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Via Email

June 6, 2022

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Councilmember Bob Blumenfield
Councilmember John S. Lee
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Re: Comment on Sustainable Communities Environmental Assessment, 5001 Wilshire Project (ENV-2021-3327-SCEA)
Planning and Land Use Management Committee Hearing; June 7, 2022; Agenda Item 9

Dear Chair Harris-Dawson and Honorable Members of the Planning and Land Use Management Committee:

I am writing on behalf of Supporters Alliance for Environmental Responsibility ("SAFER"), regarding the Sustainable Communities Environmental Assessment ("SCEA") prepared for the Project known as 5001 Wilshire (ENV-2021-3327-SCEA; DIR-2021-3324-CLQ, DIR-2021-3326-TOC-SPR-VHCA; VTT-83358-CN), including all actions referring or related to the construction of an 8-story, mixed-use building with 242 units and 10,900 sf of ground floor commercial uses and four levels of parking located at 5001 Wilshire Blvd. in the City of Los Angeles ("Project").

After reviewing the SCEA, SAFER requests that the Planning and Land Use Management Committee refrain from taking any action on the Project and SCEA at this time because (1) the SCEA fails to incorporate all feasible mitigation measures from a prior environmental impact report, and (2) the SCEA's conclusions about the

Project's impacts to air quality, hazards, and hazardous materials are not supported by substantial evidence.

SAFER previously submitted comments on the SCEA on May 13, 2022, attached here as Exhibit A. SAFER incorporates those comments herein by reference. Thank you for considering these comments.

Sincerely,

Amalia Bowley Fuentes
LOZEAU DRURY LLP

EXHIBIT A

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Via Email

May 13, 2022

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Re: Comment on Sustainable Communities Environmental Assessment, 5001 Wilshire Project

Dear Mr. Woon:

I am writing on behalf of Supporters Alliance for Environmental Responsibility ("SAFER"), regarding the Sustainable Communities Environmental Assessment ("SCEA") prepared for the Project known as 5001 Wilshire (DIR-2021-3326-TOC-SPR-VHCA), including all actions referring or related to the construction of an 8-story, mixed-use building with 242 units and 10,900 sf of ground floor commercial uses and four levels of parking located at 5001 Wilshire Blvd. in the City of Los Angeles ("Project").

After reviewing the SCEA, SAFER requests that the City of Los Angeles (City) refrain from taking any action on the Project and SCEA at this time because (1) the SCEA fails to incorporate all feasible mitigation measures from a prior environmental impact report, and (2) the SCEA's conclusions about the Project's impacts to air quality, hazards, and hazardous materials are not supported by substantial evidence. These comments are supported by the expert comments of consulting firm Baseline Environmental Consulting ("Baseline"), Certified Industrial Hygienist, Francis "Bud" Offermann, PE, CIH, and air quality experts Matt Hagemann, P.G., C.Hg., and Paul E. Rosenfeld, Ph.D., of the Soil/Water/Air Protection Enterprise ("SWAPE"). Baseline's, Mr. Offermann's and SWAPE's comments are attached as Exhibit A, B, and C, respectively, and incorporated herein by reference.

I. PROJECT DESCRIPTION

The proposed project involves demolition of an existing two-story commercial building and surface parking lots to develop an eight-story mixed use building with 242 residential units (10% affordable) and 10,900 sf of commercial space. Additionally, a portion of the site will be redeveloped into a 5,600 square foot green belt for publicly-accessible open space. The project includes up to 324 residential parking spaces in three underground parking levels and 30 commercial parking spaces on the ground level. The project site is in a primarily residential and commercial area.

II. LEGAL BACKGROUND

A. Sustainable Communities Environmental Assessment under SB 375.

CEQA allows for the streamlining of environmental review for "transit priority projects" meeting certain criteria. Pub. Res. Code §§ 21155, 21155.1, 21155.2. To qualify as a transit priority project, a project must

> (1) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 percent and 50 percent nonresidential uses, a floor area ratio of not less than 0.75;
> (2) provide a minimum net density of at least 20 dwelling units per acre; and
> (3) be within one-half mile of a major transit stop or high-quality transit corridor included in a regional transportation plan.

Pub. Res. Code § 21155(b). A transit priority project is eligible for CEQA's streamlining provisions where,

> [The transit priority project] is consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy, for which the State Air Resources Board . . . has accepted a metropolitan planning organization's determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emission reduction targets.

Pub. Res. Code § 21155(a). In 2020, SCAG's Regional Council formally adopted the Connect SoCal 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy ("2020 RTP/SCS"), which was accepted by CARB on October 30, 2020.

If "all feasible mitigation measures, performance standards, or criteria set forth in the prior applicable environmental impact reports and adopted in findings made pursuant to Section 21081" are applied to a transit priority project, the project is eligible to conduct environmental review using a sustainable communities environmental assessment ("SCEA"). Pub. Res. Code § 21155.2. A SCEA must contain an initial study which "identif[ies] all significant or potentially significant impacts of the transit priority project . . . based on substantial evidence in light of the whole record." Pub. Res. Code § 21155.2(b)(1). The initial study must also "identify any cumulative effects that have been adequately addressed and mitigated pursuant to the requirements of this division in prior applicable certified environmental impact reports." *Id*. The SCEA must then "contain measures that either avoid or mitigate to a level of insignificance all potentially significant or significant effects of the project required to be identified in the initial study." Pub. Res. Code §21155(b)(2). The SCEA is not required to discuss growth inducing impacts or any project specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network. Pub. Res. Code § 21159.28(a).

After circulating the SCEA for public review and considering all comments, a lead agency may approve the SCEA with findings that all potentially significant impacts have been identified and mitigated to a less-than-significant level. Pub. Res. Code § 21155(b)(3), (b)(4), (b)(5). A lead agency's approval of a SCEA must be supported by substantial evidence. Pub. Res. Code §21155(b)(7).

III. DISCUSSION

A. The SCEA is not adequate under CEQA because it fails to require all feasible mitigation measures from the 2020 RTP/SCS.

CEQA is clear that a SCEA is only appropriate where "all feasible mitigation measures, performance standards, or criteria set forth in the prior applicable environmental impact reports and adopted in findings made pursuant to Section 21081" are applied to the Project. Pub. Res. Code § 21155.2. In 2020, SCAG Connect SoCal prepared a 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy Program Environmental Impact Report ("2020 RTP/SCS PEIR"), which included an MMRP. The MMRP included regional mitigation measures to be implemented by SCAG and project-level mitigation measures to be applied by lead agencies to specific projects (such as the Project here).

Despite CEQA's clear directive that *all* feasible mitigation measures from prior EIRs must be applied to a project to qualify for a SCEA, numerous feasible mitigation measures from the 2020 RTP/SCS PEIR are not being applied to the Project. Specifically, Appendix A of the SCEA notes that due to its conclusion that air quality impacts would be less-than-significant, none of the RTP/SCS mitigation measures will be applied. SCEA, Appendix A, p. A-5. The SCEA also fails to implement 2020 RTP/SCS PEIR mitigation measures for Hazards and Hazardous Materials. SCEA, Appendix A, p. A-25 – A-30.

As one example regarding air quality, the 2020 RTP/SCS PEIR required that projects "use Tier 4 Final equipment or better for all engines above 50 horsepower (hp). In the event that construction equipment cannot meet to Tier 4 Final engine certification, the Project representative or contractor must demonstrate through future study with written findings supported by substantial evidence that is approved by SCAG before using other technologies/strategies." 2020 RTP/SCS PEIR, MM-AQ-1. However, the SCEA makes no mention of requiring Tier 4 equipment to mitigate the Project's air quality impacts. Instead, the SCEA claims that the Project will comply with existing regulations that have been identified and are required by the Southern California Air Quality Management District (SCAQMD). Rather than apply all feasible mitigation measures as required by CEQA, the SCEA claims that compliance with SCAQMD regulations will ensure compliance with the PEIRs' mitigation measures. SCEA, Appendix A, p. A-5.

The SCEA fundamentally misconstrues the requirements for a SCEA by not requiring *all* feasible mitigation measures from the PEIR. For air quality, the SCEA concludes that compliance with SCAQMD regulations "would satisfy the applicable requirements" of the mitigation required by the 2020 RTP/SCS PEIR. SCEA, Appendix A, p. A-5. However, such a conclusion does not explain why feasible mitigation from the prior PEIRs was not included. If a measure from the PEIRs is feasible for this Project, it must be applied in order for the Project to qualify for a SCEA. Because the SCEA here fails to apply all feasible mitigation from the PEIRs, the SCEA is improper and the City must instead prepare a negative declaration or environmental impact report ("EIR").

B. The SCEA inadequately addresses the Project's hazards and hazardous materials impacts.

Expert consulting firm Baseline Environmental Consulting (Baseline) reviewed the SCEA's Hazards and Hazardous Materials Section and associated technical studies and found various flaws in the Section's analysis, conclusions, and mitigation. Baseline's comment letter is attached as Exhibit A.

a. <u>The SCEA's analysis of subsurface contamination at the Project site is incomplete.</u>

The SCEA's Hazards and Hazardous Materials Section states that there was a historic gasoline station on the site, as well as a historic dry cleaner. Ex. A, p. 2; SCEA, p. IV-84. Additionally, Appendix A of the Phase II ESA contains maps showing that there was a greasing facility with lockers and oil storage on the Project site, indicating to Baseline that automotive maintenance was previously performed onsite. *Id.* However, the Phase II ESA fails to identify past automotive maintenance onsite as a potential source of subsurface contamination, and only included one boring where the former greasing facility building stood. *Id.* Baseline notes that there are numerous other factors which require investigation, including contaminant sources, PCB contamination, naphthalene contamination and chlorinated solvent contamination. *Id.* at 2-3. Additionally, Baseline states that the Phase II ESA's subsurface investigation is incomplete due to its failure to evaluate potential VOCs in groundwater and soil vapor. *Id.* at 3. The City must prepare an updated SCEA which adequately identifies subsurface contamination at the Project site and mitigates impacts to the public and the environment. Pub. Res. Code §21155(b)(1)-(2).

b. The SCEA failed to analyze the potential methane impacts of the Project site.

On page IV-84, the SCEA states that the area is a potential methane zone due to its proximity to the La Brea Tar Pits. Ex. A, p. 4. However, the Hazards and Hazardous Materials section does not discuss or analyze potential impacts associated with the potential presence of subsurface methane. *Id.* Baseline states that impacts could include "the risks of explosions during construction or operation of the proposed project if elevated methane is present in the subsurface of the project site and appropriate design and construction precautions are not incorporated into the proposed project." *Id.* The City must revise the SCEA to identify these impacts and mitigate them to a level of insignificance. Pub. Res. Code §21155(b)(1)-(2).

c. The SCEA's conclusions regarding the potential for hazardous materials releases onsite is unsubstantiated.

The SCEA states that a review of the California Department of Toxic Substances Control's (DTSC) EnviroStor database indicated that there are no open cases on the Project site. Ex. A, p. 5; SCEA, p. IV-84. The SCEA therefore concludes that "there is no significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions, which could release hazardous materials." *Id.* Baseline states that a suggestion that the Project would not result in the release of hazardous materials simply because it was not listed on EnviroStor or identified to have USTs is an unsubstantiated conclusion. Ex. A, p. 5. Contaminated properties are only listed on EnviroStor if brought to the attention of DTSC, therefore a site could still have significant subsurface contamination without being listed on the site. *Id.* Additionally, USTs are not the only sources of hazardous materials contamination. *Id.* As a result, the SCEA is not supported by substantial evidence and fails to identify or mitigate potential impacts from disturbing hazardous materials.

d. The SCEA failed to fully disclose and mitigate the subsurface contamination present on the Project site.

Lastly, the SCEA fails to fully disclose contamination onsite, and fails to implement the necessary mitigation based on the potential impacts identified in the Phase II ESA. Ex. A, p. 5-6. Although the Phase II ESA prepared for the Project identifies hazardous materials contamination at the Project site, the SCEA fails to analyze potential impacts associated with excavation and disturbance of contaminated soil and redevelopment of the contaminated property. *Id*. at 5. Further, the Phase II ESA identifies numerous contaminants in the soil, but only recommends measures that would address some of those detected contaminants. *Id.* at 6; SCEA, Appendix F. The Phase II ESA recommendations “failed to address the elevated concentration of PCE [] detected in Boring B-5,” and the SCEA “failed to indicate that specific management of contaminated soil should be performed during construction of the proposed project as recommended by the Phase II ESA.” Ex. A, p. 6. Without this mitigation, construction of the Project has the potential to release hazardous materials, endangering people and the environment. The SCEA must be revised to analyze and mitigate potential contamination impacts of the Project, as well as subsurface features of environmental concern.

C. The SCEA’s conclusions regarding the Project’s air quality impacts are not supported by substantial evidence.

Indoor air quality expert Francis “Bud” Offermann, PE, CIH, and air quality experts Matt Hagemann, P.G., C.Hg., and Paul E. Rosenfeld, Ph.D., of the Soil/Water/Air Protection Enterprise (“SWAPE”) reviewed the SCEA and found that the SCEA’s conclusions as to the Project’s air quality impacts were not supported by substantial evidence. Mr. Offermann found that the SCEA failed to address and mitigate the human health impacts from indoor emissions of formaldehyde. Mr. Offermann’s comment and CV are attached as Exhibit B. SWAPE found that the SCEA failed to properly model the Project’s emissions and failed to properly evaluate the Project’s heath risk impacts from emissions of diesel particulate matter. SWAPE’s comment and CVs are attached as Exhibit C.

a. The SCEA fails to discuss or mitigate the Project’s significant indoor air quality impacts.

The SCEA 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, conducted a review of the Project, the SCEA, and relevant documents regarding the Project’s indoor air emissions. 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 Project’s residential component and employees in the Project’s commercial components. 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 the SCEA prior to approval.

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

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

Mr. Offermann concludes that mitigation measures should be imposed to reduce the risk of formaldehyde exposure. *Id*. at 5-6. Mr. Offermann identifies mitigation measures that are available to reduce these significant health risks, including the installation of air filters and a requirement that the applicant use only composite wood materials (e.g. hardwood plywood, medium density fiberboard, particleboard) for all interior finish systems that are made with CARB approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins in the buildings' interiors. *Id*. at 9-13. Since the SCEA does not analyze this impact at all, none of these or other mitigation measures have been considered.

The City has a duty to investigate issues relating to a project's potential environmental impacts, especially those issues raised by an expert's comments. *See Cty. Sanitation Dist. No. 2 v. Cty. of Kern*, (2005) 127 Cal.App.4th 1544, 1597–98 ("under CEQA, the lead agency bears a burden to investigate potential environmental impacts").

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

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 and employees to cancer risks potentially in excess of SCAQMD'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 or the residences. As a result, the City must include an analysis and discussion in an updated SCEA which discloses and analyzes the health risks that the Project's formaldehyde emissions may have on future residents and employees and identifies appropriate mitigation measures.

b. The SCEA cannot be relied upon to determine the significance of the Project's air quality impacts because the SCEA's model underestimated Project emissions.

SWAPE found that the SCEA incorrectly estimated the Project's construction and operational emissions and therefore cannot be relied upon to determine the significance of the Project's impacts on local and regional air quality. Ex. C, p. 1-2. The SCEA relies on emissions calculated from the California Emissions Estimator Version CalEEMod 2016.3.2 ("CalEEMod"). SCEA, p. IV-13. This model, which is used to generate a project's construction and operational emissions, relies on recommended default values based on site specific information related to a number of factors. Ex. C, p. 1-2. CEQA requires any changes to the default values to be justified by substantial evidence. *Id*.

SWAPE reviewed the SCEA's CalEEMod output files and found that the values input into the model were inconsistent with information provided in the SCEA. *Id.* at 2. As a result, the SCEA's air quality analysis cannot be relied upon to determine the Project's emissions.

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

1. Underestimated Land Use Size. Ex. C, p. 2.
2. Unsubstantiated Reduction to Architectural Coating Area. Ex. C, p. 3.
3. Unsubstantiated Changes to Individual Construction Phase Lengths. Ex. C, p. 3-5.
4. Incorrect Application of Construction-Related Mitigation Measures. Ex. C, p. 5-7.

Based on the issues listed above, the SCEA's analysis of air quality cannot be relied upon to determine the significance of impacts. In order to more accurately estimate the Project's construction-related and operational emissions, SWAPE prepared an updated CalEEMod model with Project-specific information from the SCEA. Ex. C, p. 8. This updated modeling demonstrates that the Project's construction-related NOx emissions would exceed the SCAQMD threshold of 100 pounds per day. *Id.* This indicates a potentially significant impact which was not addressed in the SCEA.

D. The SCEA inadequately analyzed the Project's impact on human health from emissions of diesel particulate matter.

One of the primary emissions of concern regarding health effects for land development projects is DPM, which can be released during Project construction and operation. DPM consists of fine particles with a diameter less than 2.5 micrometers including a subgroup of ultrafine particles (with a diameter less than 0.1 micrometers). Diesel exhaust also contains a variety of harmful gases and cancer-causing substances. Exposure to DPM is a recognized health hazard, particularly to children whose lungs are still developing and the elderly who may have other serious health problems. According to the California Air Resources Board ("CARB"), DPM exposure may lead to the following adverse health effects: aggravated asthma; chronic bronchitis; increased respiratory and cardiovascular hospitalizations; decreased lung function in children; lung cancer; and premature deaths for those with heart or lung disease.[1]

The SCEA concluded that the Project would have less-than-significant construction-related and operational health risk impacts, but did not prepare a Health Risk Assessment ("HRA"). The SCEA states that its less-than-significant impact conclusion is based on its short-term construction schedule, small Project acreage, and compliance with applicable regulations. SCEA, p. IV-40. Further, the SCEA states that the Project's operational health risk impact would be less-than-significant as compared to existing conditions on the Project site because the limited amount of truck trips and the absence of stationary generators are not expected to generate substantial toxic air contaminant ("TAC") emissions. SWAPE identifies four main reasons for why the SCEA's evaluation of health risk impacts and less-than-significant conclusion is incorrect.

First, the SCEA inaccurately describes the baseline conditions at the Project site. According to CEQA Guidelines § 15125, CEQA environmental documents must describe physical environmental conditions of a Project site "as they exist at the time the notice of preparation is published." The SCEA states that the Project site includes a dry-cleaning facility that uses solvents that can cause TAC emissions. Ex. C, p. 9. However, elsewhere in the SCEA, it states that although a dry cleaner historically operated on the site from 1990 through 2015, it is no longer present on the site. Ex. C, p. 10; SCEA, p.

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[1] *See* CARB Resources - Overview: Diesel Exhaust & Health, available at https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health.).

IV-84. Because the Notice of Availability for the adoption of the SCEA was issued in April 2022, the Project's baseline cannot include the dry-cleaning facility.

Second, because the City did not prepare a quantified construction and operational HRA, it failed to correlate increased emissions from the Project to adverse impacts on human health caused by those emissions. Ex. C, p. 10. SWAPE finds that this is incorrect because the Project would cause emissions through the exhaust stacks of its construction equipment over the course of 32 months and will generate 1,318 daily vehicle trips, which will cause further emissions. *Id.*; SCEA, p. II-15, IV-137. In failing to connect TAC emissions to potential health risks to nearby receptors, the Project fails to meet CEQA requirements. *See Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 510.

Third, the California Department of Justice recommends the preparation of a quantitative HRA pursuant to the Office of Environmental Health Hazard Assessment ("OEHHA"), the organization responsible for providing guidance on conducting HRAs in California, as well as local air district guidelines. OEHHA released its most recent guidance document in 2015 describing which types of projects warrant preparation of an HRA. *See* "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at*: https://oehha.ca.gov/media/downloads/crnr/2015guidance manual.pdf. The OEHHA document recommends that all short-term projects lasting at least 2 months assess cancer risks. Ex. C, p. 10. Additionally, if a project is expected to last over 6 months, the exposure should be evaluated throughout the project using a 30-year exposure duration to estimate individual cancer risks. *Id.* at 11. Based on its extensive experience, SWAPE reasonably assumes that the Project will last at least 30 years, and therefore recommends that health risk impacts from the project be evaluated. *Id.* The SCEA must be revised to include an analysis of health risks resulting from operation of the Project.

Lastly, in failing to prepare a construction or operational HRA, the SCEA also fails to compare excess health risk impacts to SCAQMD's threshold of 10 in one million. *Id.* at 11. SWAPE states that "an assessment of the health risk posed to nearby, existing receptors from Project construction and operation should be conducted." *Id.*

SWAPE prepared a screening-level HRA to evaluate potential impacts from Project construction using AERSCREEN, a screening-level air quality dispersion model. Ex. C, p. 11-16. SWAPE applied a sensitive receptor distance of 50 meters and analyzed impacts to individuals at different stages of life based on OEHHA and SCAQMD guidance utilizing age sensitivity factors. *Id*.

SWAPE found that the excess cancer risks at a sensitive receptor located approximately 50 meters away over the course of Project construction and operation are approximately 155 in one million for infants and 103 in one million for children. *Id*. at 15. Moreover, **the excess residential lifetime cancer risk is approximately 275 in**

one million. *Id*. The risks to infants, children, and lifetime residents exceed SCAQMD's threshold of 10 in one million. Because a SCEA is only appropriate where all impacts have been mitigated to a level of insignificance, the City must prepare a revised SCEA to mitigate this impact or otherwise prepare an EIR.

IV. CONCLUSION

For the foregoing reasons, the SCEA for the Project should be revised or an EIR prepared prior to any further action on the Project by the City. Thank you for considering these comments.

Sincerely,

Amalia Bowley Fuentes

Amalia Bowley Fuentes
LOZEAU DRURY LLP

EXHIBIT A

13 May 2022
22214-00.02793

Amalia Bowley Fuentes
Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94612

Subject: **Peer Review of the Hazardous Materials Analysis in the Sustainable Communities Environmental Assessment for the 5001 Wilshire Project**

Dear Ms. Bowley Fuentes:

Baseline Environmental Consulting (Baseline) has reviewed the Hazards and Hazardous Materials Section and associated technical studies of the Sustainable Communities Environmental Assessment (SCEA) for the 5001 Wilshire Project (proposed project) located at 5001 Wilshire Boulevard; 671 – 677 South Highland Avenue; and 668 South Citrus Avenue in Los Angeles, California (project site). It is our understanding that the proposed project would include the demolition of the existing two-story commercial building and surface parking lots on the project site to develop an eight-story mixed-use building.

Based on our review of the SCEA for the proposed project, we have identified flaws in the Hazards and Hazardous Materials Section including an incomplete analysis of subsurface contamination, unsubstantiated conclusions regarding hazardous materials conditions, and inadequate disclosure and mitigation of known subsurface contamination that could be disturbed by the proposed project. The specific issues are described in detail below.

