SAFEWAY FUEL CENTER HEALTH RISK ASSESSMENT PETALUMA, CALIFORNIA

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Introduction

This report presents the results of community health risk assessment completed for a Safeway Fuel Center to be located on the southeast corner of Washington Square Shopping Center at 335 South McDowell Boulevard in the City of Petaluma. The Fuel Center will provide multi-product fuel categories at each of 16 fuel positions (8 pumps – two fuel positions per fuel pump) and will replace the current single story commercial land uses at the project site. This health risk assessment was conducted to address localized impacts to sensitive receptors near the project. Sensitive receptors include school children attending the North Bay Childrens Center at the corner of S. Mc Dowell Boulevard and Maria Drive, children attending Mc Dowell Elementary School at S. Mc Dowell Boulevard and Mac Gregor Avenue, and residences along S. Mc Dowell Boulevard. This analysis focuses on emissions of toxic air contaminants (TACs) from the primary sources of air pollutant emissions emitted by the project:

- Construction period emissions;
- Tailpipe and evaporative emissions from new vehicle trips generated by the project;
- Tailpipe and evaporative emissions from vehicles idling in queues waiting to access pumps and starting after fueling;
- Truck delivery emissions; and
- Evaporative emissions from the transfer and storage of gasoline (i.e., underground tank filling, tank breathing and vehicle fueling and spillage).

Where applicable, procedures recommended by the Bay Area Air Quality Management District (BAAQMD) were used. The BAAQMD has published CEQA Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects[1].

Discussion of TACs

Toxic Air Contaminants (TACs) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer or serious illness) and include, but are not limited to, criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter near a highway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level. The identification, regulation, and monitoring of TACs is relatively new compared to that for criteria air pollutants that have established ambient air quality standards. TACs are regulated or evaluated on the basis of risk to human health rather than comparison to an ambient air quality standard or emission-based threshold.

Diesel Particulate Matter

Diesel exhaust, in the form of diesel particulate matter (DPM), is the predominant TAC in urban air with the potential to cause cancer. It is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the California Air Resource Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the federal Hazardous Air Pollutants programs.

[1] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

California has adopted a comprehensive diesel risk reduction program. The U.S. Environmental Protection Agency (EPA) and the CARB have adopted low-sulfur diesel fuel standards in 2006 designed to reduce diesel particulate matter substantially. The CARB recently adopted new regulations requiring the retrofit and/or replacement of construction equipment, on-highway diesel trucks, and diesel buses in order to lower fine particulate matter ($PM_{2.5}$) emissions and reduce statewide cancer risk from diesel exhaust.

Non-Diesel Total Organic Gases

Gasoline-powered vehicles, particularly light-duty autos and trucks emit TACs mostly in the form of total organic gases (TOG). TOG emissions associated with these types of vehicles occur primarily in two forms: running exhaust and evaporative running losses. Additional TOG emissions occur when starting a vehicle, especially cold vehicles. Mobile source TOG includes TACs such as benzene, 1,3-Butadiene and formaldehyde. Emissions of these TACs are controlled through requirements of motor vehicle exhaust systems and the formulation of gasoline by the U.S. EPA and CARB

Fine Particulate Matter ($PM_{2.5}$)

Particulate matter in excess of state and federal standards represents another challenge for the Bay Area. Elevated concentrations of $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Benzene

Benzene is a fundamental component of gasoline and diesel fuel as well as vehicle exhaust. Benzene is emitted through the evaporation of gasoline vapors. Since it is known to cause cancer in humans, benzene was classified as a TAC in 1984 by CARB. Benzene emissions from fuel use are regulated in numerous ways that include standards for the formulation of gasoline, vehicle emission standards, and vapor control systems for storage, fuel dispensing facilities and vehicle on-board fuel systems.

Health Risk Assessment

Emissions of toxic pollutants potentially associated with the Project are estimated using various emissions models. Concentrations of these pollutants in the ambient air are estimated using the U.S. EPA ISCST3 dispersion model. The ISCST3 dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[2] Modeling allows the estimation of both short-term and long-term average concentrations in air for use in a health risk assessment, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in the air are characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels (RELs) for non-cancer health effects (for non-carcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the maximum impact sensitive receptor (sensitive receptors are described below). The hypothetical MEI is an individual assumed to be located where the highest concentrations of air pollutants associated with Project emissions are predicted to occur, based on the air dispersion modeling.

[2] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.

Health risks were evaluated at existing locations of nearby sensitive receptors (residences, schools, etc.). Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime excess cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of a lifetime dose and a cancer potency factor; in other words, it represents the increased cancer risk associated with continuous exposure to concentration of toxic air contaminants in the air over a 30-year lifetime. Cancer risks are also evaluated for school exposure periods, i.e., 9 year periods for adults and children. For the short-term exposures associated with construction, it is more health protective to use a one year exposure and higher exposure factors (i.e., age sensitivity factors and breathing rate for infants or children) and in this case is the basis for the risk calculation.

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[3] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[4] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[5] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters

[3] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.
[4] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.
[5] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January 2016.

per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0). Functionally, cancer risk is calculated using the following parameters and formulas (Cancer Risk parameters are shown in Table 1):

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Table 1. Parameters Used in Cancer Risk Assessment

Parameter	*Exposure Type* →	Infant		Child		Adult
	Age Range →	3rd Trimester	0<2	2 < 9	9 < 16	16 - 30
DPM Cancer Potency Factor (mg/kg-day)$^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Residential Exposure Duration (years)		0.25	2	14	14	14
Hospital Maximum Exposure (years)		0	1	0	0	0
Elementary School Exposure (years)		0	0	9	0	0
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. For cancer risk assessments, children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Residential locations are assumed to include infants and small children. Sensitive receptors include school children attending the North Bay Children's Center at the corner of S. Mc Dowell Boulevard and Maria Drive, children attending Mc Dowell Elementary School at S. Mc Dowell Boulevard and Mac Gregor Avenue, and residences along S. Mc Dowell Boulevard.

BAAQMD Rules and Regulations

BAAQMD regulates the emissions of organic compounds (i.e., ROG) from gasoline dispensing stations through Regulation 8, Rule 7. This rule requires the facility to install enhanced vapor recovery (EVR systems. Since the facility would emit more than 10 pounds of ROG (i.e., volatile organic compounds or VOCs) in a single day, the Best Available Control Technology (BACT)

requirement of Regulation 2-2-301 would be triggered. BACT for Gasoline Dispensing Facilities is considered the use of CARB-certified Phase-I and Phase-II vapor recovery equipment. According to the District's permit evaluation, the project would meet the requirement by using CNI EVR Phase I equipment and VST Balance EVR Phase II equipment with the Veeder-Root Vapor Polisher and Veeder-Root ISD controls[6]. These two systems are certified by CARB under Executive Orders VR-104 and VR-204 respectively.

A Health Risk Screening Analysis (HRSA) was required since the increased benzene emissions, a TAC, exceed the toxic air contaminant risk triggering level specified in Regulation 2-5 table 2-5-1. According to the District evaluation, the facility passed the toxic risk screening level of less than ten in a million cancer risk with the District-imposed annual throughput limit of 25.71 million gallons. Since the facility is within 1,000 feet of McDowell Elementary School and the project increases emissions, the project triggers the Public Notice requirements under California Health & Safety Code and District's Regulation 2-1-412. On August 22, 2013, a notice describing the project and announcing the public comment period was mailed to the parents of students attending the above schools and people living within 1,000 feet of the station. This public notice period has been completed and the District issued a permit to construct the project.

Community Risk Thresholds of Significance

The Bay Area Air Quality Management District (BAAQMD) identified significance thresholds for exposure to TACs and $PM_{2.5}$ as part of its May 2011 *CEQA Air Quality Guidelines*[7]. This report uses the thresholds and methodologies from BAAQMD's May 2011 *CEQA Air Quality Guidelines* to determine whether there would be any project health risk impacts. This report addresses single-source (construction and operational) impacts to nearby off-site receptors. The following are the significance criteria that are used to judge this project's impacts:

Single Source Thresholds

If emissions of TACs or $PM_{2.5}$ exceed any of the thresholds of significance listed below, the proposed project would result in a significant impact and mitigation would be required.

- An excess cancer risk level of more than 10 in 1 million, or a non-cancer (chronic or acute) hazard index greater than 1.0.
- An incremental increase of more than 0.3 micrograms per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$.

Cumulative Source Thresholds

A project would have a cumulatively considerable impact if the aggregate total of all past, present, and foreseeable future sources within a 1,000-foot radius of the fence line of a source or from the location of a receptor, plus the contribution from the project, exceeds the following thresholds.

- An excess cancer risk levels of more than 100 in one million or a chronic non-cancer hazard index (from all local sources) greater than 10.0.

[6] BAAQMD 2013. Authority to Construct for Permit Application No. 405215 at S. McDowell Blvd & Maria Drive, Petaluma, CA 94954. Dated October 10, 2013..

[7] BAAQMD, 2011. *BAAQMD CEQA Air Quality Guidelines*. May. These guidelines were updated in May 2017 to reflect recent litigation that does not affect the thresholds used for this project. See http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines accessed on September 15, 2017.

- 0.8 μg/m^3 annual average $PM_{2.5}$.

Construction Community Risk Impacts

Construction activity is anticipated to include demolition, minor grading, building construction, paving and some application of architectural coatings. Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a TAC. This health risk assessment focused on modeling on-site construction activity using construction fleet information included in the project design. Construction period emissions were modeled using the California Emissions Estimator Model, Version 2016.3.1 (CalEEMod) along with projected construction activity. The number and types of construction equipment and diesel vehicles, along with the anticipated length of their use for different phases of construction were based on the default schedule assumed by the model. Construction of the project is expected to occur over about a 6-month period assumed to all occur in 2018. While construction may begin later, the use of the earliest construction start date would result in higher emissions, reflective of slightly older construction equipment that would have higher emissions rates. Default construction assumptions assigned by CalEEMod were used.

