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Enterprise Emergency Peaker (01-EP-10C) Enterprise BESS Project

CEC Air Quality Data Request Response No. 4

prepared for

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June 2026

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Attachments

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1 Introduction

On March 27, 2026, Enterprise BESS, LLC (Applicant) received a fourth Data Request (Data Requests; Set 2) from the California Energy Commission (CEC) for the Enterprise Emergency Peaker Project (01-EP-10C) in response to the Applicant's petition to amend (TN 255290, March 18, 2025) for the Enterprise Battery Energy Storage System (BESS) Project. The following document provides the Applicant's responses to the Data Request received from the CEC.

The responses are grouped by individual discipline or topic area and are presented in the same order and with the same numbering provided by the CEC. The responses included in this document are considered complete responses to the corresponding Data Requests.

2 Air Quality and Greenhouse Gas Resources

2.1 Data Request-1 through -12

Data Request-1 through -5

Staff acknowledged the previous hazard consequence analysis (HCA), but indicated that literature review indicated the presences of toxic air contaminants (TACs) not presented in the original HCA such as benzene, particulate matter. Further staff indicated that hydrogen chloride, hydrogen fluoride, hydrogen cyanide, acrolein, formaldehyde, VOCs, sulfur dioxide, nitrogen dioxide, phosphoryl fluoride, carbonyl fluoride could also be released. Staff requested additional analysis to include not only a discussion of the TACs identified, but also to include an analysis of a worst case scenario where a whole BESS unit was involved in a thermal runaway/fire event.

- **DR-1:** Please provide a dispersion modeling analysis of all potential criteria air pollutants and TACs for the thermal runaway/fire scenario using a well-validated model (AERMOD and HARP2 preferred), including the TACs in Attachment F: Cell Gas Analysis Report, TN 268071) and those mentioned above using available representative data from the literature review or measured from any BESS test.

  Response: Rincon developed a protocol for development of an HCA using AERMOD and conducted a literature review for documents provided by CEC staff as well as other credible resources. The protocol was submitted to CEC staff for review and an e-mail with preliminary comments was received on May 13, 2026 (R. Longman). The revisions requested in the e-mail were incorporated into the HCA protocol and an HCA was conducted for Enterprise following that protocol.

  Rincon conducted a revised HCA using AERMOD. The analysis was performed for a "non-flaming event," defined as the thermal runaway propagation throughout one (1) bay (defined a containing 2 racks, with each containing 4 modules for a total of 832 cells) but with insufficient heat transfer to cause propagation across barriers separating the bays. Also, it analyzed a "flaming event" otherwise known as an "extreme event" defined as the burning of one (1) enclosure. The HCA modeling results were compared to the U.S. EPA Acute Exposure Guideline Level (AEGL) standards and the Emergency Response Planning Guidelines (ERPGs). The UL 9540A cell level test reports identify hazardous substances captured during the thermal runaway that may have an impact on nearby receptors. These hazardous substances include, but are not be limited to: carbon monoxide (CO), carbon dioxide (CO_2), hydrogen, methane, ethylene, acetylene, ethane, propane, propene (propylene), benzene, particulate matter (including ultrafine particulates and metals), hydrogen chloride (HCl), hydrogen fluoride (HF), hydrogen cyanide (HCN), acrolein, formaldehyde, VOCs (toluene, etc.), sulfur dioxide (SO_2), nitrogen dioxide (NO_2). The *Enterprise Emergency Peaker (01-EP-10C) Enterprise BESS Project AERMOD Hazard Consequences Analysis for CEC Air Quality Data Request 03; Requests DR-1 through DR-5* (HCA) is provided as Attachment A to this document.

- **DR-2:** If the modeling data originate from literature review, please provide a copy of the referenced literature. If the modeling data come from a BESS test, please also provide the specific analytical method(s) for determining the presence of off-gassing constituents in the test, including sample collection methods, laboratory preparation methods, analytical methods, the MDL (method detection limit) or PQL (practical quantitation limit) or RL (reporting limit) for all measured constituents, and all QA/QC (quality assurance/quality control) data including results of a spiked sample.

  Response: The following documents were primarily used in the preparation of the HCA and are included as Attachments B through E of this document. Additional literature was reviewed. Please refer to the HCA provided as Attachment A to this document for more information.

  - McAllister, Jamie L. et al. SFPE Foundation. June 2025. Environmental and Health Impacts of Thermal Runaway Events in Outdoor Lithium-Ion Battery Energy Storage System Installations

- A. Iqbal et al., July 2025. Comparative fire hazards of lithium-ion battery chemistries: Linking thermal behavior, gas toxicity, and state-of-charge to composite risk profiles. Journal of Power Sources 655 (2025) 237914
- Ramboll, March 2024, Offsite Consequence Analysis, Vistra Morro Bay Battery Energy Storage System (BESS) Project
- UL 9540A. 2023. Cell Test Report

- **DR-3:** Please identify the assumed worst-case scenario, including but not limited to the number of cells or modules involved, state of charge, burn duration, and emission factors. Please provide justification demonstrating that the assumptions are both representative and conservative to be protective of public health.

  Response: Rincon conducted a revised HCA using AERMOD, based on a CEC staff-reviewed protocol as discussed in DR-1 above. The analysis was performed for a "non-flaming event," defined as the thermal runaway propagation throughout one (1) bay (defined a containing 2 racks, with each containing 4 modules for a total of 832 cells) but with insufficient heat transfer to cause propagation across barriers separating the bays. Also, it analyzed a "flaming event" defined as the burning of one (1) enclosure and a burn duration of 6 hours. A full description of assumptions, methodology and emission factors is provided in the *Enterprise Emergency Peaker (01-EP-10C) Enterprise BESS Project AERMOD Hazard Consequences Analysis for CEC Air Quality Data Request 03; Requests DR-1 through DR-5* provided as Attachment A to this document.

  The plume modeling represents a situation in which "all controls failed" and is intended for bounding consequence evaluation, not likelihood-weighted risk. The modeled scenarios represented low-frequency emergency events. The UL 9540A Cell Test showed that the thermal runaway propagated to one non-induced cell resulting in a total of three cells in thermal runaway. The HCA as analyzed is therefore a conservative worst case scenario where either one full bay (non-flaming scenario) or a whole enclosure (flaming scenario) undergoes thermal runaway. The results identified in the HCA are not anticipated to occur given the nature of the BESS storage units as well as the fire suppression systems that are incorporated into the design but not accounted for in the HCA.

- **DR-4:** Please compare the modeled TACs concentrations to appropriate health-based exposure thresholds, including the U.S. EPA Acute Exposure Guideline Levels (AEGLs), the OEHHA/CARB acute Reference Exposure Levels (RELs), and Emergency Response Planning Guidelines (ERPGs) thresholds but excluding the Immediately Dangerous to Life or Health (IDLH) levels since they are not health protective.

  Response: The HCA compared the TAC concentrations to the AEGLs and ERPGs.. As detailed in the HCA (See Attachment A), the Project is anticipated to result in concentrations exceeding AEGL-1 levels for Hydrogen Fluoride, Hydrogen Chloride, Nitrogen Dioxide, and Acrolein. No ERPGs were exceeded for pollutants that did not have an AEGL. The Project is not anticipated to exceed any Level 2 or 3 emergency thresholds. As a result, isopleths were provided to anticipate the potential area of Level 1 emergency threshold exceedance, intended for use in community notification recommendations.

- **DR-5:** Please demonstrate whether the acute Hazard Index (HI) of TACs would be higher than the significance threshold of 1.0 at sensitive receptors. Please demonstrate whether the criteria air pollutant impacts would cause or contribute to any exceedance of ambient air quality standards. If the acute HI would exceed 1.0 or the criteria air pollutant impacts would cause or contribute to any exceedance of ambient air quality standards, please explain what mitigation measures are planned to be implemented to reduce the impacts to less than significant.

  Response: The modeled pollutant concentration at the sensitive receptor were used to determine the hazard index. Potential acute health risk impacts do not exceed the hazard index threshold of 1 for either the non-flaming or flaming scenarios as detailed in the HCA (See Attachment A).

Data Request-6 through 9

Staff requests additional information to fully understand how the operation of the BESS would affect operation of the Enterprise Emergency Peaker Project (EEPP). The PTA states it would not be recharged from the EEPP and only from the SDG&E Grid (pages 5, 6, and 9, and Appendix A-4 of the PTA and Appendix C, page 5). The PTA also states the BESS and EEPP could be operational at the same time during ramping periods as the switch from one to the other is made, however a maximum allowed 52 MW would not be exceeded at the point of interconnection (Pages 1, 2 and Appendix A-5 of the PTA). Further the PTA states that hourly and annual emissions from the EEPP would not increase (page 5).

- **DR-6:** The PTA states on page 9 and in Appendix C on page C-6 and elsewhere that construction would begin in Q4 of 2025 and commercial operation would begin in Q4 of 2026. Please provide an updated construction and operation schedule. It is not necessary to recompute construction emissions as long as they do not increase.

  Response: Construction of the BESS facility would begin in September of 2026 and end in October of 2027 for a total of 13 months. The first full year of operational activities is anticipated to be 2028. Emissions from construction and operational activities are not anticipated to increase because construction and operational activities would not change, they would only shift a year into the future. As construction and operational activities would remain the same and there is only a year shift in construction and operational activities, the emissions from the equipment used for construction and installed for operational activities would remain consistent with what was identified in the PTA. No remodeling is necessary as emissions would not change.

- **DR-7:** An electric vehicle is typically operated to maintain the state of charge of its battery at between 20% and 80% of its full charge, to maximize its battery life. Battery degradation is expected as stated in the PTA, for example on page 6. DR-9 in TN 268067 says the analysis of BESS operations is based on assuming the batteries charge 4 hours per day for a total of 75,920 MWh per year. Describe the expected range of the state of charge of the BESS during operations, the cost of recharging the BESS (say, in cents/kWh), the hours of the day when it would be recharged and the cost of electricity provided to the grid by the BESS (say, in cents/kWh) after considering charge/discharge efficiency.

  Response: The expected range of state of charge for the BESS during operations is 2 percent to 98 percent depending on the expected electricity draw. The BESS will be charged for up to 4 hours (estimated average 1 hour) between 9 am and 4 pm. It is estimated that an average loss per year over the 40 years is approximately 36,141 MWh/year from transportation and distribution with 39,779,500 kWh/year (75,920 MWh/year – 36,141 MWh/year). The cost of recharging the BESS is estimated at 0.5 cents per kWh and the cost of electricity provided to the grid by the BESS is estimated at 10 cents per kWh.

- **DR-8:** Compare the cost of operating the BESS (say, in cents/kWh) versus the cost of operating EEPP (say, in cents/kWh). Assuming that the cost of operating EEPP is greater than the BESS, explain when and why the EEPP would operate. If the cost of operating the BESS exceeds the cost of operating EEPP, explain the need for the BESS. Compare annual emissions of EEPP before and after installation of the BESS.

  Response: The cost of operating the BESS 0.5 cents per kWh and the anticipated cost to operate the EEPP is 7.5 cents per kWh. The cost of operating the EEPP is greater than the cost of operating the BESS. The EEPP would only be operated if the off-peak demand for electricity exceeded the electricity stored in the BESS. The annual operation of the BESS would result in an annual reduction in emissions from the EEPP of 43,760 MT CO_2e annually and 17,791 tons NO_2 annually. Calculations are provided in Attachment F.

- **DR-9:** Appendix C of TN 262237 says on pages 33 and 36 that the BESS project would be required to comply with SDAPCD's Permit to Operate (PTO). Has the project owner submitted an application to the SDAPCD? What is the status of any analysis conducted by the SDAPCD? If the SDAPCD has completed an analysis and issued a PTO for the BESS, please provide a copy.

Response: There will not be an emergency generator installed as part of the project and therefore no PTO would be required, nor will an application for one be submitted to the air district. The proposed BESS project would not have any effect on the existing PTO for the Enterprise Emergency Peaker Plant and no application has been submitted to the SDAPCD for the BESS Project since there are no applicable sources.

Data Request-10 and -11

The staff requests more details on how the project would reduce GHG emissions, especially as it relates to the diesel-fueled emergency backup generator (backup generators) if proposed as part of the project.

- **DR-10:** If any emergency diesel generator is planned for use, what other technologies or fuel alternatives to diesel for the backup generators would be explored and why would they not be pursued?

  Response: As discussed in response to Data Request 9 above, an emergency generator is not included as part of the project. Therefore, the exploration or use of technologies and fuels to replace the use of diesel is not required.

- **DR-11:** Would the project owner explore the procurement of renewable diesel and/or carbon offsets as a means of demonstrating consistency with the State of California's goal of carbon neutrality? If not, why not?

  Response: As discussed in response to Data Request 9 above, an emergency generator is not included as part of the project. Therefore, the use of renewable diesel and/or carbon offsets are not being explored as part of the project to reduce GHG emissions from diesel fuel use.

Data Request-12

In the Air Quality and Greenhouse Gas Study (Appendix C, TN #262237), Table 8 estimates total annual project emissions to be 109 $MTCO_2e$. On page 39, the project construction (amortized) emissions plus annual operation are listed as 272 $MTCO_2e$ per year.

- **DR-12:** Please explain the difference between these numbers.

  Response: Project emissions were revised from the initial writing of the report and the submitted document. The 109 $MTCO_2e$ per year presented in Table 8 is the correct, updated number when all offsets were taken into account. The 272 $MTCO_2e$ per year indicated on page 39, is a typographical error and should be 109 $MTCO_2e$ per year consistent with what is presented in Table 8.

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Attachment A

Enterprise emergency Peaker (01-EP-10C) Enterprise BESS Project AERMOD Hazard Consequences Analysis for CEC Air Quality Data Request 03; Requests DR-1 through DR-5

Enterprise Emergency Peaker (01-EP-10C)
Enterprise BESS Project

AERMOD Hazard Consequence Analysis for CEC Data Request Set 2; Requests DR-1 through DR-5

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Preface

Lithium-ion batteries are the most commonly used chemistry in utility-scale Battery Energy Storage Systems (BESS) (i.e., larger than 50 megawatts [MW]) throughout the United States (U.S.) and are expected to remain so for the next decade. Data from the Department of Energy (DOE) shows that as of the end of 2022, about 9 gigawatts (GW) of energy storage has been added to the U.S. grid since 2010. More than 90 percent of the new storage capacity has a duration of 4 hours or less, and in the last few years, lithium-ion batteries have provided about 99 percent of new capacity (DOE National Renewable Energy Laboratory 2023). Thus, lithium-ion batteries are the nearly exclusive stationary energy storage technology currently being deployed for utility-scale BESS.

There are multiple types of lithium-ion chemistry, but two types are used primarily in BESS. The first is lithium nickel manganese cobalt (NMC) and the second is lithium iron phosphate (LFP). Initially, projects relied on the NMC batteries for utility-scale BESS. However, between 2021 and 2023, the industry started moving to LFP batteries for cost competitiveness, among a multitude of reasons (Investment Recovery Association 2026). Lithium NMC batteries typically have higher energy density and smaller size units compared to LFP batteries, meaning that they can store more energy in a smaller package. However, the current NMC technology is not as thermally stable as LFP batteries, leading to a greater risk of thermal runaway and battery fires. By 2024, LFP has emerged as the undisputed standard and accounts for over 90 percent of all utility-scale BESS developed across the U.S. (Investment Recovery Association 2026).

LFP batteries have improved safety and thermal stability compared to current NMC batteries due to their lithium iron phosphate ($LiFePO4$) chemical structure (Brand, M., 2013; Evlithium 2025; Tran, M-K, 2021). They are less prone to thermal runaway and combustion, provide a significantly longer cycle life, and are considered more environmentally friendly due to their relatively non-toxic constituents and readily available raw materials. As of December 2023, no deaths have resulted from a BESS fire at a utility-scale facility in California or the U.S. (American Clean Power Association 2023)

The proposed Project discussed within this report is a BESS with LFP batteries, which is anticipated to be considerably safer and thermally stable compared to using NMC batteries. This technical analysis and report were prepared specifically to respond to comments provided by the California Energy Commission (CEC) and in accordance with their specific requests. Please note that this technical analysis and report were not prepared specifically in accordance with fire protection codes, like the California Fire Code (CFC) or the National Fire Protection Agency (NFPA).

This technical analysis is based on numerous sources, including State and Federal resources, scientific literature and various software modeling programs that are considered industry standard. The included analysis is based upon the information and industry best practices available at the time of preparation. Due to the rapidly evolving technological and regulatory landscape, information and best practices relied upon may change over time. While this analysis demonstrates a reasonable effort to ensure the accuracy and reliability of the information provided, the scenarios analyzed in its reports are intended for informational purposes only and should not be construed as definitive or exhaustive. The analyses do not guarantee the specific outcomes identified in the modeling technology or assessed in the reports. The report is provided on an as-is basis and shall not be construed to create any duty or liability to any person. No party involved in the preparation of this report shall be liable for any damages or losses resulting from the implementation or failure to implement any recommendations or measures suggested in this analysis, nor for errors, omissions, or inaccuracies in the source information. Users are advised to interpret the findings with caution and consider the potential for variability in real-world applications.

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1 Introduction

1.1 Problem Statement

Coffman Engineers, Inc. (Coffman) previously developed the *Enterprise Battery Energy Storage System Project Hazard Consequence Analysis* (HCA) using the Phast model for the Enterprise Battery Energy Storage System (BESS) Project (Project) located in Escondido in San Diego County, California. However, the California Energy Commission (CEC), as lead agency, has provided a data request for an expansion of this study.[1] The CEC has suggested that the reliance on the UL9540A report cell gas composition and identification of a "credible event" (with only a total of four cells undergoing thermal runaway per the unit test) is not sufficient for analyzing potential impacts. Rather, the CEC stated that a "worst-case fire could involve a whole BESS unit" which was understood, based on communications with the CEC, to mean an entire enclosure. The CEC also identified through literature review that other toxic air contaminants (TACs) beyond those identified in the UL9540A report may be emitted and requested that additional TACs be included in the analysis. In the absence of clear emissions and air dispersion modeling guidance promulgated by California regulatory agencies, a literature review was conducted as part of this process to identify potential health and environmental impacts of BESS thermal runaway incidents, review the factors contributing to the degree of the incidents, and review current modeling practices for air dispersion modeling.

1.2 Project Introduction

This study analyzes the potential health risk impacts associated with a thermal runaway event at the nearest sensitive receptors using the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA) Regulatory Model (AERMOD) for the Project located in Escondido, California. The Project intends to construct a nominal 52-megawatt (MW) BESS to the existing Enterprise Emergency Peaker Project. There are generally two scenarios that can occur related to potential thermal runaway events, which are the release of toxic gases without fires and the release of toxic gases associated with a fire. The "non-flaming scenario" involves an array of toxic and flammable pollutants that are different from the "flaming scenario" (both scenarios defined below). The flaming scenario also has substantial heat and buoyancy and, therefore, has different dispersion characteristics from the non-flaming scenario, which has lower temperature and less buoyancy.

The "non-flaming scenario" was defined as the thermal runaway propagation throughout one (1) bay (defined as containing 2 racks, with each containing 4 modules for a total of 832 cells) but with insufficient heat transfer to cause propagation across barriers separating the bays. Also, a "flaming scenario" was defined as the complete combustion of one (1) entire enclosure.[2] It is understood that the project will use lithium iron phosphate (LFP) battery types with a prismatic cell geometry.

The study is intended for use in responding to CEC comments as well as support for the Emergency Response Plan (ERP) – prepared independently of this analysis – so that the Operator and First Responders understand the practices and procedures to be followed to provide immediate and effective response to emergencies that may arise.

[1] CEC Data Request 1 through 5 in the March 27, 2026 document titled, *Data Requests for Enterprise Emergency Peaker Project (01-EP-10C)* (referred throughout as "CEC Data Request").
[2] This approach is consistent with the SFPE Report, discussed in more detail below, and consistent with CEC communicated requests.

1.3 Project Description

The Project is located in Escondido, California on portions of four parcels. The Project will be co-located with the existing CalPeak Power–Enterprise Emergency Peaker Project (EEPP) that was licensed by the CEC in 2001 (CEC Docket No. 01-EP-10). The Project would support California's current need for additional electrical supply capacity during high peak-load demand periods. The Project would use approximately 0.1 acre of available open areas within the northern portion of the overall 2.94-acre EEPP parcel, plus approximately 0.82 acre of additional adjacent land to the north on three parcels to the south of Auto Park Way, for a total of an approximately 1-acre area of disturbance. The Project would include containerized battery systems with internal heating ventilation and air conditioning and internal fire detection in each container/enclosure, battery management systems, power conversion systems (also called inverters), transformers, and electrical conductors. The Enterprise BESS yard will contain 24 SYL SU3794U3794KC enclosures manufactured by SYL Battery (a subsidiary of Risen Energy) containing lithium-ion battery technology.