Incomplete Analysis of Subsurface Contamination at the Project Site

The Hazards and Hazardous Materials Section of the SCEA indicates on page IV-82 that the section is in part based on the following reports, which are included as Appendix F of the SCEA:

- Limited Phase I and II Environmental Site Assessment Report, 5001 Wilshire Boulevard, Los Angeles, CA 90036, conducted by Waterstone Environmental, Inc., dated October 8, 2020 (referred to as the Phase II ESA below).

- Phase I Environmental Assessment Report, 0.164 Acre Parking Lot Located at 5055 Wilshire Boulevard, Los Angeles, CA 90036, conducted by Waterstone Environmental, Inc., dated July 2, 2019.

The Hazards and Hazardous Materials Section of the SCEA states the following on page IV-84:

> *The Limited Phase I Environmental Site Assessment determined that there was a historic gasoline station that operated at the site from approximately the 1940's through the 1960's and the dispensers were located along the southwestern portion of the property parallel to Wilshire Boulevard. It was also determined from the City Directories that a historic dry cleaner operated on the site from approximately 1990 through at least 2015, but is no longer present.*

Appendix A of the Phase II ESA includes Sanborn Maps dated 1950 and 1969 which depict that the building that was previously located on the project site was occupied by a greasing facility with lockers and oil storage, which indicates that automotive maintenance was previously performed at the project site. Automotive maintenance activities may have involved the use of hydraulic lifts, cleaning solvents, and various petroleum products. It is common for older automotive maintenance facilities to have waste oil underground storage tanks (USTs), oil/water separators, and floor drains/sumps which are common sources of subsurface contamination. Hydraulic oil in old hydraulic lifts may also have contained polychlorinated biphenyls (PCBs), which are highly toxic and were a common constituent in hydraulic oil prior to the U.S. Environmental Protection Agency banning the manufacture and use of PCBs in 1979. Cleaning solvents used in automotive maintenance facilities commonly include chlorinated volatile organic compounds (VOCs) such as tetrachloroethylene (PCE) and trichloroethylene (TCE), which are also highly toxic compounds. These VOCs were also commonly used as dry-cleaning solvents.

The Phase II ESA did not identify past automotive maintenance activities on the project site as a source of potential subsurface contamination, and it included only one boring (B-2) in the area of the former greasing facility building. Further investigation into known and potential subsurface contamination associated with former uses of the project site (e.g., the greasing facility, dry cleaner, and gas station) is warranted, as described below.

> **Contaminant Sources.** Potential subsurface features of environmental concern (e.g., a potential waste oil UST and/or potential oil/water separator) could have been located on the north side of the former greasing facility in the area that is now located beneath the existing structure on the project site, which is an area that was not evaluated during the Phase II ESA. These features, if present, could be sources of undocumented subsurface contamination.

> **PCB Contamination.** Sampling for potential PCBs was not performed as part of the Phase II ESA, but is warranted based on the past use of the site for automotive maintenance which may have included hydraulic lifts.

Naphthalene Contamination. As indicated in Table 1 and Figure 2 of the Phase II ESA (Appendix F of the SCEA), elevated concentrations of naphthalene (a highly toxic VOC) were identified in soil in the southwestern portion of the project site (in Boring B-7), with detected concentrations between depths of 5 and 15 feet that ranged from one to two orders of magnitude above the regulatory health-risk screening criteria used for comparison. The potential source and extent of naphthalene contamination was not identified in the Phase II ESA. If specific soil management methods are not performed during construction of the proposed project, vapor emissions of naphthalene from excavation of contaminated soil could potentially pose a significant health risk to construction workers on the project site and the surrounding public. Naphthalene also has a very strong odor (that of mothballs) which can be detected and cause nuisance odor complaints even at low concentrations. Vapor intrusion of naphthalene from the subsurface into indoor air could also potentially pose a significant health risk to future residents on the project site.

Chlorinated Solvent Contamination. As indicated in Table 1 and Figure 2 of the Phase II ESA (Appendix F of the SCEA), concentrations of the chlorinated solvents PCE and TCE were detected in soil samples collected from borings on the south and north sides of the existing building (Borings B-2 and B-5, respectively); however, the potential source of the PCE and TCE contamination was not identified in the Phase II ESA, and it is possible that there is more significant contamination from PCE, TCE, and other contaminants in the area beneath the existing building (e.g., in the area beneath the former dry cleaner, which is a possible source of the PCE and TCE contamination), or in other areas of the project site (e.g., along sewer lines). As indicated in Table 1 and Figure 2 of the Phase II ESA (Appendix F of the SCEA), the detected concentrations of PCE and TCE increased with depth from 15 to 20 feet in Boring B-5. This suggests that a significant release of PCE/TCE may have occurred at the project site and higher concentrations of contaminants could be present in deeper soil and groundwater. If specific soil management methods are not performed during construction of the proposed project, vapor emissions of PCE, TCE, and their breakdown products (e.g., highly toxic vinyl chloride) from excavation of contaminated soil could potentially pose a significant health risk to construction workers on the project site and the surrounding public. Vapor intrusion of PCE, TCE, and their breakdown products from the subsurface into indoor air could also pose a potentially-significant health risk to future residents on the project site.

Incomplete Subsurface Investigation. The Phase II ESA included the sampling and analysis of VOCs in soil, but it did not evaluate potential VOCs in groundwater or soil vapor. This approach is inadequate to evaluate contamination at a property where VOCs are known or suspected to be present in the subsurface, because the contamination source area (i.e., the hazardous materials release point where the highest concentrations of contaminants could be present) can be relatively small and difficult to locate using only soil borings, particularly when the borings are not advanced within a known location of concern. Contamination from VOCs in groundwater and soil vapor are typically more widespread in the subsurface than soil contamination. Given the past land uses of the project site and because VOCs contamination has been identified in soil, further investigation of the project site is necessary to:

1) Identify the potential source areas, magnitude, and extent of contamination; and

2) Ensure that appropriate measures are implemented during construction of the project to protect construction workers, the surrounding public, the environment, and future site occupants from hazardous materials that are present and could be released from the subsurface of the project site.

Additional investigation of the project site should include sampling of groundwater and soil vapor (in addition to soil) and should include investigation of the area beneath the existing building, particularly in the areas of the former dry cleaner and sewer lines. Based on the results of additional subsurface investigation, the project may need to incorporate design and/or mitigation measures to ensure that implementation of the proposed project would not exacerbate, spread, or release the existing subsurface contamination and create a significant health risk to people and the environment.

Inadequate Analysis of Potential Methane Impacts

The Hazards and Hazardous Materials Section of the SCEA indicates on page IV-84 that according to the Phase II ESA "The area is also identified as being in a potential methane zone as a result of its close proximity to nearby oilfields and the La Brea Tar Pits which is a known area of methane concern from these petroleum sources." The Hazards and Hazardous Materials Section of the SCEA does not discuss or analyze potential impacts associated with the potential presence of subsurface methane. Such impacts could include the risks of explosions during construction or operation of the proposed project if elevated methane is present in the subsurface of the project site and appropriate design and construction precautions are not incorporated into the proposed project. Methane gas can accumulate within boreholes, excavations, utilities, vaults, basements/crawl spaces, and other poorly ventilated areas that overlie or are in direct contact with the ground in areas with elevated subsurface methane. Installation of methane vapor barriers, sensors, and ventilation systems and specific electrical installation methods can be required in areas with elevated subsurface methane. The SCEA should be revised to discuss and analyze potential impacts associated with the potential presence of subsurface methane.

Unsubstantiated Conclusions

The Hazards and Hazardous Materials Section of the SCEA states the following on page IV-84:

> *A search using the California Department of Toxic Substances Control's [DTSC's] Envirostor indicated that there are no open cases within the Project Site. The Environmental Site Assessment Reports conducted by Waterstone Environmental, Inc. did not indicate that there are any underground storage tanks on the Project Site. Furthermore, the project does not involve hazardous materials. Therefore, there is no significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions, which could release hazardous materials.*

Suggesting that the proposed project would not result in the release hazardous materials because the project site was not listed on EnviroStor or identified to have USTs is an unsubstantiated conclusion. A property may have significant subsurface contamination from hazardous materials without being listed on EnviroStor or having USTs, as a contaminated property would not be listed on EnviroStor unless it is brought to the attention of DTSC, and USTs are not the only source of hazardous materials contamination. As discussed above, hazardous materials contamination has been identified in the subsurface of the project site, and the extent and magnitude of contamination have not been defined. The proposed project could result in hazardous materials being accidentally released from the subsurface of the project site into the environment in various manners, including: vapors and dust released from excavation/grading which can present health risks for construction workers and the surrounding public; stormwater runoff from contaminated soil which can impact water quality and the environment; re-use or disposal of contaminated soil at an inappropriate location which could expose the environment or public to hazardous materials; and vapor intrusion to indoor air which could present health risks for future occupants of the project site.

Inadequate Disclosure and Mitigation of Subsurface Contamination

The Hazards and Hazardous Materials Section of the SCEA did not discuss that the Phase II ESA identified hazardous materials contamination at the project site and did not analyze potential impacts associated with excavation/disturbance of contaminated soil and redevelopment of contaminated property. According to Table 1 and Figure 2 of the Phase II ESA (Appendix F of the SCEA) concentrations of hazardous materials including total petroleum hydrocarbons as gasoline range organics and as oil range organics, ethylbenzene (a common constituent of gasoline), naphthalene, and PCE that exceed the San Francisco Bay Regional Water Quality Control Board's Tier 1 Environmental Screening Levels (ESLs) were detected in soil; other hazardous materials were also detected in soil samples at concentrations below their Tier 1 ESLs, including benzene, TCE, and cis-1,2-dichloroethene and trans-1,2-dichloroethene (which are breakdown products of TCE); and other hazardous materials that do not have ESLs established for comparison were also detected in soil samples.

Page 8 of the Phase II ESA (Appendix F of the SCEA) recommended the following:

> *Soil that are excavated during the proposed property redevelopment activities in the areas that exceed the RSL [sic] values in the vicinity of borings B-1, B-4, and B-7 should be segregated and stockpiled separately for disposal along with any other soils exhibiting elevated PID [photoionization detector[1]] readings or noticeable odors. These soils should be properly disposed of or recycled at a non-hazardous waste facility permitted to accept these soils.*

The Phase II ESA recommendations failed to address the elevated concentration of PCE (exceeding the Tier 1 ESL) detected in Boring B-5. Furthermore, the Hazards and Hazardous Materials Section of the SCEA failed to indicate that specific management of contaminated soil should be performed during construction of the proposed project as recommended by the Phase II ESA. If appropriate management of contaminated soil is not performed during construction of the proposed project, hazardous materials could be accidentally released into the environment by the proposed project as discussed above.

The SCEA needs to be revised to fully analyze and mitigate potential impacts of the proposed project that could occur due to known soil contamination, potential unidentified contamination, and potential subsurface features of environmental concern at the project site.

Conclusions

Based on our review of the SCEA analysis regarding the hazards and hazardous materials impacts of the proposed project, Baseline recommends that the City of Los Angeles Department of City Planning revise and recirculate the environmental analysis to address the environmental concerns related to hazards and hazardous materials described above.

Sincerely,

Patrick Sutton,
Senior Environmental Engineer

Cem Atabek,
Senior Environmental Engineer

PS:CA:km

[1] A photoionization detector is used to measure volatile organic vapors.

EXHIBIT B

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From: Francis J. Offermann PE CIH

Subject: Indoor Air Quality: 5001 Wilshire Project, Los Angeles, CA
(IEE File Reference: P-4571)

Pages: 19

Indoor Air Quality Impacts

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

The concentrations of many air pollutants often are elevated in homes and other buildings relative to outdoor air because many of the materials and products used indoors contain and release a variety of pollutants to air (Hodgson et al., 2002; Offermann and Hodgson, 2011). With respect to indoor air contaminants for which inhalation is the primary route of exposure, the critical design and construction parameters are the provision of adequate ventilation and the reduction of indoor sources of the contaminants.

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

Therefore, the cancer risk of a resident living in a California home with the median indoor formaldehyde concentration of 36 $\mu g/m^3$, is 180 per million as a result of formaldehyde alone. The CEQA significance threshold for airborne cancer risk is 10 per million, as established by the South Coast Air Quality Management District (SCAQMD, 2015).

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

The primary source of formaldehyde indoors is composite wood products manufactured with urea-formaldehyde resins, such as plywood, medium density fiberboard, and particleboard. These materials are commonly used in building construction for flooring, cabinetry, baseboards, window shades, interior doors, and window and door trims.

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

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

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

With respect to the 5001 Wilshire Project, Los Angeles, CA, the buildings consist of residential and commercial spaces.

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

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

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

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

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

Assuming that the employees of commercial spaces work 8 hours per day and inhale 20

m^3 of air per day, the formaldehyde dose per work-day at the offices is 161 µg/day.

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

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

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

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

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

Pre-Construction Building Material/Furnishing Formaldehyde Emissions Assessment

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

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

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

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

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

CDPH, BIFMA, and other chemical emission rate testing programs, typically certify that a material or furnishing does not create indoor chemical concentrations in excess of the maximum concentrations permitted by their certification. For instance, the CDPH emission rate testing requires that the measured emission rates when input into an office, school, or residential model do not exceed one-half of the OEHHA Chronic Exposure Guidelines (OEHHA, 2017b) for the 35 specific VOCs, including formaldehyde, listed in Table 4-1 of the CDPH test method (CDPH, 2017). These certifications themselves do not provide the actual area-specific formaldehyde emission rate (i.e., µg/m^2-h) of the product, but rather provide data that the formaldehyde emission rates do not exceed the maximum rate allowed for the certification. Thus, for example, the data for a certification of a specific type of flooring may be used to calculate that the area-specific emission rate of formaldehyde is less than 31 µg/m^2-h, but not the actual measured specific emission rate, which may be 3, 18, or 30 µg/m^2-h. These area-specific emission rates determined from the product certifications of CDPH, BIFA, and other certification programs can be used as an initial estimate of the formaldehyde emission rate.

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

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

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

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

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

where:

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

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

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

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

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

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

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

Source mitigation for formaldehyde may include:

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

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

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

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

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

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

According to the Sustainable Communities Environmental Assessment (SCEA), 5001 Wilshire Project (Impact Sciences Inc., 2022), the Project is close to roads with moderate to high traffic (e.g., Wilshire Boulevard, S. Citrus Boulevard, S. Highland Boulevard, Carling Way, etc.). The SCEA states in Table IV 13-3 that the ambient noise levels range from 56.7 to 68.7 dBA Leq, and that these measurements, which were conducted in February, 2021, are likely lower than pre-pandemic levels.

As a result of the high outdoor noise levels, the current project will require a mechanical supply of outdoor air ventilation to allow for a habitable interior environment with closed windows and doors. Such a ventilation system would allow windows and doors to be kept closed at the occupant's discretion to control exterior noise within building interiors.

$PM_{2.5}$ Outdoor Concentrations Impact. An additional impact of the nearby motor vehicle traffic associated with this project, are the outdoor concentrations of $PM_{2.5}$. According to the Sustainable Communities Environmental Assessment (SCEA), 5001 Wilshire Project (Impact Sciences Inc., 2022), the Project is located in the South Coast Air Basin, which is a State and Federal non-attainment area for $PM_{2.5}$.

An air quality analyses should to be conducted to determine the concentrations of $PM_{2.5}$ in the outdoor and indoor air that people inhale each day. This air quality analyses needs to consider the cumulative impacts of the project related emissions, existing and projected future emissions from local $PM_{2.5}$ sources (e.g. stationary sources, motor vehicles, and airport traffic) upon the outdoor air concentrations at the Project site. If the outdoor concentrations are determined to exceed the California and National annual average $PM_{2.5}$ exceedence concentration of 12 $\mu g/m^3$, or the National 24-hour average exceedence concentration of 35 $\mu g/m^3$, then the buildings need to have a mechanical supply of outdoor air that has air filtration with sufficient removal efficiency, such that the indoor concentrations of outdoor $PM_{2.5}$ particles is less than the California and National $PM_{2.5}$ annual and 24-hour standards.

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

Indoor Air Quality Impact Mitigation Measures

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

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

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

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

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

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

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APPENDIX A

INDOOR FORMALDEHYDE CONCENTRATIONS AND THE CARB FORMALDEHYDE ATCM

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

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

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

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

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

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

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

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

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

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

Clearly the CARB ATCM does not regulate the formaldehyde emissions from composite wood products such that the potentially large areas of these products, such as for flooring, baseboards, interior doors, window and door trims, and kitchen and bathroom cabinetry, could be used without causing indoor formaldehyde concentrations that result in CEQA cancer risks that substantially exceed 10 per million for occupants with continuous occupancy.

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

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

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

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Education

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

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

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

Professional Experience

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PROFESSIONAL ORGANIZATION MEMBERSHIP

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

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

American Society for Testing and Materials (ASTM)

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

American Board of Industrial Hygiene (ABIH)

American Conference of Governmental Industrial Hygienists (ACGIH)

- Bioaerosols Committee (2007-2013)

American Industrial Hygiene Association (AIHA)

Cal-OSHA Indoor Air Quality Advisory Committee

International Society of Indoor Air Quality and Climate (ISIAQ)

- Co-Chairman of Task Force on HVAC Hygiene

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

Western Construction Consultants (WESTCON)

PROFESSIONAL CREDENTIALS

Licensed Professional Engineer - Mechanical Engineering

Certified Industrial Hygienist - American Board of Industrial Hygienists

SCIENTIFIC MEETINGS AND SYMPOSIA

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

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

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

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

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

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

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

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

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

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

Healthy Indoor Environments, Anaheim, CA, April 2003.

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

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

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

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

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

SPECIAL CONSULTATION

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

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

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

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

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

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

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

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

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

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

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

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

PEER-REVIEWED PUBLICATIONS :

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

M. J. Mendell, T. Brennan, L. Hathon, J.D. Odom, F.J.Offermann, B.H. Turk, K.M. Wallingford, R.C. Diamond, W.J. Fisk, "Causes and prevention of Symptom Complaints in Office Buildings: Distilling the Experience of Indoor Environmental Investigators", submitted to Indoor Air 2005, Beijing, China, September 4-9, 2005.

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

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

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

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

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

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

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

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

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

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

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

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

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

OTHER REPORTS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

"Diagnosing and Mitigating Indoor Air Quality Problems" a workshop presented by the Association of Energy Engineers, Chicago, IL, October 29-30, 1990; New York, NY, January 24-25, 1991; Anaheim, April 25-26, 1991; Boston, MA, June 10-11, 1991; Atlanta, GA, October 24-25, 1991; Chicago, IL, October 3-4, 1991; Las Vegas, NV, December 16-17, 1991; Anaheim, CA, January 30-31, 1992; Atlanta, GA, March 5-6, 1992; Washington, DC, May 7-8, 1992; Chicago, IL, August 19-20, 1992; Las Vegas, NV, October 1-2, 1992; New York City, NY, October 26-27, 1992, Las Vegas, NV, March 18-19, 1993; Lake Tahoe, CA, July 14-15, 1994; Las Vegas, NV, April 3-4, 1995; Lake Tahoe, CA, July 11-12, 1996; Miami, Fl, December 9-10, 1996.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“Closing Session Summary: ‘Building Investigations’ and ‘Building Design & Construction’, Healthy Buildings 2000, Espoo, Finland, August 2000.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“Ventilation: What a Long Strange Trip It’s Been”, Westcon, May 21, 2014.

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

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

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

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

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

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

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

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

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

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

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

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

EXHIBIT C

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

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May 6, 2022

Amalia Bowley Fuentes
Lozeau | Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94618

Subject: Comments on the 5001 Wilshire Project (SCH No. 2022040267)

Dear Ms. Fuentes,

We have reviewed the March 2022 Sustainable Communities Environmental Assessment ("SCEA") for the 5001 Wilshire Project ("Project") located in the City of Los Angeles ("City"). The Project proposes to demolish an existing commercial building and parking lot and construct a 282,050-square-foot ("SF") mixed-use development, consisting of 242 residential units and 10,900-SF of commercial space, as well as 354 parking spaces, on the 1.68-acre site.

Our review concludes that the SCEA 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 are underestimated and inadequately addressed. An 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 SCEA's air quality analysis relies on emissions calculated with the California Emissions Estimator Model ("CalEEMod") Version 2016.3.2 (p. IV-13).[1] 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

[1] "CalEEMod Version 2016.3.2." California Air Pollution Control Officers Association (CAPCOA), November 2017, *available at:* http://www.aqmd.gov/caleemod/archive/download-version-2016-3-2.

Environmental Quality Act ("CEQA") requires that such changes be justified by substantial evidence. Once all of the values are inputted into the model, the Project's construction and operational emissions are calculated, and "output files" are generated. These output files disclose to the reader what parameters are utilized in calculating the Project's air pollutant emissions and make known which default values are changed as well as provide justification for the values selected.

When reviewing the Project's CalEEMod output files, provided in the Air Quality and Greenhouse Gas Technical Study ("AQ & GHG Technical Study") as Appendix B to the SCEA, we found that several model inputs were not consistent with information disclosed in the SCEA. As a result, the Project's construction and operational emissions are underestimated. An EIR should be prepared to include an updated air quality analysis that adequately evaluates the impacts that construction and operation of the Project will have on local and regional air quality.

Underestimated Land Use Size

According to the SCEA:

> "The Applicant proposes the demolition of the existing two-story commercial building and surface parking lots to develop an eight-story mixed-use building with 242 residential units and 10,900 square feet of commercial space fronting Wilshire Boulevard. The Project will encompass a total floor area of 282,050 square feet" (p. 1).

As demonstrated above, the model should have included 271,150-SF of residential space.[2] However, review of the CalEEMod output files demonstrates that the "Wilshire Highland" model includes only 243,000-SF of "Apartments Mid Rise" (see excerpt below) (Appendix B, pp. 63, 99, 129).

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	354.00	Space	0.00	141,600.00	0
Apartments Mid Rise	243.00	Dwelling Unit	1.69	243,000.00	695
Strip Mall	10.90	1000sqft	0.00	10,900.00	0

As you can see from the excerpt above, the proposed residential space is underestimated by 28,150-SF.[3] This underestimation presents an issue, as the land use size feature is used throughout CalEEMod to determine default variable and emission factors that go into the model's calculations. The square footage of a land use is used for certain calculations such as determining the wall space to be painted (i.e., VOC emissions from architectural coatings) and volume that is heated or cooled (i.e., energy impacts).[4] Thus, by underestimating the size of the proposed residential space, the model underestimates the Project's construction and operational emissions and should not be relied upon to determine Project significance.

[2] Calculated: (282,050-SF proposed building area) – (10,900-SF proposed commercial area) = 271,150-SF proposed residential area.

[3] Calculated: (271,150-SF proposed residential area) – (243,000-SF modeled residential area) = 28,150-SF underestimated floor area.

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

Unsubstantiated Reduction to Architectural Coating Area

Review of the CalEEMod output files demonstrates that the "Wilshire Highland" model includes a manual reduction to the default architectural coating area (see excerpt below) (Appendix B, pp. 64, 100, 130).

