Justification/Reason for Appeal

3800 North Pasadena Avenue Project

DIR-2018-4190-TOC-SPR; ENV-2018-4189-CE

I. REASON FOR THE APPEAL

The Categorical Exemption prepared for the 3800 North Pasadena Avenue Project (DIR-2018-4190-TOC-SPR; ENV-2018-4189-CE) ("Project") fails to comply with the California Environmental Quality Act ("CEQA"). Furthermore, the approval of the Site Plan Review entitlements (DIR-2018-4190-TOC-SPR) was in error because (1) the City of Los Angeles ("City") must fully comply with CEQA prior to any approvals in furtherance of the Project and (2) the findings are not supported by substantial evidence. Therefore, the City of Los Angeles ("City") must set aside the Site Plan Review entitlements and prepare an initial study for the Project, followed by an environmental impact report ("EIR") or negative declaration, prior to considering approvals for the Project.

II. SPECIFICALLY THE POINTS AT ISSUE

Specifically, for the specific reasons set forth in the attached comment letters dated December 14, 2022 and February 6, 2023, the Project does not qualify for a categorical exemption pursuant to Section 15332 of the CEQA Guidelines ("Infill Exemption"). Furthermore, proper CEQA review must be complete *before* the City approves the Project's entitlements. (*Orinda Ass'n. v. Bd. of Supervisors* (1986) 182 Cal.App.3d 1145, 1171 ["No agency may approve a project subject to CEQA until the entire CEQA process is completed and the overall project is lawfully approved."].) As such, the approval of the Project's Site Plan Review entitlements was in error. Additionally, by failing to properly conduct environmental review under CEQA, the City lacks substantial evidence to support its findings for the Site Plan Review entitlements.

III. HOW YOU ARE AGGRIEVED BY THE DECISION

Members of appellant Supporters Alliance for Environmental Responsibility ("SAFER") live and/or work in the vicinity of the proposed Project. They breathe the air, suffer traffic congestion, and will suffer other environmental impacts of the Project unless it is properly mitigated.

IV. WHY YOU BELIEVE THE DECISION-MAKER ERRED OR ABUSED THEIR DISCRETION

The City Planning Commission upheld the City Planning Director's September 15, 2022 decision and approved a Categorical Exemption for the Project pursuant to Section 15332 of the CEQA Guidelines, despite expert evidence in the record establishing substantial evidence that the Project will have significant air quality and traffic impacts, and thus does not meet the requirements for the Infill Exemption. Rather than exempt the Project from CEQA, the City should have prepared an initial study followed by an EIR or negative declaration in accordance with CEQA prior to consideration of approvals for the Project. The City is not permitted to approve the Project's entitlements until proper CEQA review has been completed.

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December 14, 2022

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Re: Comment on Proposed CEQA Infill Exemption for Mixed-Use Project at 3800 North Pasadena Avenue (full version)
December 15, 2022 City Planning Commission Hearing, Agenda Item 11

Dear President Millman, Vice President Choe, Honorable Members of the Planning Commission, and Ms. Carter:

I am writing on behalf of Supporters Alliance for Environmental Responsibility ("SAFER") regarding the proposed Class 32 In-fill Development Categorical Exemption ("Exemption" or "Class 32 Exemption") for a seven-story mixed use building with 100 dwelling units and 14,734 square feet of ground floor commercial space with 13 commercial condominium units, proposed in the City of Los Angeles ("Project").

SAFER objects to the City of Los Angeles' ("City") decision to exempt the Project from review under the California Environmental Quality Act ("CEQA") pursuant to Section 15332 of the CEQA Guidelines. CEQA review is required for the Project. As demonstrated below, the Exemption is inapplicable because the Project will have significant traffic impacts, precluding use of the Class 32 Exemption. Since the Project is not exempt from CEQA, an initial study must be prepared to determine the appropriate level of CEQA review required.

I. PROJECT DESCRIPTION

The Project includes the construction, use, and maintenance of a seven-story mixed-use building with 100 dwelling units, including 10 dwelling units set aside for Extremely Low Income Households and 14,734 square feet of ground floor commercial space with 13 commercial condominium units. The Project will provide 114 automobile parking spaces, 16 short-term and 210 long-term bicycle parking spaces. The property is within the Northeast Los Angeles Community Plan with a Community Commercial land use designation. The Project site currently has one duplex and a recycling center, which would be demolished in order to construct the Project.

The Project is claiming the following Tier 3 Base and Additional Incentives pursuant to the Transit Oriented Communities Affordable Housing Incentive Program: (1) a 70 percent density increase; (2) a Floor Area Ratio increase; (3) a reduction in required parking spaces; and (4) a height increase.

II. LEGAL STANDARD

a. CEQA Exemptions Generally

As the California Supreme Court has held, "[i]f no EIR has been prepared for a nonexempt project, but substantial evidence in the record supports a fair argument that the project may result in significant adverse impacts, the proper remedy is to order preparation of an EIR." (*Communities for a Better Env't v. South Coast Air Quality Mgmt. Dist.* (2010) 48 Cal.4th 310, 319-20.) "Significant environmental effect" is defined very broadly as "a substantial or potentially substantial adverse change in the environment." (Pub. Res. Code ("PRC") § 21068; see also, 14 CCR § 15382.) An effect on the environment need not be "momentous" to meet the CEQA test for significance; it is enough that the impacts are "not trivial." (*No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68, 83.) "The 'foremost principle' in interpreting CEQA is that the Legislature intended the act to be read so as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language." (*Communities for a Better Env't v. Cal. Res. Agency* (2002) 103 Cal.App.4th 98, 109.)

The EIR is the very heart of CEQA. (*Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1214; *Pocket Protectors v. City of Sacramento* (2004) 124 Cal.App.4th 903, 927.) The EIR is an "environmental 'alarm bell' whose purpose is to alert the public and its responsible officials to environmental changes before they have reached the ecological points of no return." (*Bakersfield Citizens*, 124 Cal.App.4th at 1220.) The EIR also functions as a "document of accountability," intended to "demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action." (*Laurel Heights Improvements Assn. v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 392.) The EIR process "protects not only the environment but also informed self-government." (*Pocket Protectors*, 124 Cal.App.4th at 927.)

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]."].) In addition, there are several exceptions to CEQA's categorical exemptions. (See, 14 CCR § 15300.2.)

b. Prohibition of Mitigated Exemptions

An agency may not rely on a categorical exemption if to do so would require the imposition of mitigation measures to reduce potentially significant effects. (*Salmon Protection & Watershed Network v. County of Marin* (2004) 125 Cal.App.4th 1098, 1108 ("*SPAWN*"); *Azusa Land Reclamation Co. v. Main San Gabriel Basin Watermaster* (1997) 52 Cal.App.4th 1165, 1198-1201 ("*Azusa*").) If mitigation measures are necessary, then at a minimum, the agency must prepare a mitigated negative declaration to analyze the impacts, and to determine whether the mitigation measures are adequate to reduce the impacts to below significance. (*Id.*)

The court of appeal has thoroughly explained why projects that require mitigation are not eligible for an exemption from CEQA. (*SPAWN*, 125 Cal.App.4th at 1106-08.) In *SPAWN*, the court of appeal considered a CEQA exemption for a single-family home abutting a creek within a designated stream conservation area. (*Id*. at 1103.) The planning commission exempted the project from CEQA, noting that the project "***as conditioned incorporates numerous provisions*** reducing to insignificance the possibility that the project would harm coho salmon or steelhead trout." (*Id*. [emphasis added].) The board of supervisors similarly found that the project could result in "potential 'adverse impacts on the habitat of threatened or endangered species,'" but nevertheless exempted the project from CEQA because such impacts were addressed in a "riparian protection plan and ***other conditions of approval***." (*Id*. at 1104 [emphasis added].)

The court rejected the county's exemption of the project from CEQA, focusing on the fact that there were admitted possible impacts and that mitigation had been applied to address those impacts. (*SPAWN*, 125 Cal.App.4th at 1107-09.) The court explained,

> [***T]he County erred in relying upon mitigation measures to grant a categorical exemption from CEQA***. Only those projects having no significant effect on the environment are categorically exempt from CEQA review. (Pub. Resources Code, §§ 21080, subd. (b)(9), 21084, subd. (a).) . . . ***If a project may have a significant effect on the environment, CEQA review must occur***, and only then are mitigation measures relevant.

(*Id.* at 1107 [citing *Azusa*, 52 Cal.App.4th at 1199-2000] [emphasis added].) Indeed, "[a]n activity that may have a significant effect on the environment cannot be categorically exempt." (*Id*. [quoting *Mountain Lion Foundation v. Fish & Game Com.* (1997) 16 Cal.4th 105, 124].)

The question of whether an agency impermissibly relied on mitigation measures in exempting a project from CEQA review is reviewed *de novo* with no deference given to the agency. (*Azusa*, 52 Cal.App.4th at 1192, 1201.)

III. DISCUSSION

A. The City Improperly Relied on Mitigation Measures as a Basis for Exempting the Project.

The City has improperly used a mitigation measure to render the Project's traffic impacts less than significant, therefore it cannot claim the Class 32 Exemption for the Project. The Categorical Exemption document ("CE") prepared for the Project contains an e-mail describing the Vehicle Miles Traveled (VMT) analysis prepared for the Project. The e-mail states:

> implementation of the Project would have a significant Household Impact and no work VMT impact. To mitigate the significant VMT impact the project will incorporate unbundled parking as a TDM [transportation demand management] strategy. Parking will be provided at a cost of $150 a month for a portion of the project. With the mitigation measure applied, the project's expected Household VMT will be reduced to 6. This will fully mitigate the project's significant impact.

(CE; E-mail from Wes Pringle to Oliver Netburn re: "VTT74933 FIGUEROA AND PASADENA"; August 22, 2022; pdf p.112.) Additionally, the memorandum provided to the

City by transportation planning and engineering firm "Transpogroup" contains a section entitled "Mitigation Measures" and states that "[a]dditional TDM measures are needed to mitigate the Project VMT impact . . . [a]ttachment A shows the Project VMT impact would be less than significant with the proposed TDM mitigation strategy." (CE; Memorandum from Transpogroup to City re: "Belvedere (3832-3836 N Figueroa Street) TIS Addendum (VTT 74933)"; August 18, 2022; pdf p.116.)

The CE admits a significant traffic impact above the Department of Transportation significance threshold. Therefore, it imposes a requirement for unbundled residential parking with a monthly fee of at least $150 for all residential parking. As such, the City's decision to exempt the Project from CEQA was improper because the City evaluated the Project "as mitigated" rather than evaluating whether the Project could result in a significant impact *without* the mitigation proposed for VMT impacts. (*See SPAWN*, 125 Cal.App.4th at 1103-04, 1107-09.) Indeed, as determined by City staff, the failure to include additional TDM measures would result in a significant VMT impact.

Since the City had determined that the Project, if left unmitigated, could result in a significant impact, the Project cannot be subject to a categorical exemption from CEQA review. An MND or an EIR is required, which would allow the public to assess the adequacy of the proposed mitigation measures, would require a public and transparent environmental review process and would involve formal public notice to the public and other agencies.

B. The Class 32 Exemption Does Not Apply on its Face.

The proposed Project does not qualify for a Class 32 Exemption under CEQA because of the Project's significant traffic impact. The City must prepare an Initial Study to determine the appropriate level of CEQA review, be it a mitigated negative declaration or an environmental impact report.

The Class 32 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 [emph. added].)

One of the key limitations of the Exemption is that it does not apply if the project will have any significant effects relating to traffic. (14 CCR § 15332(d).) Here, the Exemption cannot apply because the City stated in the CE that there will be a significant traffic impact from the Project.

B. The Unusual Circumstances Exception Precludes Reliance on the Class 32 Exemption.

A categorical exemption is inapplicable "where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances." (14 CCR 15300.2(c).) 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. In such a case, to render the exception applicable, the party need only show a reasonable possibility of a significant effect due to that unusual circumstance." (*Id.*)

As discussed above, the City has admitted that the Project will have a significant traffic impact. The fact that this significant impact will occur constitutes an unusual circumstance, precluding the City's reliance on an exemption.

IV. CONCLUSION

The City cannot rely on a Class 32 exemption because the Project does not meet the terms of the exemption and because the unusual circumstances exception to exemption applies. Accordingly, the City must prepare an initial study to determine the appropriate level of environmental review to undertake pursuant to CEQA. Thank you for considering these comments.

Sincerely,

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February 6, 2023

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Re: Supplemental Comment on Proposed CEQA Infill Exemption for Mixed-Use Project at 3800 North Pasadena Avenue
February 9, 2023 City Planning Commission Hearing, Agenda Item 9

Dear President Millman, Vice President Choe, Honorable Members of the Planning Commission, and Ms. Carter:

I am writing on behalf of Supporters Alliance for Environmental Responsibility ("SAFER") regarding the proposed Class 32 In-fill Development Categorical Exemption ("Exemption" or "Class 32 Exemption") for a seven-story mixed use building with 100 dwelling units and 14,734 square feet of ground floor commercial space with 13 commercial condominium units, proposed in the City of Los Angeles ("Project").

SAFER objects to the City of Los Angeles' ("City") decision to exempt the Project from review under the California Environmental Quality Act ("CEQA") pursuant to Section 15332 of the CEQA Guidelines. CEQA review is required for the Project.

SAFER previously submitted comments on the Project on December 14, 2022, in which SAFER argued that the Project did not qualify for the Exemption because the Project proposed mitigation to render traffic impacts less than significant, and CEQA prohibits mitigated exemptions. SAFER incorporates those comments herein by reference.

As demonstrated below, the Exemption is further inapplicable because the Project will have significant air quality impacts, precluding use of the Class 32 Exemption. Since the Project is not exempt from CEQA, an initial study must be prepared to determine the appropriate level of CEQA review required.

DISCUSSION

I. The City Incorrectly Applied CEQA's Class 32 In-Fill Development Categorical Exemption to the Project and Thus a Full CEQA Analysis Is Required.

The proposed Project does not qualify for a Class 32 In-fill Development Categorical Exemption under CEQA because of the Project's potentially significant environmental impacts. The City must prepare an Initial Study to determine the appropriate level of CEQA review, be it a mitigated negative declaration or an environmental impact report.

a. The Class 32 Exemption Does Not Apply on its Face.

The Class 32 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 [emph. added].)

One of the key limitations of the Exemption is that it does not apply if the project will have any significant effects relating to traffic, noise, air quality, or water quality. (14 CCR § 15332(d).) Here, the Exemption cannot apply because there is substantial evidence that the Project will have a significant impact on air quality.

b. The Project will have significant indoor and outdoor air quality impacts, precluding reliance on the Class 32 Exemption.

i. The Project will have significant outdoor air quality impacts.

Environmental chemist Dr. Paul Rosenfeld and certified hydrogeologist Matt Hagemann of the environmental consulting firm Soil Water Air Protection Enterprise ("SWAPE") reviewed the Categorical Exemption document prepared in support of the Exemption. SWAPE's comment letter is attached as Exhibit A and incorporated herein by reference.

SWAPE found that the Exemption incorrectly estimated the Project's construction and operational emissions and therefore cannot be relied upon to determine the significance of the Project's impacts on local and regional air quality. The Exemption relies on emissions calculated from the California Emissions Estimator Version 2016.3.1 ("CalEEMod"). (Exemption, p. 42.) This model, which is used to generate a project's construction and operational emissions, relies on recommended default values based on site specific information related to a number of factors. (Ex. A, p. 4.) CEQA requires any changes to the default values to be justified by substantial evidence. (*Id.*)

SWAPE reviewed the Exemption's CalEEMod output files and found that the values input into the model were inconsistent with information about the Project. (Ex. A, p. 4.) As a result, the Exemption's air quality analysis cannot be relied upon to determine the Project's emissions.

Specifically, SWAPE found that the following values used in the Exemption's air quality analysis were either inconsistent with information provided elsewhere in the Exemption or otherwise unjustified:

1. Underestimated Land Use Sizes.
2. Underestimated Operational Daily Vehicle Trip Rates.

Due to the use of these incorrect parameters, the Exemption cannot be relied upon to determine the significance of the Project's impacts.

