

## Switzer, Donna

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**From:** Brian Flynn <brian@lozeaudrury.com>  
**Sent:** Monday, December 18, 2023 4:18 PM  
**To:** CITY COUNCIL (INCL. CMO STAFF); supplementalcomm@surfcity-hb.org; Beckman, Hayden  
**Cc:** Rebecca Davis; Madeline Dawson; Layne Fajeau  
**Subject:** Comment- Bolsa Chica Senior Living Community\_File No. 23-994 (CC Agenda Item 21\_Dec 19 2023)  
**Attachments:** 2023.12.18 SAFER Comment\_Bolsa Chica Senior Living Community (CC Agenda Item 21\_Dec 19 2023).pdf

Dear Mayor Van Der Mark, Mayor Pro Tem Burns, Honorable City Councilmembers, and Mr. Beckman:

Please find attached a comment submitted on behalf of Supporters Alliance for Environmental Responsibility ("SAFER") regarding the Bolsa Chica Senior Living Community Project (File No. 23-994) to be heard as Agenda Item 21 at the City Council's December 19, 2023 meeting.

Confirmation of receipt of this email and comment would be greatly appreciated.

Thank you,  
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### SUPPLEMENTAL COMMUNICATION

Meeting Date: 12/19/23

Agenda Item No.: 21 (23-994)



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December 18, 2023

***Via E-Mail***

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**Re: Bolsa Chica Senior Living Community Project (Council File No. 23-994)  
GPA No. 21-004; ZMA No. 21-003; ZTA No. 22-005; EIR No. 21-004  
City Council Agenda Item 21 (December 19, 2023)**

Dear Mayor Van Der Mark, Mayor Pro Tem Burns, and Honorable City Councilmembers:

This comment is submitted on behalf of Supporters Alliance for Environmental Responsibility ("SAFER") and its members living in and around the City of Huntington Beach in opposition to the environmental impact report ("EIR") prepared for the Bolsa Chica Senior Living Community Project ("Project") to be heard as Agenda Item 21 at the City Council's December 19, 2023 meeting.

SAFER's review of the EIR was assisted by indoor air quality expert Francis Offermann, CIH, and air quality experts Matt Hagemann, P.G., C.Hg., and Dr. Paul E. Rosenfeld, Ph.D., of the Soil/Water/Air Protection Enterprise ("SWAPE"), whose written comments and CVs are attached as Exhibit A and B, respectively.

For the reasons discussed below, the City lacks substantial evidence to support the EIR's conclusion that the Project will not have a significant impact on air quality. Additionally, the EIR is inadequate under the California Environmental Quality Act ("CEQA") for failing to consider how feasible renewable energy (such as roof top solar) could be incorporated into the Project.

For those reasons, SAFER respectfully requests that the City Council deny the Project until the deficiencies of the EIR are remedied and the EIR is recirculated for public review and comment.

## **I. PROJECT DESCRIPTION AND BACKGROUND**

The Project proposes (1) a Zoning Text Amendment to establish the Bolsa Chica Senior Living Community Specific Plan with development standards for height, open space, and convalescent uses on the Project site, (2) a General Plan Amendment to re-designate the site from Commercial General (CG) to Mixed Use (MU) with a Specific Plan Overlay, (3) a Zoning Map Amendment to re-designate the site from Commercial General (CG) to Specific Plan 19 (SP-19), and (4) a Conditional Use Permit to demolish 50,000 sq. ft. of existing commercial space and construct a new convalescent facility (“Facility”) with on-site alcohol sales and consumption with a subterranean parking garage and associated hardscape and landscape improvements.

In May 2023, the City circulated a draft EIR (“DEIR”) for the Project, at which time the Facility was proposed to have 5 stories (65 feet in height maximum), 202 units, and 196 parking spaces. The City released a final EIR (“FEIR”) in September 2023 (the DEIR and FEIR are collectively referred to as the “EIR”). On September 26, 2023, the Planning Commission approved the Project’s CUP and recommended that the City Council certify the EIR and approve the Project’s GPA, ZMA, and ZTA. Since that time, the Project has been amended such that the Facility is now proposed to be 4 stories (52 feet in height maximum), 178 units, and 162 parking spaces.

## **II. LEGAL STANDARD UNDER CEQA**

CEQA requires that an agency analyze the potential environmental impacts of its proposed actions in an EIR except in certain limited circumstances. The EIR is the very heart of CEQA. (*Dunn-Edwards v. BAAQMD* (1992) 9 Cal.App.4th 644, 652.) “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. Resources Agency* (2002) 103 Cal.App.4th 98, 109.)

CEQA has two primary purposes. First, CEQA is designed to inform decision makers and the public about the potential, significant environmental effects of a project. (14 CCR § 15002(a)(1).) “Its purpose is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, the EIR ‘protects not only the environment but also informed self-government.’” (*Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564.) The EIR has been described as “an environmental ‘alarm bell’ whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return.” *Berkeley Keep Jets Over the Bay v. Bd. of Port Comm’rs.* (2001) 91 Cal.App.4th 1344, 1354 (*Berkeley Jets*); *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810.)

Second, CEQA requires public agencies to avoid or reduce environmental damage when “feasible” by requiring “environmentally superior” alternatives and all feasible mitigation measures. (14 CCR § 15002(a)(2), (3); *see also, Berkeley Jets, supra*, 91 Cal.App.4th 1344, 1354; *Citizens of Goleta Valley, supra*, 52 Cal.3d at 564.) The EIR serves to provide agencies and the public with information about the environmental impacts of a proposed project and to “identify ways that environmental damage can be avoided or significantly reduced.” (14 CCR 15002(a)(2). If the project will have a significant effect on the environment, the agency may approve the project only if it finds that it has “eliminated or substantially lessened all significant effects on the environment where feasible” and that any unavoidable significant effects on the environment are “acceptable due to overriding concerns.” (PRC § 21081; 14 CCR 15092(b)(2)(A), (B).) The lead agency may deem a particular impact to be insignificant only if it produces rigorous analysis and concrete substantial evidence justifying the finding. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 732.)

The EIR is the very heart of CEQA “and the integrity of the process is dependent on the adequacy of the EIR.” (*Berkeley Jets, supra*, 91 Cal.App.4th at 1355.) CEQA requires that a lead agency analyze all potentially significant environmental impacts of its proposed actions in an EIR. (PRC § 21100(b)(1); 14 CCR 15126(a); *Berkeley Jets, supra*, 91 Cal.App.4th at 1354.) The EIR must not only identify the impacts, but must also provide “information about how adverse the impacts will be.” (*Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831.) The lead agency may deem a particular impact to be insignificant only if it produces rigorous analysis and concrete substantial evidence justifying the finding. (*Kings County Farm Bureau, supra*, 221 Cal.App.3d at 732.) “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., supra*, 103 Cal.App.4th at 109.)

While the courts review an EIR using an “abuse of discretion” standard, “the reviewing court is not to ‘uncritically rely on every study or analysis presented by a project proponent in support of its position. A ‘clearly inadequate or unsupported study is entitled to no judicial deference.’” (*Berkeley Jets, supra*, 91 Cal.App.4th at 1355 [quoting *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 391, 409 n. 12].) A prejudicial abuse of discretion occurs “if the failure to include relevant information precludes informed decisionmaking and informed public participation, thereby thwarting the statutory goals of the EIR process.” (*San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 722; *Galante Vineyards v. Monterey Peninsula Water Mgmt. Dist.* (1997) 60 Cal.App.4th 1109, 1117; *County of Amador v. El Dorado Cnty. Water Agency* (1999) 76 Cal. App. 4th 931, 946.)

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## II. DISCUSSION

### A. The EIR Fails to Disclose and Mitigate the Project's Significant Indoor Air Quality Impacts.

The EIR fails to discuss, disclose, analyze, and mitigate the significant health risks posed by the Project from formaldehyde, a toxic air contaminant ("TAC"). Certified Industrial Hygienist, Francis Offermann, PE, CIH, has conducted a review of the Project, attached as Exhibit A. Mr. Offermann is one of the world's leading experts on indoor air quality, in particular emissions of formaldehyde, and has published extensively on the topic. As discussed below and set forth in Mr. Offermann's comments, the Project's emissions of formaldehyde to air will result in very significant cancer risks to future residents of the Facility's residential units. Mr. Offermann's expert opinion demonstrates the Project's significant health risk impacts, which the City has a duty to investigate, disclose, and mitigate in a recirculated EIR.

Formaldehyde is a known human carcinogen and listed by the State as a TAC. The San Diego Air Pollution Control District ("SDAPCD") has established a significance threshold of health risks for carcinogenic TACs of 10 in a million (Ex. A, p. 2.). The EIR fails to acknowledge the significant indoor air emissions that will result from the Project. Specifically, there is no discussion of impacts or health risks, no analysis, and no identification of mitigations for significant emissions of formaldehyde to air from the Project.

Mr. Offermann explains that many composite wood products typically used in home and apartment building construction contain formaldehyde-based glues which off-gas formaldehyde over a very long time period. He states, "The primary source of formaldehyde indoors is composite wood products manufactured with urea-formaldehyde resins, such as plywood, medium density fiberboard, and particle board. These materials are commonly used in residential, office, and retail building construction for flooring, cabinetry, baseboards, window shades, interior doors, and window and door trims." (Ex. A, pp. 2-3.)