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Residential_Exterior	164,025.00	106,616.00

As you can see from the excerpt above, the residential exterior architectural coating area is reduced by 35%, from the default value of 164,025- to 140,614-SF. As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[5] According to the "User Entered Comments & Non-Default Data" table, the justification provided for this change is:

> "According to the Project Applicant, only 65% of the exterior building will be painted" (Appendix B, pp. 64, 100, 130).

However, this reduction remains unsupported, as the SCEA and associated documents fail to mention or justify the percentage of the proposed building exterior to be painted. This is incorrect, as according to the CalEEMod User's Guide:

> "CalEEMod was also designed to allow the user to change the defaults to reflect site- or project-specific information, when available, provided that the information is supported by substantial evidence as required by CEQA".[6]

Here, until the SCEA provides substantial evidence to support the revised architectural coating area, we cannot verify that 65% is an accurate representation of the area to be painted.

This unsubstantiated reduction presents an issue, as CalEEMod uses architectural coating areas to calculate the Project's ROG emissions associated with painting and reapplication.[7] Thus, by including an unsubstantiated reduction to the default architectural coating area, the model may underestimate the Project's area-source emissions and should not be relied upon to determine Project significance.

Unsubstantiated Changes to Individual Construction Phase Lengths

Review of the CalEEMod output files demonstrates that the "Wilshire Highland" model includes several changes to the default individual construction phase lengths (see excerpt below) (Appendix B, pp. 64, 100, 130).

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[5] "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.
[6] "CalEEMod User's Guide Version 2020.4.0." California Air Pollution Control Officers Association (CAPCOA), May 2021, *available at:* https://www.aqmd.gov/caleemod/user's-guide, p. 12.
[7] "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. 36.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	45.00
tblConstructionPhase	NumDays	200.00	587.00
tblConstructionPhase	NumDays	20.00	22.00
tblConstructionPhase	NumDays	4.00	66.00
tblConstructionPhase	NumDays	10.00	45.00

As a result of these changes, the model includes the following construction schedule (see excerpt below) (Appendix B, pp. 70, 105, 135):

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days
1	Demolition	Demolition	6/1/2022	6/30/2022	5	22
2	Grading	Grading	7/1/2022	9/30/2022	5	66
3	Building Construction	Building Construction	10/3/2022	12/31/2024	5	587
4	Paving	Paving	7/1/2024	8/30/2024	5	45
5	Architectural Coating	Architectural Coating	7/1/2024	8/30/2024	5	45

As you can see in the excerpt above, the demolition phase is increased by 10%, from the default value of 20 to 22 days; the grading phase is increased by 1,550%, from the default value of 4 to 66 days; the building construction phase is increased by 194%, from the default value of 200 to 587 days; and the paving and architectural coating phases are both increased by 350%, from their default values of 10 to 45 days. As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[8] According to the "User Entered Comments & Non-Default Data" table, the justification provided for these changes is:

> "Construction schedule provided by applicant" (Appendix B, pp. 64, 91, 130).

Furthermore, regarding the Project's anticipated construction schedule, the SCEA states:

> "The Project is anticipated to be constructed over a period of approximately 32 months, with completion anticipated in February of 2025" (p. II-15).

However, these justifications remain insufficient for two reasons.

First, the SCEA and associated documents fail to provide the above-mentioned Applicant-provided construction schedule. As such, we cannot verify the revised construction phase lengths are accurate.

Second, while the SCEA indicates the total construction duration, the SCEA fails to mention or justify the individual construction phase lengths. This is incorrect, as according to the CalEEMod User's Guide:

[8] "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.

> "CalEEMod was also designed to allow the user to change the defaults to reflect site- or project-specific information, when available, provided that the information is supported by substantial evidence as required by CEQA." [9]

Here, as the SCEA only justifies the total construction duration of 32 months, the SCEA fails to provide substantial evidence to support the revised individual construction phase lengths. As such, we cannot verify the changes.

These unsubstantiated changes present 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).[10]

> <u>*Demolition*</u> involves removing buildings or structures.
>
> <u>*Site Preparation*</u> involves clearing vegetation (grubbing and tree/stump removal) and removing stones and other unwanted material or debris prior to grading.
>
> <u>*Grading*</u> involves the cut and fill of land to ensure that the proper base and slope is created for the foundation.
>
> <u>*Building Construction*</u> involves the construction of the foundation, structures and buildings.
>
> <u>*Architectural Coating*</u> 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.
>
> <u>*Paving*</u> involves the laying of concrete or asphalt such as in parking lots, roads, driveways, or sidewalks.

Thus, 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 such, there will be less construction activities required per day and, consequently, less pollutants emitted per day. As a result, the model may underestimate the peak daily emissions associated with some phases of construction and should not be relied upon to determine Project significance.

Incorrect Application of Construction-Related Mitigation Measures

Review of the CalEEMod output files demonstrates that the "Wilshire Highland" model includes the following construction-related mitigation measures (see excerpt below) (Appendix B, pp. 72, 107, 137):

> **3.1 Mitigation Measures Construction**
>
> Water Exposed Area
>
> Reduce Vehicle Speed on Unpaved Roads

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[9] "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. 13-14.

[10] "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. 32.

As a result, the model includes a reduced vehicle speed of 15 miles per hour ("MPH") (see excerpt below) (Appendix B, pp. 64, 100, 130).

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15

As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[11] According to the "User Entered Comments & Non-Default Data" table, the justification provided for the inclusion of these measures is:

> "SCAQMD Rule 403 for fugitive dust emissions" (Appendix B, pp. 64, 100, 130).

Furthermore, regarding Project compliance with fugitive dust regulations, the SCEA states:

> "The following is a list of noteworthy SCAQMD rules that are required of construction activities associated with the proposed project: [..]
>
> - Rule 403 (Fugitive Dust) – This rule requires fugitive dust sources to implement best available control measures for all sources, and all forms of visible particulate matter are prohibited from crossing any property line. This rule is intended to reduce PM10 emissions from any transportation, handling, construction, or storage activity that has the potential to generate fugitive dust" (p. IV-23).

However, the inclusion of the above-mentioned construction-related mitigation measures remain unsupported for three reasons.

First, the inclusion of the construction-related mitigation measures, based on the Project's compliance with SCAQMD Rule 403, is unsupported. According to the Association of Environmental Professionals ("AEP") *CEQA Portal Topic Paper* on mitigation measures:

> "By definition, mitigation measures are not part of the original project design. Rather, mitigation measures are actions taken by the lead agency to reduce impacts to the environment resulting from the original project design. Mitigation measures are identified by the lead agency after the project has undergone environmental review and are above-and-beyond existing laws, regulations, and requirements that would reduce environmental impacts."[12]

As demonstrated above, mitigation measures "are not part of the original project design" and are intended to go "above-and-beyond" existing regulatory requirements. As such, the inclusion of these measures, based solely on SCAQMD Rule 403, is unsubstantiated.

Second, according to the above-mentioned AEP report:

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[11] "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.
[12] "CEQA Portal Topic Paper Mitigation Measures." Association of Environmental Professionals (AEP), February 2020, *available at:* https://ceqaportal.org/tp/CEQA%20Mitigation%202020.pdf, p. 5.

> "While not 'mitigation', a good practice is to include those project design feature(s) that address environmental impacts in the mitigation monitoring and reporting program (MMRP). Often the MMRP is all that accompanies building and construction plans through the permit process. If the design features are not listed as important to addressing an environmental impact, it is easy for someone not involved in the original environmental process to approve a change to the project that could eliminate one or more of the design features without understanding the resulting environmental impact."[13]

As you can see in the excerpt above, project design features ("PDFs") that are not formally included as mitigation measures may be eliminated from the Project's design altogether. Thus, as the above-mentioned construction-related measures are not formally included as mitigation measures, we cannot guarantee that they would be implemented, monitored, and enforced on the Project site.

Third, simply because the SCEA references SCAQMD Rule 403 does not justify the inclusion of the above-mentioned construction-related mitigation measures in the model. Specifically, according to SCAQMD Rule 403, Projects can either water unpaved roads 3 times per day, water unpaved roads 1 time per day and limit vehicle speeds to 15 mph or apply a chemical stabilizer (see excerpt below).[14]

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY		CONTROL ACTIONS
Unpaved Roads	(4a)	Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR
	(4b)	Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR
	(4c)	Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.

As you can see in the above excerpt, to simply comply with SCAQMD Rule 403, the Project may either water unpaved roads 3 times per day, water unpaved roads 1 time per day and limit vehicle speeds to 15 mph, or apply a chemical stabilizer. Thus, the "Water Exposed Area" and "Reduce Vehicle Speed on Unpaved Roads" measures are not both explicitly required by SCAQMD Rule 403, and should therefore not be included in the model. By incorrectly including several construction-related mitigation measures without properly committing to their implementation, the model may underestimate the Project's construction-related emissions and should not be relied upon to determine Project significance.

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[13] "CEQA Portal Topic Paper Mitigation Measures." Association of Environmental Professionals (AEP), February 2020, *available at:* https://ceqaportal.org/tp/CEQA%20Mitigation%202020.pdf, p. 6.

[14] "Rule 403. Fugitive Dust." South Coast Air Quality Management District (SCAQMD), June 2005, *available at:* http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf, p. 403-21, Table 2.

Updated Analysis Indicates a Potentially Significant Air Quality Impact

In an effort to more accurately estimate the Project's construction-related and operational emissions, we prepared an updated CalEEMod model, using the Project-specific information provided by the SCEA. In our updated model, we included the correct residential land use size; omitted the unsubstantiated change to the architectural coating area; proportionately altered the individual construction phase lengths to match the proposed construction duration of 32 months; and excluded the incorrect construction-related mitigation measures.[15]

Our updated analysis estimates that the Project's construction-related NO_X emissions would exceed the applicable South Coast Air Quality Management District ("SCAQMD") threshold of 100 pounds per day ("lbs/day"), as referenced by the SCEA (p. IV-32, Table IV.3-6) (see table below).[16]

SWAPE Criteria Air Pollutant Emissions

Construction	NO_X (lbs/day)
SCEA	46.8
SWAPE	224.8
% Increase	380%
SCAQMD Threshold	**100**
Exceeds?	***Yes***

As you can see in the table above, the Project's construction-related NO_X emissions, as estimated by SWAPE, increase by approximately 380% and exceed the applicable SCAQMD significance threshold. Thus, our updated model demonstrates that the Project would result in a potentially significant air quality impact that was not previously identified or addressed in the SCEA. As a result, an EIR should be prepared to adequately assess and mitigate the potential air quality impacts that the Project may have on the surrounding environment.

Diesel Particulate Matter Health Risk Emissions Inadequately Evaluated

The SCEA concludes that the Project would have a less-than-significant health risk impact without conducting a quantified construction or operational health risk analysis ("HRA"). Regarding the health risk impacts associated with the Project construction, the SCEA states:

> "Generally, the use of diesel-powered construction equipment would be temporary and episodic. The duration of exposure would be short and exhaust from construction equipment dissipates rapidly. Current methodology for conducting health risk assessments are associated with long term exposure periods (9, 30, and 70 years). Therefore, short-term construction activities would not generate a significant health risk.

[15] See Attachment B for updated air modeling.
[16] "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.

> Additionally, the proposed project site is approximately 1.69 acres. Generally, construction for projects contained in a site of such size to represent less than significant health risk impacts due to limitations of the off-road diesel equipment able to operate and thus a reduced amount of generated DPM, reduced amount of dust-generating ground-disturbance possible compared to larger construction sites, and reduced duration of construction activities compared to the development of larger sites. Furthermore, construction would be subject to and would comply with California regulations limiting the idling of heavy-duty construction equipment to no more than 5-minutes periods, which would further reduce nearby sensitive receptors' exposure to temporary and variable DPM emissions. For these reasons, DPM generated by construction activities, in and of itself, would not be expected to expose sensitive receptors to substantial amounts of air toxics and the proposed project would have a less than significant impact" (p. IV-40).

As demonstrated above, the SCEA concludes that the Project would result in a less-than-significant construction-related health risk impact because the short-term construction schedule, small Project acreage, and compliance with applicable regulations would not result in substantial diesel particulate matter ("DPM") emissions. Furthermore, regarding the health risk impacts associated with Project operation, the SCEA states:

> "The greatest potential during long-term operations for exposure to TACs is from the use of heavy-duty diesel trucks and stationary generators that use diesel fuel. The proposed project is a 242-unit residential development with 10,900 square feet of commercial space. Once operational, the majority of vehicle trips to the Project Site would be from residents and employees and, as a result, the proposed project would attract very few diesel truck trips. Additionally, the Project does not propose any stationary generators on-site.
>
> Furthermore, the existing Project Site includes a two-story commercial building that attracts heavy-duty vehicle truck trips from vendors and includes a dry-cleaning facility that uses solvents that can cause TAC emissions. The proposed project will replace these land uses and emissions sources from the Project Site by constructing a residential development with 10,900 square feet of commercial space, which is significantly less than what is currently on the site. For these reasons, once operational, the proposed project would not expose nearby sensitive receptors to substantial amounts of air toxics and the project would have a less than significant impact" (p. IV-40 – IV-41).

As demonstrated above, the SCEA concludes that the Project would result in a less-than-significant operational health risk impact in comparison to the existing Project site because the limited amount of truck trips and absence of stationary generators are not expected to generate substantial toxic air contaminant ("TAC") emissions. However, the SCEA's evaluation of the Project's potential health risk impacts, as well as the subsequent less-than-significant impact conclusion, is incorrect for four reasons.

First, the SCEA's claim that "the existing Project Site includes a two-story commercial building that attracts heavy-duty vehicle truck trips from vendors and includes a dry-cleaning facility that uses solvents that can cause TAC emissions'' is not entirely accurate. According to CEQA Guidelines § 15125:

> "An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant."

As demonstrated above, the existing environmental conditions at the time of the notice of preparation ("NOP") will constitute the baseline physical conditions used to determine the significance of the Project's impacts. Regarding the existing land uses on the Project site, the SCEA states:

> "It was also determined from the City Directories that a historic dry cleaner operated on the site from approximately 1990 through at least 2015, but is no longer present" (p. IV-84).

As demonstrated above, the dry cleaning land use is no longer present on the site. As the Notice of Availability to Adopt a Sustainable Communities Environmental Assessment ("NOA") was issued in April 2022, the Project's baseline should not include the operation of dry cleaning services. Thus, the SCEA's reference to a dry-cleaning facility that uses solvents that generate TAC emissions is not relevant.

Second, 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."[17] This poses a problem, as construction of the Project would produce DPM emissions through the exhaust stacks of construction equipment over a duration of approximately 32 months (p. II-15). Furthermore, operation of the Project is expected to generate 1,318 daily vehicle trips, which would produce additional exhaust emissions and continue to expose nearby, existing sensitive receptors to DPM emissions (p. IV-137). However, the SCEA fails to evaluate the TAC emissions associated with Project construction and operation or indicate the concentrations at which such pollutants would trigger adverse health effects. Thus, without making a reasonable effort to connect the Project's TAC emissions to the potential health risks posed to nearby receptors, the SCEA is inconsistent with CEQA's requirement to correlate Project-generated emissions with potential adverse impacts on human health.

Third, the Office of Environmental Health Hazard Assessment ("OEHHA"), the organization responsible for providing guidance on conducting HRAs in California, released its most recent *Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments* in February 2015. This guidance document describes the types of projects that warrant the preparation of an HRA. Specifically, OEHHA recommends that all short-term projects lasting at least 2 months assess cancer risks.[18] Furthermore, according to OEHHA:

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[17] "Sierra Club v. County of Fresno." Supreme Court of California, December 2018, a*vailable at:* https://ceqaportal.org/decisions/1907/Sierra%20Club%20v.%20County%20of%20Fresno.pdf.

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

> "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)."[19]

Thus, as the Project's anticipated construction duration exceeds the 2-month and 6-month requirements set forth by OEHHA, construction of the Project meets the threshold warranting a quantified HRA under OEHHA guidance and should be evaluated for the entire 32-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").[20] While the SCEA fails to provide the expected lifetime of the proposed Project, we can reasonably assume that the Project would operate for at least 30 years, if not more. Therefore, operation of the Project also exceeds the 2-month and 6-month requirements set forth by OEHHA and should be evaluated for the entire 30-year residential exposure duration, as indicated by OEHHA guidance. These recommendations reflect the most recent state health risk policies, and as such, an EIR should be prepared to include an analysis of health risk impacts posed to nearby sensitive receptors from Project-generated DPM emissions.

Fourth, by claiming a less-than-significant impact without conducting a quantified construction or operational HRA for nearby, existing sensitive receptors, the SCEA fails to compare the Project's excess cancer risk to the SCAQMD's specific numeric threshold of 10 in one million.[21] Thus, in accordance with the most relevant guidance, an assessment of the health risk posed to nearby, existing receptors as a result of Project construction and operation should be conducted.

Screening-Level Analysis Demonstrates Significant Impacts

In order to conduct our screening-level risk assessment we relied upon AERSCREEN, which is a screening level air quality dispersion model.[22] 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").[23, 24] A Level 2 HRSA utilizes a limited amount of site-specific information to generate maximum reasonable downwind concentrations of air contaminants to which nearby sensitive receptors may be exposed. If an unacceptable air quality hazard is determined to be possible using AERSCREEN, a more refined modeling approach is required prior to approval of the Project.

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

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

[21] "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.

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

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

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

We prepared a preliminary HRA of the Project's construction and operational health risk impact to residential sensitive receptors using the annual PM_{10} exhaust estimates from the SCEA's CalEEMod output files. Consistent with recommendations set forth by OEHHA, we assumed residential exposure begins during the third trimester stage of life.[25] The SCEA's CalEEMod model indicates that construction activities will generate approximately 270 pounds of DPM over the 944-day construction period.[26] The AERSCREEN model relies on a continuous average emission rate to simulate maximum downward concentrations from point, area, and volume emission sources. To account for the variability in equipment usage and truck trips over Project construction, we calculated an average DPM emission rate by the following equation:

$$Emission\ Rate\ \left(\frac{grams}{second}\right) = \frac{269.9\ lbs}{944\ days} \times \frac{453.6\ grams}{lbs} \times \frac{1\ day}{24\ hours} \times \frac{1\ hour}{3{,}600\ seconds} = \mathbf{0.00150\ g/s}$$

Using this equation, we estimated a construction emission rate of 0.00150 grams per second ("g/s"). Subtracting the 944-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 27.41 years. The SCEA's operational CalEEMod emissions indicate that operational activities will generate approximately 62 net pounds of DPM per year throughout operation.[27] Applying the same equation used to estimate the construction DPM rate, we estimated the following emission rate for Project operation:

$$Emission\ Rate\ \left(\frac{grams}{second}\right) = \frac{61.8\ lbs}{365\ days} \times \frac{453.6\ grams}{lbs} \times \frac{1\ day}{24\ hours} \times \frac{1\ hour}{3{,}600\ seconds} = \mathbf{0.000889\ g/s}$$

Using this equation, we estimated an operational emission rate of 0.000889 g/s. Construction and operation were simulated as a 1.68-acre rectangular area source in AERSCREEN, with approximate dimensions of 117- by 58-meters. A release height of three meters was selected to represent the height of stacks of operational equipment and other heavy-duty vehicles, and an initial vertical dimension of one and a half meters was used to simulate instantaneous plume dispersion upon release. An urban meteorological setting was selected with model-default inputs for wind speed and direction distribution. The population of Los Angeles was obtained from U.S. 2020 Census data.[28]

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.[29] According to the SCEA the nearest sensitive receptor is a single-family residence located 20 feet, or 6 meters from the Project site (p. IV-37). However, review of

[25] "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-18.
[26] See Attachment B for health risk calculations.
[27] Existing emissions subtracted from operational emissions.
[28] "Los Angeles." U.S. Census Bureau, 2020, *available at:* https://datacommons.org/place/geoId/0644000.
[29] "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.

the AERSCREEN output files demonstrates that the MEIR is located approximately 50 meters from the Project site. Thus, the single-hour concentration estimated by AERSCREEN for Project construction is approximately 4.718 µg/m^3 DPM at approximately 50 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.4718 µg/m^3 for Project construction at the MEIR. For Project operation, the single-hour concentration estimated by AERSCREEN is 2.795 µg/m^3 DPM at approximately 50 meters downwind. Multiplying this single-hour concentration by 10%, we get an annualized average concentration of 0.2795 µg/m^3 for Project operation at the MEIR.

We calculated the excess cancer risk to the MEIR using applicable HRA methodologies prescribed by OEHHA, as recommended by SCAQMD.[30] Specifically, guidance from OEHHA and the California Air Resources Board ("CARB") recommends the use of a standard point estimate approach, including high-point estimate (i.e. 95th percentile) breathing rates and age sensitivity factors ("ASF") in order to account for the increased sensitivity to carcinogens during early-in-life exposure and accurately assess risk for susceptible subpopulations such as children. The residential exposure parameters, such as the daily breathing rates ("BR/BW"), exposure duration ("ED"), age sensitivity factors ("ASF"), fraction of time at home ("FAH"), and exposure frequency ("EF") utilized for the various age groups in our screening-level HRA are as follows:

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

Exposure Assumptions for Residential Individual Cancer Risk						
Age Group	**Breathing Rate** (L/kg-day)[31]	**Age Sensitivity Factor**[32]	**Exposure Duration** (years)	**Fraction of Time at Home**[33]	**Exposure Frequency** (days/year)[34]	**Exposure Time** (hours/day)
3rd Trimester	361	10	0.25	1	350	24
Infant (0 - 2)	1090	10	2	1	350	24
Child (2 - 16)	572	3	14	1	350	24
Adult (16 - 30)	261	1	14	0.73	350	24

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

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

where:

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

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

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

[31] "Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics 'Hot Spots' Information and Assessment Act." SCAQMD, October 2020, available at: http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab-2588-supplemental-guidelines.pdf?sfvrsn=19, p. 19; see also "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.
[32] "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 8-5 Table 8.3.
[33] "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 5-24.
[34] "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 5-24.

where:

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

Consistent with the 944-day construction schedule, the annualized average concentration for construction was used for the entire third trimester of pregnancy (0.25 years), entire infantile stage of life (0 – 2 years), and the first 0.34 years of the child stage of life (2 – 16 years). The annualized average concentration for operation was used for the remainder of the 30-year exposure period, which makes up the latter 13.66 years of the child stage of life and the entire adult stage of life (16 – 30 years). The results of our calculations are shown in the table below.