Construction Plan

Safeway intends to incorporate measures in their construction plans to reduce fugitive dust emissions (PM_{10} and $PM_{2.5}$) and reduce diesel exhaust emissions. The project design features for construction shall include BAAQMD recommended "Best Management Practices" along with appropriate construction equipment selection to reduce impacts. The construction design features are intended to establish a process that minimizes fugitive dust and exhaust emissions, protecting the health and safety of nearby sensitive receptors such that temporary construction emissions would not exceed the BAAQMD significance thresholds for community risk and hazard impacts. These features will include the following:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible.
6. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
9. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action

within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

10. All diesel-powered off-road equipment larger than 50 horsepower and operating at the site for more than two days continuously shall meet U.S. EPA particulate matter emissions standards for Tier 2 engines or equivalent; and
11. Diesel-powered generators or air compressors shall not be used on-site for more than two days continuously, unless under emergency conditions.

Construction Emissions

The CalEEMod model provided unmitigated total annual PM_{10} and $PM_{2.5}$ exhaust emissions (assumed to be diesel particulate matter) for the off-road construction equipment and for exhaust emissions from on-road vehicles (haul trucks, vendor trucks, and worker vehicles), with total PM10 exhaust emissions of 0.0410 tons (82 pounds) in 2018. CalEEMod mitigated emissions modeling that incorporate the Best Management Practices listed above and included Tier 2 diesel construction for all equipment would be much lower. The construction DPM emissions include on-road emissions resulting from haul truck travel during grading activities, worker travel, and vendor deliveries during building construction, with overall trip lengths of 1.0 miles to simulate travel on and near the site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 3 pounds for the overall construction period. The CalEEMod model output with emission calculations are provided in *Attachment 1*.

Dispersion Modeling

The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM at existing sensitive receptors in the vicinity of the project site. The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for DPM exhaust emissions and one for fugitive $PM_{2.5}$ dust emissions. The ISCST3 modeling utilized area sources to represent the locations of on-site construction activities. The construction area, assumed to be the same as the overall project site, is shown on Figure 1. Emissions were distributed evenly across the areas sources. To represent the construction equipment exhaust emissions, an emission release height of 6 meters (20 feet) was used for the area sources. The elevated source height reflects the height of the equipment exhaust pipes and buoyancy of the exhaust plume. For modeling fugitive $PM_{2.5}$ emissions, a near ground level release height of 2 meters (6 feet) was used for the area sources. Emissions from on-road truck travel were included in the area sources. Emissions were modeled as occurring daily between 7 am - 4 pm. The model used a 5-year data set (1990-1994) of hourly meteorological data from Petaluma Municipal Airport available from the BAAQMD. Annual DPM concentrations from construction activities were predicted for 2018, with the annual average concentrations based on the 5-year average concentrations from modeling 5 years of meteorological data. DPM concentrations were calculated at nearby residential receptors at a height of 1.5 meters (5 feet) and at a height of 1.0 meter (3.3 feet) for school children.

Construction Cancer Risk and Hazards

The maximum-modeled unmitigated (uncontrolled) annual DPM concentration occurred at the North Bay Children's Center across Maria Drive from the project site. The maximum-modeled annual DPM concentration for a residence occurred at a residence along South Mc Dowell Boulevard south of Maria Drive. The locations of these receptors are identified on Figure 1 as

receptors circled in yellow. Increased cancer risks were calculated using the modeled annual concentrations and BAAQMD recommended risk assessment methods for an infant exposure (3rd trimester through 2 years of age), student exposure (9 years) and for an adult exposure. Table 2 reports the community risk impacts associated with construction activities at the various sensitive receptor types near the project. Results of this assessment indicate that, with project construction, the incremental school child cancer risk at the maximally exposed individual (MEI) location would be 5.8 in one million, the maximum residential child incremental cancer risk would be 2.4 in one million, and the residential adult incremental cancer risk would be 0.04 in one million. These predicted excess cancer risks are below the BAAQMD significance threshold of 10 in one million and are not considered a significant impact.

The modeled maximum annual $PM_{2.5}$ concentration was 0.21 micrograms per cubic meter ($\mu g/m^3$), occurring at the North Bay Children's Center across Maria Drive from the construction area. The maximum modeled $PM_{2.5}$ concentration occurs where the MEI for cancer risk would occur. This $PM_{2.5}$ concentration is below the BAAQMD threshold of 0.3 $\mu g/m^3$ used to judge the significance of impacts for $PM_{2.5}$.

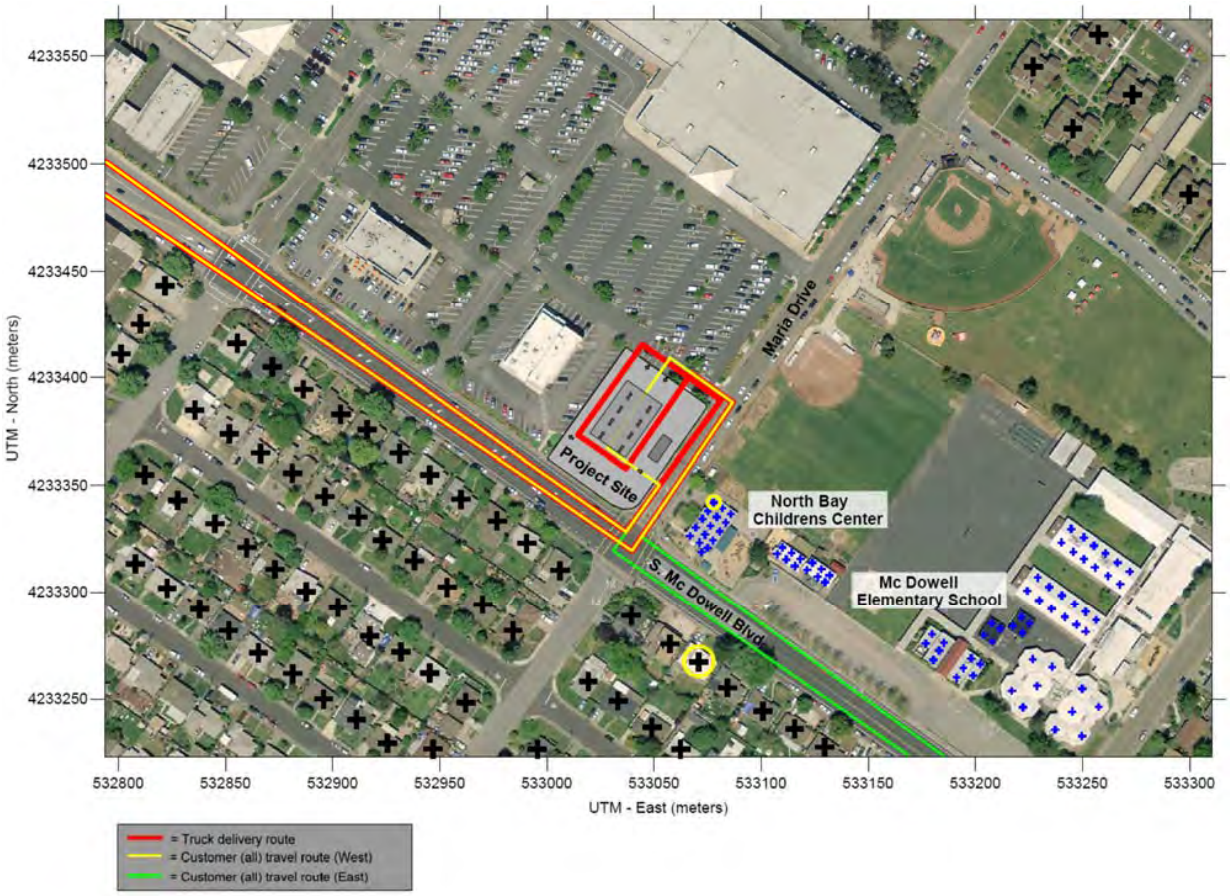
Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. The chronic inhalation reference exposure level (REL) for DPM is 5 $\mu g/m^3$. The maximum predicted annual DPM concentration was 0.202 $\mu g/m^3$, which is much lower than the REL. The Hazard Index (HI), which is the ratio of the annual DPM concentration to the REL, is 0.04. This HI is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

The project would have *a less-than-significant* impact with respect to community risk caused by construction activities. *Attachment 1* includes the emission calculations used for the area source modeling, dispersion modeling inputs, and the cancer risk calculations.

Table 2. Construction Period Community Risk Impacts

	Community Risk Impact		
Receptor	**Excess Cancer Risk (per million)**	**Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)**	**Hazard Index**
Residential – infant	2.4	0.02	0.003
Residential - adult	<0.1	0.02	0.003
School - child	5.8	0.21	0.04
BAAQMD Threshold	*10.0*	*0.3*	*1.0*
Significant	*No*	*No*	*No*

Figure 1 – Project Site, Sensitive Receptor Locations, and Project Vehicle Travel Routes



Note: "X's" indicate modeled receptor positions and yellow circles indicate the receptors with maximum impact. Blue "X's" indicate school child receptor positions, where black "X's" indicate residential receptors.

Operational Community Risk Impacts

Local traffic generated by the project along with evaporative emissions from gasoline fueling could lead to operational community risk impacts. Specific sources of emissions include traffic traveling to and from the project, traffic idling at the project, truck traffic accessing the site (importing fuel) and evaporative emissions of fuel from transfer and storage of gasoline (i.e., underground tank filling, tank breathing and vehicle fueling and spillage). Impacts from each of these sources are addressed. These sources are assumed to be operational well into the future (i.e., 30 years). The year 2019 was assumed to be the first full year of operation and was used as the year of analysis for generating emission rates. Emission rates are anticipated to decrease in the future due to improvements in exhaust systems and turnover of the fleet from older, more polluting vehicles, to newer cleaner vehicles.

