Rotten Robbie #42 Project

Health Risk Assessment

San José, California

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1.0 INTRODUCTION

This report evaluates the potential health risks associated with the for the Rotten Robbie #42 Project (Project) proposed in San Jose, California. The purpose of this Health Risk Assessment (HRA) is to evaluate potential health risks associated with gasoline vapors that would include the toxic air contaminant (TAC), benzene. According to the California Air Pollution Control Officers Association (CAPCOA) benzene is the most important substance driving cancer risk, while xylene, another pollutant emitted from gas stations, is the only substance which is associated with acute adverse health effects (1997). This Health Risk Assessment was prepared in accordance with guidance from the Office of Environmental Health Hazard Assessment (OEHHA) to determine if health risks are likely to occur from the Proposed Project.

It is noted that the site is currently operating with a gasoline-dispensing station. This is an existing use and is not associated with the Project proposal, which merely includes the demolition of the existing convenience store for the development of an approximately 3,200-square-foot convenience store building. The Project is not proposing any action associated with the existing gasoline dispensing operations. The Project is not proposing to increase the quantity of fuel-dispensing pumps beyond existing conditions and therefore would emit the same intensity of benzene emissions as currently emitted under existing conditions. The California Environmental Quality Act (CEQA) requires the analysis of proposed project impacts in comparison to the existing baseline. Gasoline dispensing activities on the site are accounted for in the existing baseline and as previously described, the Project would not increase gasoline dispensing over the existing baseline. Nonetheless this HRA has been prepared analyzing the potential health risk associated with the existing gasoline-dispensing activities at the Project site for full disclosure purposes. Technical data is included as Attachment A.

1.1 Project Description and Location

The Project Site is located in the City of San Jose, California, at the corner of the E. Julian Street / N. 10th Street intersection (455 E. Julian Street) in the central portion of the city. The 0.39-acre site is contained within the city’s Central/Downtown Planning Area, which encompasses downtown San Jose and the surrounding communities, and is located in a fully developed portion of the city.

The Project site is currently an operational gasoline dispensing station with 10 fueling positions, underground gasoline storage tanks and a 1,200-square-foot convenience store. The site is flat, with an elevation of approximately 170 feet above mean sea level (amsl). The site has been an operational gas station, convenience store, and storage facility since 1975. The site can be accessed from either E. Julian Street or N. 10^{th} Street, which traverse the southern and western boundaries of the site, respectively.

The Project site has a City General Plan designation of Neighborhood Community Commercial (NCC). The General Plan identifies the NCC designation as a land use that supports a very broad range of commercial activity, including commercial uses that serve the communities in neighboring areas, such as neighborhood serving retail and services and commercial/professional office development.

The site is generally bound by residential neighborhoods in all directions, though there are other commercial buildings to the south and west. The General Plan designation of the surrounding lands are:

Residential Neighborhood (RN) to the north and south, RN and Mixed-Use Commercial to the east, and RN and NCC to the west.

The Project site currently contains an operational gasoline dispensing station with 10 fueling positions, underground gasoline storage tanks and 1,200-square-foot convenience store. The Project proponent proposes to demolish the existing convenience store and the storage facility, currently located at the west portion of the site. The Proposed Project would replace the demolished store with a new, approximately 3,183-square-foot convenience store building located at the northwestern corner of the Project site. The existing fuel island, underground tanks, and pipeline system would remain and will remain untouched and fully intact during the demolition and construction of the new building.

2.0 HEALTH RISK ASSESSMENT

2.1 Environmental Setting

Climate and Meteorology

Air quality in a region is determined by its topography, meteorology, and existing air pollutant sources. The California Air Resources Board (CARB) divides the State into 15 air basins that share similar meteorological and topographical features. The Project site is located in the San Francisco Bay Area Air Basin (SFBAAB), pursuant to the regulatory authority of the Bay Area Air Quality Management District (BAAQMD). The air basin is subject to a combination of topographical and climatic factors that reduce the potential for high levels of regional and local air pollutants. The following section describes the pertinent characteristics of the air basin and provides an overview of the physical conditions affecting pollutant dispersion in the Project area.

San Francisco Bay Area Air Basin

San José is in the Santa Clara Valley climatological subregion of the SFBAAB. The northwest–southeast-oriented Santa Clara Valley is bounded by the Santa Cruz Mountains to the west, the Diablo Range to the east, the San Francisco Bay to the north, and the convergence of the Gabilan Range and the Diablo Range to the south. Winter temperatures are mild, except for very cool but generally frostless mornings. At the northern end of the Santa Clara Valley, San José Airport reports mean maximum temperatures ranging from the high 70s to the low 80s during the summer and from the high 50s to the low 60s during the winter, and mean minimum temperatures ranging from the high 50s in the summer to the low 40s in the winter. Farther inland, where the moderating effect of the bay is not as strong, temperature extremes are greater.

The wind patterns in the valley are influenced greatly by the terrain, resulting in a prevailing flow roughly parallel to the valley's northwest–southeast axis with a north-northwesterly ocean breeze that flows up the valley in the afternoon and early evening and a light south-southeasterly flow during the late evening and early morning. In the summer, a convergence zone is sometimes observed in the southern end of the valley between Gilroy and Morgan Hill when air flowing from the Monterey Bay through the Pajaro Gap is channeled northward into the south end of the Santa Clara Valley and meets with the prevailing north-northwesterly winds. Wind speeds are greatest in the spring and summer; nighttime and early morning hours have light winds and are frequently calm in all seasons, while summer afternoons and evenings can be windy.

Air pollution potential in the Santa Clara Valley is high. The valley has a large population and the largest complex of mobile sources in the Bay Area, making it a major source of carbon monoxide, particulate, and photochemical air pollution. In addition, photochemical pollution precursors from San Francisco, San Mateo, and Alameda counties can be carried by the prevailing winds to the Santa Clara Valley. Geographically, the valley tends to channel pollutants to the southeast because of its northwest–southeast orientation and its narrowing to the southeast.

Meteorological factors also have an effect on emissions levels. On summer days, pollutants can be recirculated by the prevailing northwesterly winds in the afternoon and by the light flow in the late evening and early morning. This recirculation significantly increases the impact of emissions. Inversions, created by warm, stable air aloft that limits the vertical dispersion of air pollutants, increase the emissions impact in all seasons. During days in the late fall and winter, clear, calm, and cold conditions associated with a strong surface-based temperature inversion tend to prevail, which can result in high levels of particulate and carbon monoxide. Though they can be found during all seasons in the Bay Area, inversions are particularly prevalent in the summer months when they are present about 90 percent of the time, both in the morning and in the afternoon.

Toxic Air Contaminants

TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

Hazardous Air Pollutants (HAP) is a term used by the Federal Clean Air Act (FCAA) that includes a variety of pollutants generated or emitted by industrial production activities. Identified as TACs under the California Clean Air Act (CCAA), ten have been singled out through ambient air quality data as being the most substantial health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders. CARB provides emission inventories for only the larger air basins.

TACs do not have ambient air quality standards because no safe levels of TACs can be determined. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. The requirements of the Air Toxic "Hot Spots" Information and Assessment Act (Assembly Bill [AB] 2588) apply to facilities that use, produce, or emit toxic chemicals. Facilities subject to the toxic emission inventory requirements of the act must prepare and submit toxic emission inventory plans and reports, and periodically update those reports.

Toxic contaminants often result from fugitive emissions during fuel storage and transfer activities, and from leaking valves and pipes. For example, the electronics industry, including semiconductor manufacturing, uses highly toxic chlorinated solvents in semiconductor production processes. Sources of air toxics go beyond industry, however. Automobile exhaust also contains toxic air pollutants such as benzene and 1,3-butadiene. The following are health effects related to common TACs:

Acetaldehyde. Acetaldehyde is directly emitted into the atmosphere and is also formed in the atmosphere from photochemical oxidation. Acetaldehyde is generated as exhaust from mobile sources and fuel combustion from stationary internal combustion engines, boilers, and process heaters. Acetaldehyde is a carcinogen that can also cause chronic non-cancer toxicity in the respiratory system. Symptoms of chronic intoxication of acetaldehyde in humans resemble those of alcoholism. The primary short-term effect of inhalation exposure to acetaldehyde is irritation of the eyes, skin, and respiratory tract. At higher exposure levels, erythematic, coughing, and pulmonary edema, and necrosis may also occur.