The Maximally Exposed Individual at an Existing Residential Receptor

Age Group	**Emissions Source**	**Duration** (years)	**Concentration** (ug/m3)	**Cancer Risk**
3rd Trimester	Construction	0.25	0.4718	6.42E-06
Infant (0 - 2)	Construction	2	0.4718	1.55E-04
	Construction	*0.34*	*0.4718*	*4.10E-06*
	Operation	*13.66*	*0.2795*	*9.88E-05*
Child (2 - 16)	Total	14		1.03E-04
Adult (16 - 30)	Operation	14	0.2795	1.12E-05
Lifetime		**30**		**2.75E-04**

As demonstrated in the table above, the excess cancer risks for the 3rd trimester of pregnancy, infants, children, and adults at the MEIR located approximately 50 meters away, over the course of Project construction and operation, are approximately 6.42, 155, 103, and 11.2 in one million, respectively. The excess cancer risk over the course of a residential lifetime (30 years) is approximately 275 in one million. The infant, child, adult, and lifetime cancer risks exceed the SCAQMD threshold of 10 in one million, thus resulting in a potentially significant impact not previously addressed or identified by the SCEA.

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

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

As demonstrated above, screening-level analyses warrant further evaluation in a refined modeling approach. Thus, as our screening-level HRA demonstrates that construction and operation of the Project could result in a potentially significant health risk impact, an 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.

Feasible Mitigation Measures Available to Reduce Emissions

Our analysis demonstrates that the Project would result in potentially significant air quality and 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: [35]

SCAG RTP/SCS 2020-2045
Air Quality Project Level Mitigation Measures – PMM-AQ-1: In accordance with provisions of sections 15091(a)(2) and 15126.4(a)(1)(B) of the *State CEQA Guidelines*, a Lead Agency for a project can and should consider mitigation measures to reduce substantial adverse effects related to violating air quality standards. Such measures may include the following or other comparable measures identified by the Lead Agency:
a) Minimize land disturbance.
b) Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes.
c) Cover trucks when hauling dirt.
d) Stabilize the surface of dirt piles if not removed immediately.

[35] "4.0 Mitigation Measures." Connect SoCal Program Environmental Impact Report Addendum #1, September 2020, available at: https://scag.ca.gov/sites/main/files/file-attachments/fpeir_connectsocal_addendum_4_mitigationmeasures.pdf?1606004420, p. 4.0-2 – 4.0-10; 4.0-19 – 4.0-23; See also: "Certified Final Connect SoCal Program Environmental Impact Report." Southern California Association of Governments (SCAG), May 2020, *available at:* https://scag.ca.gov/peir.

e) Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.
f) Minimize unnecessary vehicular and machinery activities.
g) Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
h) Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities.
i) On Caltrans projects, Caltrans Standard Specifications 10-Dust Control, 17-Watering, and 18-Dust Palliative shall be incorporated into project specifications.
j) Require contractors to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that could be used an aggregate of 40 or more hours for the construction project. Prepare a plan for approval by the applicable air district demonstrating achievement of the applicable percent reduction for a CARB-approved fleet.
k) Ensure that all construction equipment is properly tuned and maintained.
l) Minimize idling time to 5 minutes—saves fuel and reduces emissions.
m) Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
n) Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
o) Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
p) As appropriate require that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit. Arrange appropriate consultations with the CARB or the District to determine registration and permitting requirements prior to equipment operation at the site.
q) Require projects within 500 feet of residences, hospitals, or schools to use Tier 4 equipment for all engines above 50 horsepower (hp) unless the individual project can demonstrate that Tier 4 engines would not be required to mitigate emissions below significance thresholds.
r) Projects located within the South Coast Air Basin should consider applying for South Coast AQMD “SOON” funds which provides funds to applicable fleets for the purchase of commercially available low-emission heavy-duty engines to achieve near-term reduction of NOx emissions from in-use off-road diesel vehicles.
s) Projects located within AB 617 communities should review the applicable Community Emissions Reduction Plan (CERP) for additional mitigation that can be applied to individual projects.
t) Where applicable, projects should provide information about air quality related programs to schools, including the Environmental Justice Community Partnerships (EJCP), Clean Air Ranger Education (CARE), and Why Air Quality Matters programs.
u) Projects should work with local cities and counties to install adequate signage that prohibits truck idling in certain locations (e.g., near schools and sensitive receptors).
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.

bb) The following criteria related to diesel emissions shall be implemented on by individual project sponsors as appropriate and feasible: - 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% - 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%. - Nonroad diesel engines on site shall be Tier 2 or higher. - 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. - Emission control technology shall be operated, maintained, and serviced as recommended by the emission control technology manufacturer. - 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. - 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: i. Contractor and subcontractor name and address, plus contact person responsible for the vehicles or equipment. 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. 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. - 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. - The contractor shall maintain a monthly report that, for each on road diesel vehicle, nonroad construction equipment, or generator onsite, includes: i. Hour-meter readings on arrival on-site, the first and last day of every month, and on off-site date. ii. Any problems with the equipment or emission controls. iii. Certified copies of fuel deliveries for the time period that identify: 1. Source of supply 2. Quantity of fuel 3. Quantity of fuel, including sulfur content (percent by weight)
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. An EIR should be prepared to include all feasible mitigation measures, as well as include updated air quality and health risk analyses to ensure that the necessary mitigation measures are implemented to reduce emissions to below thresholds. The 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,

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

Paul E. Rosenfeld, Ph.D.

Attachment A: Construction Schedule Calculations
Attachment B: CalEEMod Output Files
Attachment C: Health Risk Calculations
Attachment D: AERSCREEN Output Files
Attachment E: Matt Hagemann CV
Attachment F: Paul E. Rosenfeld CV

Construction Schedule Calculations					
Phase	Default Phase Length	Construction Duration	%	Construction Duration	Revised Phase Length
Demolition	20	341	0.0587	944	55
Grading	4	341	0.0117	944	11
Construction	200	341	0.5865	944	554
Paving	10	341	0.0293	944	28
Architectural Coating	10	341	0.0293	944	28

	Total Default Construction Duration		Revised Construction Duration
Start Date	6/1/2022		6/1/2022
End Date	5/8/2023		12/31/2024
Total Days	341		944

Wilshire Highland

Los Angeles-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	354.00	Space	0.00	141,600.00	0
Apartments Mid Rise	243.00	Dwelling Unit	1.69	271,150.00	695
Strip Mall	10.90	1000sqft	0.00	10,900.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	11			**Operational Year**	2025
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	1227.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Consistent with the SCEA's model.

Land Use - See SWAPE comment on "Underestimated Land Use Size."

Construction Phase - See SWAPE comment on "Unsubstantiated Changes to Individual Construction Phase Lengths."

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Trips and VMT - Consistent with the SCEA's model.

Demolition - Consistent with the SCEA's model.

Grading - Consistent with the SCEA's model.

Architectural Coating - See SWAPE comment on "Unsubstantiated Reduction to Architectural Coating Area."

Vehicle Trips - Consistent with the SCEA's model.

Woodstoves - Consistent with the SCEA's model.

Energy Use -

Construction Off-road Equipment Mitigation - See SWAPE comment on "Incorrect Application of Construction-Related Mitigation Measures."

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	28.00
tblConstructionPhase	NumDays	200.00	554.00
tblConstructionPhase	NumDays	20.00	55.00
tblConstructionPhase	NumDays	4.00	11.00
tblConstructionPhase	NumDays	10.00	28.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberWood	12.15	0.00
tblGrading	MaterialExported	0.00	65,095.00
tblLandUse	LandUseSquareFeet	243,000.00	271,150.00

tblLandUse	LotAcreage	3.19	0.00
tblLandUse	LotAcreage	6.39	1.69
tblLandUse	LotAcreage	0.25	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblTripsAndVMT	HaulingTripNumber	8,137.00	9,300.00
tblVehicleTrips	ST_TR	6.39	5.25
tblVehicleTrips	ST_TR	42.04	35.89
tblVehicleTrips	SU_TR	5.86	5.25
tblVehicleTrips	SU_TR	20.43	35.89
tblVehicleTrips	WD_TR	6.65	5.25
tblVehicleTrips	WD_TR	44.32	35.89
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2188	2.8220	1.8042	7.8400e-003	0.3730	0.0608	0.4338	0.0835	0.0572	0.1408	0.0000	737.4347	737.4347	0.0780	0.0000	739.3838
2023	0.2395	1.6494	2.1407	6.8600e-003	0.3808	0.0515	0.4323	0.1021	0.0474	0.1495	0.0000	625.8429	625.8429	0.0756	0.0000	627.7316
2024	1.1137	1.3362	1.8110	5.6900e-003	0.3123	0.0423	0.3545	0.0837	0.0390	0.1227	0.0000	518.0991	518.0991	0.0652	0.0000	519.7283
2025	0.0342	6.3000e-004	1.5700e-003	0.0000	2.6000e-004	3.0000e-005	2.9000e-004	7.0000e-005	3.0000e-005	1.0000e-004	0.0000	0.3332	0.3332	1.0000e-005	0.0000	0.3335
Maximum	**1.1137**	**2.8220**	**2.1407**	**7.8400e-003**	**0.3808**	**0.0608**	**0.4338**	**0.1021**	**0.0572**	**0.1495**	**0.0000**	**737.4347**	**737.4347**	**0.0780**	**0.0000**	**739.3838**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2188	2.8220	1.8042	7.8400e-003	0.3730	0.0608	0.4338	0.0835	0.0572	0.1408	0.0000	737.4344	737.4344	0.0780	0.0000	739.3836
2023	0.2395	1.6494	2.1407	6.8600e-003	0.3808	0.0515	0.4323	0.1021	0.0474	0.1495	0.0000	625.8427	625.8427	0.0756	0.0000	627.7314
2024	1.1137	1.3362	1.8110	5.6900e-003	0.3123	0.0423	0.3545	0.0837	0.0390	0.1227	0.0000	518.0989	518.0989	0.0652	0.0000	519.7281
2025	0.0342	6.3000e-004	1.5700e-003	0.0000	2.6000e-004	3.0000e-005	2.9000e-004	7.0000e-005	3.0000e-005	1.0000e-004	0.0000	0.3332	0.3332	1.0000e-005	0.0000	0.3335
Maximum	**1.1137**	**2.8220**	**2.1407**	**7.8400e-003**	**0.3808**	**0.0608**	**0.4338**	**0.1021**	**0.0572**	**0.1495**	**0.0000**	**737.4344**	**737.4344**	**0.0780**	**0.0000**	**739.3836**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**6-1-2022**	**8-31-2022**	2.2351	2.2351
2	**9-1-2022**	**11-30-2022**	0.5445	0.5445
3	**12-1-2022**	**2-28-2023**	0.4930	0.4930
4	**3-1-2023**	**5-31-2023**	0.4750	0.4750
5	**6-1-2023**	**8-31-2023**	0.4733	0.4733
6	**9-1-2023**	**11-30-2023**	0.4716	0.4716
7	**12-1-2023**	**2-29-2024**	0.4551	0.4551
8	**3-1-2024**	**5-31-2024**	0.4474	0.4474

9	**6-1-2024**	**8-31-2024**	0.4458	0.4458
10	**9-1-2024**	**11-30-2024**	0.5072	0.5072
11	**12-1-2024**	**2-28-2025**	0.7972	0.7972
		Highest	2.2351	2.2351

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.2042	0.0717	2.5265	4.1000e-004		0.0174	0.0174		0.0174	0.0174	0.0000	53.7029	53.7029	4.8900e-003	9.1000e-004	54.0962
Energy	0.0122	0.1041	0.0447	6.6000e-004		8.4100e-003	8.4100e-003		8.4100e-003	8.4100e-003	0.0000	1,200.5477	1,200.5477	0.0278	7.4900e-003	1,203.4741
Mobile	0.4057	1.9191	5.3438	0.0216	1.9366	0.0165	1.9531	0.5190	0.0153	0.5343	0.0000	1,999.2745	1,999.2745	0.0937	0.0000	2,001.6160
Waste						0.0000	0.0000		0.0000	0.0000	25.0146	0.0000	25.0146	1.4783	0.0000	61.9726
Water						0.0000	0.0000		0.0000	0.0000	5.2791	185.5001	190.7791	0.5466	0.0137	208.5292
Total	**1.6221**	**2.0949**	**7.9149**	**0.0227**	**1.9366**	**0.0423**	**1.9789**	**0.5190**	**0.0411**	**0.5601**	**30.2936**	**3,439.0251**	**3,469.3187**	**2.1513**	**0.0221**	**3,529.6880**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.2042	0.0717	2.5265	4.1000e-004		0.0174	0.0174		0.0174	0.0174	0.0000	53.7029	53.7029	4.8900e-003	9.1000e-004	54.0962
Energy	0.0122	0.1041	0.0447	6.6000e-004		8.4100e-003	8.4100e-003		8.4100e-003	8.4100e-003	0.0000	1,200.5477	1,200.5477	0.0278	7.4900e-003	1,203.4741
Mobile	0.4057	1.9191	5.3438	0.0216	1.9366	0.0165	1.9531	0.5190	0.0153	0.5343	0.0000	1,999.2745	1,999.2745	0.0937	0.0000	2,001.6160
Waste						0.0000	0.0000		0.0000	0.0000	25.0146	0.0000	25.0146	1.4783	0.0000	61.9726
Water						0.0000	0.0000		0.0000	0.0000	5.2791	185.5001	190.7791	0.5466	0.0137	208.5292
Total	**1.6221**	**2.0949**	**7.9149**	**0.0227**	**1.9366**	**0.0423**	**1.9789**	**0.5190**	**0.0411**	**0.5601**	**30.2936**	**3,439.0251**	**3,469.3187**	**2.1513**	**0.0221**	**3,529.6880**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2022	8/16/2022	5	55	
2	Grading	Grading	8/17/2022	8/31/2022	5	11	
3	Building Construction	Building Construction	9/1/2022	10/15/2024	5	554	
4	Paving	Paving	10/16/2024	11/22/2024	5	28	
5	Architectural Coating	Architectural Coating	11/23/2024	1/1/2025	5	28	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 5.5

Acres of Paving: 0

Residential Indoor: 571,151; Residential Outdoor: 190,384; Non-Residential Indoor: 16,350; Non-Residential Outdoor: 5,450; Striped Parking Area: 8,496 (Architectural Coating – sqft)

OffRoad Equipment

Wilshire Highland - Los Angeles-South Coast County, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	3	8.00	81	0.73
Demolition	Crawler Tractors	1	8.00	212	0.43
Demolition	Excavators	1	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Signal Boards	4	8.00	6	0.82
Demolition	Skid Steer Loaders	1	8.00	65	0.37
Demolition	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	1	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	0	6.00	187	0.41
Grading	Rubber Tired Dozers	0	6.00	247	0.40
Grading	Signal Boards	4	8.00	6	0.82
Grading	Skid Steer Loaders	1	8.00	65	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	2	6.00	231	0.29
Building Construction	Excavators	1	8.00	158	0.38
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

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	11	28.00	0.00	1,279.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	9,300.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	4	238.00	51.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	48.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1384	0.0000	0.1384	0.0210	0.0000	0.0210	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0799	0.7521	0.6253	1.2400e-003		0.0350	0.0350		0.0333	0.0333	0.0000	106.3197	106.3197	0.0214	0.0000	106.8542
Total	**0.0799**	**0.7521**	**0.6253**	**1.2400e-003**	**0.1384**	**0.0350**	**0.1734**	**0.0210**	**0.0333**	**0.0542**	**0.0000**	**106.3197**	**106.3197**	**0.0214**	**0.0000**	**106.8542**

3.2 Demolition - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1300e-003	0.1643	0.0408	4.9000e-004	0.0110	4.6000e-004	0.0115	3.0200e-003	4.4000e-004	3.4600e-003	0.0000	48.1691	48.1691	3.3300e-003	0.0000	48.2524
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1100e-003	2.3300e-003	0.0268	8.0000e-005	8.4400e-003	7.0000e-005	8.5100e-003	2.2400e-003	6.0000e-005	2.3000e-003	0.0000	7.3470	7.3470	2.0000e-004	0.0000	7.3521
Total	**8.2400e-003**	**0.1666**	**0.0677**	**5.7000e-004**	**0.0194**	**5.3000e-004**	**0.0200**	**5.2600e-003**	**5.0000e-004**	**5.7600e-003**	**0.0000**	**55.5161**	**55.5161**	**3.5300e-003**	**0.0000**	**55.6045**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1384	0.0000	0.1384	0.0210	0.0000	0.0210	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0799	0.7521	0.6253	1.2400e-003		0.0350	0.0350		0.0333	0.0333	0.0000	106.3195	106.3195	0.0214	0.0000	106.8540
Total	**0.0799**	**0.7521**	**0.6253**	**1.2400e-003**	**0.1384**	**0.0350**	**0.1734**	**0.0210**	**0.0333**	**0.0542**	**0.0000**	**106.3195**	**106.3195**	**0.0214**	**0.0000**	**106.8540**

3.2 Demolition - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1300e-003	0.1643	0.0408	4.9000e-004	0.0110	4.6000e-004	0.0115	3.0200e-003	4.4000e-004	3.4600e-003	0.0000	48.1691	48.1691	3.3300e-003	0.0000	48.2524
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1100e-003	2.3300e-003	0.0268	8.0000e-005	8.4400e-003	7.0000e-005	8.5100e-003	2.2400e-003	6.0000e-005	2.3000e-003	0.0000	7.3470	7.3470	2.0000e-004	0.0000	7.3521
Total	**8.2400e-003**	**0.1666**	**0.0677**	**5.7000e-004**	**0.0194**	**5.3000e-004**	**0.0200**	**5.2600e-003**	**5.0000e-004**	**5.7600e-003**	**0.0000**	**55.5161**	**55.5161**	**3.5300e-003**	**0.0000**	**55.6045**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.6000e-003	0.0000	6.6000e-003	8.7000e-004	0.0000	8.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.2600e-003	0.0639	0.0557	1.1000e-004		2.6500e-003	2.6500e-003		2.4600e-003	2.4600e-003	0.0000	9.5813	9.5813	2.8800e-003	0.0000	9.6533
Total	**6.2600e-003**	**0.0639**	**0.0557**	**1.1000e-004**	**6.6000e-003**	**2.6500e-003**	**9.2500e-003**	**8.7000e-004**	**2.4600e-003**	**3.3300e-003**	**0.0000**	**9.5813**	**9.5813**	**2.8800e-003**	**0.0000**	**9.6533**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0373	1.1947	0.2968	3.5500e-003	0.0799	3.3500e-003	0.0833	0.0220	3.2000e-003	0.0252	0.0000	350.2525	350.2525	0.0242	0.0000	350.8581
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.3000e-004	3.8300e-003	1.0000e-005	1.2100e-003	1.0000e-005	1.2200e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0496	1.0496	3.0000e-005	0.0000	1.0503
Total	**0.0377**	**1.1951**	**0.3006**	**3.5600e-003**	**0.0811**	**3.3600e-003**	**0.0845**	**0.0223**	**3.2100e-003**	**0.0255**	**0.0000**	**351.3021**	**351.3021**	**0.0243**	**0.0000**	**351.9084**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.6000e-003	0.0000	6.6000e-003	8.7000e-004	0.0000	8.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.2600e-003	0.0639	0.0557	1.1000e-004		2.6500e-003	2.6500e-003		2.4600e-003	2.4600e-003	0.0000	9.5812	9.5812	2.8800e-003	0.0000	9.6533
Total	**6.2600e-003**	**0.0639**	**0.0557**	**1.1000e-004**	**6.6000e-003**	**2.6500e-003**	**9.2500e-003**	**8.7000e-004**	**2.4600e-003**	**3.3300e-003**	**0.0000**	**9.5812**	**9.5812**	**2.8800e-003**	**0.0000**	**9.6533**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0373	1.1947	0.2968	3.5500e-003	0.0799	3.3500e-003	0.0833	0.0220	3.2000e-003	0.0252	0.0000	350.2525	350.2525	0.0242	0.0000	350.8581
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.3000e-004	3.8300e-003	1.0000e-005	1.2100e-003	1.0000e-005	1.2200e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0496	1.0496	3.0000e-005	0.0000	1.0503
Total	**0.0377**	**1.1951**	**0.3006**	**3.5600e-003**	**0.0811**	**3.3600e-003**	**0.0845**	**0.0223**	**3.2100e-003**	**0.0255**	**0.0000**	**351.3021**	**351.3021**	**0.0243**	**0.0000**	**351.9084**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0385	0.4050	0.3381	7.0000e-004		0.0180	0.0180		0.0166	0.0166	0.0000	61.7269	61.7269	0.0200	0.0000	62.2260
Total	**0.0385**	**0.4050**	**0.3381**	**7.0000e-004**		**0.0180**	**0.0180**		**0.0166**	**0.0166**	**0.0000**	**61.7269**	**61.7269**	**0.0200**	**0.0000**	**62.2260**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.4700e-003	0.2080	0.0562	5.6000e-004	0.0140	3.9000e-004	0.0144	4.0300e-003	3.7000e-004	4.4100e-003	0.0000	54.2050	54.2050	3.2400e-003	0.0000	54.2859
Worker	0.0418	0.0313	0.3607	1.0900e-003	0.1135	9.1000e-004	0.1144	0.0301	8.3000e-004	0.0310	0.0000	98.7837	98.7837	2.7200e-003	0.0000	98.8517
Total	**0.0482**	**0.2393**	**0.4169**	**1.6500e-003**	**0.1274**	**1.3000e-003**	**0.1287**	**0.0342**	**1.2000e-003**	**0.0354**	**0.0000**	**152.9886**	**152.9886**	**5.9600e-003**	**0.0000**	**153.1376**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0385	0.4050	0.3381	7.0000e-004		0.0180	0.0180		0.0166	0.0166	0.0000	61.7268	61.7268	0.0200	0.0000	62.2259
Total	**0.0385**	**0.4050**	**0.3381**	**7.0000e-004**		**0.0180**	**0.0180**		**0.0166**	**0.0166**	**0.0000**	**61.7268**	**61.7268**	**0.0200**	**0.0000**	**62.2259**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.4700e-003	0.2080	0.0562	5.6000e-004	0.0140	3.9000e-004	0.0144	4.0300e-003	3.7000e-004	4.4100e-003	0.0000	54.2050	54.2050	3.2400e-003	0.0000	54.2859
Worker	0.0418	0.0313	0.3607	1.0900e-003	0.1135	9.1000e-004	0.1144	0.0301	8.3000e-004	0.0310	0.0000	98.7837	98.7837	2.7200e-003	0.0000	98.8517
Total	**0.0482**	**0.2393**	**0.4169**	**1.6500e-003**	**0.1274**	**1.3000e-003**	**0.1287**	**0.0342**	**1.2000e-003**	**0.0354**	**0.0000**	**152.9886**	**152.9886**	**5.9600e-003**	**0.0000**	**153.1376**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1078	1.0951	0.9988	2.1000e-003		0.0483	0.0483		0.0445	0.0445	0.0000	184.5098	184.5098	0.0597	0.0000	186.0016
Total	**0.1078**	**1.0951**	**0.9988**	**2.1000e-003**		**0.0483**	**0.0483**		**0.0445**	**0.0445**	**0.0000**	**184.5098**	**184.5098**	**0.0597**	**0.0000**	**186.0016**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0144	0.4697	0.1506	1.6100e-003	0.0418	5.5000e-004	0.0423	0.0121	5.2000e-004	0.0126	0.0000	156.9205	156.9205	8.5500e-003	0.0000	157.1342
Worker	0.1174	0.0847	0.9913	3.1500e-003	0.3390	2.6300e-003	0.3417	0.0901	2.4200e-003	0.0925	0.0000	284.4127	284.4127	7.3200e-003	0.0000	284.5958
Total	**0.1317**	**0.5543**	**1.1419**	**4.7600e-003**	**0.3808**	**3.1800e-003**	**0.3840**	**0.1021**	**2.9400e-003**	**0.1051**	**0.0000**	**441.3332**	**441.3332**	**0.0159**	**0.0000**	**441.7300**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1078	1.0951	0.9988	2.1000e-003		0.0483	0.0483		0.0445	0.0445	0.0000	184.5095	184.5095	0.0597	0.0000	186.0014
Total	**0.1078**	**1.0951**	**0.9988**	**2.1000e-003**		**0.0483**	**0.0483**		**0.0445**	**0.0445**	**0.0000**	**184.5095**	**184.5095**	**0.0597**	**0.0000**	**186.0014**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0144	0.4697	0.1506	1.6100e-003	0.0418	5.5000e-004	0.0423	0.0121	5.2000e-004	0.0126	0.0000	156.9205	156.9205	8.5500e-003	0.0000	157.1342
Worker	0.1174	0.0847	0.9913	3.1500e-003	0.3390	2.6300e-003	0.3417	0.0901	2.4200e-003	0.0925	0.0000	284.4127	284.4127	7.3200e-003	0.0000	284.5958
Total	**0.1317**	**0.5543**	**1.1419**	**4.7600e-003**	**0.3808**	**3.1800e-003**	**0.3840**	**0.1021**	**2.9400e-003**	**0.1051**	**0.0000**	**441.3332**	**441.3332**	**0.0159**	**0.0000**	**441.7300**