Prediction of Traffic-Related Emissions

Project Traffic

Daily traffic generation was predicted using the CalEEMod model default assumptions for a fueling station with 16 pumps. The CalEEMod model predicts that the project would generate about 2,696 vehicle trips per day. The model estimates that about 59 percent of these trips would be passby trips. This means the vehicles are traveling by or near the project site. However, to be conservative, this analysis assumes these trips are all new to the project site. Since the distribution of local vehicle trips to the fueling station was not available, it was assumed that all vehicles would travel along Mc Dowell Boulevard then on Maria Drive to the station. Two scenarios for traffic on South Mc Dowell Boulevard were evaluated, one where all customer vehicle travel accessed the site from South Mc Dowell east of Maria Drive (east route) and the other case with all customer travel accessing the site from South Mc Dowell west of Maria Drive (west route). The route with the greatest impact was used to represent the project's impacts. Note that the reduction in emissions from traffic generated by the existing uses, which would be removed for the project, were not considered in this analysis.

The primary TACs of concern from project traffic are non-diesel mobile source air toxics found in total organic gases (TOG). This includes 14 different toxic components of TOG running exhaust emissions. In addition, evaporative emissions of TOG from vehicles emit five different toxic components. The EMFAC2014 emission factor model provided emission rates of TOG for running exhaust (including starting emissions) and evaporative loss emissions. Starting emissions were assumed to occur once per vehicle visit to the station and all those emissions were conservatively assumed to occur at or near the project. All vehicles using the fueling station were assumed to be light-duty autos, light-duty trucks or medium-duty trucks. The percentage breakdown was based on the Sonoma County fleet average as reported by EMFAC2014. BAAQMD has developed weighted toxicity values for tailpipe and evaporative losses that incorporates the individual toxicity of each compound that make up TOG[8]. The summation of all of the individual weighted toxicity values developed by BAAQMD is then cumulatively weighted and applied in the risk and hazard calculations. TOG emission rates used in the analysis are provided in *Attachment 2*.

Customer Vehicle Idling

Idling emissions due to vehicles queuing were computed using the California Air Resources Board's EMFAC2014 motor vehicle emission factor model. Idle emissions were computed by converting 5 mile-per hour TOG emissions rates into hourly emissions. This analysis assumed the peak-hour would have 12 vehicles queuing constantly for a peak hour, which would be 3 vehicles for each line of pumps. This was a worst-case scenario that was based on the maximum queuing space available. All vehicles were assumed to be light-duty autos or light-duty trucks, and medium duty vehicles. Since the Traffic Study only predicted peak-hour traffic conditions (i.e., there were no predictions for daily average conditions), this was assumed to represent 10 percent of the daily queuing emissions[9]. Annual emissions assumed similar operating conditions 365 days per year. Evaporative TOG emissions and $PM_{2.5}$ emissions from queuing were calculated in a similar manner. The analysis of queuing emissions is provided in *Attachment 2*.

[8] BAAQMD. 2012. Recommended Methods for Screening and Modeling Local Risks and Hazard. May. May.
[9] Note that traffic impacts assessments for land use projects typically assume that the peak-hour traffic generation is equivalent to10% of the daily traffic condition.

Truck Deliveries

Safeway reports that about 2 deliveries of fuel per day would occur. This estimate is based on a projected maximum throughput of 8.5 million gallons per year. These deliveries were assumed to be made by heavy-duty diesel trucks. The TAC of concern from trucks is DPM. $PM_{2.5}$ is the air pollutant of concern that is addressed in community risk assessments. The CARB EMFAC2014 model was used to predict $PM_{2.5}$ emission rates from these trucks. DPM, the TAC of concern, is considered to be all $PM_{2.5}$ running exhaust, whereas total $PM_{2.5}$ includes exhaust, brake wear and tire wear. Emission rates for truck traffic are also included as *Attachment 2*.

Fueling Emissions

The transfer and storage of gasoline results in emissions of volatile organic compounds (VOCs) also assumed to be reactive organic gases or ROG. Emissions of ROG and benzene, which is a TAC, were computed using emission factors provided by the BAAQMD. The emission factors developed by BAAQMD are based on the *Gasoline Service Station Industry-wide Risk Assessment Guidelines* developed by the California Air Pollution Officers Association's (CAPCOA) Toxics Committee. Emissions of Precursor Organic Compound (POC) include emissions from loading, breathing, refueling and spillage. The facility would be equipped with two 20,000-gallon underground storage tanks, eight dual-sided triple-product gasoline nozzles (meeting current BAAQMD requirements)[10]. To ensure that the facility does not emit ROG emissions that would trigger requirements for emission offsets or exceed screening triggers that would require a health risk assessment, BAAQMD conditioned the facility to a gasoline throughput not to exceed 25.71 million gallons of fuel per year (Authority to Construct Permit Application No. 405215, Condition No. 26)[11]. Although BAAQMD permitted the facility for an annual gasoline throughput of 25.71 million gallons per year based on the results of the *Health Risk Screening Analysis*, the project is anticipated to handle a maximum throughput of 8.5 million gallons per year[12]. BAAQMD reports emission rates for fueling stations of 0.00369 pounds of benzene per thousand gallons of fuel handled[13]. Total benzene emissions were calculated at 31.4 pounds per year. A*ttachment 2* includes emissions of fueling storage and transfer ROG emissions and the BAAQMD Permit Evaluation.

Dispersion Modeling

The U.S. EPA ISCST3 dispersion model was also used to predict concentrations of TOG, DPM, $PM_{2.5}$, and benzene from operation of the project at off-site sensitive receptors in the vicinity of the project site. Modeling was conducted using the 5-year hourly meteorological data set from the Petaluma Municipal Airport.

Truck and other vehicle emissions were modeled as line sources (a series of volume sources along a line) representing travel routes depicted in the site circulation plans. Off-site travel was assumed to come from S. Mc Dowell Boulevard, extending 1,000 feet from the project. As described above,

[10] Phase I CNI EVR, Phase II VST Balance with Veeder Root Vapor Polisher and Veeder-Root ISD EVR

[11] BAAQMD 2013. Authority to Construct for Permit Application No. 405215 at S. McDowell Blvd & Maria Drive, Petaluma, CA 94954. Dated October 10, 2013.

[12] Based on market research and operating conditions at other comparable fuel centers, Safeway estimates that the annual throughput for the Petaluma fuel center will be approximately 8.5 million gallons per year.

[13] BAAQMD 2013. EVALUATION REPORT, Safeway Fuel Center #3011 Facility ID#200026 Application #405215 at S. McDowell Blvd & Maria Drive, Petaluma, CA 94954. Accessed from http://www.baaqmd.gov/Divisions/Engineering/Public-Notices-on-Permits/2013/082213-405215/Safeway-Fuel-Center-3011.aspx on April 15, 2014.

two customer vehicle travel scenarios were evaluated with all traffic traveling along S. McDowell Boulevard either east or west of Maria Drive, and the route producing the greatest impact at receptor was used. Trucks were assumed to travel along S. McDowell Boulevard via E Washington Street. Truck emission release heights were assumed to be 3.4 meters (11 feet), while light-duty vehicles were assumed to have a release height of 1.3 meters (4.3 feet).

Benzene emissions from the fuel station were modeled using volume sources as recommended by CAPCOA. Eight volume sources with side lengths of 13 meters (43 feet) and a 4-meter (13-foot) height were used. Four of the volume sources were used to represent vehicle fueling emissions with a release height of 1 meter and the other four volume sources represented the emission from fuel spillage with a release height of 0 meters. Emissions of TOG and $PM_{2.5}$ from queuing vehicles were modeled using three volume sources, one for TOG exhaust emissions, one for TOG evaporative emissions, and one for $PM_{2.5}$ emissions. All of these volume sources were modeled using a release height of 1 meter (3 feet). The modeling assumed the fuel station would operate 19 hours per day between 5:00 AM and 12:00 AM. A shorter duration operating scenario would result in similar or slightly lower impacts. For modeling school child receptors, it was assumed that the children could be at the school area for up to 10 hours per day 8:00 AM to 6:00 PM) for 180 days per year.

TOG, DPM and benzene concentrations were predicted at residential receptors near the project site at a height of 1.5 meters (5 feet) and at a height of 1.0 meters (3.3 feet) for school child receptors. Modeled truck routes, receptors, and location of maximum impacts are shown in Figure 1. Dispersion modeling information for these sources are included in *Attachment 2*.

Cancer Risk, $PM_{2.5}$ and Hazards

Using the maximum modeled DPM, TOG and benzene concentrations, individual cancer risks were computed using the most recent methods recommended by BAAQMD and OEHHA that include nearly continuous exposures with adjustments for infants and children. Based on modeled TOG and DPM concentrations, cancer risks were calculated for a 30-year exposure assuming constant emissions at 2019 levels over the entire 30-year period for residences and a 9-year period for school children.

Table 2 shows the excess cancer risk, annual $PM_{2.5}$ concentration and acute or chronic hazards associated with the project at the location of the residential and school child MEI. In addition, other substantial sources of TACs located within 1,000 feet of the project site are included.

The combination of construction activity and operation impacts are shown in Table 3. Excess cancer risk associated with project construction and operation would be less than 6.5 chances per million. The maximum annual $PM_{2.5}$ concentration would 0.18 $\mu g/m^3$, which does not exceed the significance threshold of 0.3 $\mu g/m^3$. The predicted Hazard Index is well below the significance threshold.