The Project includes an approximately 350-foot-long 13.8-kilovolt (kV) gen-tie line supported on aboveground cable tray to connect the BESS to the existing EEPP switchyard GSU transformer. The elevated cable tray would be supported on pile foundations and/or concrete pads. Access to the EEPP is via the existing peaker plant entrance on Enterprise Street and the access to the northern BESS parcels is via the adjacent Auto Park Way.

Project-related improvements on the northern portion of the EEPP parcel include installation of: (1) gen-tie on elevated cable tray; (2) elevated switchgear platform; and (3) electrical and communication line connections in the EEPP switchgear area, including the low side of the GSU. Minor excavations associated with equipment foundations would be required.

The Enterprise BESS would be connected to the electrical grid via the existing GSU at the EEPP, which has an existing 69-kV connection to the San Diego Gas & Electric (SDG&E) Escondido Substation to the north. The Project would not require any high voltage modifications at the EEPP switchyard or the existing off-site 69-kV line. Operation of the BESS facility would be integrated with the existing EEPP, but the BESS will be charged from the electrical grid and not the EEPP. The BESS and the EEPP may be operated simultaneously in accordance with the market-optimized dispatch instructions received from the California Independent System Operator's (CAISO) Automated Dispatching System, but the combined output would be control-limited to never exceed the limit of the Generator Interconnection Agreement.

The Enterprise BESS Project would require discretionary permitting involving approval of a Petition for Post-Certification Amendment from the CEC. The Project's operational life and associated land leases are anticipated to be up to 40 years.

Please refer to Figure 1 for an overview of the Project site and Figure 2 for the BESS enclosure locations assumed for the air dispersion modeling analysis.

Figure 1 Project Area

Imagery provided by Microsoft Bing and its licensors © 2025.

Figure 2 BESS Enclosure Area for Air Dispersion Modeling

Imagery provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.

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Fig 3 Site Layout

1.4 Surrounding Area

The BESS yard is located in a mixed commercial and residential area within Escondido, California. The landscape is typical of the developed areas of Escondido Valley with vegetation categories being described as urban, coastal scrub, and mixed chaparral. The adjacent properties are zoned for Light Industrial (M-1), General Industrial (M-2), and Specific Plan (S-P) for residential, industrial, or commercial uses. The locations of additional occupancies, including schools and hospitals, are discussed below. Sensitive receptors are considered within this document as children, elderly, or others at a heightened risk of negative effects because of air pollutants.

The modeling focused on the nearby hospital and residences. The Palomar Medical Center Escondido property is located approximately 550 feet to the west with the actual hospital building approximately 950 feet to the west-southwest. The nearest residences are located approximately 0.2 miles to the northwest. These sensitive receptors were the closest and are within the health risk methodology modeling range and therefore would experience the highest potential health risk impacts. The modeled receptor grid was initially set to 1,000 feet to correspond with health risk methodologies, however the radius was expanded to the south and west to include the entire hospital and a large representative portion of the residential area.

2 Background

Accidental releases of material during an unlikely BESS thermal runaway fire event have the potential to affect surrounding populated areas. The purpose of the dispersion modeling assessment is to determine the magnitude and extent of potential emissions of hazardous air pollutants from both a non-flaming and flaming scenario. The following sections discuss background information that will be used to develop the technical analyses.

2.1 UL9540A Fire Testing

UL9540A is the industry-standard methodology for evaluating thermal runaway and fire propagation in BESS. This is achieved typically by heating mats installed around the cell(s) to simulate excessive heat which could cause thermal runaway. At minimum at least one adjacent cell must enter thermal runaway during the test to simulate propagation. Coffman analyzed the fire testing reports in an HMA report and made the following conclusions (Coffman 2025a):

- **Cell Level Test**
  - The cell test included the same test repeated 5 times with a separate cell each time. Each time, the single cell was forced into thermal runaway. On average, cell venting occurred at 156°C (312.8°F) and thermal runaway occurred at 232°C (449.6°F).
  - Gas composition was analyzed showing the primary flammable gas constituents as hydrogen, methane and ethylene. The primary toxic gas was carbon monoxide.
- **Module Level Test**
  - The module test was conducted with 2 cells being forced into thermal runaway by inducing heat via 1 film heater between the 2 initiating cells.
  - The report does not confirm the number of cells that went into thermal runaway, but the results appear similar to what was observed during the unit level test.
  - Gas composition was analyzed showing the primary flammable gas constituents as hydrogen, methane and ethylene. The primary toxic gas was carbon monoxide.
  - No flying debris, explosive discharge of gas, sparks or electrical arcs were observed.
- **Unit Level Test**
  - The unit test was conducted with a single module being forced into thermal runaway with one (1) film heater used to simultaneously heat two (2) cells within the module. No fire suppression system was installed for any test.
  - Thermal runaway of a single module occurred approximately 1 hour and 15 minutes after heater activation. At approximately 2 hours and 24 minutes temperature readings inside the initiating module showed it had cooled to approximately the same temperature as when thermal runaway initiated. Cooling continued for the duration of the test.
  - Thermal runaway propagated to one (1) non-induced cell within the initiating module, resulting in a total of three (3) cells in thermal runaway which self-extinguished without an external suppression or cooling.
  - The unit test results demonstrate that the thermal runaway event was limited to a single module within the initiating rack unit and there was no propagation to other modules within the initiating rack unit or any of the target rack units. There were no observations of a deflagration or explosive discharge of gases.

- The UL9540A unit test demonstrates that the ESS enclosure design will limit a thermal runaway event from propagating outside of a single enclosure with a clearance distance of 100mm (0.4 inches) to adjacent units. This testing supports the proposed layout and back-to-back spacing of 6 inches of rack units at the site.
- Additional thermal runaway prevention will be provided via a Battery Management System (BMS) that monitors battery voltage, temperature, etc. to detect irregularities and disconnect power if needed. It is important to note that while the BMS may disconnect power it cannot discharge stored energy from the batteries

2.2 Hazard Characterization

Based on the CEC Data Request, modeling results will be compared to the U.S. EPA Acute Exposure Guideline Level (AEGL) standards and the Emergency Response Planning Guidelines (ERPGs). The UL9540A cell level test reports identify hazardous substances captured during the thermal runaway that may have an impact on nearby receptors described earlier. These hazardous substances may include but are not be limited to: carbon monoxide (CO), carbon dioxide (CO_2), hydrogen, methane, ethylene, acetylene, ethane, propane, propene (propylene), and others. However, the CEC Data Requests indicate that toxic air contaminants (TACs), such as benzene, particulate matter (including ultrafine particulates and metals), hydrogen chloride (HCl), hydrogen fluoride (HF), hydrogen cyanide (HCN), acrolein, formaldehyde, VOCs (toluene, etc.), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), phosphoryl fluoride, and carbonyl fluoride could also be released, even though they are not evaluated in the cell/module level UL9540A test report. To supplement the test UL9540A data, additional publicly available emissions data from other publicly available BESS project reports and technical analyses were reviewed and utilized for this analysis, including references provided by the CEC. More information is provided below.

AEGLs are developed by the National Academy of Sciences. The public exposure guideline systems use a three-tier system to differentiate severity levels. The tier levels for each system are described below for reference as published by the U.S. EPA:

- AEGL-1 is the airborne concentration (expressed as parts per million [ppm] or milligrams per cubic meter [mg/m^3]) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
- AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
- AEGL-3 is the airborne concentration, (expressed as ppm or mg/m^3), of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

The ERPG values are defined as follows:

- ERPG-1 is the maximum airborne concentration below which nearly all individuals could be exposed to for up to one hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.
- ERPG-2 is the maximum airborne concentration below which nearly all individuals could be exposed to for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.
- ERPG-3 is the maximum airborne concentration below which nearly all individuals could be exposed to for up to one hour without experiencing or developing life-threatening health effects.

Non-cancer health effects can occur due to exposure of emissions of hazardous substances during a thermal runaway event. A risk evaluation measures the immediate or short-term adverse effects—such as nausea, headaches, or eye and throat irritation—resulting from chemical exposure lasting 1 hour or less. When multiple pollutants share the same toxicological effect (the same "pathway," i.e., inhalation), the effects can be additive. The AEGLs or ERPGs do not explicitly calculate or predict the synergistic, antagonistic, or additive health effects of exposures to multiple pollutants. In determining potential non-cancer health risks from hazardous substances, it is assumed there is a dose of the chemical of concern below which there would be minimal impact on human health. The air concentration corresponding to this dose for the purposes of this analysis is the AEGL.

Non-cancer health risks can be measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its AEGL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is considered to be an insignificant health risk. For this assessment, the maximum hazard index is presented and each hazardous substance was assumed to affect the inhalation pathway. This method leads to a conservative assessment.

Table 1 provides a summary of AEGL and ERPG, levels 1 through 3. Note that AEGL and ERPG values provided in milligrams per meter cubed (mg/m^3) or parts per million (ppm) were converted to micrograms per meter cubed ($\mu g/m^3$). The TACs presented in Table 1 below are those that had identified and usable emissions data for the AERMOD analysis, based on the literature review.

Table 1 Summary of 1-Hour AEGLs and ERPGs

Gas Species	Formula	CAS Number	AEGL-1 (µg/m³)	AEGL-2 (µg/m³)	AEGL-3 (µg/m³)	ERPG-1 (µg/m³)	ERPG-2 (µg/m³)	ERPG-3 (µg/m³)
Carbon Monoxide	CO	630-08-0	–	95,000	380,000	229,000	401,000	573,000
Carbon Dioxide	CO_2	124-38-9	–	–	–	–	–	–
Hydrogen	H_2	1333-74-0	–	–	–	–	–	–
Methane	CH_4	74-82-8	–	–	–	–	–	–
Acetylene	C_2H_2	74-86-2	–	–	–	–	–	–
Ethene (Ethylene)	C_2H_4	74-85-1	–	–	–	–	--	--
Ethane	C_2H_6	74-84-0	–	–	–	–	--	--
Propene (Propylene)	C_3H_6	115-07-1	–	–	–	–	–	–
Propane	C_3H_8	74-98-6	9,900,000	31,000,000	59,000,000	–	–	–
Butane	C_4H_{10}	106-97-8	13,000,000	40,000,000	130,000,000	–	–	–
Pentane	C_5H_{12}	109-66-0	–	–	–	–	–	–
Hexane	C_6H_{14}	110-54-3	–	10,000,000	30,000,000	–	–	–
Heptene	C_7H_{14}	592-76-7	–	–	--	–	–	–
Styrene	C_8H_8	100-42-5	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000
Benzene	C_6H_6	71-43-2	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000
Toluene	C_7H_8	108-88-3	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000
Dimethyl Carbonate	$C_3H_6O_3$	616-38-6	–	–	–	–	–	–
Ethyl Methyl Carbonate	$C_4H_8O_3$	623-53-0	–	–	–	–	–	–
Hydrogen Chloride	HCl	7647-01-0	2,700	33,000	155,000	4,350	29,000	217,000
Hydrogen Fluoride	HF	7664-39-3	800	20,000	36,000	1,637	16,000	41,000
Hydrogen Cyanide	HCN	74-90-8	2,200	7,800	17,000	--	11,000	28,000
Copper and compounds	Cu	7440-5-8	–	–	–	–	–	–
Ammonia	NH_3	7664-41-7	21,000	112,000	769,000	17,413	104,000	1,045,000
Formaldehyde	CH_2O	50-00-0	1,000	17,000	69,000	1,227	12,000	49,000
Acrolein	C_3H_4O	107-02-8	70	230	3,200	115	344	3,439
Nitrogen Dioxide	NO_2	10102-44-0	940	23,000	38,000	1,882	28,000	56,000
Sulfur Dioxide	SO_2	7446-09-5	520	1,950	49,000	786	8,000	66,000

1-Hour AEGL values from U.S. EPA. Units provided in mg/m³ and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to µg/m³.
AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; µg/m³ = micrograms per meter cubed;
Source: UL9540A Cell Test Report; SFPE Report; U.S. EPA; Cameo Chemicals.

2.3 Literature Review

The following provides an overview of the materials reviewed and how they were incorporated into this analysis. Publicly available reports on other BESS projects were reviewed and utilized for this analysis, including references provided by the CEC. Many of the sources provided by the CEC and reviewed are referenced in the primary source document, the “SFPE Report” listed first, below.

In addition to the sources included in the SFPE Report, the below sources were reviewed in support of this analysis. These studies provide an indication of the range of emissions that could be generated by a variety of battery cells. However, as these studies examine a wide range of battery cell sizes and configurations, the UL9540A testing conducted for this Project provides the most accurate estimate of a limited range of pollutants as they are conducted on the Project-specific cells. The UL9540A test did not analyze the wide range of different toxic materials that could potentially be produced, or the pollutants from the flaming scenario. So, other studies were applied to supplement this information to ensure a comprehensive analysis of potential pollutants and impacts.

McAllister, Jamie L. et al. SFPE Foundation. June 2025. Environmental and Health Impacts of Thermal Runaway Events in Outdoor Lithium-Ion Battery Energy Storage System Installations.

This document, referred throughout this analysis as the “SFPE Report” was utilized as the primary source of information besides the UL9540A test reports and standard California agency-related materials and guidance. The foundation of the Society of Fire Protection Engineers (SFPE) presented this research study as methodology to assess the health and environmental impacts from thermal runaway events in outdoor, large-scale, Li-ion BESS units. Through application of the methodology, a relationship between exposure limit distance and wind speed, ambient temperature, event duration, cell chemistry, and toxic gas species can be established. This study did not consider other health factors, such as thermal exposure. The methodology involves additional literature review of approximately 51 sources (referencing other studies also reviewed here) to aggregate data, plume dispersion modeling, and a risk analysis of the model results.

As part of the SFPE Report literature review process, characteristics were identified for how they would be relevant for developing modeling inputs. How these characteristics varied between cell chemistry, state of charge (SOC), cell geometry, number of cells and their arrangement, cell capacity, and flaming or non-flaming conditions was also investigated. Publications that did not quantify the identified thermal runaway characteristics or identify the methods of quantification were excluded. The literature review primarily focused on determining characteristics for LFP and nickel-manganese-cobalt (NMC) cells. While some studies evaluated cell chemistries outside of LFP and NMC cells, that data was not considered for the modeling inputs. Studies on full-scale electric vehicles (EVs) were only included when they tested standalone batteries or used a method to isolate the contribution of the battery from the other vehicle components.[3]

This document provides an overview of rationale and approach, literature review, risk assessment methodologies (for both flaming and non-flaming scenarios) and a results and discussion section related to their hypothetical scenario. It also combines a great deal of information from peer-reviewed studies to help support the defining of variables in calculation methodologies, like emission factors, heats of combustion, etc.

[3] A similar approach was applied for the literature review conducted for this analysis, including the exclusion of non-quantifiable data and EV testing that did not isolate other vehicle components.

A. Iqbal et al., July 2025. Comparative fire hazards of lithium-ion battery chemistries: Linking thermal behavior, gas toxicity, and state-of-charge to composite risk profiles. Journal of Power Sources 655 (2025) 237914.

This document provides some emission factors for a variety of battery types at a range of state-of-charge and was identified by the CEC as a recommended source for acrolein and formaldehyde emission factors. Therefore, it was used to develop emission factors for acrolein and formaldehyde for the flaming scenario.[4] The inclusion of acrolein is considered a conservative assumption, as it was not identified as a consistently emitted hazardous gas component in the SFPE Report and was excluded from their technical analysis. Furthermore, Iqbal et al. made its conclusions and presented acrolein emission rates based on 15 total data points, of which 7 of the emission rates were either 0 or non-detected. The remaining 8 data points varied drastically with a large standard of deviation. This is based on review of Figure 11 in Iqbal et al. Formaldehyde observed similar results in Iqbal et al. Figure 10. Also, the LFP cells studied had a different cell geometry than those in the Project (cylindrical versus prismatic).

Nonetheless, this analysis incorporated the highest maximum average emission rate of acrolein and formaldehyde across the different state-of-charges studied. Therefore, the analysis presented herein incorporating acrolein and formaldehyde is conservative.

Ramboll, March 2024, Offsite Consequence Analysis, Vistra Morro Bay Battery Energy Storage System (BESS) Project.

This document prepared an HCA for an unexpected fire event at Vistra's proposed 600 megawatt (MW) battery energy storage system (BESS) project in Morro Bay, California. This document was identified by the CEC as a more conservative source of HCl and HCN emission factors for the flaming scenario. Therefore, this document was used for the flaming scenario HCl and HCN emission factors.[5]

Tetra Tech Limited. November 2023. Island Green Power Limited Cottam Solar Project Air Quality Impact Assessment of Battery Energy Storage Systems (BESS) Fire.

This document presented a similar type of modeling analysis; however, it did not provide specific emission information. The SFPE Report was favored due to its extensive research and more recent publication.

Electric Power Research Institute. December 2020. Summary of Prior Electrochemical Battery Fire Emissions Characterization Studies.

This study was reviewed for hydrofluoric acid (HF) emission rates. Much of the data presented is not in a form that can be utilized for AERMOD modeling. The HF emissions from the study were presented in parts per million (ppm) and could not be readily converted to a usable emission rate in AERMOD. The studies that expressed emissions that would be potentially usable were not for LFP prismatic cells and, thus, were excluded in favor the SFPE Report.

Bugryniec, et al. March 2024. Review of gas emissions from lithium-ion battery thermal runaway failure – Considering toxic and flammable compounds.

This document analyzes the available literature data to determine how battery parameters affect the variation in off-gas volume and composition, to determine the flammability and toxicity hazards of different battery chemistries. Much of this type of research is also provided in the SPFE Report.

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[4] Email from R. Longman of the CEC, May 13, 2026.
[5] Request provided in email from R. Longman of the CEC, May 13, 2026.

American Clean Power. August 2025. Assessment of Potential Impacts of Fires at BESS Facilities.

This study provides more of a historical context related to BESS facilities and potential fires. The study presents some analysis on airborne environmental impacts; however, much of the data presented is not in a form that can be utilized for AERMOD modeling. The emissions from the study were presented in parts per million (ppm) and could not be readily converted to a usable emission rate in AERMOD. The SFPE Report was considered more comprehensive for other source parameters, like cell gas volume produced and, thus, favored in this analysis.

Meister et al. March 2025. Evaluating inhalation risks and toxicological impacts of lithium-ion battery thermal runaway emissions.

The objective of this study was to evaluate the impact of lithium-ion battery thermal runaway particulate emission exposures on primary small airway epithelial cells for potential inhalation risk. Much of the data presented is not in a form that can be utilized for AERMOD modeling. The results are presented as impacts to cell viability. The particulate emissions were not usable for an emissions analysis because they were presented in terms of concentrations and not mass emission rates.

Truchot, et al. National Fire Protection Agency. October 2025. Environmental Impact of Lithium-Ion Battery Incidents Compared to Other Common Incidents.

This study provides a very similar research exercise to that of the SFPE Report. However, its scope is wider than the SFPE Report, including other battery sources besides BESS. The SFPE Report is more comprehensive in terms of TACs analyzed and detailed in the calculation methodologies (this report does not consider flaming versus non-flaming scenarios), so was chosen in support of this analysis over this study.

Shao et al. 2026. Toxicity and Explosive Hazards of Thermal Runaway Gases in Aged Batteries under Different States of Charge.

This study employs an experimental approach combined with empirical formulations to evaluate both the toxicity and explosion hazards of thermal runaway gases generated by aged lithium-ion batteries. Much of the data presented is not in a form that can be utilized for AERMOD modeling. The emissions from the study were presented in parts per million (ppm) and could not be readily converted to a usable emission rate in AERMOD. The SFPE Report and UL9540A cell test were favored for other source parameters, like vent temperature.

Texas A&M Engineering Extension Service. May 2024. Lithium-Ion Battery Fires and Emissions Characterization Report.

This study provides a detailed characterization of gaseous and particulate emissions from lithium-ion batteries (36V 12Ah) containing 50 cylindrical cells subjected to thermal runaway via overcharging. These batteries are widely used in electric scooters and similar consumer products. All batteries were of lithium-ion nickel manganese cobalt (Li-NMC) chemistry. Based on the battery chemistry and geometry, much of the data presented is not in a form that can be utilized for this analysis and the SFPE Report was favored for this analysis.