3.4 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0813	0.8017	0.7870	1.6700e-003		0.0350	0.0350		0.0322	0.0322	0.0000	146.9249	146.9249	0.0475	0.0000	148.1128
Total	**0.0813**	**0.8017**	**0.7870**	**1.6700e-003**		**0.0350**	**0.0350**		**0.0322**	**0.0322**	**0.0000**	**146.9249**	**146.9249**	**0.0475**	**0.0000**	**148.1128**

3.4 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0111	0.3725	0.1162	1.2800e-003	0.0333	4.3000e-004	0.0337	9.6000e-003	4.1000e-004	0.0100	0.0000	124.4351	124.4351	6.7100e-003	0.0000	124.6028
Worker	0.0885	0.0615	0.7350	2.4300e-003	0.2699	2.0600e-003	0.2720	0.0717	1.9000e-003	0.0736	0.0000	219.4154	219.4154	5.3400e-003	0.0000	219.5489
Total	**0.0997**	**0.4340**	**0.8512**	**3.7100e-003**	**0.3032**	**2.4900e-003**	**0.3057**	**0.0813**	**2.3100e-003**	**0.0836**	**0.0000**	**343.8505**	**343.8505**	**0.0121**	**0.0000**	**344.1517**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0813	0.8017	0.7870	1.6700e-003		0.0350	0.0350		0.0322	0.0322	0.0000	146.9247	146.9247	0.0475	0.0000	148.1127
Total	**0.0813**	**0.8017**	**0.7870**	**1.6700e-003**		**0.0350**	**0.0350**		**0.0322**	**0.0322**	**0.0000**	**146.9247**	**146.9247**	**0.0475**	**0.0000**	**148.1127**

3.4 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0111	0.3725	0.1162	1.2800e-003	0.0333	4.3000e-004	0.0337	9.6000e-003	4.1000e-004	0.0100	0.0000	124.4351	124.4351	6.7100e-003	0.0000	124.6028
Worker	0.0885	0.0615	0.7350	2.4300e-003	0.2699	2.0600e-003	0.2720	0.0717	1.9000e-003	0.0736	0.0000	219.4154	219.4154	5.3400e-003	0.0000	219.5489
Total	**0.0997**	**0.4340**	**0.8512**	**3.7100e-003**	**0.3032**	**2.4900e-003**	**0.3057**	**0.0813**	**2.3100e-003**	**0.0836**	**0.0000**	**343.8505**	**343.8505**	**0.0121**	**0.0000**	**344.1517**

3.5 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.6500e-003	0.0821	0.1236	1.9000e-004		3.9300e-003	3.9300e-003		3.6300e-003	3.6300e-003	0.0000	16.4837	16.4837	5.2300e-003	0.0000	16.6143
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.6500e-003**	**0.0821**	**0.1236**	**1.9000e-004**		**3.9300e-003**	**3.9300e-003**		**3.6300e-003**	**3.6300e-003**	**0.0000**	**16.4837**	**16.4837**	**5.2300e-003**	**0.0000**	**16.6143**

3.5 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.5000e-004	5.4300e-003	2.0000e-005	1.9900e-003	2.0000e-005	2.0100e-003	5.3000e-004	1.0000e-005	5.4000e-004	0.0000	1.6211	1.6211	4.0000e-005	0.0000	1.6221
Total	**6.5000e-004**	**4.5000e-004**	**5.4300e-003**	**2.0000e-005**	**1.9900e-003**	**2.0000e-005**	**2.0100e-003**	**5.3000e-004**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**1.6211**	**1.6211**	**4.0000e-005**	**0.0000**	**1.6221**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.6500e-003	0.0821	0.1236	1.9000e-004		3.9300e-003	3.9300e-003		3.6300e-003	3.6300e-003	0.0000	16.4837	16.4837	5.2300e-003	0.0000	16.6143
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.6500e-003**	**0.0821**	**0.1236**	**1.9000e-004**		**3.9300e-003**	**3.9300e-003**		**3.6300e-003**	**3.6300e-003**	**0.0000**	**16.4837**	**16.4837**	**5.2300e-003**	**0.0000**	**16.6143**

3.5 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.5000e-004	5.4300e-003	2.0000e-005	1.9900e-003	2.0000e-005	2.0100e-003	5.3000e-004	1.0000e-005	5.4000e-004	0.0000	1.6211	1.6211	4.0000e-005	0.0000	1.6221
Total	**6.5000e-004**	**4.5000e-004**	**5.4300e-003**	**2.0000e-005**	**1.9900e-003**	**2.0000e-005**	**2.0100e-003**	**5.3000e-004**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**1.6211**	**1.6211**	**4.0000e-005**	**0.0000**	**1.6221**

3.6 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.9186					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4400e-003	0.0165	0.0244	4.0000e-005		8.2000e-004	8.2000e-004		8.2000e-004	8.2000e-004	0.0000	3.4469	3.4469	1.9000e-004	0.0000	3.4517
Total	**0.9211**	**0.0165**	**0.0244**	**4.0000e-005**		**8.2000e-004**	**8.2000e-004**		**8.2000e-004**	**8.2000e-004**	**0.0000**	**3.4469**	**3.4469**	**1.9000e-004**	**0.0000**	**3.4517**

3.6 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3300e-003	1.6200e-003	0.0193	6.0000e-005	7.1000e-003	5.0000e-005	7.1600e-003	1.8900e-003	5.0000e-005	1.9400e-003	0.0000	5.7720	5.7720	1.4000e-004	0.0000	5.7755
Total	**2.3300e-003**	**1.6200e-003**	**0.0193**	**6.0000e-005**	**7.1000e-003**	**5.0000e-005**	**7.1600e-003**	**1.8900e-003**	**5.0000e-005**	**1.9400e-003**	**0.0000**	**5.7720**	**5.7720**	**1.4000e-004**	**0.0000**	**5.7755**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.9186					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4400e-003	0.0165	0.0244	4.0000e-005		8.2000e-004	8.2000e-004		8.2000e-004	8.2000e-004	0.0000	3.4469	3.4469	1.9000e-004	0.0000	3.4517
Total	**0.9211**	**0.0165**	**0.0244**	**4.0000e-005**		**8.2000e-004**	**8.2000e-004**		**8.2000e-004**	**8.2000e-004**	**0.0000**	**3.4469**	**3.4469**	**1.9000e-004**	**0.0000**	**3.4517**

3.6 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3300e-003	1.6200e-003	0.0193	6.0000e-005	7.1000e-003	5.0000e-005	7.1600e-003	1.8900e-003	5.0000e-005	1.9400e-003	0.0000	5.7720	5.7720	1.4000e-004	0.0000	5.7755
Total	**2.3300e-003**	**1.6200e-003**	**0.0193**	**6.0000e-005**	**7.1000e-003**	**5.0000e-005**	**7.1600e-003**	**1.8900e-003**	**5.0000e-005**	**1.9400e-003**	**0.0000**	**5.7720**	**5.7720**	**1.4000e-004**	**0.0000**	**5.7755**

3.6 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0340					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-005	5.7000e-004	9.0000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.1277	0.1277	1.0000e-005	0.0000	0.1278
Total	**0.0341**	**5.7000e-004**	**9.0000e-004**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.1277**	**0.1277**	**1.0000e-005**	**0.0000**	**0.1278**

3.6 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	5.0000e-005	6.6000e-004	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2055	0.2055	0.0000	0.0000	0.2056
Total	**8.0000e-005**	**5.0000e-005**	**6.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2055**	**0.2055**	**0.0000**	**0.0000**	**0.2056**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0340					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-005	5.7000e-004	9.0000e-004	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.1277	0.1277	1.0000e-005	0.0000	0.1278
Total	**0.0341**	**5.7000e-004**	**9.0000e-004**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.1277**	**0.1277**	**1.0000e-005**	**0.0000**	**0.1278**

3.6 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	5.0000e-005	6.6000e-004	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2055	0.2055	0.0000	0.0000	0.2056
Total	**8.0000e-005**	**5.0000e-005**	**6.6000e-004**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2055**	**0.2055**	**0.0000**	**0.0000**	**0.2056**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4057	1.9191	5.3438	0.0216	1.9366	0.0165	1.9531	0.5190	0.0153	0.5343	0.0000	1,999.274 5	1,999.274 5	0.0937	0.0000	2,001.616 0
Unmitigated	0.4057	1.9191	5.3438	0.0216	1.9366	0.0165	1.9531	0.5190	0.0153	0.5343	0.0000	1,999.274 5	1,999.274 5	0.0937	0.0000	2,001.616 0

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,275.75	1,275.75	1275.75	4,359,432	4,359,432
Enclosed Parking with Elevator	0.00	0.00	0.00		
Strip Mall	391.20	391.20	391.20	744,297	744,297
Total	1,666.95	1,666.95	1,666.95	5,103,729	5,103,729

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Enclosed Parking with Elevator	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Strip Mall	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,080.0740	1,080.0740	0.0255	5.2800e-003	1,082.2845
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,080.0740	1,080.0740	0.0255	5.2800e-003	1,082.2845
NaturalGas Mitigated	0.0122	0.1041	0.0447	6.6000e-004		8.4100e-003	8.4100e-003		8.4100e-003	8.4100e-003	0.0000	120.4737	120.4737	2.3100e-003	2.2100e-003	121.1896
NaturalGas Unmitigated	0.0122	0.1041	0.0447	6.6000e-004		8.4100e-003	8.4100e-003		8.4100e-003	8.4100e-003	0.0000	120.4737	120.4737	2.3100e-003	2.2100e-003	121.1896

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	2.23972e+006	0.0121	0.1032	0.0439	6.6000e-004		8.3400e-003	8.3400e-003		8.3400e-003	8.3400e-003	0.0000	119.5198	119.5198	2.2900e-003	2.1900e-003	120.2300
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	17876	1.0000e-004	8.8000e-004	7.4000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	0.9539	0.9539	2.0000e-005	2.0000e-005	0.9596
Total		**0.0122**	**0.1041**	**0.0447**	**6.7000e-004**		**8.4100e-003**	**8.4100e-003**		**8.4100e-003**	**8.4100e-003**	**0.0000**	**120.4737**	**120.4737**	**2.3100e-003**	**2.2100e-003**	**121.1896**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	2.23972e+006	0.0121	0.1032	0.0439	6.6000e-004		8.3400e-003	8.3400e-003		8.3400e-003	8.3400e-003	0.0000	119.5198	119.5198	2.2900e-003	2.1900e-003	120.2300
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	17876	1.0000e-004	8.8000e-004	7.4000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	0.9539	0.9539	2.0000e-005	2.0000e-005	0.9596
Total		**0.0122**	**0.1041**	**0.0447**	**6.7000e-004**		**8.4100e-003**	**8.4100e-003**		**8.4100e-003**	**8.4100e-003**	**0.0000**	**120.4737**	**120.4737**	**2.3100e-003**	**2.2100e-003**	**121.1896**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	962299	535.9638	0.0127	2.6200e-003	537.0607
Enclosed Parking with Elevator	829776	462.1533	0.0109	2.2600e-003	463.0992
Strip Mall	147150	81.9569	1.9400e-003	4.0000e-004	82.1246
Total		**1,080.0740**	**0.0255**	**5.2800e-003**	**1,082.2845**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	962299	535.9638	0.0127	2.6200e-003	537.0607
Enclosed Parking with Elevator	829776	462.1533	0.0109	2.2600e-003	463.0992
Strip Mall	147150	81.9569	1.9400e-003	4.0000e-004	82.1246
Total		**1,080.0740**	**0.0255**	**5.2800e-003**	**1,082.2845**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.2042	0.0717	2.5265	4.1000e-004		0.0174	0.0174		0.0174	0.0174	0.0000	53.7029	53.7029	4.8900e-003	9.1000e-004	54.0962
Unmitigated	1.2042	0.0717	2.5265	4.1000e-004		0.0174	0.0174		0.0174	0.0174	0.0000	53.7029	53.7029	4.8900e-003	9.1000e-004	54.0962

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0953					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0283					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.0100e-003	0.0428	0.0182	2.7000e-004		3.4600e-003	3.4600e-003		3.4600e-003	3.4600e-003	0.0000	49.6003	49.6003	9.5000e-004	9.1000e-004	49.8951
Landscaping	0.0756	0.0289	2.5083	1.3000e-004		0.0139	0.0139		0.0139	0.0139	0.0000	4.1025	4.1025	3.9400e-003	0.0000	4.2011
Total	**1.2042**	**0.0717**	**2.5265**	**4.0000e-004**		**0.0174**	**0.0174**		**0.0174**	**0.0174**	**0.0000**	**53.7029**	**53.7029**	**4.8900e-003**	**9.1000e-004**	**54.0962**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0953					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0283					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.0100e-003	0.0428	0.0182	2.7000e-004		3.4600e-003	3.4600e-003		3.4600e-003	3.4600e-003	0.0000	49.6003	49.6003	9.5000e-004	9.1000e-004	49.8951
Landscaping	0.0756	0.0289	2.5083	1.3000e-004		0.0139	0.0139		0.0139	0.0139	0.0000	4.1025	4.1025	3.9400e-003	0.0000	4.2011
Total	**1.2042**	**0.0717**	**2.5265**	**4.0000e-004**		**0.0174**	**0.0174**		**0.0174**	**0.0174**	**0.0000**	**53.7029**	**53.7029**	**4.8900e-003**	**9.1000e-004**	**54.0962**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	190.7791	0.5466	0.0137	208.5292
Unmitigated	190.7791	0.5466	0.0137	208.5292

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	15.8324 / 9.98131	181.6056	0.5201	0.0130	198.4946
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.80739 / 0.494852	9.1736	0.0265	6.6000e-004	10.0347
Total		**190.7791**	**0.5466**	**0.0137**	**208.5292**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	15.8324 / 9.98131	181.6056	0.5201	0.0130	198.4946
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.80739 / 0.494852	9.1736	0.0265	6.6000e-004	10.0347
Total		**190.7791**	**0.5466**	**0.0137**	**208.5292**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	25.0146	1.4783	0.0000	61.9726
Unmitigated	25.0146	1.4783	0.0000	61.9726

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	111.78	22.6903	1.3410	0.0000	56.2143
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Strip Mall	11.45	2.3243	0.1374	0.0000	5.7582
Total		**25.0146**	**1.4783**	**0.0000**	**61.9726**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	111.78	22.6903	1.3410	0.0000	56.2143
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
Strip Mall	11.45	2.3243	0.1374	0.0000	5.7582
Total		**25.0146**	**1.4783**	**0.0000**	**61.9726**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Wilshire Highland

Los Angeles-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	354.00	Space	0.00	141,600.00	0
Apartments Mid Rise	243.00	Dwelling Unit	1.69	271,150.00	695
Strip Mall	10.90	1000sqft	0.00	10,900.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	11			**Operational Year**	2025
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	1227.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Consistent with the SCEA's model.

Land Use - See SWAPE comment on "Underestimated Land Use Size."

Construction Phase - See SWAPE comment on "Unsubstantiated Changes to Individual Construction Phase Lengths."

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Trips and VMT - Consistent with the SCEA's model.

Demolition - Consistent with the SCEA's model.

Grading - Consistent with the SCEA's model.

Architectural Coating - See SWAPE comment on "Unsubstantiated Reduction to Architectural Coating Area."

Vehicle Trips - Consistent with the SCEA's model.

Woodstoves - Consistent with the SCEA's model.

Energy Use -

Construction Off-road Equipment Mitigation - See SWAPE comment on "Incorrect Application of Construction-Related Mitigation Measures."

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	28.00
tblConstructionPhase	NumDays	200.00	554.00
tblConstructionPhase	NumDays	20.00	55.00
tblConstructionPhase	NumDays	4.00	11.00
tblConstructionPhase	NumDays	10.00	28.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberWood	12.15	0.00
tblGrading	MaterialExported	0.00	65,095.00
tblLandUse	LandUseSquareFeet	243,000.00	271,150.00

tblLandUse	LotAcreage	3.19	0.00
tblLandUse	LotAcreage	6.39	1.69
tblLandUse	LotAcreage	0.25	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblTripsAndVMT	HaulingTripNumber	8,137.00	9,300.00
tblVehicleTrips	ST_TR	6.39	5.25
tblVehicleTrips	ST_TR	42.04	35.89
tblVehicleTrips	SU_TR	5.86	5.25
tblVehicleTrips	SU_TR	20.43	35.89
tblVehicleTrips	WD_TR	6.65	5.25
tblVehicleTrips	WD_TR	44.32	35.89
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.9263	222.3464	63.4973	0.6738	16.2068	1.2900	17.2953	4.2705	1.2279	5.2985	0.0000	72,856.7940	72,856.7940	5.3675	0.0000	72,990.9818
2023	1.8347	12.5696	16.9337	0.0540	2.9868	0.3960	3.3828	0.7995	0.3645	1.1641	0.0000	5,429.6319	5,429.6319	0.6417	0.0000	5,445.6754
2024	68.3977	11.8274	16.2689	0.0532	2.9868	0.3617	3.3485	0.7995	0.3329	1.1324	0.0000	5,346.3815	5,346.3815	0.6355	0.0000	5,362.2678
2025	68.3791	1.2419	3.2314	7.7200e-003	0.5365	0.0554	0.5920	0.1423	0.0551	0.1974	0.0000	754.6968	754.6968	0.0263	0.0000	755.3552
Maximum	**68.3977**	**222.3464**	**63.4973**	**0.6738**	**16.2068**	**1.2900**	**17.2953**	**4.2705**	**1.2279**	**5.2985**	**0.0000**	**72,856.7940**	**72,856.7940**	**5.3675**	**0.0000**	**72,990.9818**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.9263	222.3464	63.4973	0.6738	16.2068	1.2900	17.2953	4.2705	1.2279	5.2985	0.0000	72,856.7940	72,856.7940	5.3675	0.0000	72,990.9818
2023	1.8347	12.5696	16.9337	0.0540	2.9868	0.3960	3.3828	0.7995	0.3645	1.1641	0.0000	5,429.6319	5,429.6319	0.6417	0.0000	5,445.6754
2024	68.3977	11.8274	16.2689	0.0532	2.9868	0.3617	3.3485	0.7995	0.3329	1.1324	0.0000	5,346.3815	5,346.3815	0.6355	0.0000	5,362.2678
2025	68.3791	1.2419	3.2314	7.7200e-003	0.5365	0.0554	0.5920	0.1423	0.0551	0.1974	0.0000	754.6968	754.6968	0.0263	0.0000	755.3552
Maximum	**68.3977**	**222.3464**	**63.4973**	**0.6738**	**16.2068**	**1.2900**	**17.2953**	**4.2705**	**1.2279**	**5.2985**	**0.0000**	**72,856.7940**	**72,856.7940**	**5.3675**	**0.0000**	**72,990.9818**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.178 1	4,410.178 1	0.1186	0.0802	4,437.040 0
Energy	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
Mobile	2.3595	10.1630	30.4902	0.1229	10.8503	0.0907	10.9410	2.9031	0.0842	2.9873		12,536.24 52	12,536.24 52	0.5704		12,550.50 46
Total	**9.5886**	**14.3906**	**52.2588**	**0.1494**	**10.8503**	**0.5251**	**11.3754**	**2.9031**	**0.5186**	**3.4217**	**0.0000**	**17,674.09 21**	**17,674.09 21**	**0.7029**	**0.0935**	**17,719.53 75**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.178 1	4,410.178 1	0.1186	0.0802	4,437.040 0
Energy	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
Mobile	2.3595	10.1630	30.4902	0.1229	10.8503	0.0907	10.9410	2.9031	0.0842	2.9873		12,536.24 52	12,536.24 52	0.5704		12,550.50 46
Total	**9.5886**	**14.3906**	**52.2588**	**0.1494**	**10.8503**	**0.5251**	**11.3754**	**2.9031**	**0.5186**	**3.4217**	**0.0000**	**17,674.09 21**	**17,674.09 21**	**0.7029**	**0.0935**	**17,719.53 75**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2022	8/16/2022	5	55	
2	Grading	Grading	8/17/2022	8/31/2022	5	11	
3	Building Construction	Building Construction	9/1/2022	10/15/2024	5	554	
4	Paving	Paving	10/16/2024	11/22/2024	5	28	
5	Architectural Coating	Architectural Coating	11/23/2024	1/1/2025	5	28	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 5.5

Acres of Paving: 0

Residential Indoor: 571,151; Residential Outdoor: 190,384; Non-Residential Indoor: 16,350; Non-Residential Outdoor: 5,450; Striped Parking Area: 8,496 (Architectural Coating – sqft)

OffRoad Equipment

Wilshire Highland - Los Angeles-South Coast County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	3	8.00	81	0.73
Demolition	Crawler Tractors	1	8.00	212	0.43
Demolition	Excavators	1	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Signal Boards	4	8.00	6	0.82
Demolition	Skid Steer Loaders	1	8.00	65	0.37
Demolition	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	1	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	0	6.00	187	0.41
Grading	Rubber Tired Dozers	0	6.00	247	0.40
Grading	Signal Boards	4	8.00	6	0.82
Grading	Skid Steer Loaders	1	8.00	65	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	2	6.00	231	0.29
Building Construction	Excavators	1	8.00	158	0.38
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

