancer guidelines, and if so, allow for changes in the selection of specific material/furnishings and/or the design minimum outdoor air ventilations rates such that cancer and non-cancer guidelines are not exceeded.

1.) Define Indoor Air Quality Zones. Divide the building into separate indoor air quality zones, (IAQ Zones). IAQ Zones are defined as areas of well-mixed air. Thus, each ventilation system with recirculating air is considered a single zone, and each room or group of rooms where air is not recirculated (e.g. 100% outdoor air) is considered a separate zone. For IAQ Zones with the same construction material/furnishings and design minimum outdoor air ventilation rates. (e.g. hotel rooms, apartments, condominiums, etc.) the formaldehyde emission rates need only be assessed for a single IAQ Zone of that type.

2.) Calculate Material/Furnishing Loading. For each IAQ Zone, determine the building material and furnishing loadings (e.g., $m^2$ of material/$m^2$ floor area, units of furnishings/$m^2$ floor area) from an inventory of all potential indoor formaldehyde sources, including flooring, ceiling tiles, furnishings, finishes, insulation, sealants, adhesives, and any products constructed with composite wood products containing urea-formaldehyde resins (e.g., plywood, medium density fiberboard, particleboard).

3.) Calculate the Formaldehyde Emission Rate. For each building material, calculate the formaldehyde emission rate (µg/h) from the product of the area-specific formaldehyde emission rate (µg/$m^2$-h) and the area ($m^2$) of material in the IAQ Zone, and from each furnishing (e.g. chairs, desks, etc.) from the unit-specific formaldehyde emission rate (µg/unit-h) and the number of units in the IAQ Zone.

NOTE: As a result of the high-performance building rating systems and building codes (California Building Standards Commission, 2014; USGBC, 2014), most manufacturers of building materials furnishings sold in the United States conduct chemical emission rate tests using the California Department of Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers," (CDPH, 2017), or other equivalent chemical emission rate testing methods. Most manufacturers of building furnishings sold in the United States conduct chemical emission rate tests using ANSI/BIFMA M7.1 Standard Test Method for Determining VOC Emissions (BIFMA, 2018), or other equivalent chemical emission rate testing methods.

CDPH, BIFMA, and other chemical emission rate testing programs, typically certify that a material or furnishing does not create indoor chemical concentrations in excess of the maximum concentrations permitted by their certification. For instance, the CDPH emission rate testing requires that the measured emission rates when input into an office, school, or residential model do not exceed one-half of the OEHHA Chronic Exposure Guidelines (OEHHA, 2017b) for the 35 specific VOCs, including formaldehyde, listed in Table 4-1 of the CDPH test method (CDPH, 2017). These certifications themselves do not provide the actual area-specific formaldehyde emission rate (i.e., µg/$m^2$-h) of the product, but rather provide data that the formaldehyde emission rates do not exceed the maximum rate allowed

for the certification. Thus, for example, the data for a certification of a specific type of flooring may be used to calculate that the area-specific emission rate of formaldehyde is less than 31 µg/$m^2$-h, but not the actual measured specific emission rate, which may be 3, 18, or 30 µg/$m^2$-h. These area-specific emission rates determined from the product certifications of CDPH, BIFA, and other certification programs can be used as an initial estimate of the formaldehyde emission rate.

If the actual area-specific emission rates of a building material or furnishing is needed (i.e. the initial emission rates estimates from the product certifications are higher than desired), then that data can be acquired by requesting from the manufacturer the complete chemical emission rate test report. For instance if the complete CDPH emission test report is requested for a CDHP certified product, that report will provide the actual area-specific emission rates for not only the 35 specific VOCs, including formaldehyde, listed in Table 4-1 of the CDPH test method (CDPH, 2017), but also all of the cancer and reproductive/developmental chemicals listed in the California Proposition 65 Safe Harbor Levels (OEHHA, 2017a), all of the toxic air contaminants (TACs) in the California Air Resources Board Toxic Air Contamination List (CARB, 2011), and the 10 chemicals with the greatest emission rates.

Alternatively, a sample of the building material or furnishing can be submitted to a chemical emission rate testing laboratory, such as Berkeley Analytical Laboratory (https://berkeleyanalytical.com), to measure the formaldehyde emission rate.

4.) Calculate the Total Formaldehyde Emission Rate. For each IAQ Zone, calculate the total formaldehyde emission rate (i.e. µg/h) from the individual formaldehyde emission rates from each of the building material/furnishings as determined in Step 3.

5.) Calculate the Indoor Formaldehyde Concentration. For each IAQ Zone, calculate the indoor formaldehyde concentration (µg/$m^3$) from Equation 1 by dividing the total formaldehyde emission rates (i.e. µg/h) as determined in Step 4, by the design minimum outdoor air ventilation rate ($m^3$/h) for the IAQ Zone.

$$C_{in} = \frac{E_{total}}{Q_{oa}}$$ (Equation 1)

where:

$C_{in}$ = indoor formaldehyde concentration (µg/m$^3$)

$E_{total}$ = total formaldehyde emission rate (µg/h) into the IAQ Zone.

$Q_{oa}$ = design minimum outdoor air ventilation rate to the IAQ Zone (m$^3$/h)

The above Equation 1 is based upon mass balance theory, and is referenced in Section 3.10.2 "Calculation of Estimated Building Concentrations" of the California Department of Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers", (CDPH, 2017).

6.) Calculate the Indoor Exposure Cancer and Non-Cancer Health Risks. For each IAQ Zone, calculate the cancer and non-cancer health risks from the indoor formaldehyde concentrations determined in Step 5 and as described in the OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines; Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2015).

7.) Mitigate Indoor Formaldehyde Exposures of exceeding the CEQA Cancer and/or Non-Cancer Health Risks. In each IAQ Zone, provide mitigation for any formaldehyde exposure risk as determined in Step 6, that exceeds the CEQA cancer risk of 10 per million or the CEQA non-cancer Hazard Quotient of 1.0.

Provide the source and/or ventilation mitigation required in all IAQ Zones to reduce the health risks of the chemical exposures below the CEQA cancer and non-cancer health risks.

Source mitigation for formaldehyde may include:

1.) reducing the amount materials and/or furnishings that emit formaldehyde
2.) substituting a different material with a lower area-specific emission rate of formaldehyde

Ventilation mitigation for formaldehyde emitted from building materials and/or furnishings may include:

1.) increasing the design minimum outdoor air ventilation rate to the IAQ Zone.

NOTE: Mitigating the formaldehyde emissions through use of less material/furnishings, or use of lower emitting materials/furnishings, is the preferred mitigation option, as mitigation with increased outdoor air ventilation increases initial and operating costs associated with the heating/cooling systems.

Further, we are not asking that the builder "speculate" on what and how much composite materials be used, but rather at the design stage to select composite wood materials based on the formaldehyde emission rates that manufacturers routinely conduct using the California Department of Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers," (CDPH, 2017), and use the procedure described earlier above (i.e. Pre-Construction Building Material/Furnishing Formaldehyde Emissions Assessment) to insure that the materials selected achieve acceptable cancer risks from material off gassing of formaldehyde.

**Outdoor Air Ventilation Impact**. Another important finding of the CNHS, was that the outdoor air ventilation rates in the homes were very low. Outdoor air ventilation is a very important factor influencing the indoor concentrations of air contaminants, as it is the primary removal mechanism of all indoor air generated contaminants. Lower outdoor air exchange rates cause indoor generated air contaminants to accumulate to higher indoor air concentrations. Many homeowners rarely open their windows or doors for ventilation as a result of their concerns for security/safety, noise, dust, and odor concerns (Price, 2007). In the CNHS field study, 32% of the homes did not use their windows during the 24-hour Test Day, and 15% of the homes did not use their windows during the entire preceding week. Most of the homes with no window usage were homes in the winter field session. Thus, a substantial percentage of homeowners never open their windows, especially in the winter season. The median 24-hour measurement was 0.26 air changes per hour (ach), with a range of 0.09 ach to 5.3 ach. A total of 67% of the homes had outdoor air exchange rates below the minimum California Building Code (2001) requirement of 0.35 ach. Thus, the relatively tight envelope construction, combined with the fact that many people never open their

windows for ventilation, results in homes with low outdoor air exchange rates and higher indoor air contaminant concentrations.

According to the Zoning Adjustments Board Staff Report – 2900-20 Shattuck Avenue, Berkeley, CA (City of Berkeley, 2023), the Project is close to roads with moderate to high traffic (e.g., Shattuck Avenue, Adeline Street, Ashby Avenue, Russell Street, Newbury Street etc.). As a result the Project site is a sound impacted site.

According to the Zoning Adjustments Board Staff Report – 2900-20 Shattuck Avenue, Berkeley, CA (City of Berkeley, 2023), no assessment of the ambient noise levels resulting from the local traffic has been conducted. In order to design the building for this Project such that interior noise levels are acceptable, an acoustic study with actual on site measurements of the existing ambient noise levels and modeled future ambient noise levels needs to be conducted. The acoustic study of the existing ambient noise levels should be conducted over a one-week period and report the dBA CNEL or Ldn. This study will allow for the selection of a building envelope and windows with a sufficient STC such that the indoor noise levels are acceptable. A mechanical supply of outdoor air ventilation to allow for a habitable interior environment with closed windows and doors will also be required. Such a ventilation system would allow windows and doors to be kept closed at the occupant's discretion to control exterior noise within building interiors.

**$PM_{2.5}$ Outdoor Concentrations Impact**. An additional impact of the nearby motor vehicle traffic associated with this project, are the outdoor concentrations of $PM_{2.5}$. According to the Zoning Adjustments Board Staff Report – 2900-20 Shattuck Avenue, Berkeley, CA (City of Berkeley, 2023), the Project is located in the San Francisco Bay Area Basin, which is a State and Federal non-attainment area for $PM_{2.5}$.

An air quality analyses should be conducted to determine the concentrations of $PM_{2.5}$ in the outdoor and indoor air that people inhale each day. This air quality analyses needs to consider the cumulative impacts of the project related emissions, existing and projected future emissions from local $PM_{2.5}$ sources (e.g. stationary sources, motor vehicles, and airport traffic) upon the outdoor air concentrations at the Project site. If the outdoor

concentrations are determined to exceed the California and National annual average $PM_{2.5}$ exceedence concentration of 12 µg/$m^3$, or the National 24-hour average exceedence concentration of 35 µg/$m^3$, then the buildings need to have a mechanical supply of outdoor air that has air filtration with sufficient removal efficiency, such that the indoor concentrations of outdoor $PM_{2.5}$ particles is less than the California and National $PM_{2.5}$ annual and 24-hour standards.

It is my experience that based on the projected high traffic noise levels, the annual average concentration of $PM_{2.5}$ will exceed the California and National $PM_{2.5}$ annual and 24-hour standards and warrant installation of high efficiency air filters (i.e. MERV 13 or higher) in all mechanically supplied outdoor air ventilation systems.

**Indoor Air Quality Impact Mitigation Measures**

The following are recommended mitigation measures to minimize the impacts upon indoor quality:

Indoor Formaldehyde Concentrations Mitigation. Use only composite wood materials (e.g. hardwood plywood, medium density fiberboard, particleboard) for all interior finish systems that are made with CARB approved no-added formaldehyde (NAF) resins (CARB, 2009). CARB Phase 2 certified composite wood products, or ultra-low emitting formaldehyde (ULEF) resins, do not insure indoor formaldehyde concentrations that are below the CEQA cancer risk of 10 per million. Only composite wood products manufactured with CARB approved no-added formaldehyde (NAF) resins, such as resins made from soy, polyvinyl acetate, or methylene diisocyanate can insure that the OEHHA cancer risk of 10 per million is met.

Alternatively, conduct the previously described Pre-Construction Building Material/Furnishing Chemical Emissions Assessment, to determine that the combination of formaldehyde emissions from building materials and furnishings do not create indoor formaldehyde concentrations that exceed the CEQA cancer and non-cancer health risks.