3 Methodology

The Risk Assessment Methodology from the SFPE Report was incorporated into the analysis. The SFPE Report methodology was determined to be most comprehensive and most relevant to the CEC data request and other communications, and the requested approach using the AERMOD model.

The analysis models both non-flaming and flaming thermal runaway scenarios for LFP cell chemistry that involves part of or a full single BESS unit. No fire suppression is assumed.[6] A non-flaming thermal runaway event is a thermal runaway condition in which cells off gas due to thermal decomposition, but gases are not ignited and no combustion occurs. A flaming runaway thermal runaway event is a thermal runaway condition where off gases from the cells ignite and sustained combustion takes place where there are visible flames. For non-flaming events, the analysis assumed that the thermal runaway propagated through one bay, but heat transfer was not sufficient to propagate across the barriers into other bays; therefore, only one bay was involved. For the flaming scenario, the analysis assumed propagation throughout an entire BESS enclosure.

The modeled emissions and resultant concentrations are based on estimates and assumptions from the data available at the time the report was generated. The AERMOD model and Rincon standalone modeling spreadsheets (provided in the Appendices A - E) are considered conservative in that they are designed to overpredict impacts. It is important to note that the accuracy of dispersion models is limited by data scarcity - only a few field experiments have been conducted in which hazardous gases were released and their concentrations measured. Furthermore, the complexity and randomness of the real world cannot be completely captured in any computer program. Additionally, the plume modeling represents a situation in which “all controls failed” and is intended for bounding consequence evaluation, not likelihood-weighted risk. Due to the inherent uncertainties, the modeling analysis incorporates conservative assumptions regarding emissions, meteorology, and plume characteristics to calculate the ground-level concentrations.

3.1 Gas Production and Mass Loss Rate

Calculation of gas concentrations is dependent on the release rate. To determine the mass loss rate (MLR), the heat release rate (HRR) and heat of combustion was estimated for the flaming scenario. MLR was determined based on data obtained from literature review and known project specifications. For the non-flaming scenario, gas production is a result of thermal decomposition of the cell’s chemistry. Thermal decomposition is the breakdown of a compound into smaller constituents in the present of heat and does not require a flame. Combustion is the reaction between a fuel and oxygen that produces a flame (heat and light). Gas production rates were determined based on the percentage gas composition.

An average steady state gas release volume was modeled for each scenario. The average gas production does not capture the peak gas production values; however, these peak values are hard to predict due to specific cell/module/unit configurations, cell geometry, failure mechanisms, ignition location, etc. Further, peaks would last minutes while community exposure is evaluated on one or more hours; therefore, it is expected that community exposure times would include fluctuations in the MLR or gas production rate profiles. Therefore, the use of the average gas production rate is considered the most representative approach and will be estimated based on project-specific information and literature review. Approaches for the non-flaming and flaming scenarios are discussed below.

[6] The potential role of fire suppression will be discussed qualitatively.

3.1.1 General Assumptions

The following general assumptions apply to this technical analysis.

BESS Cell Information

As stated in UL9540A Cell Test Report for the Project, Enterprise BESS contains SYL SU3794U3794KC BESS enclosures.[7] Each enclosure has 5 battery bays and each battery bay contains 2 racks. One rack has 4 modules, each with 104 battery cells. This corresponds to 832 cells per bay and 4,160 cells per enclosure. The number of cells per bay was incorporated into the non-flaming scenario and the number of cells per enclosure was incorporated into the flaming scenario. Below is additional information related to the project that was incorporated into the analysis:

- **Cell type**: LFP [UL9540A Cell Report, Page 8]
- **Cell model**: CBDC0 [UL9540A Unit Level, Page 4]
- **Cell geometry**: Prismatic [UL9540A Cell Report, Page 8]
- **Total bay power**: 416 kWh [208 kWh per rack; Hazard Mitigation Analysis (HMA) Report (Coffman 2025c) Section 1.6.1]
- **Total enclosure power**: 3,794 kWh [HMA Report Section 1.6.1]
- **Total cell off-gas volume**: 211.7 Liters (L) [UL9540A Cell Report, Page 2]
- **Thermal Runaway Temperature**: 449.6 degrees Fahrenheit [UL9540A Cell Report, Page 2]
- **Cell weight**: 5,400 grams (approximately 12 lbs) [UL9540A Cell Report, Page 7; HMA Report Section 1.6.1]
- **Weight of enclosure**: 70,000 lbs [HMA Report Section 1.6.1]

Release Duration

Historical studies of incidents and unit level testing indicate that releases associated with a non-flaming thermal runaway scenario can occur over long periods of time, sometimes days. In the absence of comparable data from the UL9540A testing[8], a release duration for the non-flaming and flaming scenarios were developed based on the literature review and technical analyses performed in the SFPE Report. The SFPE Report Section 4.2.1 estimated a single bay release duration for a non-flaming scenario at 6.6 hours based upon the report's literature review and technical analysis. A duration of 6 hours was assumed in this analysis for the non-flaming scenario as a result. It is more conservative, as it presented a higher emission rate with the same mass loss occurring over a shorter time period.

Similarly, a duration of 6 hours was assumed in the analysis for the flaming scenario. This was based on the SFPE Report Section 4.2.3 that analyzed historical events for enclosure burns, with the Elkhorn and Victoria fires occurring for 7 and 6.5 hours. These were for nickel-manganese-cobalt (NMC) cells, which were determined to burn much quicker than LFP cells based on the SFPE Report research. Furthermore, most new CSA TS-800 / UL9540A 6th edition full scale fire tests show a burn duration of 10 to 12 hours. Therefore, the 6-hour release duration for the flaming scenario was considered conservative.

Meteorology

Meteorology is an important variable for air dispersion modeling in this technical analysis. AERMOD utilizes meteorological inputs from real-world weather readings processed through AERMET. The AERMET meteorological file provides information on hourly variations in surface wind and direction, ambient temperature, boundary layers, relative humidity, pressure, precipitation, and cloud cover.

[7] The UL9540A cell test report was issued on 9/7/2023 and revised on 12/11/2023 for Project Number 4790838636.1.

[8] The UL9540A testing was conducted using a heater to heat a subset of cells, not a full bay for the non-flaming scenario,

Three years of meteorological data provided by the SDAPCD for the Escondido-East Valley Parkway monitoring station were used . The AERMOD model analyzes the impacts from the hourly meteorology data to present the peak 1-hour concentrations produced for the potential project impacts. The station is located approximately 2.5 miles east of the Project Site and the data covers the years 2010 to 2012, which is the most recently available dataset at the time of this report. This is the most representative available meteorological data for use in AERMOD.

3.1.2 Non-Flaming Scenario

The non-flaming scenario assumed consumption of one (1) bay, which considers a greater involvement than the previously analyzed “credible event” (with only the three cells undergoing thermal runaway per the unit test) as described in Section 1.[9] This scenario is considered worst-case and non-probable, as thermal runaway occurs at 450F and it is unlikely that (832) cells or (8) modules would be at this excessive temperature without combustion starting. There is no flame produced in the non-flaming scenario; therefore, use of HRR and heat of combustion to predict MLR is not appropriate. Prediction of the gas rate required a different methodology from the flaming scenario. Mass loss was determined from the cell off gassing. The gas release rate was obtained from project-specific data, like gas volume release rate from the UL9540A reports and estimated non-flaming scenario event duration from the SFPE Report.

Venting time is the time it takes for the gas to leave the cell through the external vents. The cell capacity impacts the duration of venting due to higher gas production for larger units. For large capacity cells (>100 Wh) cell venting times were estimated at 6 hours for a single bay.[10]

A single bay for the Project will hold 832 cells, and with an event duration of 6 hours, this corresponds to approximately 138.7 cells per hour undergoing thermal runaway in a non-flaming scenario. According to the UL9540A cell test report, the total single cell off-gas volume is 211.7 L. Using this off-gas volume and cell burning rate, the anticipated gas production rate will be **8.15 liters per second (L/s)**.

As a backcheck for the specific battery specified, the UL9540A cell-level test captured 211.7 L of gas during a thermal runaway event over a collection time of approximately 15 minutes resulting in a uniform gas production rate of 0.24 L/s for a single cell. The 9540A unit-level test showed that simultaneous venting of four cells is probable and a 2x safety factor is recommended, resulting in an anticipated gas production rate of 1.92 L/s. The reality is that gas release rates will not be steady state, and the proposed uniform 8.15 L/s is a conservative approach.

3.1.3 Flaming Scenario

The flaming scenario assumes that all cells in the BESS enclosure unit would undergo thermal runaway and propagate beyond a non-flaming scenario. It is assumed that the full capacity of the enclosure – 3,794 kilowatt-hours (kWh) for Enterprise BESS – would burn. To estimate HHR the total heat released (THR) will be divided across an estimated event duration. THR will be estimated using the normalized THR of 28.3 kilojoules per watt-hour [kJ/Wh] based on the average for prismatic LFP cells provided in Table 8 of the SFPE Report, multiplied by total enclosure capacity.

To calculate HHR:

HHR (kW) = THR (kJ) / Event Duration (sec)

= 107,370,200 kJ / 21,600 sec * 1 kW / kJ/s = 4971 kW

Where:

THR = 28.3 kJ/Wh x 3,794 kWh = 107,370,200 kJ

Event duration = 6 hours (21,600 sec)

Note: 1 kW = 1 kJ/s

[9] 832 cells versus 6 cells.

[10] SFPE Report, page 32.

Based on the SFPE Report methodologies and research, a 6-hour event duration was assumed for LFP cells.[11] So, a 6-hour scenario is used for the analysis.

To calculate the MLR:

MLR (g/s) = HHR (kW) / Heat of Combustion
= 4971 kW / 15 kJ/g * 1 KJ/s / kW = 332 g/s

Where:

HHR = 4,971 kW (calculated above)

Heat of combustion = 15.0 kilojoules per gram (kJ/g) [Average for all prismatic LFP results from Table 10 of the SFPE Report]

Based upon the SFPE Report, the estimated mass loss rate for the project flaming scenario is **332 grams per second (g/s).**

For comparison, the UL9540A module level test, which involved four cells before self-extinguishing, had a loss of 1.1 kilograms (Kg) over an approximate period of 22 minutes, or 50 grams per second (g/s). A larger fire event would be expected to consume more cells, and the 6x factor from the SFPE Report is a conservative approach.

3.2 Toxic Gas Emissions

Lithium-ion batteries, similar to all fuels, result in the release of chemical compounds that can be harmful to human health at sufficient dose. Toxic and asphyxiant gases produced during a thermal runaway event could include, but are not limited to benzene, CO, CO_2, HCl, HCN, HF, ammonia (NH_3), NO_2, and SO_2. Reviews of other studies conducted in the literature review demonstrate that the emission rates can vary substantially. For example, HF emissions are often expressed in terms of HF per energy unit (i.e., grams per Wh). Smaller cells often produce larger volumes of total gases per Wh than larger cells. So, directly extrapolating emissions rates from smaller cells to larger cells, such as the ones used for this Project, would overestimate emission rates. Therefore, it is preferable to use concentration values where possible, such as in the SFPE Report, and emission factors expressed in terms of per energy unit are expected to be conservative.

Full constituent lists are a combination of Table 12 and 14 from the SFPE Report and gas constituent data from UL9540A test reports; this has been summarized above in Table 1. More details related to the gas constituents of the non-flaming and flaming scenarios are provided below.

3.2.1 Non-Flaming Scenario

Mass production rate for each gas constituent is calculated using a percent volume of the gas composition. The percent volume is multiplied by the average total gas production rate then converted to mass using the ideal gas law under standard pressure and the thermal runaway reference temperature from the UL9540A report. This is reflected in the equation, below.

To calculate mass production rate:

m (g/s) = PVM / RT

Where:

P = Pressure, 1 atmosphere (atm)

V = Volumetric Gas Release Rate, 8.15 (L/s) [see above]

[11] SFPE Report, Section 4.2.2

M = Molar Mass (g/mol), varies per compound [refer to Table 2]

R = Universal Gas Constant, 0.08206 L-atm/mol-K

T = Temperature, 505.15 Kelvin at thermal runaway [see above, presented in Fahrenheit]

Table 12 from the SFPE Report and gas constituent data from UL9540A test reports are used to determine the species' yields and mass production rates. Note that total percentage yield may conservatively exceed 100 percent with the combination of constituents from the two lists. Table 2, below, shows the UL9540A hazardous gas component breakdown.

Table 2 Non-Flaming Scenario UL9540A Hazardous Gas Component Breakdown

Hazardous Gas Component	Molar Mass (g/mol)	UL9540A Gas Analysis (% vol)	Mass Production Rate [g/s] 6 hr
Carbon Monoxide	28.01	13.453	0.74
Carbon Dioxide	44.01	27.205	2.36
Hydrogen	2.02	41.313	0.16
Methane	16.043	7.403	0.23
Acetylene	26.04	0.101	0.01
Ethene (Ethylene)	28.05	4.408	0.24
Ethane	30.07	1.235	0.07
Propene (Propylene)	42.08	1.297	0.11
Propane	44.1	0.734	0.06
Butane	58.12	1.296	0.15
Pentane	72.15	0.335	0.05
Hexane	86.18	0.147	0.02
Heptene	98.18	0.025	0.00
Styrene	104.15	0.013	0.003
Benzene	78.11	0.049	0.01
Toluene	92.14	0.013	0.002
Dimethyl Carbonate	90.09	0.917	0.163
Ethyl Methyl Carbonate	104.1	0.055	0.011

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runaway temperature identified in the UL9540A cell test report.

g/mol = grams per mole; % vol = percent volume; g/s = grams per second.

Source: UL9540A Cell Test Report, page 2.

Table 3 below provides the species yields and mass production rates for the LFP non-flaming scenario. Mass production rates for each constituent were calculated utilizing the percent volume composition of gas constituents and the average total gas production rate, discussed above. The percent volume for specific constituents, multiplied by the average total gas production rate, was then converted to mass using the ideal gas law under standard pressure and the thermal runaway reference temperature from the UL9540A report (see equation above). Note that no data was found for hydrogen bromide (HBr) and sulfur dioxide (SO2), and no usable data was found for ammonia (NH3), according to the literature research in the SFPE report. CO and CO2 emissions were based on UL9540A test data, included with the other constituents in Table 2. Please refer to Appendix B for more information.

It is important to note that the SFPE report states: "*Ideally, for a specific BESS unit, the total gas production estimates will be derived from experimental testing of the actual unit or unit components.*" The limitation of the UL9540A cell data above is that it does not include all the plastic wiring, enclosure, HVAC system, etc. However, these components are no different from any other structural fire and, therefore, not requiring more concern than other construction in the immediate vicinity.

Table 3 Non-Flaming Scenario Species Yields and Mass Production Rates from SFPE Report

Species	Molar Mass g/mol	Yield % vol	Mass Production Rate [g/s] 6 hr
Hydrogen Chloride	36.46	1.9	0.14
Hydrogen Cyanide	27.03	0.5	0.03
Hydrogen Fluoride	20.01	2.7	0.11
Nitrogen Dioxide	46.01	7.9	0.72

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runaway temperature identified in the UL9540A cell test report.

g/mol = grams per mole; % vol = percent volume; mg/g = milligrams per gram; mg/Wh = milligrams per watt-hour; g/s = grams per second.

Source: SFPE Report, Table 12.

3.2.2 Flaming Scenario

Mass production rates for the flaming scenario are calculated using the species' mass normalized by the amount of mass consumed and the average MLR as determined in Section 3.1.3 above. This is reflected in the equation, below.

To calculate mass production rate:

m (g/s) = yield * MLR / 1000

Where:

yield = mass consumed (mg/g) [refer to Table 5]

MLR = 332 g/s [see above]

The species yield and mass production rates for the flaming scenario are taken from Table 14 of the SFPE Report because the UL9540A testing does not account for this type of scenario. The flaming scenario will result in emissions of toxics as well as criteria air pollutants, including NO_2, SO_2 and particulate. CO and CO_2 emissions were based on the SFPE Report data, assuming it was more representative than the UL9540A test data for a flaming scenario. However, the SFPE Report is missing many of the constituents from the UL9540A test report as identified in Table 5. Emissions from the constituents in Table 2 that were missing from the SFPE Report were scaled up from one bay to one enclosure based on cell numbers (4,160 instead of 832) for inclusion in the flaming scenario analysis.

Iqbal et al, 2025 was utilized to estimate acrolein and formaldehyde emissions. The emission factors were generated in terms of L/kWh (similar to the non-flaming scenario) based on data from experiments performed in the study for LFP batteries. The peak average emission factors across the state-of-charges was 3.0 L/kWh for acrolein and 1.5 L/kWh for formaldehyde. The emissions were scaled up to the kWh for an enclosure then converted to g/s using ideal gas law parameters similar to the non-flaming scenario.

The scaled emissions from the UL9450A test report are provided in Table 4, below. The flaming scenario species yields and mass production rates, as identified in the SFPE Report, are provided in Table 5, below. The acrolein and formaldehyde gas release rates and mass production rates are provided below in Table 6. Please refer to Appendix B for more information.

Table 4 Flaming Scenario Scaled UL9540A Hazardous Gas Component Breakdown

Hazardous Gas Component	Molar Mass (g/mol)	UL9540A Gas Analysis (%)	Mass Production Rate [g/s] 6 hr
Carbon Monoxide	28.01	13.453	3.72
Carbon Dioxide	44.01	27.205	11.81
Hydrogen	2.02	41.313	0.82
Methane	16.043	7.403	1.17
Acetylene	26.04	0.101	0.03
Ethene (Ethylene)	28.05	4.408	1.22
Ethane	30.07	1.235	0.37
Propene (Propylene)	42.08	1.297	0.54
Propane	44.1	0.734	0.32
Butane	58.12	0.193	0.74
Pentane	72.15	0.335	0.24
Hexane	86.18	0.147	0.12
Heptene	98.18	0.025	0.02
Styrene	104.15	0.013	0.01
Benzene	78.11	0.049	0.04
Toluene	92.14	0.013	0.04
Dimethyl Carbonate	90.09	0.917	0.01
Ethyl Methyl Carbonate	104.1	0.055	0.06

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runaway temperature identified in the UL9540A cell test report.

Source: UL9540A Cell Test Report, page 2.

Table 5 Flaming Scenario Species Yields and Mass Production Rates from SFPE Report

Species	Yield		Mass Production Rate [g/s] 6 hr
	mg/g	mg/Wh	
CO	35.1	–	11.66
CO_2	1463	–	485.9
HCl	2.6	–	0.86
HF	24.8	–	8.24
HCN	1.3	–	0.42
NH_3	0.5	–	0.17
NO_2	1.9	–	0.63
SO_2	3.5	–	1.16
Particulate	56	–	18.60

Source: SFPE Report, Table 14.

Table 6 Flaming Scenario Acrolein and Formaldehyde Emission Rates from Iqbal et al, 2025

Hazardous Gas Component	Gas Release Rate (L/s)	Molar Mass (g/mol)	Mass Production Rate [g/s] 6 hr
Formaldehyde	0.26	30	0.19
Acrolein	0.53	56.1	0.72

Gas release rate based on 6 hour event and 3,794 kWh total per enclosure.
Source: Iqbal et al, 2025.

3.3 Metal Emissions

Metals can be emitted into the air during lithium-ion thermal runaway events. These metals include lithium (Li), aluminum (Al), copper (Cu), chromium (Cr), and zinc (Zn). Chromium and copper are typically the only ones considered heavy metals; however, all can be considered toxic to humans and the environment with a high enough dose. The metals are transported in particulate matter (PM) produced during thermal runaway events and deposited when the particulate matter falls out of the plume into the surrounding environment. The information in this section is based on the research efforts in the SFPE Report, Section 4.4. Please refer to Appendix B for more information.

3.3.1 Particulate Yield

Table 19 of the SFPE Report identifies particulate yields under a non-flaming thermal runaway event for LFP cells as 55 milligrams per gram (mg/g) of fuel. Total particulate matter is based on the number of cells undergoing thermal runaway. Data provided includes particulate yields from PM_{900} (particulate matter at 900 microns or less). Detailed in the reviewed SFPE Report, fine particulate matter (PM2.9) was not identified as it did not settle out of the plume where analyzed, therefore a 1 percent increase was applied to the PM emission factor to account for the PM that did not settle out of the plume, resulting in a PM emission yield of 56 mg/g, as presented in Table 5. Based on the SFPE Report research and methodologies, this PM emission yield was applied for both the non-flaming and flaming scenarios.