Benzene. Approximately 84 percent of the benzene emitted in California comes from motor vehicles, including evaporative leakage and unburned fuel exhaust. Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer health effects. Brief inhalation exposure to high concentrations can cause central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness.

Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions. Exposure to liquid and vapor may irritate the skin, eyes, and upper respiratory tract. Redness and blisters may result from dermal exposure to benzene. Chronic inhalation of certain levels of benzene causes blood disorders because benzene specifically affects bone marrow, which produces blood cells. Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in humans occupationally exposed to benzene.

1,3-Butadiene. The majority of 1,3-butadiene emissions comes from incomplete combustion of gasoline and diesel fuels. 1,3-butadiene has been identified as a carcinogen in California. Butadiene vapors at elevated levels cause neurological effects such as blurred vision, fatigue, headache, and vertigo. Dermal exposure to 1,3-butadiene causes a sensation of cold, followed by a burning sensation, and can lead to frostbite. Chronic exposure to 1,3-butadiene via inhalation has been shown to result in an increase in cardiovascular diseases, and increase in the occurrence of leukemia, and an increased incidence of respiratory, bladder, stomach, and lymphato-hematopoietic cancers.

Carbon Tetrachloride. The primary sources of carbon tetrachloride in California include chemical manufacturing facilities and petroleum refineries. Carbon tetrachloride has been identified as a probable human carcinogen in California. Carbon tetrachloride is also a central nervous system depressant and mild eye and respiratory tract irritant. Acute inhalation and oral exposures to high levels of carbon tetrachloride can damage the liver and kidneys in humans and animals. Symptoms of acute exposure in humans include headache, weakness, lethargy, nausea, and vomiting.

Chromium, Hexavalent. Chromium planting and other metal finishing processes are the primary sources of hexavalent chromium emissions in California. California has identified hexavalent chromium as a carcinogen. Exposure to inhaled hexavalent chromium may result in lung cancer, and short-term exposure symptoms may include renal toxicity, gastrointestinal hemorrhage, and intravascular hemolysis.

Inhalation exposure of hexavalent exposure targets the respiratory tract. Exposure to very high concentrations of hexavalent chromium can include burns, effects on the respiratory tract such as perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, asthma, and nasal itching and soreness. Chronic human exposure to high levels of hexavalent chromium by inhalation or oral exposure may adversely affect the liver, kidney, and gastrointestinal and immune system.

Para-Dichlorobenzene. The primary sources of para-dichlorobenzene include consumer products such as non-aerosol insect repellents and solid air fresheners. These sources contribute 99 percent of statewide para-dichlorobenzene emissions. In California, para-dichlorobenzene has been identified as a carcinogen. Acute exposure to 1,4-dichlorobenzene via inhalation in humans results in irritation to the eyes, skin, and throat. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system.

Formaldehyde. Formaldehyde is both directly emitted into the atmosphere and formed in the atmosphere as a result of photochemical oxidation. Formaldehyde is a product of incomplete combustion, and one of the primary sources of formaldehyde is vehicular exhaust. Formaldehyde can also be found in many consumer products as an antimicrobial agent and is used in fumigants and soil disinfectants.

Acute formaldehyde inhalation exposure can result in eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. Chronic inhalation exposure to formaldehyde has been associated with respiratory symptoms and eye, nose, and throat irritation. In California, formaldehyde has been identified as a carcinogen, and occupational studies have shown associations between exposure to formaldehyde and increased incidence of lung and nasopharyngeal cancer.

Methylene Chloride. Methylene chloride is a solvent used in paint stripping operations and as a blowing and cleaning agent in the manufacture of polyurethane foam and plastic. Paint removers account for the largest use of methylene chloride in California. Inhalation exposure to extremely high levels of methylene chloride can be fatal to humans. Acute inhalation exposure to high levels of methylene chloride can result in decreased visual, auditory, and psychomotor functions, but these effects are reversible once exposure ceases. Methylene chloride also irritates the nose and throat at high concentrations. The major effects from chronic inhalation exposure to methylene chloride are headaches, dizziness, nausea, and memory loss. Chronic exposure can also lead to bone marrow, hepatic, and renal toxicity. California considers methylene chloride to be carcinogenic.

Perchloroethylene. Perchloroethylene is used as a solvent, primarily in dry cleaning operations. Perchloroethylene is also used in degreasing operations, paints and coatings, adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos and laboratory solvents. Perchloroethylene vapors are irritating to the eyes and respiratory tract and chronic exposure can result in liver toxicity, kidney dysfunction, and neurological disorders. California identifies perchloroethylene as a carcinogen.

Sensitive Receptors

Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Table 1 lists the locations of the nearest sensitive receptors within the Project vicinity, as well as their distances from the nearest storage tanks or gasoline dispensing area.

Table 1. Nearest Sensitive Receptors

Type	Distance from Project Fuel Canopy (feet)	Direction from Project Site	Location
Residence	60	West	West of the Project site, directly adjacent and fronting E. Julian Street
Residence	112	North	North of the Project site, fronting N. 10th Street
Residence	128	East	East of the Project site, across N. 10th Street
Residence	140	South	South of the Project site, fronting E. Julian Street

2.2 Regulatory Framework

Federal

Clean Air Act

The Federal Clean Air Act (FCAA) was amended in 1990 to address a large number of air pollutants that are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects. 188 specific pollutants and chemical groups were initially identified as HAPs, and the list has been modified over time. The FCAA Amendments included new regulatory programs to control acid deposition and for the issuance of stationary source operating permits.

In 2001, the U.S. Environmental Protection Agency (EPA) issued its first Mobile Source Air Toxics Rule, which identified 21 mobile source air toxic (MSAT) compounds as being HAPs that required regulation. A subset of six of these MSAT compounds were identified as having the greatest influence on health and included benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, and diesel particulate matter. More recently, the EPA issued a second MSAT Rule in February 2007, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health. The rule also identified several engine emission certification standards that must be implemented. Unlike the criteria pollutants, toxics do not have National Ambient Air Quality Standards (NAAQS) making evaluation of their impacts more subjective.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs) were incorporated into a greatly expanded program for controlling toxic air pollutants. The provisions for attainment and maintenance of the NAAQS were substantially modified and expanded. Other revisions included provisions regarding stratospheric ozone protection, increased enforcement authority, and expanded research programs.

Section 112 of the FCAA Amendments governs the federal control program for HAPs. NESHAPs are issued to limit the release of specified HAPs from specific industrial sectors. These standards are technology-based, meaning that they represent the best available control technology an industrial sector could afford. The level of emissions controls required by NESHAPs are not based on health risk considerations because allowable releases and resulting concentrations have not been determined to be safe for the general public. The FCAA does not establish air quality standards for HAPs that define legally acceptable concentrations of these pollutants in ambient air.

State

California Air Resources Board

CARB's statewide comprehensive air toxics program was established in 1983 with AB 1807 the Toxic Air Contaminant Identification and Control Act (Tanner Air Toxics Act of 1983). AB 1807 created California's program to reduce exposure to air toxics and sets forth a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an airborne toxics control measure (ATCM) for sources that emit designated TACs. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology (T-BACT) to minimize emissions.

CARB also administers the state's mobile source emissions control program and oversees air quality programs established by state statute, such as AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment and, if specific thresholds are exceeded, required to communicate the results to the public in the form of notices and public meetings. In September 1992, the "Hot Spots" Act was amended by Senate Bill (SB) 1731 which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.