Mr. Offermann found that future residents of the Project's residential units will be exposed to a cancer risk from formaldehyde of approximately 120 per million, *even assuming that* all materials are compliant with the California Air Resources Board's formaldehyde airborne toxics control measure. (Ex. A, pp. 4-5.) This is more than 12 times SDAPCD's CEQA significance threshold of 10 per million. (*Id.*)

Mr. Offermann concludes that these significant environmental impacts must be analyzed in an EIR and mitigation measures should be imposed to reduce the risk of formaldehyde exposure. (Ex. A, pp. 5, 12-13.) He prescribes a methodology for estimating the Project's formaldehyde emissions in order to do a more project-specific health risk assessment. (*Id.*, pp. 5-10.). Mr. Offermann also suggests several feasible mitigation measures, such as requiring the use of no-added-formaldehyde composite wood products, which are readily available. (*Id.*, pp. 12-

13.) Mr. Offermann also suggests requiring air ventilation systems which would reduce formaldehyde levels. (*Id.*) Since the EIR does not analyze this impact at all, none of these or other mitigation measures have been considered.

When a Project exceeds a duly adopted CEQA significance threshold, as here, this alone establishes substantial evidence that the project will have a significant adverse environmental impact. Indeed, in many instances, such air quality thresholds are the only criteria reviewed and treated as dispositive in evaluating the significance of a project's air quality impacts. (See, e.g. *Schenck v. County of Sonoma* (2011) 198 Cal.App.4th 949, 960 [County applies Air District's "published CEQA quantitative criteria" and "threshold level of cumulative significance"]; see also *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 110-111 ["A 'threshold of significance' for a given environmental effect is simply that level at which the lead agency finds the effects of the project to be significant"].)

The California Supreme Court made clear the substantial importance that an air district significance threshold plays in providing substantial evidence of a significant adverse impact. (*Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 327 ["As the District's established significance threshold for NOx is 55 pounds per day, these estimates [of NOx emissions of 201 to 456 pounds per day] constitute substantial evidence supporting a fair argument for a significant adverse impact."].) Since expert evidence demonstrates that the Project will exceed the SDAPCD's CEQA significance threshold, there is substantial evidence that an "unstudied, **potentially significant environmental effect**[]" exists. (See *Friends of Coll. of San Mateo Gardens v. San Mateo Cty. Cmty. Coll. Dist.* (2016) 1 Cal.5th 937, 958 [emphasis added].)

The failure of the EIR to address the Project's formaldehyde emissions is contrary to the California Supreme Court's decision in *California Building Industry Ass'n v. Bay Area Air Quality Mgmt. Dist.* (2015) 62 Cal.4th 369, 386 ("*CBIA*"). In that case, the Supreme Court expressly holds that potential adverse impacts to future users and residents from pollution generated by a proposed project **must be addressed** under CEQA. At issue in *CBIA* was whether the Air District could enact CEQA guidelines that advised lead agencies that they must analyze the impacts of adjacent environmental conditions on a project. The Supreme Court held that CEQA does not generally require lead agencies to consider the environment's effects on a project. (*CBIA*, 62 Cal.4th at 800-01.) However, to the extent a project may exacerbate existing environmental conditions at or near a project site, those would still have to be considered pursuant to CEQA. (*Id.* at 801.) In so holding, the Court expressly held that CEQA's statutory language required lead agencies to disclose and analyze "impacts on **a project's users or residents** that arise **from the project's effects** on the environment." (*Id.* at 800 [emphasis added].)

The carcinogenic formaldehyde emissions identified by Mr. Offermann are not an existing environmental condition. Those emissions to the air will be from the Project. People will be residing in and working in the Project's buildings once built and emitting formaldehyde. Once

built, the Project will begin to emit formaldehyde at levels that pose significant direct and cumulative health risks. The Supreme Court in *CBIA* expressly finds that this type of air emission and health impact by the project on the environment and a “project’s users and residents” must be addressed in the CEQA process. The existing TAC sources near the Project site would have to be considered in evaluating the cumulative effect on future residents of both the Project’s TAC emissions as well as those existing off-site emissions.

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

The City has a duty to investigate issues relating to a project’s potential environmental impacts. (*See County Sanitation Dist. No. 2 v. County of Kern*, (2005) 127 Cal.App.4th 1544, 1597–98. [“[U]nder CEQA, the lead agency bears a burden to investigate potential environmental impacts.”].) The proposed buildings will have significant impacts on air quality and health risks by emitting cancer-causing levels of formaldehyde into the air that will expose future residents to cancer risks potentially in excess of SDAPCD’s threshold of significance for cancer health risks of 10 in a million. Currently, outside of Mr. Offermann’s comments, the City does not have any idea what risks will be posed by formaldehyde emissions from the Project. As a result, the City must include an analysis and discussion in an updated EIR which discloses and analyzes the health risks that the Project’s formaldehyde emissions may have on future residents and identifies appropriate mitigation measures.

**B. The EIR inadequately evaluates the Project’s impacts from emissions of diesel particulate matter.**

Matt Hagemann, P.G., C.Hg., and Paul E. Rosenfeld, Ph.D., of the Soil/Water/Air Protection Enterprise (“SWAPE”) reviewed the air quality analysis in the EIR. SWAPE’s comment letter and CVs are attached as Exhibit C. SWAPE found that the EIR failed to adequately evaluate the human health impacts resulting from the Project’s emissions of diesel particulate matter.

The EIR fails to make any mention of the human health impacts from emissions of diesel particulate matter (“DPM”) from construction and operation of the Project. As noted by SWAPE, CEQA requires that the EIR “correlate Project-generated emissions with potential adverse impacts on human health.” (Ex. B, p. 5.) However, such an analysis is not possible without a

quantified health risk assessment (“HRA”). The failure of the EIR to provide a quantified HRA is inconsistent with the most recent guidance of the Office of Environmental Health Hazard Assessment (“OEHHA”). (Ex. B, pp. 5-6.) OEHHA recommends that exposure from projects lasting more than 6 months be evaluated for the duration of the project and recommends that an exposure duration of 30 years be used to estimate individual cancer risk for the maximally exposed individual resident (“MEIR”). (*Id.*) A quantified HRA for construction and operation of the Project is necessary to ensure that the Project’s health risks are disclosed and compared to the applicable SDAPCD significance threshold for increased cancer risk.

SWAPE prepared a screening-level HRA to evaluate potential impacts to human health from DPM during construction and operation of the Project using AERSCREEN, the leading screening-level air quality dispersion model. (Ex. B, pp. 6-10.) According to the EIR’s air quality modeling data, construction of the Project will generate approximately 425 pounds of DPM over the 753-day construction period and operation of the Project would result in an additional 66 pounds of DPM emissions per year. (*Id.* at pp. 6-7.) Using those values, SWAPE conducted their HRA to calculate the increased cancer risk resulting from those DPM emissions to the MEIR located approximately 74 meters downwind of the Project site. (*Id.* at p. 7.) The HRA utilized age sensitivity factors in order to account for the increased sensitivity to carcinogens during early-in-life exposure and to assess the risk for susceptible subpopulations such as children. (*Id.* at p. 8.)

SWAPE’s HRA found that increased cancer risk to infants and children during construction and operation of the Project would be 211 in one million and 79.9 in one million, respectively. (Ex. B, pp. 9-10.) Additionally, the increased cancer risk for a 30-year residential lifetime would be 309 in one million. (*Id.*) Each of the above increased cancer risks exceed SDAPCD’s CEQA significance threshold of 10 in one million. By failing to conduct an HRA, the EIR fails to provide substantial evidence that the Project’s health impacts from DPM emissions would be less than significant. The EIR must be amended and recirculated in order to disclose this impact and mitigate it to the extent feasible.

**C. The EIR’s conclusions about the Project’s emissions are not supported by substantial evidence.**

The EIR relies on emission estimates calculated from the California Emissions Estimator Model Version CalEEMod.2016.3.2 (“CalEEMod”). This model relies on recommended default values based on site specific information related to a number of factors. The model is used to generate a project’s construction and operational emissions. SWAPE reviewed the Project’s CalEEMod output files from the DEIR and found that the values input into the model were inconsistent with information provided in the DEIR, resulting in an underestimation of the Project’s emissions. (Ex. B, pp. 1-5.)

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



1. Unsubstantiated changes to construction phase lengths (Ex. B, pp. 2-4.)
2. Underestimated number of construction worker trips (Ex. B, pp. 4-5.)

As a result, the EIR's air quality analysis underestimates the Project's emissions and fails to provide substantial evidence that those impacts will be less than significant.. The EIR must be revised adequately evaluate the impacts that construction and operation of the Project will have on local and regional air quality.