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	11	28.00	0.00	1,279.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	9,300.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	4	238.00	51.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	48.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.0330	0.0000	5.0330	0.7621	0.0000	0.7621			0.0000			0.0000
Off-Road	2.9036	27.3482	22.7372	0.0452		1.2709	1.2709		1.2098	1.2098		4,261.722 7	4,261.722 7	0.8570		4,283.146 7
Total	**2.9036**	**27.3482**	**22.7372**	**0.0452**	**5.0330**	**1.2709**	**6.3040**	**0.7621**	**1.2098**	**1.9718**		**4,261.722 7**	**4,261.722 7**	**0.8570**		**4,283.146 7**

3.2 Demolition - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1845	5.7947	1.4477	0.0179	0.4066	0.0166	0.4233	0.1115	0.0159	0.1274		1,945.091 5	1,945.091 5	0.1316		1,948.380 9
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1124	0.0745	1.0405	3.0900e-003	0.3130	2.4500e-003	0.3154	0.0830	2.2600e-003	0.0853		307.6395	307.6395	8.4900e-003		307.8517
Total	**0.2970**	**5.8692**	**2.4882**	**0.0210**	**0.7196**	**0.0191**	**0.7387**	**0.1945**	**0.0182**	**0.2126**		**2,252.730 9**	**2,252.730 9**	**0.1401**		**2,256.232 7**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.0330	0.0000	5.0330	0.7621	0.0000	0.7621			0.0000			0.0000
Off-Road	2.9036	27.3482	22.7372	0.0452		1.2709	1.2709		1.2098	1.2098	0.0000	4,261.722 7	4,261.722 7	0.8570		4,283.146 6
Total	**2.9036**	**27.3482**	**22.7372**	**0.0452**	**5.0330**	**1.2709**	**6.3040**	**0.7621**	**1.2098**	**1.9718**	**0.0000**	**4,261.722 7**	**4,261.722 7**	**0.8570**		**4,283.146 6**

3.2 Demolition - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1845	5.7947	1.4477	0.0179	0.4066	0.0166	0.4233	0.1115	0.0159	0.1274		1,945.091 5	1,945.091 5	0.1316		1,948.380 9
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1124	0.0745	1.0405	3.0900e-003	0.3130	2.4500e-003	0.3154	0.0830	2.2600e-003	0.0853		307.6395	307.6395	8.4900e-003		307.8517
Total	**0.2970**	**5.8692**	**2.4882**	**0.0210**	**0.7196**	**0.0191**	**0.7387**	**0.1945**	**0.0182**	**0.2126**		**2,252.730 9**	**2,252.730 9**	**0.1401**		**2,256.232 7**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1995	0.0000	1.1995	0.1586	0.0000	0.1586			0.0000			0.0000
Off-Road	1.1375	11.6173	10.1194	0.0206		0.4819	0.4819		0.4478	0.4478		1,920.277 5	1,920.277 5	0.5777		1,934.721 0
Total	**1.1375**	**11.6173**	**10.1194**	**0.0206**	**1.1995**	**0.4819**	**1.6814**	**0.1586**	**0.4478**	**0.6064**		**1,920.277 5**	**1,920.277 5**	**0.5777**		**1,934.721 0**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	6.7085	210.6758	52.6347	0.6510	14.7838	0.6048	15.3886	4.0526	0.5786	4.6312		70,716.7741	70,716.7741	4.7837		70,836.3667
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0803	0.0532	0.7432	2.2100e-003	0.2236	1.7500e-003	0.2253	0.0593	1.6100e-003	0.0609		219.7425	219.7425	6.0600e-003		219.8941
Total	**6.7888**	**210.7291**	**53.3779**	**0.6532**	**15.0073**	**0.6066**	**15.6139**	**4.1119**	**0.5802**	**4.6921**		**70,936.5165**	**70,936.5165**	**4.7898**		**71,056.2608**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1995	0.0000	1.1995	0.1586	0.0000	0.1586			0.0000			0.0000
Off-Road	1.1375	11.6173	10.1194	0.0206		0.4819	0.4819		0.4478	0.4478	0.0000	1,920.2775	1,920.2775	0.5777		1,934.7210
Total	**1.1375**	**11.6173**	**10.1194**	**0.0206**	**1.1995**	**0.4819**	**1.6814**	**0.1586**	**0.4478**	**0.6064**	**0.0000**	**1,920.2775**	**1,920.2775**	**0.5777**		**1,934.7210**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	6.7085	210.6758	52.6347	0.6510	14.7838	0.6048	15.3886	4.0526	0.5786	4.6312		70,716.7741	70,716.7741	4.7837		70,836.3667
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0803	0.0532	0.7432	2.2100e-003	0.2236	1.7500e-003	0.2253	0.0593	1.6100e-003	0.0609		219.7425	219.7425	6.0600e-003		219.8941
Total	**6.7888**	**210.7291**	**53.3779**	**0.6532**	**15.0073**	**0.6066**	**15.6139**	**4.1119**	**0.5802**	**4.6921**		**70,936.5165**	**70,936.5165**	**4.7898**		**71,056.2608**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8854	9.3101	7.7721	0.0162		0.4141	0.4141		0.3810	0.3810		1,564.1900	1,564.1900	0.5059		1,576.8373
Total	**0.8854**	**9.3101**	**7.7721**	**0.0162**		**0.4141**	**0.4141**		**0.3810**	**0.3810**		**1,564.1900**	**1,564.1900**	**0.5059**		**1,576.8373**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1455	4.7088	1.2248	0.0130	0.3265	8.8500e-003	0.3354	0.0940	8.4700e-003	0.1025		1,389.6780	1,389.6780	0.0798		1,391.6717
Worker	0.9556	0.6334	8.8441	0.0262	2.6603	0.0208	2.6811	0.7055	0.0192	0.7247		2,614.9353	2,614.9353	0.0722		2,616.7397
Total	**1.1011**	**5.3423**	**10.0689**	**0.0392**	**2.9868**	**0.0297**	**3.0165**	**0.7995**	**0.0277**	**0.8272**		**4,004.6133**	**4,004.6133**	**0.1519**		**4,008.4114**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8854	9.3101	7.7721	0.0162		0.4141	0.4141		0.3810	0.3810	0.0000	1,564.1900	1,564.1900	0.5059		1,576.8373
Total	**0.8854**	**9.3101**	**7.7721**	**0.0162**		**0.4141**	**0.4141**		**0.3810**	**0.3810**	**0.0000**	**1,564.1900**	**1,564.1900**	**0.5059**		**1,576.8373**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1455	4.7088	1.2248	0.0130	0.3265	8.8500e-003	0.3354	0.0940	8.4700e-003	0.1025		1,389.678 0	1,389.678 0	0.0798		1,391.671 7
Worker	0.9556	0.6334	8.8441	0.0262	2.6603	0.0208	2.6811	0.7055	0.0192	0.7247		2,614.935 3	2,614.935 3	0.0722		2,616.739 7
Total	**1.1011**	**5.3423**	**10.0689**	**0.0392**	**2.9868**	**0.0297**	**3.0165**	**0.7995**	**0.0277**	**0.8272**		**4,004.613 3**	**4,004.613 3**	**0.1519**		**4,008.411 4**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8293	8.4237	7.6829	0.0162		0.3717	0.3717		0.3419	0.3419		1,564.516 9	1,564.516 9	0.5060		1,577.166 8
Total	**0.8293**	**8.4237**	**7.6829**	**0.0162**		**0.3717**	**0.3717**		**0.3419**	**0.3419**		**1,564.516 9**	**1,564.516 9**	**0.5060**		**1,577.166 8**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1079	3.5729	1.1061	0.0126	0.3265	4.1300e-003	0.3307	0.0940	3.9400e-003	0.0980		1,345.9279	1,345.9279	0.0707		1,347.6946
Worker	0.8974	0.5731	8.1447	0.0253	2.6603	0.0202	2.6805	0.7055	0.0186	0.7242		2,519.1871	2,519.1871	0.0651		2,520.8140
Total	**1.0053**	**4.1460**	**9.2508**	**0.0378**	**2.9868**	**0.0244**	**3.0112**	**0.7995**	**0.0226**	**0.8221**		**3,865.1150**	**3,865.1150**	**0.1357**		**3,868.5086**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8293	8.4237	7.6829	0.0162		0.3717	0.3717		0.3419	0.3419	0.0000	1,564.5169	1,564.5169	0.5060		1,577.1668
Total	**0.8293**	**8.4237**	**7.6829**	**0.0162**		**0.3717**	**0.3717**		**0.3419**	**0.3419**	**0.0000**	**1,564.5169**	**1,564.5169**	**0.5060**		**1,577.1668**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1079	3.5729	1.1061	0.0126	0.3265	4.1300e-003	0.3307	0.0940	3.9400e-003	0.0980		1,345.9279	1,345.9279	0.0707		1,347.6946
Worker	0.8974	0.5731	8.1447	0.0253	2.6603	0.0202	2.6805	0.7055	0.0186	0.7242		2,519.1871	2,519.1871	0.0651		2,520.8140
Total	**1.0053**	**4.1460**	**9.2508**	**0.0378**	**2.9868**	**0.0244**	**3.0112**	**0.7995**	**0.0226**	**0.8221**		**3,865.1150**	**3,865.1150**	**0.1357**		**3,868.5086**

3.4 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7858	7.7455	7.6038	0.0162		0.3377	0.3377		0.3106	0.3106		1,564.8014	1,564.8014	0.5061		1,577.4537
Total	**0.7858**	**7.7455**	**7.6038**	**0.0162**		**0.3377**	**0.3377**		**0.3106**	**0.3106**		**1,564.8014**	**1,564.8014**	**0.5061**		**1,577.4537**

3.4 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1053	3.5593	1.0724	0.0125	0.3265	4.0800e-003	0.3306	0.0940	3.9000e-003	0.0979		1,340.4658	1,340.4658	0.0697		1,342.2074
Worker	0.8489	0.5226	7.5927	0.0245	2.6603	0.0199	2.6802	0.7055	0.0184	0.7239		2,441.1143	2,441.1143	0.0597		2,442.6068
Total	**0.9543**	**4.0819**	**8.6651**	**0.0370**	**2.9868**	**0.0240**	**3.0108**	**0.7995**	**0.0223**	**0.8218**		**3,781.5801**	**3,781.5801**	**0.1294**		**3,784.8141**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7858	7.7455	7.6038	0.0162		0.3377	0.3377		0.3106	0.3106	0.0000	1,564.8014	1,564.8014	0.5061		1,577.4537
Total	**0.7858**	**7.7455**	**7.6038**	**0.0162**		**0.3377**	**0.3377**		**0.3106**	**0.3106**	**0.0000**	**1,564.8014**	**1,564.8014**	**0.5061**		**1,577.4537**

3.4 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1053	3.5593	1.0724	0.0125	0.3265	4.0800e-003	0.3306	0.0940	3.9000e-003	0.0979		1,340.4658	1,340.4658	0.0697		1,342.2074
Worker	0.8489	0.5226	7.5927	0.0245	2.6603	0.0199	2.6802	0.7055	0.0184	0.7239		2,441.1143	2,441.1143	0.0597		2,442.6068
Total	**0.9543**	**4.0819**	**8.6651**	**0.0370**	**2.9868**	**0.0240**	**3.0108**	**0.7995**	**0.0223**	**0.8218**		**3,781.5801**	**3,781.5801**	**0.1294**		**3,784.8141**

3.5 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6180	5.8607	8.8253	0.0136		0.2810	0.2810		0.2594	0.2594		1,297.8688	1,297.8688	0.4114		1,308.1547
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6180**	**5.8607**	**8.8253**	**0.0136**		**0.2810**	**0.2810**		**0.2594**	**0.2594**		**1,297.8688**	**1,297.8688**	**0.4114**		**1,308.1547**

3.5 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0464	0.0286	0.4147	1.3400e-003	0.1453	1.0900e-003	0.1464	0.0385	1.0000e-003	0.0395		133.3382	133.3382	3.2600e-003		133.4197
Total	**0.0464**	**0.0286**	**0.4147**	**1.3400e-003**	**0.1453**	**1.0900e-003**	**0.1464**	**0.0385**	**1.0000e-003**	**0.0395**		**133.3382**	**133.3382**	**3.2600e-003**		**133.4197**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6180	5.8607	8.8253	0.0136		0.2810	0.2810		0.2594	0.2594	0.0000	1,297.868 8	1,297.868 8	0.4114		1,308.154 7
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6180**	**5.8607**	**8.8253**	**0.0136**		**0.2810**	**0.2810**		**0.2594**	**0.2594**	**0.0000**	**1,297.868 8**	**1,297.868 8**	**0.4114**		**1,308.154 7**

3.5 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0464	0.0286	0.4147	1.3400e-003	0.1453	1.0900e-003	0.1464	0.0385	1.0000e-003	0.0395		133.3382	133.3382	3.2600e-003		133.4197
Total	**0.0464**	**0.0286**	**0.4147**	**1.3400e-003**	**0.1453**	**1.0900e-003**	**0.1464**	**0.0385**	**1.0000e-003**	**0.0395**		**133.3382**	**133.3382**	**3.2600e-003**		**133.4197**

3.6 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**68.2265**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.6 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1712	0.1054	1.5313	4.9400e-003	0.5365	4.0200e-003	0.5406	0.1423	3.7000e-003	0.1460		492.3256	492.3256	0.0120		492.6266
Total	**0.1712**	**0.1054**	**1.5313**	**4.9400e-003**	**0.5365**	**4.0200e-003**	**0.5406**	**0.1423**	**3.7000e-003**	**0.1460**		**492.3256**	**492.3256**	**0.0120**		**492.6266**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**68.2265**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.6 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1712	0.1054	1.5313	4.9400e-003	0.5365	4.0200e-003	0.5406	0.1423	3.7000e-003	0.1460		492.3256	492.3256	0.0120		492.6266
Total	**0.1712**	**0.1054**	**1.5313**	**4.9400e-003**	**0.5365**	**4.0200e-003**	**0.5406**	**0.1423**	**3.7000e-003**	**0.1460**		**492.3256**	**492.3256**	**0.0120**		**492.6266**

3.6 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**68.2166**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.6 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1626	0.0964	1.4222	4.7500e-003	0.5365	3.9400e-003	0.5405	0.1423	3.6300e-003	0.1459		473.2488	473.2488	0.0110		473.5234
Total	**0.1626**	**0.0964**	**1.4222**	**4.7500e-003**	**0.5365**	**3.9400e-003**	**0.5405**	**0.1423**	**3.6300e-003**	**0.1459**		**473.2488**	**473.2488**	**0.0110**		**473.5234**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**68.2166**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.6 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1626	0.0964	1.4222	4.7500e-003	0.5365	3.9400e-003	0.5405	0.1423	3.6300e-003	0.1459		473.2488	473.2488	0.0110		473.5234
Total	**0.1626**	**0.0964**	**1.4222**	**4.7500e-003**	**0.5365**	**3.9400e-003**	**0.5405**	**0.1423**	**3.6300e-003**	**0.1459**		**473.2488**	**473.2488**	**0.0110**		**473.5234**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.3595	10.1630	30.4902	0.1229	10.8503	0.0907	10.9410	2.9031	0.0842	2.9873		12,536.24 52	12,536.24 52	0.5704		12,550.50 46
Unmitigated	2.3595	10.1630	30.4902	0.1229	10.8503	0.0907	10.9410	2.9031	0.0842	2.9873		12,536.24 52	12,536.24 52	0.5704		12,550.50 46

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,275.75	1,275.75	1275.75	4,359,432	4,359,432
Enclosed Parking with Elevator	0.00	0.00	0.00		
Strip Mall	391.20	391.20	391.20	744,297	744,297
Total	1,666.95	1,666.95	1,666.95	5,103,729	5,103,729

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Enclosed Parking with Elevator	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Strip Mall	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
NaturalGas Unmitigated	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	6136.21	0.0662	0.5655	0.2406	3.6100e-003		0.0457	0.0457		0.0457	0.0457		721.9070	721.9070	0.0138	0.0132	726.1969
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	48.9753	5.3000e-004	4.8000e-003	4.0300e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004		5.7618	5.7618	1.1000e-004	1.1000e-004	5.7960
Total		**0.0667**	**0.5703**	**0.2447**	**3.6400e-003**		**0.0461**	**0.0461**		**0.0461**	**0.0461**		**727.6688**	**727.6688**	**0.0140**	**0.0133**	**731.9930**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	6.13621	0.0662	0.5655	0.2406	3.6100e-003		0.0457	0.0457		0.0457	0.0457		721.9070	721.9070	0.0138	0.0132	726.1969
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.0489753	5.3000e-004	4.8000e-003	4.0300e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004		5.7618	5.7618	1.1000e-004	1.1000e-004	5.7960
Total		**0.0667**	**0.5703**	**0.2447**	**3.6400e-003**		**0.0461**	**0.0461**		**0.0461**	**0.0461**		**727.6688**	**727.6688**	**0.0140**	**0.0133**	**731.9930**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400
Unmitigated	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5220					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.6347					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4010	3.4263	1.4580	0.0219		0.2770	0.2770		0.2770	0.2770	0.0000	4,374.0000	4,374.0000	0.0838	0.0802	4,399.9925
Landscaping	0.6048	0.2310	20.0660	1.0600e-003		0.1113	0.1113		0.1113	0.1113		36.1781	36.1781	0.0348		37.0475
Total	**7.1625**	**3.6573**	**21.5240**	**0.0229**		**0.3883**	**0.3883**		**0.3883**	**0.3883**	**0.0000**	**4,410.1781**	**4,410.1781**	**0.1186**	**0.0802**	**4,437.0400**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5220					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.6347					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4010	3.4263	1.4580	0.0219		0.2770	0.2770		0.2770	0.2770	0.0000	4,374.000 0	4,374.000 0	0.0838	0.0802	4,399.992 5
Landscaping	0.6048	0.2310	20.0660	1.0600e-003		0.1113	0.1113		0.1113	0.1113		36.1781	36.1781	0.0348		37.0475
Total	**7.1625**	**3.6573**	**21.5240**	**0.0229**		**0.3883**	**0.3883**		**0.3883**	**0.3883**	**0.0000**	**4,410.178 1**	**4,410.178 1**	**0.1186**	**0.0802**	**4,437.040 0**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Wilshire Highland

Los Angeles-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	354.00	Space	0.00	141,600.00	0
Apartments Mid Rise	243.00	Dwelling Unit	1.69	271,150.00	695
Strip Mall	10.90	1000sqft	0.00	10,900.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	11			**Operational Year**	2025
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	1227.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Consistent with the SCEA's model.

Land Use - See SWAPE comment on "Underestimated Land Use Size."

Construction Phase - See SWAPE comment on "Unsubstantiated Changes to Individual Construction Phase Lengths."

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Off-road Equipment - Consistent with the SCEA's model.

Trips and VMT - Consistent with the SCEA's model.

Demolition - Consistent with the SCEA's model.

Grading - Consistent with the SCEA's model.

Architectural Coating - See SWAPE comment on "Unsubstantiated Reduction to Architectural Coating Area."

Vehicle Trips - Consistent with the SCEA's model.

Woodstoves - Consistent with the SCEA's model.

Energy Use -

Construction Off-road Equipment Mitigation - See SWAPE comment on "Incorrect Application of Construction-Related Mitigation Measures."

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	28.00
tblConstructionPhase	NumDays	200.00	554.00
tblConstructionPhase	NumDays	20.00	55.00
tblConstructionPhase	NumDays	4.00	11.00
tblConstructionPhase	NumDays	10.00	28.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberWood	12.15	0.00
tblGrading	MaterialExported	0.00	65,095.00
tblLandUse	LandUseSquareFeet	243,000.00	271,150.00

tblLandUse	LotAcreage	3.19	0.00
tblLandUse	LotAcreage	6.39	1.69
tblLandUse	LotAcreage	0.25	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblTripsAndVMT	HaulingTripNumber	8,137.00	9,300.00
tblVehicleTrips	ST_TR	6.39	5.25
tblVehicleTrips	ST_TR	42.04	35.89
tblVehicleTrips	SU_TR	5.86	5.25
tblVehicleTrips	SU_TR	20.43	35.89
tblVehicleTrips	WD_TR	6.65	5.25
tblVehicleTrips	WD_TR	44.32	35.89
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.0976	224.7582	66.4943	0.6622	16.2068	1.2903	17.3047	4.2705	1.2282	5.3075	0.0000	71,608.0609	71,608.0609	5.5303	0.0000	71,746.3187
2023	1.9470	12.6144	16.3074	0.0522	2.9868	0.3962	3.3830	0.7995	0.3647	1.1643	0.0000	5,246.0925	5,246.0925	0.6418	0.0000	5,262.1378
2024	68.4186	11.8674	15.6795	0.0514	2.9868	0.3619	3.3487	0.7995	0.3331	1.1326	0.0000	5,167.7168	5,167.7168	0.6357	0.0000	5,183.6083
2025	68.3996	1.2521	3.1018	7.4400e-003	0.5365	0.0554	0.5920	0.1423	0.0551	0.1974	0.0000	727.0881	727.0881	0.0256	0.0000	727.7290
Maximum	**68.4186**	**224.7582**	**66.4943**	**0.6622**	**16.2068**	**1.2903**	**17.3047**	**4.2705**	**1.2282**	**5.3075**	**0.0000**	**71,608.0609**	**71,608.0609**	**5.5303**	**0.0000**	**71,746.3187**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.0976	224.7582	66.4943	0.6622	16.2068	1.2903	17.3047	4.2705	1.2282	5.3075	0.0000	71,608.0609	71,608.0609	5.5303	0.0000	71,746.3187
2023	1.9470	12.6144	16.3074	0.0522	2.9868	0.3962	3.3830	0.7995	0.3647	1.1643	0.0000	5,246.0925	5,246.0925	0.6418	0.0000	5,262.1378
2024	68.4186	11.8674	15.6795	0.0514	2.9868	0.3619	3.3487	0.7995	0.3331	1.1326	0.0000	5,167.7168	5,167.7168	0.6357	0.0000	5,183.6083
2025	68.3996	1.2521	3.1018	7.4400e-003	0.5365	0.0554	0.5920	0.1423	0.0551	0.1974	0.0000	727.0881	727.0881	0.0256	0.0000	727.7290
Maximum	**68.4186**	**224.7582**	**66.4943**	**0.6622**	**16.2068**	**1.2903**	**17.3047**	**4.2705**	**1.2282**	**5.3075**	**0.0000**	**71,608.0609**	**71,608.0609**	**5.5303**	**0.0000**	**71,746.3187**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400
Energy	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
Mobile	2.2841	10.3704	28.9490	0.1170	10.8503	0.0911	10.9414	2.9031	0.0846	2.9877		11,940.1010	11,940.1010	0.5699		11,954.3492
Total	**9.5133**	**14.5980**	**50.7177**	**0.1435**	**10.8503**	**0.5254**	**11.3758**	**2.9031**	**0.5190**	**3.4221**	**0.0000**	**17,077.9479**	**17,077.9479**	**0.7025**	**0.0935**	**17,123.3821**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400
Energy	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
Mobile	2.2841	10.3704	28.9490	0.1170	10.8503	0.0911	10.9414	2.9031	0.0846	2.9877		11,940.1010	11,940.1010	0.5699		11,954.3492
Total	**9.5133**	**14.5980**	**50.7177**	**0.1435**	**10.8503**	**0.5254**	**11.3758**	**2.9031**	**0.5190**	**3.4221**	**0.0000**	**17,077.9479**	**17,077.9479**	**0.7025**	**0.0935**	**17,123.3821**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2022	8/16/2022	5	55	
2	Grading	Grading	8/17/2022	8/31/2022	5	11	
3	Building Construction	Building Construction	9/1/2022	10/15/2024	5	554	
4	Paving	Paving	10/16/2024	11/22/2024	5	28	
5	Architectural Coating	Architectural Coating	11/23/2024	1/1/2025	5	28	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 5.5