Local

Bay Area Air Quality Management District

The BAAQMD has stringent requirements for the control of gasoline vapor emissions from gasoline-dispensing facilities. BAAQMD Regulation 8 Rule 7, *Gasoline Dispensing Facilities*, limits emissions of organic compounds from gasoline-dispensing facilities. Regulation 8 Rule 7 prohibits the transfer or allowance of the transfer of gasoline into stationary tanks at a gasoline-dispensing facility unless a CARB-certified Phase I vapor recovery system is used; and further prohibits the transfer or allowance of the transfer of gasoline from stationary tanks into motor vehicle fuel tanks at a gasoline-dispensing facility unless a CARB-certified Phase II vapor recovery system is used during each transfer. Vapor recovery systems collect gasoline vapors that would otherwise escape into the air during bulk fuel delivery (Phase I) or fuel storage and vehicle refueling (Phase II). Phase I vapor recovery system components include the couplers that connect tanker trucks to the underground tanks, spill containment drain valves, overfill prevention devices, and vent pressure/vacuum valves. Phase II vapor recovery system components include gasoline dispensers, nozzles, piping, break away, hoses, face plates, vapor processors, and system monitors. Regulation 8 Rule 7 also requires fuel storage tanks to be equipped with a permanent submerged fill pipe and the storage tank which prevents the escape of gasoline vapors. BAAQMD's permitting procedures require substantial control of emissions, and permits are not issued unless TAC risk screening or TAC risk assessment can show that risks are not significant. BAAQMD may impose limits on annual throughput to ensure that risks are within acceptable limits. In addition, California has statewide limits on the benzene content in gasoline, which greatly reduces the toxic potential of gasoline emissions.

Gasoline-dispensing facilities are also regulated by BAAQMD Regulation 2, Rule 5, *New Source Review of Toxic Air Contaminants*, which provides for the review of TAC emissions in order to evaluate potential public exposure and health risk, to mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced. Pursuant to BAAQMD Regulation 2, Rule 5, stationary sources having the potential to emit TACs, including gas stations, are required to obtain permits from BAAQMD. Permits may be granted to these operations provided they are operated in accordance with applicable BAAQMD rules and regulations. The BAAQMD's permitting procedures require substantial control of emissions, and permits are not issued unless TAC risk screening or TAC risk assessment can show that risks are not significant. The BAAQMD may impose limits on annual throughput to ensure that risks are within acceptable limits. (In addition, California has statewide limits on the benzene content in gasoline, which greatly reduces the toxic potential of gasoline emissions.)

2.3 Health Risk and Hazard Assessment

Thresholds of Significance

In order to determine whether or not a Proposed project would cause a significant effect on the environment, the impact of the Project must be determined by examining the types and levels of air toxics generated and the associated impacts on factors that affect air quality. The thresholds for air toxic emissions are as follows.

- Cancer Risk: Emit carcinogenic or toxic contaminants that exceed the maximum individual cancer risk of 10 in one million.
- Non-Cancer Risk: Emit toxic contaminants that exceed the maximum hazard quotient of 1 in one million.

Cancer risk is expressed in terms of expected incremental incidence per million population. Per the BAAQMD, an incidence rate of 10 persons per million is the maximum acceptable incremental cancer risk due to benzene exposure. This threshold serves to determine whether or not a given project has a potentially significant development-specific and cumulative impact. The 10 in one million standard is a very health-protective significance threshold. A risk level of 10 in one million implies a likelihood that up to 10 persons, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time. This risk would be an excess cancer that is in addition to any cancer risk borne by a person not exposed to these air toxics. To put this risk in perspective, the risk of dying from accidental drowning is 1,000 in a million which is 100 times more than the threshold of 10 in one million.

Noncarcinogenic risks are quantified by calculating a "hazard index," expressed as the ratio between the ambient pollutant concentration and its toxicity or Reference Exposure Level (REL). An REL is a concentration at or below which health effects are not likely to occur. A hazard index less of than one (1.0) means that adverse health effects are not expected. Within this analysis, non-carcinogenic exposures of less than 1.0 are considered less than significant.

Methodology

This HRA evaluates potential health risks associated with the emission of benzene. Out of the compounds emitted from the gasoline stations, benzene is the TAC which drives the risk, accounting for 87 percent of cancer risk from gasoline vapors, while xylene is the only substance which is associated with acute adverse health effects. According to CAPCOA *Gasoline Service Station Industrywide Risk Assessment Guidelines* (1997), not until the benzene emissions are three orders of magnitude above the rate of an increase of 10 per million cancer risk, do the emissions of xylene begin to cause acute adverse health effects. Therefore, downwind xylene concentrations do not need be determined unless the gasoline throughput caused the cancer risk from benzene to exceed 100 per million. Furthermore, benzene constitutes more than three to four times the weight of gasoline than any other pollutant compound emitted from gasoline stations. Therefore, benzene emissions have been modeled in order to determine potential health risk.

The air dispersion modeling for the HRA was performed using the U.S. EPA AERMOD dispersion model. AERMOD is a steady-state, multiple-source, Gaussian dispersion model designed for use with emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources (not a factor in this case). AERMOD requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. Surface and upper air meteorological data provided by CARB for the Norman Y. Mineta San Jose International Airport was selected as being the most representative meteorology based on proximity.

Emissions sources include on-site fuel storage tanks and fuel dispensers. The Project accommodates a maximum annual gasoline throughput of 1,851,732 gallons to be stored and dispensed with the use of underground fuel storage tanks and 10 passenger automobile fuel dispensing positions. The specific processes associated with fuel storage tanks and fuel dispensers that emit air toxics include loading, breathing, refueling, and spillage, as described below:

- Loading – Emissions occur when a fuel tanker truck unloads gasoline into the storage tanks. The storage tank vapors, displaced during loading, are emitted through its vent pipe. (A required pressure/vacuum valve installed on the tank vent pipe significantly reduces these emissions.)

- Breathing – Emissions occur through the storage tank vent pipe as a result of temperature and pressure changes in the tank vapor space.

- Refueling – Emissions occur during motor vehicle refueling when gasoline vapors escape through the vehicle/nozzle interface.
- Spillage – Emissions occur from evaporating gasoline that spills during vehicle refueling.

Loading and breathing emissions exit the underground storage tank vent pipe and are thus treated as a point source. The height and diameter of the vent are assumed to be 3.7 meters and 0.05 meters, respectively. Refueling and spillage emissions are modeled as volume sources with horizontal and vertical dimensions consistent with the modeling parameters of 4 meters high by 13 meters wide. For refueling, the release height is assumed to be 1 meter to approximate the height of a vehicle fuel tank inlet, whereas spillage emissions are assumed to be released at ground level since nearly all the gasoline from spillage reaches the ground.

The model was run to obtain the peak one-hour, 24-hour and annual average concentration in micrograms per cubic meter [$\mu g/m^3$] at nearby sensitive receptors. Air dispersion modeling is required to estimate (a) annual average concentrations to calculate the Maximum Individual Cancer Risk (MICR), the maximum chronic HI, the zones of impact, and excess cancer burden and (b) peak hourly concentrations to calculate the health impact from substances with acute non-cancer health effects. To achieve these goals, the receptor grid was extended to cover the zone of impact.

Note that the concentration estimates developed using this methodology is considered conservative and is not a specific prediction of the actual concentrations that would occur as a result of the Project any one point in time.

A health risk computation was performed to determine the risk of developing an excess cancer risk calculated on a 70-year lifetime basis, 30-year, and 9-year exposure scenarios. The chronic and carcinogenic health risk calculations are based on the standardized equations contained in the OEHHA Guidance Manual (2015).

Based on the OEHHA methodology, the residential inhalation cancer risk from the annual average benzene concentrations are calculated by multiplying the daily inhalation or oral dose, by a cancer potency factor, the age sensitivity factor (ASF), the frequency of time spent at home (for residents only), and the exposure duration divided by averaging time, to yield the excess cancer risk. These factors are discussed in more detail below. It is important to note that exposure duration is based on continual gasoline dispensing operations at the Project site. Cancer risk must be separately calculated for specified age groups, because of age differences in sensitivity to carcinogens and age differences in intake rates (per kg body weight). Separate risk estimates for these age groups provide a health-protective estimate of cancer risk by accounting for greater susceptibility in early life, including both age-related sensitivity and amount of exposure.

