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,

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

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. 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 ISCST3 dispersion model. 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. 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 the cancer potency factor derived by the Office of Environmental Health Hazard Assessment. In other words, it represents the increased cancer risk associated with continuous exposure to concentration of toxic air contaminants in the air over a 70-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.

Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in the air was performed by comparing modeled concentrations in air with the RELs. A REL is a concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL. This ratio is referred to as a hazard quotient. The cancer potency factors, unit risk values and RELs used to characterize health risks associated with modeled concentrations in the air were obtained based on information from the BAAQMD and the California Office of Health Hazard Assessment (OEHHA).

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[2]. 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 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

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

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*[3]. 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.
- 0.8 $\mu g/m^3$ 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 2013.2.2 (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 provided site-specific construction activity schedule. Construction of the project is expected to occur over about a 6-month period assumed to all occur in 2014. 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.

[3] BAAQMD, 2011. *BAAQMD CEQA Air Quality Guidelines*. May.

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

CalEEMod emissions modeling incorporated the Best Management Practices listed above and included Tier 2 diesel construction for all equipment larger than 50 horsepower. The CalEEMod model provided total annual $PM_{2.5}$ 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 emissions of 0.0247 tons (50 pounds) in 2014. The on-road emissions are a result of haul truck travel during grading activities, worker travel, and vendor deliveries during building construction, with overall trip lengths of 0.5 miles to simulate travel on and near the site. The CalEEMod model output with emission calculations are provided in *Attachment 1*.

Dispersion Modeling

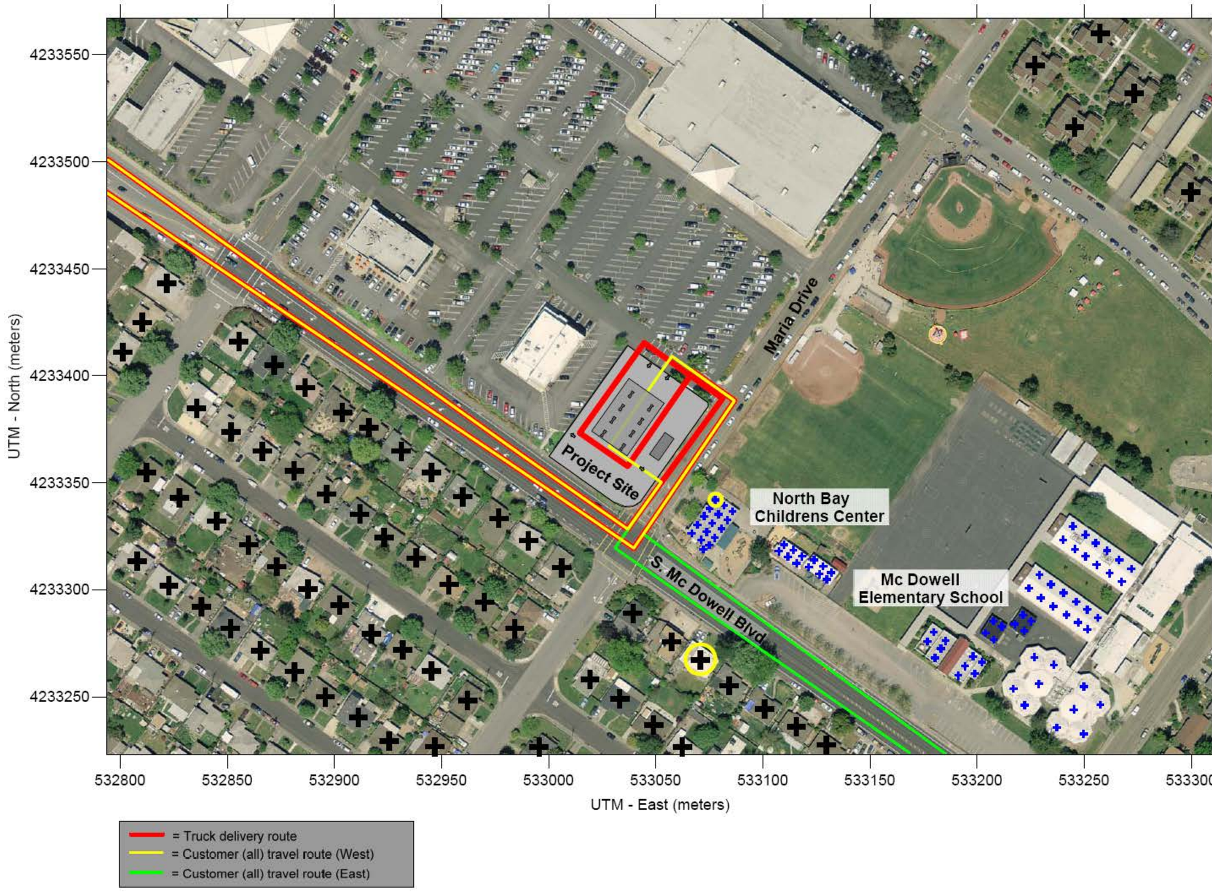
The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM at existing sensitive receptors in the vicinity of the project site. The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for DPM exhaust emissions and one for fugitive $PM_{2.5}$ 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. For each construction area, area sources were used to model exhaust emissions and fugitive dust ($PM_{2.5}$) emissions. 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 2014, 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 sensitive receptors at a height of 1.5 meters (5 feet).