It is important to note that we are not asking that the builder "speculate" on what and how much composite materials be used, but rather at the design stage to select composite wood materials based on the formaldehyde emission rates that manufacturers routinely conduct using the California Department of Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers", (CDPH, 2017), and use the procedure described above (i.e. Pre-Construction Building Material/Furnishing Formaldehyde Emissions Assessment) to insure that the materials selected achieve acceptable cancer risks from material off gassing of formaldehyde.

Outdoor Air Ventilation Mitigation. Provide each habitable room with a continuous mechanical supply of outdoor air that meets or exceeds the California 2016 Building Energy Efficiency Standards (California Energy Commission, 2015) requirements of the greater of 15 cfm/occupant or 0.15 cfm/$ft^2$ of floor area. Following installation of the system conduct testing and balancing to insure that required amount of outdoor air is entering each habitable room and provide a written report documenting the outdoor airflow rates. Do not use exhaust only mechanical outdoor air systems, use only balanced outdoor air supply and exhaust systems or outdoor air supply only systems. Provide a manual for the occupants or maintenance personnel, that describes the purpose of the mechanical outdoor air system and the operation and maintenance requirements of the system.

$PM_{2.5}$ Outdoor Air Concentration Mitigation. Install air filtration with sufficient $PM_{2.5}$ removal efficiency (e.g. MERV 13 or higher) to filter the outdoor air entering the mechanical outdoor air supply systems, such that the indoor concentrations of outdoor $PM_{2.5}$ particles are less than the California and National $PM_{2.5}$ annual and 24-hour standards. Install the air filters in the system such that they are accessible for replacement by the occupants or maintenance personnel. Include in the mechanical outdoor air ventilation system manual instructions on how to replace the air filters and the estimated frequency of replacement.

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APPENDIX A

INDOOR FORMALDEHYDE CONCENTRATIONS
AND THE
CARB FORMALDEHYDE ATCM

With respect to formaldehyde emissions from composite wood products, the CARB ATCM regulations of formaldehyde emissions from composite wood products, do not assure healthful indoor air quality. The following is the stated purpose of the CARB ATCM regulation - *The purpose of this airborne toxic control measure is to "reduce formaldehyde emissions from composite wood products, and finished goods that contain composite wood products, that are sold, offered for sale, supplied, used, or manufactured for sale in California".* In other words, the CARB ATCM regulations do not "assure healthful indoor air quality", but rather "reduce formaldehyde emissions from composite wood products".

Just how much protection do the CARB ATCM regulations provide building occupants from the formaldehyde emissions generated by composite wood products? Definitely some, but certainly the regulations do not "*assure healthful indoor air quality"* when CARB Phase 2 products are utilized. As shown in the Chan 2019 study of new California homes, the median indoor formaldehyde concentration was of 22.4 µg/m$^3$ (18.2 ppb), which corresponds to a cancer risk of 112 per million for occupants with continuous exposure, which is more than 11 times the CEQA cancer risk of 10 per million.

Another way of looking at how much protection the CARB ATCM regulations provide building occupants from the formaldehyde emissions generated by composite wood products is to calculate the maximum number of square feet of composite wood product that can be in a residence without exceeding the CEQA cancer risk of 10 per million for occupants with continuous occupancy.

For this calculation I utilized the floor area (2,272 ft$^2$), the ceiling height (8.5 ft), and the number of bedrooms (4) as defined in Appendix B (New Single-Family Residence Scenario) of the Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers, Version 1.1, 2017, California Department of Public Health,

Richmond, CA. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx.

For the outdoor air ventilation rate I used the 2019 Title 24 code required mechanical ventilation rate (ASHRAE 62.2) of 106 cfm (180 $m^3/h$) calculated for this model residence. For the composite wood formaldehyde emission rates I used the CARB ATCM Phase 2 rates.

The calculated maximum number of square feet of composite wood product that can be in a residence, without exceeding the CEQA cancer risk of 10 per million for occupants with continuous occupancy are as follows for the different types of regulated composite wood products.

Medium Density Fiberboard (MDF) – 15 $ft^2$ (0.7% of the floor area), or
Particle Board – 30 $ft^2$ (1.3% of the floor area), or
Hardwood Plywood – 54 $ft^2$ (2.4% of the floor area), or
Thin MDF – 46 $ft^2$ (2.0 % of the floor area).

For offices and hotels the calculated maximum amount of composite wood product (% of floor area) that can be used without exceeding the CEQA cancer risk of 10 per million for occupants, assuming 8 hours/day occupancy, and the California Mechanical Code minimum outdoor air ventilation rates are as follows for the different types of regulated composite wood products.

Medium Density Fiberboard (MDF) – 3.6 % (offices) and 4.6% (hotel rooms), or
Particle Board – 7.2 % (offices) and 9.4% (hotel rooms), or
Hardwood Plywood – 13 % (offices) and 17% (hotel rooms), or
Thin MDF – 11 % (offices) and 14 % (hotel rooms)

Clearly the CARB ATCM does not regulate the formaldehyde emissions from composite wood products such that the potentially large areas of these products, such as for flooring, baseboards, interior doors, window and door trims, and kitchen and bathroom cabinetry, could be used without causing indoor formaldehyde concentrations that result in CEQA

cancer risks that substantially exceed 10 per million for occupants with continuous occupancy.

Even composite wood products manufactured with CARB certified ultra low emitting formaldehyde (ULEF) resins do not insure that the indoor air will have concentrations of formaldehyde the meet the OEHHA cancer risks that substantially exceed 10 per million. The permissible emission rates for ULEF composite wood products are only 11-15% lower than the CARB Phase 2 emission rates. Only use of composite wood products made with no-added formaldehyde resins (NAF), such as resins made from soy, polyvinyl acetate, or methylene diisocyanate can insure that the OEHHA cancer risk of 10 per million is met.

If CARB Phase 2 compliant or ULEF composite wood products are utilized in construction, then the resulting indoor formaldehyde concentrations should be determined in the design phase using the specific amounts of each type of composite wood product, the specific formaldehyde emission rates, and the volume and outdoor air ventilation rates of the indoor spaces, and all feasible mitigation measures employed to reduce this impact (e.g. use less formaldehyde containing composite wood products and/or incorporate mechanical systems capable of higher outdoor air ventilation rates). See the procedure described earlier (i.e. Pre-Construction Building Material/Furnishing Formaldehyde Emissions Assessment) to insure that the materials selected achieve acceptable cancer risks from material off gassing of formaldehyde.

Alternatively, and perhaps a simpler approach, is to use only composite wood products (e.g. hardwood plywood, medium density fiberboard, particleboard) for all interior finish systems that are made with CARB approved no-added formaldehyde (NAF) resins.

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## Education

M.S. Mechanical Engineering (1985)
Stanford University, Stanford, CA.

Graduate Studies in Air Pollution Monitoring and Control (1980)
University of California, Berkeley, CA.

B.S. in Mechanical Engineering (1976)
Rensselaer Polytechnic Institute, Troy, N.Y.

## Professional Experience

President: Indoor Environmental Engineering, San Francisco, CA. December, 1981 - present.

Direct team of environmental scientists, chemists, and mechanical engineers in conducting State and Federal research regarding indoor air quality instrumentation development, building air quality field studies, ventilation and air cleaning performance measurements, and chemical emission rate testing.

Provide design side input to architects regarding selection of building materials and ventilation system components to ensure a high quality indoor environment.

Direct Indoor Air Quality Consulting Team for the winning design proposal for the new State of Washington Ecology Department building.

Develop a full-scale ventilation test facility for measuring the performance of air diffusers; ASHRAE 129, Air Change Effectiveness, and ASHRAE 113, Air Diffusion Performance Index.

Develop a chemical emission rate testing laboratory for measuring the chemical emissions from building materials, furnishings, and equipment.

Principle Investigator of the California New Homes Study (2005-2007). Measured ventilation and indoor air quality in 108 new single family detached homes in northern and southern California.

Develop and teach IAQ professional development workshops to building owners, managers, hygienists, and engineers.

Air Pollution Engineer: Earth Metrics Inc., Burlingame, CA, October, 1985 to March, 1987.

Responsible for development of an air pollution laboratory including installation a forced choice olfactometer, tracer gas electron capture chromatograph, and associated calibration facilities. Field team leader for studies of fugitive odor emissions from sewage treatment plants, entrainment of fume hood exhausts into computer chip fabrication rooms, and indoor air quality investigations.

Staff Scientist: Building Ventilation and Indoor Air Quality Program, Energy and Environment Division, Lawrence Berkeley Laboratory, Berkeley, CA. January, 1980 to August, 1984.

Deputy project leader for the Control Techniques group; responsible for laboratory and field studies aimed at evaluating the performance of indoor air pollutant control strategies (i.e. ventilation, filtration, precipitation, absorption, adsorption, and source control).

Coordinated field and laboratory studies of air-to-air heat exchangers including evaluation of thermal performance, ventilation efficiency, cross-stream contaminant transfer, and the effects of freezing/defrosting.

Developed an *in situ* test protocol for evaluating the performance of air cleaning systems and introduced the concept of effective cleaning rate (ECR) also known as the Clean Air Delivery Rate (CADR).

Coordinated laboratory studies of portable and ducted air cleaning systems and their effect on indoor concentrations of respirable particles and radon progeny.

Co-designed an automated instrument system for measuring residential ventilation rates and radon concentrations.

Designed hardware and software for a multi-channel automated data acquisition system used to evaluate the performance of air-to-air heat transfer equipment.

Assistant Chief Engineer: Alta Bates Hospital, Berkeley, CA, October, 1979 to January, 1980.

Responsible for energy management projects involving installation of power factor correction capacitors on large inductive electrical devices and installation of steam meters on physical plant steam lines. Member of Local 39, International Union of Operating Engineers.

Manufacturing Engineer: American Precision Industries, Buffalo, NY, October, 1977 to October, 1979.

Responsible for reorganizing the manufacturing procedures regarding production of shell and tube heat exchangers. Designed customized automatic assembly, welding, and testing equipment. Designed a large paint spray booth. Prepared economic studies justifying new equipment purchases. Safety Director.

Project Engineer: Arcata Graphics, Buffalo, N.Y. June, 1976 to October, 1977.

Responsible for the design and installation of a bulk ink storage and distribution system and high speed automatic counting and marking equipment. Also coordinated material handling studies which led to the purchase and installation of new equipment.

**PROFESSIONAL ORGANIZATION MEMBERSHIP**

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

- Chairman of SPC-145P, Standards Project Committee - Test Method for Assessing the Performance of Gas Phase Air Cleaning Equipment (1991-1992)
- Member SPC-129P, Standards Project Committee - Test Method for Ventilation Effectiveness (1986-97)
  - Member of Drafting Committee
- Member Environmental Health Committee (1992-1994, 1997-2001, 2007-2010)
  - Chairman of EHC Research Subcommittee
  - Member of Man Made Mineral Fiber Position Paper Subcommittee
  - Member of the IAQ Position Paper Committee
  - Member of the Legionella Position Paper Committee
  - Member of the Limiting Indoor Mold and Dampness in Buildings Position Paper Committee
- Member SSPC-62, Standing Standards Project Committee - Ventilation for Acceptable Indoor Air Quality (1992 to 2000)
  - Chairman of Source Control and Air Cleaning Subcommittee
- Chairman of TC-4.10, Indoor Environmental Modeling (1988-92)
  - Member of Research Subcommittee
- Chairman of TC-2.3, Gaseous Air Contaminants and Control Equipment (1989-92)
  - Member of Research Subcommittee

American Society for Testing and Materials (ASTM)

- D-22 Sampling and Analysis of Atmospheres
  - Member of Indoor Air Quality Subcommittee
- E-06 Performance of Building Constructions

American Board of Industrial Hygiene (ABIH)

American Conference of Governmental Industrial Hygienists (ACGIH)

- Bioaerosols Committee (2007-2013)

American Industrial Hygiene Association (AIHA)

Cal-OSHA Indoor Air Quality Advisory Committee

International Society of Indoor Air Quality and Climate (ISIAQ)

- Co-Chairman of Task Force on HVAC Hygiene

U. S. Green Building Council (USGBC)
- Member of the IEQ Technical Advisory Group (2007-2009)
- Member of the IAQ Performance Testing Work Group (2010-2012)

Western Construction Consultants (WESTCON)

## PROFESSIONAL CREDENTIALS

Licensed Professional Engineer - Mechanical Engineering

Certified Industrial Hygienist - American Board of Industrial Hygienists

## SCIENTIFIC MEETINGS AND SYMPOSIA

Biological Contamination, Diagnosis, and Mitigation, Indoor Air'90, Toronto, Canada, August, 1990.