Acres of Paving: 0

Residential Indoor: 571,151; Residential Outdoor: 190,384; Non-Residential Indoor: 16,350; Non-Residential Outdoor: 5,450; Striped Parking Area: 8,496 (Architectural Coating – sqft)

OffRoad Equipment

Wilshire Highland - Los Angeles-South Coast County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	3	8.00	81	0.73
Demolition	Crawler Tractors	1	8.00	212	0.43
Demolition	Excavators	1	8.00	158	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Signal Boards	4	8.00	6	0.82
Demolition	Skid Steer Loaders	1	8.00	65	0.37
Demolition	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	1	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	0	6.00	187	0.41
Grading	Rubber Tired Dozers	0	6.00	247	0.40
Grading	Signal Boards	4	8.00	6	0.82
Grading	Skid Steer Loaders	1	8.00	65	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	2	6.00	231	0.29
Building Construction	Excavators	1	8.00	158	0.38
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

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	11	28.00	0.00	1,279.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	9,300.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	4	238.00	51.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	48.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.0330	0.0000	5.0330	0.7621	0.0000	0.7621			0.0000			0.0000
Off-Road	2.9036	27.3482	22.7372	0.0452		1.2709	1.2709		1.2098	1.2098		4,261.722 7	4,261.722 7	0.8570		4,283.146 7
Total	**2.9036**	**27.3482**	**22.7372**	**0.0452**	**5.0330**	**1.2709**	**6.3040**	**0.7621**	**1.2098**	**1.9718**		**4,261.722 7**	**4,261.722 7**	**0.8570**		**4,283.146 7**

3.2 Demolition - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1890	5.8609	1.5320	0.0176	0.4066	0.0169	0.4235	0.1115	0.0162	0.1276		1,911.0975	1,911.0975	0.1361		1,914.4991
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1254	0.0825	0.9497	2.9100e-003	0.3130	2.4500e-003	0.3154	0.0830	2.2600e-003	0.0853		289.6795	289.6795	7.9800e-003		289.8789
Total	**0.3144**	**5.9434**	**2.4817**	**0.0205**	**0.7196**	**0.0194**	**0.7390**	**0.1945**	**0.0184**	**0.2129**		**2,200.7769**	**2,200.7769**	**0.1441**		**2,204.3780**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.0330	0.0000	5.0330	0.7621	0.0000	0.7621			0.0000			0.0000
Off-Road	2.9036	27.3482	22.7372	0.0452		1.2709	1.2709		1.2098	1.2098	0.0000	4,261.7227	4,261.7227	0.8570		4,283.1466
Total	**2.9036**	**27.3482**	**22.7372**	**0.0452**	**5.0330**	**1.2709**	**6.3040**	**0.7621**	**1.2098**	**1.9718**	**0.0000**	**4,261.7227**	**4,261.7227**	**0.8570**		**4,283.1466**

3.2 Demolition - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1890	5.8609	1.5320	0.0176	0.4066	0.0169	0.4235	0.1115	0.0162	0.1276		1,911.0975	1,911.0975	0.1361		1,914.4991
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1254	0.0825	0.9497	2.9100e-003	0.3130	2.4500e-003	0.3154	0.0830	2.2600e-003	0.0853		289.6795	289.6795	7.9800e-003		289.8789
Total	**0.3144**	**5.9434**	**2.4817**	**0.0205**	**0.7196**	**0.0194**	**0.7390**	**0.1945**	**0.0184**	**0.2129**		**2,200.7769**	**2,200.7769**	**0.1441**		**2,204.3780**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1995	0.0000	1.1995	0.1586	0.0000	0.1586			0.0000			0.0000
Off-Road	1.1375	11.6173	10.1194	0.0206		0.4819	0.4819		0.4478	0.4478		1,920.2775	1,920.2775	0.5777		1,934.7210
Total	**1.1375**	**11.6173**	**10.1194**	**0.0206**	**1.1995**	**0.4819**	**1.6814**	**0.1586**	**0.4478**	**0.6064**		**1,920.2775**	**1,920.2775**	**0.5777**		**1,934.7210**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	6.8705	213.0820	55.6966	0.6396	14.7838	0.6142	15.3980	4.0526	0.5877	4.6402		69,480.8695	69,480.8695	4.9469		69,604.5414
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0896	0.0589	0.6784	2.0800e-003	0.2236	1.7500e-003	0.2253	0.0593	1.6100e-003	0.0609		206.9139	206.9139	5.7000e-003		207.0563
Total	**6.9601**	**213.1409**	**56.3749**	**0.6417**	**15.0073**	**0.6160**	**15.6233**	**4.1119**	**0.5893**	**4.7011**		**69,687.7834**	**69,687.7834**	**4.9526**		**69,811.5977**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.1995	0.0000	1.1995	0.1586	0.0000	0.1586			0.0000			0.0000
Off-Road	1.1375	11.6173	10.1194	0.0206		0.4819	0.4819		0.4478	0.4478	0.0000	1,920.2775	1,920.2775	0.5777		1,934.7210
Total	**1.1375**	**11.6173**	**10.1194**	**0.0206**	**1.1995**	**0.4819**	**1.6814**	**0.1586**	**0.4478**	**0.6064**	**0.0000**	**1,920.2775**	**1,920.2775**	**0.5777**		**1,934.7210**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	6.8705	213.0820	55.6966	0.6396	14.7838	0.6142	15.3980	4.0526	0.5877	4.6402		69,480.8695	69,480.8695	4.9469		69,604.5414
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0896	0.0589	0.6784	2.0800e-003	0.2236	1.7500e-003	0.2253	0.0593	1.6100e-003	0.0609		206.9139	206.9139	5.7000e-003		207.0563
Total	**6.9601**	**213.1409**	**56.3749**	**0.6417**	**15.0073**	**0.6160**	**15.6233**	**4.1119**	**0.5893**	**4.7011**		**69,687.7834**	**69,687.7834**	**4.9526**		**69,811.5977**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8854	9.3101	7.7721	0.0162		0.4141	0.4141		0.3810	0.3810		1,564.1900	1,564.1900	0.5059		1,576.8373
Total	**0.8854**	**9.3101**	**7.7721**	**0.0162**		**0.4141**	**0.4141**		**0.3810**	**0.3810**		**1,564.1900**	**1,564.1900**	**0.5059**		**1,576.8373**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1528	4.6960	1.3554	0.0126	0.3265	9.1400e-003	0.3357	0.0940	8.7400e-003	0.1028		1,351.3484	1,351.3484	0.0849		1,353.4716
Worker	1.0659	0.7010	8.0724	0.0247	2.6603	0.0208	2.6811	0.7055	0.0192	0.7247		2,462.2753	2,462.2753	0.0678		2,463.9703
Total	**1.2186**	**5.3971**	**9.4278**	**0.0374**	**2.9868**	**0.0300**	**3.0168**	**0.7995**	**0.0279**	**0.8275**		**3,813.6237**	**3,813.6237**	**0.1527**		**3,817.4419**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8854	9.3101	7.7721	0.0162		0.4141	0.4141		0.3810	0.3810	0.0000	1,564.1900	1,564.1900	0.5059		1,576.8373
Total	**0.8854**	**9.3101**	**7.7721**	**0.0162**		**0.4141**	**0.4141**		**0.3810**	**0.3810**	**0.0000**	**1,564.1900**	**1,564.1900**	**0.5059**		**1,576.8373**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1528	4.6960	1.3554	0.0126	0.3265	9.1400e-003	0.3357	0.0940	8.7400e-003	0.1028		1,351.3484	1,351.3484	0.0849		1,353.4716
Worker	1.0659	0.7010	8.0724	0.0247	2.6603	0.0208	2.6811	0.7055	0.0192	0.7247		2,462.2753	2,462.2753	0.0678		2,463.9703
Total	**1.2186**	**5.3971**	**9.4278**	**0.0374**	**2.9868**	**0.0300**	**3.0168**	**0.7995**	**0.0279**	**0.8275**		**3,813.6237**	**3,813.6237**	**0.1527**		**3,817.4419**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8293	8.4237	7.6829	0.0162		0.3717	0.3717		0.3419	0.3419		1,564.5169	1,564.5169	0.5060		1,577.1668
Total	**0.8293**	**8.4237**	**7.6829**	**0.0162**		**0.3717**	**0.3717**		**0.3419**	**0.3419**		**1,564.5169**	**1,564.5169**	**0.5060**		**1,577.1668**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1135	3.5567	1.2044	0.0122	0.3265	4.3400e-003	0.3309	0.0940	4.1500e-003	0.0982		1,309.3807	1,309.3807	0.0748		1,311.2498
Worker	1.0042	0.6340	7.4201	0.0238	2.6603	0.0202	2.6805	0.7055	0.0186	0.7242		2,372.1950	2,372.1950	0.0611		2,373.7212
Total	**1.1177**	**4.1907**	**8.6245**	**0.0360**	**2.9868**	**0.0246**	**3.0114**	**0.7995**	**0.0228**	**0.8223**		**3,681.5756**	**3,681.5756**	**0.1358**		**3,684.9710**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8293	8.4237	7.6829	0.0162		0.3717	0.3717		0.3419	0.3419	0.0000	1,564.5169	1,564.5169	0.5060		1,577.1668
Total	**0.8293**	**8.4237**	**7.6829**	**0.0162**		**0.3717**	**0.3717**		**0.3419**	**0.3419**	**0.0000**	**1,564.5169**	**1,564.5169**	**0.5060**		**1,577.1668**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1135	3.5567	1.2044	0.0122	0.3265	4.3400e-003	0.3309	0.0940	4.1500e-003	0.0982		1,309.380 7	1,309.380 7	0.0748		1,311.249 8
Worker	1.0042	0.6340	7.4201	0.0238	2.6603	0.0202	2.6805	0.7055	0.0186	0.7242		2,372.195 0	2,372.195 0	0.0611		2,373.721 2
Total	**1.1177**	**4.1907**	**8.6245**	**0.0360**	**2.9868**	**0.0246**	**3.0114**	**0.7995**	**0.0228**	**0.8223**		**3,681.575 6**	**3,681.575 6**	**0.1358**		**3,684.971 0**

3.4 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7858	7.7455	7.6038	0.0162		0.3377	0.3377		0.3106	0.3106		1,564.801 4	1,564.801 4	0.5061		1,577.453 7
Total	**0.7858**	**7.7455**	**7.6038**	**0.0162**		**0.3377**	**0.3377**		**0.3106**	**0.3106**		**1,564.801 4**	**1,564.801 4**	**0.5061**		**1,577.453 7**

3.4 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1107	3.5439	1.1679	0.0122	0.3265	4.2700e-003	0.3308	0.0940	4.0800e-003	0.0981		1,304.3024	1,304.3024	0.0736		1,306.1432
Worker	0.9529	0.5781	6.9078	0.0231	2.6603	0.0199	2.6802	0.7055	0.0184	0.7239		2,298.6130	2,298.6130	0.0559		2,300.0114
Total	**1.0636**	**4.1220**	**8.0757**	**0.0352**	**2.9868**	**0.0242**	**3.0110**	**0.7995**	**0.0224**	**0.8220**		**3,602.9154**	**3,602.9154**	**0.1296**		**3,606.1546**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7858	7.7455	7.6038	0.0162		0.3377	0.3377		0.3106	0.3106	0.0000	1,564.8014	1,564.8014	0.5061		1,577.4537
Total	**0.7858**	**7.7455**	**7.6038**	**0.0162**		**0.3377**	**0.3377**		**0.3106**	**0.3106**	**0.0000**	**1,564.8014**	**1,564.8014**	**0.5061**		**1,577.4537**

3.4 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1107	3.5439	1.1679	0.0122	0.3265	4.2700e-003	0.3308	0.0940	4.0800e-003	0.0981		1,304.3024	1,304.3024	0.0736		1,306.1432
Worker	0.9529	0.5781	6.9078	0.0231	2.6603	0.0199	2.6802	0.7055	0.0184	0.7239		2,298.6130	2,298.6130	0.0559		2,300.0114
Total	**1.0636**	**4.1220**	**8.0757**	**0.0352**	**2.9868**	**0.0242**	**3.0110**	**0.7995**	**0.0224**	**0.8220**		**3,602.9154**	**3,602.9154**	**0.1296**		**3,606.1546**

3.5 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6180	5.8607	8.8253	0.0136		0.2810	0.2810		0.2594	0.2594		1,297.8688	1,297.8688	0.4114		1,308.1547
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6180**	**5.8607**	**8.8253**	**0.0136**		**0.2810**	**0.2810**		**0.2594**	**0.2594**		**1,297.8688**	**1,297.8688**	**0.4114**		**1,308.1547**

3.5 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0521	0.0316	0.3773	1.2600e-003	0.1453	1.0900e-003	0.1464	0.0385	1.0000e-003	0.0395		125.5545	125.5545	3.0600e-003		125.6309
Total	**0.0521**	**0.0316**	**0.3773**	**1.2600e-003**	**0.1453**	**1.0900e-003**	**0.1464**	**0.0385**	**1.0000e-003**	**0.0395**		**125.5545**	**125.5545**	**3.0600e-003**		**125.6309**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6180	5.8607	8.8253	0.0136		0.2810	0.2810		0.2594	0.2594	0.0000	1,297.868 8	1,297.868 8	0.4114		1,308.154 7
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6180**	**5.8607**	**8.8253**	**0.0136**		**0.2810**	**0.2810**		**0.2594**	**0.2594**	**0.0000**	**1,297.868 8**	**1,297.868 8**	**0.4114**		**1,308.154 7**

3.5 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0521	0.0316	0.3773	1.2600e-003	0.1453	1.0900e-003	0.1464	0.0385	1.0000e-003	0.0395		125.5545	125.5545	3.0600e-003		125.6309
Total	**0.0521**	**0.0316**	**0.3773**	**1.2600e-003**	**0.1453**	**1.0900e-003**	**0.1464**	**0.0385**	**1.0000e-003**	**0.0395**		**125.5545**	**125.5545**	**3.0600e-003**		**125.6309**

3.6 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**68.2265**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.6 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1922	0.1166	1.3932	4.6500e-003	0.5365	4.0200e-003	0.5406	0.1423	3.7000e-003	0.1460		463.5858	463.5858	0.0113		463.8679
Total	**0.1922**	**0.1166**	**1.3932**	**4.6500e-003**	**0.5365**	**4.0200e-003**	**0.5406**	**0.1423**	**3.7000e-003**	**0.1460**		**463.5858**	**463.5858**	**0.0113**		**463.8679**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**68.2265**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.6 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1922	0.1166	1.3932	4.6500e-003	0.5365	4.0200e-003	0.5406	0.1423	3.7000e-003	0.1460		463.5858	463.5858	0.0113		463.8679
Total	**0.1922**	**0.1166**	**1.3932**	**4.6500e-003**	**0.5365**	**4.0200e-003**	**0.5406**	**0.1423**	**3.7000e-003**	**0.1460**		**463.5858**	**463.5858**	**0.0113**		**463.8679**

3.6 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**68.2166**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.6 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1831	0.1066	1.2927	4.4700e-003	0.5365	3.9400e-003	0.5405	0.1423	3.6300e-003	0.1459		445.6401	445.6401	0.0103		445.8972
Total	**0.1831**	**0.1066**	**1.2927**	**4.4700e-003**	**0.5365**	**3.9400e-003**	**0.5405**	**0.1423**	**3.6300e-003**	**0.1459**		**445.6401**	**445.6401**	**0.0103**		**445.8972**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	68.0457					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**68.2166**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.6 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1831	0.1066	1.2927	4.4700e-003	0.5365	3.9400e-003	0.5405	0.1423	3.6300e-003	0.1459		445.6401	445.6401	0.0103		445.8972
Total	**0.1831**	**0.1066**	**1.2927**	**4.4700e-003**	**0.5365**	**3.9400e-003**	**0.5405**	**0.1423**	**3.6300e-003**	**0.1459**		**445.6401**	**445.6401**	**0.0103**		**445.8972**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.2841	10.3704	28.9490	0.1170	10.8503	0.0911	10.9414	2.9031	0.0846	2.9877		11,940.10 10	11,940.10 10	0.5699		11,954.34 92
Unmitigated	2.2841	10.3704	28.9490	0.1170	10.8503	0.0911	10.9414	2.9031	0.0846	2.9877		11,940.10 10	11,940.10 10	0.5699		11,954.34 92

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,275.75	1,275.75	1275.75	4,359,432	4,359,432
Enclosed Parking with Elevator	0.00	0.00	0.00		
Strip Mall	391.20	391.20	391.20	744,297	744,297
Total	1,666.95	1,666.95	1,666.95	5,103,729	5,103,729

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Enclosed Parking with Elevator	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841
Strip Mall	0.544880	0.044491	0.207704	0.117752	0.014693	0.006272	0.020732	0.032141	0.002572	0.001984	0.005239	0.000700	0.000841

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930
NaturalGas Unmitigated	0.0667	0.5703	0.2447	3.6400e-003		0.0461	0.0461		0.0461	0.0461		727.6688	727.6688	0.0140	0.0133	731.9930

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	6136.21	0.0662	0.5655	0.2406	3.6100e-003		0.0457	0.0457		0.0457	0.0457		721.9070	721.9070	0.0138	0.0132	726.1969
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	48.9753	5.3000e-004	4.8000e-003	4.0300e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004		5.7618	5.7618	1.1000e-004	1.1000e-004	5.7960
Total		**0.0667**	**0.5703**	**0.2447**	**3.6400e-003**		**0.0461**	**0.0461**		**0.0461**	**0.0461**		**727.6688**	**727.6688**	**0.0140**	**0.0133**	**731.9930**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	6.13621	0.0662	0.5655	0.2406	3.6100e-003		0.0457	0.0457		0.0457	0.0457		721.9070	721.9070	0.0138	0.0132	726.1969
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Strip Mall	0.0489753	5.3000e-004	4.8000e-003	4.0300e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004		5.7618	5.7618	1.1000e-004	1.1000e-004	5.7960
Total		**0.0667**	**0.5703**	**0.2447**	**3.6400e-003**		**0.0461**	**0.0461**		**0.0461**	**0.0461**		**727.6688**	**727.6688**	**0.0140**	**0.0133**	**731.9930**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400
Unmitigated	7.1625	3.6573	21.5240	0.0229		0.3883	0.3883		0.3883	0.3883	0.0000	4,410.1781	4,410.1781	0.1186	0.0802	4,437.0400

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5220					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.6347					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4010	3.4263	1.4580	0.0219		0.2770	0.2770		0.2770	0.2770	0.0000	4,374.0000	4,374.0000	0.0838	0.0802	4,399.9925
Landscaping	0.6048	0.2310	20.0660	1.0600e-003		0.1113	0.1113		0.1113	0.1113		36.1781	36.1781	0.0348		37.0475
Total	**7.1625**	**3.6573**	**21.5240**	**0.0229**		**0.3883**	**0.3883**		**0.3883**	**0.3883**	**0.0000**	**4,410.1781**	**4,410.1781**	**0.1186**	**0.0802**	**4,437.0400**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.5220					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.6347					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4010	3.4263	1.4580	0.0219		0.2770	0.2770		0.2770	0.2770	0.0000	4,374.000 0	4,374.000 0	0.0838	0.0802	4,399.992 5
Landscaping	0.6048	0.2310	20.0660	1.0600e-003		0.1113	0.1113		0.1113	0.1113		36.1781	36.1781	0.0348		37.0475
Total	**7.1625**	**3.6573**	**21.5240**	**0.0229**		**0.3883**	**0.3883**		**0.3883**	**0.3883**	**0.0000**	**4,410.178 1**	**4,410.178 1**	**0.1186**	**0.0802**	**4,437.040 0**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Construction

2022	
Annual Emissions (tons/year)	0.0482
Daily Emissions (lbs/day)	0.264109589
Construction Duration (days)	214
Total DPM (lbs)	56.51945205
Total DPM (g)	25637.22345
Start Date	6/1/2022
End Date	1/1/2023
Construction Days	214

2023	
Annual Emissions (tons/year)	0.0515
Daily Emissions (lbs/day)	0.282191781
Construction Duration (days)	365
Total DPM (lbs)	103
Total DPM (g)	46720.8
Start Date	1/1/2023
End Date	1/1/2024
Construction Days	365

2024	
Annual Emissions (tons/year)	0.0552
Daily Emissions (lbs/day)	0.302465753
Construction Duration (days)	365
Total DPM (lbs)	110.4
Total DPM (g)	50077.44
Start Date	1/1/2024
End Date	12/31/2024
Construction Days	365

Total	
Total DPM (lbs)	269.9194521
Total DPM (g)	122435.4635
Emission Rate (g/s)	0.001501141
Release Height (meters)	3
Total Acreage	1.68
Max Horizontal (meters)	116.61
Min Horizontal (meters)	58.30
Initial Vertical Dimension (meters)	1.5
Setting	Urban
Population	3,898,747
Start Date	6/1/2022
End Date	12/31/2024
Total Construction Days	944
Total Years of Construction	2.59
Total Years of Operation	27.41

Operation

Emission Rate	
Annual Emissions (tons/year)	0.0309
Daily Emissions (lbs/day)	0.169315068
Total DPM (lbs)	61.8
Emission Rate (g/s)	0.000888904
Release Height (meters)	3
Total Acreage	1.68
Max Horizontal (meters)	116.61
Min Horizontal (meters)	58.30
Initial Vertical Dimension (meters)	1.5
Setting	Urban
Population	3,898,747

```
Start date and time  05/02/22 16:33:34

                              AERSCREEN 21112


5001 Wilshire, Construction


            5001 Wilshire, Construction



         -----------------  DATA ENTRY VALIDATION  -----------------

                       METRIC             ENGLISH

 ** AREADATA **  ---------------     ----------------


 Emission Rate:    0.150E-02 g/s         0.119E-01 lb/hr

 Area Height:           3.00 meters           9.84 feet

 Area Source Length:  116.61 meters         382.58 feet

 Area Source Width:    58.30 meters         191.27 feet

 Vertical Dimension:    1.50 meters           4.92 feet

 Model Mode:           URBAN

 Population:         3898747

 Dist to Ambient Air:           1.0 meters             3. feet



 ** BUILDING DATA **
```

No Building Downwash Parameters

** TERRAIN DATA **

No Terrain Elevations

Source Base Elevation: 0.0 meters   0.0 feet

Probe distance: 5000. meters   16404. feet

No flagpole receptors

No discrete receptors used

** FUMIGATION DATA **

No fumigation requested

** METEOROLOGY DATA **

Min/Max Temperature: 250.0 / 310.0 K   -9.7 / 98.3 Deg F

Minimum Wind Speed: 0.5 m/s

Anemometer Height: 10.000 meters

Dominant Surface Profile: Urban

Dominant Climate Type: Average Moisture

Surface friction velocity (u*): not adjusted

DEBUG OPTION ON

AERSCREEN output file:

2022.05.02_AERSCREEN_5001Wilshire_Construction.out

*** AERSCREEN Run is Ready to Begin

No terrain used, AERMAP will not be run

****

SURFACE CHARACTERISTICS & MAKEMET

Obtaining surface characteristics...