SWAPE prepared a screening-level health risk assessment ("HRA") to evaluate potential impacts from Project construction and operation using air quality dispersion model AERSCREEN. (*Id.* at 9.) SWAPE applied a sensitive receptor distance of 75 meters and analyzed impacts to individuals at different stages of life based on OEHHA and SCAQMD guidance utilizing age sensitivity factors. (*Id.* at 11-13.) SWAPE found that the excess cancer risk over the course of Project construction and operation is approximately 10.4 in one million for the 3rd trimester of pregnancy, 99.4 in one million for infants, and 18 in one million for children. (*Id.* at 12.) Moreover, SWAPE found that the excess cancer risk over the course of a residential lifetime of 30 years is 130 in one million. (*Id.*) The cancer risks for the 3rd trimester of pregnancy, infants, children, and lifetime residents therefore exceed the SCAQMD threshold of 10 in one million. (*Id.*)

SWAPE also found that the GHG impacts of the Project were not adequately analyzed. (Ex. A, pp. 13-14.) Specifically, SWAPE found that the City's analysis of GHG impacts and the City's subsequent less-than-significant conclusion as to GHG impacts, is incorrect for three reasons:

(1) The Exemption's quantitative GHG analysis relies on a flawed air model;
(2) The Exemption's quantitative GHG analysis relies upon an outdated threshold; and
(3) The Exemption fails to identify a potentially significant impact.

(*Id*.) Based on these inadequacies, SWAPE found that a full CEQA analysis is necessary to adequately assess the Project's potential GHG impacts.

SWAPE's analysis demonstrates potentially significant air quality and GHG impacts from the Project that necessitate mitigation. The Project therefore does not quality for an infill exemption. A full CEQA analysis should be prepared which includes an updated air quality and GHG analysis and which proposes feasible measures to mitigate any significant impacts.

ii. The Project will have significant indoor air quality impacts.

Certified Industrial Hygienist, Francis "Bud" Offermann, PE, CIH, conducted a review of the proposed Exemption and relevant documents regarding the Project's indoor air emissions. Indoor Environmental Engineering Comments (January 25, 2023). Mr. Offermann concludes that it is likely that the Project will expose residents and commercial employees of the Project to significant impacts related to indoor air quality, and in particular, emissions of the cancer-causing chemical formaldehyde. Mr. Offermann is a leading expert on indoor air quality and has published extensively on the topic. Mr. Offermann's expert comments and curriculum vitae are attached as Exhibit B.

Mr. Offermann explains that 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, p. 2-3.)

Formaldehyde is a known human carcinogen. Mr. Offermann states that future residents of the Project would be exposed to a 120 in one million cancer risk, and commercial employees of the Project would be exposed to a 17.7 in one million risk, ***even assuming*** all materials are compliant with the California Air Resources Board's formaldehyde airborne toxics control measure. (*Id*. at 4-5.) This potential exposure level exceeds the SCAQMD CEQA significance threshold for airborne cancer risk of 10 per million.

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. (*Id*. at 12-13.) These significant environmental impacts preclude the use of an infill exemption for the Project. These impacts should be considered in a full CEQA analysis and mitigation measures should be imposed to reduce the risk of formaldehyde exposure.

II. The Unusual Circumstances Exception Precludes Reliance on the Class 32 Exemption.

A categorical exemption is inapplicable "where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances." (14 CCR 15300.2(c).) Here, the Project does not present the same general risk of environmental impacts as other projects falling under Class 32 exemptions and therefore the exemption cannot apply.

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. In such a case, to render the exception applicable, the party need only show a reasonable possibility of a significant effect due to that unusual circumstance." (*Id*.)

As discussed above, we have submitted substantial evidence that the Project will have significant air quality impacts. The fact that these significant impacts will occur constitutes an unusual circumstance, precluding the City's reliance on an exemption.

CONCLUSION

The City cannot rely on a Class 32 exemption because 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. Thank you for considering these comments.

Sincerely,

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EXHIBIT A

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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January 30, 2023

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Subject: Comments on the North Figueroa Street Project (ENV-2018-4189-CE)

Dear Ms. Fuentes,

We have reviewed the Class 32 Categorical Exemption ("Exemption") for the North Figueroa Street Project ("Project") located in the City of Los Angeles ("City"). The Project proposes to construct 100 dwelling units, 14,374-square-feet ("SF") of retail space, and 114 parking spaces on the 0.86-acre site.

Our review concludes that the Exemption fails to adequately evaluate the Project's hazards, hazardous materials, air quality, health risk, and greenhouse gas impacts. As a result, emissions and health risk impacts associated with construction and operation of the proposed Project are underestimated and inadequately addressed. A full CEQA analysis should be prepared to adequately assess and mitigate the potential hazards, hazardous materials, air quality, health risk, and greenhouse gas impacts that the project may have on the environment.

Hazards and Hazardous Materials

Inadequate Disclosure and Analysis of Impacts

The Exemption states that the Project site is currently used as a recycling center (p. 1). Furthermore, in a photo from May 2022, Google Maps Street View shows the Project site to be used for storage of various materials (see excerpt below):

**View east of Project site, May 2022*

A Phase I Environmental Site Assessment (ESA) is necessary for inclusion in a full CEQA analysis to evaluate current and past uses for potential contamination prior to Project approval. Uses of the site may have resulted in the release of hazardous materials that would pose a risk to workers involved in earthwork necessary for site preparation and to future residents.

The preparation of a Phase I ESA is often undertaken in the preparation of project approval documents to identify and disclose hazardous waste issues that may present impacts to the public, workers, or the environment, and which may require further investigation, including environmental sampling and cleanup. Standards for performing a Phase I ESA have been established by the US EPA and the American Society for Testing and Materials Standards ("ASTM").[1] Phase I ESAs are conducted to identify conditions that would indicate a release of hazardous substance and include:

- a review of all known sites in the vicinity of the subject property that are on regulatory agency databases undergoing assessment or cleanup activities;
- an inspection;
- interviews with people knowledgeable about the property; and
- recommendations for further actions to address potential hazards.

Phase I ESAs conclude with the identification of any "recognized environmental conditions" ("RECs") and recommendations to address such conditions. A REC is the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. If RECs are identified, then a Phase II ESA generally follows, which includes the collection of soil, soil vapor and groundwater samples, as necessary, to identify the extent of contamination and the need for cleanup to reduce exposure potential to the public.

A Phase I ESA, completed by a licensed environmental professional, is necessary for inclusion in a full CEQA analysis to identify recognized environmental conditions, if any, at the proposed Project site. If

[1] "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." ASTM International, December 2021, *available at:* http://www.astm.org/Standards/E1527.htm.

past land uses include RECs, a Phase II should be conducted to sample for residual concentrations of contaminants in soil. Any contamination that is identified above regulatory screening levels, including California Department of Toxic Substances Control Soil Screening Levels[2], should be further evaluated and cleaned up, if necessary, in coordination with the Regional Water Quality Control Board and the California Department of Toxic Substances Control.

Air Quality

Incorrect Reliance on Class 32 Categorical Exemption

The Exemption claims that the Project is categorically exempt pursuant to CEQA Guidelines § 15332, stating:

> "The project meets the conditions for a Class 32 Exemption found in CEQA Guidelines, Section 15332 (In-Fill Development Projects), and none of the exceptions to a categorical exemption pursuant to CEQA Guidelines, Section 15300.2 apply.
>
> _*Conditions for a Class 32 Exemption*_
>
> A project qualifies for a Class 32 Categorical Exemption if it is developed on an infill site and meets the following criteria:
>
>> 1) The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with the applicable zoning designation and regulations;
>>
>> 2) The proposed developed occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses;
>>
>> 3) The project site has no value as habitat for endangered, rare or threatened species;
>>
>> 4) Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality; and
>>
>> 5) The site can be adequately served by all required utilities and public services" (p. 3).

As demonstrated above, a project can only be characterized as an in-fill development and qualify for a Class 32 Categorical Exemption if "approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality." The Exemption claims that the Project would result in less-than-significant air quality impacts. However, this claim is unsubstantiated, as the Project's air quality analysis is insufficient for the following three reasons:

1) The Exemption relies upon an incorrect, unsubstantiated, and outdated air model;
2) The Exemption fails to adequately evaluate diesel particulate matter emissions; and

[2] "HERO HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs)." California Department Of Toxic Substances Control (DTSC) & Human And Ecological Risk Office (HERO), June 2020, *available at:* https://dtsc.ca.gov/wp-content/uploads/sites/31/2022/02/HHRA-Note-3-June2020-Revised-May2022A.pdf.

3) SWAPE's screening-level HRA indicates a potentially significant health risk impact.

1) Incorrect, Unsubstantiated, and Outdated Model

The Exemption's air quality analysis relies on emissions calculated with CalEEMod.2016.3.1 (p. 42).[3] CalEEMod provides recommended default values based on site-specific information, such as land use type, meteorological data, total lot acreage, project type and typical equipment associated with project type. If more specific project information is known, the user can change the default values and input project-specific values, but the California Environmental Quality Act ("CEQA") requires that such changes be justified by substantial evidence. Once all of the values are inputted into the model, the Project's construction and operational emissions are calculated, and "output files" are generated. These output files disclose to the reader what parameters are utilized in calculating the Project's air pollutant emissions and make known which default values are changed as well as provide justification for the values selected.

When reviewing the Project's CalEEMod output files, provided as Appendix A to the March 2017 Air Quality Impact Analysis ("AQIA"), we found that several model inputs were not consistent with information disclosed in the Exemption. As it is currently January 2023, the AQIA is now more than 5 years old, and likely relies on outdated information. As a result, the Project's construction and operational emissions may be underestimated. A full CEQA analysis should be prepared to include an updated air quality analysis that adequately evaluates the impacts that construction and operation of the Project will have on local and regional air quality.

Underestimated Land Use Sizes

According to the Exemption:

> "The proposed project is the construction, use, and maintenance of a new, seven-story (with one [1] basement level), mixed-use building with 100 dwelling units, including 10 dwelling units set aside for Extremely Low Income Households (or 10% of the total number of units) and 14,734 square feet of ground floor commercial space [...] The project will provide a total of 114 automobile parking spaces" (p. 1).

As such, in order to be consistent with the information provided in the Exemption, the model should have included 100 dwelling units, 14,734-SF of commercial space, and 114 parking spots. However, review of the CalEEMod output files demonstrates that the "3802 N Pasadena Ave Mixed-Use" model fails to include the correct land use sizes (see excerpt below) (AQIA, Appendix A, pp. 47, 77).

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	24.80	1000sqft	0.00	24,800.00	0
Strip Mall	1.20	1000sqft	0.03	1,200.00	0
Apartments Mid Rise	89.00	Dwelling Unit	1.06	137,920.00	255

[3] "CalEEMod User's Guide." California Air Pollution Control Officers Association (CAPCOA), September 2016, *available at:* http://www.aqmd.gov/caleemod/archive/download-version-2016-3-1.

As demonstrated above, the model only includes 89 dwelling units, and only 1,200-SF of "Strip Mall" land use. As such, the model underestimates the residential land use by 11 units,[4] and underestimates the commercial land use by 13,534-SF.[5] Furthermore, while the model includes 24,800-SF of parking, according to CalEEMod, 114 parking spaces is equivalent to 45,600-SF (see example excerpt below).

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Square Feet
Parking	Enclosed Parking with Elevator	114	Space	1.03	45,600

As such, the model underestimates the parking land use by approximately 20,800-SF, and instead should have included either 114 parking spaces, or 45,600-SF of parking.

These underestimations present an issue, as the land use size feature is used throughout CalEEMod to determine default variable and emission factors that go into the model's calculations. The square footage of a land use is used for certain calculations such as determining the wall space to be painted (i.e., VOC emissions from architectural coatings) and volume that is heated or cooled (i.e., energy impacts).[6] As such, by underestimating the size of the proposed commercial, parking and dwelling land uses, the model underestimates the Project's construction and operational emissions. As a result, the IS/MND's less-than-significant impact determination should not be relied upon.

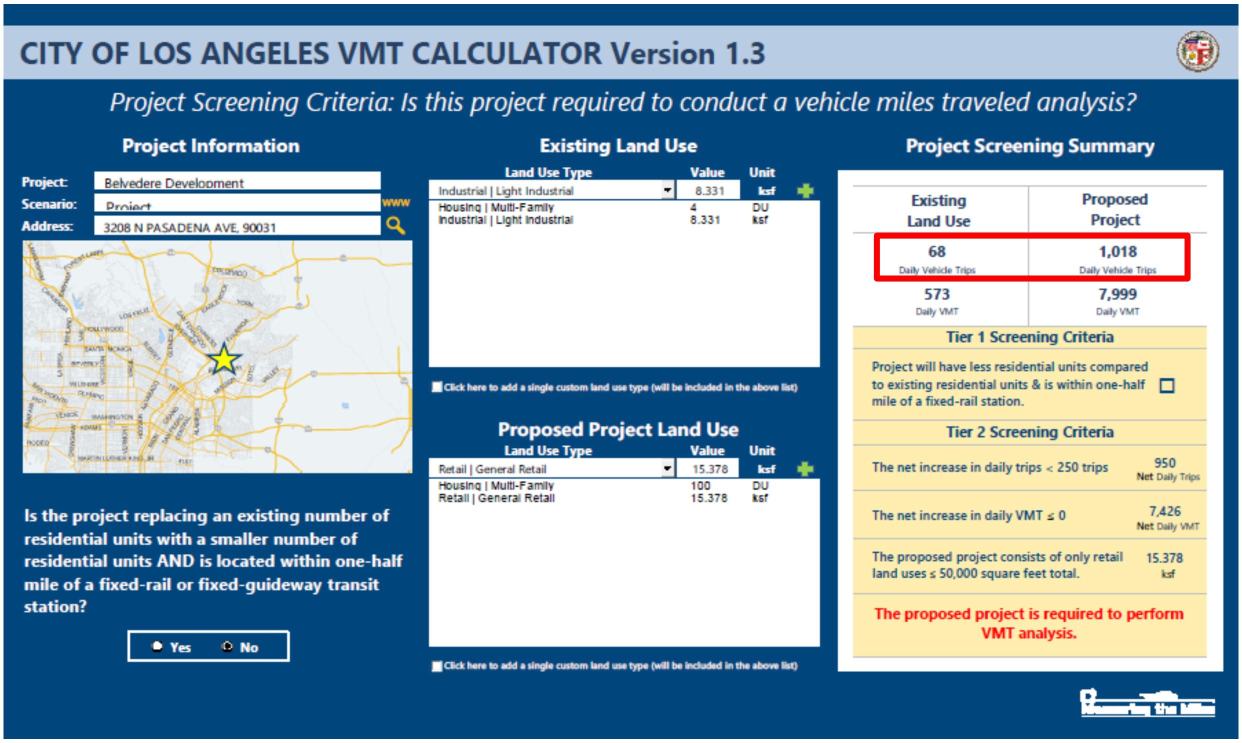
Underestimated Operational Daily Vehicle Trip Rates

According to the August 2022 Traffic Impact Analysis Addendum ("TIA"), provided as an attachment to the Exemption, the proposed Project is expected to generate approximately 950 net new daily vehicle trips during operation (TIA, pp. 115). Furthermore, the TIA provides the following VMT analysis (see exerpt below) (TIA, pp. 118):

[4] Calculated: (100 proposed dwelling units) – (89 modeled dwelling units) = 11 underestimated dwelling units.

[5] Calculated: (14,734-SF proposed commercial space) – (1,200-SF modeled commercial space) = 13,534 underestimated commercial space.

[6] "CalEEMod User's Guide Version 2020.4.0." California Air Pollution Control Officers Association (CAPCOA), May 2021, *available at:* https://www.aqmd.gov/caleemod/user's-guide, p. 28.



As such, the Project's model should have included 950 net daily vehicle trips.[7] However, review of the CalEEMod output files demonstrates that the "3802 N Pasadena Ave Mixed-Use" model includes only approximately 645 weekday, 619 Saturday, and 546 Sunday vehicle trips (see excerpt below) (AQIA, Appendix A, pp. 70, 100).

	Average Daily Trip Rate		
Land Use	Weekday	Saturday	Sunday
Apartments Mid Rise	591.85	568.71	521.54
Enclosed Parking with Elevator	0.00	0.00	0.00
Strip Mall	53.18	50.45	24.52
Total	645.03	619.16	546.06

As demonstrated in the excerpt above, the weekday, Saturday, and Sunday trips are each underestimated by approximately 254 trips,[8] 280 trips,[9] and 353 trips,[10] respectively. As such, the trip rates inputted into the model are underestimated and inconsistent with the information provided by the TIA.