The only other sources of TACs or PM2.5 near the project are traffic on South Mc Dowell and U.S. 101. The effect of these sources was included in Table 2. When combined with project impacts, the community risk impacts are below the significance thresholds that are cancer risk of 100 chances per million, PM2.5 concentrations of 0.8 $\mu g/m^3$ and an HI less than 100.

Table 3. Safeway Community Risk Impacts

Receptor/Source	Community Risk Impact		
	Excess Cancer Risk (per million)	**Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)**	**Hazard Index (highest of Acute or Chronic)**
Residential (30-year lifetime)			
Construction Impacts (2019)	2.4	0.21	0.003
Traffic (vehicle trips & idling)	1.2	0.02	0.013
Traffic (truck deliveries)	0.02	0.00	0.000
Benzene (from fuel evaporation)	1.4	0.00	0.08
Total Project - Residential	**3.0**	**0.23**	**0.10**
School Child (9-year)			
Construction Impacts (20194)	5.8	0.21	0.04
Traffic (vehicle trips & idling)	0.28	0.01	0.015
Traffic (truck deliveries)	0.01	0.00	0.000
Benzene (from fuel evaporation)	0.39	0.00	0.09
Total Project - School Child	**6.5**	**0.22**[1]	**0.15**
Significance Threshold (Project)	*10*	*0.3*	*1.0*
Cumulative Sources at Residential			
Project	3.0	0.23	0.10
S. Mc Dowell Blvd traffic at 30 feet[2]	7.0	0.27	<0.01
U.S. 101 at 900 feet[3]	8.0	0.06	<0.01
Cumulative including Project	**18.0**	**0.56**	**<0.12**
Cumulative Sources at School			
Project	6.5	0.22	0.15
S. Mc Dowell Blvd traffic at 40 feet[2]	8.8	0.33	<0.01
U.S. 101 at over 1,000 feet[3]	<6.9	<0.05	<0.01
Maximum Cumulative including Project	**<22.2**	**0.60**	**<0.12**
Significance Threshold (Cumulative)	*100*	*0.8*	*10.0*

[1] Note that maximum year for $PM_{2.5}$ exposure would have 6 months of construction and only one-half year of operation.
[2] Based on BAAQMD Roadway Screening Calculator for North-South Roadway with 20,000 ADT at 25 feet. Adjusted for number of school days
[3] Based on BAAQMD Google Earth Highway Screening Analysis Tool for U.S. 101. Adjusted for number of school days

Summary of Impacts

This analysis found that the combination of TAC emissions from construction and operation would not exceed the thresholds of significance for community risk impacts in terms of excess lifetime cancer risk, annual $PM_{2.5}$ concentrations and Hazard Index. Both single-source and cumulative source thresholds for community risk would not be exceeded. As a result, the project would have a less than significant impact in terms of exposing sensitive receptors to substantial air pollutant concentrations.

Attachment 1: Construction Modeling Information

Petaluma Safeway

Sonoma-San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Gasoline/Service Station	16.00	Pump	0.05	2,258.80	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	435	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E

Land Use - default gas station

Construction Phase - default schedule

Off-road Equipment -

Off-road Equipment -

Trips and VMT - added paving trips and adjusted trips to 1 mile for HRA (local travel)

Demolition - estimated based on 180ft x 75 ft

Vehicle Trips - local travel and no passby/diverted

Construction Off-road Equipment Mitigation - Tier 2 and BMP

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2

tblConstEquipMitigation	Tier	No Change	Tier 2
tblProjectCharacteristics	CO2IntensityFactor	641.35	435
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripLength	20.00	1.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	VendorTripLength	7.30	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblVehicleTrips	CC_TL	7.30	1.00
tblVehicleTrips	CNW_TL	7.30	1.00
tblVehicleTrips	CW_TL	9.50	1.00
tblVehicleTrips	DV_TP	27.00	0.00
tblVehicleTrips	PB_TP	59.00	0.00
tblVehicleTrips	PR_TP	14.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0762	0.6439	0.4617	6.9000e-004	7.8100e-003	0.0410	0.0489	1.4900e-003	0.0379	0.0394	0.0000	62.4248	62.4248	0.0184	0.0000	62.8844
Maximum	**0.0762**	**0.6439**	**0.4617**	**6.9000e-004**	**7.8100e-003**	**0.0410**	**0.0489**	**1.4900e-003**	**0.0379**	**0.0394**	**0.0000**	**62.4248**	**62.4248**	**0.0184**	**0.0000**	**62.8844**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0400	0.6324	0.4732	6.9000e-004	3.5900e-003	0.0228	0.0264	6.9000e-004	0.0228	0.0235	0.0000	62.4248	62.4248	0.0184	0.0000	62.8844

Maximum	**0.0400**	**0.6324**	**0.4732**	**6.9000e-004**	**3.5900e-003**	**0.0228**	**0.0264**	**6.9000e-004**	**0.0228**	**0.0235**	**0.0000**	**62.4248**	**62.4248**	**0.0184**	**0.0000**	**62.8844**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**47.49**	**1.79**	**-2.49**	**0.00**	**54.03**	**44.42**	**45.94**	**53.69**	**39.86**	**40.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2018**	**3-31-2018**	0.3828	0.3582
2	**4-1-2018**	**6-30-2018**	0.3324	0.3080
		Highest	0.3828	0.3582

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0100	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Energy	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	6.9446	6.9446	3.1000e-004	1.1000e-004	6.9852
Mobile	0.6412	1.9485	3.2661	1.8700e-003	0.0000	3.8200e-003	3.8200e-003	0.0000	3.5600e-003	3.5600e-003	0.0000	171.7718	171.7718	0.0392	0.0000	172.7515
Waste						0.0000	0.0000		0.0000	0.0000	1.7498	0.0000	1.7498	0.1034	0.0000	4.3350
Water						0.0000	0.0000		0.0000	0.0000	0.0674	0.3168	0.3843	6.9500e-003	1.7000e-004	0.6079
Total	**0.6516**	**1.9514**	**3.2687**	**1.8900e-003**	**0.0000**	**4.0400e-003**	**4.0400e-003**	**0.0000**	**3.7800e-003**	**3.7800e-003**	**1.8172**	**179.0335**	**180.8507**	**0.1499**	**2.8000e-004**	**184.6799**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0100	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Energy	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	6.9446	6.9446	3.1000e-004	1.1000e-004	6.9852
Mobile	0.6412	1.9485	3.2661	1.8700e-003	0.0000	3.8200e-003	3.8200e-003	0.0000	3.5600e-003	3.5600e-003	0.0000	171.7718	171.7718	0.0392	0.0000	172.7515
Waste						0.0000	0.0000		0.0000	0.0000	1.7498	0.0000	1.7498	0.1034	0.0000	4.3350
Water						0.0000	0.0000		0.0000	0.0000	0.0674	0.3168	0.3843	6.9500e-003	1.7000e-004	0.6079
Total	**0.6516**	**1.9514**	**3.2687**	**1.8900e-003**	**0.0000**	**4.0400e-003**	**4.0400e-003**	**0.0000**	**3.7800e-003**	**3.7800e-003**	**1.8172**	**179.0335**	**180.8507**	**0.1499**	**2.8000e-004**	**184.6799**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description

1	Demolition	Demolition	1/1/2018	1/12/2018	5	10	
2	Site Preparation	Site Preparation	1/13/2018	1/15/2018	5	1	
3	Grading	Grading	1/16/2018	1/17/2018	5	2	
4	Building Construction	Building Construction	1/18/2018	6/6/2018	5	100	
5	Paving	Paving	6/7/2018	6/13/2018	5	5	
6	Architectural Coating	Architectural Coating	6/14/2018	6/20/2018	5	5	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 3,388; Non-Residential Outdoor: 1,129; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	1.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	10.00	0.00	61.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	1.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	10.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.6400e-003	0.0000	6.6400e-003	1.0100e-003	0.0000	1.0100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.3200e-003	0.0472	0.0389	6.0000e-005		3.1100e-003	3.1100e-003		2.9700e-003	2.9700e-003	0.0000	5.3041	5.3041	1.0200e-003	0.0000	5.3297
Total	**5.3200e-003**	**0.0472**	**0.0389**	**6.0000e-005**	**6.6400e-003**	**3.1100e-003**	**9.7500e-003**	**1.0100e-003**	**2.9700e-003**	**3.9800e-003**	**0.0000**	**5.3041**	**5.3041**	**1.0200e-003**	**0.0000**	**5.3297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.0000e-005	3.3300e-003	6.2000e-004	0.0000	3.0000e-005	1.0000e-005	3.0000e-005	1.0000e-005	1.0000e-005	1.0000e-005	0.0000	0.3433	0.3433	6.0000e-005	0.0000	0.3448
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	5.0000e-005	6.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0456	0.0456	0.0000	0.0000	0.0456
Total	**1.8000e-004**	**3.3800e-003**	**1.2300e-003**	**0.0000**	**7.0000e-005**	**1.0000e-005**	**7.0000e-005**	**2.0000e-005**	**1.0000e-005**	**2.0000e-005**	**0.0000**	**0.3888**	**0.3888**	**6.0000e-005**	**0.0000**	**0.3904**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.9900e-003	0.0000	2.9900e-003	4.5000e-004	0.0000	4.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4200e-003	0.0518	0.0397	6.0000e-005		2.0100e-003	2.0100e-003		2.0100e-003	2.0100e-003	0.0000	5.3041	5.3041	1.0200e-003	0.0000	5.3296
Total	**2.4200e-003**	**0.0518**	**0.0397**	**6.0000e-005**	**2.9900e-003**	**2.0100e-003**	**5.0000e-003**	**4.5000e-004**	**2.0100e-003**	**2.4600e-003**	**0.0000**	**5.3041**	**5.3041**	**1.0200e-003**	**0.0000**	**5.3296**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.0000e-005	3.3300e-003	6.2000e-004	0.0000	3.0000e-005	1.0000e-005	3.0000e-005	1.0000e-005	1.0000e-005	1.0000e-005	0.0000	0.3433	0.3433	6.0000e-005	0.0000	0.3448
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	5.0000e-005	6.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0456	0.0456	0.0000	0.0000	0.0456
Total	**1.8000e-004**	**3.3800e-003**	**1.2300e-003**	**0.0000**	**7.0000e-005**	**1.0000e-005**	**7.0000e-005**	**2.0000e-005**	**1.0000e-005**	**2.0000e-005**	**0.0000**	**0.3888**	**0.3888**	**6.0000e-005**	**0.0000**	**0.3904**