Exposure through inhalation (Dose-air) is a function the breathing rate, the exposure frequency, and the concentration of a substance in the air. For residential exposure, the breathing rates are determined for specific age groups, so Dose-air is calculated for each of these age groups, 3rd trimester, 0<2, 2<9, 2<16, 16<30 and 16-70 years. To estimate cancer risk, the dose was estimated by applying the following formula to each ground-level concentration:

$$\textbf{Dose-air} = (C_{air} * \{BR/BW\} * A * EF * 10^{-6})$$

Where:

Dose-air	=	dose through inhalation (mg/kg/day)
C_{air}	=	air concentration ($\mu g/m^3$) from air dispersion model
{BR/BW}	=	daily breathing rate normalized to body weight (L/kg body weight – day) (361 L\kg BW-day for 3rd Trimester, 1,090 L/kg BW-day for 0<2 years, 861 L/kg BW-day for 2<9 years, 745 L/kg BW-day for 2<16 years, 335 L/kg BW-day for 16<30 years, and 209 L/kg BW-day 16<70 years)
A	=	Inhalation absorption factor (unitless [1])
EF	=	exposure frequency (unitless), days/365 days (0.96 [approximately 350 days per year])
10^{-6}	=	conversion factor (micrograms to milligrams, liters to cubic meters)

OEHHA developed ASFs to take into account the increased sensitivity to carcinogens during early-in-life exposure. In the absence of chemical-specific data, OEHHA recommends a default ASF of 10 for the third trimester to age 2 years, an ASF of 3 for ages 2 through 15 years to account for potential increased sensitivity to carcinogens during childhood and an ASF of 1 for ages 16 through 70 years.

Fraction of time at home (FAH) during the day is used to adjust exposure duration and cancer risk from a specific facility's emissions, based on the assumption that exposure to the facility's emissions are not occurring away from home. OEHHA recommends the following FAH values: from the third trimester to age <2 years, 85 percent of time is spent at home; from age 2 through <16 years, 72 percent of time is spent at home; from age 16 years and greater, 73 percent of time is spent at home.

To estimate the cancer risk, the dose is multiplied by the cancer potency factor, the ASF, the exposure duration divided by averaging time, and the frequency of time spent at home (for residents only):

$$\textbf{Risk}_{inh-res} = (Dose_{air} * CPH * ASF * ED/AT * FAH)$$

Where:

$Risk_{inh-res}$	=	residential inhalation cancer risk (potential chances per million)
$Dose_{air}$	=	daily dose through inhalation (mg/kg-day)

CPF	=	inhalation cancer potency factor (mg/kg-day^{-1})
ASF	=	age sensitivity factor for a specified age group (unitless)
ED	=	exposure duration (in years) for a specified age group (0.25 years for 3rd trimester, 2 years for 0<2, 7 years for 2<9, 14 years for 2<16, 14 years for 16<30, 54 years for 16-70)
AT	=	averaging time of lifetime cancer risk (years)
FAH	=	fraction of time spent at home (unitless)

Chronic Non-Cancer Hazard

Non-cancer chronic impacts are calculated by dividing the annual average concentration by the Reference Exposure Level (REL) for that substance. The REL is defined as the concentration at which no adverse non-cancer health effects are anticipated. The following equation was used to determine the non-cancer risk:

Hazard Quotient = Ci/RELi

Where:

Ci	=	Concentration in the air of substance i (annual average concentration in µg/m^3)
RELi	=	Chronic noncancer Reference Exposure Level for substance i (µg/m^3)

Acute Non-Cancer Hazard

The potential for acute non-cancer hazards is evaluated by comparing the maximum short-term exposure level to an acute REL. RELs are designed to protect sensitive individuals within the population. The calculation of acute non-cancer impacts is similar to the procedure for chronic non-cancer impacts. The equation is as follows:

Acute HQ = Maximum Hourly Air Concentration (µg/m^3) / Acute REL (µg/m^3)

Impact Analysis

PROJECT RISK AND HAZARD ASSESSMENT

CARB has identified benzene a as TAC. The majority of benzene emitted in California comes from motor vehicles, including evaporative leakage and unburned fuel exhaust. Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer health effects. As the Project is proposing to dispense gasoline, an analysis of benzene was performed using the EPA-approved AERMOD model.

Carcinogenic Risk

Benzene emissions were estimated for underground fuel storage tanks and 10 passenger automobile fuel dispensing positions. The specific processes associated with fuel storage tanks and fuel dispensers that emit benzene include loading, breathing, refueling, and spillage. Based on the AERMOD outputs, the expected annual average benzene emission concentrations at the most exposed sensitive receptor, the residence adjacent to the site to the west, resulting from existing operations of the Project is 0.056 $\mu g/m^3$ at the greatest.

Cancer risk calculations for residences are based on 70-, 30-, and 9-year exposure periods. The calculated carcinogenic risk at the sensitive receptor as a result of the Project is depicted in Table 2.

Table 2. Maximum Operational Cancer Risk at the Project Vicinity Residential Neighborhoods			
Exposure Scenario	**Maximum Cancer Risk (Risk per Million)**	**Significance Threshold (Risk per Million)**	**Exceeds BAAQMD Significance Threshold?**
Residence to the West			
70-Year Exposure	4.11	10	No
30-Year Exposure	3.50	10	**No**
9-Year Exposure	2.50	10	**No**
Residence to the North			
70-Year Exposure	3.28	10	**No**
30-Year Exposure	2.79	10	**No**
9-Year Exposure	1.00	10	**No**
Residence to the East			
70-Year Exposure	1.53	10	**No**
30-Year Exposure	1.30	10	**No**
9-Year Exposure	0.93	10	**No**
Residence to the South			
70-Year Exposure	1.53	10	**No**
30-Year Exposure	1.30	10	**No**
9-Year Exposure	0.93	10	**No**

Source: ECORP Consulting 2020. Refer to Attachment A for Model Data Outputs.

As shown, impacts related to cancer risk from gasoline dispensing would not surpass significance thresholds at the nearest residences.

Non-Carcinogenic Hazards

The significance thresholds for TAC exposure requires an evaluation of non-cancer risk stated in terms of a hazard index. Non-cancer chronic impacts are calculated by dividing the annual average concentration by the Reference Exposure Level (REL) for that substance. The REL is defined as the concentration at which no adverse non-cancer health effects are anticipated. The potential for acute non-cancer hazards is evaluated by comparing the maximum short-term exposure level to an acute REL. RELs are designed to protect sensitive individuals within the population. The calculation of acute non-cancer impacts is similar to the procedure for chronic non-cancer impacts.

An acute or chronic hazard index of 1.0 is considered individually significant. The hazard index is calculated by dividing the acute or chronic exposure by the reference exposure level. The highest maximum chronic and acute hazard index at a sensitive receptor associated with benzene emissions from the Project is shown in Table 3.

Table 3. Maximum Operational Non-Cancer Risk at the Project Vicinity Residential Neighborhoods

Exposure Scenario	Maximum Non-Cancer Hazard	Index Significance Threshold	Exceeds BAAQMD Significance Threshold?
Residence to the West			
Chronic Hazard Index	0.018	1	**No**
Acute Hazard Index	0.076	1	**No**
Residence to the North			
Chronic Hazard Index	0.015	1	**No**
Acute Hazard Index	0.036	1	**No**
Residence to the East			
Chronic Hazard Index	0.007	1	**No**
Acute Hazard Index	0.050	1	**No**
Residence to the South			
Chronic Hazard Index	0.007	1	**No**
Acute Hazard Index	0.034	1	**No**

Source: ECORP Consulting 2020. Refer to Attachment A for Model Data Outputs.

As shown, impacts related to non-cancer risk (chronic and acute hazard index) from gasoline dispensing would not surpass significance thresholds at the nearest residences.

3.0 REFERENCES

CAPCOA (California Air Pollution Control Officers Association). 1997. *Gasoline Service Station Industrywide Risk Assessment Guidelines.*

OEHHA (California Environmental Protection Agency's Office of Environmental Health Hazard Assessment). 2015. *Guidance Manual for Preparation of Health Risk Assessments*.