Models for Predicting Air Quality, Indoor Air'90, Toronto, Canada, August, 1990.

Microbes in Building Materials and Systems, Indoor Air '93, Helsinki, Finland, July, 1993.

Microorganisms in Indoor Air Assessment and Evaluation of Health Effects and Probable Causes, Walnut Creek, CA, February 27, 1997.

Controlling Microbial Moisture Problems in Buildings, Walnut Creek, CA, February 27, 1997.

Scientific Advisory Committee, Roomvent 98, 6$^{th}$ International Conference on Air Distribution in Rooms, KTH, Stockholm, Sweden, June 14-17, 1998.

Moisture and Mould, Indoor Air '99, Edinburgh, Scotland, August, 1999.

Ventilation Modeling and Simulation, Indoor Air '99, Edinburgh, Scotland, August, 1999.

Microbial Growth in Materials, Healthy Buildings 2000, Espoo, Finland, August, 2000.

Co-Chair, Bioaerosols X- Exposures in Residences, Indoor Air 2002, Monterey, CA, July 2002.

Healthy Indoor Environments, Anaheim, CA, April 2003.

Chair, Environmental Tobacco Smoke in Multi-Family Homes, Indoor Air 2008, Copenhagen, Denmark, July 2008.

Co-Chair, ISIAQ Task Force Workshop; HVAC Hygiene, Indoor Air 2002, Monterey, CA, July 2002.

Chair, ETS in Multi-Family Housing: Exposures, Controls, and Legalities Forum, Healthy Buildings 2009, Syracuse, CA, September 14, 2009.

Chair, Energy Conservation and IAQ in Residences Workshop, Indoor Air 2011, Austin, TX, June 6, 2011.

Chair, Electronic Cigarettes: Chemical Emissions and Exposures Colloquium, Indoor Air 2016, Ghent, Belgium, July 4, 2016.

**SPECIAL CONSULTATION**

Provide consultation to the American Home Appliance Manufacturers on the development of a standard for testing portable air cleaners, AHAM Standard AC-1.

Served as an expert witness and special consultant for the U.S. Federal Trade Commission regarding the performance claims found in advertisements of portable air cleaners and residential furnace filters.

Conducted a forensic investigation for a San Mateo, CA pro se defendant, regarding an alleged homicide where the victim was kidnapped in a steamer trunk. Determined the air exchange rate in the steamer trunk and how long the person could survive.

Conducted *in situ* measurement of human exposure to toluene fumes released during nailpolish application for a plaintiffs attorney pursuing a California Proposition 65 product labeling case. June, 1993.

Conducted a forensic *in situ* investigation for the Butte County, CA Sheriff's Department of the emissions of a portable heater used in the bedroom of two twin one year old girls who suffered simultaneous crib death.

Consult with OSHA on the 1995 proposed new regulation regarding indoor air quality and environmental tobacco smoke.

Consult with EPA on the proposed Building Alliance program and with OSHA on the proposed new OSHA IAQ regulation.

Johnson Controls Audit/Certification Expert Review; Milwaukee, WI. May 28-29, 1997.

Winner of the nationally published 1999 Request for Proposals by the State of Washington to conduct a comprehensive indoor air quality investigation of the Washington State Department of Ecology building in Lacey, WA.

Selected by the State of California Attorney General's Office in August, 2000 to conduct a comprehensive indoor air quality investigation of the Tulare County Court House.

Lawrence Berkeley Laboratory IAQ Experts Workshop: "Cause and Prevention of Sick Building Problems in Offices: The Experience of Indoor Environmental Quality Investigators", Berkeley, California, May 26-27, 2004.

Provide consultation and chemical emission rate testing to the State of California Attorney General's Office in 2013-2015 regarding the chemical emissions from e-cigarettes.

**PEER-REVIEWED PUBLICATIONS :**

F.J.Offermann, C.D.Hollowell, and G.D.Roseme, "Low-Infiltration Housing in Rochester, New York: A Study of Air Exchange Rates and Indoor Air Quality," *Environment International*, *8*, pp. 435-445, 1982.

W.W.Nazaroff, F.J.Offermann, and A.W.Robb, "Automated System for Measuring Air Exchange Rate and Radon Concentration in Houses," *Health Physics*, *45*, pp. 525-537, 1983.

F.J.Offermann, W.J.Fisk, D.T.Grimsrud, B.Pedersen, and K.L.Revzan, "Ventilation Efficiencies of Wall- or Window-Mounted Residential Air-to-Air Heat Exchangers," *ASHRAE Annual Transactions*, *89-2B*, pp 507-527, 1983.

W.J.Fisk, K.M.Archer, R.E Chant, D. Hekmat, F.J.Offermann, and B.Pedersen, "Onset of Freezing in Residential Air-to-Air Heat Exchangers," *ASHRAE Annual Transactions*, *91-1B*, 1984.

W.J.Fisk, K.M.Archer, R.E Chant, D. Hekmat, F.J.Offermann, and B.Pedersen, "Performance of Residential Air-to-Air Heat Exchangers During Operation with Freezing and Periodic Defrosts," *ASHRAE Annual Transactions*, *91-1B*, 1984.

F.J.Offermann, R.G.Sextro, W.J.Fisk, D.T.Grimsrud, W.W.Nazaroff, A.V.Nero, and K.L.Revzan, "Control of Respirable Particles with Portable Air Cleaners," *Atmospheric Environment*, Vol. 19, pp.1761-1771, 1985.

R.G.Sextro, F.J.Offermann, W.W.Nazaroff, A.V.Nero, K.L.Revzan, and J.Yater, "Evaluation of Indoor Control Devices and Their Effects on Radon Progeny Concentrations," *Atmospheric Environment*, *12*, pp. 429-438, 1986.

W.J. Fisk, R.K.Spencer, F.J.Offermann, R.K.Spencer, B.Pedersen, R.Sextro, "Indoor Air Quality Control Techniques," *Noyes Data Corporation*, Park Ridge, New Jersey, (1987).

F.J.Offermann, "Ventilation Effectiveness and ADPI Measurements of a Forced Air Heating System," *ASHRAE Transactions* , Volume 94, Part 1, pp 694-704, 1988.

F.J.Offermann and D. Int-Hout "Ventilation Effectiveness Measurements of Three Supply/Return Air Configurations," *Environment International* , Volume 15, pp 585-592 1989.

F.J. Offermann, S.A. Loiselle, M.C. Quinlan, and M.S. Rogers, "A Study of Diesel Fume Entrainment in an Office Building," *IAQ '89*, The Human Equation: Health and Comfort, pp 179-183, ASHRAE, Atlanta, GA, 1989.

R.G.Sextro and F.J.Offermann, "Reduction of Residential Indoor Particle and Radon Progeny Concentrations with Ducted Air Cleaning Systems," submitted to *Indoor Air*, 1990.

S.A.Loiselle, A.T.Hodgson, and F.J.Offermann, "Development of An Indoor Air Sampler for Polycyclic Aromatic Compounds", *Indoor Air* , Vol 2, pp 191-210, 1991.

F.J.Offermann, S.A.Loiselle, A.T.Hodgson, L.A. Gundel, and J.M. Daisey, "A Pilot Study to Measure Indoor Concentrations and Emission Rates of Polycyclic Aromatic Compounds", *Indoor Air* , Vol 4, pp 497-512, 1991.

F.J. Offermann, S. A. Loiselle, R.G. Sextro, "Performance Comparisons of Six Different Air Cleaners Installed in a Residential Forced Air Ventilation System," *IAQ'91*, Healthy Buildings, pp 342-350, ASHRAE, Atlanta, GA (1991).

F.J. Offermann, J. Daisey, A. Hodgson, L. Gundell, and S. Loiselle, "Indoor Concentrations and Emission Rates of Polycyclic Aromatic Compounds", *Indoor Air,* Vol 4, pp 497-512 (1992).

F.J. Offermann, S. A. Loiselle, R.G. Sextro, "Performance of Air Cleaners Installed in a Residential Forced Air System," *ASHRAE Journal*, pp 51-57, July, 1992.

F.J. Offermann and S. A. Loiselle, "Performance of an Air-Cleaning System in an Archival Book Storage Facility," *IAQ'92*, ASHRAE, Atlanta, GA, 1992.

S.B. Hayward, K.S. Liu, L.E. Alevantis, K. Shah, S. Loiselle, F.J. Offermann, Y.L. Chang, L. Webber, "Effectiveness of Ventilation and Other Controls in Reducing Exposure to ETS in Office Buildings," Indoor Air '93, Helsinki, Finland, July 4-8, 1993.

F.J. Offermann, S. A. Loiselle, G. Ander, H. Lau, "Indoor Contaminant Emission Rates Before and After a Building Bake-out," *IAQ'93*, Operating and Maintaining Buildings for Health, Comfort, and Productivity, pp 157-163, ASHRAE, Atlanta, GA, 1993.

L.E. Alevantis, Hayward, S.B., Shah, S.B., Loiselle, S., and Offermann, F.J. "Tracer Gas Techniques for Determination of the Effectiveness of Pollutant Removal From Local Sources," *IAQ '93*, Operating and Maintaining Buildings for Health, Comfort, and Productivity, pp 119-129, ASHRAE, Atlanta, GA, 1993.

L.E. Alevantis, Liu, L.E., Hayward, S.B., Offermann, F.J., Shah, S.B., Leiserson, K. Tsao, E., and Huang, Y., "Effectiveness of Ventilation in 23 Designated Smoking Areas in California Buildings," *IAQ '94*, Engineering Indoor Environments, pp 167-181, ASHRAE, Atlanta, GA, 1994.

L.E. Alevantis, Offermann, F.J., Loiselle, S., and Macher, J.M., "Pressure and Ventilation Requirements of Hospital Isolation Rooms for Tuberculosis (TB) Patients: Existing Guidelines in the United States and a Method for Measuring Room Leakage", Ventilation and Indoor air quality in Hospitals, M. Maroni, editor, Kluwer Academic publishers, Netherlands, 1996.

F.J. Offermann, M. A. Waz, A.T. Hodgson, and H.M. Ammann, "Chemical Emissions from a Hospital Operating Room Air Filter," *IAQ'96*, Paths to Better Building Environments, pp 95-99, ASHRAE, Atlanta, GA, 1996.

F.J. Offermann, "Professional Malpractice and the Sick Building Investigator," *IAQ'96*, Paths to Better Building Environments, pp 132-136, ASHRAE, Atlanta, GA, 1996.

F.J. Offermann, "Standard Method of Measuring Air Change Effectiveness," *Indoor Air*, Vol 1, pp.206-211, 1999.

F. J. Offermann, A. T. Hodgson, and J. P. Robertson, "Contaminant Emission Rates from PVC Backed Carpet Tiles on Damp Concrete", Healthy Buildings 2000, Espoo, Finland, August 2000.

K.S. Liu, L.E. Alevantis, and F.J. Offermann, "A Survey of Environmental Tobacco Smoke Controls in California Office Buildings", *Indoor Air*, Vol 11, pp. 26-34, 2001.