3.3 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.9000e-004	4.8800e-003	2.1300e-003	0.0000		2.1000e-004	2.1000e-004		1.9000e-004	1.9000e-004	0.0000	0.4458	0.4458	1.4000e-004	0.0000	0.4492
Total	**3.9000e-004**	**4.8800e-003**	**2.1300e-003**	**0.0000**	**2.7000e-004**	**2.1000e-004**	**4.8000e-004**	**3.0000e-005**	**1.9000e-004**	**2.2000e-004**	**0.0000**	**0.4458**	**0.4458**	**1.4000e-004**	**0.0000**	**0.4492**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.2800e-003	2.2800e-003	0.0000	0.0000	2.2800e-003
Total	**0.0000**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.2800e-003**	**2.2800e-003**	**0.0000**	**0.0000**	**2.2800e-003**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.5000e-004	4.3100e-003	2.9300e-003	0.0000		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	0.4458	0.4458	1.4000e-004	0.0000	0.4492
Total	**1.5000e-004**	**4.3100e-003**	**2.9300e-003**	**0.0000**	**1.2000e-004**	**1.2000e-004**	**2.4000e-004**	**1.0000e-005**	**1.2000e-004**	**1.3000e-004**	**0.0000**	**0.4458**	**0.4458**	**1.4000e-004**	**0.0000**	**0.4492**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.2800e-003	2.2800e-003	0.0000	0.0000	2.2800e-003
Total	**0.0000**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.2800e-003**	**2.2800e-003**	**0.0000**	**0.0000**	**2.2800e-003**

3.4 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.5000e-004	0.0000	7.5000e-004	4.1000e-004	0.0000	4.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0600e-003	9.4300e-003	7.7800e-003	1.0000e-005		6.2000e-004	6.2000e-004		5.9000e-004	5.9000e-004	0.0000	1.0608	1.0608	2.0000e-004	0.0000	1.0659
Total	**1.0600e-003**	**9.4300e-003**	**7.7800e-003**	**1.0000e-005**	**7.5000e-004**	**6.2000e-004**	**1.3700e-003**	**4.1000e-004**	**5.9000e-004**	**1.0000e-003**	**0.0000**	**1.0608**	**1.0608**	**2.0000e-004**	**0.0000**	**1.0659**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	1.0000e-005	1.2000e-004	0.0000	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	9.1100e-003	9.1100e-003	0.0000	0.0000	9.1300e-003
Total	**2.0000e-005**	**1.0000e-005**	**1.2000e-004**	**0.0000**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**9.1100e-003**	**9.1100e-003**	**0.0000**	**0.0000**	**9.1300e-003**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.4000e-004	0.0000	3.4000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.8000e-004	0.0104	7.9400e-003	1.0000e-005		4.0000e-004	4.0000e-004		4.0000e-004	4.0000e-004	0.0000	1.0608	1.0608	2.0000e-004	0.0000	1.0659
Total	**4.8000e-004**	**0.0104**	**7.9400e-003**	**1.0000e-005**	**3.4000e-004**	**4.0000e-004**	**7.4000e-004**	**1.9000e-004**	**4.0000e-004**	**5.9000e-004**	**0.0000**	**1.0608**	**1.0608**	**2.0000e-004**	**0.0000**	**1.0659**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-005	1.0000e-005	1.2000e-004	0.0000	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	9.1100e-003	9.1100e-003	0.0000	0.0000	9.1300e-003
Total	**2.0000e-005**	**1.0000e-005**	**1.2000e-004**	**0.0000**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**9.1100e-003**	**9.1100e-003**	**0.0000**	**0.0000**	**9.1300e-003**

3.5 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0542	0.5516	0.3876	5.7000e-004		0.0354	0.0354		0.0326	0.0326	0.0000	52.0058	52.0058	0.0162	0.0000	52.4106
Total	**0.0542**	**0.5516**	**0.3876**	**5.7000e-004**		**0.0354**	**0.0354**		**0.0326**	**0.0326**	**0.0000**	**52.0058**	**52.0058**	**0.0162**	**0.0000**	**52.4106**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	5.0000e-005	6.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0456	0.0456	0.0000	0.0000	0.0456
Total	**1.0000e-004**	**5.0000e-005**	**6.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0456**	**0.0456**	**0.0000**	**0.0000**	**0.0456**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0235	0.5351	0.3981	5.7000e-004		0.0193	0.0193		0.0193	0.0193	0.0000	52.0058	52.0058	0.0162	0.0000	52.4105
Total	**0.0235**	**0.5351**	**0.3981**	**5.7000e-004**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**52.0058**	**52.0058**	**0.0162**	**0.0000**	**52.4105**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	5.0000e-005	6.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0456	0.0456	0.0000	0.0000	0.0456
Total	**1.0000e-004**	**5.0000e-005**	**6.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0456**	**0.0456**	**0.0000**	**0.0000**	**0.0456**

3.6 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.3000e-003	0.0219	0.0181	3.0000e-005		1.2800e-003	1.2800e-003		1.1800e-003	1.1800e-003	0.0000	2.4270	2.4270	6.8000e-004	0.0000	2.4441
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.3000e-003**	**0.0219**	**0.0181**	**3.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.1800e-003**	**1.1800e-003**	**0.0000**	**2.4270**	**2.4270**	**6.8000e-004**	**0.0000**	**2.4441**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	5.5000e-004	1.0000e-004	0.0000	0.0000	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0563	0.0563	1.0000e-005	0.0000	0.0565
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	4.0000e-005	5.5000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0410	0.0410	0.0000	0.0000	0.0411
Total	**1.0000e-004**	**5.9000e-004**	**6.5000e-004**	**0.0000**	**3.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0973**	**0.0973**	**1.0000e-005**	**0.0000**	**0.0976**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.9000e-004	0.0209	0.0173	3.0000e-005		7.6000e-004	7.6000e-004		7.6000e-004	7.6000e-004	0.0000	2.4270	2.4270	6.8000e-004	0.0000	2.4441
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.9000e-004**	**0.0209**	**0.0173**	**3.0000e-005**		**7.6000e-004**	**7.6000e-004**		**7.6000e-004**	**7.6000e-004**	**0.0000**	**2.4270**	**2.4270**	**6.8000e-004**	**0.0000**	**2.4441**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	5.5000e-004	1.0000e-004	0.0000	0.0000	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0563	0.0563	1.0000e-005	0.0000	0.0565
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	4.0000e-005	5.5000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0410	0.0410	0.0000	0.0000	0.0411
Total	**1.0000e-004**	**5.9000e-004**	**6.5000e-004**	**0.0000**	**3.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0973**	**0.0973**	**1.0000e-005**	**0.0000**	**0.0976**

3.7 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0118					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.5000e-004	5.0100e-003	4.6400e-003	1.0000e-005		3.8000e-004	3.8000e-004		3.8000e-004	3.8000e-004	0.0000	0.6383	0.6383	6.0000e-005	0.0000	0.6398
Total	**0.0125**	**5.0100e-003**	**4.6400e-003**	**1.0000e-005**		**3.8000e-004**	**3.8000e-004**		**3.8000e-004**	**3.8000e-004**	**0.0000**	**0.6383**	**0.6383**	**6.0000e-005**	**0.0000**	**0.6398**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0118					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.8000e-004	5.8800e-003	4.5800e-003	1.0000e-005		2.4000e-004	2.4000e-004		2.4000e-004	2.4000e-004	0.0000	0.6383	0.6383	6.0000e-005	0.0000	0.6398
Total	**0.0121**	**5.8800e-003**	**4.5800e-003**	**1.0000e-005**		**2.4000e-004**	**2.4000e-004**		**2.4000e-004**	**2.4000e-004**	**0.0000**	**0.6383**	**0.6383**	**6.0000e-005**	**0.0000**	**0.6398**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6412	1.9485	3.2661	1.8700e-003	0.0000	3.8200e-003	3.8200e-003	0.0000	3.5600e-003	3.5600e-003	0.0000	171.7718	171.7718	0.0392	0.0000	172.7515
Unmitigated	0.6412	1.9485	3.2661	1.8700e-003	0.0000	3.8200e-003	3.8200e-003	0.0000	3.5600e-003	3.5600e-003	0.0000	171.7718	171.7718	0.0392	0.0000	172.7515

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Gasoline/Service Station	2,696.96	2,696.96	2696.96		
Total	2,696.96	2,696.96	2,696.96		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-...	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Gasoline/Service Station	1.00	1.00	1.00	2.00	79.00	19.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Gasoline/Service Station	0.568926	0.041373	0.172015	0.112977	0.030659	0.007080	0.028564	0.025868	0.003029	0.001930	0.005517	0.000872	0.001190