———. *2018. Current District Rules and Regulations.* https://www.valleyair.org/rules/1ruleslist.htm

APPENDIX A

Health Risk Calculations and AERMOD Outputs

Rotten Robbie #42 Project

Benzene Emissions Calculations

Three Underground Storage Tanks		Annual Throughput (gallons)	Emission Factor (lbs/1,000 gallons)	Daily Fuel Movement (gallons)	lbs/day	g/day	g/sec	g/sec per tank
Loading- point source		1,851,732	0.001260	5,073	0.006	2.90E+00	3.36E-05	8.39E-06
Breathing- point source			0.000075	5,073	0.000	1.73E-01	2.00E-06	4.99E-07

Fuel Dispensers		Annual Throughput (gallons)	Emission Factor (lbs/1,000 gallons)	Daily Throughput (gallons)	lbs/day	g/day	g/sec
Refueling- volume source		1,851,732	0.000960	5,073	0.005	2.21E+00	2.56E-05
Spillage- volume source			0.004200	5,073	0.021	9.66E+00	1.12E-04

Sources:

California Air Pollution Control Officers Association [CAPCOA] Gasoline Service Station Industrywide Risk Assessment Guidelines (1997)

Notes:

The Daily Fuel Movement is based on the Annual Throughput

Health Risk at Nearest Residence to the West

Risk Calculations

1 Hour Avg Concentration:	2.054
24 Hour Avg Concentration:	0.280
Annual Avg Concentration:	0.056

Cancer Risk

	3rd trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
DOSEair = (Cair*(BR/BW)*A*EF*10^{-6})	1.95237E-05	5.89496E-05	4.65648E-05	4.02912E-05	1.81175E-05	1.5684E-05
Risk = DOSEair * CPF * ASF * ED/AT * FAH	5.92683E-08	1.43163E-06	1.0058E-06	1.74058E-06	2.645160E-07	8.8322E-07

		Risk	in one million
Cancer Risk:	70-year exposure	4.11E-06	4.11
	30-year exposure	3.50E-06	3.50
	9-year exposure	2.50E-06	2.50
Threshold:			10 in one million

	DOSEair		mg/kg-d	Dose through inhalation
	CPF	0.1	$(mg/kg/day)^{-1}$	Cancer Potency Factor for Benzene
BR/BW	BR/BW (3rd trimester)	361	L/kg bodyweight-day	Daily Breathing rate normalized to body weight
	BR/BW (0 < 2 years)	1090		
	BR/BW (2 < 9 years)	861		
	BR/BW (2 < 16 years)	745		
	BR/BW (16 < 30 years)	335		
	BR/BW (16 < 70 years)	290		
	10^{-6}	1.00E-06		Micrograms to milligrams conversions, liters to cubic meters conversion
	Cair	0.0564	ug/m^3	Concentration in air (ug/m^3), modeled annual average concentration
	A	1		Inhalation absorption factor
	EF	0.96	days/year	Exposure frequency (days/year)
ED	ED (3rd trimester)	0.25	years	Exposure duration (years)
	ED (0 < 2 years)	2		
	ED (2 < 9 years)	7		
	ED (2 < 16, 16 < 30 years)	14		
	ED (16 - 70 years)	54		
	AT	70	years	Averaging time period over which exposure is averaged
ASF	ASF (3rd trimester - 2 years)	10		Age Sensitivity Factor
	ASF (2 - 16 years)	3		
	ASF (16 - 70 years)	1		
FAH	FAH (3rd trimester - 2 years)	0.85		Fraction of time spent at home (unitless)
	FAH (2 - 16 years)	0.72		
	FAH (16 - 70 years)	0.73		

Chronic Noncancer Hazard

Threshold: 1

Hazard Quotient = C_i/REL_i

HQ = 1.88E-02

C_i 5.64E-02 Concentration (annual average)

REL_i 3 Reference Exposure Level

Acute NonCancer Hazard

Threshold: 1

Acute HQ = Maximum Hourly Concentration/Acute REL

Acute HQ = 7.61E-02

Max Hourly 2.05E+00

Acute REL (Benzene) 27

Health Risk at Nearest Residence to the North

Risk Calculations

1 Hour Avg Concentration: 0.984
24 Hour Avg Concentration: 0.219
Annual Avg Concentration: 0.045

Cancer Risk

	3rd trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
DOSEair = $(Cair*(BR/BW)*A*EF*10^{-6})$	1.55774E-05	4.70342E-05	3.71527E-05	3.21473E-05	1.44555E-05	1.2514E-05
Risk = DOSEair * CPF * ASF * ED/AT * FAH	4.72885E-08	1.14226E-06	8.02499E-07	1.38876E-06	2.110500E-07	7.047E-07

		Risk	in one million
Cancer Risk:	70-year exposure	3.28E-06	3.28
	30-year exposure	2.79E-06	2.79
	9-year exposure	1.99E-06	1.99
Threshold:			10 in one million

	DOSEair		mg/kg-d	Dose through inhalation
	CPF	0.1	$(mg/kg/day)^{-1}$	Cancer Potency Factor for Benzene
BR/BW	BR/BW (3rd trimester)	361	L/kg bodyweight-day	Daily Breathing rate normalized to body weight
	BR/BW (0 < 2 years)	1090		
	BR/BW (2 < 9 years)	861		
	BR/BW (2 < 16 years)	745		
	BR/BW (16 < 30 years)	335		
	BR/BW (16 < 70 years)	290		
	10^{-6}	1.00E-06		Micrograms to milligrams conversions, liters to cubic meters conversion
	Cair	0.045	ug/m^3	Concentration in air (ug/m^3), modeled annual average concentration
	A	1		Inhalation absorption factor
	EF	0.96	days/year	Exposure frequency (days/year)
ED	ED (3rd trimester)	0.25	years	Exposure duration (years)
	ED (0 < 2 years)	2		
	ED (2 < 9 years)	7		
	ED (2 < 16, 16 < 30 years)	14		
	ED (16 - 70 years)	54		
	AT	70	years	Averaging time period over which exposure is averaged
ASF	ASF (3rd trimester - 2 years)	10		Age Sensitivity Factor
	ASF (2 - 16 years)	3		
	ASF (16 - 70 years)	1		
FAH	FAH (3rd trimester - 2 years)	0.85		Fraction of time spent at home (unitless)
	FAH (2 - 16 years)	0.72		
	FAH (16 - 70 years)	0.73		

Chronic Noncancer Hazard

Threshold: 1

Hazard Quotient = C_i/REL_i

HQ = 1.50E-02

C_i 4.50E-02 Concentration (annual average)
REL_i 3 Reference Exposure Level

Acute NonCancer Hazard

Threshold: 1

Acute HQ = Maximum Hourly Concentration/Acute REL

Acute HQ = 3.64E-02

Max Hourly 9.84E-01
Acute REL (Benzene) 27

Health Risk at Nearest Residence to the East

Risk Calculations

1 Hour Avg Concentration: 1.359
24 Hour Avg Concentration: 0.219
Annual Avg Concentration: 0.021

Cancer Risk

	3rd trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
DOSEair = (Cair*(BR/BW)*A*EF*10^{-6})	7.26945E-06	2.19493E-05	1.73379E-05	1.50021E-05	6.74589E-06	5.8397E-06
Risk = DOSEair * CPF * ASF * ED/AT * FAH	2.2068E-08	5.33055E-07	3.745E-07	6.48089E-07	9.849000E-08	3.2886E-07

		Risk	in one million
Cancer Risk:	70-year exposure	1.53E-06	1.53
	30-year exposure	1.30E-06	1.30
	9-year exposure	9.30E-07	0.93
Threshold:			10 in one million

	DOSEair		mg/kg-d	Dose through inhalation
	CPF	0.1	$(mg/kg/day)^{-1}$	Cancer Potency Factor for Benzene
BR/BW	BR/BW (3rd trimester)	361	L/kg bodyweight-day	Daily Breathing rate normalized to body weight
	BR/BW (0 < 2 years)	1090		
	BR/BW (2 < 9 years)	861		
	BR/BW (2 < 16 years)	745		
	BR/BW (16 < 30 years)	335		
	BR/BW (16 < 70 years)	290		
	10^{-6}	1.00E-06		Micrograms to milligrams conversions, liters to cubic meters conversion
	Cair	0.021	ug/m^3	Concentration in air (ug/m^3), modeled annual average concentration
	A	1		Inhalation absorption factor
	EF	0.96	days/year	Exposure frequency (days/year)
ED	ED (3rd trimester)	0.25	years	Exposure duration (years)
	ED (0 < 2 years)	2		
	ED (2 < 9 years)	7		
	ED (2 < 16, 16 < 30 years)	14		
	ED (16 - 70 years)	54		
	AT	70	years	Averaging time period over which exposure is averaged
ASF	ASF (3rd trimester - 2 years)	10		Age Sensitivity Factor
	ASF (2 - 16 years)	3		
	ASF (16 - 70 years)	1		
FAH	FAH (3rd trimester - 2 years)	0.85		Fraction of time spent at home (unitless)
	FAH (2 - 16 years)	0.72		
	FAH (16 - 70 years)	0.73		