F.J. Offermann, R. Colfer, P. Radzinski, and J. Robertson, "Exposure to Environmental Tobacco Smoke in an Automobile", Indoor Air 2002, Monterey, California, July 2002.

F. J. Offermann, J.P. Robertson, and T. Webster, "The Impact of Tracer Gas Mixing on Airflow Rate Measurements in Large Commercial Fan Systems", Indoor Air 2002, Monterey, California, July 2002.

M. J. Mendell, T. Brennan, L. Hathon, J.D. Odom, F.J.Offermann, B.H. Turk, K.M. Wallingford, R.C. Diamond, W.J. Fisk, "Causes and prevention of Symptom Complaints

in Office Buildings: Distilling the Experience of Indoor Environmental Investigators", submitted to Indoor Air 2005, Beijing, China, September 4-9, 2005.

F.J. Offermann, "Ventilation and IAQ in New Homes With and Without Mechanical Outdoor Air Systems", Healthy Buildings 2009, Syracuse, CA, September 14, 2009.

F.J. Offermann, "ASHRAE 62.2 Intermittent Residential Ventilation: What's It Good For, Intermittently Poor IAQ", IAQVEC 2010, Syracuse, CA, April 21, 2010.

F.J. Offermann and A.T. Hodgson, "Emission Rates of Volatile Organic Compounds in New Homes", Indoor Air 2011, Austin, TX, June, 2011.

P. Jenkins, R. Johnson, T. Phillips, and F. Offermann, "Chemical Concentrations in New California Homes and Garages", Indoor Air 2011, Austin, TX, June, 2011.

W. J. Mills, B. J. Grigg, F. J. Offermann, B. E. Gustin, and N. E. Spingarm, "Toluene and Methyl Ethyl Ketone Exposure from a Commercially Available Contact Adhesive", Journal of Occupational and Environmental Hygiene, 9:D95-D102 May, 2012.

F. J. Offermann, R. Maddalena, J. C. Offermann, B. C. Singer, and H, Wilhelm, "The Impact of Ventilation on the Emission Rates of Volatile Organic Compounds in Residences", HB 2012, Brisbane, AU, July, 2012.

F. J. Offermann, A. T. Hodgson, P. L. Jenkins, R. D. Johnson, and T. J. Phillips, "Attached Garages as a Source of Volatile Organic Compounds in New Homes", HB 2012, Brisbane, CA, July, 2012.

R. Maddalena, N. Li, F. Offermann, and B. Singer, "Maximizing Information from Residential Measurements of Volatile Organic Compounds", HB 2012, Brisbane, AU, July, 2012.

W. Chen, A. Persily, A. Hodgson, F. Offermann, D. Poppendieck, and K. Kumagai, "Area-Specific Airflow Rates for Evaluating the Impacts of VOC emissions in U.S. Single-Family Homes", Building and Environment, Vol. 71, 204-211, February, 2014.

F. J. Offermann, A. Eagan A. C. Offermann, and L. J. Radonovich, "Infectious Disease Aerosol Exposures With and Without Surge Control Ventilation System Modifications", Indoor Air 2014, Hong Kong, July, 2014.

F. J. Offermann, "Chemical Emissions from E-Cigarettes: Direct and Indirect Passive Exposures", Building and Environment, Vol. 93, Part 1, 101-105, November, 2015.

F. J. Offermann, "Formaldehyde Emission Rates From Lumber Liquidators Laminate Flooring Manufactured in China", Indoor Air 2016, Belgium, Ghent, July, 2016.

F. J. Offermann, "Formaldehyde and Acetaldehyde Emission Rates for E-Cigarettes", Indoor Air 2016, Belgium, Ghent, July, 2016.

**OTHER REPORTS:**

W.J.Fisk, P.G.Cleary, and F.J.Offermann, "Energy Saving Ventilation with Residential Heat Exchangers," a Lawrence Berkeley Laboratory brochure distributed by the Bonneville Power Administration, 1981.

F.J.Offermann, J.R.Girman, and C.D.Hollowell, "Midway House Tightening Project: A Study of Indoor Air Quality," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-12777, 1981.

F.J.Offermann, J.B.Dickinson, W.J.Fisk, D.T.Grimsrud, C.D.Hollowell, D.L.Krinkle, and G.D.Roseme, "Residential Air-Leakage and Indoor Air Quality in Rochester, New York," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-13100, 1982.

F.J.Offermann, W.J.Fisk, B.Pedersen, and K.L.Revzan, Residential Air-to-Air Heat Exchangers: A Study of the Ventilation Efficiencies of Wall- or Window- Mounted Units," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-14358, 1982.

F.J.Offermann, W.J.Fisk, W.W.Nazaroff, and R.G.Sextro, "A Review of Portable Air Cleaners for Controlling Indoor Concentrations of Particulates and Radon Progeny," An interim report for the Bonneville Power Administration, 1983.

W.J.Fisk, K.M.Archer, R.E.Chant, D.Hekmat, F.J.Offermann, and B.S. Pedersen, "Freezing in Residential Air-to-Air Heat Exchangers: An Experimental Study," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-16783, 1983.

R.G.Sextro, W.W.Nazaroff, F.J.Offermann, and K.L.Revzan, "Measurements of Indoor Aerosol Properties and Their Effect on Radon Progeny," Proceedings of the American Association of Aerosol Research Annual Meeting, April, 1983.

F.J.Offermann, R.G.Sextro, W.J.Fisk, W.W. Nazaroff, A.V.Nero, K.L.Revzan, and J.Yater, "Control of Respirable Particles and Radon Progeny with Portable Air Cleaners," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-16659, 1984.

W.J.Fisk, R.K.Spencer, D.T.Grimsrud, F.J.Offermann, B.Pedersen, and R.G.Sextro, "Indoor Air Quality Control Techniques: A Critical Review," Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-16493, 1984.

F.J.Offermann, J.R.Girman, and R.G.Sextro, "Controlling Indoor Air Pollution from Tobacco Smoke: Models and Measurements,", Indoor Air, Proceedings of the 3rd International Conference on Indoor Air Quality and Climate, Vol 1, pp 257-264, Swedish Council for Building Research, Stockholm (1984), Lawrence Berkeley Laboratory, Berkeley, CA, Report LBL-17603, 1984.

R.Otto, J.Girman, F.Offermann, and R.Sextro,"A New Method for the Collection and Comparison of Respirable Particles in the Indoor Environment," Lawrence Berkeley Laboratory, Berkeley, CA, Special Director Fund's Study, 1984.

A.T.Hodgson and F.J.Offermann, "Examination of a Sick Office Building," Lawrence Berkeley Laboratory, Berkeley, CA, an informal field study, 1984.

R.G.Sextro, F.J.Offermann, W.W.Nazaroff, and A.V.Nero, "Effects of Aerosol Concentrations on Radon Progeny," Aerosols, Science, & Technology, and Industrial Applications of Airborne Particles, editors B.Y.H.Liu, D.Y.H.Pui, and H.J.Fissan, p525, Elsevier, 1984.

K.Sexton, S.Hayward, F.Offermann, R.Sextro, and L.Weber, "Characterization of Particulate and Organic Emissions from Major Indoor Sources, Proceedings of the Third International Conference on Indoor Air Quality and Climate, Stockholm, Sweden, August 20-24, 1984.

F.J.Offermann, "Tracer Gas Measurements of Laboratory Fume Entrainment at a Semi-Conductor Manufacturing Plant," an Indoor Environmental Engineering R&D Report, 1986.

F.J.Offermann, "Tracer Gas Measurements of Ventilation Rates in a Large Office Building," an Indoor Environmental Engineering R&D Report, 1986.

F.J.Offermann, "Measurements of Volatile Organic Compounds in a New Large Office Building with Adhesive Fastened Carpeting," an Indoor Environmental Engineering R&D Report, 1986.

F.J.Offermann, "Designing and Operating Healthy Buildings", an Indoor Environmental Engineering R&D Report, 1986.

F.J.Offermann, "Measurements and Mitigation of Indoor Spray-Applicated Pesticides", an Indoor Environmental Engineering R&D Report, 1988.

F.J.Offermann and S. Loiselle, "Measurements and Mitigation of Indoor Mold Contamination in a Residence", an Indoor Environmental Engineering R&D Report, 1989.

F.J.Offermann and S. Loiselle, "Performance Measurements of an Air Cleaning System in a Large Archival Library Storage Facility", an Indoor Environmental Engineering R&D Report, 1989.

F.J. Offermann, J.M. Daisey, L.A. Gundel, and A.T. Hodgson, S. A. Loiselle, "Sampling, Analysis, and Data Validation of Indoor Concentrations of Polycyclic Aromatic Hydrocarbons", Final Report, Contract No. A732-106, California Air Resources Board, March, 1990.

L.A. Gundel, J.M. Daisey, and F.J. Offermann, "A Sampling and Analytical Method for Gas Phase Polycyclic Aromatic Hydrocarbons", Proceedings of the 5th International Conference on Indoor Air Quality and Climate, Indoor Air '90, July 29-August 1990.

A.T. Hodgson, J.M. Daisey, and F.J. Offermann "Development of an Indoor Sampling and Analytical Method for Particulate Polycyclic Aromatic Hydrocarbons", Proceedings of the 5th International Conference on Indoor Air Quality and Climate, Indoor Air '90, July 29-August, 1990.

F.J. Offermann, J.O. Sateri, "Tracer Gas Measurements in Large Multi-Room Buildings", Indoor Air '93, Helsinki, Finland, July 4-8, 1993.

F.J.Offermann, M. T. O'Flaherty, and M. A. Waz "Validation of ASHRAE 129 - Standard Method of Measuring Air Change Effectiveness", Final Report of ASHRAE Research Project 891, December 8, 1997.

S.E. Guffey, F.J. Offermann et. al., "Proceedings of the Workshop on Ventilation Engineering Controls for Environmental Tobacco smoke in the Hospitality Industry", U.S. Department of Labor Occupational Safety and Health Administration and ACGIH, 1998.

F.J. Offermann, R.J. Fiskum, D. Kosar, and D. Mudaari, "A Practical Guide to Ventilation Practices & Systems for Existing Buildings", *Heating/Piping/Air Conditioning Engineering* supplement to April/May 1999 issue.

F.J. Offermann, P. Pasanen, "Workshop 18: Criteria for Cleaning of Air Handling Systems", Healthy Buildings 2000, Espoo, Finland, August 2000.

F.J. Offermann, Session Summaries: Building Investigations, and Design & Construction, Healthy Buildings 2000, Espoo, Finland, August 2000.

F.J. Offermann, "The IAQ Top 10", Engineered Systems, November, 2008.

L. Kincaid and F.J. Offermann, "Unintended Consequences: Formaldehyde Exposures in Green Homes, AIHA Synergist, February, 2010.

F.J. Offermann, " IAQ in Air Tight Homes", ASHRAE Journal, November, 2010.

F.J. Offermann, "The Hazards of E-Cigarettes", ASHRAE Journal, June, 2014.

**PRESENTATIONS :**

"Low-Infiltration Housing in Rochester, New York: A Study of Air Exchange Rates and Indoor Air Quality," Presented at the International Symposium on Indoor Air Pollution, Health and Energy Conservation, Amherst, MA, October 13-16,1981.

"Ventilation Efficiencies of Wall- or Window-Mounted Residential Air-to-Air Heat Exchangers," Presented at the American Society of Heating, Refrigeration, and Air Conditioning Engineers Summer Meeting, Washington, DC, June, 1983.

"Controlling Indoor Air Pollution from Tobacco Smoke: Models and Measurements," Presented at the Third International Conference on Indoor Air Quality and Climate, Stockholm, Sweden, August 20-24, 1984.

"Indoor Air Pollution: An Emerging Environmental Problem", Presented to the Association of Environmental Professionals, Bar Area/Coastal Region 1, Berkeley, CA, May 29, 1986.