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3.7527	3.7527	2.5000e-004	5.0000e-005	3.7744
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3.7527	3.7527	2.5000e-004	5.0000e-005	3.7744
NaturalGas Mitigated	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1919	3.1919	6.0000e-005	6.0000e-005	3.2108
NaturalGas Unmitigated	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1919	3.1919	6.0000e-005	6.0000e-005	3.2108

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					

Gasoline/Service Station	59813	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1919	3.1919	6.0000e-005	6.0000e-005	3.2108
Total		**3.2000e-004**	**2.9300e-003**	**2.4600e-003**	**2.0000e-005**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**3.1919**	**3.1919**	**6.0000e-005**	**6.0000e-005**	**3.2108**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Gasoline/Service Station	59813	3.2000e-004	2.9300e-003	2.4600e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1919	3.1919	6.0000e-005	6.0000e-005	3.2108
Total		**3.2000e-004**	**2.9300e-003**	**2.4600e-003**	**2.0000e-005**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**3.1919**	**3.1919**	**6.0000e-005**	**6.0000e-005**	**3.2108**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Gasoline/Service Station	19019.1	3.7527	2.5000e-004	5.0000e-005	3.7744
Total		**3.7527**	**2.5000e-004**	**5.0000e-005**	**3.7744**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Gasoline/Service Station	19019.1	3.7527	2.5000e-004	5.0000e-005	3.7744
Total		**3.7527**	**2.5000e-004**	**5.0000e-005**	**3.7744**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Mitigated	0.0100	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Unmitigated	0.0100	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Total	**0.0100**	**0.0000**	**1.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.9000e-004**	**2.9000e-004**	**0.0000**	**0.0000**	**3.1000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Total	**0.0100**	**0.0000**	**1.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.9000e-004**	**2.9000e-004**	**0.0000**	**0.0000**	**3.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.3843	6.9500e-003	1.7000e-004	0.6079
Unmitigated	0.3843	6.9500e-003	1.7000e-004	0.6079

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Gasoline/Service Station	0.21251 / 0.130248	0.3843	6.9500e-003	1.7000e-004	0.6079
Total		**0.3843**	**6.9500e-003**	**1.7000e-004**	**0.6079**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Gasoline/Service Station	0.21251 / 0.130248	0.3843	6.9500e-003	1.7000e-004	0.6079
Total		**0.3843**	**6.9500e-003**	**1.7000e-004**	**0.6079**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	1.7498	0.1034	0.0000	4.3350
Unmitigated	1.7498	0.1034	0.0000	4.3350

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Gasoline/Service Station	8.62	1.7498	0.1034	0.0000	4.3350
Total		**1.7498**	**0.1034**	**0.0000**	**4.3350**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Gasoline/Service Station	8.62	1.7498	0.1034	0.0000	4.3350
Total		**1.7498**	**0.1034**	**0.0000**	**4.3350**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Construction Health Risk Information

Safeway, Petaluma

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2018	Construction	0.0410	CON_DPM	82.0	0.02496	3.15E-03	2,956	1.06E-06

Construction Hours

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2018	Construction	CON_FUG	0.0015	3.0	0.00091	1.14E-04	2,956	3.87E-08

Construction Hours

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

Safeway - Petaluma - Construction Impacts
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information					
							Modeled					
Exposure Year	**Exposure Duration (years)**	**Age**	**DPM Conc (ug/m3) Year**	**DPM Conc (ug/m3) Annual**	**Age Sensitivity Factor**	**Infant/Child Cancer Risk (per million)**	**DPM Conc (ug/m3) Year**	**DPM Conc (ug/m3) Annual**	**Age Sensitivity Factor**	**Adult Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*		-	10	-		-	-	-		
1	1	0 - 1	2018	0.0148	10	2.43	2018	0.0148	1	0.04	0.0006	0.015
2	1	1 - 2		0.0000	10	0.00		0.0000	1	0.00		
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00		
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00		
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00		
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00		
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00		
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**2.4**				**0.04**		

* Third trimester of pregnancy

Safeway - Petaluma - Construction Impacts
Maximum DPM Cancer Risk Calculations From Construction
Daycare/School Child Receptor Locations

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information					
				DPM Conc (ug/m3)		Infant/Child Cancer Risk		Modeled DPM Conc (ug/m3)		Adult Cancer Risk		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Age Sensitivity Factor**	**(per million)**	**Year**	**Annual**	**Age Sensitivity Factor**	**(per million)**	**Fugitive PM2.5**	**Total PM2.5**
2018	1	5 - 6	2018	0.2022	3	5.77	2018	0.18865	1	0.54	0.0107	0.199
Total Increased Cancer Risk						**5.77**				**0.54**		

* Third trimester of pregnancy

Attachment 2: Operational Emissions Modeling, Dispersion Modeling Information, and Health Risk Calculations

Vehicle Idle Emissions From Queing at Gas Station

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Sonoma
Calendar Year: 2019
Season: Annual
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Area	CalYr	Season	Veh	Fuel	Speed	VMT	Assumed % of Vehicles	ROG_RUNEX	TOG_RUNEX	NOX_RUNEX	CO2_RUNEX(Pavley I+LCFS)	PM10_RUNEX	PM2_5_RUNE X
Sonoma	2019	Annual	LDA	GAS	5		0.58	0.0949	0.1383	0.1376	922.5062	0.0118	0.0109
Sonoma	2019	Annual	LDA	DSL	5		0.01	0.2849	0.3243	0.2861	721.2901	0.0918	0.0878
Sonoma	2019	Annual	LDT1	GAS	5		0.05	0.2184	0.3153	0.3473	1098.2722	0.0172	0.0158
Sonoma	2019	Annual	LDT1	DSL	5		0	0.9391	1.0691	0.8146	957.4096	0.6896	0.6598
Sonoma	2019	Annual	LDT2	GAS	5		0.18	0.1247	0.1810	0.2264	1240.5727	0.0115	0.0106
Sonoma	2019	Annual	LDT2	DSL	5		0	0.2691	0.3063	0.1883	882.2919	0.0296	0.0283
Sonoma	2019	Annual	MDV	GAS	5		0.12	0.2850	0.3994	0.4497	1665.3488	0.0122	0.0112
Sonoma	2019	Annual	MDV	DSL	5		0	0.2141	0.2438	0.1690	1094.7699	0.0240	0.0229
Sonoma	2019	Annual	MCY	GAS	5		0.01	13.7447	16.6018	1.5620	543.2175	0.0104	0.0097
Sonoma	2019	Annual	LHDT1	GAS	5		0.02	0.49548	0.71731	0.85168	1400.99808	0.01178	0.01083
Sonoma	2019	Annual	LHDT1	DSL	5		0.02	0.83210	0.94729	3.81068	1290.25429	0.13931	0.13328
Sonoma	2019	Annual	LHDT2	GAS	5		0	0.19449	0.28380	0.48389	1482.32785	0.00715	0.00657
Sonoma	2019	Annual	LHDT2	DSL	5		0.01	0.77184	0.87869	2.66373	1345.06716	0.09704	0.09284
Sonoma	2019	Annual					100%						
								0.297	0.388	0.330	1093.033	0.016	0.015
		IdleVehicle Emission Rate =						1.486	1.939	1.651	5465.165	0.081	0.076
								gram/hr		*based on 5 mph emission rate for 1 hour (5 miles)*			
		Assume 12 vehicles constantly idling per peak demand hour =						17.83	23.27	19.82	65581.97	0.98	0.91
								gram/hr					
		Assume peak demand hour is 10% of daily emission rate =						178.29	232.68	198.16	655819.75	9.77	9.09
								gram/day					
								0.39	0.51	0.44	1444.54	0.022	0.020
								lbs/day					
								0.07	0.09	0.08	239.16	0.004	0.004
								tons/year (metric tons CO_2e)					

Vehicle Idle Emissions From Queing at Gas Station

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Sonoma
Calendar Year: 2019
Season: Annual
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Area	CalYr	Season	Veh	Fuel	Speed	VMT	Assumed % of Vehicles	TOG Evap RL
Sonoma	2019	Annual	LDA	GAS	5		0.58	0.048473207
Sonoma	2019	Annual	LDA	DSL	5		0.01	0
Sonoma	2019	Annual	LDT1	GAS	5		0.05	0.313470559
Sonoma	2019	Annual	LDT1	DSL	5		0	0
Sonoma	2019	Annual	LDT2	GAS	5		0.18	0.101229584
Sonoma	2019	Annual	LDT2	DSL	5		0	0
Sonoma	2019	Annual	MDV	GAS	5		0.12	0.161045132
Sonoma	2019	Annual	MDV	DSL	5		0	0
Sonoma	2019	Annual	MCY	GAS	5		0.01	1.031992068
Sonoma	2019	Annual	LHDT1	GAS	5		0.02	0.928532625
Sonoma	2019	Annual	LHDT1	DSL	5		0.02	0
Sonoma	2019	Annual	LHDT2	GAS	5		0	0.390995228
Sonoma	2019	Annual	LHDT2	DSL	5		0.01	0
			Average 5 mph Emission Rate				100%	0.110
			IdleVehicle Emission Rate =					0.551
								gram/hr
			Assume 12 vehicles constantly idling per peak demand hour =					6.61
								gram/hr
			Assume peak demand hour is 10% of daily emission rate =					66.14
								gram/day
								0.15
								lbs/day

Source of idle emissions (from CARB, see *http://www.arb.ca.gov/msei/modeling.htm*)

Idling Emission Rates for EMFAC2011-LDV Vehicle Categories

Step 1 – Extract 5 MPH Running emission rates from Emission Rate Web Database at http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/rateSelectionPage_1.jsp.

Step 2 – Calculate the by model year LDV idling emission rates by multiplying the 5 MPH Running emission rates by 5 (g/mile X mile/hr = g/hr).