Chronic Noncancer Hazard

Threshold: 1

Hazard Quotient = C_i/REL_i

HQ = 7.00E-03

C_i 2.10E-02 Concentration (annual average)
REL_i 3 Reference Exposure Level

Acute NonCancer Hazard

Threshold: 1

Acute HQ = Maximum Hourly Concentration/Acute REL

Acute HQ = 5.03E-02

Max Hourly 1.36E+00
Acute REL (Benzene) 27

Health Risk at Nearest Residence to the South

Risk Calculations

1 Hour Avg Concentration:	0.925
24 Hour Avg Concentration:	0.123
Annual Avg Concentration:	0.021

Cancer Risk

	3rd trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
DOSEair = $(Cair*(BR/BW)*A*EF*10^{-6})$	7.26945E-06	2.19493E-05	1.73379E-05	1.50021E-05	6.74589E-06	5.8397E-06
Risk = DOSEair * CPF * ASF * ED/AT * FAH	2.2068E-08	5.33055E-07	3.745E-07	6.48089E-07	9.849000E-08	3.2886E-07

		Risk	in one million
Cancer Risk:	70-year exposure	1.53E-06	1.53
	30-year exposure	1.30E-06	1.30
	9-year exposure	9.30E-07	0.93
Threshold:			10 in one million

	DOSEair		mg/kg-d	Dose through inhalation
	CPF	0.1	$(mg/kg/day)^{-1}$	Cancer Potency Factor for Benzene
BR/BW	BR/BW (3rd trimester)	361	L/kg bodyweight-day	Daily Breathing rate normalized to body weight
	BR/BW (0 < 2 years)	1090		
	BR/BW (2 < 9 years)	861		
	BR/BW (2 < 16 years)	745		
	BR/BW (16 < 30 years)	335		
	BR/BW (16 < 70 years)	290		
	10^{-6}	1.00E-06		Micrograms to milligrams conversions, liters to cubic meters conversion
	Cair	0.021	ug/m^3	Concentration in air (ug/m^3), modeled annual average concentration
	A	1		Inhalation absorption factor
	EF	0.96	days/year	Exposure frequency (days/year)
ED	ED (3rd trimester)	0.25	years	Exposure duration (years)
	ED (0 < 2 years)	2		
	ED (2 < 9 years)	7		
	ED (2 < 16, 16 < 30 years)	14		
	ED (16 - 70 years)	54		
	AT	70	years	Averaging time period over which exposure is averaged
ASF	ASF (3rd trimester - 2 years)	10		Age Sensitivity Factor
	ASF (2 - 16 years)	3		
	ASF (16 - 70 years)	1		
FAH	FAH (3rd trimester - 2 years)	0.85		Fraction of time spent at home (unitless)
	FAH (2 - 16 years)	0.72		
	FAH (16 - 70 years)	0.73		

Chronic Noncancer Hazard

Threshold: 1

Hazard Quotient = C_i/REL_i

HQ = 7.00E-03

C_i 2.10E-02 Concentration (annual average)

REL_i 3 Reference Exposure Level

Acute NonCancer Hazard

Threshold: 1

Acute HQ = Maximum Hourly Concentration/Acute REL

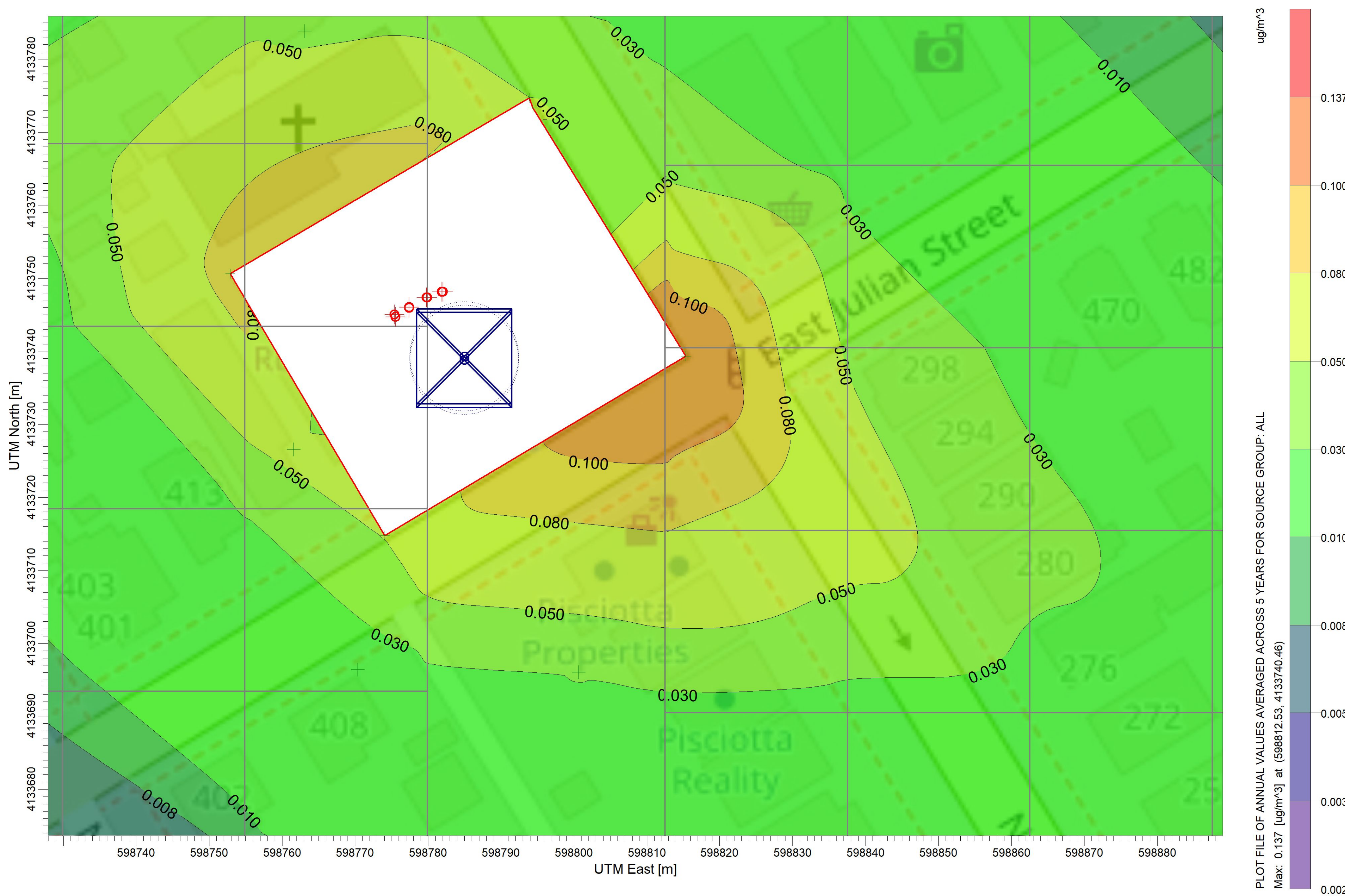
Acute HQ = 3.43E-02

Max Hourly 9.25E-01

Acute REL (Benzene) 27

PROJECT TITLE:

C:\Lakes\AERMOD View\Rotten Robbie #42\Rotten Robbie #42.isc



COMMENTS:

SOURCES:

10

RECEPTORS:

111

OUTPUT TYPE:

Concentration

MAX:

0.137 ug/m^3

COMPANY NAME:

MODELER:

DATE:

8/5/2020

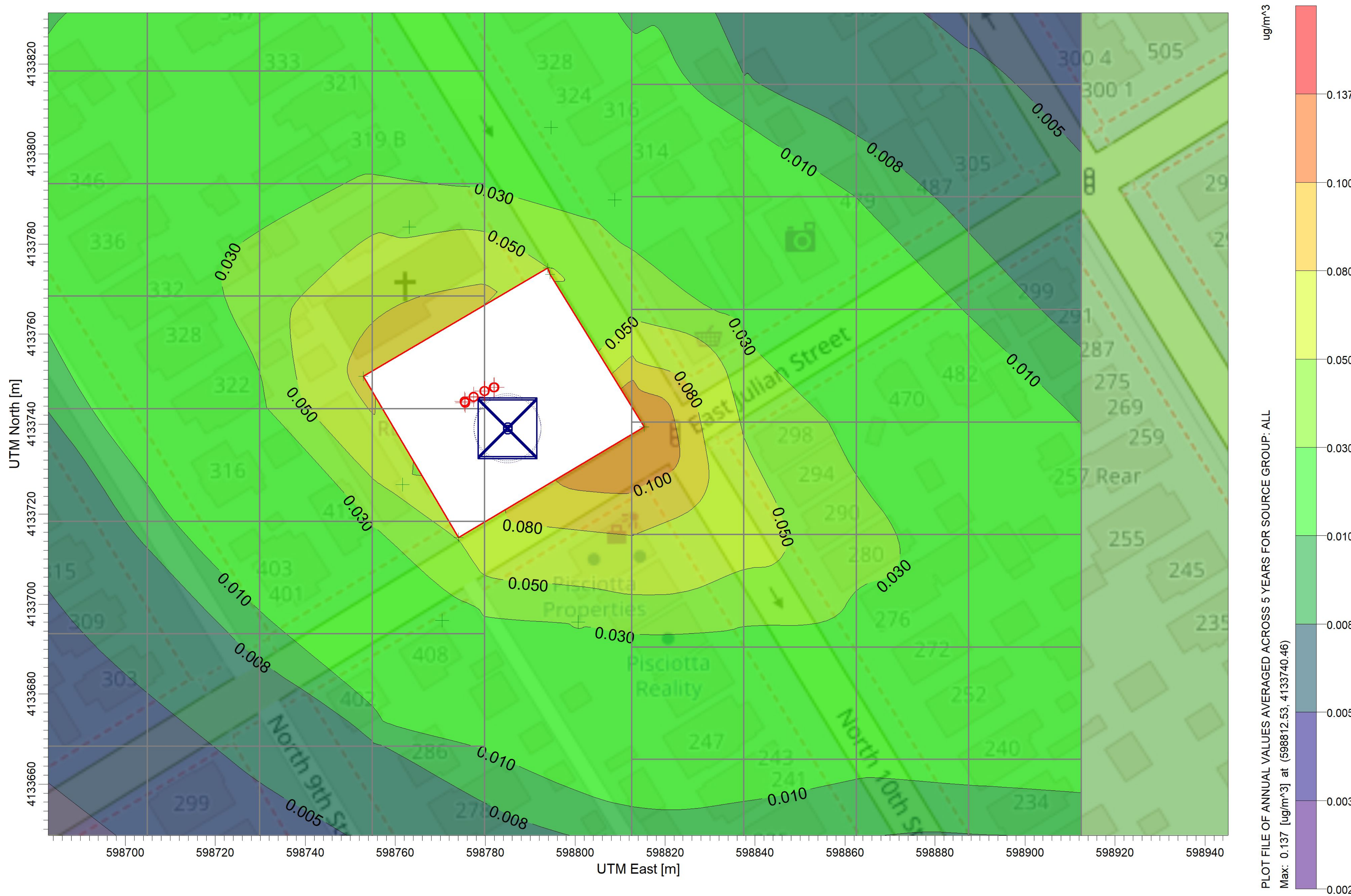
SCALE: 1:540

0 0.01 km

PROJECT NO.:

PROJECT TITLE:

C:\Lakes\AERMOD View\Rotten Robbie #42\Rotten Robbie #42.isc



COMMENTS:

SOURCES:

10

RECEPTORS:

111

OUTPUT TYPE:

Concentration

MAX:

0.137 ug/m^3

COMPANY NAME:

MODELER:

DATE:

8/5/2020

SCALE: 1:880

0 0.02 km

PROJECT NO.:

Control Pathway

Dispersion Options

Titles

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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

OTHER - BENZENE

Averaging Time Options

Hours

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

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

Exponential Decay

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

Terrain Height Options

- [ ] Flat
- [x] Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

- [ ] Yes
- [x] No

Default Height = 0.00 m

Control Pathway

AERMOD

Optional Files

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

Detailed Error Listing File

Filename: Rotten Robbie #42.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	STCK1	598775.54 Loading1	4133744.75	22.68	3.66	8.39E-6	291.00	0.00	0.05
POINT	STCK2	598777.40 Loading2	4133745.98	22.67	3.66	8.39E-6	291.00	0.00	0.05
POINT	STCK3	598779.86 Loading3	4133747.37	22.65	3.66	8.39E-6	291.00	0.00	0.05
POINT	STCK4	598782.02 Loading4	4133748.14	22.62	3.66	8.39E-6	291.00	0.00	0.05
POINT	STCK5	598775.39 Breathing1	4133745.06	22.69	3.66	4.99E-7	289.00	0.00	0.05
POINT	STCK6	598777.42 Breathing2	4133746.06	22.67	3.66	4.99E-7	289.00	0.00	0.05
POINT	STCK7	598779.79 Breathing3	4133747.39	22.65	3.66	4.99E-7	289.00	0.00	0.05
POINT	STCK8	598781.87 Breathing4	4133748.15	22.62	3.66	4.99E-7	289.00	0.00	0.05

Volume Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dim. [m]	Initial Vertical Dim. [m]
VOLUME	VOL1	598784.97 Refilling	4133738.81	22.61	1.00	0.00003	13.00		3.02	1.86
VOLUME	VOL2	598784.97 Spillage	4133739.29	22.61	0.00	0.00011	13.00		3.02	1.86

Receptor Networks

Note: Terrain Elavations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Uniform Cartesian Grid

Receptor Network ID	Grid Origin X Coordinate [m]	Grid Origin Y Coordinate [m]	No. of X-Axis Receptors	No. of Y-Axis Receptors	Spacing for X-Axis [m]	Spacing for Y-Axis [m]
UCART1	598679.90	4133618.41	5	10	25.00	25.00
UCART2	598812.53	4133615.46	5	10	25.00	25.00

Discrete Receptors

Discrete Cartesian Receptors

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m] (Optional)
1	598763.09	4133783.82		22.38	
2	598808.80	4133789.85		22.35	
3	598770.37	4133696.42		22.49	
4	598794.64	4133805.93		22.13	
5	598800.63	4133696.05		22.68	
6	598761.59	4133726.55		22.61	

Plant Boundary Receptors

Cartesian Plant Boundary

Primary

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m] (Optional)
1	598752.89	4133750.61	FENCEPRI	22.69	
2	598774.05	4133714.78	FENCEPRI	22.39	
3	598815.35	4133739.35	FENCEPRI	22.28	
4	598794.36	4133773.31	FENCEPRI	22.20	
5	598793.85	4133774.67	FENCEPRI	22.20	

Receptor Groups

Record Number	Group ID	Group Description
1	FENCEPRI	Cartesian plant boundary Primary Receptors