[7] Calculated: 1,018 proposed trips – 68 existing trips = 950 total net daily vehicle trips.
[8] Calculated: 899 proposed vehicle trips – 645.03 modeled vehicle trips = 253.97 underestimated vehicle trips.
[9] Calculated: 899 proposed vehicle trips – 619.16 modeled vehicle trips = 279.84 underestimated vehicle trips.
[10] Calculated: 899 proposed vehicle trips – 546.06 modeled vehicle trips = 352.94 underestimated vehicle trips.

These inconsistencies present an issue, as CalEEMod uses the operational vehicle trip rates to calculate the emissions associated with the operational on-road vehicles.[11] By including underestimated weekday, Saturday, and Sunday operational vehicle trips, the model underestimates the Project's mobile-source operational emissions and should not be relied upon to determine Project significance.

2) Diesel Particulate Matter Emissions Inadequately Evaluated

The AQIA concludes that the Project would have a less-than-significant health risk impact based on a Localized Significance Threshold ("LST") analysis (see excerpt below) (p. 9, Table 7).

Table 7
Local Significance Thresholds (LST)
and Peak Daily Onsite Emissions (pounds/day)

LST 1.0 acre/25 meters Central LA	NO_X	CO	PM-10	PM-2.5
LST Threshold	74	680	5	3
Peak Onsite Daily Emissions	**28.7**	**19.5**	**3.1**	**1.8**
Significant Impact? Y/N	No	No	No	No
Source: CalEEMod output, March 9, 2017				

However, the AQIA's evaluation of the Project's potential health risk impacts, as well as the subsequent less-than-significant impact conclusion, is incorrect for four reasons.

First, the use of a LST analysis to determine the health risk impacts posed to nearby, existing sensitive receptors as a result of the Project's operational toxic air contaminant ("TAC") emissions is incorrect. While the LST method assesses the impact of pollutants at a local level, it only evaluates impacts from criteria air pollutants. According to the *Final Localized Significance Threshold Methodology* document prepared by the South Coast Air Quality Management District ("SCAQMD"), LST analyses are only applicable to NO_x, CO, PM_{10}, and $PM_{2.5}$ emissions, which are collectively referred to as criteria air pollutants.[12] Because LST methods can only be applied to criteria air pollutants, they cannot be used to determine whether emissions from TACs, specifically Diesel Particulate Matter ("DPM"), a known human carcinogen, would result in a significant health risk impact to nearby sensitive receptors. As a result, health impacts during Project operation from exposure to TACs, such as DPM, were not analyzed, thus leaving a gap in the AQIA's analysis.

Second, by failing to prepare a quantified construction and operational HRA, the AQIA is inconsistent with CEQA's requirement to make "a reasonable effort to substantively connect a project's air quality impacts to likely health consequences." [13] This poses a problem, as according to the Noise and Vibration

[11] "CalEEMod User's Guide." California Air Pollution Control Officers Association (CAPCOA), May 2021, *available at:* https://www.aqmd.gov/caleemod/user's-guide, p. 36.
[12] "Final Localized Significance Threshold Methodology." South Coast Air Quality Management District (SCAQMD), Revised July 2008, *available at:* http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf.
[13] "Sierra Club v. County of Fresno." Supreme Court of California, December 2018, a*vailable at:* https://ceqaportal.org/decisions/1907/Sierra%20Club%20v.%20County%20of%20Fresno.pdf.

Impact Report ("Noise Report") to the Exemption, construction of the Project would produce DPM emissions through the exhaust stacks of construction equipment over a duration of approximately 24 months (Noise Report, pp. 16). Furthermore, according to the TIA, operation of the Project is anticipated to generate 950 net new daily vehicle trips, which would produce additional exhaust emissions and continue to expose nearby, existing sensitive receptors to DPM emissions (TIA, pp. 115). However, the AQIA fails to evaluate the TAC emissions associated with Project construction and operation or indicate the concentrations at which such pollutants would trigger adverse health effects. By failing to make a reasonable effort to connect the Project's TAC emissions to the potential health risks posed to nearby receptors, the AQIA is inconsistent with CEQA's requirement to correlate Project-generated emissions with potential adverse impacts on human health.

Third, the Office of Environmental Health Hazard Assessment ("OEHHA"), the organization responsible for providing guidance on conducting HRAs in California, released its most recent *Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments* in February 2015. This guidance document describes the types of projects that warrant the preparation of an HRA. Specifically, OEHHA recommends that all short-term projects lasting at least 2 months assess cancer risks.[14] Furthermore, according to OEHHA:

> "Exposure from projects lasting more than 6 months should be evaluated for the duration of the project. In all cases, for assessing risk to residential receptors, the exposure should be assumed to start in the third trimester to allow for the use of the ASFs (OEHHA, 2009)."[15]

Thus, as the Project's anticipated construction duration exceeds the 2-month and 6-month requirements set forth by OEHHA, construction of the Project meets the threshold warranting a quantified HRA under OEHHA guidance and should be evaluated for the entire 24-month construction period. Furthermore, OEHHA recommends that an exposure duration of 30 years should be used to estimate the individual cancer risk at the maximally exposed individual resident ("MEIR").[16] While the Exemption fails to provide the expected lifetime of the proposed Project, we can reasonably assume that the Project would operate for at least 30 years, if not more. Therefore, operation of the Project also exceeds the 2-month and 6-month requirements set forth by OEHHA and should be evaluated for the entire 30-year residential exposure duration, as indicated by OEHHA guidance. These recommendations reflect the most recent state health risk policies, and as such, a full CEQA analysis should be prepared to include an analysis of health risk impacts posed to nearby sensitive receptors from Project-generated DPM emissions.

Fourth, by claiming a less-than-significant impact without conducting a quantified construction or operational HRA for nearby, existing sensitive receptors, the AQIA fails to compare the Project's excess

[14] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-18.

[15] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-18.

[16] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 2-4.

cancer risk to the SCAQMD's specific numeric threshold of 10 in one million.[17] Thus, in accordance with the most relevant guidance, an assessment of the health risk posed to nearby, existing receptors as a result of Project construction and operation should be conducted.

3) Screening-Level Analysis Demonstrates Potentially Significant Health Risk Impact

In order to conduct our screening-level risk assessment we relied upon AERSCREEN, which is a screening level air quality dispersion model.[18] As discussed above, the model replaced SCREEN3, and AERSCREEN is included in the OEHHA and the California Air Pollution Control Officers Associated ("CAPCOA") guidance as the appropriate air dispersion model for Level 2 health risk screening assessments ("HRSAs").[19, 20] A Level 2 HRSA utilizes a limited amount of site-specific information to generate maximum reasonable downwind concentrations of air contaminants to which nearby sensitive receptors may be exposed. If an unacceptable air quality hazard is determined to be possible using AERSCREEN, a more refined modeling approach is required prior to approval of the Project.

We prepared a preliminary HRA of the Project's construction and operational health risk impact to residential sensitive receptors using the annual PM_{10} exhaust estimates from the AQIA's CalEEMod output files. Consistent with recommendations set forth by OEHHA, we assumed residential exposure begins during the third trimester stage of life.[21] The AQIA's CalEEMod model indicates that construction activities will generate approximately 230 pounds of DPM over the 350-day construction period.[22] The AERSCREEN model relies on a continuous average emission rate to simulate maximum downward concentrations from point, area, and volume emission sources. To account for the variability in equipment usage and truck trips over Project construction, we calculated an average DPM emission rate by the following equation:

$$Emission\ Rate\ \left(\frac{grams}{second}\right) = \frac{230.1\ lbs}{350\ days} \times \frac{453.6\ grams}{lbs} \times \frac{1\ day}{24\ hours} \times \frac{1\ hour}{3{,}600\ seconds} = \mathbf{0.00345\ g/s}$$

Using this equation, we estimated a construction emission rate of 0.00345 grams per second ("g/s"). Subtracting the 350-day construction period from the total residential duration of 30 years, we assumed that after Project construction, the sensitive receptor would be exposed to the Project's operational DPM for an additional 29 years. The AQIA's operational CalEEMod emissions indicate that operational activities will generate approximately 41 pounds of DPM per year throughout operation. Applying the

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[17] "South Coast AQMD Air Quality Significance Thresholds." SCAQMD, April 2019, *available at:* http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf.

[18] "AERSCREEN Released as the EPA Recommended Screening Model," U.S. EPA, April 2011, *available at:* http://www.epa.gov/ttn/scram/guidance/clarification/20110411_AERSCREEN_Release_Memo.pdf

[19] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.

[20] "Health Risk Assessments for Proposed Land Use Projects." CAPCOA, July 2009, *available at:* http://www.capcoa.org/wp-content/uploads/2012/03/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf.

[21] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-18.

[22] See Attachment A for health risk calculations.

same equation used to estimate the construction DPM rate, we estimated the following emission rate for Project operation:

$$Emission\ Rate\ \left(\frac{grams}{second}\right) = \frac{40.8\ lbs}{365\ days} \times \frac{453.6\ grams}{lbs} \times \frac{1\ day}{24\ hours} \times \frac{1\ hour}{3{,}600\ seconds} = \mathbf{0.000587\ g/s}$$

Using this equation, we estimated an operational emission rate of 0.000587 g/s. Construction and operation were simulated as a 2.83-acre rectangular area source in AERSCREEN, with approximate dimensions of 151- by 76-meters. A release height of three meters was selected to represent the height of stacks of operational equipment and other heavy-duty vehicles, and an initial vertical dimension of one and a half meters was used to simulate instantaneous plume dispersion upon release. An urban meteorological setting was selected with model-default inputs for wind speed and direction distribution. The population of Los Angeles was obtained from U.S. 2020 Census data.[23]

The AERSCREEN model generates maximum reasonable estimates of single-hour DPM concentrations from the Project Site. The U.S. EPA suggests that the annualized average concentration of an air pollutant be estimated by multiplying the single-hour concentration by 10% in screening procedures.[24] According to the Noise Report the nearest sensitive receptor is located approximately 10 feet from the Project site (pp. 15). However, review of the AERSCREEN output files demonstrates that the MEIR is located approximately 75 meters from the Project site. Thus, the single-hour concentration estimated by AERSCREEN for Project construction is approximately 7.632 µg/m^3 DPM at approximately 75 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.7632 µg/m^3 for Project construction at the MEIR. For Project operation, the single-hour concentration estimated by AERSCREEN is 0.4967 µg/m^3 DPM at approximately 75 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.04967 µg/m^3 for Project operation at the MEIR.[25]

We calculated the excess cancer risk to the MEIR using applicable HRA methodologies prescribed by OEHHA, as recommended by SCAQMD.[26] Specifically, guidance from OEHHA and the CARB recommends the use of a standard point estimate approach, including high-point estimate (i.e. 95th percentile) breathing rates and age sensitivity factors ("ASF") in order to account for the increased sensitivity to carcinogens during early-in-life exposure and accurately assess risk for susceptible subpopulations such as children. The residential exposure parameters, such as the daily breathing rates ("BR/BW"), exposure duration ("ED"), age sensitivity factors ("ASF"), fraction of time at home ("FAH"), and exposure frequency ("EF") utilized for the various age groups in our screening-level HRA are as follows:

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[23] "Los Angeles." U.S. Census Bureau, 2020, *available at:* https://datacommons.org/place/geoId/0644000.

[24] "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources Revised." U.S. EPA, October 1992, *available at:* http://www.epa.gov/ttn/scram/guidance/guide/EPA-454R-92-019_OCR.pdf.

[25] See Attachment B for AERSCREEN output files.

[26] "AB 2588 and Rule 1402 Supplemental Guidelines." SCAQMD, October 2020, *available at:* http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab-2588-supplemental-guidelines.pdf?sfvrsn=19, p. 2.

Exposure Assumptions for Residential Individual Cancer Risk						
Age Group	**Breathing Rate** (L/kg-day)[27]	**Age Sensitivity Factor**[28]	**Exposure Duration** (years)	**Fraction of Time at Home**[29]	**Exposure Frequency** (days/year)[30]	**Exposure Time** (hours/day)
3rd Trimester	361	10	0.25	1	350	24
Infant (0 - 2)	1090	10	2	1	350	24
Child (2 - 16)	572	3	14	1	350	24
Adult (16 - 30)	261	1	14	0.73	350	24

For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose for each age group. Once determined, contaminant dose is multiplied by the cancer potency factor ("CPF") in units of inverse dose expressed in milligrams per kilogram per day ($mg/kg/day^{-1}$) to derive the cancer risk estimate. Therefore, to assess exposures, we utilized the following dose algorithm:

$$Dose_{AIR,per\ age\ group} = C_{air} \times EF \times \left[\frac{BR}{BW}\right] \times A \times CF$$

where:

$Dose_{AIR}$ = dose by inhalation (mg/kg/day), per age group
C_{air} = concentration of contaminant in air (µg/m3)
EF = exposure frequency (number of days/365 days)
BR/BW = daily breathing rate normalized to body weight (L/kg/day)
A = inhalation absorption factor (default = 1)
CF = conversion factor (1x10-6, µg to mg, L to m3)

To calculate the overall cancer risk, we used the following equation for each appropriate age group:

$$Cancer\ Risk_{AIR} = Dose_{AIR} \times CPF \times ASF \times FAH \times \frac{ED}{AT}$$

27 "Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics 'Hot Spots' Information and Assessment Act." SCAQMD, October 2020, available at: http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab-2588-supplemental-guidelines.pdf?sfvrsn=19, p. 19; see also "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.
28 "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-5 Table 8.3.
29 "Risk Assessment Procedures." SCAQMD, August 2017, available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1401/riskassessmentprocedures_2017_080717.pdf, p. 7.
30 "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 5-24.

where:

$Dose_{AIR}$ = dose by inhalation (mg/kg/day), per age group
CPF = cancer potency factor, chemical-specific $(mg/kg/day)^{-1}$
ASF = age sensitivity factor, per age group
FAH = fraction of time at home, per age group (for residential receptors only)
ED = exposure duration (years)
AT = averaging time period over which exposure duration is averaged (always 70 years)

Consistent with the 350-day construction schedule, the annualized average concentration for construction was used for the entire third trimester of pregnancy (0.25 years), and the first 0.71 years of the infantile (0 – 2) stage of life. The annualized average concentration for operation was used for the remainder of the 30-year exposure period, which makes up the latter 1.29 years of the infantile stage of life, the entire child stage of life (2 – 16), as well the entire adult (16 – 30 years) stage of life. The results of our calculations are shown in the table below.

The Maximally Exposed Individual at an Existing Residential Receptor

Age Group	**Emissions Source**	**Duration** (years)	**Concentration** (ug/m3)	**Cancer Risk**
3rd Trimester	Construction	0.25	0.7632	1.04E-05
	Construction	*0.71*	*0.7632*	*8.89E-05*
	Operation	*1.29*	*0.0497*	*1.05E-05*
Infant (0 - 2)	Total	2		9.94E-05
Child (2 - 16)	Operation	14	0.0497	1.80E-05
Adult (16 - 30)	Operation	14	0.0497	2.00E-06
Lifetime		**30**		**1.30E-04**

As demonstrated in the table above, the excess cancer risks for the 3rd trimester of pregnancy, infants, children, and adults at the MEIR located approximately 75 meters away, over the course of Project construction and operation, are approximately 10.4, 99.4, 18.0, and 2.0 in one million, respectively. The excess cancer risk over the course of a residential lifetime (30 years) is approximately 130 in one million. The 3rd trimester, infant, child, and lifetime cancer risks exceed the SCAQMD threshold of 10 in one million, thus resulting in a potentially significant impact not previously addressed or identified by the AQIA.

Our analysis represents a screening-level HRA, which is known to be conservative and tends to err on the side of health protection. The purpose of the screening-level HRA is to demonstrate the potential link between Project-generated emissions and adverse health risk impacts. According to the U.S. EPA:

> "EPA's Exposure Assessment Guidelines recommend completing exposure assessments iteratively using a tiered approach to 'strike a balance between the costs of adding detail and refinement to an assessment and the benefits associated with that additional refinement' (U.S. EPA, 1992).
>
> In other words, an assessment using basic tools (e.g., simple exposure calculations, default values, rules of thumb, conservative assumptions) can be conducted as the first phase (or tier) of the overall assessment (i.e., a screening-level assessment).
>
> The exposure assessor or risk manager can then determine whether the results of the screening-level assessment warrant further evaluation through refinements of the input data and exposure assumptions or by using more advanced models."