3.3.2 Particulate Size Distribution

Particulate size distribution determines the size of the particulates that settle out of the plume in the surrounding areas. The size of the particulates that are relevant to the health risks associated with thermal runaway events is PM_{10}. The particulate size distribution for LFP cells is identified in Table 21 of the SFPE Report. This table identifies PM_{13} or less as 10 percent of the settled particulate matter. As PM_{10} is the target size, the analysis will conservatively use the 10 percent distribution identified. This corresponds to a PM_{10} mass production rate of **1.86 g/s** (i.e., 10 percent of the particulate mass production rate provided in Table 5).

As discussed in Section 3.3.1 above, $PM_{2.5}$ was not identified in the analysis and, therefore, is not quantified separately from PM_{10}.

3.3.3 Particulate Composition

Particulate composition is assumed to be homogeneous for all particulate matter. Specific data on the particulate composition of LFP cells was not identified during data reviews. Therefore, data composition for non-flaming and flaming scenarios is based on the particulate composition of nickel-manganese-cobalt (NMC) cells and adjusted to remove metals that are specific to NMC cells. Table 23 in the SFPE Report identifies the particulate composition that will be used in the analysis, presented below for reference in Table 7.

Table 7 Particulate Composition

Scenario	Particulate Composition [% Mass] Li	Al	Cu	Fe
Non-Flaming	17.5	6.3	5.4	14.4
Flaming	20.4	3.9	0.0	16.6

Li = lithium; Al = aluminum; Cu = copper; Fe = iron.

Source: SFPE Report, Table 23.

Table 8 presents the estimated metal emissions using the particulate composition data in Table 7 combined with the estimated particulate emission rates provided in Table 5.

Table 8 Metal Emissions

Scenario	Metal Emissions (g/s) Li	Al	Cu	Fe
Non-Flaming	3.26	1.17	1.00	2.68
Flaming	3.79	0.73	0.00	3.09

3.4 AERMOD Model

3.4.1 Model Overview

The latest version of the AERMOD dispersion model, version 24142 dated November 20, 2024, was used to estimate ambient air concentrations.[12] AERMOD is the preferred U.S. EPA's and CARB dispersion model for use in assessing health risk when air is the predominant pathway. OEHHA has also adopted the AERMOD model as the preferred model for assessing health risk impacts from sources of toxic emissions. AERMOD is a steady-state dispersion model that uses planetary boundary layer (PBL) theory to model air pollutant concentrations. The planetary boundary layer is the breathable portion of the atmosphere that is influenced by contact with the ground surfaces or friction. AERMOD is a regulatory method for providing conservative estimates of ground-level concentrations from combustion and non-combustion source types. AERMOD requires the pre-processing of surface characteristics to calculate the effects of meteorology and terrain on air pollutant concentrations. Surface characteristics and meteorological data such as wind speed and direction, temperature, etc. are combined with upper air data to compute planetary boundary parameters used by AERMOD to estimate vertical and horizontal pollutant dispersion. Terrain data was also processed to allow the influence of terrain on modeled concentrations.

3.4.2 Model Inputs

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Along with the referenced inputs below, land use type is required as input into the model which will be determined based on the project site. The maximum concentrations were determined for a 1-hour averaging period for the health risk assessment.

[12] Please note that as of July 9, 2026 Version 26135 of the AERMOD dispersion model was released by the U.S. EPA. Lakes Environmental most recent version of AERMOD View has not yet been updated to incorporate the new U.S. EPA executable. Based on the model release notes for Version 26135, it is not anticipated to have any effect on the technical results presented in this report.

AERMOD Source Parameters

Sources were defined in AERMOD to simulate a potential thermal runaway event. There were twelve (12) locations identified for the battery enclosures, of which it is assumed that any of these enclosures could observe a thermal runaway event. These are presented in Figure 3. Each enclosure was represented by a point source situated in the middle of the enclosure location, along the enclosure edge closest to fencelines. The concentrations from a thermal runaway event occurring at any one of the twelve battery enclosures were modeled and analyzed individually. This was intended to capture reasonable worst-case impacts from a potential thermal runaway event and estimate the potential risk at sensitive receptors.

A unitized emission rate (i.e., 1 gram per second [g/s]) was normalized for each of the identified potential emissions sources for a thermal runaway event.[13] A unitized emission rate produces in AERMOD a "X/Q," which is a dispersion factor normalized concentration at each modeled receptor location (i.e., a ground level concentration "per 1 g/s of emissions from the source"). Because AERMOD is a linear Gaussian dispersion model for non-reactive pollutants, predicted ground-level concentrations scale directly with the emission rate. Actual ground-level concentrations can be determined by multiplying X/Q by the actual emission rates (g/s).

The SFPE Report implemented a point source to represent emission releases from a thermal runaway event, which were similarly be used in these analyses. AERMOD source parameters were obtained from both the SFPE Report and the UL9540A reports. The specific point source parameters assumed are:

- **Release Height:** 8 feet; corresponding to the enclosure height.[14]
- **Emission Rate:** 1 g/s (exception potentially being for NAAQS/CAAQS modeling, where actual emission rates may be used. Please reference above on how the actual emission rate is derived).
- **Gas Exit Temperature**
  - **Non-Flaming Scenario**: 449.6 degrees Fahrenheit [UL9540A Cell Report, page 2]
  - **Flaming Scenario**: 438.5 degrees Fahrenheit [499 degrees Kelvin, SFPE Report, Table 25 for LFP][15]
- **Stack Inside Diameter:** 0.9 meters (assumed effective diameter of air exhaust vent in Ramboll 2024 Vistra Morro Bay study)
- **Gas Exit Velocity**
  - **Non-Flaming Scenario**: 0.02 m/w [Calculated based on Exit Flow Rate & Stack Inside Diameter]
  - **Flaming Scenario**: 8.5 m/s [SPFE Report, Table 25)
- **Gas Exit Flow Rate**
  - **Non-Flaming Scenario**: 0.125 cubic meters per second (m^3/s) [SPFE Report, Table 25)
  - **Flaming Scenario**: 5.407 m^3/s [Calculated based on Exit Velocity & Stack Inside Diameter]

Variable emissions (i.e., what time of day the events could occur) were not applied in the model because it is unpredictable when a potential thermal runaway event would occur.

[13] Except the 1-hour NO_2 analyses was run in a separate model using estimated emission rates to account for NO_x to NO_2 conversion.
[14] This is consistent with the Coffman HCA report and the SFPE Report methodology described in Section 4.6.
[15] As noted in Footnote 7 of the SFPE report, the gas exit temperature input utilized in the flaming scenario is lower than the non-flaming scenario. This is due to the methodology used to capture the characteristics of the plume at a point above the combustion reaction. With this methodology, the values indicated for the flaming scenario represent the average temperature of gases released from the BESS unit combined with the ambient air that has been entrained into the plume.

Meteorology

The meteorology data used for this analysis are discussed under Section 3.1.1 General Assumptions above. Figure 4 presents an annual wind rose for the meteorological data period.

Receptors and Terrain

Receptor and source base elevations were determined from United States Geological Survey (USGS) National Elevation Dataset (NED) data. The NED data was processed with the EPA-model AERMAP for the receptor locations selected. All coordinates (both sources and receptors) referenced UTM North American Datum 1983 (NAD83, Zone 10). AERMAP is capable of interpolating the elevation data in the NED data for both receptor elevations and hill height scales.

Cartesian coordinate receptor grids were used to provide adequate spatial coverage surrounding the project areas for assessing ground-level pollution concentrations, to identify the potential severity of impacts, and to identify maximum impact locations. The nearest sensitive receptors were identified within the grid and analyzed for potential health risk impacts, including Palomar Medical Center Escondido nearby to the west and the residences nearby to the northwest. The modeling domain and receptor grids are provided in Figure 5.

Figure 3 AERMOD Modeled BESS Vent Locations

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Fig 5 Sources (BESS vent locations)

Figure 4 Wind Rose

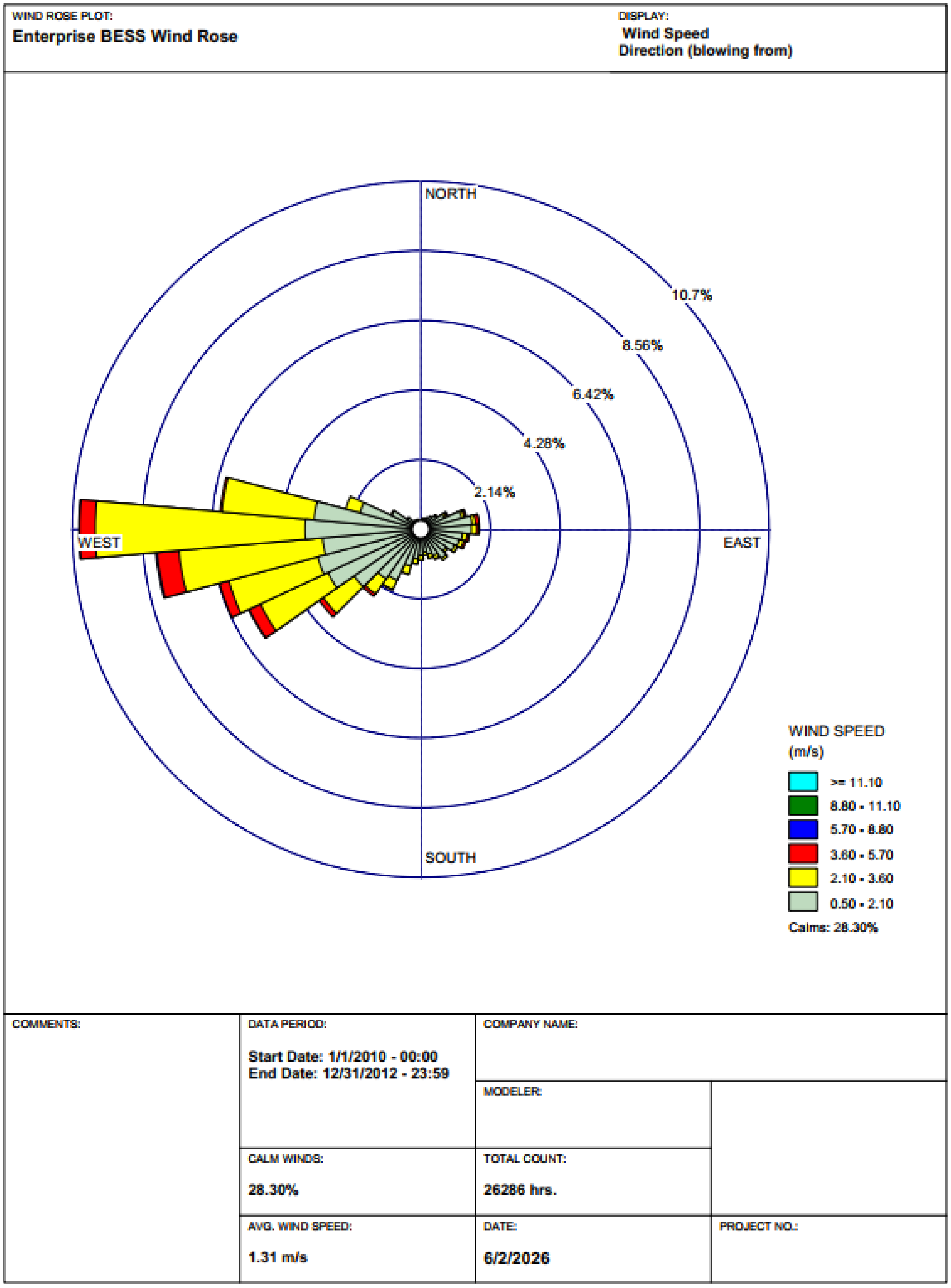

Figure 5 Receptor Grid

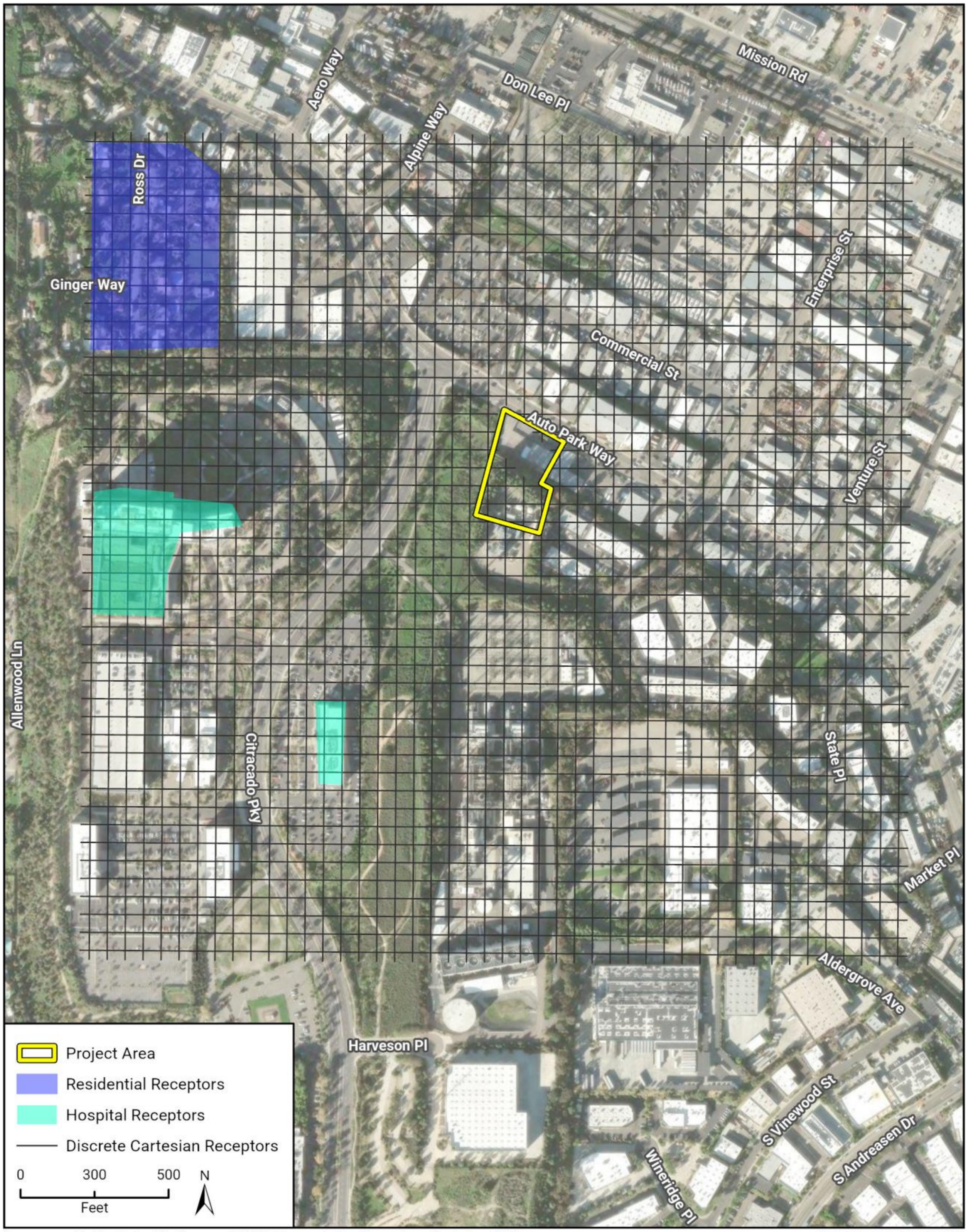

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Fig 4 Receptor Grid

4 Results and Conclusions

The following section provides the results and conclusions to the analyses performed for this study. The plume modeling represents a situation when "all controls failed," like those identified in the Coffman *Hazard Mitigation Analysis for Enterprise BESS.* It should be noted that these results are intended for bounding consequence evaluation, not likelihood-weighted risk. The modeled scenarios represent low-frequency emergency events. The overall risk is reduced through engineering and administrative controls aimed at preventing a thermal runaway event from ever occurring. It should be noted that the conclusions herein are limited to the scope of non-flaming and flaming scenarios for a thermal runaway, as defined above.

4.1 Exposure Concentrations Compared Against Emergency Thresholds

The AEGLs and ERPGs were developed to protect the public against exposure to potentially hazardous substances in the event of an accidental release of chemicals. A thermal runaway event is by nature an accidental release of chemicals and an unpredictable and emergency event; therefore, the application of these thresholds is appropriate for determining potential significance.

AERMOD outputs were obtained in concentration form. Actual ground level concentrations of each toxic air contaminant were estimated and compared against the corresponding AEGL and ERPG at the sensitive receptors. As discussed above, level 1 of the AEGL and ERPG correlate to discomfort, generally; whereas, level 2 of the AEGL and ERPG correlate to more serious potential health impacts and/or an impaired ability to escape. Level 3 of the AEGL and ERPG correlate to potential life-threatening effects or death. Exposure concentrations are provided below in table format, identifying maximum impacts.

To support emergency planning, this report recommends that an exceedance of an AEGL or ERPG Level 1 result in community notification, an exceedance of Level 2 result in a community shelter-in-place advisory and an exceedance of a Level 3 result in a community evacuation advisory. This is consistent with the "Suggested Applications for AEGLs" as identified in the United States Army Public Health Center's 2011 *Frequently Asked Questions Regarding Acute Exposure Guideline Levels (AEGLs) and their Applications*. Isopleths were developed for any exceedance of AEGL or ERPG levels to provide the relationship between distances and for notification and advisory requirements. Please refer to Appendix C for more information.

4.1.1 Non-Flaming Scenario

Potential emissions from the non-flaming scenario are compared against the corresponding AEGL and ERPG values in Table 9, below. The results demonstrated that only HCl, HF and NO_2 Level 1 AEGLs were exceeded at locations readily accessible to the public (however, not at any of the identified sensitive receptors). This means that a potential non-flaming scenario could result in notable discomfort or irritation among members of the public. Any effects are anticipated to be reversible.

It should be noted that the HCl, HF and NO_2 concentrations did *not* exceed the Level 2 or 3 AEGLs and any ERPG at any point readily accessible by the public (i.e., sidewalks and businesses located near the Project site). Therefore, a potential non-flaming scenario is *not* anticipated to result in any more serious or potentially irreversible health effects or result in potential life-threatening effects associated with Level 2 or 3 AEGLs and ERGPs.

Because a Level 1 AEGL is exceeded, isopleths for impacts were prepared to demonstrate the relationship between HF and NO_2 concentrations, the Level 1 AEGL and distance. The prepared isopleth takes the maximum HF and NO_2 impacts from each of the point sources (representing the enclosure locations at the fenceline) at all of the receptors in the vicinity of the Project site. This is intended to capture the potential worst-case impacts. This isopleth is provided as Figure 6 for HF, as Figure 7 for HCl, and Figure 8 for NO_2. As demonstrated, the maximum distance from the centerline of the facility to exceedance of the Level 1 AEGL for HF is 202.64 feet, for HCl is 13.32 feet and for NO_2 is 352.84 feet.

Therefore, in the event of a non-flaming thermal runaway scenario, at a minimum, a community notification should be provided at least to the building owners captured within the highest impact area of isopleth (i.e., red or black areas and a distance of 352.84 feet), based on these figures. Please note that there may be some potential higher impacts of HCl, HF, NO_2 and other hazardous components at the southern fenceline (the analysis already accounts for the other nearby businesses). However, this area is difficult to access wooded areas between the Project site and other industrial land use, deemed not readily accessible to the public.

In conclusion, a non-flaming scenario may result in an AEGL Level 1 exceedance; however, it is not anticipated to occur at any of the identified sensitive receptors nor result in a more serious exceedance of an emergency threshold (i.e., Level 2 or 3). Minimum emergency precautions for a non-flaming scenario are to issue a community notification to at least the buildings captured by the highest impact areas of the isopleths.[16] However, it may be prudent for first responders to utilize increased levels of PPE out of an abundance of caution.

4.1.2 Flaming Scenario

Potential emissions from the flaming scenario are compared against the corresponding AEGL and ERPG values in Table 10, below. Similar to the non-flaming scenario, the results demonstrated that, with the exception of HF and acrolein Level 1 AEGL and ERPG, the AEGL or ERPG values were not exceeded at locations readily accessible to the public. This means that a potential flaming scenario could result in notable discomfort or irritation among members of the public. However, any effects are anticipated to be reversible.

The HF and acrolein concentrations did *not* exceed the Level 2 or 3 AEGL and ERPG at any point readily accessible by the public. Therefore, a potential flaming scenario is *not* anticipated to result in any more serious or potentially irreversible health effects associated with Level 2 or 3 AEGLs and ERGPs, or result in potential life-threatening effects.