Safeway, Petaluma - Operational Emissions - Fuel Delivery Truck DPM Emissions 2019

Truck Route	Line Source Name	Truck Delivery	Vehicle Type[1]	Daily Number Round Trucks	Total Annual Trips[2]	PM2.5 Emission Factor[3] (g/mi)	Operation[4] Schedule (hrs/day)	Travel Distance (feet)	Travel Distance (miles)	Annual DPM Emissions (lb/year)	Average Hourly Emissions (lb/hr)
Gas truck Route	TRUCKS	Gas Station	HHDT	2	730	0.03221	24	3132	0.59	0.031	3.51E-06

[1] HHDT = heavy heavy duty truck

[2] Annual trips - Based on 365 days of operation

[3] Emission factor from EMFAC2014 for Sonoma County for operation in 2019 and assumes all trucks are diesel.

[4] Gas truck delivery hours assumed to be 24 hours per day, 365 days per year

Safeway, Petaluma - Operational Emissions - Customer Vehicle Travel

Route	Line Source Name	Vehicle Type[1]	Annual Trips[2]	Emissions Factors[3] Total PM2.5 (g/VMT)	TOG Exhaust (g/VMT)	TOG Start Exhaust (g/trip)	TOG Run Loss (g/VMT)	Operation[4] Schedule (hrs/day)	Round Trip Travel Distance (feet)	Round Trip Travel Distance (miles)	Annual Emissions (lb/year) Total PM2.5	TOG Exhaust	TOG[5] Starting Exhaust	TOG Running Loss	Average Hourly Emissions (lb/hr)[4] Total PM2.5	TOG Exhaust	TOG Starting Exhaust	TOG Running Loss
West Route	West	Default	984,405	0.0217	0.0467	0.2632	0.1196	19	2695	0.51	12	26	286	66	1.73E-03	3.73E-03	4.12E-02	9.55E-03
East Route	East	Default	984,405	0.0217	0.0467	0.2632	0.1196	19	1876	0.36	8	18	286	46	1.21E-03	2.60E-03	4.12E-02	6.65E-03

[1] Default EMFAC2014 vehicle mix for LDA, LDT, and MDT

[2] Annual one-way trips

[3] Emission factors developed from EMFAC2014 for Sonoma County

[4] Station operation assumed to be from 5 am to 12 am, 365 days per year

[5] Starting emissions occur at gas station, assumed to occur once per round trip

BAAQMD Permit Evaluation

EVALUATION REPORT

Safeway Fuel Center #3011
Facility ID#200026
Application #405215
S. McDowell Blvd & Maria Drive, Petaluma, CA 94954

BACKGROUND

Safeway Inc. has submitted this application to construct a new gasoline dispensing facility – Safeway Fuel Center #3011

This station is within 1,000 feet of McDowell Elementary School and the project increases Precursor Organic Compound (POC) and Benzene emissions. Thus, the projects trigger the Public Notice requirements under California Health & Safety Code and District's Regulation 2-1-412.

The facility will be equipped with two (2) 20,000 gallon underground storage tanks, eight (8) triple-product gasoline nozzles Phase I CNI EVR, Phase II VST Balance with Veeder Root Vapor Polisher and Veeder-Root ISD EVR.

A Health Risk Screening Analysis (HRSA) was performed for this application indicates that a throughput of 25.71 million-gallons per year is acceptable per District's Risk Management Policy. Accordingly, this station will be conditioned to 25.71 million gallons per year.

Before this project can be approved, a 30-day public comment period will be held. Notice describing the project and announcing the public comment period will be mailed to the parents of students attending the above schools and residential and business neighbors within 1,000 feet of the station. The cost of preparing and distributing this notice will be paid by the applicant.

EMISSION CALCULATIONS

Emission factors are taken from the Gasoline Service Station Industry-wide Risk Assessment Guidelines developed by the California Air Pollution Officers Association's (CAPCOA) Toxics Committee. Emissions of Precursor Organic Compound (POC) include emissions from loading, breathing, refueling and spillage. The annual gasoline throughput of 25.71 million gal per year is based on the results of the Air Toxics Risk Screening.

Table 1 - Emissions Calculation

Pollutant	Emissions Factors (lb/thousand gallon)	Emissions (lb/day)	Emissions (lb/year)	Emissions (ton/year)
POC	0.670	47.19	17,225.7	8.613
Benzene	0.00369	0.26	94.87	0.047

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The proposed annual throughput emits more than 10 pounds of VOC in a single day. Thus the Best Available Control Technology (BACT) requirement of Regulation 2-2-301 is triggered.

BACT for Gasoline Dispensing Facilities (GDFs) is considered the use of CARB-certified Phase-I and Phase-II vapor recovery equipment.

Safeway Fuel Center #3011 will meet the requirement by using CNI EVR Phase I equipment and VST Balance EVR Phase II equipment with the Veeder-Root Vapor Polisher and Veeder-Root ISD controls. These two systems are certified by CARB under Executive Orders VR-104 and VR-204 respectively.

BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS (TBACT)

The expected increased health risk from this project exceeds 1 per million, triggering the use of TBACT equipment. TBACT for GDFs is considered the use of CARB-certified Phase-I and Phase-II vapor recovery equipment.

Safeway Fuel Center #3011 will meet this through the use of CNI EVR Phase I equipment and VST Balance EVR Phase II equipment with the Veeder-Root Vapor Polisher and Veeder-Root ISD controls. The two systems are certified by CARB under Executive Orders VR-104 and VR-204 respectively.

HEALTH RISK SCREENING ANALYSIS (HRSA)

An HRSA was required since the increased benzene emissions exceed the toxic air contaminant risk triggering level specified in Regulation 2-5 table 2-5-1. For a GDF that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. The facility meets the risk standards with 25.71 million gallons of annual throughput.

PUBLIC NOTIFICATION

This station is within 1,000 feet of McDowell Elementary School and the project increases emissions. Thus, the projects trigger the Public Notice requirements under California Health & Safety Code and District's Regulation 2-1-412. Before this project can be approved, a 30-day public comment period will be held. Notice describing the project and announcing the public comment period will be mailed to the parents of students attending the above schools and people living within 1,000 feet of the station. The cost of preparing and distributing this notice will be paid by the applicant.

COMPLIANCE

The facility shall comply with the District's Regulation 8-7-301 and 302 (Phase I and Phase II) and CARB Executive Orders VR-104 and VR-204. The facility is required to perform source test on the Phase I and Phase II device in accordance to the CARB Executive Orders.

Offsets, Regulation 2-2-302: Because the total facility emissions will be less than 15 tons per year, the facility is not required to provide offsets.

California Environmental Quality ACT (CEQA), Regulation 2-1-311: This project is considered to be ministerial under Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.and therefore is not discretionary as defined by CEQA.

RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the proposed source will be located within 1000 feet of a school which triggers the public notification requirements of District Regulation 2-1-412.6. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct for the following facility:

S-1 Safeway Fuel Center #3011, Gasoline Dispensing Facility, 25.71 MM

_____

Scott Owen
Supervising Air Quality Engineer
Engineering Division

SAO:JW:jw

Safeway, Petaluma - Operational Emissions - Gas Station Benzene Emissions

Source	Annual Gasoline Throughput (10^3 gallons/year)	Annual ROG Emissions (lb/year)	Benzene Emission Factor (lb/10^3 Gallon)	Operation[2] Schedule (hrs/day)	Benzene Emissions: Annual Average (lb/year)	Benzene Emissions: Average Hourly (lb/hr)
16-Pump Fuel Station	8,500	5,695	0.00369	19	31.4	0.00452

Notes:

1. BAAQMD 2013. Authority to Construct for Permit Application No. 405215 at S. McDowell Blvd & Maria Drive, Petaluma, CA 94954. Dated October 10, 2013.
2. Daily operation hours assumed to be 5:00 AM to 12:00 AM, 365 days per year

Gas Station Modeling Emissions and Volume Source Parameters

Emission Source	Percent of[1] Total Emissions	Total Average Hourly Emissions (lb/hr)	Number of Volume Sources	Emissions per Volume (lb/hr)	Volume Source Dimensions (meters): Length	Width	Height	Volume Source[1] Release Height (meters)
Refueling	67%	0.0030	4	0.00076	13.0	13	4	1
Spillage	33%	0.0015	4	0.00037	13	13	4	0

Notes:

1. CAPCOA Air Toxics "Hot Spots" Program, Gasoline Service Station Industrywide Risk Assessment Guidelines, November 1997.