"Ventilation Measurement Techniques," Presented at the Workshop on Sampling and Analytical Techniques, Georgia Institute of Technology, Atlanta, Georgia, September 26, 1986 and September 25, 1987.

"Buildings That Make You Sick: Indoor Air Pollution", Presented to the Sacramento Association of Professional Energy Managers, Sacramento, CA, November 18, 1986.

"Ventilation Effectiveness and Indoor Air Quality", Presented to the American Society of Heating, Refrigeration, and Air Conditioning Engineers Northern Nevada Chapter, Reno, NV, February 18, 1987, Golden Gate Chapter, San Francisco, CA, October 1, 1987, and the San Jose Chapter, San Jose, CA, June 9, 1987.

"Tracer Gas Techniques for Studying Ventilation," Presented at the Indoor Air Quality Symposium, Georgia Tech Research Institute, Atlanta, GA, September 22-24, 1987.

"Indoor Air Quality Control: What Works, What Doesn't," Presented to the Sacramento Association of Professional Energy Managers, Sacramento, CA, November 17, 1987.

"Ventilation Effectiveness and ADPI Measurements of a Forced Air Heating System," Presented at the American Society of Heating, Refrigeration, and Air Conditioning Engineers Winter Meeting, Dallas, Texas, January 31, 1988.

"Indoor Air Quality, Ventilation, and Energy in Commercial Buildings", Presented at the Building Owners &Managers Association of Sacramento, Sacramento, CA, July 21, 1988.

"Controlling Indoor Air Quality: The New ASHRAE Ventilation Standards and How to Evaluate Indoor Air Quality", Presented at a conference "Improving Energy Efficiency and Indoor Air Quality in Commercial Buildings," National Energy Management Institute, Reno, Nevada, November 4, 1988.

"A Study of Diesel Fume Entrainment Into an Office Building," Presented at Indoor Air '89: The Human Equation: Health and Comfort, American Society of Heating, Refrigeration, and Air Conditioning Engineers, San Diego, CA, April 17-20, 1989.

"Indoor Air Quality in Commercial Office Buildings," Presented at the Renewable Energy Technologies Symposium and International Exposition, Santa Clara, CA June 20, 1989.

"Building Ventilation and Indoor Air Quality", Presented to the San Joaquin Chapter of the American Society of Heating, Refrigeration, and Air Conditioning Engineers, September 7, 1989.

"How to Meet New Ventilation Standards: Indoor Air Quality and Energy Efficiency," a workshop presented by the Association of Energy Engineers; Chicago, IL, March 20-21, 1989; Atlanta, GA, May 25-26, 1989; San Francisco, CA, October 19-20, 1989; Orlando, FL, December 11-12, 1989; Houston, TX, January 29-30, 1990; Washington D.C., February 26-27, 1990; Anchorage, Alaska, March 23, 1990; Las Vegas, NV, April 23-24, 1990; Atlantic City, NJ, September 27-28, 1991; Anaheim, CA, November 19-20, 1991; Orlando, FL, February 28 - March 1, 1991; Washington, DC, March 20-21, 1991; Chicago, IL, May 16-17, 1991; Lake Tahoe, NV, August 15-16, 1991; Atlantic City, NJ, November 18-19, 1991; San Jose, CA, March 23-24, 1992.

"Indoor Air Quality," a seminar presented by the Anchorage, Alaska Chapter of the American Society of Heating, Refrigeration, and Air Conditioning Engineers, March 23, 1990.

"Ventilation and Indoor Air Quality", Presented at the 1990 HVAC & Building Systems Congress, Santa, Clara, CA, March 29, 1990.

"Ventilation Standards for Office Buildings", Presented to the South Bay Property Managers Association, Santa Clara, May 9, 1990.

"Indoor Air Quality", Presented at the Responsive Energy Technologies Symposium & International Exposition (RETSIE), Santa Clara, CA, June 20, 1990.

"Indoor Air Quality - Management and Control Strategies", Presented at the Association of Energy Engineers, San Francisco Bay Area Chapter Meeting, Berkeley, CA, September 25, 1990.

"Diagnosing Indoor Air Contaminant and Odor Problems", Presented at the ASHRAE Annual Meeting, New York City, NY, January 23, 1991.

"Diagnosing and Treating the Sick Building Syndrome", Presented at the Energy 2001, Oklahoma, OK, March 19, 1991.

"Diagnosing and Mitigating Indoor Air Quality Problems" a workshop presented by the Association of Energy Engineers, Chicago, IL, October 29-30, 1990; New York, NY, January 24-25, 1991; Anaheim, April 25-26, 1991; Boston, MA, June 10-11, 1991; Atlanta, GA, October 24-25, 1991; Chicago, IL, October 3-4, 1991; Las Vegas, NV, December 16-17, 1991; Anaheim, CA, January 30-31, 1992; Atlanta, GA, March 5-6, 1992; Washington, DC, May 7-8, 1992; Chicago, IL, August 19-20, 1992; Las Vegas,

NV, October 1-2, 1992; New York City, NY, October 26-27, 1992, Las Vegas, NV, March 18-19, 1993; Lake Tahoe, CA, July 14-15, 1994; Las Vegas, NV, April 3-4, 1995; Lake Tahoe, CA, July 11-12, 1996; Miami, Fl, December 9-10, 1996.

"Sick Building Syndrome and the Ventilation Engineer", Presented to the San Jose Engineers Club, May, 21, 1991.

"Duct Cleaning: Who Needs It ? How Is It Done ? What Are The Costs ?" What Are the Risks ?, Moderator of Forum at the ASHRAE Annual Meeting, Indianapolis ID, June 23, 1991.

"Operating Healthy Buildings", Association of Plant Engineers, Oakland, CA, November 14, 1991.

"Duct Cleaning Perspectives", Moderator of Seminar at the ASHRAE Semi-Annual Meeting, Indianapolis, IN, June 24, 1991.

"Duct Cleaning: The Role of the Environmental Hygienist," ASHRAE Annual Meeting, Anaheim, CA, January 29, 1992.

"Emerging IAQ Issues", Fifth National Conference on Indoor Air Pollution, University of Tulsa, Tulsa, OK, April 13-14, 1992.

"International Symposium on Room Air Convection and Ventilation Effectiveness", Member of Scientific Advisory Board, University of Tokyo, July 22-24, 1992.

"Guidelines for Contaminant Control During Construction and Renovation Projects in Office Buildings," Seminar paper at the ASHRAE Annual Meeting, Chicago, IL, January 26, 1993.

"Outside Air Economizers: IAQ Friend or Foe", Moderator of Forum at the ASHRAE Annual Meeting, Chicago, IL, January 26, 1993.

"Orientation to Indoor Air Quality," an EPA two and one half day comprehensive indoor air quality introductory workshop for public officials and building property managers; Sacramento, September 28-30, 1992; San Francisco, February 23-24, 1993; Los Angeles, March 16-18, 1993; Burbank, June 23, 1993; Hawaii, August 24-25, 1993; Las Vegas, August 30, 1993; San Diego, September 13-14, 1993; Phoenix, October 18-19, 1993; Reno, November 14-16, 1995; Fullerton, December 3-4, 1996; Fresno, May 13-14, 1997.

"Building Air Quality: A Guide for Building Owners and Facility Managers," an EPA one half day indoor air quality introductory workshop for building owners and facility managers. Presented throughout Region IX 1993-1995.

“Techniques for Airborne Disease Control”, EPRI Healthcare Initiative Symposium; San Francisco, CA; June 7, 1994.

“Diagnosing and Mitigating Indoor Air Quality Problems”, CIHC Conference; San Francisco, September 29, 1994.

”Indoor Air Quality: Tools for Schools,” an EPA one day air quality management workshop for school officials, teachers, and maintenance personnel; San Francisco, October 18-20, 1994; Cerritos, December 5, 1996; Fresno, February 26, 1997; San Jose, March 27, 1997; Riverside, March 5, 1997; San Diego, March 6, 1997; Fullerton, November 13, 1997; Santa Rosa, February 1998; Cerritos, February 26, 1998; Santa Rosa, March 2, 1998.

ASHRAE 62 Standard “Ventilation for Acceptable IAQ”, ASCR Convention; San Francisco, CA, March 16, 1995.

“New Developments in Indoor Air Quality: Protocol for Diagnosing IAQ Problems”, AIHA-NC; March 25, 1995.

"Experimental Validation of ASHRAE SPC 129, Standard Method of Measuring Air Change Effectiveness", 16th AIVC Conference, Palm Springs, USA, September 19-22, 1995.

“Diagnostic Protocols for Building IAQ Assessment”, American Society of Safety Engineers Seminar: ‘Indoor Air Quality – The Next Door’; San Jose Chapter, September 27, 1995; Oakland Chapter, 9, 1997.

“Diagnostic Protocols for Building IAQ Assessment”, Local 39; Oakland, CA, October 3, 1995.

“Diagnostic Protocols for Solving IAQ Problems”, CSU-PPD Conference; October 24, 1995.

“Demonstrating Compliance with ASHRAE 62-1989 Ventilation Requirements”, AIHA; October 25, 1995.

“IAQ Diagnostics: Hands on Assessment of Building Ventilation and Pollutant Transport”, EPA Region IX; Phoenix, AZ, March 12, 1996; San Francisco, CA, April 9, 1996; Burbank, CA, April 12, 1996.

“Experimental Validation of ASHRAE 129P: Standard Method of Measuring Air Change Effectiveness”, Room Vent ‘96 / International Symposium on Room Air Convection and Ventilation Effectiveness"; Yokohama, Japan, July 16-19, 1996.

“IAQ Diagnostic Methodologies and RFP Development”, CCEHSA 1996 Annual Conference, Humboldt State University, Arcata, CA, August 2, 1996.

“The Practical Side of Indoor Air Quality Assessments”, California Industrial Hygiene Conference ‘96, San Diego, CA, September 2, 1996.

"ASHRAE Standard 62: Improving Indoor Environments", Pacific Gas and Electric Energy Center, San Francisco, CA, October 29, 1996.

"Operating and Maintaining Healthy Buildings", April 3-4, 1996, San Jose, CA; July 30, 1997, Monterey, CA.

"IAQ Primer", Local 39, April 16, 1997; Amdahl Corporation, June 9, 1997; State Compensation Insurance Fund's Safety & Health Services Department, November 21, 1996.

"Tracer Gas Techniques for Measuring Building Air Flow Rates", ASHRAE, Philadelphia, PA, January 26, 1997.

"How to Diagnose and Mitigate Indoor Air Quality Problems"; Women in Waste; March 19, 1997.

"Environmental Engineer: What Is It?", Monte Vista High School Career Day; April 10, 1997.

"Indoor Environment Controls: What's Hot and What's Not", Shaklee Corporation; San Francisco, CA, July 15, 1997.

"Measurement of Ventilation System Performance Parameters in the US EPA BASE Study", Healthy Buildings/IAQ'97, Washington, DC, September 29, 1997.

"Operations and Maintenance for Healthy and Comfortable Indoor Environments", PASMA; October 7, 1997.

"Designing for Healthy and Comfortable Indoor Environments", Construction Specification Institute, Santa Rosa, CA, November 6, 1997.

"Ventilation System Design for Good IAQ", University of Tulsa 10th Annual Conference, San Francisco, CA, February 25, 1998.

"The Building Shell", Tools For Building Green Conference and Trade Show, Alameda County Waste Management Authority and Recycling Board, Oakland, CA, February 28, 1998.

"Identifying Fungal Contamination Problems In Buildings", The City of Oakland Municipal Employees, Oakland, CA, March 26, 1998.

"Managing Indoor Air Quality in Schools: Staying Out of Trouble", CASBO, Sacramento, CA, April 20, 1998.

"Indoor Air Quality", CSOOC Spring Conference, Visalia, CA, April 30, 1998.