#### **D. The EIR's Analysis of the Project's Energy Impacts Is Inadequate.**

CEQA provides that all Projects must include mitigation measures "to reduce the wasteful, inefficient, and unnecessary consumption of energy." (Pub. Res. Code § 21100(b)(3).) Energy conservation under CEQA is defined as the "wise and efficient use of energy." (CEQA Guidelines, app. F, § I.) The "wise and efficient use of energy" is achieved by "(1) decreasing overall per capita energy consumption, (2) decreasing reliance on fossil fuels such as coal, natural gas and oil, and (3) increasing reliance on renewable energy resources." (*Id.*)

Mere compliance with the California Building Energy Efficiency Standards (Cal. Code Regs., tit. 24, part 6) ("Title 24") does not constitute an adequate analysis of energy. (*League to Save Lake Tahoe Mountain Area Preservation Foundation v. County of Placer* (2022) 75 Cal.App.5th 63, 165 (*League to Save Lake Tahoe*); *Ukiah Citizens for Safety First v. City of Ukiah* (2016) 248 Cal. App. 4th 256, 264-65; *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 209-13.) Even where an agency has concluded that a project's impacts on energy resources would be less than significant, a lead agency must still analyze implementation of all "renewable energy options that might have been available or appropriate for [a] project." (*League to Save Lake Tahoe, supra*, 75 Cal.App.5th at 166-67.) A lead agency's failure to consider implementation of all feasible renewable energy proposals raised during the environmental review process constitutes a "prejudicial error." (*Id.* at 168.)

Despite CEQA's requirement to consider all renewable energy options—and despite the City's General Plan Policy to encourage the use of solar energy systems (DEIR, pp. 4-4.6 to 4-4.7), the EIR merely claims that the Project will comply with Title 24 requirements (*id.* at p. 4.4-9) and makes no mention of renewable energy options that could be incorporated into the Project. This is inadequate under CEQA and the EIR must be revised to include a good faith analysis of feasible renewable energy features that could be incorporated into the Project.

### **III. CONCLUSION**

SAFER respectfully requests that the City Council deny the Project due the deficiencies in the EIR as described above. The EIR will need to be revised and recirculated prior to any approval of the Project.

SAFER Comment  
Bolsa Chica Senior Living Community  
CC Agenda Item 21 (December 19, 2023)  
December 18, 2023  
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Sincerely,

A handwritten signature in blue ink that reads "Brian B. Flynn". The signature is written in a cursive style with a large, stylized "B" and "F".

Brian Flynn  
Lozeau | Drury LLP

# EXHIBIT A



## INDOOR ENVIRONMENTAL ENGINEERING



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Date: December 17, 2023

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From: Francis J. Offermann PE CIH

Subject: Indoor Air Quality: Bolsa Chica Senior Living Community Project, Huntington Beach, CA. (IEE File Reference: P-4772)

Pages: 19

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### **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<sup>3</sup>, assuming a continuous 24-hour exposure, a total daily inhaled air volume of 20 m<sup>3</sup>, and 100% absorption by the respiratory system. All of the CNHS homes exceeded this NSRL concentration of 2 µg/m<sup>3</sup>. The median indoor formaldehyde concentration was 36 µg/m<sup>3</sup>, and ranged from 4.8 to 136 µg/m<sup>3</sup>, which corresponds to a median exceedance of the 2 µg/m<sup>3</sup> 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<sup>3</sup>, 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 San Diego County Air Pollution Control District (SDAPCD, 2021).

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<sup>3</sup> to 28% for the Acute REL of 55 µg/m<sup>3</sup>.

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  $22.4 \mu\text{g}/\text{m}^3$  (18.2 ppb) as compared to a median of  $36 \mu\text{g}/\text{m}^3$  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  $24.1 \mu\text{g}/\text{m}^3$ , which is 33% lower than the  $36 \mu\text{g}/\text{m}^3$  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 Bolsa Chica Senior Living Community Project, Huntington Beach, CA, the buildings consist of senior living residential 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  $24.1 \mu\text{g}/\text{m}^3$  (Singer et. al., 2020)

Assuming that the residential occupants inhale  $20 \text{ m}^3$  of air per day, the average 70-year lifetime formaldehyde daily dose is  $482 \mu\text{g}/\text{day}$  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 for 70 years, the cancer risk will be proportionally less but still substantially over the CEQA cancer risk of 10 per million (e.g. continuous 20 year occupancy, more than 3.4 times the CEQA cancer risk of 10 per million).

In addition, we note that the average outdoor air concentration of formaldehyde in California is 3 ppb, or  $3.7 \mu\text{g}/\text{m}^3$ , (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 SCAQMD's Multiple Air Toxics Exposure Study ("MATES V") identifies an existing cancer risk at the Project site of 399 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 the building occupants, 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 that 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<sup>2</sup> of material/m<sup>2</sup> floor area, units of furnishings/m<sup>2</sup> 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<sup>2</sup>-h) and the area (m<sup>2</sup>) 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.,  $\mu\text{g}/\text{m}^2\text{-h}$ ) 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  $31 \mu\text{g}/\text{m}^2\text{-h}$ , but not the actual measured specific emission rate, which may be 3, 18, or  $30 \mu\text{g}/\text{m}^2\text{-h}$ . 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<sup>3</sup>) 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<sup>3</sup>/h) for the IAQ Zone.

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

where:

$C_{in}$  = indoor formaldehyde concentration (µg/m<sup>3</sup>)

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

$Q_{oa}$  = design minimum outdoor air ventilation rate to the IAQ Zone (m<sup>3</sup>/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.

The Bolsa Chica Senior Living Community Project, Huntington Beach, CA is close to roads with moderate to high traffic (e.g., Bolsa Chica Street, Warner Avenue, etc.).

According to Table 4.8.A in the Draft Environmental Impact Report - Bolsa Chica Senior Living Community, Huntington Beach, CA (LSA, 2023), the existing Project ambient sound levels range from, 58.2 - 67.6 dBA CNEL. However, these ambient sound levels were measured at just 2 locations over a single 24-hr period on July 26-27, 2022. In order to design the building for this Project such that interior noise levels are acceptable, an acoustic study with actual on-site measurements of the existing ambient noise levels and modeled future ambient noise levels needs to be conducted. The acoustic study of the existing ambient noise levels should be conducted over a minimum of a one-week period and report the dBA CNEL or Ldn. This study will allow for the selection of a building envelope and windows with a sufficient STC such that the indoor noise levels are acceptable. A mechanical supply of outdoor air ventilation to allow for a habitable interior environment with closed windows and doors will also be required. Such a ventilation system would allow windows and doors to be kept closed at the occupant's discretion to control exterior noise within building interiors.

**PM<sub>2.5</sub> Outdoor Concentrations Impact.** An additional impact of the nearby motor vehicle traffic associated with this project, are the outdoor concentrations of PM<sub>2.5</sub>. According to the Bolsa Chica Senior Living Community, Huntington Beach, CA (LSA, 2023), the Project is located in the South Coast Air Basin, which is a State and Federal non-attainment area for PM<sub>2.5</sub>.

Additionally, the SCAQMD's MATES V study cites an existing cancer risk of 399 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 be conducted to determine the concentrations of PM<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> exceedence concentration of 12 µg/m<sup>3</sup>, or the National 24-hour average exceedence concentration of 35 µg/m<sup>3</sup>, 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<sub>2.5</sub> particles is less than the California and National PM<sub>2.5</sub> annual and 24-hour standards.

It is my experience that based on the projected high traffic noise levels, the annual average concentration of PM<sub>2.5</sub> will exceed the California and National PM<sub>2.5</sub> annual and 24-hour standards and warrant installation of high efficiency air filters (i.e. at least MERV 13, or possibly MERV 14 or 15 depending on the results of the Project ambient PM<sub>2.5</sub> concentrations) 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 OEHHHA cancer risk of 10 per million is met.

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

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

Outdoor Air Ventilation Mitigation. Provide each habitable room with a continuous mechanical supply of outdoor air that meets or exceeds the California 2016 Building Energy Efficiency Standards (California Energy Commission, 2015) requirements of the greater of 15 cfm/occupant or 0.15 cfm/ft<sup>2</sup> 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<sub>2.5</sub> Outdoor Air Concentration Mitigation. Install air filtration with sufficient PM<sub>2.5</sub> 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<sub>2.5</sub> particles are less than the California and National PM<sub>2.5</sub> 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  $22.4 \mu\text{g}/\text{m}^3$  (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<sup>2</sup>), 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,

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<sup>3</sup>/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<sup>2</sup> (0.7% of the floor area), or

Particle Board – 30 ft<sup>2</sup> (1.3% of the floor area), or

Hardwood Plywood – 54 ft<sup>2</sup> (2.4% of the floor area), or

Thin MDF – 46 ft<sup>2</sup> (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 that meet the OEHHA cancer risks that substantially exceed 10 per million. The permissible emission rates for ULEF composite wood products are only 11-15% lower than the CARB Phase 2 emission rates. Only use of composite wood products made with no-added formaldehyde resins (NAF), such as resins made from soy, polyvinyl acetate, or methylene diisocyanate can insure that the OEHHA cancer risk of 10 per million is met.

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

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

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## Expert Witness Services

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### Education

- M.S. Mechanical Engineering Stanford University, Stanford, CA.
- Graduate Studies in Air Pollution Monitoring and Control University of California, Berkeley, CA.
- B.S. in Mechanical Engineering Rensselaer Polytechnic Institute, Troy, N.Y.

### Professional Affiliations

ACGIH, AIHA, ASHRAE, CSI, ASTM, ISIAQ, PARMA, and USGBC

### Work Experience

Mr. Offermann PE, CIH, has 36 years experience as an IAQ researcher, technical author, and workshop instructor. He is president of Indoor Environmental Engineering, a San Francisco based IAQ R&D consulting firm. As president of Indoor Environmental Engineering, Mr. Offermann directs an interdisciplinary team of environmental scientists, chemists, and mechanical engineers in indoor air quality building investigations. Under Mr. Offermann's supervision, IEE has developed both pro-active and reactive IAQ measurement methods and diagnostic protocols. He has supervised over 2,000 IAQ investigations in commercial, residential, and institutional buildings and conducted numerous forensic investigations related to IAQ.