Using AERMET seasonal surface characteristics for Urban with Average Moisture

Season	Albedo	Bo	zo
Winter	0.35	1.50	1.000
Spring	0.14	1.00	1.000
Summer	0.16	2.00	1.000
Autumn	0.18	2.00	1.000

Creating met files aerscreen_01_01.sfc & aerscreen_01_01.pfl

Creating met files aerscreen_02_01.sfc & aerscreen_02_01.pfl

Creating met files aerscreen_03_01.sfc & aerscreen_03_01.pfl

Creating met files aerscreen_04_01.sfc & aerscreen_04_01.pfl

Buildings and/or terrain present or rectangular area source, skipping probe

FLOWSECTOR started 05/02/22 16:36:49

****

Running AERMOD

Processing Winter

Processing surface roughness sector 1

```
*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
```

```
*****************************************************

Processing wind flow sector   4


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  15


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


*****************************************************

Processing wind flow sector   5


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  20


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


*****************************************************

Processing wind flow sector   6


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  25


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


*****************************************************
```

```
Processing wind flow sector   7

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  30

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Spring

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   5
```

```
    ********   WARNING MESSAGES   ********
               ***  NONE  ***

**************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

**************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

**************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  20
```

```
    ********   WARNING MESSAGES   ********
               ***  NONE  ***

************************************************
Processing wind flow sector   6


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  25


    ********   WARNING MESSAGES   ********
               ***  NONE  ***

************************************************
Processing wind flow sector   7


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  30


    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ****************************************


  Running AERMOD
 Processing Summer


Processing surface roughness sector  1
```

```
*****************************************************
Processing wind flow sector   1


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   0


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   2


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   5


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   3


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  10


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
```

Processing wind flow sector 4

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector 15

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 5

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector 20

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 6

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector 25

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 7

```
 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  30

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Autumn

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   5
```

```
    ********   WARNING MESSAGES   ********
               ***  NONE  ***

******************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

******************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

******************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  20

    ********   WARNING MESSAGES   ********
```

*** NONE ***

****

Processing wind flow sector 6

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector 25

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 7

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector 30

******** WARNING MESSAGES ********

*** NONE ***

FLOWSECTOR ended 05/02/22 16:36:56

REFINE started 05/02/22 16:36:56

AERMOD Finishes Successfully for REFINE stage 3 Winter sector 0

******** WARNING MESSAGES ********

*** NONE ***

REFINE ended 05/02/22 16:36:57

****

AERSCREEN Finished Successfully

With no errors or warnings

Check log file for details

****

Ending date and time 05/02/22 16:36:58

Concentration	Distance	Elevation	Diag	Season/Month	Zo sector	Date	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	HT	REF TA	HT
0.37763E+01	1.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.43316E+01	25.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.47179E+01	50.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
* 0.48305E+01	59.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.33325E+01	75.00	0.00	20.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.19969E+01	100.00	0.00	5.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.14155E+01	125.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.10790E+01	150.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.86174E+00	175.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.71111E+00	200.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.60181E+00	225.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.51834E+00	250.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.45326E+00	275.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.40149E+00	300.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.35892E+00	325.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.32370E+00	350.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.29416E+00	375.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.26896E+00	400.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.24733E+00	425.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.22852E+00	450.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.21203E+00	475.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.19752E+00	500.00	0.00	5.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.18466E+00	525.00	0.00	5.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.17320E+00	550.00	0.00	5.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.16293E+00	575.00	0.00	5.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0	1.000	1.50	0.35	0.50	10.0	310.0	2.0
0.15367E+00	600.00	0.00	0.0	Winter	0-360	10011001	-1.30	0.043	-9.000	0.020	-999.	21.	6.0							

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1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.14530E+00     625.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.13770E+00     650.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.13077E+00     675.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.12441E+00     700.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.11856E+00     725.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.11317E+00     750.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.10817E+00     775.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.10353E+00     800.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.99236E-01     825.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.95237E-01     850.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.91510E-01     875.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.88030E-01     900.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.84773E-01     925.00     0.00   5.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.81720E-01     950.00     0.00  10.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.78854E-01     975.00     0.00  10.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.76157E-01    1000.00     0.00  10.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.73617E-01    1025.00     0.00  10.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.71222E-01    1050.00     0.00  15.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.68956E-01    1075.00     0.00  15.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.67033E-01    1100.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.64996E-01    1125.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.63064E-01    1150.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.61229E-01    1175.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.59485E-01    1200.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.57825E-01    1225.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.56244E-01    1250.00     0.00   5.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.54736E-01    1275.00     0.00   0.0      Winter      0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
```

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.53296E-01 1300.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.51921E-01 1325.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.50607E-01 1350.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.49348E-01 1375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.48144E-01 1400.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.46989E-01 1425.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.45881E-01 1450.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.44818E-01 1475.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.43796E-01 1500.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.42815E-01 1525.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.41871E-01 1550.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.40962E-01 1575.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.40087E-01 1600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.39244E-01 1625.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.38431E-01 1650.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.37646E-01 1675.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.36890E-01 1700.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.36159E-01 1725.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.35452E-01 1750.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.34770E-01 1775.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.34109E-01 1800.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.33471E-01 1825.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.32852E-01 1850.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.32254E-01 1875.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.31673E-01 1900.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.31111E-01 1924.99 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.30566E-01 1950.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.30037E-01 1975.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.29524E-01 2000.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.29025E-01 2025.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.28541E-01 2050.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.28072E-01 2075.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.27615E-01 2100.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.27171E-01 2125.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.26739E-01 2150.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.26319E-01 2175.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25910E-01 2200.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25513E-01 2224.99 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25125E-01 2250.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.24748E-01 2275.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.24381E-01 2300.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.24023E-01 2325.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23674E-01 2350.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23333E-01 2375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23001E-01 2400.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.22678E-01 2425.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.22361E-01 2450.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.22053E-01 2475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21751E-01 2500.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21457E-01 2525.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21169E-01 2550.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20888E-01 2575.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20614E-01 2600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20345E-01 2625.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20083E-01 2650.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19826E-01 2675.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19576E-01 2700.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19330E-01 2725.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19090E-01 2750.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18855E-01 2775.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18625E-01 2800.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18399E-01 2825.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18179E-01 2850.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17963E-01 2875.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17751E-01 2900.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17544E-01 2925.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17340E-01 2950.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17141E-01 2975.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16946E-01 3000.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16754E-01 3025.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16567E-01 3050.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16383E-01 3075.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16202E-01 3100.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16025E-01 3125.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15851E-01 3150.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15680E-01 3174.99 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15513E-01 3200.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15348E-01 3225.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15187E-01 3250.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15029E-01 3275.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14873E-01 3300.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

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1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.14720E-01    3325.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.14570E-01    3350.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.14422E-01    3375.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.14278E-01    3400.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.14135E-01    3425.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13995E-01    3450.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13857E-01    3475.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13722E-01    3500.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13589E-01    3525.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13458E-01    3550.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13330E-01    3575.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13203E-01    3600.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.13079E-01    3625.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12956E-01    3650.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12836E-01    3675.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12717E-01    3700.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12601E-01    3725.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12486E-01    3750.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12373E-01    3775.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12261E-01    3800.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12152E-01    3825.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.12044E-01    3850.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.11938E-01    3875.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.11833E-01    3900.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.11730E-01    3925.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.11629E-01    3950.00    0.00  0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
1.000  1.50  0.35   0.50  10.0  310.0   2.0
  0.11529E-01    3975.00    0.00  5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.  21.    6.0
```

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11430E-01 4000.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11333E-01 4025.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11238E-01 4050.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11143E-01 4075.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11051E-01 4100.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10959E-01 4125.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10869E-01 4150.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10780E-01 4175.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10692E-01 4200.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10606E-01 4225.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10520E-01 4250.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10436E-01 4275.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10353E-01 4300.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10272E-01 4325.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10191E-01 4350.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10111E-01 4375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10033E-01 4400.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.99553E-02 4425.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.98789E-02 4450.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.98035E-02 4475.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.97290E-02 4500.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.96556E-02 4525.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.95830E-02 4550.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.95115E-02 4575.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.94408E-02 4600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.93711E-02 4625.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.93022E-02 4650.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

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1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.92342E-02    4675.00    0.00  20.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.91671E-02    4700.00    0.00   0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.91008E-02    4725.00    0.00  25.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.90353E-02    4750.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.89707E-02    4775.00    0.00   0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.89068E-02    4800.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.88437E-02    4825.00    0.00  15.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.87814E-02    4850.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.87199E-02    4875.00    0.00   0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.86591E-02    4900.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.85990E-02    4924.99    0.00  15.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.85396E-02    4950.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.84810E-02    4975.00    0.00   0.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
  0.84230E-02    5000.00    0.00   5.0    Winter    0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.     6.0
1.000   1.50   0.35   0.50  10.0  310.0   2.0
```

Start date and time 05/05/22 11:11:12

AERSCREEN 21112

5001 Wilshire, Operation

5001 Wilshire, Operation

----------------- DATA ENTRY VALIDATION -----------------

	METRIC	ENGLISH
** AREADATA **	---------------	----------------
Emission Rate:	0.889E-03 g/s	0.705E-02 lb/hr
Area Height:	3.00 meters	9.84 feet
Area Source Length:	116.61 meters	382.58 feet
Area Source Width:	58.30 meters	191.27 feet
Vertical Dimension:	1.50 meters	4.92 feet
Model Mode:	URBAN	
Population:	3898747	
Dist to Ambient Air:	1.0 meters	3. feet

** BUILDING DATA **

No Building Downwash Parameters

** TERRAIN DATA **

No Terrain Elevations

Source Base Elevation: 0.0 meters   0.0 feet

Probe distance: 5000. meters   16404. feet

No flagpole receptors

No discrete receptors used

** FUMIGATION DATA **

No fumigation requested

** METEOROLOGY DATA **

Min/Max Temperature: 250.0 / 310.0 K   -9.7 / 98.3 Deg F

Minimum Wind Speed: 0.5 m/s

Anemometer Height: 10.000 meters

Dominant Surface Profile: Urban

Dominant Climate Type: Average Moisture

Surface friction velocity (u*): not adjusted

DEBUG OPTION ON

AERSCREEN output file:

2022.05.05_AERSCREEN_5001Wilshire_Operation.out

*** AERSCREEN Run is Ready to Begin

No terrain used, AERMAP will not be run

****

SURFACE CHARACTERISTICS & MAKEMET

Obtaining surface characteristics...

Using AERMET seasonal surface characteristics for Urban with Average Moisture

Season	Albedo	Bo	zo
Winter	0.35	1.50	1.000
Spring	0.14	1.00	1.000
Summer	0.16	2.00	1.000
Autumn	0.18	2.00	1.000

Creating met files aerscreen_01_01.sfc & aerscreen_01_01.pfl

Creating met files aerscreen_02_01.sfc & aerscreen_02_01.pfl

Creating met files aerscreen_03_01.sfc & aerscreen_03_01.pfl

Creating met files aerscreen_04_01.sfc & aerscreen_04_01.pfl

Buildings and/or terrain present or rectangular area source, skipping probe

FLOWSECTOR started 05/05/22 11:16:10

****

Running AERMOD

Processing Winter

Processing surface roughness sector 1

```
****************************************************

Processing wind flow sector   1


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   0


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


****************************************************

Processing wind flow sector   2


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   5


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


****************************************************

Processing wind flow sector   3


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  10


    ********   WARNING MESSAGES   ********

               ***  NONE  ***
```

****

Processing wind flow sector   4

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector 15

********   WARNING MESSAGES   ********

*** NONE ***

****

Processing wind flow sector   5

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector 20

********   WARNING MESSAGES   ********

*** NONE ***

****

Processing wind flow sector   6

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector 25

********   WARNING MESSAGES   ********

*** NONE ***

****

```
Processing wind flow sector   7


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  30


    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************


  Running AERMOD
 Processing Spring


Processing surface roughness sector  1


*****************************************************
Processing wind flow sector   1


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   0


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   2


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   5
```

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 3

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector 10

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 4

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector 15

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 5

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector 20

```
    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   6

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  25

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   7

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  30

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Summer

Processing surface roughness sector  1
```

```
*****************************************************

Processing wind flow sector   1


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   0


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************

Processing wind flow sector   2


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   5


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************

Processing wind flow sector   3


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  10


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
```

```
Processing wind flow sector   4


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  15


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   5


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  20


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   6


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  25


    ********   WARNING MESSAGES   ********
               ***  NONE  ***


*****************************************************
Processing wind flow sector   7
```

```
 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  30

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Autumn

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   5
```

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 3

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector 10

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 4

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector 15

******** WARNING MESSAGES ********

*** NONE ***

****

Processing wind flow sector 5

AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector 20

******** WARNING MESSAGES ********

```
               ***  NONE  ***


*****************************************************

Processing wind flow sector   6


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  25


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


*****************************************************

Processing wind flow sector   7


 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  30


    ********   WARNING MESSAGES   ********

               ***  NONE  ***


FLOWSECTOR   ended 05/05/22 11:16:16


REFINE       started 05/05/22 11:16:16


 AERMOD Finishes Successfully for REFINE stage 3 Winter sector   0


    ********   WARNING MESSAGES   ********
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*** NONE ***

REFINE ended 05/05/22 11:16:18

****

AERSCREEN Finished Successfully

With no errors or warnings

Check log file for details

****

Ending date and time 05/05/22 11:16:19

Concentration Distance Elevation Diag Season/Month Zo sector Date H0 U* W* DT/DZ ZICNV
ZIMCH M-O LEN Z0 BOWEN ALBEDO REF WS HT REF TA HT
0.22370E+01 1.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25660E+01 25.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.27949E+01 50.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
* 0.28615E+01 59.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19742E+01 75.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11829E+01 100.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.83854E+00 125.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.63916E+00 150.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.51049E+00 175.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.42126E+00 200.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.35651E+00 225.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.30706E+00 250.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.26851E+00 275.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23784E+00 300.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21262E+00 325.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19176E+00 350.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17426E+00 375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15933E+00 400.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14652E+00 425.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13538E+00 450.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12560E+00 475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11701E+00 500.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10939E+00 525.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10260E+00 550.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.96516E-01 575.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.91030E-01 600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

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1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.86073E-01      625.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.81570E-01      650.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.77464E-01      675.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.73698E-01      700.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.70232E-01      725.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.67040E-01      750.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.64078E-01      775.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.61333E-01      800.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.58786E-01      825.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.56418E-01      850.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.54210E-01      875.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.52148E-01      900.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.50219E-01      925.00      0.00   5.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.48410E-01      950.00      0.00  10.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.46712E-01      975.00      0.00  10.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.45115E-01     1000.00      0.00  10.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.43610E-01     1025.00      0.00  10.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.42191E-01     1050.00      0.00  15.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.40849E-01     1075.00      0.00  15.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.39710E-01     1100.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.38503E-01     1125.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.37359E-01     1150.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.36272E-01     1175.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.35238E-01     1200.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.34255E-01     1225.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.33318E-01     1250.00      0.00   5.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
1.000  1.50  0.35   0.50  10.0  310.0    2.0
  0.32425E-01     1275.00      0.00   0.0       Winter       0-360   10011001   -1.30  0.043 -9.000  0.020 -999.   21.      6.0
```

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.31572E-01 1300.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.30758E-01 1325.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.29979E-01 1350.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.29234E-01 1375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.28520E-01 1400.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.27836E-01 1425.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.27180E-01 1450.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.26550E-01 1475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25945E-01 1500.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.25363E-01 1525.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.24804E-01 1550.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.24265E-01 1575.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23747E-01 1600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.23248E-01 1625.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.22766E-01 1650.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.22301E-01 1675.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21853E-01 1700.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21420E-01 1725.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.21002E-01 1750.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20597E-01 1775.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.20206E-01 1800.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19828E-01 1824.99 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19461E-01 1850.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.19107E-01 1875.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18763E-01 1900.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18430E-01 1924.99 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.18107E-01 1950.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17794E-01 1975.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17490E-01 2000.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.17194E-01 2025.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16908E-01 2050.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16629E-01 2075.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16359E-01 2100.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.16096E-01 2125.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15840E-01 2150.00 0.00 30.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15591E-01 2175.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15349E-01 2200.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.15113E-01 2225.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14884E-01 2250.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14660E-01 2275.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14443E-01 2300.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14231E-01 2325.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.14024E-01 2350.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13822E-01 2375.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13626E-01 2400.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13434E-01 2425.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13247E-01 2450.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.13064E-01 2475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12885E-01 2500.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12711E-01 2525.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12540E-01 2550.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12374E-01 2575.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12211E-01 2600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.12052E-01 2625.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11897E-01 2650.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11745E-01 2675.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11596E-01 2700.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11451E-01 2725.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11309E-01 2750.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11169E-01 2775.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.11033E-01 2800.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10900E-01 2825.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10769E-01 2850.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10641E-01 2875.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10515E-01 2900.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10393E-01 2925.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10272E-01 2950.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10154E-01 2975.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.10039E-01 3000.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.99252E-02 3025.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.98140E-02 3050.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.97049E-02 3075.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.95979E-02 3100.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.94930E-02 3125.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.93900E-02 3150.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.92889E-02 3174.99 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.91897E-02 3199.99 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.90923E-02 3225.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.89967E-02 3250.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.89029E-02 3275.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.88107E-02 3300.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.87201E-02 3325.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.86312E-02 3350.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.85438E-02 3375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.84579E-02 3400.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.83735E-02 3425.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.82906E-02 3450.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.82090E-02 3475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.81289E-02 3500.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.80501E-02 3525.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.79726E-02 3550.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.78964E-02 3575.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.78215E-02 3600.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.77477E-02 3625.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.76752E-02 3650.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.76038E-02 3675.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.75336E-02 3700.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.74645E-02 3724.99 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.73965E-02 3750.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.73295E-02 3775.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.72636E-02 3800.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.71987E-02 3825.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.71348E-02 3849.99 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.70719E-02 3875.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.70100E-02 3900.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.69489E-02 3925.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.68888E-02 3950.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.68296E-02 3975.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.67713E-02 4000.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.67138E-02 4025.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.66571E-02 4050.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.66013E-02 4075.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.65463E-02 4100.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.64921E-02 4125.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.64386E-02 4150.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.63859E-02 4175.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.63339E-02 4200.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.62827E-02 4225.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.62322E-02 4250.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.61824E-02 4275.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.61333E-02 4300.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.60848E-02 4325.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.60370E-02 4350.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.59899E-02 4375.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.59434E-02 4400.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.58975E-02 4425.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.58522E-02 4450.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.58075E-02 4475.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.57634E-02 4500.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.57199E-02 4525.00 0.00 10.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.56769E-02 4550.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.56345E-02 4575.00 0.00 20.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.55926E-02 4600.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.55513E-02 4625.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.55105E-02 4650.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0

1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.54703E-02 4675.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.54305E-02 4700.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.53912E-02 4725.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.53525E-02 4750.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.53141E-02 4775.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.52763E-02 4800.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.52389E-02 4825.00 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.52020E-02 4850.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.51656E-02 4875.00 0.00 25.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.51296E-02 4900.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.50940E-02 4924.99 0.00 15.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.50588E-02 4950.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.50241E-02 4975.00 0.00 0.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
1.000 1.50 0.35 0.50 10.0 310.0 2.0
0.49897E-02 5000.00 0.00 5.0 Winter 0-360 10011001 -1.30 0.043 -9.000 0.020 -999. 21. 6.0
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SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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

Education:

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

Professional Certifications:

California Professional Geologist
California Certified Hydrogeologist
Qualified SWPPP Developer and Practitioner

Professional Experience:

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

Positions Matt has held include:

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

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

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, Coloradao.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Other Experience:

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

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

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Paul Rosenfeld, Ph.D.

Chemical Fate and Transport & Air Dispersion Modeling

Principal Environmental Chemist

Risk Assessment & Remediation Specialist

Education

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

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

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

Professional Experience

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

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

Professional History:

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

Publications:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Presentations:

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

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

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

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

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

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

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

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

Rosenfeld, P. E. (October 15-18, 2007). The Repeated Trespass of Tritium-Contaminated Water Into A Surrounding Community Form Repeated Waste Spills From A Nuclear Power Plant. *The 23rd Annual International*

Conferences on Soils Sediment and Water. Platform lecture conducted from University of Massachusetts, Amherst MA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Teaching Experience:

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

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

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

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

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

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

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

Academic Grants Awarded:

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

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

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

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

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

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

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

Deposition and/or Trial Testimony:

In the 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, 5-14-2021
Trial, October 8-4-2021

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

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

In the Superior Court of the State of Arizona In and For the Cunty of Maricopa
Mary Tryon et al., Plaintiff vs. The City of Pheonix v. Cox Cactus Farm, L.L.C., Utah Shelter Systems, Inc.
Case Number 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 *Plaintiffs*, vs. CNA Insurance Company et al.
Case Number 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, *Plaintiffs,* 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.: 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.: No. BC646857
Rosenfeld Deposition, 10-6-2018; Trial 3-7-19

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

In The District Court Of Regan County, Texas, 112th Judicial District
Phillip Bales et al., Plaintiff vs. Dow Agrosciences, LLC, et al., Defendants
Cause No.: 1923
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 Gilber, 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 Number: 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.: 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 N0. 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 17th Judicial Circuit, in and For Broward County, Florida
Walter Hinton, et. al. Plaintiff, vs. City of Fort Lauderdale, Florida, a Municipality, Defendant.
Case Number 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 Number 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 Number: 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 Number 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 Number 2:07CV1052
Rosenfeld Deposition: July 2009