Because a Level 1 threshold was exceeded for HF and acrolein, isopleths for impacts were prepared to demonstrate the relationship between concentrations, the Level 1 AEGL and distance. It should be noted that the AEGL is less than the ERPG and is used as the basis for community notification and isopleth preparation. The prepared isopleths were developed like for the non-flaming scenario, and the HF AEGL-1 isopleth is provided as Figure 9, and the acrolein AEGL-1 Isopleth is provided as Figure 10.[17] As demonstrated, the maximum distance from the centerline of the facility to exceedance of the Level 1 AEGL for HF is 431.20 feet and for acrolein is 432.10 feet

In the event of a flaming thermal runaway scenario, at a minimum, a community notification should be provided at least to the building owners captured within the highest impact area of isopleth (i.e., red areas and a distance of approximately 432 feet).[18] A flaming runaway scenario is not anticipated to result in more severe health impacts associated with a Level 2 AEGL or ERPG. However, it may be prudent for first responders to utilize increased levels of PPE out of an abundance of caution.

[16] Note that isopleths may also extend into the potential area of unsheltered community on the SDG&E parcel to the west/southwest of the Project site.

[17] Note that Figure 9 and 10 look nearly identical because the ratio of emissions between HF and acrolein (11.42) is nearly identical to the ratio of the AEGL-1 between HF and acrolein (11.43). Hence, the isopleths look very similar.

[18] Ibid.

Table 9 AEGL & ERPG Comparison, Non-Flaming Scenario

Gas Species	Emission Rate (g/sec)	Ground Level Conc (µg/m³)	AEGL-1 (µg/m³)	AEGL-2 (µg/m³)	AEGL-3 (µg/m³)	ERPG-1 (µg/m³)	ERPG-2 (µg/m³)	ERPG-3 (µg/m³)
Carbon Monoxide	0.741	17,601	–	95,000	380,000	229,000	401,000	573,000
Carbon Dioxide	2.355	55,925	–	–	–	–	–	–
Hydrogen	0.164	3,898	–	–	–	–	–	–
Methane	0.234	5,547	–	–	–	–	–	–
Acetylene	0.005	123	–	–	–	–	–	–
Ethene (Ethylene)	0.243	5,775	–	–	–	–	–	–
Ethane	0.073	1,735	–	–	–	–	–	–
Propene (Propylene)	0.107	2,549	–	–	–	–	–	–
Propane	0.064	1,512	9,900,000	31,000,000	59,000,000	–	–	–
Butane	0.148	3,518	13,000,000	40,000,000	130,000,000	–	–	–
Pentane	0.048	1,129	–	–	–	–	–	–
Hexane	0.025	592	–	10,000,000	30,000,000	–	–	–
Heptene	0.005	115	–	–	–	–	–	–
Styrene	0.003	63	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000
Benzene	0.008	179	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000
Toluene	0.002	56	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000
Dimethyl Carbonate	0.163	3,859	–	–	–	–	–	–
Ethyl Methyl Carbonate	0.011	267	–	–	–	–	–	–
Hydrogen Chloride	0.136	**3,236**	**2,700**	33,000	155,000	4,350	29,000	217,000
Hydrogen Fluoride	0.106	**2,524**	**800**	20,000	36,000	**1,637**	16,000	41,000
Hydrogen Cyanide	0.027	631	2,200	7,800	17,000	--	11,000	28,000
Copper and compounds	1.00	23,848	–	–	–	–	–	–
Ammonia	0	0	21,000	112,000	769,000	17,413	104,000	1,045,000
Formaldehyde	0	0	1,000	17,000	69,000	1,227	12,000	49,000
Acrolein	0	0	70	230	3,200	115	344	3,439
Nitrogen Dioxide	0.715	**8,222**	**940**	23,000	38,000	**1,882**	28,000	56,000
Sulfur Dioxide	0	0	520	1,950	49,000	786	8,000	66,000

Bold lettering indicates an exceedance.

1-Hour AEGL values from U.S. EPA. Units provided in mg/m³ and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to µg/m³.

CAS = Chemical Abstract Service; AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; µg/m³ = micrograms per meter cubed.

Source: U.S. EPA 2026a; Cameo Chemical 2026.

Table 10 AEGL & ERPG Comparison, Flaming Scenario

Gas Species	Emission Rate (g/sec)	Ground Level Conc (μg/m³)	AEGL-1 (μg/m³)	AEGL-2 (μg/m³)	AEGL-3 (μg/m³)	ERPG-1 (μg/m³)	ERPG-2 (μg/m³)	ERPG-3 (μg/m³)
Carbon Monoxide	11.66	2,481	–	95,000	380,000	229,000	401,000	573,000
Carbon Dioxide	485.9	103,429	–	–	–	–	–	–
Hydrogen	0.821	175	–	–	–	–	–	–
Methane	1.168	249	–	–	–	–	–	–
Acetylene	0.026	6	–	–	–	–	–	–
Ethene (Ethylene)	1.216	259	–	–	–	–	–	–
Ethane	0.365	78	–	–	–	–	–	–
Propene (Propylene)	0.537	114	–	–	–	–	–	–
Propane	0.318	68	9,900,000	31,000,000	59,000,000	–	–	–
Butane	0.741	158	13,000,000	40,000,000	130,000,000	–	–	–
Pentane	0.238	51	–	–	–	–	–	–
Hexane	0.125	27	–	10,000,000	30,000,000	–	–	–
Heptene	0.024	5	–	–	–	–	–	–
Styrene	0.013	3	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000
Benzene	0.038	8	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000
Toluene	0.038	8	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000
Dimethyl Carbonate	0.012	3	–	–	–	–	–	–
Ethyl Methyl Carbonate	0.056	12	–	–	–	–	–	–
Hydrogen Chloride	0.855	182	2,700	33,000	155,000	4,350	29,000	217,000
Hydrogen Fluoride	8.237	**1,753**	**800**	20,000	36,000	**1,637**	16,000	41,000
Hydrogen Cyanide	0.416	89	2,200	7,800	17,000	–	11,000	28,000
Copper and compounds	0	0	–	–	–	–	–	–
Ammonia	0.166	35	21,000	112,000	769,000	17,413	104,000	1,045,000
Formaldehyde	0.193	41	1,000	17,000	69,000	1,227	12,000	49,000
Acrolein	0.721	**154**	**70**	230	3,200	**115**	344	3,439
Nitrogen Dioxide	0.631	39	940	23,000	38,000	1,882	28,000	56,000
Sulfur Dioxide	1.162	247	520	1,950	49,000	786	8,000	66,000

Bold lettering indicates an exceedance. Copper is present only for the non-flaming scenarios based on the SFPE Report.
1-Hour AEGL values from U.S. EPA. Units provided in mg/m³ and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to μg/m³.
CAS = Chemical Abstract Service; AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; μg/m³ = micrograms per meter cubed.
Source: U.S. EPA 2026a; Cameo Chemical 2026.

Figure 6 Non-Flaming Scenario, Hydrogen Fluoride AEGL-1 Isopleth

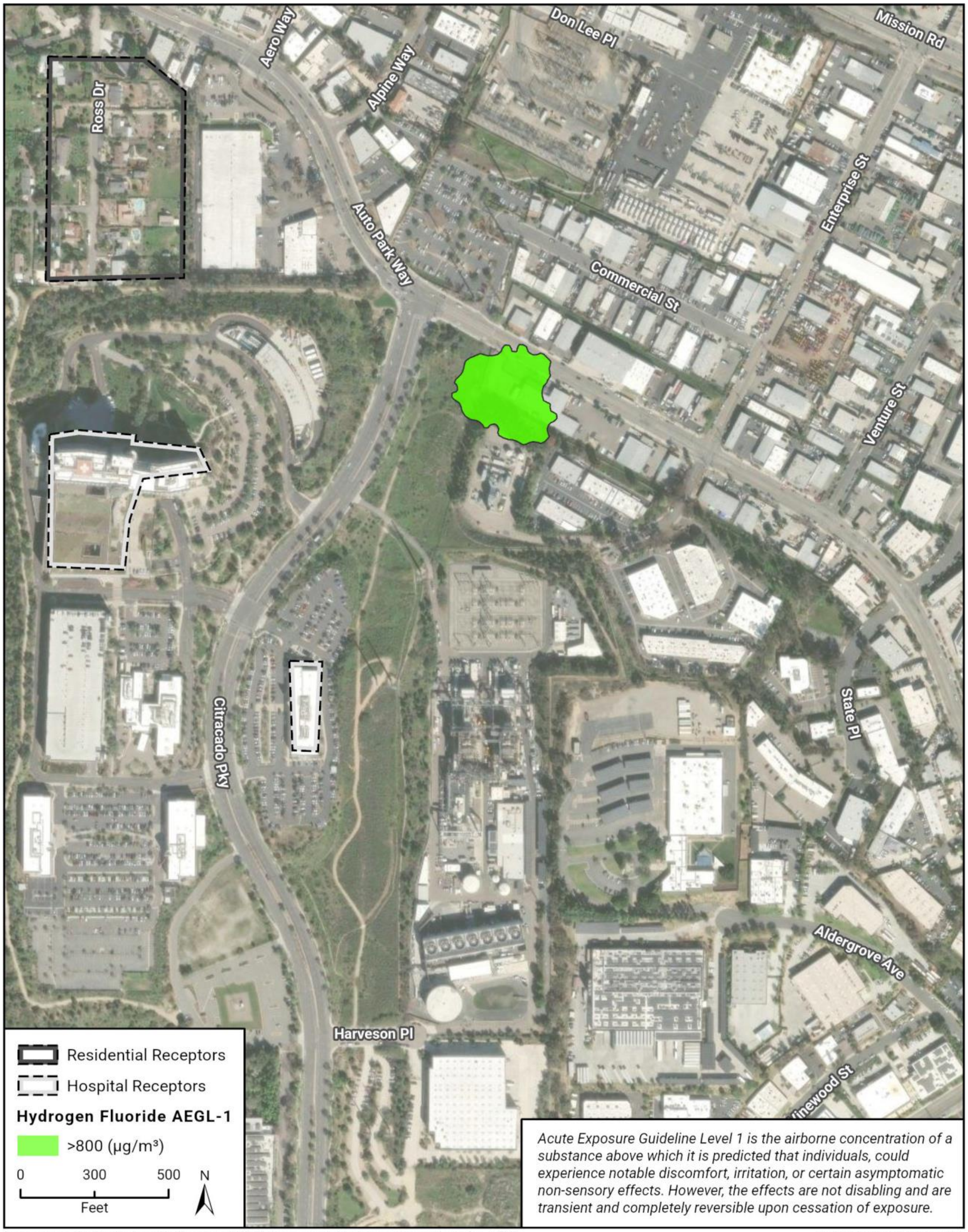

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Fig 6 Non-Flaming Scenario Hydrogen Fluoride AEGL-1 Isopleth

Figure 7 Non-Flaming Scenario, Hydrogen Chloride AEGL-1 Isopleth

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Fig 7 Non-Flaming Scenario Hydrogen Chloride AEGL-1 Isopleth

Figure 8 Non-Flaming Scenario, Nitrogen Dioxide AEGL-1 Isopleth

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Fig 8 Non-Flaming Scenario Nitrogen Dioxide AEGL-1 Isopleth

Figure 9 Flaming Scenario, Hydrogen Fluoride AEGL-1 Isopleth

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25-18266 Enterprise BESS 2026
Fig 9 Flaming Scenario Hydrogen Fluoride AEGL-1 Isopleth

Figure 10 Flaming Scenario, Acrolein AEGL-1 Isopleth

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Fig 10 Flaming Scenario Acrolein AEGL-1 Isopleth

Health Risk Calculations

According to the California Environmental Protection Agency Office of Environmental Health Hazard Assessment (OEHHA), the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly) was enacted in 1987, requiring stationary sources of pollutants to report the types and quantities of certain substances routinely released into the air. The goals of the Air Toxics "Hot Spots" Act are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels (OEHHA 2026b). This includes the methodologies to calculate non-cancer health risk, like that being conducted in this report.

OEHHA also prepared a document in 2001 titled *A Guide to Health Risk Assessment*, with the purpose of providing a “basic explanation of risk assessment for laypeople.” This document provides helpful context related to non-cancer health risk, and states within:

> Non-cancer risk is usually determined by comparing the actual level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects, even in the most susceptible people. Levels of exposure at which no adverse health effects are expected are called “health reference levels,” and they generally are based on the results of animal studies. However, scientists usually set health reference levels much lower than the levels of exposure that were found to have no adverse effects in the animals tested. This approach helps to ensure that real health risks are not underestimated by adjusting for possible differences in a chemical’s effects on laboratory animals and humans; the possibility that some humans, such as children and the elderly, may be particularly sensitive to a chemical; and possible deficiencies in data from the animal studies.
>
> Depending on the amount of uncertainty in the data, scientists may set a health reference level 100 to 10,000 times lower than the levels of exposure observed to have no adverse effects in animal studies. Exposures above the health reference level are not necessarily hazardous, but the risk of toxic effects increases as the dose increases.

AERMOD outputs were imported into Excel to perform non-cancer health risk calculations. Non-cancer health risks were measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its AEGL, as shown in the equation below.

$$Hazard\ Quotient = \frac{1 - Hour\ Max\ Concentration\ (\frac{\mu g}{m^3})}{Acute\ Exposure\ Guideline\ Level\ (AEGL)\ (\frac{\mu g}{m^3})}$$

Hazard quotients for pollutants affecting the same target organ were summed with the resulting totals expressed as hazard indices for each organ system. It was assumed that all pollutants affected the inhalation pathway and thus were all summed together. A hazard index of less than 1.0 is considered to be an insignificant health risk. The maximum hazard quotient are presented below at sensitive receptors in table format.

4.1.3 Non-Flaming Scenario

Potential non-cancer health risk impacts from the non-flaming scenario were calculated at the sensitive receptors as requested in the CEC Data Request, item #5. The maximum hazard quotient value was calculated for each hazardous gas component at each residential and hospital sensitive receptor. The hazard quotient values were then summed together for each target organ (i.e., respiratory system, eyes, nervous system, etc.). Please note that copper emissions were identified, but it was assumed that the metals would deposit from the plume very quickly and not disperse to the distance of the sensitive receptors identified. The non-cancer health risk impacts from the non-flaming scenario are provided in Table 11. As demonstrated in the table, non-cancer health risk impacts remain below the hazard index threshold of 1.0.

4.1.4 Flaming Scenario

Potential non-cancer health risk impacts from the flaming scenario were calculated at the sensitive receptors as requested in the CEC Data Request, item #5. The maximum hazard quotient value was calculated for each hazardous gas component at each residential and hospital sensitive receptor. The flaming scenario differs from the non-flaming scenario with the inclusion of formaldehyde and acrolein emissions and revised emission factors for HCl and HCN based on the CEC request.[19]

The non-cancer health risk impacts from the flaming scenario are provided in Table 12. As demonstrated in the table, non-cancer health risk impacts do not exceed the hazard index threshold of 1.0 at either the residential and hospital sensitive receptors.

Table 11 Non-Cancer Health Risk Impacts, Non-Flaming Scenario

Hazardous Gas Component	Emission Rate (g/sec)	Res Conc (µg/m³)	Hosp Conc (µg/m³)	AEGL-1 (µg/m³)	Res Haz Quotient	Hosp Haz Quotient
Carbon Monoxide	0.741	292.7	236.2	–	N/A	N/A
Carbon Dioxide	2.355	929.9	750.4	–	N/A	N/A
Hydrogen	0.164	64.8	52.3	–	N/A	N/A
Methane	0.234	92.2	74.4	–	N/A	N/A
Acetylene	0.005	2.0	1.6	–	N/A	N/A
Ethene (Ethylene)	0.243	96.0	77.5	–	N/A	N/A
Ethane	0.073	28.8	23.3	–	N/A	N/A
Propene (Propylene)	0.107	42.4	34.2	–	N/A	N/A
Propane	0.064	25.1	20.3	9,900,000	2.53936E-06	2.04917E-06
Butane	0.148	58.5	47.2	13,000,000	4.49999E-06	3.63133E-06
Pentane	0.048	18.8	15.1	–	N/A	N/A
Hexane	0.025	9.8	7.9	–	N/A	N/A
Heptene	0.005	1.9	1.5	–	N/A	N/A
Styrene	0.003	1.1	0.8	85,000	1.24E-05	9.98E-06
Benzene	0.008	3.0	2.4	170,000	1.75E-05	1.41E-05
Toluene	0.002	0.9	0.8	250,000	3.72E-06	3.00E-06
Dimethyl Carbonate	0.163	64.2	51.8	–	N/A	N/A
Ethyl Methyl Carbonate	0.011	4.4	3.6	–	N/A	N/A
Hydrogen Chloride	0.136	53.8	43.4	2,700	1.99E-02	1.61E-02
Hydrogen Fluoride	0.106	42.0	33.9	800	5.24E-02	4.23E-02
Hydrogen Cyanide	0.027	10.5	8.5	2,200	4.77E-03	3.85E-03
Copper and compounds	1.00	N/A	N/A	–	N/A	N/A
Ammonia	0	0	0	21,000	0	0
Formaldehyde	0	0	0	1,000	0	0
Acrolein	0	0	0	70	0	0
Nitrogen Dioxide	0.715	282.3	227.8	940	3.00E-01	2.42E-01
Sulfur Dioxide	0	0	0	520	0	0
Hazard Index					**0.38**	**0.30**
Threshold					**1**	**1**
Exceed?					**no**	**no**

g/sec = grams per second; µg/m³ = micrograms per meter cubed; AEGL = Acute Exposure Guideline Level

[19] Email from R. Longman of the CEC, May 13, 2026.

Table 12 Non-Cancer Health Risk Impacts, Flaming Scenario

Hazardous Gas Component	Emission Rate (g/sec)	Res Conc (μg/m³)	Hosp Conc (μg/m³)	AEGL-1 (μg/m³)	Res Haz Quotient	Hosp Haz Quotient
Carbon Monoxide	11.658	250.7	293.4	–	N/A	N/A
Carbon Dioxide	485.9	10,451	12,230	–	N/A	N/A
Hydrogen	0.821	17.7	20.7	–	N/A	N/A
Methane	1.168	25.1	29.4	–	N/A	N/A
Acetylene	0.026	0.6	0.7	–	N/A	N/A
Ethene (Ethylene)	1.216	26.2	30.6	–	N/A	N/A
Ethane	0.365	7.9	9.2	–	N/A	N/A
Propene (Propylene)	0.537	11.5	13.5	–	N/A	N/A
Propane	0.318	6.8	8.0	9,900,000	6.91686E-07	8.0945E-07
Butane	0.741	15.9	18.6	13,000,000	1.22574E-06	1.43443E-06
Pentane	0.238	5.1	6.0	–	N/A	N/A
Hexane	0.125	2.7	3.1	–	N/A	N/A
Heptene	0.024	0.5	0.6	–	N/A	N/A
Styrene	0.013	0.3	0.3	85,000	3.37E-06	3.94E-06
Benzene	0.038	0.8	0.9	170000	4.76E-06	5.57E-06
Toluene	0.038	0.8	0.9	250,000	3.24E-06	3.79E-06
Dimethyl Carbonate	0.012	0.3	0.3	–	N/A	N/A
Ethyl Methyl Carbonate	0.056	1.2	1.4	–	N/A	N/A
Hydrogen Chloride	0.855	18.4	21.5	2,700	6.81E-03	7.97E-03
Hydrogen Fluoride	8.237	177.2	207.3	800	0.22	0.26
Hydrogen Cyanide	0.416	9.0	10.5	2,200	4.07E-03	4.76E-03
Copper and compounds	0	0	0	–	N/A	N/A
Ammonia	0.166	3.6	4.2	21,000	1.70E-04	1.99E-04
Formaldehyde	0.193	4.2	4.9	1,000	4.15E-03	4.86E-03
Acrolein	0.721	15.5	18.2	70	2.22E-01	2.59E-01
Nitrogen Dioxide	0.631	13.6	15.9	940	1.44E-02	1.69E-02
Sulfur Dioxide	1.162	25.0	29.3	520	4.81E-02	5.63E-02
Hazard Index					**0.52**	**0.61**
Threshold					**1**	**1**
Exceed?					**no**	**no**

g/sec = grams per second; μg/m³ = micrograms per meter cubed; AEGL = Acute Exposure Guideline Level

5 Modeling Summary

The goal of this analysis was to present a modeling analysis that will achieve the objectives in the CEC Data Request 1 through 5 in the *Data Requests for Enterprise Emergency Peaker Project (01-EP-10C)*. The analysis represents a situation when "all controls failed," like those identified in the *Coffman Hazard Mitigation Analysis for Enterprise BESS*. It should be noted that these results were intended for bounding consequence evaluation, not likelihood-weighted risk. The modeled scenarios represented low-frequency emergency events.