Construction Cancer Risk and Hazards

The maximum-modeled annual DPM concentration occurred at the North Bay Childrens 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 a child exposure (3rd trimester through 2 years of age), student exposure (9 years) and for an adult exposure. Since the modeling was conducted under the conservative assumption that emissions occurred 365 days per year, the default BAAQMD exposure period of 350 days per year was used for children and adults. Table 1 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 3.2 in one million, the maximum residential child incremental cancer risk would be 0.8 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 0.13 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 $PM_{2.5}$.

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.

Table 1. Construction Period Community Risk Impacts

Receptor	Community Risk Impact		
	Excess Cancer Risk (per million)	Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)	Hazard Index
Residential – child	0.8	0.01	0.002
Residential - adult	<0.1	0.01	0.002
School - child	3.2	0.13	0.024
BAAQMD Threshold	*10.0*	*0.3*	*1.0*
Significant	*No*	*No*	*No*

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 0.122 $\mu g/m^3$, which is much lower than the REL. The Hazard Index (HI), which is the ratio of the annual DPM concentration to the REL, is 0.024. 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.

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., 70 years). The year 2015 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 2,605 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 EMFAC2011 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 San Francisco Bay Area fleet average as reported by EMFAC2011. BAAQMD has developed weighted toxicity values for tailpipe and evaporative losses that incorporates the individual toxicity of each compound that make up TOG[4]. 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 EMFAC2011 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. 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[5]. 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 TOG and $PM_{2.5}$ emissions is provided in *Attachment 2*.

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 EMFAC2011 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

[4] BAAQMD. 2012. Recommended Methods for Screening and Modeling Local Risks and Hazard. May. May.
[5] 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.

dual-sided triple-product gasoline nozzles (meeting current BAAQMD requirements)[6]. 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)[7]. 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[8]. BAAQMD reports emission rates for fueling stations of 0.00369 pounds of benzene per thousand gallons of fuel handled[9]. The District's permit evaluation is provided in *Attachment 2*.

Total benzene emissions were calculated at 36.7 pounds per year. 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. A*ttachment 2* includes emissions of fueling storage and transfer ROG emissions.

<u>Dispersion Modeling</u>

The U.S. EPA ISCST3 dispersion model was also used to predict concentrations of TOG, DPM 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, 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 feet) 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 fuel station emissions and queuing emissions were modeled as occurring 19 hours per day.

TOG, DPM and benzene concentrations were predicted at receptors near the project site at a height of 1.5 meters (5 feet). 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*.

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[6] Phase I CNI EVR, Phase II VST Balance with Veeder Root Vapor Polisher and Veeder-Root ISD EVR
[7] BAAQMD 2013. <u>Authority to Construct for Permit Application No. 405215 at S. McDowell Blvd & Maria Drive, Petaluma, CA 94954</u>. Dated October 10, 2013.
[8] 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.
[9] 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.

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 including nearly continuous exposures. Based on modeled TOG and DPM concentrations, cancer risks were calculated for a 70-year exposure assuming constant emissions at 2015 levels over the entire 70 year period for residences and a 9-year period for school children. A cancer risk adjustment factor of 1.7 was applied to residential exposures to account for age sensitivity. A cancer risk adjustment factor of 3 was applied to school children exposures. While residences were assumed to have almost continuous exposure over 70 years, school children were assumed to be present 10 hours per day, 5 days per week for 36 weeks, over 9 years.