### Litigation Experience

Mr. Offermann has been qualified numerous times in court as an expert in the field of indoor air quality and ventilation for both plaintiffs and defendants. He has been deposed over 150 times in cases involving indoor air quality/ventilation issues in commercial, residential, and institutional buildings involving construction defects, and/or operation and maintenance problems. Examples of indoor air quality cases he has worked on are alleged personal injury and/or property damages from mold and bacterial contamination/moisture intrusion, building renovation activities, insufficient outdoor air ventilation, off gassing of volatile organic compounds from building materials and coatings, malfunctioning gas heaters and carbon monoxide poisoning, and applications of pesticides. Mr. Offermann has testified with respect to the scientific admissibility of expert testimony regarding indoor air quality issues via Daubert and Kelly-Frye motions.



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# EXHIBIT B



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December 15, 2023

Brian Flynn  
Lozeau | Drury LLP  
1939 Harrison Street, Suite 150  
Oakland, CA 94618

**Subject: Comments on the Bolsa Chica Senior Living Project (SCH No. 2022110040)**

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Dear Mr. Flynn,

We have reviewed the September 2023 Final Environmental Impact Report ("FEIR") and the April 2023 Draft Environmental Impact Report ("DEIR") for the Bolsa Chica Senior Living Project ("Project") located in the City of Huntington Beach ("City"). The Project proposes to demolish two existing commercial buildings and construct a 298,000-square-foot ("SF") senior living community with 213 living units and 207 parking spaces on the 3.10-acre site.

Our review concludes that the FEIR fails to adequately evaluate the Project's air quality and health risk impacts. As a result, emissions and health risk impacts associated with construction and operation of the proposed Project may be underestimated and inadequately addressed. A revised Environmental Impact Report ("EIR") should be prepared to adequately assess and mitigate the potential air quality and health risk impacts that the project may have on the environment.

## Air Quality

### Unsubstantiated Input Parameters Used to Estimate Project Emissions

The DEIR and FEIR's air quality analysis relies on emissions calculated with California Emissions Estimator Model ("CalEEMod") Version 2020.4.0 (DEIR, p. 4.2-1).<sup>1</sup> 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

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<sup>1</sup> "CalEEMod Version 2020.4.0." California Air Pollution Control Officers Association (CAPCOA), May 2021, *available at*: <http://www.aqmd.gov/caleemod/download-model>.



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 used in calculating the Project’s air pollutant emissions and demonstrate which default values are changed. Justifications are provided for the selected values.

When reviewing the Project’s CalEEMod output files, provided in the Air Quality Modeling Data (“AQ Report”) as Appendix D to the DEIR, we found that several model inputs are not consistent with information disclosed in the DEIR or FEIR. As a result, the Project’s construction and operational emissions may be underestimated. A revised EIR should be prepared to include an updated air quality analysis that adequately evaluates the impacts that operation of the Project will have on local and regional air quality.

### *Unsubstantiated Changes to Individual Construction Phase Lengths*

Review of the CalEEMod output files demonstrates that the “Bolsa Chica Senior Living Community Project” model includes several changes to the default individual construction phase lengths (see excerpt below) (Appendix D, pp. 3, 44, 78).

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	260.00
tblConstructionPhase	NumDays	230.00	425.00
tblConstructionPhase	NumDays	20.00	45.00
tblConstructionPhase	NumDays	8.00	25.00
tblConstructionPhase	NumDays	18.00	15.00
tblConstructionPhase	NumDays	5.00	30.00

As a result of these changes, the model includes the following construction schedule (see excerpt below) (Appendix D, pp. 9, 10, 48, 49, 82, 83).

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days
1	Demolition	Demolition	4/1/2024	5/31/2024	5	45
2	Site Preparation	Site Preparation	6/3/2024	7/12/2024	5	30
3	Grading	Grading	7/15/2024	8/16/2024	5	25
4	Building Construction	Building Construction	8/19/2024	4/3/2026	5	425
5	Architectural Coating	Architectural Coating	4/7/2025	4/3/2026	5	260
6	Paving	Paving	4/6/2026	4/24/2026	5	15

As demonstrated above, the demolition phase is increased by 125%, from the default value of 20 to 45 days; the site preparation phase is increased by 500%, from the default value of 5 to 30 days; the grading phase is increased by 213%, from the default value of 8 to 25 days; the building construction phase is increased by 85%, from the default value of 230 to 425 days; the architectural coating phase is increased by 1,344%, from the default value of 18 to 260 days; and the paving phase is decreased by 17%, from the default value of 18 to 15 days. As previously mentioned, the CalEEMod User’s Guide

requires any changes to model defaults be justified.<sup>2</sup> According to the “User Entered Comments & Non-Default Data” table, the justification provided for these changes is:

“Construction is anticipated to begin Q2 2024 and end Q2 2026. Overlap of building construction and architectural coating” (Appendix D, pp. 1, 42, 76).

Regarding construction activities, the DEIR states:

“In addition to demolition, construction activities would include excavation and grading of the site; delivery of materials and personnel; construction of the subterranean parking garage and building area; and landscaping. It is anticipated that the construction period for the senior living community, including the subterranean parking garage, would be approximately 28 months” (p. 3-26).

However, the changes to the individual construction phase lengths remain unsubstantiated. While the DEIR states that the total length of Project construction would be 28 months, the DEIR and associated documents fail to substantiate the changes to individual construction phase lengths. Until the above-mentioned construction schedule is provided, the model should have included proportionately altered individual phase lengths to match the proposed construction duration of 28 months.

The construction schedule included in the model presents an issue, as the construction emissions are improperly spread out over a longer period of time for some phases, but not for others. According to the CalEEMod User’s Guide, each construction phase is associated with different emissions activities (see excerpt below).<sup>3</sup>

Demolition involves removing buildings or structures.

Site Preparation involves clearing vegetation (grubbing and tree/stump removal) and removing stones and other unwanted material or debris prior to grading.

Grading involves the cut and fill of land to ensure that the proper base and slope is created for the foundation.

Building Construction involves the construction of the foundation, structures and buildings.

Architectural Coating involves the application of coatings to both the interior and exterior of buildings or structures, the painting of parking lot or parking garage striping, associated signage and curbs, and the painting of the walls or other components such as stair railings inside parking structures.

Paving involves the laying of concrete or asphalt such as in parking lots, roads, driveways, or sidewalks.

By disproportionately altering and extending some of the individual construction phase lengths without proper justification, the model assumes there are a greater number of days to complete the construction activities required by the prolonged phases. As a result, there will be less construction

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<sup>2</sup> “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. 1, 14.

<sup>3</sup> “CalEEMod User’s Guide.” California Air Pollution Control Officers Association (CAPCOA), May 2021, available at: <https://www.aqmd.gov/caleemod/user's-guide>, p. 32.

activities required per day and, consequently, less pollutants emitted per day. Until we are able to verify the revised construction schedule, the model may underestimate the peak daily emissions associated with some phases of construction and should not be relied upon to determine Project significance.

### *Underestimated Number of Construction Worker Trips*

Review of the CalEEMod output files demonstrates that the “Bolsa Chica Senior Living Community Project” model includes a change to the default building construction worker trip number (see excerpt below) (Appendix D, pp. 3, 44, 78).

Table Name	Column Name	Default Value	New Value
tblTripsAndVMT	WorkerTripNumber	198.00	200.00

As a result of this change, the model includes the following “Trips and VMT” table (see excerpt below) (Appendix D, pp. 11, 50, 84).

#### Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	250.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	6,875.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	200.00	39.00	0.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	38.00	0.00	0.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	35.00	LD_Mix	HDT_Mix	HHDT

As previously mentioned, the CalEEMod User’s Guide requires any changes to model defaults be justified.<sup>4</sup> According to the “User Entered Comments & Non-Default Data” table, the justification provided for these changes is:

“During peak construction, approximately 200 construction workers will be anticipated. Haul distance is 35 miles” (Appendix D, pp. 1, 42, 76).

Regarding the amount of construction workers required for Project construction, the DEIR states:

“During the peak of construction approximately 200 construction workers are anticipated to be on site each day” (p. 3-26).

As demonstrated above, Project construction would require the employment of 200 daily construction workers. The employment of 200 daily construction workers would result in 400 daily worker trips to account both the trips to and from the Project site. However, as demonstrated in screenshots above, the model only accounts for a total of 200 worker trips. Therefore, the model is inconsistent with the information provided in the DEIR and associated documents.

<sup>4</sup> “CalEEMod User’s Guide.” California Air Pollution Control Officers Association (CAPCOA), May 2021, available at: <https://www.aqmd.gov/caleemod/user's-guide>, p. 1, 14.

These incorrect reductions present an issue, as CalEEMod uses the worker trip numbers to estimate the construction-related emissions associated with on-road vehicles.<sup>5</sup> By including incorrect changes to the default worker trip numbers, the models may underestimate the Project's mobile-source construction-related emissions and should not be relied upon to determine Project significance.