The Project is anticipated to result in concentrations exceeding only Level 1 AEGLs and/or ERPGs for hydrochloric acid, hydrofluoric acid and nitrogen dioxide due to the emergency occurrence of a non-flaming or flaming thermal runaway event. The Project is *not* anticipated to exceed any Level 2 or 3 emergency thresholds. So, the Project may result in reversible effects to the public, like noticeable discomfort or irritation; however, it is *not* anticipated to result in more serious or potentially irreversible health effects or worse associated with Level 2 or 3 AEGLs or ERPGs.

As a result, isopleths were provided to anticipate the potential area of Level 1 emergency threshold exceedance, intended for use in community notification recommendations. While HF concentrations are not anticipated to exceed Level 2 or 3 emergency thresholds for the non-flaming and flaming thermal runaway scenarios defined herein, it may be prudent for first responders to utilize increased levels of PPE out of an abundance of caution. In the event of a non-flaming or flaming scenario, it is recommended that notifications be provided, at a minimum, to the nearby businesses within a radius of 430 feet (as discussed in Section 4.1).

Potential non-cancer health risk impacts are not anticipated to exceed the hazard index thresholds at sensitive receptors for the non-flaming or flaming scenarios.

Direct mitigation of potential Project impacts is infeasible. Rather, the overall risk is reduced through engineering and administrative controls, such as a battery management system, aimed at preventing a thermal runaway event from ever occurring or an NFPA 69 combustible concentration reduction system designed to exhaust flammable gases and prevent fire.

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Appendix A

Thresholds Summary

Summary of AEGLs and ERPGs (1-Hour Average)

Gas Species	Formula	CAS #	AEGL-1 (μg/m³)	AEGL-2 (μg/m³)	AEGL-3 (μg/m³)	ERPG-1 (μg/m³)	ERPG-2 (μg/m³)	ERPG-3 (μg/m³)	MW	ERPG-1 (ppm)	ERPG-2 (ppm)	ERPG-3 (ppm)
Carbon Monoxide	CO	630-08-0	--	95,000	380,000	229,000	401,000	573,000	28.01	200	350	500
Carbon Dioxide	CO_2	124-38-9	--	--	--	--	--	--		--	--	--
Hydrogen	H_2	1333-74-0	--	--	--	--	--	--		--		
Methane	CH_4	74-82-8	--	--	--	--	--	--		--		
Acetylene	C_2H_2	74-86-2	--	--	--	--	--	--		--		
Ethene (Ethylene)	C_2H_4	74-85-1	--	--	--	--	--	--		--		
Ethane	C_2H_6	74-84-0	--	--	--	--	--	--		--		
Propene (Propylene)	C_3H_6	115-07-1	--	--	--	--	--	--		--		
Propane	C_3H_8	74-98-6	9,900,000	31,000,000	59,000,000	--	--	--		--		
Butane	C_4H_{10}	106-97-8	13,000,000	40,000,000	130,000,000	--	--	--		--		
Pentane	C_5H_{12}	109-66-0	--	--	--	--	--	--		--		
Hexane	C_6H_{14}	110-54-3	--	10,000,000	30,000,000	--	--	--		--		
Heptene	C_7H_{14}	592-76-7	--	--	--	--	--	--		--		
Styrene	C_8H_8	100-42-5	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000	104.15	50	250	1000
Benzene	C_6H_6	71-43-2	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000	78.11	50	150	1000
Toluene	C_7H_8	108-88-3	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000	92.14	50	300	1000
Dimethyl Carbonate	$C_3H_6O_3$	616-38-6	--	--	--	--	--	--		--		
Ethyl Methyl Carbonate	$C_4H_8O_3$	623-53-0	--	--	--	--	--	--		--		
Hydrogen Chloride	HCl	7647-01-0	2,700	33,000	155,000	4,350	29,000	217,000	35.45	3	20	150
Hydrogen Fluoride	HF	7664-39-3	800	20,000	36,000	1,637	16,000	41,000	20.01	2	20	50
Hydrogen Cyanide	HCN	74-90-8	2,200	7,800	17,000	--	11,000	28,000	27.03	--	10	25
Copper and compounds	Cu	7440-5-8	--	--	--	--	--	--				
Ammonia	NH_3	7664-41-7	21,000	112,000	769,000	17,413	104,000	1,045,000	17.03	25	150	1500
Formaldehyde	CH_2O	50-00-0	1,000	17,000	69,000	1,227	12,000	49,000	30	1	10	40
Acrolein	C_3H_4O	107-02-8	70	230	3,200	115	344	3,439	56.06	0.05	0.15	1.5
Nitrogen Dioxide	NO_2	10102-44-0	940	23,000	38,000	1,882	28,000	56,000	46.01	1	15	30
Sulfur Dioxide	SO_2	7446-09-5	520	1,950	49,000	786	8,000	66,000	64.07	0.3	3	25

Additional air toxics from SFPE Foundation, Environmental and Health Impacts of Thermal Runaway Events in Outdoor Lithium-Ion Battery Energy Storage System Installations, June 2025

1-Hour AEGL values from U.S. EPA. Units provided in mg/m³ and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to μg/m³.

CAS = Chemical Abstract Service; AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; μg/m³ = micrograms per meter cubed;

Appendix B

Emissions Calculations & Summary

Hazardous Gas Component	Emission Rate (g/sec) Non-Flaming Scenario	Flaming Scenario
Carbon Monoxide	0.741	11.66
Carbon Dioxide	2.355	485.9
Hydrogen	0.164	0.821
Methane	0.234	1.168
Acetylene	0.005	0.026
Ethene (Ethylene)	0.243	1.216
Ethane	0.073	0.365
Propene (Propylene)	0.107	0.537
Propane	0.064	0.318
Butene	0.000	0.000
Butane	0.148	0.741
Pentane	0.048	0.238
Hexane	0.025	0.125
Heptene	0.005	0.024
Styrene	0.003	0.013
Benzene	0.008	0.038
Toluene	0.002	0.038
Dimethyl Carbonate	0.163	0.012
Ethyl Methyl Carbonate	0.011	0.056
Hydrogen Chloride	0.136	0.855
Hydrogen Fluoride	0.106	8.237
Hydrogen Cyanide	0.027	0.416
Copper and compounds	1.00	0
Ammonia	0	0.166
Formaldehyde	0	0.193
Acrolein	0	0.721
Nitrogen Dioxide	0.715	0.631
Sulfur Dioxide	0	1.162

Hazardous Gas Component	Molar Mass (g/mol)	UL 9540A Gas Analysis (%)	Mass Production Rate [g/s] 6 hr
Carbon Monoxide	28.01	13.453	0.74
Carbon Dioxide	44.01	27.205	2.36
Hydrogen	2.02	41.313	0.16
Methane	16.043	7.403	0.23
Acetylene	26.04	0.101	0.01
Ethene (Ethylene)	28.05	4.408	0.24
Ethane	30.07	1.235	0.07
Propene (Propylene)	42.08	1.297	0.11
Propane	44.1	0.734	0.06
Butane	58.12	1.296	0.15
Pentane	72.15	0.335	0.05
Hexane	86.18	0.147	0.02
Heptene	98.18	0.025	0.00
Styrene	104.15	0.013	0.003
Benzene	78.11	0.049	0.01
Toluene	92.14	0.013	0.002
Dimethyl Carbonate	90.09	0.917	0.163
Ethyl Methyl Carbonate	104.1	0.055	0.011

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runway temperature identified in the UL 9540A cell test report.

Source: UL 9540A Cell Test Report, page 2.

Mass Production Rate [g/s] 6 hr
0.74
2.36
0.16
0.23
0.01
0.24
0.07
0.11
0.06
0.15
0.05
0.02
0.00
0.00
0.01
0.002
0.163
0.011

Species	Molar Mass	Yield			Mass Production Rate [g/s]
	g/mol	% vol	mg/g	mg/Wh	6 hr
Benzene - n/a	78.11	0.65	-	-	0.10
Hydrogen Chloride	36.46	1.9	-	-	0.14
Hydrogen Cyanide	27.03	0.5	-	-	0.03
Hydrogen Fluoride	20.01	2.7	-	-	0.11
Nitrogen Dioxide	46.01	7.9	-	-	0.72

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runway temperature identified in the UL 9540A cell test report.

Source: SFPE Report, Table 12

Ideal Gas Law Parameters	PV=nRT; m = PVM/RT		
Gas Release Rate	8.15437037	L/s	
Pressure	1	atm	
R	0.08206	L-atm/(mol-K)	
Temperature	505.15	K	449.6 F @ thermal runway

Mass Loss Rate: 332 g/s

Species	Yield		Mass Production Rate [g/s]
	mg/g	mg/Wh	6 hr
Carbon Monoxide	35.1	-	11.66
Carbon Dioxide	1463	-	485.9
Hydrogen Chloride	2.575	-	0.86
Hydrogen Fluoride	24.8	-	8.24
Hydrogen Cyanide	1.253	-	0.42
Ammonia	0.5	-	0.17
Formaldehyde	See below	-	0.19
Acrolein	See below	-	0.72
Nitrogen Dioxide	1.9	-	0.63
Sulfur Dioxide	3.5	-	1.16
Particulate	56	-	18.60
PM_{10}		-	1.86

Source: SFPE Report, Table 14. Acrolein and formaledhyde emissions from Iqbal et al., 2025. HCl and HCN emission factors using the more conservative emission factors from Vista Morro Bay project Table 3-4.

Hazardous Gas Component	Molar Mass (g/mol)	UL 9540A Gas Analysis (%)	Mass Production Rate [g/s] 6 hr
Carbon Monoxide - n/a	28.01	13.453	3.71
Carbon Dioxide - n/a	44.01	27.205	11.78
Hydrogen	2.02	41.313	0.82
Methane	16.043	7.403	1.17
Acetylene	26.04	0.101	0.03
Ethene (Ethylene)	28.05	4.408	1.22
Ethane	30.07	1.235	0.37
Propene (Propylene)	42.08	1.297	0.54
Propane	44.1	0.734	0.32
Butane	58.12	0.193	0.74
Pentane	72.15	0.335	0.24
Hexane	86.18	0.147	0.12
Heptene	98.18	0.025	0.02
Styrene	104.15	0.013	0.01
Benzene	78.11	0.049	0.04
Toluene	92.14	0.013	0.04
Dimethyl Carbonate	90.09	0.917	0.01
Ethyl Methyl Carbonate	104.1	0.055	0.06

Notes: The ideal gas law was used to convert gas production to mass production, assuming standard pressure and the thermal runway temperature identified in the UL 9540A cell test report. The values were then scaled up for an entire enclosure.

Source: UL 9540A Cell Test Report, page 2.

Iqbal et al, 2025 supplementary calculations

Gas Emitted (L/kWh) per SOC %	10%	25%	50%	75%	100%	Average	Peak Average
Formaledhyde	1.5	0.25	0.75	0	0	0.5	1.5
Acrolein	3	0.5	2	2.5	2	2	3
Approximations based off of Figure 10 & Figure 11 for LFP batteries, excluding outlier values. SOC = State of Charge							

Ideal Gas Law Parameters

Gas Release Rate	tbd	L/s	
Pressure	1	atm	PV=nRT; m = PVM/RT
R	0.08206	L-atm/(mol-K)	
Temperature	499	K	438.5 degrees Fahrenheit [499 degrees Kelvin, SFPE Report, Table 25 for LFP]

Ideal Gas Law Calculation

Hazardous Gas Component	Gas Release Rate (L/s)	Molar Mass (g/mol)	Mass Production Rate [g/s] 6 hr
Formaledhyde	0.2635	30	0.1930
Acrolein	0.5269	56.06	0.7214
Gas release rate based on 6 hour event and 3794 kWh total per enclosure.			

Scenario	Particulate Composition [% Mass]			
	Li	Al	Cu	Fe
Non-Flaming	17.5	6.3	5.4	14.4
Flaming	20.4	3.9	0	16.6

Source: SFPE Report, Table 23

Scenario	Metal Emissions (g/s)			
	Li	Al	Cu	Fe
Non-Flaming	3.25485016	1.2	1.004354	2.7
Flaming	3.79422533	0.725367	0	3.087458

Appendix C

Emergency Threshold Comparison Calculations

Non-Flaming Scenario

Gas Species	Emission Rate (g/sec)	Ground Level Conc (μg/m^3)	AEGL-1 (μg/m^3)	AEGL-2 (μg/m^3)	AEGL-3 (μg/m^3)	ERPG-1 (μg/m^3)	ERPG-2 (μg/m^3)	ERPG-3 (μg/m^3)
Carbon Monoxide	0.741	17,601	--	95,000	380,000	229,000	401,000	573,000
Carbon Dioxide	2.355	55,925	--	--	--	--	--	--
Hydrogen	0.164	3,898	--	--	--	--	--	--
Methane	0.234	5,547	--	--	--	--	--	--
Acetylene	0.005	123	--	--	--	--	--	--
Ethene (Ethylene)	0.243	5,775	--	--	--	--	--	--
Ethane	0.073	1,735	--	--	--	--	--	--
Propene (Propylene)	0.107	2,549	--	--	--	--	--	--
Propane	0.064	1,512	9,900,000	31,000,000	59,000,000	--	--	--
Butane	0.148	3,518	13,000,000	40,000,000	130,000,000	--	--	--
Pentane	0.048	1,129	--	--	--	--	--	--
Hexane	0.025	592	--	10,000,000	30,000,000	--	--	--
Heptene	0.005	115	--	--	--	--	--	--
Styrene	0.003	63	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000
Benzene	0.008	179	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000
Toluene	0.002	56	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000
Dimethyl Carbonate	0.163	3,859	--	--	--	--	--	--
Ethyl Methyl Carbonate	0.011	267	--	--	--	--	--	--
Hydrogen Chloride	0.136	**3,236**	**2,700**	33,000	155,000	4,350	29,000	217,000
Hydrogen Fluoride	0.106	**2,524**	800	20,000	36,000	**1,637**	16,000	41,000
Hydrogen Cyanide	0.027	631	2,200	7,800	17,000	--	11,000	28,000
Copper and compounds	1.00	23,848	--	--	--	--	--	--
Ammonia	0	0	21000	112000	769000	17413.088	104000	1045000
Formaldehyde	0	0	1000	17000	69000	1226.9939	12000	49000
Acrolein	0	0	70	230	3200	114.64213	344	3439
Nitrogen Dioxide	0.715	**8,222**	**940**	23,000	38,000	**1,882**	28,000	56,000
Sulfur Dioxide	0	0	520	1,950	49,000	786	8,000	66,000

Additional air toxics from SFPE Report. Bold lettering indicates an exceedance. Note that ammonia is only present for flaming scenarios based on SFPE Report.

1-Hour AEGL values from U.S. EPA. Units provided in mg/m^3 and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to μg/m^3.

CAS = Chemical Abstract Service; AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; μg/m^3 = micrograms per meter cubed.

Source: U.S. EPA 2026a; Cameo Chemical 2026.

Flaming Scenario

Gas Species	Emission Rate (g/sec)	Ground Level Conc (µg/m^3)	AEGL-1 (µg/m^3)	AEGL-2 (µg/m^3)	AEGL-3 (µg/m^3)	ERPG-1 (µg/m^3)	ERPG-2 (µg/m^3)	ERPG-3 (µg/m^3)
Carbon Monoxide	11.66	2,481	--	95,000	380,000	229,000	401,000	573,000
Carbon Dioxide	485.9	103,429	--	--	--	--	--	--
Hydrogen	0.821	175	--	--	--	--	--	--
Methane	1.168	249	--	--	--	--	--	--
Acetylene	0.026	6	--	--	--	--	--	--
Ethene (Ethylene)	1.216	259	--	--	--	--	--	--
Ethane	0.365	78	--	--	--	--	--	--
Propene (Propylene)	0.537	114	--	--	--	--	--	--
Propane	0.318	68	9,900,000	31,000,000	59,000,000	--	--	--
Butane	0.741	158	13,000,000	40,000,000	130,000,000	--	--	--
Pentane	0.238	51	--	--	--	--	--	--
Hexane	0.125	27	--	10,000,000	30,000,000	--	--	--
Heptene	0.024	5	--	--	--	--	--	--
Styrene	0.013	3	85,000	550,000	4,690,000	213,000	1,065,000	4,260,000
Benzene	0.038	8	170,000	2,600,000	13,000,000	159,734	479,000	3,195,000
Toluene	0.038	8	250,000	2,100,000	14,000,000	188,000	1,131,000	3,769,000
Dimethyl Carbonate	0.012	3	--	--	--	--	--	--
Ethyl Methyl Carbonate	0.056	12	--	--	--	--	--	--
Hydrogen Chloride	0.855	182	2,700	33,000	155,000	4,350	29,000	217,000
Hydrogen Fluoride	8.237	**1,753**	**800**	20,000	36,000	**1,637**	16,000	41,000
Hydrogen Cyanide	0.416	89	2,200	7,800	17,000	--	11,000	28,000
Copper and compounds	0	0	--	--	--	--	--	--
Ammonia	0.166	35	21,000	112,000	769,000	17,413	104,000	1,045,000
Formaldehyde	0.193	41	1,000	17,000	69,000	1,227	12,000	49,000
Acrolein	0.721	**154**	**70**	230	3,200	**115**	344	3,439
Nitrogen Dioxide	0.631	39	940	23,000	38,000	1,882	28,000	56,000
Sulfur Dioxide	1.162	247	520	1,950	49,000	786	8,000	66,000

Additional air toxics from SFPE Report. Bold lettering indicates an exceedance. Note that copper is present only for the non-flaming scenarios based on the SFPE Report.

1-Hour AEGL values from U.S. EPA. Units provided in mg/m^3 and converted to ERPG's obtained from Cameo Chemicals and converted from ppm to µg/m^3.

CAS = Chemical Abstract Service; AEGL = Acute Exposure Guideline; ERPG = Emergency Response Planning Guidelines; µg/m^3 = micrograms per meter cubed.

Source: U.S. EPA 2026a; Cameo Chemical 2026.