Safeway, Petaluma - Operational Emissions - Gas Station Customer TOG and PM2.5 Emissions

Source	Annual Vehicles (vehicles/year)	Operation Schedule (hrs/day)	Annual Emissions (lb/year): PM2.5 Idle Exhaust	TOG Idle Exhaust	TOG Starting Exhaust	TOG Running Loss	Total TOG	Average Hourly Emissions (lb/hour): PM2.5 Idle Exhaust	TOG Idle Exhaust	TOG Starting Exhaust	TOG Running Loss
Customer Vehicles	492,203	19	7.30	186.15	285.61	54.75	526.51	0.0011	0.0268	0.0412	0.0079

Notes:

1. Daily operation hours assumed to be 5:00 AM to 12:00 AM, 365 days per year

Gas Station Modeling Emissions and Volume Source Parameters

Emission Source	Average Hourly Emissions (lb/hr)	Number of Volume Sources	Emissions per Volume (lb/hr)	Volume Source Dimensions (meters): Length	Width	Height	Volume Source Release Ht (meters)
Idle - PM2.5	0.0011	1	0.00105	20	20	2	1
Idle - TOG Exhaust	0.0268	1	0.02684	20	20	2	1
Idle - TOG Running Loss	0.0079	1	0.00789	20	20	2	1
Statting - TOG Exhaust	0.0412	4	0.01030	13	13	4	1

Safeway, Petaluma
Health Risk Impact Summary

Maximum Cancer Risks

	Maximum Cancer Risks (per million)			
Sensitive Receptor Type	**DPM Trucks**	**Benzene GDF**	**TOG Total**	**Total Operational Cancer Risk**
Off-Site Residential (30-year exposure)	0.02	1.35	1.22	2.6
Student (9-year exposure)	0.01	0.39	0.28	0.7

Maximum Non-Cancer Health Effects

	Maximum Chronic Hazard Index			
Sensitive Receptor Type	**DPM Trucks**	**Benzene GDF**	**TOG Total**	**Total Hazard Index**
Off-Site Residential (30-year exposure)	6.00E-06	0.007	1.87E-03	0.009
Student (9-year exposure)	1.60E-05	0.012	2.06E-03	0.014
	Maximum Acute Hazard Index			
Sensitive Receptor Type	**DPM Trucks**	**Benzene GDF**	**TOG Total**	**Total Hazard Index**
Off-Site Residential (30-year exposure)	-	0.076	0.013	0.090
Student (9-year exposure)	-	0.090	0.015	0.105
	Maximum Annual PM2.5 ($\mu g/m^3$)			
Sensitive Receptor Type	**PM2.5 Trucks**	**PM2.5 Customer Travel and Idling**		**Total PM2.5**
Off-Site Residential (30-year exposure)	3.00E-05	0.018		0.018
Student (9-year exposure)	8.00E-05	0.013		0.013

Safeway, Petaluma
ISCST3 Risk Modeling Parameters and Maximum TAC Concentrations
Off-Site Residential Receptors
Receptor at Location of Maximum Cancer Risk from Project Operation

Receptor Information

Number of Receptors	63
Receptor Height =	1.5 meters
Receptor distances =	variable - at nearby residences

Meteorological Conditions

BAAQMD - Petaluma Airport	1990-1994
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

MEI Maximum Concentrations

TAC	Concentration ($\mu g/m^3$) Project Operation	
	Max Period Average	Max 1-hour Average
DPM	0.000030	-
Vehicle TOG Exhaust	0.281150	28.01
Vehicle TOG Evaporative	0.105260	3.67
Benzene	0.019920	2.06
PM2.5		
Delivery Trucks	0.00003	-
Customer Vehicles	0.01821	-
PM2.5 Total	0.01824	

Non-Cancer Health Effects

TAC	Project Operation Hazard Index	
	Acute	Chronic
DPM	-	6.00E-06
Vehicle TOG Exhaust	8.53E-03	9.90E-04
Vehicle TOG Evaporative	4.82E-03	8.77E-04
Benzene	7.63E-02	6.64E-03
Total	**0.090**	**0.0085**

Safeway, Petaluma
Maximum Cancer & Non-Cancer Health Impacts
at Location of Maximum Cancer Risk from Project Operation
30-Year Residential Exposure

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - <2**	**2 - <16**	**16 - 70**
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Cancer Potency Factors and Reference Exposure Levels (REL)

		REL ($\mu g/m^3$)	
TAC	**CPF $(mg/kg\text{-}day)^{-1}$**	**Acute (1-hour)**	**Chronic (ann ave)**
DPM	1.10E+00	-	5
Vehicle TOG Exhaust	6.28E-03	3283	284
Vehicle TOG Evaporative	3.70E-04	762	120
Benzene	1.00E-01	27	3

Project Operation Cancer Risk - Maximum Project Operation Impact Residential Receptor Location

					Maximum - Exposure Information Annual Conc (ug/m3)				Cancer Risk (per million)				
Exposure Year	**Year**	**Exposure Duration (years)**	**Age**	**Age Sensitivity Factor**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**Benzene**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**Benzene**	**Total**
0	2019	0.25	-0.25 - 0*	10	0.00003	0.281150	0.10526	0.01992	0.0004	0.0218	0.0005	0.0246	0.05
1	2019	1	1	10	0.00003	0.281150	0.10526	0.01992	0.0049	0.2637	0.0058	0.2974	0.57
2	2020	1	2	10	0.00003	0.281150	0.10526	0.01992	0.0049	0.2637	0.0058	0.2974	0.57
3	2021	1	3	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
4	2022	1	4	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
5	2023	1	5	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
6	2024	1	6	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
7	2025	1	7	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
8	2026	1	8	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
9	2027	1	9	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
10	2028	1	10	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
11	2029	1	11	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
12	2030	1	12	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
13	2031	1	13	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
14	2032	1	14	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
15	2033	1	15	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
16	2034	1	16	3	0.00003	0.281150	0.10526	0.01992	0.0008	0.0415	0.0009	0.0468	0.09
17	2035	1	17	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
18	2036	1	18	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
19	2037	1	19	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
20	2038	1	20	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
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21	2039	1	21	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
22	2040	1	22	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
23	2041	1	23	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
24	2042	1	24	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
25	2043	1	25	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
26	2044	1	26	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
27	2045	1	27	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
28	2046	1	28	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
29	2047	1	29	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
30	2048	1	30	1	0.00003	0.281150	0.10526	0.01992	0.0001	0.0046	0.0001	0.0052	0.01
Total Increased Cancer Risk									**0.02**	**1.19**	**0.03**	**1.35**	**2.6**

* Third trimester of pregnancy

Safeway, Petaluma
ISCST3 Risk Modeling Parameters and Maximum TAC Concentrations
Off-Site School/Daycare Receptors
Receptor at Location of Maximum Cancer Risk from Project Operation

Receptor Information

Number of Receptors	80
Receptor Height =	1.0 meters
Receptor distances =	variable - within daycare and school areas

Meteorological Conditions

BAAQMD - Petaluma Airport	1990-1994
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

MEI Maximum Concentrations

TAC	Concentration ($\mu g/m^3$) Project Operation	
	Max Period Average	**Max 1-hour Average**
DPM	0.000080	-
Vehicle TOG Exhaust	0.403630	24.93
Vehicle TOG Evaporative	0.077120	5.46
Benzene	0.035890	2.44
PM2.5		
Delivery Trucks	0.00008	-
Customer Vehicles	0.0132	-
PM2.5 Total	0.01328	

Non-Cancer Health Effects

TAC	Project Operation Hazard Index	
	Acute	**Chronic**
DPM	-	1.60E-05
Vehicle TOG Exhaust	7.59E-03	1.42E-03
Vehicle TOG Evaporative	7.17E-03	6.43E-04
Benzene	9.02E-02	1.20E-02
Total	**0.105**	**0.014**

Safeway, Petaluma
Maximum Cancer & Non-Cancer Health Impacts
at Location of Maximum Cancer Risk from Project Operation
9-Year School Child Exposure

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - <2**	**2 - <16 (school child)**	**16 - 70**
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	180	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Cancer Potency Factors and Reference Exposure Levels (REL)

		REL ($\mu g/m^3$)	
TAC	**CPF $(mg/kg\text{-}day)^{-1}$**	**Acute (1-hour)**	**Chronic (ann ave)**
DPM	1.10E+00	-	5
Vehicle TOG Exhaust	6.28E-03	3283	284
Vehicle TOG Evaporative	3.70E-04	762	120
Benzene	1.00E-01	27	3

Project Operation Cancer Risk - Maximum Project Operation Impact School Child Receptor Location

					Maximum - Exposure Information Annual Conc (ug/m3)				Cancer Risk (per million)				
Exposure Year	**Year**	**Exposure Duration (years)**	**Age**	**Age Sensitivity Factor**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**Benzene**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**Benzene**	**Total**
1	2019	1	5	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
2	2020	1	6	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
3	2021	1	7	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
4	2022	1	8	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
5	2023	1	9	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
6	2024	1	10	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
7	2025	1	11	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
8	2026	1	12	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
9	2027	1	13	3	0.00008	0.403630	0.07712	0.03589	0.0011	0.0306	0.0003	0.0434	0.08
Total Increased Cancer Risk									**0.01**	**0.28**	**0.003**	**0.39**	**0.7**

* Third trimester of pregnancy

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Sonoma
Roadway Direction	North-South
Side of the Roadway	West
Distance from Roadway	30 feet
Annual Average Daily Traffic (ADT)	20,000

Results

Sonoma County

NORTH-SOUTH DIRECTIONAL ROADWAY

PM2.5 annual average

0.274 ($\mu g/m^3$)

Cancer Risk

10.18 (per million)

S. Mc Dowell (highest of N-S and E-W)

Data for Sonoma County based on meteorological data collected from Santa Rosa in 2005

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

6.99

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

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When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Sonoma
Roadway Direction	North-South
Side of the Roadway	East
Distance from Roadway	40 feet
Annual Average Daily Traffic (ADT)	20,000

Results

Sonoma County

NORTH-SOUTH DIRECTIONAL ROADWAY

PM2.5 annual average

0.330 ($\mu g/m^3$)

Cancer Risk

12.84 (per million)

S. Mc Dowell (highest of N-S and E-W)

Data for Sonoma County based on meteorological data collected from Santa Rosa in 2005

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

8.82

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Link 738 (6ft elevation)

PM2.5	Risk	Chron.HI		Acute.HI
10 ft N	0.715	68.516	0.076	0.069
25 ft N	0.558	53.508	0.059	0.058
50 ft N	0.421	40.449	0.044	0.047
75 ft N	0.345	33.123	0.036	0.041
100 ft N	0.294	28.310	0.031	0.037
200 ft N	0.191	18.388	0.020	0.027
300 ft N	0.143	13.843	0.015	0.021
400 ft N	0.115	11.151	0.012	0.017
500 ft N	0.097	9.343	0.010	0.013
750 ft N	0.068	6.625	0.007	0.009
1000 ft N	0.052	5.074	0.005	0.008