"Particulate and Gas Phase Air Filtration", ACGIH/OSHA, Ft. Mitchell, KY, June 1998.

"Building Air Quality Facts and Myths", The City of Oakland / Alameda County Safety Seminar, Oakland, CA, June 12, 1998.

"Building Engineering and Moisture", Building Contamination Workshop, University of California Berkeley, Continuing Education in Engineering and Environmental Management, San Francisco, CA, October 21-22, 1999.

"Identifying and Mitigating Mold Contamination in Buildings", Western Construction Consultants Association, Oakland, CA, March 15, 2000; AIG Construction Defect Seminar, Walnut Creek, CA, May 2, 2001; City of Oakland Public Works Agency, Oakland, CA, July 24, 2001; Executive Council of Homeowners, Alamo, CA, August 3, 2001.

"Using the EPA BASE Study for IAQ Investigation / Communication", Joint Professional Symposium 2000, American Industrial Hygiene Association, Orange County & Southern California Sections, Long Beach, October 19, 2000.

"Ventilation," Indoor Air Quality: Risk Reduction in the 21st Century Symposium, sponsored by the California Environmental Protection Agency/Air Resources Board, Sacramento, CA, May 3-4, 2000.

"Workshop 18: Criteria for Cleaning of Air Handling Systems", Healthy Buildings 2000, Espoo, Finland, August 2000.

"Closing Session Summary: 'Building Investigations' and 'Building Design & Construction', Healthy Buildings 2000, Espoo, Finland, August 2000.

"Managing Building Air Quality and Energy Efficiency, Meeting the Standard of Care", BOMA, MidAtlantic Environmental Hygiene Resource Center, Seattle, WA, May 23rd, 2000; San Antonio, TX, September 26-27, 2000.

"Diagnostics & Mitigation in Sick Buildings: When Good Buildings Go Bad," University of California Berkeley, September 18, 2001.

"Mold Contamination: Recognition and What To Do and Not Do", Redwood Empire Remodelers Association; Santa Rosa, CA, April 16, 2002.

"Investigative Tools of the IAQ Trade", Healthy Indoor Environments 2002; Austin, TX; April 22, 2002.

"Finding Hidden Mold: Case Studies in IAQ Investigations", AIHA Northern California Professionals Symposium; Oakland, CA, May 8, 2002.

"Assessing and Mitigating Fungal Contamination in Buildings", Cal/OSHA Training; Oakland, CA, February 14, 2003 and West Covina, CA, February 20-21, 2003.

"Use of External Containments During Fungal Mitigation", Invited Speaker, ACGIH Mold Remediation Symposium, Orlando, FL, November 3-5, 2003.

Building Operator Certification (BOC), 106-IAQ Training Workshops, Northwest Energy Efficiency Council; Stockton, CA, December 3, 2003; San Francisco, CA, December 9, 2003; Irvine, CA, January 13, 2004; San Diego, January 14, 2004; Irwindale, CA, January 27, 2004; Downey, CA, January 28, 2004; Santa Monica, CA, March 16, 2004; Ontario, CA, March 17, 2004; Ontario, CA, November 9, 2004, San Diego, CA, November 10, 2004; San Francisco, CA, November 17, 2004; San Jose, CA, November 18, 2004; Sacramento, CA, March 15, 2005.

"Mold Remediation: The National QUEST for Uniformity Symposium", Invited Speaker, Orlando, Florida, November 3-5, 2003.

"Mold and Moisture Control", Indoor Air Quality workshop for The Collaborative for High Performance Schools (CHPS), San Francisco, December 11, 2003.

"Advanced Perspectives In Mold Prevention & Control Symposium", Invited Speaker, Las Vegas, Nevada, November 7-9, 2004.

"Building Sciences: Understanding and Controlling Moisture in Buildings", American Industrial Hygiene Association, San Francisco, CA, February 14-16, 2005.

"Indoor Air Quality Diagnostics and Healthy Building Design", University of California Berkeley, Berkeley, CA, March 2, 2005.

"Improving IAQ = Reduced Tenant Complaints", Northern California Facilities Exposition, Santa Clara, CA, September 27, 2007.

"Defining Safe Building Air", Criteria for Safe Air and Water in Buildings, ASHRAE Winter Meeting, Chicago, IL, January 27, 2008.

"Update on USGBC LEED and Air Filtration", Invited Speaker, NAFA 2008 Convention, San Francisco, CA, September 19, 2008.

"Ventilation and Indoor air Quality in New California Homes", National Center of Healthy Housing, October 20, 2008.

"Indoor Air Quality in New Homes", California Energy and Air Quality Conference, October 29, 2008.

"Mechanical Outdoor air Ventilation Systems and IAQ in New Homes", ACI Home Performance Conference, Kansas City, MO, April 29, 2009.

"Ventilation and IAQ in New Homes with and without Mechanical Outdoor Air Systems", Healthy Buildings 2009, Syracuse, CA, September 14, 2009.

"Ten Ways to Improve Your Air Quality", Northern California Facilities Exposition, Santa Clara, CA, September 30, 2009.

"New Developments in Ventilation and Indoor Air Quality in Residential Buildings", Westcon meeting, Alameda, CA, March 17, 2010.

"Intermittent Residential Mechanical Outdoor Air Ventilation Systems and IAQ", ASHRAE SSPC 62.2 Meeting, Austin, TX, April 19, 2010.

"Measured IAQ in Homes", ACI Home Performance Conference, Austin, TX, April 21, 2010.

"Respiration: IEQ and Ventilation", AIHce 2010, How IH Can LEED in Green buildings, Denver, CO, May 23, 2010.

"IAQ Considerations for Net Zero Energy Buildings (NZEB)", Northern California Facilities Exposition, Santa Clara, CA, September 22, 2010.

"Energy Conservation and Health in Buildings", Berkeley High SchoolGreen Career Week, Berkeley, CA, April 12, 2011.

"What Pollutants are Really There ?", ACI Home Performance Conference, San Francisco, CA, March 30, 2011.

"Energy Conservation and Health in Residences Workshop", Indoor Air 2011, Austin, TX, June 6, 2011.

"Assessing IAQ and Improving Health in Residences", US EPA Weatherization Plus Health, September 7, 2011.

"Ventilation: What a Long Strange Trip It's Been", Westcon, May 21, 2014.

"Chemical Emissions from E-Cigarettes: Direct and Indirect Passive Exposures", Indoor Air 2014, Hong Kong, July, 2014.

"Infectious Disease Aerosol Exposures With and Without Surge Control Ventilation System Modifications", Indoor Air 2014, Hong Kong, July, 2014.

"Chemical Emissions from E-Cigarettes", IMF Health and Welfare Fair, Washington, DC, February 18, 2015.

"Chemical Emissions and Health Hazards Associated with E-Cigarettes", Roswell Park Cancer Institute, Buffalo, NY, August 15, 2014.

"Formaldehyde Indoor Concentrations, Material Emission Rates, and the CARB ATCM", Harris Martin's Lumber Liquidators Flooring Litigation Conference, WQ Minneapolis Hotel, May 27, 2015.

"Chemical Emissions from E-Cigarettes: Direct and Indirect Passive Exposure", FDA Public Workshop: Electronic Cigarettes and the Public Health, Hyattsville, MD June 2, 2015.

"Creating Healthy Homes, Schools, and Workplaces", Chautauqua Institution, Athenaeum Hotel, August 24, 2015.

"Diagnosing IAQ Problems and Designing Healthy Buildings", University of California Berkeley, Berkeley, CA, October 6, 2015.

"Diagnosing Ventilation and IAQ Problems in Commercial Buildings", BEST Center Annual Institute, Lawrence Berkeley National Laboratory, January 6, 2016.

"A Review of Studies of Ventilation and Indoor Air Quality in New Homes and Impacts of Environmental Factors on Formaldehyde Emission Rates From Composite Wood Products", AIHce2016, May, 21-26, 2016.

"Admissibility of Scientific Testimony", Science in the Court, Proposition 65 Clearinghouse Annual Conference, Oakland, CA, September 15, 2016.

"Indoor Air Quality and Ventilation", ASHRAE Redwood Empire, Napa, CA, December 1, 2016.

**Jacob, Melinda**

**From:** Zoning Adjustments Board (ZAB)
**Subject:** FW: SUPPLEMENTAL OBJECTIONS TO 2920 SHATTUCK PROJECT PLANS, #ZP2022-0116, 4/27/23 ZAB MEETING

**From:** Larisa Cummings <pidicummings@gmail.com>
**Sent:** Monday, April 24, 2023 4:26 PM
**To:** Zoning Adjustments Board (ZAB) <Planningzab@cityofberkeley.info>
**Cc:** Burns, Anne M <ABurns@cityofberkeley.info>; Gong, Sharon <SGong@cityofberkeley.info>; Berkeley Mayor's Office <mayor@cityofberkeley.info>; All Council <council@cityofberkeley.info>
**Subject:** SUPPLEMENTAL OBJECTIONS TO 2920 SHATTUCK PROJECT PLANS, #ZP2022-0116, 4/27/23 ZAB MEETING



Dear ZAB members:

As immediate neighbors to the proposed plans to develop 2920 Shattuck, we strenuously object to the project on numerous grounds, per applicable state law and objective local standards, policies and conditions that may not be ignored. We are asking the ZAB to deny issuance of Use Permit #ZP2022-0116 until the concerns below are appropriately addressed:

**1. The city has attempted to bypass Govt. Code Section 65589.5(e) and Cal. Code Regs. tit. 14 § 15300.2(e) by recommending to the ZAB that the project is categorically exempt from the California Environmental Quality Act ("CEQA") pursuant to Cal. Code Regs. Tit. 14, § 15332 ("Infill Development Project"). To protect public health and safety, an environmental review pursuant to CEQA is clearly required.**

First, the project does not meet standards for a *categorical exemption* cited by the City, Cal. Code Regs. tit. 14 § 15332, because at the very least it cannot be determined without CEQA review that "[a]pproval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality." See discussion below.

Among other significant environmental effects that require further review under CEQA, and public notice, the City has failed to address the fact of a public record evidencing contamination at the site. See SWRCB record for 2900 Shattuck Avenue (geotracker.waterboards.ca.gov/profile_report?global_id=T0600101310) in the State Water Resources Control Board database. Cal. Code Regs. tit. 14 § 15300.2(e) expressly prohibits a categorical infill exemption in this case. Furthermore, had the City completed the required reviews, all of the following conditions, and more, would be subject to CEQA.

**2. The project violates Govt. Code Section 65589.5(j)(1)(A) because it would have specific, adverse impact upon the public health or safety; and per (j)(1)(B), there is no feasible method to satisfactorily mitigate or avoid the adverse impact, other than the disapproval of the housing development project or the approval of the project upon the condition that it be developed at a lower density. *A "specific, adverse impact" as defined in the law means a significant, quantifiable, direct, and unavoidable impact, based on objective, identified written public health or safety standards, policies, or conditions as they existed on the date the application was deemed complete.***

There are numerous reasons this finding must be made, including but not limited to the following.

The portion of Russell Street along the project site has long been highly and increasingly used as an officially designated “Bike Boulevard”, and as such, requires special consideration of adverse impacts by project developers and by the City. But this policy requirement has been ignored, to the peril of the community, most recently in the latest DRC Staff Report for the second DRC meeting on 4/20/23. See 2017 Berkeley City Council Bicycle Plan (“Bicycle Plan”), policy PL-1, pp. 2-2 to 2-3 (https://altago.com/wp-content/uploads/Berkeley-Bicycle-Plan.pdf). Among other policies that must be well known to the City, the Bicycle Plan includes an objective policy standard which requires the following: “Ensure that all traffic impact studies, analyses of proposed street changes, and development projects address impacts on bicycling and bicycling facilities. Specifically, the following should be considered: Consistency with General Plan, Area Plan, and Bicycle Plan policies and recommendations; Impact on the existing bikeway network; Degree to which bicycle travel patterns are altered or restricted by the projects; and Safety of future bicycle operations (based on project conformity to Bicycle Plan design guidelines and City, State, and Federal design standards).”