Receptor Pathway

AERMOD

Terrain Elevations and Flagpole Heights for Network Grids

Uniform Cartesian Grid

Receptor Network ID	Location: X-Coordinate [m]	Location: Y-Coordinate [m]	Terrain Elevations (Optional)	Flagpole Heights (Optional)
UCART1	598679.90	4133618.41	23.20	Option not Selected
	598704.90	4133618.41	23.30	
	598729.90	4133618.41	23.10	
	598754.90	4133618.41	22.90	
	598779.90	4133618.41	22.80	
	598679.90	4133643.41	22.60	
	598704.90	4133643.41	22.90	
	598729.90	4133643.41	23.00	
	598754.90	4133643.41	22.70	
	598779.90	4133643.41	23.10	
	598679.90	4133668.41	22.50	
	598704.90	4133668.41	22.60	
	598729.90	4133668.41	22.60	
	598754.90	4133668.41	22.60	
	598779.90	4133668.41	22.70	
	598679.90	4133693.41	22.80	
	598704.90	4133693.41	22.70	
	598729.90	4133693.41	22.50	
	598754.90	4133693.41	22.60	
	598779.90	4133693.41	22.40	
	598679.90	4133718.41	22.60	
	598704.90	4133718.41	22.40	
	598729.90	4133718.41	22.60	
	598754.90	4133718.41	22.60	
	598779.90	4133718.41	22.40	
	598679.90	4133743.41	22.30	
	598704.90	4133743.41	22.30	
	598729.90	4133743.41	22.80	
	598754.90	4133743.41	22.60	
	598779.90	4133743.41	22.60	
	598679.90	4133768.41	22.20	
	598704.90	4133768.41	22.50	
	598729.90	4133768.41	22.60	
	598754.90	4133768.41	22.60	
	598779.90	4133768.41	22.70	
	598679.90	4133793.41	22.20	
	598704.90	4133793.41	22.40	
	598729.90	4133793.41	22.30	
	598754.90	4133793.41	22.30	
	598779.90	4133793.41	22.10	
	598679.90	4133818.41	22.30	
	598704.90	4133818.41	22.40	
	598729.90	4133818.41	22.40	
	598754.90	4133818.41	22.30	
	598779.90	4133818.41	22.20	

Receptor Pathway

AERMOD

Receptor Network ID	Location: X-Coordinate [m]	Location: Y-Coordinate [m]	Terrain Elevations (Optional)	Flagpole Heights (Optional)
UCART1	598679.90	4133843.41	22.30	Option not Selected
	598704.90	4133843.41	22.40	
	598729.90	4133843.41	22.40	
	598754.90	4133843.41	22.10	
	598779.90	4133843.41	22.50	

Receptor Network ID	Location: X-Coordinate [m]	Location: Y-Coordinate [m]	Terrain Elevations (Optional)	Flagpole Heights (Optional)
UCART2	598812.53	4133615.46	23.30	Option not Selected
	598837.53	4133615.46	22.90	
	598862.53	4133615.46	23.00	
	598887.53	4133615.46	22.60	
	598912.53	4133615.46	22.70	
	598812.53	4133640.46	23.20	
	598837.53	4133640.46	22.90	
	598862.53	4133640.46	23.00	
	598887.53	4133640.46	22.60	
	598912.53	4133640.46	23.30	
	598812.53	4133665.46	22.70	
	598837.53	4133665.46	22.80	
	598862.53	4133665.46	22.50	
	598887.53	4133665.46	22.90	
	598912.53	4133665.46	23.10	
	598812.53	4133690.46	22.60	
	598837.53	4133690.46	22.50	
	598862.53	4133690.46	22.50	
	598887.53	4133690.46	22.90	
	598912.53	4133690.46	23.20	
	598812.53	4133715.46	22.50	
	598837.53	4133715.46	22.50	
	598862.53	4133715.46	22.80	
	598887.53	4133715.46	23.00	
	598912.53	4133715.46	23.30	
	598812.53	4133740.46	22.20	
	598837.53	4133740.46	22.40	
	598862.53	4133740.46	22.80	
	598887.53	4133740.46	23.00	
	598912.53	4133740.46	23.20	
	598812.53	4133765.46	22.30	
	598837.53	4133765.46	22.70	
	598862.53	4133765.46	22.40	
	598887.53	4133765.46	22.50	
	598912.53	4133765.46	23.30	
	598812.53	4133790.46	22.50	
	598837.53	4133790.46	22.80	
	598862.53	4133790.46	22.90	
	598887.53	4133790.46	22.90	
	598912.53	4133790.46	22.50	

Receptor Pathway

AERMOD

Receptor Network ID	Location: X-Coordinate [m]	Location: Y-Coordinate [m]	Terrain Elevations (Optional)	Flagpole Heights (Optional)
UCART2	598812.53	4133815.46	22.40	Option not Selected
	598837.53	4133815.46	22.80	
	598862.53	4133815.46	22.90	
	598887.53	4133815.46	22.70	
	598912.53	4133815.46	22.40	
	598812.53	4133840.46	22.60	
	598837.53	4133840.46	22.50	
	598862.53	4133840.46	22.60	
	598887.53	4133840.46	22.40	
	598912.53	4133840.46	22.70	

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: C:\Users\smyers\Desktop\Met Data\San Jose Inter Airport\724945.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: C:\Users\smyers\Desktop\Met Data\San Jose Inter Airport\724945.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): 50.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2009			
Upper Air		2009			OAKLAND/WSO AP

Data Period

Data Period to Process

Start Date: 1/1/2009 Start Hour: 1 End Date: 1/2/2014 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

Output Pathway

AERMOD

Tabular Printed Outputs

Short Term Averaging Period	RECTABLE Highest Values Table										MAXTABLE Maximum Values Table	DAYTABLE Daily Values Table
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th		
1	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐		No
24	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐		No

Contour Plot Files (PLOTFILE)

Path for PLOTFILES: Rotten Robbie #42.AD

Averaging Period	Source Group ID	High Value	File Name
1	ALL	1st	01H1GALL.PLT
24	ALL	1st	24H1GALL.PLT
Annual	ALL	N/A	AN00GALL.PLT

Results Summary

C:\Lakes\AERMOD View\Rotten Robbie #42\Rotten Robbie #42.isc

BENZENE - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	2.68271	ug/m^3	598812.53	4133740.46	22.20	0.00	22.20	1/12/2011, 2
24-HR	1ST	0.55772	ug/m^3	598812.53	4133740.46	22.20	0.00	22.20	1/26/2009, 24
ANNUAL		0.13743	ug/m^3	598812.53	4133740.46	22.20	0.00	22.20	

Sensitive Receptor Summary

C:\Lakes\AERMOD View\Rotten Robbie #42\Rotten Robbie #42.isc

BENZENE - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	Receptor ID	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	0.98359	ug/m^3	North Res	598763.09	4133783.82	22.38	0.00	22.38	2/2/2013, 4
1-HR	1ST	1.35915	ug/m^3	East Res	598808.80	4133789.85	22.35	0.00	22.35	2/1/2011, 8
1-HR	1ST	0.92465	ug/m^3	South Res	598770.37	4133696.42	22.49	0.00	22.49	2/6/2012, 3
1-HR	1ST	1.09390	ug/m^3	NorthRes2	598794.64	4133805.93	22.13	0.00	22.13	2/1/2012, 4
1-HR	1ST	0.65729	ug/m^3	SouthRes2	598800.63	4133696.05	22.68	0.00	22.68	2/9/2011, 20
1-HR	1ST	2.05427	ug/m^3	West Res	598761.59	4133726.55	22.61	0.00	22.61	1/7/2013, 23
24-HR	1ST	0.21861	ug/m^3	North Res	598763.09	4133783.82	22.38	0.00	22.38	2/12/2009, 24
24-HR	1ST	0.21932	ug/m^3	East Res	598808.80	4133789.85	22.35	0.00	22.35	2/19/2009, 24
24-HR	1ST	0.12260	ug/m^3	South Res	598770.37	4133696.42	22.49	0.00	22.49	5/1/2012, 24
24-HR	1ST	0.15554	ug/m^3	NorthRes2	598794.64	4133805.93	22.13	0.00	22.13	4/7/2009, 24
24-HR	1ST	0.12272	ug/m^3	SouthRes2	598800.63	4133696.05	22.68	0.00	22.68	4/2/2011, 24
24-HR	1ST	0.27964	ug/m^3	West Res	598761.59	4133726.55	22.61	0.00	22.61	1/26/2011, 24
ANNUAL		0.04468	ug/m^3	North Res	598763.09	4133783.82	22.38	0.00	22.38	
ANNUAL		0.02130	ug/m^3	East Res	598808.80	4133789.85	22.35	0.00	22.35	
ANNUAL		0.02066	ug/m^3	South Res	598770.37	4133696.42	22.49	0.00	22.49	
ANNUAL		0.01873	ug/m^3	NorthRes2	598794.64	4133805.93	22.13	0.00	22.13	
ANNUAL		0.03093	ug/m^3	SouthRes2	598800.63	4133696.05	22.68	0.00	22.68	
ANNUAL		0.05640	ug/m^3	West Res	598761.59	4133726.55	22.61	0.00	22.61	