As demonstrated above, screening-level analyses warrant further evaluation in a refined modeling approach. Thus, as our screening-level HRA demonstrates that construction and operation of the Project could result in a potentially significant health risk impact, a full CEQA analysis should be prepared to include a refined health risk analysis which adequately and accurately evaluates health risk impacts associated with both Project construction and operation. If the refined analysis similarly concludes that the Project would result in a significant health risk impact, then mitigation measures should be incorporated, as described below in the "Feasible Mitigation Measures Available to Reduce Emissions" section.

Greenhouse Gas

Failure to Adequately Evaluate Greenhouse Gas Impacts

The AQIA estimates that the Project would generate net annual greenhouse gas ("GHG") emissions of 1,419.9 metric tons of carbon dioxide equivalents per year ("MT CO_2e/year"), which would not exceed the SCAQMD threshold of 3,500 MT CO_2e/year (p. 11). However, the AQIA's analysis, as well as the subsequent less-than-significant impact conclusion, is incorrect for three reasons.

(1) The Exemption's quantitative GHG analysis relies upon a flawed air model;
(2) The Exemption's quantitative GHG analysis relies upon an outdated threshold; and
(3) The Exemption fails to identify a potentially significant impact.

1) Incorrect and Unsubstantiated Quantitative Analysis of Emissions

As previously stated, the AQIA estimates that the Project would generate net annual GHG emissions of 1,419.9 MT CO_2e/year (p. 11). However, the AQIA's quantitative GHG analysis is unsubstantiated. As previously discussed, when we reviewed the Project's CalEEMod output files, provided in Appendix A to the AQIA, we found that several of the values inputted into the models are not consistent with information disclosed in the Exemption. As a result, the models underestimate the Project's emissions, and the AQIA's quantitative GHG analysis should not be relied upon to determine Project significance. A full CEQA analysis should be prepared that adequately assesses the potential GHG impacts that construction and operation of the proposed Project may have on the environment.

2) Incorrect Reliance on an Outdated Quantitative GHG Threshold

As previously stated, the AQIA estimates that the Project would generate net annual GHG emissions of 1,419.9 MT CO_2e/year, which would not exceed the SCAQMD bright-line threshold of 3,500 MT CO_2e/year (p. 11). However, the guidance that provided the 3,500 MT CO_2e/year threshold, the SCAQMD's 2008 *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules, and Plans* report, was developed when the Global Warming Solutions Act of 2006, commonly known as "AB 32", was the governing statute for GHG reductions in California. AB 32 requires California to reduce GHG emissions to 1990 levels by 2020. [31] Furthermore, AEP guidance states:

> "[F]or evaluating projects with a post 2020 horizon, the threshold will need to be revised based on a new gap analysis that would examine 17 development and reduction potentials out to the next GHG reduction milestone." [32]

As it is currently January 2023, thresholds for 2020 are not applicable to the proposed Project and should be revised to reflect the current GHG reduction target. As such, the SCAQMD bright-line threshold of 3,500 MT CO_2e/year is outdated and inapplicable to the proposed Project, and the AQIA's less-than-significant GHG impact conclusion should not be relied upon. Instead, we recommend that the Project apply the SCAQMD 2035 service population efficiency target of 3.0 metric tons of carbon dioxide equivalents per service population per year ("MT CO_2e/SP/year"), which was calculated by applying a 40% reduction to the 2020 targets.[33]

3) Failure to Identify a Potentially Significant GHG Impact

In an effort to quantitatively evaluate the Project's GHG emissions, we compared the Project's GHG emissions, as estimated by the AQIA, to the SCAQMD 2035 efficiency target of 3.0 MT CO_2e/SP/year. When applying this threshold, the Project's incorrect and unsubstantiated air model indicates a potentially significant GHG impact.

As previously stated, the AQIA estimates that the Project would generate net annual GHG emissions of 1,419.9 MT CO_2e/year (p. 11). According to CAPCOA's *CEQA & Climate Change* report, a service population ("SP") is defined as "the sum of the number of residents and the number of jobs supported by the project."[34] The CalEEMod output files, provided as Appendix A to the AQIA, indicate that the

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[31] "Health & Safety Code 38550." California State Legislature, January 2007, *available at:* https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=38550.

[32] "Beyond Newhall and 2020: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California." Association of Environmental Professionals (AEP), October 2016, *available at:* https://califaep.org/docs/AEP-2016_Final_White_Paper.pdf, p. 39.

[33] "Minutes for the GHG CEQA Significance Threshold Stakeholder Working Group #15." SCAQMD, September 2010, *available at:* http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-15/ghg-meeting-15-minutes.pdf, p. 2.

[34] "CEQA & Climate Change." California Air Pollution Control Officers Association (CAPCOA), January 2008, *available at:* http://www.capcoa.org/wp-content/uploads/2012/03/CAPCOA-White-Paper.pdf, p. 71-72.

Project would include a population of 255 for residentual land uses. Furthermore, according to the *Employment Density Study Summary Report* completed by the Southern California Association of Governments ("SCAG"), the project would support approximately 3 employees.[35, 36] Thus, we estimate an SP of 258 people. When dividing the Project's net annual GHG emissions, as estimated by the AQIA, by an SP of 258 people, we find that the Project would emit approximately 5.5 MT CO_2e/SP/year (see table below).[37]

Project Greenhouse Gas Emissions	
Annual Emissions (MT CO_2e/year)	1,419.9
Service Population	258
Service Population Efficiency (MT CO_2e/SP/year)	5.5
SCAQMD 2035 Target	**3.0**
Exceeds?	***Yes***

As demonstrated above, the Project's service population efficiency value exceeds the SCAQMD 2035 efficiency target of 3.0 MT CO_2e/SP/year, indicating a potentially significant impact not previously identified or addressed by the AQIA. As a result, the AQIA's less-than-significant GHG impact conclusion should not be relied upon. A full CEQA analysis should be prepared, including an updated GHG analysis and incorporating additional mitigation measures to reduce the Project's GHG emissions to less-than-significant levels.

Mitigation

Feasible Mitigation Measures Available to Reduce Emissions

Our analysis demonstrates that the Project would result in potentially significant health risk and GHG impacts that should be mitigated further. As such, in an effort to reduce the Project's emissions, we identified several mitigation measures that are applicable to the proposed Project. Therefore, to reduce the Project's emissions, we recommend consideration of SCAG's 2020 *RTP/SCS* PEIR's Air Quality Project Level Mitigation Measures ("PMM-AQ-1") and Greenhouse Gas Project Level Mitigation Measures ("PMM-GHG-1"), as described below: [38]

[35] Calculated: (1,200-SF strip-mall) / (424-SF per one employee other retail in San Bernardino County) = 2.83 employees.

[36] "Employment Density Study Summary Report." Southern California Association of Governments (SCAG), October 2001, *available at:* https://docplayer.net/30300085-Employment-density-study-summary-report-october-31-prepared-for-southern-california-association-of-governments.html, p. 4.

[37] Calculated: (1,419.9 MT CO_2e/year) / (258 service population) = (5.5 MT CO_2e/SP/year).

[38] "4.0 Mitigation Measures." Connect SoCal Program Environmental Impact Report Addendum #1, September 2020, available at: https://scag.ca.gov/sites/main/files/file-attachments/fpeir_connectsocal_addendum_4_mitigationmeasures.pdf?1606004420, p. 4.0-2 – 4.0-10; 4.0-19 – 4.0-23; See also: "Certified Final Connect SoCal Program Environmental Impact Report." Southern California Association of Governments (SCAG), May 2020, *available at:* https://scag.ca.gov/peir.

SCAG RTP/SCS 2020-2045
Air Quality Project Level Mitigation Measures – PMM-AQ-1: In accordance with provisions of sections 15091(a)(2) and 15126.4(a)(1)(B) of the *State CEQA Guidelines*, a Lead Agency for a project can and should consider mitigation measures to reduce substantial adverse effects related to violating air quality standards. Such measures may include the following or other comparable measures identified by the Lead Agency:
a) Minimize land disturbance.
b) Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes.
c) Cover trucks when hauling dirt.
d) Stabilize the surface of dirt piles if not removed immediately.
e) Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.
f) Minimize unnecessary vehicular and machinery activities.
g) Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
h) Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities.
j) Require contractors to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that could be used an aggregate of 40 or more hours for the construction project. Prepare a plan for approval by the applicable air district demonstrating achievement of the applicable percent reduction for a CARB-approved fleet.
k) Ensure that all construction equipment is properly tuned and maintained.
l) Minimize idling time to 5 minutes—saves fuel and reduces emissions.
m) Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
n) Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
o) Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
p) As appropriate require that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit. Arrange appropriate consultations with the CARB or the District to determine registration and permitting requirements prior to equipment operation at the site.
q) Require projects within 500 feet of residences, hospitals, or schools to use Tier 4 equipment for all engines above 50 horsepower (hp) unless the individual project can demonstrate that Tier 4 engines would not be required to mitigate emissions below significance thresholds.
r) Projects located within the South Coast Air Basin should consider applying for South Coast AQMD "SOON" funds which provides funds to applicable fleets for the purchase of commercially available low-emission heavy-duty engines to achieve near-term reduction of NOx emissions from in-use off-road diesel vehicles.
s) Projects located within AB 617 communities should review the applicable Community Emissions Reduction Plan (CERP) for additional mitigation that can be applied to individual projects.

t) Where applicable, projects should provide information about air quality related programs to schools, including the Environmental Justice Community Partnerships (EJCP), Clean Air Ranger Education (CARE), and Why Air Quality Matters programs.
u) Projects should work with local cities and counties to install adequate signage that prohibits truck idling in certain locations (e.g., near schools and sensitive receptors).
Greenhouse Gas Project Level Mitigation Measures – PMM-GHG-1 In accordance with provisions of sections 15091(a)(2) and 15126.4(a)(1)(B) of the *State CEQA Guidelines*, a Lead Agency for a project can and should consider mitigation measures to reduce substantial adverse effects related to violating air quality standards. Such measures may include the following or other comparable measures identified by the Lead Agency:
b) Reduce emissions resulting from projects through implementation of project features, project design, or other measures, such as those described in Appendix F of the State CEQA Guidelines.
c) Include off-site measures to mitigate a project's emissions.
d) Measures that consider incorporation of Best Available Control Technology (BACT) during design, construction and operation of projects to minimize GHG emissions, including but not limited to: i. Use energy and fuel-efficient vehicles and equipment; ii. Deployment of zero- and/or near zero emission technologies; iii. Use lighting systems that are energy efficient, such as LED technology; iv. Use the minimum feasible amount of GHG-emitting construction materials; v. Use cement blended with the maximum feasible amount of flash or other materials that reduce GHG emissions from cement production; vi. Incorporate design measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse; vii. Incorporate design measures to reduce energy consumption and increase use of renewable energy; viii. Incorporate design measures to reduce water consumption; ix. Use lighter-colored pavement where feasible; x. Recycle construction debris to maximum extent feasible; xi. Plant shade trees in or near construction projects where feasible; and xii. Solicit bids that include concepts listed above.
e) Measures that encourage transit use, carpooling, bike-share and car-share programs, active transportation, and parking strategies, including, but not limited to the following: i. Promote transit-active transportation coordinated strategies; ii. Increase bicycle carrying capacity on transit and rail vehicles; iii. Improve or increase access to transit; iv. Increase access to common goods and services, such as groceries, schools, and day care; v. Incorporate affordable housing into the project; vi. Incorporate the neighborhood electric vehicle network; vii. Orient the project toward transit, bicycle and pedestrian facilities; viii. Improve pedestrian or bicycle networks, or transit service; ix. Provide traffic calming measures; x. Provide bicycle parking; xi. Limit or eliminate park supply; xii. Unbundle parking costs;

xiii. Provide parking cash-out programs; xiv. Implement or provide access to commute reduction program;
f) Incorporate bicycle and pedestrian facilities into project designs, maintaining these facilities, and providing amenities incentivizing their use; and planning for and building local bicycle projects that connect with the regional network;
g) Improving transit access to rail and bus routes by incentives for construction and transit facilities within developments, and/or providing dedicated shuttle service to transit stations; and
h) Adopting employer trip reduction measures to reduce employee trips such as vanpool and carpool programs, providing end-of-trip facilities, and telecommuting programs including but not limited to measures that: i. Provide car-sharing, bike sharing, and ride-sharing programs; ii. Provide transit passes; iii. Shift single occupancy vehicle trips to carpooling or vanpooling, for example providing ride-matching services; iv. Provide incentives or subsidies that increase that use of modes other than single-occupancy vehicle; v. Provide on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, and showers and locker rooms; vi. Provide employee transportation coordinators at employment sites; vii. Provide a guaranteed ride home service to users of non-auto modes.
i) Designate a percentage of parking spaces for ride-sharing vehicles or high-occupancy vehicles, and provide adequate passenger loading and unloading for those vehicles;
j) Land use siting and design measures that reduce GHG emissions, including: i. Developing on infill and brownfields sites; ii. Building compact and mixed-use developments near transit; iii. Retaining on-site mature trees and vegetation, and planting new canopy trees; iv. Measures that increase vehicle efficiency, encourage use of zero and low emissions vehicles, or reduce the carbon content of fuels, including constructing or encouraging construction of electric vehicle charging stations or neighborhood electric vehicle networks, or charging for electric bicycles; and v. Measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse.
k) Consult the SCAG Environmental Justice Toolbox for potential measures to address impacts to low-income and/or minority communities. The measures provided above are also intended to be applied in low income and minority communities as applicable and feasible.
l) Require at least five percent of all vehicle parking spaces include electric vehicle charging stations, or at a minimum, require the appropriate infrastructure to facilitate sufficient electric charging for passenger vehicles and trucks to plug-in.
m) Encourage telecommuting and alternative work schedules, such as: i. Staggered starting times ii. Flexible schedules iii. Compressed work weeks
n) Implement commute trip reduction marketing, such as: i. New employee orientation of trip reduction and alternative mode options ii. Event promotions iii. Publications
o) Implement preferential parking permit program
p) Implement school pool and bus programs

q) Price workplace parking, such as:

i. Explicitly charging for parking for its employees;
ii. Implementing above market rate pricing;
iii. Validating parking only for invited guests;
iv. Not providing employee parking and transportation allowances; and
v. Educating employees about available alternatives.

These measures offer a cost-effective, feasible way to incorporate lower-emitting design features into the proposed Project, which subsequently, reduce emissions released during Project construction and operation.

Furthermore, as it is policy of the State that eligible renewable energy resources and zero-carbon resources supply 100% of retail sales of electricity to California end-use customers by December 31, 2045, we emphasize the applicability of incorporating solar power system into the Project design. Until the feasibility of incorporating on-site renewable energy production is considered, the Project should not be approved.

A full CEQA analysis should be prepared to include all feasible mitigation measures, as well as include updated air quality, health risk, and GHG analyses to ensure that the necessary mitigation measures are implemented to reduce emissions to below thresholds. The CEQA analysis should also demonstrate a commitment to the implementation of these measures prior to Project approval, to ensure that the Project's significant emissions are reduced to the maximum extent possible.

Disclaimer

SWAPE has received limited discovery regarding this project. Additional information may become available in the future; thus, we retain the right to revise or amend this report when additional information becomes available. Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable environmental consultants practicing in this or similar localities at the time of service. No other warranty, expressed or implied, is made as to the scope of work, work methodologies and protocols, site conditions, analytical testing results, and findings presented. This report reflects efforts which were limited to information that was reasonably accessible at the time of the work, and may contain informational gaps, inconsistencies, or otherwise be incomplete due to the unavailability or uncertainty of information obtained or provided by third parties.

Sincerely,

Matt Hagemann, P.G., C.Hg.

Paul E. Rosenfeld, Ph.D.