### Diesel Particulate Matter Emissions Inadequately Evaluated

The DEIR fails to mention or evaluate the Project's construction-related or operational toxic air contaminant ("TAC") emissions whatsoever. This is incorrect for three reasons.

First, by failing to prepare a quantified construction and operational HRA, the Project is inconsistent with CEQA's requirement to make "a reasonable effort to substantively connect a project's air quality impacts to likely health consequences."<sup>6</sup> The DEIR and associated documents fails to evaluate the TAC emissions associated with Project construction or indicate the concentrations at which such pollutants would trigger adverse health effects. Without making a reasonable effort to connect the Project's TAC emissions to the potential health risks posed to nearby receptors, the DEIR is inconsistent with CEQA's requirement to correlate Project-generated emissions with potential adverse impacts on human health.

Second, the Office of Environmental Health Hazard Assessment ("OEHHA") 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.<sup>7</sup> 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)."<sup>8</sup>

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 15-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").<sup>9</sup> While the DEIR 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-

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<sup>5</sup> "CalEEMod User's Guide." California Air Pollution Control Officers Association (CAPCOA), May 2021, *available at*: <https://www.agmd.gov/caleemod/user's-guide>, p. 34.

<sup>6</sup> "Sierra Club v. County of Fresno." Supreme Court of California, December 2018, *available at*: <https://ceqaportal.org/decisions/1907/Sierra%20Club%20v.%20County%20of%20Fresno.pdf>.

<sup>7</sup> "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at*: <https://oehha.ca.gov/media/downloads/cnr/2015guidancemanual.pdf>, p. 8-18.

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

<sup>9</sup> "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at*: <https://oehha.ca.gov/media/downloads/cnr/2015guidancemanual.pdf>, p. 2-4.

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 revised EIR should be prepared to include an analysis of health risk impacts posed to nearby sensitive receptors from Project-generated DPM emissions.

Third, by claiming a less than significant impact without conducting a quantified construction or operational HRA for nearby, existing sensitive receptors, the DEIR fails to compare the excess health risk impact to the South Coast Air Quality Management District's ("SCAQMD") specific numeric threshold of 10 in one million.<sup>10</sup> In accordance with the most relevant guidance, an assessment of the health risk posed to nearby, existing receptors from Project construction and operation should have been conducted.

### 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.<sup>11</sup> 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").<sup>12, 13</sup> 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 should be conducted prior to the approval of the Project.

We prepared a preliminary HRA of the "Bolsa Chica Senior Living Community Project" model's construction and operational health risk impact to residential sensitive receptors using the annual PM<sub>10</sub> exhaust estimates from the AQ Report's CalEEMod output files. Consistent with recommendations set forth by OEHHA, we assumed residential exposure begins during the third trimester stage of life.<sup>14</sup> The AQ Report's CalEEMod model indicates that construction activities will generate approximately 425 pounds of DPM over the 753-day construction period.<sup>15</sup> 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:

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<sup>10</sup> "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>.

<sup>11</sup> "Air Quality Dispersion Modeling - Screening Models," U.S. EPA, *available at*: <https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models>.

<sup>12</sup> "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at*: <https://oehha.ca.gov/media/downloads/cnr/2015guidancemanual.pdf>.

<sup>13</sup> "Health Risk Assessments for Proposed Land Use Projects." CAPCOA, July 2009, *available at*: [http://www.valleyair.org/transportation/CAPCOA\\_HRA\\_LU\\_Guidelines\\_8-6-09.pdf](http://www.valleyair.org/transportation/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf).

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

<sup>15</sup> See Attachment C for health risk calculations.

$$\text{Emission Rate } \left( \frac{\text{grams}}{\text{second}} \right) = \frac{424.7 \text{ lbs}}{753 \text{ days}} \times \frac{453.6 \text{ grams}}{\text{lbs}} \times \frac{1 \text{ day}}{24 \text{ hours}} \times \frac{1 \text{ hour}}{3,600 \text{ seconds}} = \mathbf{0.00296 \text{ g/s}}$$

Using this equation, we estimated a construction emission rate of 0.00296 grams per second (“g/s”). Subtracting the 753-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 27.94 years. The AQ Report’s operational CalEEMod emissions indicate that operational activities will generate approximately 66 pounds of DPM per year throughout operation. Applying the same equation used to estimate the construction DPM rate, we estimated the following emission rate for Project operation:

$$\text{Emission Rate } \left( \frac{\text{grams}}{\text{second}} \right) = \frac{66.2 \text{ lbs}}{365 \text{ days}} \times \frac{453.6 \text{ grams}}{\text{lbs}} \times \frac{1 \text{ day}}{24 \text{ hours}} \times \frac{1 \text{ hour}}{3,600 \text{ seconds}} = \mathbf{0.00095 \text{ g/s}}$$

Using this equation, we estimated an operational emission rate of 0.00095 g/s. Construction and operation were simulated as a 3.1-acre rectangular area source in AERSCREEN, with approximate dimensions of 158- by 79-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 Huntington Beach was obtained from U.S. 2021 Census data.<sup>16</sup>

The AERSCREEN model generates maximum reasonable estimates of single-hour DPM concentrations from the Project Site. The United States Environmental Protection Agency (“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.<sup>17</sup> According to the DEIR, the nearest sensitive receptors are apartments immediately west of the Project site (p. 4.2-26). However, according to the AERSCREEN output files, the Maximally Exposed Individual Receptor (“MEIR”) is located approximately 75 meters downwind of the Project site. The single-hour concentration estimated by AERSCREEN for Project construction is therefore approximately 6.864 µg/m<sup>3</sup> DPM at approximately 75 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.6864 µg/m<sup>3</sup> for Project construction at the MEIR. For Project operation, the single-hour concentration estimated by AERSCREEN is 2.208 µg/m<sup>3</sup> DPM at approximately 75 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.2208 µg/m<sup>3</sup> for Project operation at the MEIR.<sup>18</sup>

<sup>16</sup> “Huntington Beach.” U.S. Census Bureau, 2021, available at: <https://datacommons.org/place/geoid/0636000>.

<sup>17</sup> “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](http://www.epa.gov/ttn/scram/guidance/guide/EPA-454R-92-019_OCR.pdf).

<sup>18</sup> See Attachment D for AERSCREEN output files.

We calculated the excess cancer risk to the MEIR using applicable HRA methodologies prescribed by OEHHA, as recommended by SCAQMD.<sup>19</sup> Specifically, guidance from OEHHA and CARB recommends the use of a standard point estimate approach, including high-point estimate (i.e. 95<sup>th</sup> 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 utilized for the various age groups in our screening-level HRA are as follows:

Exposure Assumptions for Residential Individual Cancer Risk						
Age Group	Breathing Rate (L/kg-day) <sup>20</sup>	Age Sensitivity Factor <sup>21</sup>	Exposure Duration (years)	Fraction of Time at Home <sup>22</sup>	Exposure Frequency (days/year) <sup>23</sup>	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<sup>-1</sup>) 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:

<sup>19</sup> “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.

<sup>20</sup> “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/cnr/2015guidancemanual.pdf>.

<sup>21</sup> “Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments.” OEHHA, February 2015, *available at*: <https://oehha.ca.gov/media/downloads/cnr/2015guidancemanual.pdf>, p. 8-5 Table 8.3.

<sup>22</sup> “Risk Assessment Procedures.” SCAQMD, August 2017, *available at*: [http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1401/riskassessmentprocedures\\_2017\\_080717.pdf](http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1401/riskassessmentprocedures_2017_080717.pdf), p. 7.

<sup>23</sup> “Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments.” OEHHA, February 2015, *available at*: <https://oehha.ca.gov/media/downloads/cnr/2015guidancemanual.pdf>, p. 5-24.



$Dose_{AIR}$  = dose by inhalation (mg/kg/day), per age group  
 $C_{air}$  = concentration of contaminant in air ( $\mu\text{g}/\text{m}^3$ )  
 $EF$  = 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 ( $1 \times 10^{-6}$ ,  $\mu\text{g}$  to  $\text{mg}$ , L to  $\text{m}^3$ )

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

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

where:

$Dose_{AIR}$  = dose by inhalation (mg/kg/day), per age group  
 $CPF$  = cancer potency factor, chemical-specific ( $\text{mg}/\text{kg}/\text{day}$ )<sup>-1</sup>  
 $ASF$  = 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 753-day construction schedule, the annualized average concentration for construction was used for the entire third trimester of pregnancy (0.25 years), and the first 1.81 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 0.19 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 ( $\mu\text{g}/\text{m}^3$ )	Cancer Risk
3rd Trimester	Construction	0.25	0.6864	9.33E-06
	<i>Construction</i>	<i>1.81</i>	<i>0.6864</i>	<i>2.04E-04</i>
	<i>Operation</i>	<i>0.19</i>	<i>0.2208</i>	<i>6.78E-06</i>
Infant (0 - 2)	Total	2		2.11E-04
Child (2 - 16)	Operation	14	0.2208	7.99E-05
Adult (16 - 30)	Operation	14	0.2208	8.87E-06
<b>Lifetime</b>		<b>30</b>		<b>3.09E-04</b>



As demonstrated in the table above, the excess cancer risks for the 3<sup>rd</sup> 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 9.33, 211.0, 79.9, and 8.87 in one million, respectively. The excess cancer risk over the course of a residential lifetime (30 years) is approximately 309 in one million. The infant, child and lifetime cancer risks exceed the SCAQMD threshold of 10 in one million, resulting in a potentially significant impact not previously addressed or identified by the DEIR or associated documents.