Appendix D

Non-Cancer Health Risk Calculations

Non-Flaming Scenario

Hazardous Gas Component	Emission Rate (g/sec)	Res Conc (μg/m³)	Hosp Conc (μg/m³)	AEGL-1 (μg/m³)	Res Haz Quotient	Hosp Haz Quotient
Carbon Monoxide	0.741	292.7	236.2	--	N/A	N/A
Carbon Dioxide	2.355	929.9	750.4	--	N/A	N/A
Hydrogen	0.164	64.8	52.3	--	N/A	N/A
Methane	0.234	92.2	74.4	--	N/A	N/A
Acetylene	0.005	2.0	1.6	--	N/A	N/A
Ethene (Ethylene)	0.243	96.0	77.5	--	N/A	N/A
Ethane	0.073	28.8	23.3	--	N/A	N/A
Propene (Propylene)	0.107	42.4	34.2	--	N/A	N/A
Propane	0.064	25.1	20.3	9,900,000	2.53936E-06	2.04917E-06
Butane	0.148	58.5	47.2	13,000,000	4.49999E-06	3.63133E-06
Pentane	0.048	18.8	15.1	--	N/A	N/A
Hexane	0.025	9.8	7.9	--	N/A	N/A
Heptene	0.005	1.9	1.5	--	N/A	N/A
Styrene	0.003	1.1	0.8	85,000	1.24E-05	9.98E-06
Benzene	0.008	3.0	2.4	170,000	1.75E-05	1.41E-05
Toluene	0.002	0.9	0.8	250,000	3.72E-06	3.00E-06
Dimethyl Carbonate	0.163	64.2	51.8	--	N/A	N/A
Ethyl Methyl Carbonate	0.011	4.4	3.6	--	N/A	N/A
Hydrogen Chloride	0.136	53.8	43.4	2,700	1.99E-02	1.61E-02
Hydrogen Fluoride	0.106	42.0	33.9	800	5.24E-02	4.23E-02
Hydrogen Cyanide	0.027	10.5	8.5	2,200	4.77E-03	3.85E-03
Copper and compounds	1.00	N/A	N/A	--	N/A	N/A
Ammonia	0	0	0	21,000	0	0
Formaldehyde	0	0	0	1,000	0	0
Acrolein	0	0	0	70	0	0
Nitrogen Dioxide	0.715	282.3	227.8	940	3.00E-01	2.42E-01
Sulfur Dioxide	0	0	0	520	0	0
				Hazard Index:	0.38	0.30
				Threshold:	1	1
				Exceed?	no	no

g/sec = grams per second; μg/m³ = micrograms per meter cubed; AEGL = Acute Exposure Guideline Level

Flaming Scenario

Hazardous Gas Component	Emission Rate (g/sec)	Res Conc (μg/m^3)	Hosp Conc (μg/m^3)	AEGL-1 (μg/m^3)	Res Haz Quotient	Hosp Haz Quotient
Carbon Monoxide	11.658	250.7	293.4	--	N/A	N/A
Carbon Dioxide	485.9	10,451	12,230	--	N/A	N/A
Hydrogen	0.821	17.7	20.7	--	N/A	N/A
Methane	1.168	25.1	29.4	--	N/A	N/A
Acetylene	0.026	0.6	0.7	--	N/A	N/A
Ethene (Ethylene)	1.216	26.2	30.6	--	N/A	N/A
Ethane	0.365	7.9	9.2	--	N/A	N/A
Propene (Propylene)	0.537	11.5	13.5	--	N/A	N/A
Propane	0.318	6.8	8.0	9,900,000	6.91686E-07	8.0945E-07
Butane	0.741	15.9	18.6	13,000,000	1.22574E-06	1.43443E-06
Pentane	0.238	5.1	6.0	--	N/A	N/A
Hexane	0.125	2.7	3.1	--	N/A	N/A
Heptene	0.024	0.5	0.6	--	N/A	N/A
Styrene	0.013	0.3	0.3	85,000	3.37E-06	3.94E-06
Benzene	0.038	0.8	0.9	170000	4.76E-06	5.57E-06
Toluene	0.038	0.8	0.9	250,000	3.24E-06	3.79E-06
Dimethyl Carbonate	0.012	0.3	0.3	--	N/A	N/A
Ethyl Methyl Carbonate	0.056	1.2	1.4	--	N/A	N/A
Hydrogen Chloride	0.855	18.4	21.5	2,700	6.81E-03	7.97E-03
Hydrogen Fluoride	8.237	177.2	207.3	800	0.22	0.26
Hydrogen Cyanide	0.416	9.0	10.5	2,200	4.07E-03	4.76E-03
Copper and compounds	0	0	0	--	N/A	N/A
Ammonia	0.166	3.6	4.2	21,000	1.70E-04	1.99E-04
Formaldehyde	0.193	4.2	4.9	1,000	4.15E-03	4.86E-03
Acrolein	0.721	15.5	18.2	70	2.22E-01	2.59E-01
Nitrogen Dioxide	0.631	13.6	15.9	940	1.44E-02	1.69E-02
Sulfur Dioxide	1.162	25.0	29.3	520	4.81E-02	5.63E-02
				Hazard Index:	0.52	0.61
				Threshold:	1	1
				Exceed?	no	no

g/sec = grams per second; μg/m^3 = micrograms per meter cubed; AEGL = Acute Exposure Guideline Level

Appendix E

AERMOD Files

Control Pathway

Dispersion Options

Titles

C:\Lakes\AERMOD View\Project Files\Enterprise HRA\Enterprise HRA.isc

Dispersion Options

☒ Regulatory Default ☐ Non-Default Options

Dispersion Coefficient

Urban

Population:
Name (Optional):
Roughness Length:

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

Averaging Time Options

Hours

1	2	3	4	6	8	12	24
☒	☐	☐	☐	☐	☒	☐	☒

☐ Month ☒ Period ☐ Annual

Exponential Decay

Half Life of 4 hrs will be used
Option not available

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 2.50 m

Optional Files

☐ Re-Start File	☐ Init File	☐ Multi-Year Analyses	☐ Event Input File	☒ Error Listing File

Detailed Error Listing File

Filename: Enterprise HCA Unitized.err

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B1_NF	489056.71 Battery 1 - Non-Flaming	3664957.20	217.77	2.44	1.00000	505.15	0.02	0.90
POINT	B2_NF	489064.40 Battery 2 - Non-Flaming	3664953.07	217.40	2.44	1.00000	505.15	0.02	0.90
POINT	B3_NF	489072.09 Battery 3 - Non-Flaming	3664948.89	216.98	2.44	1.00000	505.15	0.02	0.90
POINT	B4_NF	489079.85 Battery 4 - Non-Flaming	3664944.72	216.66	2.44	1.00000	505.15	0.02	0.90
POINT	B5_NF	489087.50 Battery 5 - Non-Flaming	3664940.55	216.69	2.44	1.00000	505.15	0.02	0.90
POINT	B6_NF	489088.62 Battery 6 - Non-Flaming	3664904.82	218.23	2.44	1.00000	505.15	0.02	0.90
POINT	B7_NF	489080.82 Battery 7 - Non-Flaming	3664909.16	217.69	2.44	1.00000	505.15	0.02	0.90
POINT	B8_NF	489073.39 Battery 8 - Non-Flaming	3664913.13	218.82	2.44	1.00000	505.15	0.02	0.90
POINT	B9_NF	489065.47 Battery 9 - Non-Flaming	3664917.33	218.77	2.44	1.00000	505.15	0.02	0.90
POINT	B10_NF	489058.04 Battery 10 - Non-Flaming	3664921.61	219.20	2.44	1.00000	505.15	0.02	0.90
POINT	B11_NF	489050.17 Battery 11 - Non-Flaming	3664925.66	219.94	2.44	1.00000	505.15	0.02	0.90
POINT	B12_NF	489042.15 Battery 12 - Non-Flaming	3664930.04	219.37	2.44	1.00000	505.15	0.02	0.90

Source Pathway - Source Inputs

AERMOD

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B1_F	489056.71 Battery 1 - Flaming	3664957.20	217.77	2.44	1.00000	498.98	8.50	0.90
POINT	B2_F	489064.40 Battery 2 - Flaming	3664953.07	217.40	2.44	1.00000	498.98	8.50	0.90
POINT	B3_F	489072.09 Battery 3 - Flaming	3664948.89	216.98	2.44	1.00000	498.98	8.50	0.90
POINT	B4_F	489079.85 Battery 4 - Flaming	3664944.72	216.66	2.44	1.00000	498.98	8.50	0.90
POINT	B5_F	489087.50 Battery 5 - Flaming	3664940.55	216.69	2.44	1.00000	498.98	8.50	0.90
POINT	B6_F	489088.62 Battery 6 - Flaming	3664904.82	218.23	2.44	1.00000	498.98	8.50	0.90
POINT	B7_F	489080.82 Battery 7 - Flaming	3664909.16	217.69	2.44	1.00000	498.98	8.50	0.90
POINT	B8_F	489073.39 Battery 8 - Flaming	3664913.13	218.82	2.44	1.00000	498.98	8.50	0.90
POINT	B9_F	489065.47 Battery 9 - Flaming	3664917.33	218.77	2.44	1.00000	498.98	8.50	0.90
POINT	B10_F	489058.04 Battery 10 - Flaming	3664921.61	219.20	2.44	1.00000	498.98	8.50	0.90
POINT	B11_F	489050.17 Battery 11 - Flaming	3664925.66	219.94	2.44	1.00000	498.98	8.50	0.90
POINT	B12_F	489042.15 Battery 12 - Flaming	3664930.04	219.37	2.44	1.00000	498.98	8.50	0.90
POINT	STCK1	489058.04 Battery 10 - Non-Flaming	3664921.61	219.20	2.44	1.00000	505.15	0.00	1.54

Source Pathway

AERMOD

Building Downwash Information

Option not in use

Emission Rate Units for Output

For Concentration

Unit Factor:	1E6
Emission Unit Label:	GRAMS/SEC
Concentration Unit Label:	MICROGRAMS/M**3

Source Pathway

AERMOD

Source Groups

Source Group ID	List of Sources in Group (Source Range or Single Sources)
B9_NF	B9_NF
B9_F	B9_F
B8_NF	B8_NF
B8_F	B8_F
B7_NF	B7_NF
B7_F	B7_F
B6_NF	B6_NF
B6_F	B6_F
B5_NF	B5_NF
B5_F	B5_F
B4_NF	B4_NF
B4_F	B4_F
B3_NF	B3_NF
B3_F	B3_F
B2_NF	B2_NF

Source Pathway

AERMOD

Source Group ID: B2_F	List of Sources in Group (Source Range or Single Sources)
	B2_F

Source Group ID: B12_NF	List of Sources in Group (Source Range or Single Sources)
	B12_NF

Source Group ID: B12_F	List of Sources in Group (Source Range or Single Sources)
	B12_F

Source Group ID: B11_NF	List of Sources in Group (Source Range or Single Sources)
	B11_NF

Source Group ID: B11_F	List of Sources in Group (Source Range or Single Sources)
	B11_F

Source Group ID: B10_NF	List of Sources in Group (Source Range or Single Sources)
	B10_NF

Source Group ID: B10_F	List of Sources in Group (Source Range or Single Sources)
	B10_F

Source Group ID: B1_NF	List of Sources in Group (Source Range or Single Sources)
	B1_NF

Source Group ID: B1_F	List of Sources in Group (Source Range or Single Sources)
	B1_F

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: ESC_2010_2012_v24142.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: ESC_2010_2012_v24142.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 202.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2010			Escondido - SDAPCD provided
Upper Air		2010			
On-Site		2010			

Data Period

Data Period to Process

Start Date: 1/1/2010 Start Hour: 1 End Date: 12/31/2012 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

```
**
****************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 13.1.0
** Lakes Environmental Software Inc.
** Date: 7/13/2026
** File: C:\AERMOD Projs\Enterprise\Enterprise HCA Unitized\Enterprise HCA
Unitized.ADI
**
****************************************
**
**
****************************************
** AERMOD Control Pathway
****************************************
**
**
CO STARTING
   TITLEONE C:\Lakes\AERMOD View\Project Files\Enterprise HRA\Enterprise HRA.isc
   MODELOPT DFAULT CONC
   AVERTIME 1 8 24 PERIOD
   URBANOPT 146194
   POLLUTID OTHER
   FLAGPOLE 2.50
   RUNORNOT RUN
   ERRORFIL "Enterprise HCA Unitized.err"
CO FINISHED
**
****************************************
** AERMOD Source Pathway
****************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION B1_NF        POINT      489056.713  3664957.202      217.770
** DESCRSRC Battery 1 - Non-Flaming
   LOCATION B2_NF        POINT      489064.396  3664953.066      217.400
** DESCRSRC Battery 2 - Non-Flaming
   LOCATION B3_NF        POINT      489072.088  3664948.891      216.980
** DESCRSRC Battery 3 - Non-Flaming
   LOCATION B4_NF        POINT      489079.852  3664944.722      216.660
** DESCRSRC Battery 4 - Non-Flaming
   LOCATION B5_NF        POINT      489087.498  3664940.553      216.690
** DESCRSRC Battery 5 - Non-Flaming
   LOCATION B6_NF        POINT      489088.615  3664904.822      218.230
** DESCRSRC Battery 6 - Non-Flaming
   LOCATION B7_NF        POINT      489080.818  3664909.160      217.690
```

```
** DESCRSRC Battery 7 - Non-Flaming
   LOCATION B8_NF        POINT      489073.388  3664913.132      218.820
** DESCRSRC Battery 8 - Non-Flaming
   LOCATION B9_NF        POINT      489065.474  3664917.330      218.770
** DESCRSRC Battery 9 - Non-Flaming
   LOCATION B10_NF       POINT      489058.037  3664921.608      219.200
** DESCRSRC Battery 10 - Non-Flaming
   LOCATION B11_NF       POINT      489050.171  3664925.658      219.940
** DESCRSRC Battery 11 - Non-Flaming
   LOCATION B12_NF       POINT      489042.154  3664930.041      219.370
** DESCRSRC Battery 12 - Non-Flaming
   LOCATION B1_F         POINT      489056.713  3664957.202      217.770
** DESCRSRC Battery 1 - Flaming
   LOCATION B2_F         POINT      489064.396  3664953.066      217.400
** DESCRSRC Battery 2 - Flaming
   LOCATION B3_F         POINT      489072.088  3664948.891      216.980
** DESCRSRC Battery 3 - Flaming
   LOCATION B4_F         POINT      489079.852  3664944.722      216.660
** DESCRSRC Battery 4 - Flaming
   LOCATION B5_F         POINT      489087.498  3664940.553      216.690
** DESCRSRC Battery 5 - Flaming
   LOCATION B6_F         POINT      489088.615  3664904.822      218.230
** DESCRSRC Battery 6 - Flaming
   LOCATION B7_F         POINT      489080.818  3664909.160      217.690
** DESCRSRC Battery 7 - Flaming
   LOCATION B8_F         POINT      489073.388  3664913.132      218.820
** DESCRSRC Battery 8 - Flaming
   LOCATION B9_F         POINT      489065.474  3664917.330      218.770
** DESCRSRC Battery 9 - Flaming
   LOCATION B10_F        POINT      489058.037  3664921.608      219.200
** DESCRSRC Battery 10 - Flaming
   LOCATION B11_F        POINT      489050.171  3664925.658      219.940
** DESCRSRC Battery 11 - Flaming
   LOCATION B12_F        POINT      489042.154  3664930.041      219.370
** DESCRSRC Battery 12 - Flaming
** Source Parameters **
   SRCPARAM B1_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B2_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B3_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B4_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B5_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B6_NF              1.0      2.438    505.150 0.0196487584064068       0.9

   SRCPARAM B7_NF              1.0      2.438    505.150 0.0196487584064068       0.9
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   SRCPARAM B8_NF             1.0     2.438   505.150 0.0196487584064068       0.9

   SRCPARAM B9_NF             1.0     2.438   505.150 0.0196487584064068       0.9

   SRCPARAM B10_NF            1.0     2.438   505.150 0.0196487584064068       0.9

   SRCPARAM B11_NF            1.0     2.438   505.150 0.0196487584064068       0.9

   SRCPARAM B12_NF            1.0     2.438   505.150 0.0196487584064068       0.9

   SRCPARAM B1_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B2_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B3_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B4_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B5_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B6_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B7_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B8_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B9_F              1.0     2.438   498.980       8.5       0.9
   SRCPARAM B10_F             1.0     2.438   498.980       8.5       0.9
   SRCPARAM B11_F             1.0     2.438   498.980       8.5       0.9
   SRCPARAM B12_F             1.0     2.438   498.980       8.5       0.9
   URBANSRC ALL
   SRCGROUP B10_F    B10_F
   SRCGROUP B10_NF   B10_NF
   SRCGROUP B11_F    B11_F
   SRCGROUP B11_NF   B11_NF
   SRCGROUP B12_F    B12_F
   SRCGROUP B12_NF   B12_NF
   SRCGROUP B1_F     B1_F
   SRCGROUP B1_NF    B1_NF
   SRCGROUP B2_F     B2_F
   SRCGROUP B2_NF    B2_NF
   SRCGROUP B3_F     B3_F
   SRCGROUP B3_NF    B3_NF
   SRCGROUP B4_F     B4_F
   SRCGROUP B4_NF    B4_NF
   SRCGROUP B5_F     B5_F
   SRCGROUP B5_NF    B5_NF
   SRCGROUP B6_F     B6_F
   SRCGROUP B6_NF    B6_NF
   SRCGROUP B7_F     B7_F
   SRCGROUP B7_NF    B7_NF
   SRCGROUP B8_F     B8_F
   SRCGROUP B8_NF    B8_NF
   SRCGROUP B9_F     B9_F
   SRCGROUP B9_NF    B9_NF
SO FINISHED
**
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** AERMOD Receptor Pathway
****************************************
**
**
RE STARTING
   INCLUDED "Enterprise HCA Unitized.rou"
RE FINISHED
**
****************************************
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
   SURFFILE ESC_2010_2012_v24142.SFC
   PROFFILE ESC_2010_2012_v24142.PFL
   SURFDATA 53120 2010 Escondido_-_SDAPCD_provided
   UAIRDATA 3190 2010
   SITEDATA 1002 2010
   PROFBASE 202.0 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST-2ND 4TH
   RECTABLE 8 1ST-2ND
   RECTABLE 24 1ST 6TH 8TH
** Auto-Generated Plotfiles
   PLOTFILE 1 B10_F 1ST "ENTERPRISE HCA UNITIZED.AD\01H1G001.PLT" 31
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   PLOTFILE 8 B10_NF 1ST "ENTERPRISE HCA UNITIZED.AD\08H1G002.PLT" 35
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   PLOTFILE 8 B11_F 1ST "ENTERPRISE HCA UNITIZED.AD\08H1G003.PLT" 38
   PLOTFILE 24 B11_F 1ST "ENTERPRISE HCA UNITIZED.AD\24H1G003.PLT" 39
   PLOTFILE 1 B11_NF 1ST "ENTERPRISE HCA UNITIZED.AD\01H1G004.PLT" 40
   PLOTFILE 8 B11_NF 1ST "ENTERPRISE HCA UNITIZED.AD\08H1G004.PLT" 41
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PLOTFILE 24 B9_F 6TH "ENTERPRISE HCA UNITIZED.AD\24H6G023.PLT" 197
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PLOTFILE 24 B10_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G002.PLT" 200
PLOTFILE 24 B11_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G003.PLT" 201
PLOTFILE 24 B11_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G004.PLT" 202
PLOTFILE 24 B12_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G005.PLT" 203
PLOTFILE 24 B12_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G006.PLT" 204
PLOTFILE 24 B1_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G007.PLT" 205
PLOTFILE 24 B1_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G008.PLT" 206
PLOTFILE 24 B2_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G009.PLT" 207
PLOTFILE 24 B2_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G010.PLT" 208
PLOTFILE 24 B3_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G011.PLT" 209
PLOTFILE 24 B3_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G012.PLT" 210
PLOTFILE 24 B4_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G013.PLT" 211
PLOTFILE 24 B4_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G014.PLT" 212
PLOTFILE 24 B5_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G015.PLT" 213
PLOTFILE 24 B5_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G016.PLT" 214
PLOTFILE 24 B6_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G017.PLT" 215
PLOTFILE 24 B6_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G018.PLT" 216
PLOTFILE 24 B7_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G019.PLT" 217
PLOTFILE 24 B7_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G020.PLT" 218
PLOTFILE 24 B8_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G021.PLT" 219
PLOTFILE 24 B8_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G022.PLT" 220
PLOTFILE 24 B9_F 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G023.PLT" 221
PLOTFILE 24 B9_NF 8TH "ENTERPRISE HCA UNITIZED.AD\24H8G024.PLT" 222
PLOTFILE PERIOD B10_F "ENTERPRISE HCA UNITIZED.AD\PE00G001.PLT" 223
PLOTFILE PERIOD B10_NF "ENTERPRISE HCA UNITIZED.AD\PE00G002.PLT" 224
PLOTFILE PERIOD B11_F "ENTERPRISE HCA UNITIZED.AD\PE00G003.PLT" 225
PLOTFILE PERIOD B11_NF "ENTERPRISE HCA UNITIZED.AD\PE00G004.PLT" 226
PLOTFILE PERIOD B12_F "ENTERPRISE HCA UNITIZED.AD\PE00G005.PLT" 227
PLOTFILE PERIOD B12_NF "ENTERPRISE HCA UNITIZED.AD\PE00G006.PLT" 228
PLOTFILE PERIOD B1_F "ENTERPRISE HCA UNITIZED.AD\PE00G007.PLT" 229
PLOTFILE PERIOD B1_NF "ENTERPRISE HCA UNITIZED.AD\PE00G008.PLT" 230
PLOTFILE PERIOD B2_F "ENTERPRISE HCA UNITIZED.AD\PE00G009.PLT" 231
PLOTFILE PERIOD B2_NF "ENTERPRISE HCA UNITIZED.AD\PE00G010.PLT" 232
PLOTFILE PERIOD B3_F "ENTERPRISE HCA UNITIZED.AD\PE00G011.PLT" 233
PLOTFILE PERIOD B3_NF "ENTERPRISE HCA UNITIZED.AD\PE00G012.PLT" 234
PLOTFILE PERIOD B4_F "ENTERPRISE HCA UNITIZED.AD\PE00G013.PLT" 235
PLOTFILE PERIOD B4_NF "ENTERPRISE HCA UNITIZED.AD\PE00G014.PLT" 236
PLOTFILE PERIOD B5_F "ENTERPRISE HCA UNITIZED.AD\PE00G015.PLT" 237
PLOTFILE PERIOD B5_NF "ENTERPRISE HCA UNITIZED.AD\PE00G016.PLT" 238
PLOTFILE PERIOD B6_F "ENTERPRISE HCA UNITIZED.AD\PE00G017.PLT" 239
PLOTFILE PERIOD B6_NF "ENTERPRISE HCA UNITIZED.AD\PE00G018.PLT" 240
PLOTFILE PERIOD B7_F "ENTERPRISE HCA UNITIZED.AD\PE00G019.PLT" 241
PLOTFILE PERIOD B7_NF "ENTERPRISE HCA UNITIZED.AD\PE00G020.PLT" 242
PLOTFILE PERIOD B8_F "ENTERPRISE HCA UNITIZED.AD\PE00G021.PLT" 243
PLOTFILE PERIOD B8_NF "ENTERPRISE HCA UNITIZED.AD\PE00G022.PLT" 244
PLOTFILE PERIOD B9_F "ENTERPRISE HCA UNITIZED.AD\PE00G023.PLT" 245
PLOTFILE PERIOD B9_NF "ENTERPRISE HCA UNITIZED.AD\PE00G024.PLT" 246
SUMMFILE "Enterprise HCA Unitized.sum"
```

```
OU FINISHED
**
****************************************
** Project Parameters
****************************************
** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    World Geodetic System 1984
** DTMRGN   Global Definition
** UNITS    m
** ZONE     11
** ZONEINX  0
**
```