See also, pp. 4-7 and 4-19 of the Bicycle Plan, where it is documented that *Russell Street is the most highly and increasingly used Bike Boulevard in the city, and that Russell/Shattuck is among the recognized high collision intersections for cyclists*. Further, children commute on bike and foot every weekday on Russell Street to/from two elementary schools (Malcolm X and Sylvia Mendez) and two middle schools (Willard and Longfellow).

All of the following concerns, and more, should have been and must be addressed as required by the city's Bicycle Plan, to protect public health and safety. The ongoing oversight by both the developer and by the City is egregious.

a. At commute times (morning is school + work, 2-3 pm is school, 5-6 pm is work), it is typical to observe 2 to 5 bikers a minute passing up and down the Russell Bike Boulevard, which corresponds with 120 to 300 bikers an hour for those peak times. See again, Bicycle Plan - the Russell Bike Boulevard is heavily used.
b. Delivery driver traffic during meal times (which substantially overlap with commute times) will be significant.
c. The project describes 221 units with minimal kitchens. Per a recent study “70% of college students order food from a third-party delivery platform per week, ordering four times per week on average.” (reference here).
d. It is reasonable to estimate about 150 units ordering 4 times per week, or 600 deliveries a week. That is 85 extra stops per day, concentrated in the morning and evening hours.
e. Each one of those delivery drivers has to park, go into the building, find and get to the unit in a very large building with 10 floors, easily 5 to 10 minutes per delivery.
f. This implies that the building needs 30 deliveries per hour at peak * 7 minutes average per delivery = 210 minutes of parking per hour. That is **IN ADDITION TO THE REGULAR NEEDS of the building (e.g. for loading and unloading of residents, moves into and out of the building, garbage collection, traffic to the businesses at ground level, etc**).
g. Drivers are often in a hurry, and without proper loading space tend to double park and block traffic. This double parking will be on Russell, due to the traffic volume on Shattuck, blocking the Bike Boulevard. 200 bikers an hour and drivers double parking in

peak hours is completely unsafe, and clearly meets the criteria of "specific adverse impact".

**3. The project fails the substantial evidence of compliance test in Govt. Code Section 65589.5(f)(4), which states: "(f)(4) For purposes of this section, a housing development project or emergency shelter shall be deemed consistent, compliant, and in conformity with an applicable plan, program, policy, ordinance, standard, requirement, or other similar provision if there is substantial evidence that would allow a *reasonable person* to conclude that the housing development project or emergency shelter is consistent, compliant, or in conformity."**

At a minimum, due to Concern #2 described above, which identifies numerous alarming policy oversights, there is no reasonable person standard that can be applied to find that the project is in conformity with applicable City requirements–independent from CEQA requirements–that exist to protect public health and safety.

**4. Additionally, there are substantial concerns that this project doesn't provide housing units that meet minimum square footage requirements. Per Cal. Code Regs. tit. 24 § 1208.4, the California Building Code requires these "efficiency" units to have "a living room of not less than 190 square feet". A review of the draft architectural plans indicates that these units have living rooms of not more than 170 and 180 square feet.**

Since there are clear concerns and explicit objective law and policy requirements for further review, including ***multiple concerns about specific, adverse impact upon the public health or safety***, we ask the ZAB to please deny the issuance of a use permit, or delay that issuance until these and all other related concerns are appropriately addressed by the city and the developer as required by applicable law. Thank you for your due consideration.

Sincerely yours,

LARISA CUMMINGS (2913 NEWBURY STREET),
DAVE AUERBACH (2905 NEWBURY STREET),
FRANK BROWN (2918 NEWBURY STREET),
REED DILLINGHAM (2903 and 2927 NEWBURY STREET),
PAUL DILLINGHAM (2927 NEWBURY STREET),
ANIA SHAPIRO (2917 NEWBURY STREET)

## Jacob, Melinda

**From:** Zoning Adjustments Board (ZAB)
**Subject:** FW: opposition to Use Permit #ZP2022-0116,
**Attachments:** zoning.opposition.2900-20 Shattuck Avenue.pages

**From:** María Gracia <magachita@gmail.com>
**Sent:** Monday, April 24, 2023 7:34 AM
**To:** Zoning Adjustments Board (ZAB) <Planningzab@cityofberkeley.info>
**Cc:** giannara1@icloud.com; Ann Einsten <anneeinstein@sbcglobalnet.net>; MiSoon Burzlaff <yangmisoon@gmail.com>; Bill Walzer <walzer@usa.net>; Joyce Freedman <rejoycef@yahoo.com>
**Subject:** opposition to Use Permit #ZP2022-0116,



Land Use Planning Division,
**Attn: Zoning Adjustments Board Secretary,**
1947 Center Street, 2nd Floor, Berkeley, CA 94704

This correspondence is in opposition to the proposed building, **agenda item number 10** New Public Hearing Application**:** Use Permit **#ZP2022-0116, 2900-20 Shattuck Avenue.**
Please provide the attached document to the honorable board

Thank you.
Maria Gracia Galvez Picon
2916 Lorina St, Berkeley, CA 94705

Berkeley sits on the territory of Xučyun, **the ancestral and unceded land of the Chochenyo Ohlone,** the successors of the historic and sovereign Verona Band of Alameda County. This land was and continues to be of great importance to the Ohlone people.

## Jacob, Melinda

**From:** Zoning Adjustments Board (ZAB)
**Subject:** FW: application for Use Permit #ZP2022-0116 for 2900-2920 Shattuck Avenue: 4/27/23 ZAB MEETING
**Attachments:** GeoTracker LUST entry- 2900 Shattuck.pdf; 2920 Shattuck CEQA Exemption Challenge.pdf

**From:** Dave Auerbach <dave.auerbach@gmail.com>
**Sent:** Wednesday, April 19, 2023 9:21 PM
**To:** Zoning Adjustments Board (ZAB) <Planningzab@cityofberkeley.info>
**Cc:** Gong, Sharon <SGong@cityofberkeley.info>
**Subject:** RE: application for Use Permit #ZP2022-0116 for 2900-2920 Shattuck Avenue: 4/27/23 ZAB MEETING



To the City Of Berkeley Zoning Adjustment Board (CC Planner Sharon Gong):

Attached please find a PDF of comments I'd like to submit to the ZAB for their 4/27/23 meeting, regarding agenda item 10: 2900-20 Shattuck Avenue – New Public Hearing. These comments raise multiple objections to adoption of the CEQA exemption recommendation. I hope that these comments, and the additional attachment summarizing the LUST (leaking underground storage tank) case, can be added to the materials provided to the ZAB regarding the application for Use Permit #ZP2022-0116 for 2900-2920 Shattuck Avenue.

Sincerely,

Dave Auerbach

STATE WATER RESOURCES CONTROL BOARD
GEOTRACKER

Tools Reports UST Case Closures How to Use GeoTracker ESI Information

## CASE SUMMARY

REPORT DATE
4/4/1988

HAZARDOUS MATERIAL INCIDENT REPORT FILED WITH OES?

**I. REPORTED BY** -
UNKNOWN

**CREATED BY**
UNKNOWN

**III. SITE LOCATION**
FACILITY NAME
SOUTHWICK CHRYSLER PLYMOUTH
FACILITY ADDRESS
2900 SHATTUCK AVE
BERKELEY, CA 94704
ALAMEDA COUNTY

FACILITY ID

ORIENTATION OF SITE TO STREET

CROSS STREET

**V. SUBSTANCES RELEASED / CONTAMINANT(S) OF CONCERN**
WASTE OIL / MOTOR / HYDRAULIC / LUBRICATING

**VI. DISCOVERY/ABATEMENT**
DATE DISCHARGE BEGAN

DATE DISCOVERED
4/4/1988

HOW DISCOVERED
Tank Closure

DESCRIPTION

DATE STOPPED
4/4/1988

STOP METHOD

DESCRIPTION

**VII. SOURCE/CAUSE**
SOURCE OF DISCHARGE
Tank

CAUSE OF DISCHARGE
Physc / Mech Damage

DISCHARGE DESCRIPTION

**VIII. CASE TYPE**
CASE TYPE
Soil

**IX. REMEDIAL ACTION**
NO REMEDIAL ACTIONS ENTERED

**X. GENERAL COMMENTS**

**XI. CERTIFICATION**
**I HEREBY CERTIFY THAT THE INFORMATION REPORTED HEREIN IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.**

**XII. REGULATORY USE ONLY**
LOCAL AGENCY CASE NUMBER
01-1419

REGIONAL BOARD CASE NUMBER
01-1419

**LOCAL AGENCY**

| CONTACT NAME | INITIALS | ORGANIZATION NAME | EMAIL ADDRESS |
|---|---|---|---|
| GEOFFERY FIEDLER | GAF | BERKELEY, CITY OF | gfiedler@ci.berkeley.ca.us |

ADDRESS
2118 MILVIA STREET 3RD FLOOR
BERKELEY, CA 94704

CONTACT DESCRIPTION
City of Berkeley, Planning Dept., Division of Toxics Mgt. Hazardous Materials Specialist II California Registered Geologist California Registered Environmental Assessor I

| PHONE TYPE | PHONE NUMBER | EXTENSION |
|---|---|---|
| Office | (510)-981-7460 | |

**REGIONAL BOARD**

| CONTACT NAME | INITIALS | ORGANIZATION NAME | EMAIL ADDRESS |
|---|---|---|---|
| Regional Water Board | UUU | SAN FRANCISCO BAY RWQCB (REGION 2) | |

ADDRESS
1515 CLAY ST SUITE 1400
OAKLAND, CA 94612

CONTACT DESCRIPTION

| PHONE TYPE | PHONE NUMBER | EXTENSION |
|---|---|---|
| Office | (510)-622-2300 | |

| | |
|---|---|
| SCP General Contact | (510)-622-2408 |
| UST General Contact | (510)-622-3277 |

TO: City Of Berkeley Zoning Adjustment Board
FROM: Dave Auerbach, 2905 Newbury St
RE: Objections to adoption of CEQA exemption recommendation in the application for Use Permit #ZP2022-0116 for 2900-2920 Shattuck Avenue: 4/27/23 ZAB MEETING

DATE: 4/19/23

Dear ZAB members:

I am writing to dispute the recommendation that City of Berkeley Planning staff is making regarding the CEQA status for the project at 2900-2920 Shattuck. The staff is recommending that the project be found "Categorically exempt pursuant to Section 15332 of the CEQA Guidelines ("In-fill Development Projects")". However, that conclusion is not supportable given the law and the circumstances. I will briefly review the relevant statutes here, and then summarize the facts below that cause this project to clearly not be eligible for this exemption from CEQA.

Article 19 of the California Environmental Quality Act (CEQA Guidelines Section 15300 to Section 15333) includes a list of classes of projects that are exempt from review under CEQA. Among the classes of projects that are exempt from CEQA review are those projects that are specifically identified as urban in-fill development. CEQA Guidelines Section 15332 (Class 32) consists of projects characterized as in-fill development when meeting the following conditions:

- 15332(a): the project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations
- 15332(b): the proposed development occurs within city limits, on a project site of no more than five acres, substantially surrounded by urban uses
- 15332(c): the project site has no value as habitat for endangered, rare or threatened species
- 15332(d): approval of the project would not result in any significant effects relating to traffic, noise, air quality or water quality, and
- 15332(e): the site can be adequately served by all required utilities and public services

Additionally, Article 19 of the California Environmental Quality Act contains exceptions where a categorical exemption may not be applied (CEQA Guidelines Section 15300.2). The relevant exemptions that exclude the 2920 Shattuck project from being categorically exempt include:

- 15300.2(b): Cumulative Impact. All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.
- 15300.2(e): Hazardous Waste Sites. A categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code.