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. As our screening-level HRA demonstrates that construction and operation of the Project could result in a potentially significant health risk impact, a revised EIR 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.

## Mitigation

### Feasible Mitigation Measures Available to Reduce Emissions

Our analysis demonstrates that the Project would result in potentially significant health risk 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”), as described below:<sup>24</sup>

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<sup>24</sup> “4.0 Mitigation Measures.” Connect SoCal Program Environmental Impact Report Addendum #1, September 2020, available at: <https://scag.ca.gov/sites/main/files/file->

## 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.
- 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) 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.

[attachments/fpeir\\_connectsocial\\_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>.

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).
y) Projects that will introduce sensitive receptors within 500 feet of freeways and other sources should consider installing high efficiency of enhanced filtration units, such as Minimum Efficiency Reporting Value (MERV) 13 or better. Installation of enhanced filtration units can be verified during occupancy inspection prior to the issuance of an occupancy permit.
z) Develop an ongoing monitoring, inspection, and maintenance program for the MERV filters.
aa) Consult the SCAG Environmental Justice Toolbox for potential measures to address impacts to low-income and/or minority communities.
<p>bb) The following criteria related to diesel emissions shall be implemented on by individual project sponsors as appropriate and feasible:</p> <ul style="list-style-type: none"> <li>- Diesel nonroad vehicles on site for more than 10 total days shall have either (1) engines that meet EPA on road emissions standards or (2) emission control technology verified by EPA or CARB to reduce PM emissions by a minimum of 85%</li> <li>- Diesel generators on site for more than 10 total days shall be equipped with emission control technology verified by EPA or CARB to reduce PM emissions by a minimum of 85%.</li> <li>- Nonroad diesel engines on site shall be Tier 2 or higher.</li> <li>- Diesel nonroad construction equipment on site for more than 10 total days shall have either (1) engines meeting EPA Tier 4 nonroad emissions standards or (2) emission control technology verified by EPA or CARB for use with nonroad engines to reduce PM emissions by a minimum of 85% for engines for 50 hp and greater and by a minimum of 20% for engines less than 50 hp.</li> <li>- Emission control technology shall be operated, maintained, and serviced as recommended by the emission control technology manufacturer.</li> <li>- Diesel vehicles, construction equipment, and generators on site shall be fueled with ultra-low sulfur diesel fuel (ULSD) or a biodiesel blend approved by the original engine manufacturer with sulfur content of 15 ppm or less.</li> <li>- The construction contractor shall maintain a list of all diesel vehicles, construction equipment, and generators to be used on site. The list shall include the following: <ul style="list-style-type: none"> <li>i. Contractor and subcontractor name and address, plus contact person responsible for the vehicles or equipment.</li> <li>ii. Equipment type, equipment manufacturer, equipment serial number, engine manufacturer, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel usage and hours of operation.</li> <li>iii. For the emission control technology installed: technology type, serial number, make, model, manufacturer, EPA/CARB verification number/level, and installation date and hour-meter reading on installation date.</li> </ul> </li> <li>- The contractor shall establish generator sites and truck-staging zones for vehicles waiting to load or unload material on site. Such zones shall be located where diesel emissions have the least impact on abutters, the general public, and especially sensitive receptors such as hospitals, schools, daycare facilities, elderly housing, and convalescent facilities.</li> <li>- The contractor shall maintain a monthly report that, for each on road diesel vehicle, nonroad construction equipment, or generator onsite, includes: <ul style="list-style-type: none"> <li>i. Hour-meter readings on arrival on-site, the first and last day of every month, and on off-site date.</li> <li>ii. Any problems with the equipment or emission controls.</li> <li>iii. Certified copies of fuel deliveries for the time period that identify: <ul style="list-style-type: none"> <li>1. Source of supply</li> <li>2. Quantity of fuel</li> <li>3. Quantity of fuel, including sulfur content (percent by weight)</li> </ul> </li> </ul> </li> </ul>

cc) Project should exceed Title-24 Building Envelope Energy Efficiency Standards (California Building Standards Code). The following measures can be used to increase energy efficiency:

- Provide pedestrian network improvements, such as interconnected street network, narrower roadways and shorter block lengths, sidewalks, accessibility to transit and transit shelters, traffic calming measures, parks and public spaces, minimize pedestrian barriers.
- Provide traffic calming measures, such as:
  - i. Marked crosswalks
  - ii. Count-down signal timers
  - iii. Curb extensions
  - iv. Speed tables
  - iv. Raised crosswalks
  - v. Raised intersections
  - vi. Median islands
  - vii. Tight corner radii
  - viii. Roundabouts or mini-circles
  - ix. On-street parking
  - x. Chicanes/chokers
- Create urban non-motorized zones
- Provide bike parking in non-residential and multi-unit residential projects
- Dedicate land for bike trails
- Limit parking supply through:
  - i. Elimination (or reduction) of minimum parking requirements
  - ii. Creation of maximum parking requirements
  - iii. Provision of shared parking
- Require residential area parking permit.
- Provide ride-sharing programs
  - i. Designate a certain percentage of parking spacing for ride sharing vehicles
  - ii. Designating adequate passenger loading and unloading and waiting areas for ride-sharing vehicles
  - iii. Providing a web site or messaging board for coordinating rides
  - iv. Permanent transportation management association membership and finding requirement.

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.

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 that the energy mix that will charge the batteries and power electrical equipment must be 100% renewable energy resources. Until the feasibility of charging the batteries with renewable energy resources only is evaluated, the Project should not be approved.

A revised EIR should be prepared to include all feasible mitigation measures, as well as include updated health risk analysis to ensure that the necessary mitigation measures are implemented to reduce emissions to below thresholds. The revised EIR 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,

A handwritten signature in blue ink, appearing to read "Matt Hagemann".

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

A handwritten signature in blue ink, appearing to read "Paul Rosenfeld".

Paul E. Rosenfeld, Ph.D.

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

Construction				Operation	
2024		Total		Emission Rate	
Annual Emissions (tons/year)	0.0941	Total DPM (lbs)	424.7090411	Annual Emissions (tons/year)	0.0331
Daily Emissions (lbs/day)	0.515616438	Total DPM (g)	192648.021	Daily Emissions (lbs/day)	0.181369863
Construction Duration (days)	275	Emission Rate (g/s)	0.002961119	Total DPM (lbs)	66.2
Total DPM (lbs)	141.7945205	Release Height (meters)	3	Emission Rate (g/s)	0.000952192
Total DPM (g)	64317.99452	Total Acreage	3.1	Release Height (meters)	3
Start Date	4/1/2024	Max Horizontal (meters)	158.40	Total Acreage	3.1
End Date	1/1/2025	Min Horizontal (meters)	79.20	Max Horizontal (meters)	158.40
Construction Days	275	Initial Vertical Dimension (meters)	1.5	Min Horizontal (meters)	79.20
2025		Setting	Urban	Initial Vertical Dimension (meters)	1.5
Annual Emissions (tons/year)	0.1296	Population	196,652	Setting	Urban
Daily Emissions (lbs/day)	0.710136986	Start Date	4/1/2024	Population	196,652
Construction Duration (days)	365	End Date	4/24/2026		
Total DPM (lbs)	259.2	Total Construction Days	753		
Total DPM (g)	117573.12	Total Years of Construction	2.06		
Start Date	1/1/2025	Total Years of Operation	27.94		
End Date	1/1/2026				
Construction Days	365				
2026					
Annual Emissions (tons/year)	0.0383				
Daily Emissions (lbs/day)	0.209863014				
Construction Duration (days)	113				
Total DPM (lbs)	23.71452055				
Total DPM (g)	10756.90652				
Start Date	1/1/2026				
End Date	4/24/2026				
Construction Days	113				

AERSCREEN 21112 / AERMOD 21112

12/11/23

14:27:04

TITLE: Bolsa Chica Senior Living Community, Construction

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 \*\*\*\*\* AREA PARAMETERS \*\*\*\*\*  
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SOURCE EMISSION RATE:	0.296E-02 g/s	0.235E-01 lb/hr
AREA EMISSION RATE:	0.236E-06 g/(s-m2)	0.187E-05 lb/(hr-m2)
AREA HEIGHT:	3.00 meters	9.84 feet
AREA SOURCE LONG SIDE:	158.40 meters	519.68 feet
AREA SOURCE SHORT SIDE:	79.20 meters	259.84 feet
INITIAL VERTICAL DIMENSION:	1.50 meters	4.92 feet
RURAL OR URBAN:	URBAN	
POPULATION:	196652	
INITIAL PROBE DISTANCE =	5000. meters	16404. feet

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 \*\*\*\*\* BUILDING DOWNWASH PARAMETERS \*\*\*\*\*  
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BUILDING DOWNWASH NOT USED FOR NON-POINT SOURCES

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 \*\*\*\*\* FLOW SECTOR ANALYSIS \*\*\*\*\*  
 25 meter receptor spacing: 1. meters - 5000. meters  
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## MAXIMUM IMPACT RECEPTOR