Attachment A: Health Risk Calculations
Attachment B: AERSCREEN Output Files
Attachment C: Matt Hagemann CV
Attachment D: Paul Rosenfeld CV

Construction

2017	
Annual Emissions (tons/year)	0.1367
Daily Emissions (lbs/day)	0.749041096
Construction Duration (days)	304
Total DPM (lbs)	227.7084932
Total DPM (g)	103288.5725
Start Date	3/3/2017
End Date	1/1/2018
Construction Days	304

2018	
Annual Emissions (tons/year)	0.00958
Daily Emissions (lbs/day)	0.052493151
Construction Duration (days)	46
Total DPM (lbs)	2.414684932
Total DPM (g)	1095.301085
Start Date	1/1/2018
End Date	2/16/2018
Construction Days	46

Total	
Total DPM (lbs)	230.1231781
Total DPM (g)	104383.8736
Emission Rate (g/s)	0.003451848
Release Height (meters)	3
Total Acreage	2.83
Max Horizontal (meters)	151.34
Min Horizontal (meters)	75.67
Initial Vertical Dimension (meters)	1.5
Setting	Urban
Population	3,849,297
Start Date	3/3/2017
End Date	2/16/2018
Total Construction Days	350
Total Years of Construction	0.96
Total Years of Operation	29.04

Operation

Emission Rate	
Annual Emissions (tons/year)	0.0204
Daily Emissions (lbs/day)	0.111780822
Total DPM (lbs)	40.8
Emission Rate (g/s)	0.000586849
Release Height (meters)	3
Total Acreage	2.83
Max Horizontal (meters)	151.34
Min Horizontal (meters)	75.67
Initial Vertical Dimension (meters)	1.5
Setting	Urban
Population	3,849,297

```
AERSCREEN 21112 / AERMOD 21112                                       01/13/23
                                                                     10:55:24

TITLE: North Figueroa Street, Construction


-----------------------------------------------------------------------------
******************************  AREA PARAMETERS  ****************************
-----------------------------------------------------------------------------

SOURCE EMISSION RATE:          0.345E-02 g/s            0.274E-01 lb/hr

AREA EMISSION RATE:            0.301E-06 g/(s-m2)       0.239E-05 lb/(hr-m2)
AREA HEIGHT:                        3.00 meters              9.84 feet
AREA SOURCE LONG SIDE:            151.34 meters            496.52 feet
AREA SOURCE SHORT SIDE:            75.67 meters            248.26 feet
INITIAL VERTICAL DIMENSION:         1.50 meters              4.92 feet
RURAL OR URBAN:                    URBAN
POPULATION:                      3849297

INITIAL PROBE DISTANCE =           5000. meters            16404. feet



-----------------------------------------------------------------------------
***********************  BUILDING DOWNWASH PARAMETERS  **********************
-----------------------------------------------------------------------------

               BUILDING DOWNWASH NOT USED FOR NON-POINT SOURCES



-----------------------------------------------------------------------------
**************************  FLOW SECTOR ANALYSIS  ***************************
                 25 meter receptor spacing: 1. meters - 5000. meters
-----------------------------------------------------------------------------


   MAXIMUM  IMPACT  RECEPTOR

   Zo        SURFACE   1-HR CONC  RADIAL  DIST   TEMPORAL
   SECTOR    ROUGHNESS  (ug/m3)    (deg)   (m)    PERIOD
  -----------------------------------------------------
      1*       1.000     7.632       0    75.0     WIN
* = worst case diagonal


-----------------------------------------------------------------------------
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**********************  MAKEMET METEOROLOGY PARAMETERS  *********************
------------------------------------------------------------------------------

MIN/MAX TEMPERATURE:    250.0 / 310.0 (K)

MINIMUM WIND SPEED:       0.5 m/s

ANEMOMETER HEIGHT:     10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
DOMINANT CLIMATE TYPE:    Average Moisture
DOMINANT SEASON:          Winter

ALBEDO:                  0.35
BOWEN RATIO:             1.50
ROUGHNESS LENGTH:       1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED


       METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT
       -------------------------------------------------------------

 YR MO DY JDY HR
 -- -- -- --- --
 10 01 10  10 01

    H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 -1.30  0.043 -9.000  0.020 -999.   21.      6.0 1.000   1.50   0.35    0.50

    HT  REF TA     HT
- - - - - - - - - - -
  10.0   310.0    2.0


------------------------------------------------------------------------------
*********************** AERSCREEN AUTOMATED DISTANCES *********************
                  OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE
------------------------------------------------------------------------------


                MAXIMUM                                MAXIMUM
         DIST     1-HR CONC                     DIST     1-HR CONC
          (m)      (ug/m3)                       (m)      (ug/m3)
       ---------------------                 ---------------------
         1.00     5.985                      2525.00    0.4940E-01
```

25.00	6.697	2550.00	0.4874E-01
50.00	7.222	2575.00	0.4810E-01
75.00	7.632	2600.00	0.4746E-01
100.00	4.834	2625.00	0.4685E-01
125.00	3.287	2650.00	0.4624E-01
150.00	2.495	2675.00	0.4565E-01
175.00	1.987	2700.00	0.4507E-01
200.00	1.637	2725.00	0.4451E-01
225.00	1.383	2750.00	0.4395E-01
250.00	1.191	2775.00	0.4341E-01
275.00	1.041	2800.00	0.4288E-01
300.00	0.9215	2825.00	0.4236E-01
325.00	0.8246	2850.00	0.4186E-01
350.00	0.7436	2875.00	0.4136E-01
375.00	0.6753	2900.00	0.4087E-01
400.00	0.6175	2925.00	0.4039E-01
425.00	0.5680	2950.00	0.3993E-01
450.00	0.5248	2975.00	0.3947E-01
475.00	0.4869	3000.00	0.3902E-01
500.00	0.4536	3025.00	0.3858E-01
525.00	0.4241	3050.00	0.3814E-01
550.00	0.3979	3075.00	0.3772E-01
575.00	0.3742	3100.00	0.3731E-01
600.00	0.3530	3125.00	0.3690E-01
625.00	0.3337	3150.00	0.3650E-01
650.00	0.3162	3174.99	0.3610E-01
675.00	0.3002	3200.00	0.3572E-01
700.00	0.2855	3225.00	0.3534E-01
725.00	0.2721	3250.00	0.3497E-01
750.00	0.2597	3275.00	0.3460E-01
775.00	0.2483	3300.00	0.3425E-01
800.00	0.2377	3325.00	0.3389E-01
825.00	0.2279	3350.00	0.3355E-01
850.00	0.2188	3375.00	0.3321E-01
875.00	0.2103	3400.00	0.3287E-01
900.00	0.2023	3425.00	0.3255E-01
925.00	0.1949	3450.00	0.3222E-01
950.00	0.1879	3475.00	0.3191E-01
975.00	0.1814	3500.00	0.3160E-01
1000.00	0.1752	3525.00	0.3129E-01
1025.00	0.1694	3550.00	0.3099E-01
1050.00	0.1639	3575.00	0.3069E-01
1075.00	0.1587	3600.00	0.3040E-01
1100.00	0.1538	3625.00	0.3011E-01
1125.00	0.1491	3650.00	0.2983E-01
1150.00	0.1447	3675.00	0.2955E-01
1175.00	0.1405	3700.00	0.2928E-01
1200.00	0.1365	3724.99	0.2901E-01
1225.00	0.1327	3750.00	0.2875E-01
1250.00	0.1290	3775.00	0.2849E-01

1275.00	0.1256
1300.00	0.1223
1325.00	0.1191
1350.00	0.1161
1375.00	0.1132
1400.00	0.1108
1425.00	0.1082
1450.00	0.1056
1475.00	0.1032
1500.00	0.1008
1525.00	0.9858E-01
1550.00	0.9641E-01
1575.00	0.9431E-01
1600.00	0.9230E-01
1625.00	0.9036E-01
1650.00	0.8849E-01
1675.00	0.8668E-01
1700.00	0.8494E-01
1725.00	0.8325E-01
1750.00	0.8163E-01
1775.00	0.8006E-01
1800.00	0.7854E-01
1825.00	0.7707E-01
1850.00	0.7564E-01
1875.00	0.7426E-01
1900.00	0.7293E-01
1924.99	0.7163E-01
1950.00	0.7038E-01
1975.00	0.6916E-01
2000.00	0.6798E-01
2025.00	0.6683E-01
2050.00	0.6572E-01
2075.00	0.6463E-01
2100.00	0.6358E-01
2125.00	0.6256E-01
2150.00	0.6157E-01
2175.00	0.6060E-01
2200.00	0.5966E-01
2225.00	0.5874E-01
2250.00	0.5785E-01
2275.00	0.5698E-01
2300.00	0.5614E-01
2325.00	0.5531E-01
2350.00	0.5451E-01
2375.00	0.5373E-01
2400.00	0.5296E-01
2425.00	0.5222E-01
2449.99	0.5149E-01
2475.00	0.5078E-01
2500.00	0.5008E-01

3800.00	0.2823E-01
3825.00	0.2798E-01
3850.00	0.2773E-01
3875.00	0.2749E-01
3900.00	0.2725E-01
3925.00	0.2701E-01
3950.00	0.2678E-01
3975.00	0.2655E-01
4000.00	0.2632E-01
4025.00	0.2609E-01
4050.00	0.2587E-01
4075.00	0.2566E-01
4100.00	0.2544E-01
4125.00	0.2523E-01
4150.00	0.2503E-01
4175.00	0.2482E-01
4200.00	0.2462E-01
4225.00	0.2442E-01
4250.00	0.2422E-01
4275.00	0.2403E-01
4300.00	0.2384E-01
4325.00	0.2365E-01
4350.00	0.2346E-01
4375.00	0.2328E-01
4400.00	0.2310E-01
4425.00	0.2292E-01
4450.00	0.2275E-01
4475.00	0.2257E-01
4500.00	0.2240E-01
4525.00	0.2223E-01
4550.00	0.2207E-01
4575.00	0.2190E-01
4600.00	0.2174E-01
4625.00	0.2158E-01
4650.00	0.2142E-01
4675.00	0.2126E-01
4700.00	0.2111E-01
4725.00	0.2095E-01
4750.00	0.2080E-01
4775.00	0.2066E-01
4800.00	0.2051E-01
4825.00	0.2036E-01
4850.00	0.2022E-01
4875.00	0.2008E-01
4900.00	0.1994E-01
4925.00	0.1980E-01
4950.00	0.1966E-01
4975.00	0.1953E-01
5000.00	0.1939E-01

********************** AERSCREEN MAXIMUM IMPACT SUMMARY *********************

3-hour, 8-hour, and 24-hour scaled
concentrations are equal to the 1-hour concentration as referenced in
SCREENING PROCEDURES FOR ESTIMATING THE AIR QUALITY
IMPACT OF STATIONARY SOURCES, REVISED (Section 4.5.4)
Report number EPA-454/R-92-019
http://www.epa.gov/scram001/guidance_permit.htm
under Screening Guidance

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	7.647	7.647	7.647	7.647	N/A

DISTANCE FROM SOURCE 76.00 meters

IMPACT AT THE AMBIENT BOUNDARY	5.985	5.985	5.985	5.985	N/A

DISTANCE FROM SOURCE 1.00 meters

```
AERSCREEN 21112 / AERMOD 21112                                     01/13/23
                                                                   10:57:12

TITLE: North Figueroa St, Operations


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******************************  AREA PARAMETERS  ****************************
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SOURCE EMISSION RATE:         0.587E-03 g/s            0.466E-02 lb/hr

AREA EMISSION RATE:           0.137E-05 g/(s-m2)       0.109E-04 lb/(hr-m2)
AREA HEIGHT:                       3.00 meters              9.84 feet
AREA SOURCE LONG SIDE:           151.34 meters            496.52 feet
AREA SOURCE SHORT SIDE:            2.83 meters              9.28 feet
INITIAL VERTICAL DIMENSION:       75.67 meters            248.26 feet
RURAL OR URBAN:                   URBAN
POPULATION:                     3849297

INITIAL PROBE DISTANCE =          5000. meters            16404. feet



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***********************  BUILDING DOWNWASH PARAMETERS  *********************
----------------------------------------------------------------------------

               BUILDING DOWNWASH NOT USED FOR NON-POINT SOURCES



----------------------------------------------------------------------------
**************************  FLOW SECTOR ANALYSIS  **************************
                 25 meter receptor spacing: 1. meters - 5000. meters
----------------------------------------------------------------------------


   MAXIMUM  IMPACT  RECEPTOR

   Zo         SURFACE   1-HR CONC  RADIAL  DIST   TEMPORAL
   SECTOR    ROUGHNESS  (ug/m3)    (deg)   (m)    PERIOD
  -----------------------------------------------------
      1*       1.000    0.4967       0    75.0     WIN
* = worst case diagonal



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*********************  MAKEMET METEOROLOGY PARAMETERS  ********************
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MIN/MAX TEMPERATURE:    250.0 / 310.0 (K)

MINIMUM WIND SPEED:       0.5 m/s

ANEMOMETER HEIGHT:     10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
DOMINANT CLIMATE TYPE:    Average Moisture
DOMINANT SEASON:          Winter

ALBEDO:                  0.35
BOWEN RATIO:             1.50
ROUGHNESS LENGTH:       1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED


       METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT
       -------------------------------------------------------------

 YR MO DY JDY HR
 -- -- -- --- --
 10 01 10  10 01

    H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 -1.30  0.043 -9.000  0.020 -999.   21.      6.0 1.000   1.50   0.35    0.50

    HT  REF TA     HT
- - - - - - - - - - - -
  10.0   310.0    2.0



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*********************** AERSCREEN AUTOMATED DISTANCES *********************
                  OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE
---------------------------------------------------------------------------


                   MAXIMUM                              MAXIMUM
            DIST     1-HR CONC                   DIST     1-HR CONC
             (m)      (ug/m3)                     (m)      (ug/m3)
         ---------------------                ---------------------
            1.00    0.3813                   2525.00    0.7959E-02
```

25.00	0.4151	2550.00	0.7858E-02
50.00	0.4576	2575.00	0.7759E-02
75.00	0.4967	2600.00	0.7662E-02
100.00	0.2688	2625.00	0.7566E-02
125.00	0.2082	2650.00	0.7473E-02
150.00	0.1752	2675.00	0.7382E-02
175.00	0.1520	2700.00	0.7293E-02
200.00	0.1344	2725.00	0.7206E-02
225.00	0.1206	2750.00	0.7120E-02
250.00	0.1093	2775.00	0.7037E-02
275.00	0.9995E-01	2800.00	0.6955E-02
300.00	0.9200E-01	2825.00	0.6874E-02
325.00	0.8517E-01	2850.00	0.6795E-02
350.00	0.7922E-01	2875.00	0.6718E-02
375.00	0.7400E-01	2900.00	0.6642E-02
400.00	0.6937E-01	2925.00	0.6568E-02
425.00	0.6523E-01	2950.00	0.6495E-02
450.00	0.6152E-01	2975.00	0.6423E-02
475.00	0.5785E-01	3000.00	0.6353E-02
500.00	0.5486E-01	3025.00	0.6284E-02
525.00	0.5214E-01	3050.00	0.6216E-02
550.00	0.4964E-01	3075.00	0.6150E-02
575.00	0.4734E-01	3100.00	0.6085E-02
600.00	0.4522E-01	3125.00	0.6021E-02
625.00	0.4326E-01	3150.00	0.5958E-02
650.00	0.4144E-01	3175.00	0.5896E-02
675.00	0.3976E-01	3200.00	0.5836E-02
700.00	0.3818E-01	3225.00	0.5776E-02
725.00	0.3671E-01	3250.00	0.5718E-02
750.00	0.3534E-01	3275.00	0.5660E-02
775.00	0.3405E-01	3300.00	0.5604E-02
800.00	0.3285E-01	3325.00	0.5548E-02
825.00	0.3171E-01	3350.00	0.5493E-02
850.00	0.3064E-01	3375.00	0.5440E-02
875.00	0.2963E-01	3400.00	0.5387E-02
900.00	0.2867E-01	3425.00	0.5335E-02
925.00	0.2777E-01	3450.00	0.5284E-02
950.00	0.2692E-01	3475.00	0.5234E-02
975.00	0.2611E-01	3500.00	0.5184E-02
1000.00	0.2534E-01	3525.00	0.5136E-02
1025.00	0.2461E-01	3550.00	0.5088E-02
1050.00	0.2391E-01	3575.00	0.5041E-02
1075.00	0.2325E-01	3600.00	0.4995E-02
1100.00	0.2262E-01	3625.00	0.4949E-02
1125.00	0.2201E-01	3650.00	0.4904E-02
1150.00	0.2144E-01	3675.00	0.4860E-02
1175.00	0.2089E-01	3700.00	0.4817E-02
1200.00	0.2036E-01	3725.00	0.4774E-02
1225.00	0.1986E-01	3750.00	0.4732E-02
1250.00	0.1937E-01	3775.00	0.4690E-02