- 15300.2(c) Significant Effect. A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.

The following are **reasons why CEQA Guidelines Section 15300.2 exceptions apply**, causing this project to **not be eligible** for the In-fill development categorical exemption:

**15300.2(e): Hazardous Waste Sites**
Section 65962.5 of the Government Code describes the so-called "Cortese List(s)" (to paraphrase, these are lists of properties and sites with hazardous waste concerns). The California EPA maintains a list of data resources that "provide information regarding the facilities or sites identified as meeting the "Cortese List" requirements" at https://calepa.ca.gov/sitecleanup/corteselist/ . One of those data resources is the "List of Leaking Underground Storage Tank Sites from the State Water Board's GeoTracker database".

Within the above mentioned "State Water Board GeoTracker database", Record T0600101310 describes a City of Berkeley CASE #: 01-1419 (see https://geotracker.waterboards.ca.gov/profile_report?global_id=T0600101310 , summary attached). This case describes a LUST cleanup site(Leaking Underground Storage Tank) at 2920 Shattuck, the location of the proposed project. Per this record, an underground tank leaked waste oil due to mechanical damage in 1988.Additionally, per that record, no cleanup work was ever performed.

Since the property has an entry on a list that is "compiled pursuant to Section 65962.5 of the Government Code", **this project has an exception that preempts the use of the CEQA "urban in-fill" categorical exemption** the city is claiming.

**15300.2(c) Significant Effect**
Related to but separate from the section above, as described in State Water Board GeoTracker database Record T0600101310 ( linked above), the site has un-remediated soil contamination from a leaking underground storage tank. Per section 15300.2(c), there is a reasonable possibility that the activity will have a significant effect on the environment when the contaminated soil is disturbed and/or transported off the property. That significant effect is the scattering of contaminated soil onto adjacent properties, and the dispersal of contaminated soil in non-hazardous-waste soil disposal sites. This project is directly adjacent to a residential neighborhood with at least 10 children under 10 years old in residence, who are particularly vulnerable to the impact of contaminated soil on their development. The standard "reasonable possibility of significant effect on the environment" is very clearly met by this concern, and thus **this project has an exception that preempts the use of the CEQA "urban in-fill" categorical exemption** the city is claiming.

**15300.2(b): Cumulative Impact**

There are at least 6 large scale multi-story housing projects actively pursuing permits or under construction in a 2 block radius of this project. That list includes 2847 Shattuck Ave, 3000 Shattuck, 2902 Adeline St, 2001 Ashby Ave, 3130 Adeline St, and this project at 2920 Shattuck. Per 5300.2(b), the CEQA "urban in-fill" categorical exemption can't be used "when the cumulative impact of successive projects of the same type in the same place, over time is significant." Each one of these projects has the potential for substantial impact on many of the categories that CEQA has oversight on: Air Quality (indoor and outdoor), Energy, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Noise, Transportation, etc.

This project cannot be considered in a vacuum separate from the significant impact to the surrounding neighborhood of all of the projects. For that reason, there is a "cumulative impact" that must be considered, and thus **this project has an exception that preempts the use of the CEQA "urban in-fill" categorical exemption** the city is claiming.

Additionally, the 2920 Shattuck project **doesn't meet two of the conditions required** to claim the CEQA "urban in-fill" categorical exemption.

**Section 15332(d): traffic, noise, air quality**
This section requires that, to use the CEQA "urban in-fill" categorical exemption, "approval of the project would not result in any significant effects relating to traffic, noise, air quality or water quality".

There are multiple ways in which this project can and should be expected to have significant effects on traffic, noise, and air quality.

*Traffic*
While it is understood that this project is near to transit and that the residents are expected not to own cars, there is still a very serious (and potentially deadly) impact to traffic.

Per the statement of the Architects at the Design Review Committee meeting on 3/16/23, this building is expected to serve mostly a student population, given the small size of the units (~250 usable sq ft) and the proximity to the University of California - Berkeley.

This development is on Russell st in Berkeley, one of the dominant East/West bike routes in Berkeley. This bike route is also used heavily by young bicyclists attending the Sylvia Mendez Primary School three blocks east of the project site.

Per appendix one to this letter, it is reasonable to expect 85 additional delivery driver trips to the project site per day. This alone is a significant traffic effect. Combine that additional traffic with the high volume (120 to 300 per hour, again per appendix one) of bicyclists traveling the Russell street bike

boulevard, and there is a high chance of hazardous or deadly traffic incidents due to the increased traffic from this project.

Based on this assessment, the 2920 Shattuck project **doesn't meet condition 15332(d) required** to claim the CEQA "urban in-fill" categorical exemption, since there are significant traffic effects.

*Noise*

The approval of this project will result in substantial construction noise affecting nearby neighbors. Heavy construction equipment produces loud noise. The US Department of Transportation Federal Highway Administration Construction Noise Handbook lists typical loudness of construction equipment at 50 feet of distance (see https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm) . This 50' distance is a typical separation between this project and the neighboring houses.

Many items of equipment that will be in use in a 10 story project such as this one product noise at 90 db or more at 50': Jackhammers, Concrete Saws, and Pile Drivers are all likely to be used. The US CDC states that noise of 80 to 85 db can permanently damage hearing after 2 hours of exposure (see https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html ).

Based on this assessment, there is significant change of hearing-damaging noise over many months of construction. Hearing damage to residents of adjacent properties clearly meet the standard of "significant effects" from noise. It's worth noting that this project is unusual in its extremely close proximity to many residences, making the noise impact much more significant than a typical 10 story construction project. Thus, the 2920 Shattuck project **doesn't meet condition 15332(d) required** to claim the CEQA "urban in-fill" categorical exemption, since there are significant noise effects.

*Air Quality: Outdoor*

Diesel engine exhaust is classified as a Group 1 definite human carcinogen by the International Agency for Research on Cancer.

Per the California Air Resources Board (https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health):

> In 1998, CARB identified DPM (Diesel Particulate Matter) as a toxic air contaminant based on published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects. In 2012, additional studies on the cancer-causing potential of diesel exhaust published since CARB's determination led the International Agency for Research on Cancer (IARC, a division of the World Health Organization) to list diesel engine exhaust as "carcinogenic to humans". This determination is based primarily on evidence from

occupational studies that show a link between exposure to DPM and lung cancer induction, as well as death from lung cancer. Download the IARC report (external site).

Because it is part of PM2.5, DPM also contributes to the same non-cancer health effects as PM2.5 exposure. These effects include premature death, hospitalizations and emergency department visits for exacerbated chronic heart and lung disease, including asthma, increased respiratory symptoms, and decreased lung function in children. Several studies suggest that exposure to DPM may also facilitate development of new allergies. Those most vulnerable to non-cancer health effects are children whose lungs are still developing and the elderly who often have chronic health problems.

This project proposes a building that will be under construction for likely 1 to 2 years, powered by diesel heavy equipment and diesel generators. There are multiple highly vulnerable individuals living adjacent to the proposed construction site, including at least 4 children under 10 years old and multiple elderly residents, who are particularly vulnerable to long term health impacts of diesel pollution.

A detailed assessment of the exact impact of this specific project will have, and the appropriate mitigation steps, is outside of the scope of this letter. The need for this assessment (to keep nearby residents safe) is *exactly why CEQA requires Environmental Impact Reports.* Because there is a high likelihood of "significant effects" to outdoor air quality (and potential intrusion of that diesel particulate matter into nearby houses) the 2920 Shattuck project **doesn't meet condition 15332(d) required** to claim the CEQA "urban in-fill" categorical exemption, since there are significant air quality effects on outdoor air.

*Air Quality: Indoor*

As mentioned above in the "Air Quality: Outdoor" section, there is a substantial chance that any significant outdoor air quality impact will also intrude and cause substantially lower air quality in nearby residences, since many of these residences are older houses - over 100 years old - with poor sealing to the outdoors.

Additionally, there is a serious concern to indoor air quality within the residences of the proposed project. Modern construction, particularly low-cost construction, uses a substantial amount of wood laminates. The developer and the architect have both described cost concerns as driving the design of this project, both in a call with the developers and at the 3/16/23 DRC meeting with the architect.

These wood laminates use Formaldehyde in their glues, and recent studies have shown that typical use of these wood laminate products can cause indoor formaldehyde levels well above what has been found safe, leading to long term health impacts on the residents. I am in conversation with a potential expert witness who can provide more specifics and research citation on this topic if needed.

Based on these indoor air quality concerns, the 2920 Shattuck project **doesn't meet condition 15332(d) required** to claim the CEQA "urban in-fill" categorical exemption, since there are significant air quality effects on indoor air.

**Section 15332(c): habitat for endangered, rare or threatened species**
This section requires that, to use the CEQA "urban in-fill" categorical exemption, "the project site has no value as habitat for endangered, rare or threatened species".

The Coast Live Oak is a threatened species. It is protected from removal or damaging pruning by City of Berkeley Municipal Code Title 6, Chapter 6.52: "MORATORIUM ON THE REMOVAL OF COAST LIVE OAK TREES". Multiple recent studies (see e.g. https://www.fs.usda.gov/research/treesearch/53014 ) describe the threat to this tree from Sudden oak death (SOD), caused by the non-native invasive pathogen, Phytophthora Ramorum. Per the referenced study, Coast Live Oak are at risk of 60% to 70% mortality over the coming decade.

One adjacent property, 2905 Newbury St, has a 40' coast live oak with a tree canopy of approximately 40' in diameter, situated approximately 12' from the property line shared with the proposed 2920 Shattuck project. The root system diameter of a typical oak tree is about twice that of the canopy diameter (see e.g https://treenewal.com/the-root-system-of-oak-trees-the-essential-guide/ ), meaning that the root system of this protected and threatened tree projects about 30' into the project property, and subject to significant damage from construction equipment and excavation.

Since this project site is in fact habitat for an existing protected Coast Live Oak, this project **doesn't meet the condition described in Section 15332(c)** and **is not eligible for the CEQA "urban in-fill" categorical exemption.**

Sincerely,

Dave Auerbach, on behalf of the residents of Newbury St and of Russell St between Adeline and Shattuck

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**Appendix 1**: Calculations around likely bicycle and delivery driver traffic at peak morning and evening traffic times

- At commute times (morning is school + work, 2-3 pm is school, 5-6 pm is workers), it is easy to observe 2 to 5 bikers a minute passing up and down the Russel bike corridor, which corresponds with 120 to 300 bikers an hour for those peak times. These numbers are supported by the 2017 City of Berkeley Bicycle Plan Needs Analysis bike counts, see https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Bicycle-Plan-2017-Ch4_NeedsAnalysis.pdf .
- The project describes 221 units with minimal kitchens. Per a recent study "70% of college students order food from a third-party delivery platform per week, ordering four times per week on average." (reference at https://doordash.news/consumer/doordash-launches-dashpass-for-students-membership-plan/ based on a survey conducted for DoorDash by Wakefield Research).
- Assuming that most or all of the residents of this project are students, and following the statistics above, it is reasonable to estimate about 150 units ordering 4 times per week, or 600 deliveries a week. That is 85 delivery drop offs per day, concentrated in the morning and evening meal hours.
- Each one of those delivery drivers has to park, go into the building, take the elevator, find the unit, about 5 to 10 minutes per delivery.
- Delivery drivers are in a hurry, and tend to double park and block traffic. This double parking will be on Russell, due to the traffic volume on Shattuck, blocking the bike lane. 200 bikers an hour and 30 delivery drivers double parking in peak hours is completely unsafe. Bikers will need to go around these stopped / double parked vehicles into oncoming traffic.
- The chances of an injury or death associated with a bicyclist and a delivery driver dropping off at the proposed project  is unacceptably high without adjustments to the project to lower the density, or providing appropriate loading space as part of the project.