Zo SECTOR	SURFACE ROUGHNESS	1-HR CONC (ug/m3)	RADIAL (deg)	DIST (m)	TEMPORAL PERIOD
1*	1.000	6.864	0	75.0	WIN

\* = worst case diagonal

\*\*\*\*\* 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 ADJUSTED

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

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	5.259	2525.00	0.5901E-01



25.00	5.887	2550.00	0.5822E-01
50.00	6.384	2575.00	0.5745E-01
75.00	6.864	2600.00	0.5669E-01
100.00	5.181	2625.00	0.5595E-01
125.00	3.543	2650.00	0.5523E-01
150.00	2.761	2675.00	0.5453E-01
175.00	2.236	2700.00	0.5384E-01
200.00	1.863	2725.00	0.5316E-01
225.00	1.586	2750.00	0.5250E-01
250.00	1.373	2775.00	0.5186E-01
275.00	1.206	2800.00	0.5122E-01
300.00	1.072	2825.00	0.5060E-01
325.00	0.9607	2850.00	0.5000E-01
350.00	0.8687	2875.00	0.4940E-01
375.00	0.7915	2900.00	0.4882E-01
400.00	0.7244	2925.00	0.4825E-01
425.00	0.6670	2950.00	0.4769E-01
450.00	0.6172	2975.00	0.4714E-01
475.00	0.5736	3000.00	0.4661E-01
500.00	0.5349	3025.00	0.4608E-01
525.00	0.5006	3050.00	0.4556E-01
550.00	0.4698	3074.99	0.4506E-01
575.00	0.4422	3100.00	0.4456E-01
600.00	0.4174	3125.00	0.4407E-01
625.00	0.3949	3150.00	0.4360E-01
650.00	0.3743	3174.99	0.4313E-01
675.00	0.3554	3199.99	0.4267E-01
700.00	0.3382	3225.00	0.4221E-01
725.00	0.3224	3250.00	0.4177E-01
750.00	0.3079	3275.00	0.4133E-01
775.00	0.2944	3300.00	0.4091E-01
800.00	0.2820	3325.00	0.4049E-01
825.00	0.2705	3350.00	0.4007E-01
850.00	0.2597	3375.00	0.3967E-01
875.00	0.2497	3400.00	0.3927E-01
900.00	0.2403	3425.00	0.3888E-01
925.00	0.2315	3450.00	0.3849E-01
950.00	0.2232	3475.00	0.3811E-01
975.00	0.2154	3500.00	0.3774E-01
1000.00	0.2081	3525.00	0.3738E-01
1025.00	0.2012	3550.00	0.3702E-01
1050.00	0.1947	3575.00	0.3666E-01
1075.00	0.1885	3600.00	0.3631E-01
1100.00	0.1827	3625.00	0.3597E-01
1125.00	0.1772	3650.00	0.3564E-01
1150.00	0.1720	3675.00	0.3530E-01
1175.00	0.1670	3700.00	0.3498E-01
1200.00	0.1623	3724.99	0.3466E-01
1225.00	0.1578	3750.00	0.3434E-01
1250.00	0.1535	3775.00	0.3403E-01

1275.00	0.1494	3800.00	0.3372E-01
1300.00	0.1455	3825.00	0.3342E-01
1325.00	0.1418	3849.99	0.3313E-01
1350.00	0.1382	3875.00	0.3283E-01
1375.00	0.1348	3900.00	0.3255E-01
1400.00	0.1316	3925.00	0.3226E-01
1425.00	0.1284	3950.00	0.3198E-01
1450.00	0.1254	3975.00	0.3171E-01
1475.00	0.1233	4000.00	0.3144E-01
1500.00	0.1205	4025.00	0.3117E-01
1525.00	0.1178	4050.00	0.3091E-01
1550.00	0.1152	4075.00	0.3065E-01
1575.00	0.1127	4100.00	0.3039E-01
1600.00	0.1103	4125.00	0.3014E-01
1625.00	0.1079	4149.99	0.2989E-01
1650.00	0.1057	4175.00	0.2965E-01
1675.00	0.1035	4200.00	0.2941E-01
1700.00	0.1015	4225.00	0.2917E-01
1725.00	0.9945E-01	4250.00	0.2894E-01
1750.00	0.9751E-01	4275.00	0.2871E-01
1775.00	0.9563E-01	4300.00	0.2848E-01
1800.00	0.9382E-01	4325.00	0.2825E-01
1825.00	0.9206E-01	4350.00	0.2803E-01
1850.00	0.9036E-01	4375.00	0.2781E-01
1875.00	0.8871E-01	4400.00	0.2760E-01
1900.00	0.8712E-01	4425.00	0.2738E-01
1924.99	0.8557E-01	4450.00	0.2717E-01
1950.00	0.8407E-01	4475.00	0.2696E-01
1975.00	0.8262E-01	4500.00	0.2676E-01
2000.00	0.8121E-01	4525.00	0.2656E-01
2025.00	0.7984E-01	4550.00	0.2636E-01
2050.00	0.7850E-01	4575.00	0.2616E-01
2075.00	0.7721E-01	4600.00	0.2597E-01
2100.00	0.7596E-01	4625.00	0.2578E-01
2125.00	0.7473E-01	4650.00	0.2559E-01
2150.00	0.7355E-01	4675.00	0.2540E-01
2175.00	0.7239E-01	4700.00	0.2521E-01
2200.00	0.7127E-01	4725.00	0.2503E-01
2224.99	0.7017E-01	4750.00	0.2485E-01
2250.00	0.6911E-01	4775.00	0.2467E-01
2275.00	0.6807E-01	4800.00	0.2450E-01
2300.00	0.6706E-01	4825.00	0.2433E-01
2325.00	0.6607E-01	4850.00	0.2415E-01
2350.00	0.6511E-01	4875.00	0.2399E-01
2375.00	0.6417E-01	4900.00	0.2382E-01
2400.00	0.6326E-01	4925.00	0.2365E-01
2425.00	0.6237E-01	4950.00	0.2349E-01
2449.99	0.6150E-01	4975.00	0.2333E-01
2475.00	0.6065E-01	5000.00	0.2317E-01
2500.00	0.5982E-01		

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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](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	6.938	6.938	6.938	6.938	N/A
DISTANCE FROM SOURCE	80.00 meters				
IMPACT AT THE AMBIENT BOUNDARY	5.259	5.259	5.259	5.259	N/A
DISTANCE FROM SOURCE	1.00 meters				

TITLE: Bolsa Chica Senior Living Community, Operations

## \*\*\*\*\* AREA PARAMETERS \*\*\*\*\*

SOURCE EMISSION RATE:	0.952E-03 g/s	0.756E-02 lb/hr
AREA EMISSION RATE:	0.759E-07 g/(s-m2)	0.602E-06 lb/(hr-m2)
AREA HEIGHT:	3.00 meters	9.84 feet
AREA SOURCE LONG SIDE:	158.40 meters	519.68 feet
AREA SOURCE SHORT SIDE:	79.20 meters	259.84 feet
INITIAL VERTICAL DIMENSION:	1.50 meters	4.92 feet
RURAL OR URBAN:	URBAN	
POPULATION:	196652	
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 SECTOR	SURFACE ROUGHNESS	1-HR CONC (ug/m3)	RADIAL (deg)	DIST (m)	TEMPORAL PERIOD
1*	1.000	2.208	0	75.0	WIN

\* = worst case diagonal

\*\*\*\*\* 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 ADJUSTED

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

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	1.691	2525.00	0.1898E-01

25.00	1.893	2550.00	0.1872E-01
50.00	2.053	2575.00	0.1848E-01
75.00	2.208	2600.00	0.1823E-01
100.00	1.666	2625.00	0.1800E-01
125.00	1.139	2650.00	0.1776E-01
150.00	0.8879	2675.00	0.1754E-01
175.00	0.7191	2700.00	0.1731E-01
200.00	0.5992	2725.00	0.1710E-01
225.00	0.5102	2750.00	0.1689E-01
250.00	0.4417	2775.00	0.1668E-01
275.00	0.3880	2800.00	0.1647E-01
300.00	0.3447	2825.00	0.1627E-01
325.00	0.3090	2850.00	0.1608E-01
350.00	0.2794	2875.00	0.1589E-01
375.00	0.2546	2900.00	0.1570E-01
400.00	0.2330	2925.00	0.1552E-01
425.00	0.2145	2950.00	0.1534E-01
450.00	0.1985	2975.00	0.1516E-01
475.00	0.1845	3000.00	0.1499E-01
500.00	0.1720	3025.00	0.1482E-01
525.00	0.1610	3050.00	0.1465E-01
550.00	0.1511	3075.00	0.1449E-01
575.00	0.1422	3100.00	0.1433E-01
600.00	0.1342	3125.00	0.1417E-01
625.00	0.1270	3150.00	0.1402E-01
650.00	0.1204	3175.00	0.1387E-01
675.00	0.1143	3200.00	0.1372E-01
700.00	0.1088	3225.00	0.1358E-01
725.00	0.1037	3250.00	0.1343E-01
750.00	0.9901E-01	3275.00	0.1329E-01
775.00	0.9469E-01	3300.00	0.1316E-01
800.00	0.9070E-01	3325.00	0.1302E-01
825.00	0.8699E-01	3350.00	0.1289E-01
850.00	0.8353E-01	3375.00	0.1276E-01
875.00	0.8030E-01	3400.00	0.1263E-01
900.00	0.7728E-01	3425.00	0.1250E-01
925.00	0.7445E-01	3450.00	0.1238E-01
950.00	0.7178E-01	3475.00	0.1226E-01
975.00	0.6928E-01	3500.00	0.1214E-01
1000.00	0.6692E-01	3525.00	0.1202E-01
1025.00	0.6470E-01	3550.00	0.1190E-01
1050.00	0.6261E-01	3575.00	0.1179E-01
1075.00	0.6063E-01	3600.00	0.1168E-01
1100.00	0.5876E-01	3625.00	0.1157E-01
1125.00	0.5698E-01	3650.00	0.1146E-01
1150.00	0.5530E-01	3675.00	0.1135E-01
1175.00	0.5370E-01	3700.00	0.1125E-01
1200.00	0.5219E-01	3725.00	0.1115E-01
1225.00	0.5074E-01	3750.00	0.1104E-01
1250.00	0.4937E-01	3775.00	0.1094E-01