Control Pathway

Dispersion Options

Titles

C:\Lakes\AERMOD View\Project Files\Enterprise HRA\Enterprise HRA.isc

Dispersion Options

- [x] Regulatory Default
- [ ] Non-Default Options

Dispersion Coefficient

Urban

Population:
Name (Optional):
Roughness Length:

Output Type

- [x] Concentration
- [ ] Total Deposition (Dry & Wet)
- [ ] Dry Deposition
- [ ] Wet Deposition

Plume Depletion

- [ ] Dry Removal
- [ ] Wet Removal

Output Warnings

- [ ] No Output Warnings
- [ ] Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

NO2

Averaging Time Options

Hours

1	2	3	4	6	8	12	24
[x]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

- [ ] Month
- [ ] Period
- [ ] Annual

- [ ] 1-Hour NO2 Non-NAAQS
- [x] 1-Hour NO2 NAAQS

Exponential Decay

Half Life of 4 hrs will be used / Option not available

Terrain Height Options

- [ ] Flat
- [x] Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

- [x] Yes
- [ ] No

Default Height = 2.50 m

Control Pathway

Optional Files

☐ Re-Start File ☐ Init File ☐ Multi-Year Analyses ☐ Event Input File ☒ Error Listing File

Detailed Error Listing File

Filename: Enterprise HCA NO2 1hr.err

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B1_NF	489056.71 Battery 1 - Non-Flaming	3664957.20	217.77	2.44	0.71715	505.15	0.02	0.90
POINT	B2_NF	489064.40 Battery 2 - Non-Flaming	3664953.07	217.40	2.44	0.71715	505.15	0.02	0.90
POINT	B3_NF	489072.09 Battery 3 - Non-Flaming	3664948.89	216.98	2.44	0.71715	505.15	0.02	0.90
POINT	B4_NF	489079.85 Battery 4 - Non-Flaming	3664944.72	216.66	2.44	0.71715	505.15	0.02	0.90
POINT	B5_NF	489087.50 Battery 5 - Non-Flaming	3664940.55	216.69	2.44	0.71715	505.15	0.02	0.90
POINT	B6_NF	489088.62 Battery 6 - Non-Flaming	3664904.82	218.23	2.44	0.71715	505.15	0.02	0.90
POINT	B7_NF	489080.82 Battery 7 - Non-Flaming	3664909.16	217.69	2.44	0.71715	505.15	0.02	0.90
POINT	B8_NF	489073.39 Battery 8 - Non-Flaming	3664913.13	218.82	2.44	0.71715	505.15	0.02	0.90
POINT	B9_NF	489065.47 Battery 9 - Non-Flaming	3664917.33	218.77	2.44	0.71715	505.15	0.02	0.90
POINT	B10_NF	489058.04 Battery 10 - Non-Flaming	3664921.61	219.20	2.44	0.71715	505.15	0.02	0.90
POINT	B11_NF	489050.17 Battery 11 - Non-Flaming	3664925.66	219.94	2.44	0.71715	505.15	0.02	0.90
POINT	B12_NF	489042.15 Battery 12 - Non-Flaming	3664930.04	219.37	2.44	0.71715	505.15	0.02	0.90

Source Pathway - Source Inputs

AERMOD

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B1_F	489056.71 Battery 1 - Flaming	3664957.20	217.77	2.44	0.63104	498.98	8.50	0.90
POINT	B2_F	489064.40 Battery 2 - Flaming	3664953.07	217.40	2.44	0.63104	498.98	8.50	0.90
POINT	B3_F	489072.09 Battery 3 - Flaming	3664948.89	216.98	2.44	0.63104	498.98	8.50	0.90
POINT	B4_F	489079.85 Battery 4 - Flaming	3664944.72	216.66	2.44	0.63104	498.98	8.50	0.90
POINT	B5_F	489087.50 Battery 5 - Flaming	3664940.55	216.69	2.44	0.63104	498.98	8.50	0.90
POINT	B6_F	489088.62 Battery 6 - Flaming	3664904.82	218.23	2.44	0.63104	498.98	8.50	0.90
POINT	B7_F	489080.82 Battery 7 - Flaming	3664909.16	217.69	2.44	0.63104	498.98	8.50	0.90
POINT	B8_F	489073.39 Battery 8 - Flaming	3664913.13	218.82	2.44	0.63104	498.98	8.50	0.90
POINT	B9_F	489065.47 Battery 9 - Flaming	3664917.33	218.77	2.44	0.63104	498.98	8.50	0.90
POINT	B10_F	489058.04 Battery 10 - Flaming	3664921.61	219.20	2.44	0.63104	498.98	8.50	0.90
POINT	B11_F	489050.17 Battery 11 - Flaming	3664925.66	219.94	2.44	0.63104	498.98	8.50	0.90
POINT	B12_F	489042.15 Battery 12 - Flaming	3664930.04	219.37	2.44	0.63104	498.98	8.50	0.90

Source Pathway

Building Downwash Information

Option not in use

Emission Rate Units for Output

For Concentration

Unit Factor:	1E6
Emission Unit Label:	GRAMS/SEC
Concentration Unit Label:	MICROGRAMS/M**3

Source Groups

Source Group ID:	List of Sources in Group (Source Range or Single Sources)
B9_NF	B9_NF
B9_F	B9_F
B8_NF	B8_NF
B8_F	B8_F
B7_NF	B7_NF
B7_F	B7_F
B6_NF	B6_NF
B6_F	B6_F
B5_NF	B5_NF
B5_F	B5_F
B4_NF	B4_NF
B4_F	B4_F
B3_NF	B3_NF
B3_F	B3_F
B2_NF	B2_NF

Source Pathway

Source Group ID: B2_F	List of Sources in Group (Source Range or Single Sources)
	B2_F

Source Group ID: B12_NF	List of Sources in Group (Source Range or Single Sources)
	B12_NF

Source Group ID: B12_F	List of Sources in Group (Source Range or Single Sources)
	B12_F

Source Group ID: B11_NF	List of Sources in Group (Source Range or Single Sources)
	B11_NF

Source Group ID: B11_F	List of Sources in Group (Source Range or Single Sources)
	B11_F

Source Group ID: B10_NF	List of Sources in Group (Source Range or Single Sources)
	B10_NF

Source Group ID: B10_F	List of Sources in Group (Source Range or Single Sources)
	B10_F

Source Group ID: B1_NF	List of Sources in Group (Source Range or Single Sources)
	B1_NF

Source Group ID: B1_F	List of Sources in Group (Source Range or Single Sources)
	B1_F

```
**
****************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 13.1.0
** Lakes Environmental Software Inc.
** Date: 7/13/2026
** File: C:\AERMOD Projs\Enterprise\Enterprise HCA NO2 1hr\Enterprise HCA NO2
1hr.ADI
**
****************************************
**
**
****************************************
** AERMOD Control Pathway
****************************************
**
**
CO STARTING
   TITLEONE C:\Lakes\AERMOD View\Project Files\Enterprise HRA\Enterprise HRA.isc
   MODELOPT DFAULT CONC ARM2
   AVERTIME 1
   URBANOPT 146194
   POLLUTID NO2
   FLAGPOLE 2.50
   RUNORNOT RUN
** NO2 Conversion Options
   ARMRATIO 0.500 0.900
   ERRORFIL "Enterprise HCA NO2 1hr.err"
CO FINISHED
**
****************************************
** AERMOD Source Pathway
****************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION B1_NF        POINT      489056.713  3664957.202      217.770
** DESCRSRC Battery 1 - Non-Flaming
   LOCATION B2_NF        POINT      489064.396  3664953.066      217.400
** DESCRSRC Battery 2 - Non-Flaming
   LOCATION B3_NF        POINT      489072.088  3664948.891      216.980
** DESCRSRC Battery 3 - Non-Flaming
   LOCATION B4_NF        POINT      489079.852  3664944.722      216.660
** DESCRSRC Battery 4 - Non-Flaming
   LOCATION B5_NF        POINT      489087.498  3664940.553      216.690
** DESCRSRC Battery 5 - Non-Flaming
   LOCATION B6_NF        POINT      489088.615  3664904.822      218.230
```

```
** DESCRSRC Battery 6 - Non-Flaming
   LOCATION B7_NF        POINT      489080.818  3664909.160      217.690
** DESCRSRC Battery 7 - Non-Flaming
   LOCATION B8_NF        POINT      489073.388  3664913.132      218.820
** DESCRSRC Battery 8 - Non-Flaming
   LOCATION B9_NF        POINT      489065.474  3664917.330      218.770
** DESCRSRC Battery 9 - Non-Flaming
   LOCATION B10_NF       POINT      489058.037  3664921.608      219.200
** DESCRSRC Battery 10 - Non-Flaming
   LOCATION B11_NF       POINT      489050.171  3664925.658      219.940
** DESCRSRC Battery 11 - Non-Flaming
   LOCATION B12_NF       POINT      489042.154  3664930.041      219.370
** DESCRSRC Battery 12 - Non-Flaming
   LOCATION B1_F         POINT      489056.713  3664957.202      217.770
** DESCRSRC Battery 1 - Flaming
   LOCATION B2_F         POINT      489064.396  3664953.066      217.400
** DESCRSRC Battery 2 - Flaming
   LOCATION B3_F         POINT      489072.088  3664948.891      216.980
** DESCRSRC Battery 3 - Flaming
   LOCATION B4_F         POINT      489079.852  3664944.722      216.660
** DESCRSRC Battery 4 - Flaming
   LOCATION B5_F         POINT      489087.498  3664940.553      216.690
** DESCRSRC Battery 5 - Flaming
   LOCATION B6_F         POINT      489088.615  3664904.822      218.230
** DESCRSRC Battery 6 - Flaming
   LOCATION B7_F         POINT      489080.818  3664909.160      217.690
** DESCRSRC Battery 7 - Flaming
   LOCATION B8_F         POINT      489073.388  3664913.132      218.820
** DESCRSRC Battery 8 - Flaming
   LOCATION B9_F         POINT      489065.474  3664917.330      218.770
** DESCRSRC Battery 9 - Flaming
   LOCATION B10_F        POINT      489058.037  3664921.608      219.200
** DESCRSRC Battery 10 - Flaming
   LOCATION B11_F        POINT      489050.171  3664925.658      219.940
** DESCRSRC Battery 11 - Flaming
   LOCATION B12_F        POINT      489042.154  3664930.041      219.370
** DESCRSRC Battery 12 - Flaming
** Source Parameters **
   SRCPARAM B1_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B2_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B3_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B4_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B5_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B6_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
```

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   SRCPARAM B7_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B8_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B9_NF        0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B10_NF       0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B11_NF       0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B12_NF       0.7171490159     2.438   505.150 0.0196487584064068
0.9
   SRCPARAM B1_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B2_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B3_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B4_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B5_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B6_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B7_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B8_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B9_F         0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B10_F        0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B11_F        0.6310423781     2.438   498.980       8.5       0.9

   SRCPARAM B12_F        0.6310423781     2.438   498.980       8.5       0.9

   URBANSRC ALL
   SRCGROUP B10_F    B10_F
   SRCGROUP B10_NF   B10_NF
   SRCGROUP B11_F    B11_F
   SRCGROUP B11_NF   B11_NF
   SRCGROUP B12_F    B12_F
   SRCGROUP B12_NF   B12_NF
   SRCGROUP B1_F     B1_F
   SRCGROUP B1_NF    B1_NF
   SRCGROUP B2_F     B2_F
   SRCGROUP B2_NF    B2_NF
   SRCGROUP B3_F     B3_F
   SRCGROUP B3_NF    B3_NF
   SRCGROUP B4_F     B4_F
```

```
   SRCGROUP B4_NF    B4_NF
   SRCGROUP B5_F     B5_F
   SRCGROUP B5_NF    B5_NF
   SRCGROUP B6_F     B6_F
   SRCGROUP B6_NF    B6_NF
   SRCGROUP B7_F     B7_F
   SRCGROUP B7_NF    B7_NF
   SRCGROUP B8_F     B8_F
   SRCGROUP B8_NF    B8_NF
   SRCGROUP B9_F     B9_F
   SRCGROUP B9_NF    B9_NF
SO FINISHED
**
****************************************
** AERMOD Receptor Pathway
****************************************
**
**
RE STARTING
   INCLUDED "Enterprise HCA NO2 1hr.rou"
RE FINISHED
**
****************************************
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
   SURFFILE ESC_2010_2012_v24142.SFC
   PROFFILE ESC_2010_2012_v24142.PFL
   SURFDATA 53120 2010 Escondido_-_SDAPCD_provided
   UAIRDATA 3190 2010
   SITEDATA 1002 2010
   PROFBASE 202.0 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST 8TH
   RECTABLE 1 1ST 8TH
** Auto-Generated Plotfiles
   PLOTFILE 1 B10_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G001.PLT" 31
   PLOTFILE 1 B10_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G002.PLT" 32
   PLOTFILE 1 B11_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G003.PLT" 33
   PLOTFILE 1 B11_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G004.PLT" 34
   PLOTFILE 1 B12_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G005.PLT" 35
```

```
PLOTFILE 1 B12_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G006.PLT" 36
PLOTFILE 1 B1_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G007.PLT" 37
PLOTFILE 1 B1_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G008.PLT" 38
PLOTFILE 1 B2_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G009.PLT" 39
PLOTFILE 1 B2_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G010.PLT" 40
PLOTFILE 1 B3_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G011.PLT" 41
PLOTFILE 1 B3_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G012.PLT" 42
PLOTFILE 1 B4_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G013.PLT" 43
PLOTFILE 1 B4_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G014.PLT" 44
PLOTFILE 1 B5_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G015.PLT" 45
PLOTFILE 1 B5_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G016.PLT" 46
PLOTFILE 1 B6_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G017.PLT" 47
PLOTFILE 1 B6_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G018.PLT" 48
PLOTFILE 1 B7_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G019.PLT" 49
PLOTFILE 1 B7_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G020.PLT" 50
PLOTFILE 1 B8_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G021.PLT" 51
PLOTFILE 1 B8_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G022.PLT" 52
PLOTFILE 1 B9_F 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G023.PLT" 53
PLOTFILE 1 B9_NF 1ST "ENTERPRISE HCA NO2 1HR.AD\01H1G024.PLT" 54
PLOTFILE 1 B10_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G001.PLT" 55
PLOTFILE 1 B10_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G002.PLT" 56
PLOTFILE 1 B11_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G003.PLT" 57
PLOTFILE 1 B11_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G004.PLT" 58
PLOTFILE 1 B12_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G005.PLT" 59
PLOTFILE 1 B12_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G006.PLT" 60
PLOTFILE 1 B1_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G007.PLT" 61
PLOTFILE 1 B1_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G008.PLT" 62
PLOTFILE 1 B2_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G009.PLT" 63
PLOTFILE 1 B2_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G010.PLT" 64
PLOTFILE 1 B3_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G011.PLT" 65
PLOTFILE 1 B3_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G012.PLT" 66
PLOTFILE 1 B4_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G013.PLT" 67
PLOTFILE 1 B4_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G014.PLT" 68
PLOTFILE 1 B5_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G015.PLT" 69
PLOTFILE 1 B5_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G016.PLT" 70
PLOTFILE 1 B6_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G017.PLT" 71
PLOTFILE 1 B6_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G018.PLT" 72
PLOTFILE 1 B7_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G019.PLT" 73
PLOTFILE 1 B7_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G020.PLT" 74
PLOTFILE 1 B8_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G021.PLT" 75
PLOTFILE 1 B8_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G022.PLT" 76
PLOTFILE 1 B9_F 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G023.PLT" 77
PLOTFILE 1 B9_NF 8TH "ENTERPRISE HCA NO2 1HR.AD\01H8G024.PLT" 78
MXDYBYYR B10_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B10_F_NO2.DAT" 79
MXDYBYYR B10_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B10_NF_NO2.DAT" 80
MXDYBYYR B11_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B11_F_NO2.DAT" 81
MXDYBYYR B11_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B11_NF_NO2.DAT" 82
MXDYBYYR B12_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B12_F_NO2.DAT" 83
MXDYBYYR B12_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B12_NF_NO2.DAT" 84
MXDYBYYR B1_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B1_F_NO2.DAT" 85
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   MXDYBYYR B1_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B1_NF_NO2.DAT" 86
   MXDYBYYR B2_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B2_F_NO2.DAT" 87
   MXDYBYYR B2_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B2_NF_NO2.DAT" 88
   MXDYBYYR B3_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B3_F_NO2.DAT" 89
   MXDYBYYR B3_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B3_NF_NO2.DAT" 90
   MXDYBYYR B4_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B4_F_NO2.DAT" 91
   MXDYBYYR B4_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B4_NF_NO2.DAT" 92
   MXDYBYYR B5_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B5_F_NO2.DAT" 93
   MXDYBYYR B5_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B5_NF_NO2.DAT" 94
   MXDYBYYR B6_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B6_F_NO2.DAT" 95
   MXDYBYYR B6_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B6_NF_NO2.DAT" 96
   MXDYBYYR B7_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B7_F_NO2.DAT" 97
   MXDYBYYR B7_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B7_NF_NO2.DAT" 98
   MXDYBYYR B8_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B8_F_NO2.DAT" 99
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   MXDYBYYR B9_F "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B9_F_NO2.DAT" 101
   MXDYBYYR B9_NF "ENTERPRISE HCA NO2 1HR.AD\MXDYBYYR_B9_NF_NO2.DAT" 102
   MAXDAILY B10_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B10_F_NO2.DAT" 103
   MAXDAILY B10_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B10_NF_NO2.DAT" 104
   MAXDAILY B11_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B11_F_NO2.DAT" 105
   MAXDAILY B11_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B11_NF_NO2.DAT" 106
   MAXDAILY B12_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B12_F_NO2.DAT" 107
   MAXDAILY B12_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B12_NF_NO2.DAT" 108
   MAXDAILY B1_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B1_F_NO2.DAT" 109
   MAXDAILY B1_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B1_NF_NO2.DAT" 110
   MAXDAILY B2_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B2_F_NO2.DAT" 111
   MAXDAILY B2_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B2_NF_NO2.DAT" 112
   MAXDAILY B3_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B3_F_NO2.DAT" 113
   MAXDAILY B3_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B3_NF_NO2.DAT" 114
   MAXDAILY B4_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B4_F_NO2.DAT" 115
   MAXDAILY B4_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B4_NF_NO2.DAT" 116
   MAXDAILY B5_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B5_F_NO2.DAT" 117
   MAXDAILY B5_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B5_NF_NO2.DAT" 118
   MAXDAILY B6_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B6_F_NO2.DAT" 119
   MAXDAILY B6_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B6_NF_NO2.DAT" 120
   MAXDAILY B7_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B7_F_NO2.DAT" 121
   MAXDAILY B7_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B7_NF_NO2.DAT" 122
   MAXDAILY B8_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B8_F_NO2.DAT" 123
   MAXDAILY B8_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B8_NF_NO2.DAT" 124
   MAXDAILY B9_F "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B9_F_NO2.DAT" 125
   MAXDAILY B9_NF "ENTERPRISE HCA NO2 1HR.AD\MAXDAILY_B9_NF_NO2.DAT" 126
   SUMMFILE "Enterprise HCA NO2 1hr.sum"
OU FINISHED
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** Project Parameters
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** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    World Geodetic System 1984
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** DTMRGN   Global Definition
** UNITS    m
** ZONE     11
** ZONEINX  0
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