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 is included in Table 2. Excess cancer risk associated with project construction and operation would be less than 5.5 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.

Table 2. 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 (70-year lifetime)			
Construction Impacts (2014)	0.8	0.01	0.002
Traffic (vehicle trips & idling)	0.9	0.03	0.012
Traffic (truck deliveries)	0.1	0.00	0.000
Benzene (from fuel evaporation)	1.2	0.00	0.002
Total Residential	**3.0**	**0.04**	**0.02**
School Child (9-year)			
Construction Impacts (2014)	3.2	0.13	0.024
Traffic (vehicle trips & idling)	1.4	0.09	0.013
Traffic (truck deliveries)	0.01	0.00	0.000
Benzene (from fuel evaporation)	0.85	0.00	0.003
Total School Child	**5.5**	**0.18**[1]	**0.04**
Significance Threshold (Project)	*10*	*0.3*	*1.0*
Cumulative Sources at MEI			
S. Mc Dowell Boulevard traffic[2]	5.9	0.17	<0.03
U.S. 101 at over 750 feet[3]	6.6	0.07	<0.01
Maximum Cumulative including Project	**<18.0**	**0.46**	**<0.08**
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 Analysis Tables for North-South Roadway with 20,000 ADT at 50 feet.
[3] Based on BAAQMD Google Earth Highway Screening Analysis Tool for U.S. 101 at 750 feet.

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 PM2.5 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

Safeway Gas Station in Petaluma

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	0.50	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**	2015
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated lot size

Construction Phase - Use default schedule

Off-road Equipment -

Off-road Equipment -

Demolition - Remove a 180 by 75 ft single story building

Trips and VMT -

Architectural Coating - Assume paints would meet BAAQMD Regs

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	150.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	150.00
tblLandUse	LotAcreage	0.05	0.50
tblProjectCharacteristics	OperationalYear	2014	2015

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					
2014	0.1061	0.8737	0.5202	7.2000e-004	9.5900e-003	0.0604	0.0700	1.9700e-003	0.0558	0.0578	0.0000	68.2627	68.2627	0.0185	0.0000	68.6517
Total	**0.1061**	**0.8737**	**0.5202**	**7.2000e-004**	**9.5900e-003**	**0.0604**	**0.0700**	**1.9700e-003**	**0.0558**	**0.0578**	**0.0000**	**68.2627**	**68.2627**	**0.0185**	**0.0000**	**68.6517**

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					
2014	0.1061	0.8737	0.5202	7.2000e-004	9.5900e-003	0.0604	0.0700	1.9700e-003	0.0558	0.0578	0.0000	68.2626	68.2626	0.0185	0.0000	68.6516
Total	**0.1061**	**0.8737**	**0.5202**	**7.2000e-004**	**9.5900e-003**	**0.0604**	**0.0700**	**1.9700e-003**	**0.0558**	**0.0578**	**0.0000**	**68.2626**	**68.2626**	**0.0185**	**0.0000**	**68.6516**

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

2.2 Overall Operational

<u>Unmitigated Operational</u>

	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	3.0000e-004
Energy	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	9.2377	9.2377	3.3000e-004	1.2000e-004	9.2806
Mobile	1.6143	1.6155	9.8908	8.8800e-003	0.5535	0.0177	0.5712	0.1486	0.0162	0.1647	0.0000	720.1958	720.1958	0.0484	0.0000	721.2122
Waste						0.0000	0.0000		0.0000	0.0000	1.7498	0.0000	1.7498	0.1034	0.0000	3.9214
Water						0.0000	0.0000		0.0000	0.0000	0.0674	0.4671	0.5346	6.9500e-003	1.7000e-004	0.7325
Total	**1.6246**	**1.6185**	**9.8935**	**8.9000e-003**	**0.5535**	**0.0179**	**0.5714**	**0.1486**	**0.0164**	**0.1650**	**1.8172**	**729.9009**	**731.7181**	**0.1591**	**2.9000e-004**	**735.1469**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	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	3.0000e-004
Energy	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	9.2377	9.2377	3.3000e-004	1.2000e-004	9.2806
Mobile	1.6143	1.6155	9.8908	8.8800e-003	0.5535	0.0177	0.5712	0.1486	0.0162	0.1647	0.0000	720.1958	720.1958	0.0484	0.0000	721.2122
Waste						0.0000	0.0000		0.0000	0.0000	1.7498	0.0000	1.7498	0.1034	0.0000	3.9214
Water						0.0000	0.0000		0.0000	0.0000	0.0674	0.4671	0.5346	6.9400e-003	1.7000e-004	0.7324
Total	**1.6246**	**1.6185**	**9.8935**	**8.9000e-003**	**0.5535**	**0.0179**	**0.5714**	**0.1486**	**0.0164**	**0.1650**	**1.8172**	**729.9009**	**731.7181**	**0.1591**	**2.9000e-004**	**735.1468**