1275.00	0.4805E-01	3800.00	0.1085E-01
1300.00	0.4680E-01	3825.00	0.1075E-01
1325.00	0.4560E-01	3850.00	0.1065E-01
1350.00	0.4446E-01	3875.00	0.1056E-01
1375.00	0.4336E-01	3900.00	0.1047E-01
1400.00	0.4231E-01	3925.00	0.1038E-01
1425.00	0.4131E-01	3950.00	0.1029E-01
1450.00	0.4035E-01	3975.00	0.1020E-01
1475.00	0.3964E-01	4000.00	0.1011E-01
1500.00	0.3874E-01	4025.00	0.1003E-01
1525.00	0.3787E-01	4050.00	0.9941E-02
1550.00	0.3704E-01	4075.00	0.9857E-02
1575.00	0.3623E-01	4100.00	0.9775E-02
1600.00	0.3546E-01	4125.00	0.9694E-02
1625.00	0.3471E-01	4149.99	0.9614E-02
1650.00	0.3399E-01	4175.00	0.9536E-02
1675.00	0.3330E-01	4200.00	0.9458E-02
1700.00	0.3263E-01	4225.00	0.9382E-02
1725.00	0.3198E-01	4250.00	0.9306E-02
1750.00	0.3136E-01	4275.00	0.9232E-02
1775.00	0.3076E-01	4300.00	0.9159E-02
1800.00	0.3017E-01	4325.00	0.9086E-02
1825.00	0.2961E-01	4350.00	0.9015E-02
1850.00	0.2906E-01	4375.00	0.8945E-02
1875.00	0.2853E-01	4400.00	0.8875E-02
1900.00	0.2802E-01	4425.00	0.8807E-02
1924.99	0.2752E-01	4450.00	0.8739E-02
1950.00	0.2704E-01	4475.00	0.8672E-02
1975.00	0.2657E-01	4500.00	0.8606E-02
2000.00	0.2612E-01	4525.00	0.8541E-02
2025.00	0.2568E-01	4550.00	0.8477E-02
2050.00	0.2525E-01	4575.00	0.8414E-02
2075.00	0.2483E-01	4600.00	0.8351E-02
2100.00	0.2443E-01	4625.00	0.8290E-02
2125.00	0.2404E-01	4650.00	0.8229E-02
2150.00	0.2365E-01	4675.00	0.8169E-02
2175.00	0.2328E-01	4700.00	0.8109E-02
2200.00	0.2292E-01	4725.00	0.8051E-02
2225.00	0.2257E-01	4750.00	0.7993E-02
2250.00	0.2223E-01	4775.00	0.7936E-02
2275.00	0.2189E-01	4800.00	0.7879E-02
2300.00	0.2157E-01	4825.00	0.7823E-02
2325.00	0.2125E-01	4850.00	0.7768E-02
2350.00	0.2094E-01	4875.00	0.7714E-02
2375.00	0.2064E-01	4900.00	0.7660E-02
2400.00	0.2034E-01	4924.99	0.7607E-02
2425.00	0.2006E-01	4950.00	0.7554E-02
2450.00	0.1978E-01	4975.00	0.7503E-02
2475.00	0.1951E-01	5000.00	0.7451E-02
2500.00	0.1924E-01		

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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](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	2.231	2.231	2.231	2.231	N/A
DISTANCE FROM SOURCE	80.00 meters				
IMPACT AT THE AMBIENT BOUNDARY	1.691	1.691	1.691	1.691	N/A
DISTANCE FROM SOURCE	1.00 meters				





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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 – 2014, 2017;
- Senior Environmental Analyst, Komex H<sub>2</sub>O 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).

**Senior Regulatory and Litigation Support Analyst:**

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, Colorado.

**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 representatives, 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.**, Fukunaga, 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.

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**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.





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## ***Paul Rosenfeld, Ph.D.***

*Principal Environmental Chemist*

**Chemical Fate and Transport & Air Dispersion Modeling**

**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<sub>2</sub>O 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 Aermid 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). Perfluorooctanoic Acid (PFOA) and Perfluorooctane 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 23<sup>rd</sup> 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 23<sup>rd</sup> 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 23<sup>rd</sup> 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 Conference*. 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 4<sup>th</sup> 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 Cuntly 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, 112<sup>th</sup> Judicial District  
Phillip Bales et al., Plaintiff vs. Dow Agrosiences, LLC, et al., Defendants  
Cause No. 1923  
Rosenfeld Deposition 11-17-2017

In The Superior Court of the State of California In And For The County Of Contra Costa  
Simons et al., Plaintiffs vs. Chevron Corporation, et al., Defendants  
Cause No. C12-01481  
Rosenfeld Deposition 11-20-2017

In The Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois  
Martha Custer et al., Plaintiff vs. Cerro Flow Products, Inc., Defendants  
Case No.: No. 0i9-L-2295  
Rosenfeld Deposition 8-23-2017

In United States District Court For The Southern District of Mississippi  
Guy Manuel vs. The BP Exploration et al., Defendants  
Case No. 1:19-cv-00315-RHW  
Rosenfeld Deposition 4-22-2020

In The Superior Court of the State of California, For The County of Los Angeles  
Warrn Gilbert and Penny Gilbert, Plaintiff vs. BMW of North America LLC  
Case No. LC102019 (c/w BC582154)  
Rosenfeld Deposition 8-16-2017, Trail 8-28-2018

In the Northern District Court of Mississippi, Greenville Division  
Brenda J. Cooper, et al., Plaintiffs, vs. Meritor Inc., et al., Defendants  
Case No. 4:16-cv-52-DMB-JVM  
Rosenfeld Deposition July 2017

In The Superior Court of the State of Washington, County of Snohomish  
Michael Davis and Julie Davis et al., Plaintiff vs. Cedar Grove Composting Inc., Defendants  
Case No. 13-2-03987-5  
Rosenfeld Deposition, February 2017  
Trial March 2017

In The Superior Court of the State of California, County of Alameda  
Charles Spain., Plaintiff vs. Thermo Fisher Scientific, et al., Defendants  
Case No. RG14711115  
Rosenfeld Deposition September 2015

In The Iowa District Court In And For Poweshiek County  
Russell D. Winburn, et al., Plaintiffs vs. Doug Hoksbergen, et al., Defendants  
Case No. LALA002187  
Rosenfeld Deposition August 2015

In The Circuit Court of Ohio County, West Virginia  
Robert Andrews, et al. v. Antero, et al.  
Civil Action No. 14-C-30000  
Rosenfeld Deposition June 2015

In The Iowa District Court for Muscatine County  
Laurie Freeman et. al. Plaintiffs vs. Grain Processing Corporation, Defendant  
Case No. 4980  
Rosenfeld Deposition May 2015

In the Circuit Court of the 17<sup>th</sup> Judicial Circuit, in and For Broward County, Florida  
Walter Hinton, et. al. Plaintiff, vs. City of Fort Lauderdale, Florida, a Municipality, Defendant.  
Case No. CACE07030358 (26)  
Rosenfeld Deposition December 2014

In the County Court of Dallas County Texas  
Lisa Parr et al, Plaintiff, vs. Aruba et al, Defendant.  
Case No. cc-11-01650-E  
Rosenfeld Deposition: March and September 2013  
Rosenfeld Trial April 2014

In the Court of Common Pleas of Tuscarawas County Ohio  
John Michael Abicht, et al., Plaintiffs, vs. Republic Services, Inc., et al., Defendants  
Case No. 2008 CT 10 0741 (Cons. w/ 2009 CV 10 0987)  
Rosenfeld Deposition October 2012

In the United States District Court for the Middle District of Alabama, Northern Division  
James K. Benefield, et al., Plaintiffs, vs. International Paper Company, Defendant.  
Civil Action No. 2:09-cv-232-WHA-TFM  
Rosenfeld Deposition July 2010, June 2011

In the Circuit Court of Jefferson County Alabama  
Jaeanette Moss Anthony, et al., Plaintiffs, vs. Drummond Company Inc., et al., Defendants  
Civil Action No. CV 2008-2076  
Rosenfeld Deposition September 2010

In the United States District Court, Western District Lafayette Division  
Ackle et al., Plaintiffs, vs. Citgo Petroleum Corporation, et al., Defendants.  
Case No. 2:07CV1052  
Rosenfeld Deposition July 2009