1275.00	0.1891E-01	3800.00	0.4649E-02
1300.00	0.1847E-01	3825.00	0.4609E-02
1325.00	0.1804E-01	3850.00	0.4569E-02
1350.00	0.1763E-01	3875.00	0.4530E-02
1375.00	0.1723E-01	3900.00	0.4492E-02
1400.00	0.1685E-01	3925.00	0.4454E-02
1425.00	0.1649E-01	3950.00	0.4416E-02
1450.00	0.1614E-01	3975.00	0.4379E-02
1475.00	0.1580E-01	4000.00	0.4343E-02
1500.00	0.1547E-01	4025.00	0.4307E-02
1525.00	0.1515E-01	4050.00	0.4272E-02
1550.00	0.1485E-01	4075.00	0.4237E-02
1575.00	0.1455E-01	4100.00	0.4203E-02
1600.00	0.1427E-01	4125.00	0.4169E-02
1625.00	0.1399E-01	4150.00	0.4135E-02
1650.00	0.1373E-01	4175.00	0.4102E-02
1675.00	0.1347E-01	4200.00	0.4070E-02
1700.00	0.1322E-01	4225.00	0.4038E-02
1725.00	0.1298E-01	4250.00	0.4006E-02
1750.00	0.1275E-01	4275.00	0.3975E-02
1775.00	0.1252E-01	4300.00	0.3944E-02
1800.00	0.1230E-01	4325.00	0.3914E-02
1825.00	0.1208E-01	4350.00	0.3884E-02
1850.00	0.1188E-01	4375.00	0.3854E-02
1875.00	0.1168E-01	4400.00	0.3825E-02
1900.00	0.1148E-01	4425.00	0.3796E-02
1925.00	0.1129E-01	4450.00	0.3768E-02
1950.00	0.1111E-01	4475.00	0.3740E-02
1975.00	0.1093E-01	4500.00	0.3712E-02
2000.00	0.1075E-01	4525.00	0.3685E-02
2025.00	0.1058E-01	4550.00	0.3658E-02
2050.00	0.1042E-01	4575.00	0.3631E-02
2075.00	0.1026E-01	4600.00	0.3605E-02
2100.00	0.1010E-01	4625.00	0.3579E-02
2125.00	0.9949E-02	4650.00	0.3553E-02
2150.00	0.9800E-02	4675.00	0.3528E-02
2175.00	0.9656E-02	4700.00	0.3503E-02
2200.00	0.9515E-02	4725.00	0.3478E-02
2225.00	0.9377E-02	4750.00	0.3453E-02
2250.00	0.9243E-02	4775.00	0.3429E-02
2275.00	0.9112E-02	4800.00	0.3405E-02
2300.00	0.8984E-02	4825.00	0.3382E-02
2325.00	0.8859E-02	4850.00	0.3359E-02
2350.00	0.8737E-02	4875.00	0.3336E-02
2375.00	0.8618E-02	4900.00	0.3313E-02
2400.00	0.8502E-02	4925.00	0.3290E-02
2425.00	0.8388E-02	4950.00	0.3268E-02
2450.00	0.8277E-02	4975.00	0.3246E-02
2475.00	0.8169E-02	5000.00	0.3224E-02
2500.00	0.8063E-02		

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*********************  AERSCREEN MAXIMUM IMPACT SUMMARY  ********************
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3-hour, 8-hour, and 24-hour scaled
concentrations are equal to the 1-hour concentration as referenced in
SCREENING PROCEDURES FOR ESTIMATING THE AIR QUALITY
IMPACT OF STATIONARY SOURCES, REVISED (Section 4.5.4)
Report number EPA-454/R-92-019
http://www.epa.gov/scram001/guidance_permit.htm
under Screening Guidance

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	0.5083	0.5083	0.5083	0.5083	N/A

DISTANCE FROM SOURCE 77.00 meters

IMPACT AT THE AMBIENT BOUNDARY	0.3813	0.3813	0.3813	0.3813	N/A

DISTANCE FROM SOURCE 1.00 meters

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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Matthew F. Hagemann, P.G., C.Hg., QSD, QSP

Geologic and Hydrogeologic Characterization
Investigation and Remediation Strategies
Litigation Support and Testifying Expert
Industrial Stormwater Compliance
CEQA Review

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.
B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

Professional Certifications:

California Professional Geologist
California Certified Hydrogeologist
Qualified SWPPP Developer and Practitioner

Professional Experience:

Matt has 30 years of experience in environmental policy, contaminant assessment and remediation, stormwater compliance, and CEQA review. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) and directed efforts to improve hydrogeologic characterization and water quality monitoring. For the past 15 years, as a founding partner with SWAPE, Matt has developed extensive client relationships and has managed complex projects that include consultation as an expert witness and a regulatory specialist, and a manager of projects ranging from industrial stormwater compliance to CEQA review of impacts from hazardous waste, air quality and greenhouse gas emissions.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2104, 2017;
- Senior Environmental Analyst, Komex H2O Science, Inc. (2000 -- 2003);

- Executive Director, Orange Coast Watch (2001 – 2004);
- Senior Science Policy Advisor and Hydrogeologist, U.S. Environmental Protection Agency (1989–1998);
- Hydrogeologist, National Park Service, Water Resources Division (1998 – 2000);
- Adjunct Faculty Member, San Francisco State University, Department of Geosciences (1993 – 1998);
- Instructor, College of Marin, Department of Science (1990 – 1995);
- Geologist, U.S. Forest Service (1986 – 1998); and
- Geologist, Dames & Moore (1984 – 1986).

<u>Senior Regulatory and Litigation Support Analyst:</u>

With SWAPE, Matt's responsibilities have included:

- Lead analyst and testifying expert in the review of over 300 environmental impact reports and negative declarations since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, greenhouse gas emissions, and geologic hazards. Make recommendations for additional mitigation measures to lead agencies at the local and county level to include additional characterization of health risks and implementation of protective measures to reduce worker exposure to hazards from toxins and Valley Fever.
- Stormwater analysis, sampling and best management practice evaluation at more than 100 industrial facilities.
- Expert witness on numerous cases including, for example, perfluorooctanoic acid (PFOA) contamination of groundwater, MTBE litigation, air toxins at hazards at a school, CERCLA compliance in assessment and remediation, and industrial stormwater contamination.
- Technical assistance and litigation support for vapor intrusion concerns.
- Lead analyst and testifying expert in the review of environmental issues in license applications for large solar power plants before the California Energy Commission.
- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.

With Komex H2O Science Inc., Matt's duties included the following:

- Senior author of a report on the extent of perchlorate contamination that was used in testimony by the former U.S. EPA Administrator and General Counsel.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of MTBE use, research, and regulation.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of perchlorate use, research, and regulation.
- Senior researcher in a study that estimates nationwide costs for MTBE remediation and drinking water treatment, results of which were published in newspapers nationwide and in testimony against provisions of an energy bill that would limit liability for oil companies.
- Research to support litigation to restore drinking water supplies that have been contaminated by MTBE in California and New York.

- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.
- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

As Executive Director with Orange Coast Watch, Matt led efforts to restore water quality at Orange County beaches from multiple sources of contamination including urban runoff and the discharge of wastewater. In reporting to a Board of Directors that included representatives from leading Orange County universities and businesses, Matt prepared issue papers in the areas of treatment and disinfection of wastewater and control of the discharge of grease to sewer systems. Matt actively participated in the development of countywide water quality permits for the control of urban runoff and permits for the discharge of wastewater. Matt worked with other nonprofits to protect and restore water quality, including Surfrider, Natural Resources Defense Council and Orange County CoastKeeper as well as with business institutions including the Orange County Business Council.

Hydrogeology:

As a Senior Hydrogeologist with the U.S. Environmental Protection Agency, Matt led investigations to characterize and cleanup closing military bases, including Mare Island Naval Shipyard, Hunters Point Naval Shipyard, Treasure Island Naval Station, Alameda Naval Station, Moffett Field, Mather Army Airfield, and Sacramento Army Depot. Specific activities were as follows:

- Led efforts to model groundwater flow and contaminant transport, ensured adequacy of monitoring networks, and assessed cleanup alternatives for contaminated sediment, soil, and groundwater.
- Initiated a regional program for evaluation of groundwater sampling practices and laboratory analysis at military bases.
- Identified emerging issues, wrote technical guidance, and assisted in policy and regulation development through work on four national U.S. EPA workgroups, including the Superfund Groundwater Technical Forum and the Federal Facilities Forum.

At the request of the State of Hawaii, Matt developed a methodology to determine the vulnerability of groundwater to contamination on the islands of Maui and Oahu. He used analytical models and a GIS to show zones of vulnerability, and the results were adopted and published by the State of Hawaii and County of Maui.

As a hydrogeologist with the EPA Groundwater Protection Section, Matt worked with provisions of the Safe Drinking Water Act and NEPA to prevent drinking water contamination. Specific activities included the following:

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted

public hearings, and responded to public comments from residents who were very concerned about the impact of designation.

- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

Matt served as a hydrogeologist with the RCRA Hazardous Waste program. Duties were as follows:

- Supervised the hydrogeologic investigation of hazardous waste sites to determine compliance with Subtitle C requirements.
- Reviewed and wrote "part B" permits for the disposal of hazardous waste.
- Conducted RCRA Corrective Action investigations of waste sites and led inspections that formed the basis for significant enforcement actions that were developed in close coordination with U.S. EPA legal counsel.
- Wrote contract specifications and supervised contractor's investigations of waste sites.

With the National Park Service, Matt directed service-wide investigations of contaminant sources to prevent degradation of water quality, including the following tasks:

- Applied pertinent laws and regulations including CERCLA, RCRA, NEPA, NRDA, and the Clean Water Act to control military, mining, and landfill contaminants.
- Conducted watershed-scale investigations of contaminants at parks, including Yellowstone and Olympic National Park.
- Identified high-levels of perchlorate in soil adjacent to a national park in New Mexico and advised park superintendent on appropriate response actions under CERCLA.
- Served as a Park Service representative on the Interagency Perchlorate Steering Committee, a national workgroup.
- Developed a program to conduct environmental compliance audits of all National Parks while serving on a national workgroup.
- Co-authored two papers on the potential for water contamination from the operation of personal watercraft and snowmobiles, these papers serving as the basis for the development of nation-wide policy on the use of these vehicles in National Parks.
- Contributed to the Federal Multi-Agency Source Water Agreement under the Clean Water Action Plan.

Policy:

Served senior management as the Senior Science Policy Advisor with the U.S. Environmental Protection Agency, Region 9.

Activities included the following:

- Advised the Regional Administrator and senior management on emerging issues such as the potential for the gasoline additive MTBE and ammonium perchlorate to contaminate drinking water supplies.
- Shaped EPA's national response to these threats by serving on workgroups and by contributing to guidance, including the Office of Research and Development publication, Oxygenates in Water: Critical Information and Research Needs.
- Improved the technical training of EPA's scientific and engineering staff.
- Earned an EPA Bronze Medal for representing the region's 300 scientists and engineers in negotiations with the Administrator and senior management to better integrate scientific

principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

Geology:

With the U.S. Forest Service, Matt led investigations to determine hillslope stability of areas proposed for timber harvest in the central Oregon Coast Range. Specific activities were as follows:

- Mapped geology in the field, and used aerial photographic interpretation and mathematical models to determine slope stability.
- Coordinated his research with community members who were concerned with natural resource protection.
- Characterized the geology of an aquifer that serves as the sole source of drinking water for the city of Medford, Oregon.

As a consultant with Dames and Moore, Matt led geologic investigations of two contaminated sites (later listed on the Superfund NPL) in the Portland, Oregon, area and a large hazardous waste site in eastern Oregon. Duties included the following:

- Supervised year-long effort for soil and groundwater sampling.
- Conducted aquifer tests.
- Investigated active faults beneath sites proposed for hazardous waste disposal.

Teaching:

From 1990 to 1998, Matt taught at least one course per semester at the community college and university levels:

- At San Francisco State University, held an adjunct faculty position and taught courses in environmental geology, oceanography (lab and lecture), hydrogeology, and groundwater contamination.
- Served as a committee member for graduate and undergraduate students.
- Taught courses in environmental geology and oceanography at the College of Marin.

Matt is currently a part time geology instructor at Golden West College in Huntington Beach, California where he taught from 2010 to 2014 and in 2017.

Invited Testimony, Reports, Papers and Presentations:

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Presentation to the Public Environmental Law Conference, Eugene, Oregon.

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Invited presentation to U.S. EPA Region 9, San Francisco, California.

Hagemann, M.F., 2005. Use of Electronic Databases in Environmental Regulation, Policy Making and Public Participation. Brownfields 2005, Denver, Coloradao.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Nevada and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Las Vegas, NV (served on conference organizing committee).

Hagemann, M.F., 2004. Invited testimony to a California Senate committee hearing on air toxins at schools in Southern California, Los Angeles.

Brown, A., Farrow, J., Gray, A. and **Hagemann, M.**, 2004. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to the Ground Water and Environmental Law Conference, National Groundwater Association.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Arizona and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Phoenix, AZ (served on conference organizing committee).

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in the Southwestern U.S. Invited presentation to a special committee meeting of the National Academy of Sciences, Irvine, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a tribal EPA meeting, Pechanga, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal repesentatives, Parker, AZ.

Hagemann, M.F., 2003. Impact of Perchlorate on the Colorado River and Associated Drinking Water Supplies. Invited presentation to the Inter-Tribal Meeting, Torres Martinez Tribe.

Hagemann, M.F., 2003. The Emergence of Perchlorate as a Widespread Drinking Water Contaminant. Invited presentation to the U.S. EPA Region 9.

Hagemann, M.F., 2003. A Deductive Approach to the Assessment of Perchlorate Contamination. Invited presentation to the California Assembly Natural Resources Committee.

Hagemann, M.F., 2003. Perchlorate: A Cold War Legacy in Drinking Water. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. From Tank to Tap: A Chronology of MTBE in Groundwater. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. A Chronology of MTBE in Groundwater and an Estimate of Costs to Address Impacts to Groundwater. Presentation to the annual meeting of the Society of Environmental Journalists.

Hagemann, M.F., 2002. An Estimate of the Cost to Address MTBE Contamination in Groundwater (and Who Will Pay). Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to a meeting of the U.S. EPA and State Underground Storage Tank Program managers.

Hagemann, M.F., 2001. From Tank to Tap: A Chronology of MTBE in Groundwater. Unpublished report.

Hagemann, M.F., 2001. Estimated Cleanup Cost for MTBE in Groundwater Used as Drinking Water. Unpublished report.

Hagemann, M.F., 2001. Estimated Costs to Address MTBE Releases from Leaking Underground Storage Tanks. Unpublished report.

Hagemann, M.F., and VanMouwerik, M., 1999. Potential Water Quality Concerns Related to Snowmobile Usage. Water Resources Division, National Park Service, Technical Report.

VanMouwerik, M. and **Hagemann, M.F**. 1999, Water Quality Concerns Related to Personal Watercraft Usage. Water Resources Division, National Park Service, Technical Report.

Hagemann, M.F., 1999, Is Dilution the Solution to Pollution in National Parks? The George Wright Society Biannual Meeting, Asheville, North Carolina.

Hagemann, M.F., 1997, The Potential for MTBE to Contaminate Groundwater. U.S. EPA Superfund Groundwater Technical Forum Annual Meeting, Las Vegas, Nevada.

Hagemann, M.F., and Gill, M., 1996, Impediments to Intrinsic Remediation, Moffett Field Naval Air Station, Conference on Intrinsic Remediation of Chlorinated Hydrocarbons, Salt Lake City.

Hagemann, M.F., Fukunaga, G.L., 1996, The Vulnerability of Groundwater to Anthropogenic Contaminants on the Island of Maui, Hawaii. Hawaii Water Works Association Annual Meeting, Maui, October 1996.

Hagemann, M. F., Fukanaga, G. L., 1996, Ranking Groundwater Vulnerability in Central Oahu, Hawaii. Proceedings, Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association Publication VIP-61.

Hagemann, M.F., 1994. Groundwater Characterization and Cleanup at Closing Military Bases in California. Proceedings, California Groundwater Resources Association Meeting.

Hagemann, M.F. and Sabol, M.A., 1993. Role of the U.S. EPA in the High Plains States Groundwater Recharge Demonstration Program. Proceedings, Sixth Biennial Symposium on the Artificial Recharge of Groundwater.

Hagemann, M.F., 1993. U.S. EPA Policy on the Technical Impracticability of the Cleanup of DNAPL-contaminated Groundwater. California Groundwater Resources Association Meeting.

Hagemann, M.F., 1992. Dense Nonaqueous Phase Liquid Contamination of Groundwater: An Ounce of Prevention... Proceedings, Association of Engineering Geologists Annual Meeting, v. 35.

Other Experience:

Selected as subject matter expert for the California Professional Geologist licensing examinations, 2009-2011.

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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Paul Rosenfeld, Ph.D.

Chemical Fate and Transport & Air Dispersion Modeling

Principal Environmental Chemist

Risk Assessment & Remediation Specialist

Education

Ph.D. Soil Chemistry, University of Washington, 1999. Dissertation on volatile organic compound filtration.

M.S. Environmental Science, U.C. Berkeley, 1995. Thesis on organic waste economics.

B.A. Environmental Studies, U.C. Santa Barbara, 1991. Focus on wastewater treatment.

Professional Experience

Dr. Rosenfeld has over 25 years of experience conducting environmental investigations and risk assessments for evaluating impacts to human health, property, and ecological receptors. His expertise focuses on the fate and transport of environmental contaminants, human health risk, exposure assessment, and ecological restoration. Dr. Rosenfeld has evaluated and modeled emissions from oil spills, landfills, boilers and incinerators, process stacks, storage tanks, confined animal feeding operations, industrial, military and agricultural sources, unconventional oil drilling operations, and locomotive and construction engines. His project experience ranges from monitoring and modeling of pollution sources to evaluating impacts of pollution on workers at industrial facilities and residents in surrounding communities. Dr. Rosenfeld has also successfully modeled exposure to contaminants distributed by water systems and via vapor intrusion.

Dr. Rosenfeld has investigated and designed remediation programs and risk assessments for contaminated sites containing lead, heavy metals, mold, bacteria, particulate matter, petroleum hydrocarbons, chlorinated solvents, pesticides, radioactive waste, dioxins and furans, semi- and volatile organic compounds, PCBs, PAHs, creosote, perchlorate, asbestos, per- and poly-fluoroalkyl substances (PFOA/PFOS), unusual polymers, fuel oxygenates (MTBE), among other pollutants. Dr. Rosenfeld also has experience evaluating greenhouse gas emissions from various projects and is an expert on the assessment of odors from industrial and agricultural sites, as well as the evaluation of odor nuisance impacts and technologies for abatement of odorous emissions. As a principal scientist at SWAPE, Dr. Rosenfeld directs air dispersion modeling and exposure assessments. He has served as an expert witness and testified about pollution sources causing nuisance and/or personal injury at sites and has testified as an expert witness on numerous cases involving exposure to soil, water and air contaminants from industrial, railroad, agricultural, and military sources.

Professional History:

Soil Water Air Protection Enterprise (SWAPE); 2003 to present; Principal and Founding Partner
UCLA School of Public Health; 2007 to 2011; Lecturer (Assistant Researcher)
UCLA School of Public Health; 2003 to 2006; Adjunct Professor
UCLA Environmental Science and Engineering Program; 2002-2004; Doctoral Intern Coordinator
UCLA Institute of the Environment, 2001-2002; Research Associate
Komex H_2O Science, 2001 to 2003; Senior Remediation Scientist
National Groundwater Association, 2002-2004; Lecturer
San Diego State University, 1999-2001; Adjunct Professor
Anteon Corp., San Diego, 2000-2001; Remediation Project Manager
Ogden (now Amec), San Diego, 2000-2000; Remediation Project Manager
Bechtel, San Diego, California, 1999 – 2000; Risk Assessor
King County, Seattle, 1996 – 1999; Scientist
James River Corp., Washington, 1995-96; Scientist
Big Creek Lumber, Davenport, California, 1995; Scientist
Plumas Corp., California and USFS, Tahoe 1993-1995; Scientist
Peace Corps and World Wildlife Fund, St. Kitts, West Indies, 1991-1993; Scientist

Publications:

Rosenfeld P. E., Spaeth K., Hallman R., Bressler R., Smith, G., (2022) Cancer Risk and Diesel Exhaust Exposure Among Railroad Workers. *Water Air Soil Pollution.* **233,** 171.

Remy, L.L., Clay T., Byers, V., **Rosenfeld P. E.** (2019) Hospital, Health, and Community Burden After Oil Refinery Fires, Richmond, California 2007 and 2012. *Environmental Health.* 18:48

Simons, R.A., Seo, Y. **Rosenfeld, P**., (2015) Modeling the Effect of Refinery Emission On Residential Property Value. Journal of Real Estate Research. 27(3):321-342

Chen, J. A, Zapata A. R., Sutherland A. J., Molmen, D.R., Chow, B. S., Wu, L. E., **Rosenfeld, P. E.,** Hesse, R. C., (2012) Sulfur Dioxide and Volatile Organic Compound Exposure To A Community In Texas City Texas Evaluated Using Aermod and Empirical Data. *American Journal of Environmental Science*, 8(6), 622-632.

Rosenfeld, P.E. & Feng, L. (2011). *The Risks of Hazardous Waste.* Amsterdam: Elsevier Publishing.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2011). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Agrochemical Industry*, Amsterdam: Elsevier Publishing.

Gonzalez, J., Feng, L., Sutherland, A., Waller, C., Sok, H., Hesse, R., **Rosenfeld, P.** (2010). PCBs and Dioxins/Furans in Attic Dust Collected Near Former PCB Production and Secondary Copper Facilities in Sauget, IL. *Procedia Environmental Sciences*. 113–125.

Feng, L., Wu, C., Tam, L., Sutherland, A.J., Clark, J.J., **Rosenfeld, P.E.** (2010). Dioxin and Furan Blood Lipid and Attic Dust Concentrations in Populations Living Near Four Wood Treatment Facilities in the United States. *Journal of Environmental Health*. 73(6), 34-46.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2010). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Wood and Paper Industries.* Amsterdam: Elsevier Publishing.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2009). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Petroleum Industry*. Amsterdam: Elsevier Publishing.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P**. (2009). Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States. *WIT Transactions on Ecology and the Environment, Air Pollution,* 123 (17), 319-327.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). A Statistical Analysis Of Attic Dust And Blood Lipid Concentrations Of Tetrachloro-p-Dibenzodioxin (TCDD) Toxicity Equivalency Quotients (TEQ) In Two Populations Near Wood Treatment Facilities. *Organohalogen Compounds*, 70, 002252-002255.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). Methods For Collect Samples For Assessing Dioxins And Other Environmental Contaminants In Attic Dust: A Review. *Organohalogen Compounds*, 70, 000527-000530.

Hensley, A.R. A. Scott, J. J. J. Clark, **Rosenfeld, P.E.** (2007). Attic Dust and Human Blood Samples Collected near a Former Wood Treatment Facility. *Environmental Research*. 105, 194-197.

Rosenfeld, P.E., J. J. J. Clark, A. R. Hensley, M. Suffet. (2007). The Use of an Odor Wheel Classification for Evaluation of Human Health Risk Criteria for Compost Facilities. *Water Science & Technology* 55(5), 345-357.

Rosenfeld, P. E., M. Suffet. (2007). The Anatomy Of Odour Wheels For Odours Of Drinking Water, Wastewater, Compost And The Urban Environment. *Water Science & Technology* 55(5), 335-344.

Sullivan, P. J. Clark, J.J.J., Agardy, F. J., **Rosenfeld, P.E.** (2007). *Toxic Legacy, Synthetic Toxins in the Food, Water, and Air in American Cities.* Boston Massachusetts: Elsevier Publishing

Rosenfeld, P.E., and Suffet I.H. (2004). Control of Compost Odor Using High Carbon Wood Ash. *Water Science and Technology*. 49(9),171-178.

Rosenfeld P. E., J.J. Clark, I.H. (Mel) Suffet (2004). The Value of An Odor-Quality-Wheel Classification Scheme For The Urban Environment. *Water Environment Federation's Technical Exhibition and Conference (WEFTEC) 2004.* New Orleans, October 2-6, 2004.

Rosenfeld, P.E., and Suffet, I.H. (2004). Understanding Odorants Associated With Compost, Biomass Facilities, and the Land Application of Biosolids. *Water Science and Technology*. 49(9), 193-199.

Rosenfeld, P.E., and Suffet I.H. (2004). Control of Compost Odor Using High Carbon Wood Ash, *Water Science and Technology*, 49(9), 171-178.

Rosenfeld, P. E., Grey, M. A., Sellew, P. (2004). Measurement of Biosolids Odor and Odorant Emissions from Windrows, Static Pile and Biofilter. *Water Environment Research*. 76(4), 310-315.

Rosenfeld, P.E., Grey, M and Suffet, M. (2002). Compost Demonstration Project, Sacramento California Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Integrated Waste Management Board Public Affairs Office*, Publications Clearinghouse (MS–6), Sacramento, CA Publication #442-02-008.

Rosenfeld, P.E., and C.L. Henry. (2001). Characterization of odor emissions from three different biosolids. *Water Soil and Air Pollution*. 127(1-4), 173-191.

Rosenfeld, P.E., and Henry C. L., (2000). Wood ash control of odor emissions from biosolids application. *Journal of Environmental Quality.* 29, 1662-1668.

Rosenfeld, P.E., C.L. Henry and D. Bennett. (2001). Wastewater dewatering polymer affect on biosolids odor emissions and microbial activity. *Water Environment Research*. 73(4), 363-367.

Rosenfeld, P.E., and C.L. Henry. (2001). Activated Carbon and Wood Ash Sorption of Wastewater, Compost, and Biosolids Odorants. *Water Environment Research*, 73, 388-393.

Rosenfeld, P.E., and Henry C. L., (2001). High carbon wood ash effect on biosolids microbial activity and odor. *Water Environment Research*. 131(1-4), 247-262.

Chollack, T. and **P. Rosenfeld. (**1998). Compost Amendment Handbook For Landscaping. Prepared for and distributed by the City of Redmond, Washington State.

Rosenfeld, P. E. (1992). The Mount Liamuiga Crater Trail. *Heritage Magazine of St. Kitts*, 3(2).

Rosenfeld, P. E. (1993). High School Biogas Project to Prevent Deforestation On St. Kitts. *Biomass Users Network*, 7(1).

Rosenfeld, P. E. (1998). Characterization, Quantification, and Control of Odor Emissions From Biosolids Application To Forest Soil. Doctoral Thesis. University of Washington College of Forest Resources.

Rosenfeld, P. E. (1994). Potential Utilization of Small Diameter Trees on Sierra County Public Land. Masters thesis reprinted by the Sierra County Economic Council. Sierra County, California.

Rosenfeld, P. E. (1991). How to Build a Small Rural Anaerobic Digester & Uses Of Biogas In The First And Third World. Bachelors Thesis. University of California.

Presentations:

Rosenfeld, P.E., "The science for Perfluorinated Chemicals (PFAS): What makes remediation so hard?" Law Seminars International, (May 9-10, 2018) 800 Fifth Avenue, Suite 101 Seattle, WA.

Rosenfeld, P.E., Sutherland, A; Hesse, R.; Zapata, A. (October 3-6, 2013). Air dispersion modeling of volatile organic emissions from multiple natural gas wells in Decatur, TX. *44th Western Regional Meeting, American Chemical Society.* Lecture conducted from Santa Clara, CA.

Sok, H.L.; Waller, C.C.; Feng, L.; Gonzalez, J.; Sutherland, A.J.; Wisdom-Stack, T.; Sahai, R.K.; Hesse, R.C.; **Rosenfeld, P.E.** (June 20-23, 2010). Atrazine: A Persistent Pesticide in Urban Drinking Water. *Urban Environmental Pollution*. Lecture conducted from Boston, MA.

Feng, L.; Gonzalez, J.; Sok, H.L.; Sutherland, A.J.; Waller, C.C.; Wisdom-Stack, T.; Sahai, R.K.; La, M.; Hesse, R.C.; **Rosenfeld, P.E.** (June 20-23, 2010). Bringing Environmental Justice to East St. Louis, Illinois. *Urban Environmental Pollution.* Lecture conducted from Boston, MA.

Rosenfeld, P.E. (April 19-23, 2009). Perfluoroctanoic Acid (PFOA) and Perfluoroactane Sulfonate (PFOS) Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*, Lecture conducted from Tuscon, AZ.

Rosenfeld, P.E. (April 19-23, 2009). Cost to Filter Atrazine Contamination from Drinking Water in the United States" Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*. Lecture conducted from Tuscon, AZ.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P**. (20-22 July, 2009). Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States. Brebbia, C.A. and Popov, V., eds., *Air Pollution XVII: Proceedings of the Seventeenth International Conference on Modeling, Monitoring and Management of Air Pollution*. Lecture conducted from Tallinn, Estonia.

Rosenfeld, P. E. (October 15-18, 2007). Moss Point Community Exposure To Contaminants From A Releasing Facility. *The 23rd Annual International Conferences on Soils Sediment and Water.* Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). The Repeated Trespass of Tritium-Contaminated Water Into A Surrounding Community Form Repeated Waste Spills From A Nuclear Power Plant. *The 23rd Annual International Conferences on Soils Sediment and Water*. Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). Somerville Community Exposure To Contaminants From Wood Treatment Facility Emissions. The *23rd Annual International Conferences on Soils Sediment and Water*. Lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld P. E. (March 2007). Production, Chemical Properties, Toxicology, & Treatment Case Studies of 1,2,3-Trichloropropane (TCP). *The Association for Environmental Health and Sciences (AEHS) Annual Meeting*. Lecture conducted from San Diego, CA.

Rosenfeld P. E. (March 2007). Blood and Attic Sampling for Dioxin/Furan, PAH, and Metal Exposure in Florala, Alabama. *The AEHS Annual Meeting.* Lecture conducted from San Diego, CA.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (August 21 – 25, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006*. Lecture conducted from Radisson SAS Scandinavia Hotel in Oslo Norway.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (November 4-8, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *APHA 134 Annual Meeting & Exposition.* Lecture conducted from Boston Massachusetts.

Paul Rosenfeld Ph.D. (October 24-25, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. Mealey's C8/PFOA. *Science, Risk & Litigation Conference.* Lecture conducted from The Rittenhouse Hotel, Philadelphia, PA.

Paul Rosenfeld Ph.D. (September 19, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, *Toxicology and Remediation PEMA Emerging Contaminant Conference*. Lecture conducted from Hilton Hotel, Irvine California.

Paul Rosenfeld Ph.D. (September 19, 2005). Fate, Transport, Toxicity, And Persistence of 1,2,3-TCP. *PEMA Emerging Contaminant Conference.* Lecture conducted from Hilton Hotel in Irvine, California.

Paul Rosenfeld Ph.D. (September 26-27, 2005). Fate, Transport and Persistence of PDBEs. *Mealey's Groundwater Conference.* Lecture conducted from Ritz Carlton Hotel, Marina Del Ray, California.

Paul Rosenfeld Ph.D. (June 7-8, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. *International Society of Environmental Forensics: Focus On Emerging Contaminants*. Lecture conducted from Sheraton Oceanfront Hotel, Virginia Beach, Virginia.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Fate Transport, Persistence and Toxicology of PFOA and Related Perfluorochemicals. *2005 National Groundwater Association Ground Water And Environmental Law Conference*. Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, Toxicology and Remediation. *2005 National Groundwater Association Ground Water and Environmental Law Conference.* Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. and Rob Hesse R.G. (May 5-6, 2004). Tert-butyl Alcohol Liability and Toxicology, A National Problem and Unquantified Liability. *National Groundwater Association. Environmental Law Conference*. Lecture conducted from Congress Plaza Hotel, Chicago Illinois.

Paul Rosenfeld, Ph.D. (March 2004). Perchlorate Toxicology. *Meeting of the American Groundwater Trust*. Lecture conducted from Phoenix Arizona.

Hagemann, M.F., **Paul Rosenfeld, Ph.D.** and Rob Hesse (2004). Perchlorate Contamination of the Colorado River. *Meeting of tribal representatives*. Lecture conducted from Parker, AZ.

Paul Rosenfeld, Ph.D. (April 7, 2004). A National Damage Assessment Model For PCE and Dry Cleaners. *Drycleaner Symposium. California Ground Water Association*. Lecture conducted from Radison Hotel, Sacramento, California.

Rosenfeld, P. E., Grey, M., (June 2003) Two stage biofilter for biosolids composting odor control. *Seventh International In Situ And On Site Bioremediation Symposium Battelle Conference* Orlando, FL.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. (February 20-21, 2003) Understanding Historical Use, Chemical Properties, Toxicity and Regulatory Guidance of 1,4 Dioxane. *National Groundwater Association. Southwest Focus Conference. Water Supply and Emerging Contaminants*.. Lecture conducted from Hyatt Regency Phoenix Arizona.

Paul Rosenfeld, Ph.D. (February 6-7, 2003). Underground Storage Tank Litigation and Remediation. *California CUPA Forum*. Lecture conducted from Marriott Hotel, Anaheim California.

Paul Rosenfeld, Ph.D. (October 23, 2002) Underground Storage Tank Litigation and Remediation. *EPA Underground Storage Tank Roundtable*. Lecture conducted from Sacramento California.

Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Understanding Odor from Compost, *Wastewater and Industrial Processes. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Using High Carbon Wood Ash to Control Compost Odor. *Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

Rosenfeld, P.E. and Grey, M. A. (September 22-24, 2002). Biocycle Composting For Coastal Sage Restoration. *Northwest Biosolids Management Association*. Lecture conducted from Vancouver Washington..

Rosenfeld, P.E. and Grey, M. A. (November 11-14, 2002). Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Soil Science Society Annual Conferenc*e. Lecture conducted from Indianapolis, Maryland.

Rosenfeld. P.E. (September 16, 2000). Two stage biofilter for biosolids composting odor control. *Water Environment Federation.* Lecture conducted from Anaheim California.

Rosenfeld. P.E. (October 16, 2000). Wood ash and biofilter control of compost odor. *Biofest.* Lecture conducted from Ocean Shores, California.

Rosenfeld, P.E. (2000). Bioremediation Using Organic Soil Amendments. *California Resource Recovery Association*. Lecture conducted from Sacramento California.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. *Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings*. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., and C.L. Henry. (1999). An evaluation of ash incorporation with biosolids for odor reduction. *Soil Science Society of America*. Lecture conducted from Salt Lake City Utah.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Comparison of Microbial Activity and Odor Emissions from Three Different Biosolids Applied to Forest Soil. *Brown and Caldwell.* Lecture conducted from Seattle Washington.

Rosenfeld, P.E., C.L. Henry. (1998). Characterization, Quantification, and Control of Odor Emissions from Biosolids Application To Forest Soil. *Biofest.* Lecture conducted from Lake Chelan, Washington.

Rosenfeld, P.E, C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., C.L. Henry, R. B. Harrison, and R. Dills. (1997). Comparison of Odor Emissions From Three Different Biosolids Applied to Forest Soil. *Soil Science Society of America*. Lecture conducted from Anaheim California.

Teaching Experience:

UCLA Department of Environmental Health (Summer 2003 through 20010) Taught Environmental Health Science 100 to students, including undergrad, medical doctors, public health professionals and nurses. Course focused on the health effects of environmental contaminants.

National Ground Water Association, Successful Remediation Technologies. Custom Course in Sante Fe, New Mexico. May 21, 2002. Focused on fate and transport of fuel contaminants associated with underground storage tanks.

National Ground Water Association; Successful Remediation Technologies Course in Chicago Illinois. April 1, 2002. Focused on fate and transport of contaminants associated with Superfund and RCRA sites.

California Integrated Waste Management Board, April and May, 2001. Alternative Landfill Caps Seminar in San Diego, Ventura, and San Francisco. Focused on both prescriptive and innovative landfill cover design.

UCLA Department of Environmental Engineering, February 5, 2002. Seminar on Successful Remediation Technologies focusing on Groundwater Remediation.

University Of Washington, Soil Science Program, Teaching Assistant for several courses including: Soil Chemistry, Organic Soil Amendments, and Soil Stability.

U.C. Berkeley, Environmental Science Program Teaching Assistant for Environmental Science 10.

Academic Grants Awarded:

California Integrated Waste Management Board. $41,000 grant awarded to UCLA Institute of the Environment. Goal: To investigate effect of high carbon wood ash on volatile organic emissions from compost. 2001.

Synagro Technologies, Corona California: $10,000 grant awarded to San Diego State University.
Goal: investigate effect of biosolids for restoration and remediation of degraded coastal sage soils. 2000.

King County, Department of Research and Technology, Washington State. $100,000 grant awarded to University of Washington: Goal: To investigate odor emissions from biosolids application and the effect of polymers and ash on VOC emissions. 1998.

Northwest Biosolids Management Association, Washington State. $20,000 grant awarded to investigate effect of polymers and ash on VOC emissions from biosolids. 1997.

James River Corporation, Oregon: $10,000 grant was awarded to investigate the success of genetically engineered Poplar trees with resistance to round-up. 1996.

United State Forest Service, Tahoe National Forest: $15,000 grant was awarded to investigating fire ecology of the Tahoe National Forest. 1995.

Kellogg Foundation, Washington D.C. $500 grant was awarded to construct a large anaerobic digester on St. Kitts in West Indies. 1993

Deposition and/or Trial Testimony:

In the Superior Court of the State of California, County of San Bernardino
Billy Wildrick, Plaintiff vs. BNSF Railway Company
Case No. CIVDS1711810
Rosenfeld Deposition 10-17-2022

In the State Court of Bibb County, State of Georgia
Richard Hutcherson, Plaintiff vs Norfolk Southern Railway Company
Case No. 10-SCCV-092007
Rosenfeld Deposition 10-6-2022

In the Civil District Court of the Parish of Orleans, State of Louisiana
Millard Clark, Plaintiff vs. Dixie Carriers, Inc. et al.
Case No. 2020-03891
Rosenfeld Deposition 9-15-2022

In The Circuit Court of Livingston County, State of Missouri, Circuit Civil Division
Shirley Ralls, Plaintiff vs. Canadian Pacific Railway and Soo Line Railroad
Case No. 18-LV-CC0020
Rosenfeld Deposition 9-7-2022

In The Circuit Court of the 13th Judicial Circuit Court, Hillsborough County, Florida Civil Division
Jonny C. Daniels, Plaintiff vs. CSX Transportation Inc.
Case No. 20-CA-5502
Rosenfeld Deposition 9-1-2022

In The Circuit Court of St. Louis County, State of Missouri
Kieth Luke et. al. Plaintiff vs. Monsanto Company et. al.
Case No. 19SL-CC03191
Rosenfeld Deposition 8-25-2022

In The Circuit Court of the 13th Judicial Circuit Court, Hillsborough County, Florida Civil Division
Jeffery S. Lamotte, Plaintiff vs. CSX Transportation Inc.
Case No. NO. 20-CA-0049
Rosenfeld Deposition 8-22-2022

In State of Minnesota District Court, County of St. Louis Sixth Judicial District
Greg Bean, Plaintiff vs. Soo Line Railroad Company
Case No. 69-DU-CV-21-760
Rosenfeld Deposition 8-17-2022

In United States District Court Western District of Washington at Tacoma, Washington
John D. Fitzgerald Plaintiff vs. BNSF
Case No. 3:21-cv-05288-RJB
Rosenfeld Deposition 8-11-2022

In Circuit Court of the Sixth Judicial Circuit, Macon Illinois
Rocky Bennyhoff Plaintiff vs. Norfolk Southern
Case No. 20-L-56
Rosenfeld Deposition 8-3-2022

In Court of Common Pleas, Hamilton County Ohio
Joe Briggins Plaintiff vs. CSX
Case No. A2004464
Rosenfeld Deposition 6-17-2022

In the Superior Court of the State of California, County of Kern
George LaFazia vs. BNSF Railway Company.
Case No. BCV-19-103087
Rosenfeld Deposition 5-17-2022

In the Circuit Court of Cook County Illinois
Bobby Earles vs. Penn Central et. al.
Case No. 2020-L-000550
Rosenfeld Deposition 4-16-2022

In United States District Court Easter District of Florida
Albert Hartman Plaintiff vs. Illinois Central
Case No. 2:20-cv-1633
Rosenfeld Deposition 4-4-2022

In the Circuit Court of the 4th Judicial Circuit, in and For Duval County, Florida
Barbara Steele vs. CSX Transportation
Case No.16-219-Ca-008796
Rosenfeld Deposition 3-15-2022

In United States District Court Easter District of New York
Romano et al. vs. Northrup Grumman Corporation
Case No. 16-cv-5760
Rosenfeld Deposition 3-10-2022

In the Circuit Court of Cook County Illinois
Linda Benjamin vs. Illinois Central
Case No. No. 2019 L 007599
Rosenfeld Deposition 1-26-2022

In the Circuit Court of Cook County Illinois
Donald Smith vs. Illinois Central
Case No. No. 2019 L 003426
Rosenfeld Deposition 1-24-2022

In the Circuit Court of Cook County Illinois
Jan Holeman vs. BNSF
Case No. 2019 L 000675
Rosenfeld Deposition 1-18-2022

In the State Court of Bibb County State of Georgia
Dwayne B. Garrett vs. Norfolk Southern
Case No. 20-SCCV-091232
Rosenfeld Deposition 11-10-2021

In the Circuit Court of Cook County Illinois
Joseph Ruepke vs. BNSF
Case No. 2019 L 007730
Rosenfeld Deposition 11-5-2021

In the United States District Court For the District of Nebraska
Steven Gillett vs. BNSF
Case No. 4:20-cv-03120
Rosenfeld Deposition 10-28-2021

In the Montana Thirteenth District Court of Yellowstone County
James Eadus vs. Soo Line Railroad and BNSF
Case No. DV 19-1056
Rosenfeld Deposition 10-21-2021

In the Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al.cvs. Cerro Flow Products, Inc.
Case No. 0i9-L-2295
Rosenfeld Deposition 5-14-2021
Trial October 8-4-2021

In the Circuit Court of Cook County Illinois
Joseph Rafferty vs. Consolidated Rail Corporation and National Railroad Passenger Corporation d/b/a AMTRAK,
Case No. 18-L-6845
Rosenfeld Deposition 6-28-2021

In the United States District Court For the Northern District of Illinois
Theresa Romcoe vs. Northeast Illinois Regional Commuter Railroad Corporation d/b/a METRA Rail
Case No. 17-cv-8517
Rosenfeld Deposition 5-25-2021

In the Superior Court of the State of Arizona In and For the Cunty of Maricopa
Mary Tryon et al. vs. The City of Pheonix v. Cox Cactus Farm, L.L.C., Utah Shelter Systems, Inc.
Case No. CV20127-094749
Rosenfeld Deposition 5-7-2021

In the United States District Court for the Eastern District of Texas Beaumont Division
Robinson, Jeremy et al vs. CNA Insurance Company et al.
Case No. 1:17-cv-000508
Rosenfeld Deposition 3-25-2021

In the Superior Court of the State of California, County of San Bernardino
Gary Garner, Personal Representative for the Estate of Melvin Garner vs. BNSF Railway Company.
Case No. 1720288
Rosenfeld Deposition 2-23-2021

In the Superior Court of the State of California, County of Los Angeles, Spring Street Courthouse
Benny M Rodriguez vs. Union Pacific Railroad, A Corporation, et al.
Case No. 18STCV01162
Rosenfeld Deposition 12-23-2020

In the Circuit Court of Jackson County, Missouri
Karen Cornwell, Plaintiff, vs. Marathon Petroleum, LP, Defendant.
Case No. 1716-CV10006
Rosenfeld Deposition 8-30-2019

In the United States District Court For The District of New Jersey
Duarte et al, Plaintiffs, vs. United States Metals Refining Company et. al. Defendant.
Case No. 2:17-cv-01624-ES-SCM
Rosenfeld Deposition 6-7-2019

In the United States District Court of Southern District of Texas Galveston Division
M/T Carla Maersk vs. Conti 168., Schiffahrts-GMBH & Co. Bulker KG MS "Conti Perdido" Defendant.
Case No. 3:15-CV-00106 consolidated with 3:15-CV-00237
Rosenfeld Deposition 5-9-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
Carole-Taddeo-Bates et al., vs. Ifran Khan et al., Defendants
Case No. BC615636
Rosenfeld Deposition 1-26-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
The San Gabriel Valley Council of Governments et al. vs El Adobe Apts. Inc. et al., Defendants
Case No. BC646857
Rosenfeld Deposition 10-6-2018; Trial 3-7-19

In United States District Court For The District of Colorado
Bells et al. Plaintiffs vs. The 3M Company et al., Defendants
Case No. 1:16-cv-02531-RBJ
Rosenfeld Deposition 3-15-2018 and 4-3-2018

In The District Court Of Regan County, Texas, 112th Judicial District
Phillip Bales et al., Plaintiff vs. Dow Agrosciences, LLC, et al., Defendants
Cause No. 1923
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Cause No. C12-01481
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Case No.: No. 0i9-L-2295
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Case No. 2:07CV1052
Rosenfeld Deposition July 2009

EXHIBIT B

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Subject: Indoor Air Quality: Belvedere Project, Los Angeles, CA
(IEE File Reference: P-4666)

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 South Coast Air Quality Management District (SCAQMD, 2015).

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 $\mu g/m^3$ (18.2 ppb) as compared to a median of 36 $\mu g/m^3$ 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 $\mu g/m^3$, which is 33% lower than the 36 $\mu g/m^3$ 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 the Belvedere Project, Los Angeles, CA the buildings consist of residential 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.

Additionally, the Project site is located in an area with high vehicle traffic. The SCAQMD's Multiple Air Toxics Exposure Study ("MATES V") identifies an existing cancer risk at the site of 1.036 per million due to the site's elevated ambient air contaminant concentrations, which are due to the area's high levels of vehicle traffic. These impacts would further exacerbate the pre-existing cancer risk to residents, which result from exposure to formaldehyde in both indoor and outdoor air.

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., $\mu g/m^2$-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 $\mu g/m^2$-h, but not the actual measured specific emission rate, which may be 3, 18, or 30 $\mu g/m^2$-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.

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

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 Categorical Exemption No. Env-2018-4189-CE – Belvedere Project, Los Angeles, CA (City of Los Angeles, 2018) the Project is close to roads with moderate to high traffic (e.g., Pasadena Avenue, North Figueroa, 110/66, Avenue 38, Avenue 39 etc.).

The Categorical Exemption No. Env-2018-4189-CE – Belvedere Project, Los Angeles, CA (City of Los Angeles, 2018) contains only two short-term (i.e., 15 minute measurements) made in 2018 that ranged from 63.6 to 70.1 dBA Leq. An assessment of the outdoor traffic noise levels over a one week period needs to be conducted so that the building envelope and windows can be designed with a sufficient STC such that the indoor noise levels are acceptable.

As a result of the high outdoor traffic noise levels, the current project will require a mechanical supply of outdoor air ventilation to allow for a habitable interior environment with closed windows and doors. 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 Categorical Exemption No. Env-2018-4189-CE – Belvedere Project, Los Angeles, CA (City of Los Angeles, 2018) the Project is located in the South Coast Air Basin, which is a State and Federal non-attainment area for $PM_{2.5}$.

Additionally, the SCAQMD's MATES V study cites an existing cancer risk of 1,036 per million at the Project site due to the site's high concentration of ambient air contaminants resulting from the area's high levels of motor vehicle traffic.

An air quality analyses should to 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 $\mu g/m^3$, or the National 24-hour average exceedence concentration of 35 $\mu g/m^3$, 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.

<u>Outdoor Air Ventilation Mitigation</u>. Provide <u>each</u> 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 $\mu g/m^3$ (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.