	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	0.01	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	1/1/2014	1/14/2014	5	10	
2	Site Preparation	Site Preparation	1/15/2014	1/15/2014	5	1	
3	Grading	Grading	1/16/2014	1/17/2014	5	2	
4	Building Construction	Building Construction	1/18/2014	6/6/2014	5	100	
5	Paving	Paving	6/7/2014	6/13/2014	5	5	
6	Architectural Coating	Architectural Coating	6/14/2014	6/20/2014	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 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	7.00	125	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	1.00	255	0.40
Grading	Rubber Tired Dozers	1	1.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

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	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	1.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2014

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	7.4600e-003	0.0625	0.0443	6.0000e-005		4.6500e-003	4.6500e-003		4.4500e-003	4.4500e-003	0.0000	5.4760	5.4760	1.1400e-003	0.0000	5.4999
Total	**7.4600e-003**	**0.0625**	**0.0443**	**6.0000e-005**	**6.6400e-003**	**4.6500e-003**	**0.0113**	**1.0100e-003**	**4.4500e-003**	**5.4600e-003**	**0.0000**	**5.4760**	**5.4760**	**1.1400e-003**	**0.0000**	**5.4999**

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	9.6000e-004	0.0121	0.0114	2.0000e-005	5.1000e-004	2.1000e-004	7.2000e-004	1.4000e-004	1.9000e-004	3.3000e-004	0.0000	2.0903	2.0903	2.0000e-005	0.0000	2.0907
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	2.8000e-004	3.7000e-004	3.7100e-003	1.0000e-005	4.5000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4384	0.4384	3.0000e-005	0.0000	0.4390
Total	**1.2400e-003**	**0.0125**	**0.0151**	**3.0000e-005**	**9.6000e-004**	**2.1000e-004**	**1.1800e-003**	**2.6000e-004**	**1.9000e-004**	**4.5000e-004**	**0.0000**	**2.5287**	**2.5287**	**5.0000e-005**	**0.0000**	**2.5297**

3.2 Demolition - 2014

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.6400e-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	7.4600e-003	0.0625	0.0443	6.0000e-005		4.6500e-003	4.6500e-003		4.4500e-003	4.4500e-003	0.0000	5.4760	5.4760	1.1400e-003	0.0000	5.4999
Total	**7.4600e-003**	**0.0625**	**0.0443**	**6.0000e-005**	**6.6400e-003**	**4.6500e-003**	**0.0113**	**1.0100e-003**	**4.4500e-003**	**5.4600e-003**	**0.0000**	**5.4760**	**5.4760**	**1.1400e-003**	**0.0000**	**5.4999**

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	9.6000e-004	0.0121	0.0114	2.0000e-005	5.1000e-004	2.1000e-004	7.2000e-004	1.4000e-004	1.9000e-004	3.3000e-004	0.0000	2.0903	2.0903	2.0000e-005	0.0000	2.0907
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	2.8000e-004	3.7000e-004	3.7100e-003	1.0000e-005	4.5000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4384	0.4384	3.0000e-005	0.0000	0.4390
Total	**1.2400e-003**	**0.0125**	**0.0151**	**3.0000e-005**	**9.6000e-004**	**2.1000e-004**	**1.1800e-003**	**2.6000e-004**	**1.9000e-004**	**4.5000e-004**	**0.0000**	**2.5287**	**2.5287**	**5.0000e-005**	**0.0000**	**2.5297**

3.3 Site Preparation - 2014

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	7.2000e-004	7.2400e-003	3.7000e-003	0.0000		4.5000e-004	4.5000e-004		4.1000e-004	4.1000e-004	0.0000	0.4514	0.4514	1.3000e-004	0.0000	0.4542
Total	**7.2000e-004**	**7.2400e-003**	**3.7000e-003**	**0.0000**	**2.7000e-004**	**4.5000e-004**	**7.2000e-004**	**3.0000e-005**	**4.1000e-004**	**4.4000e-004**	**0.0000**	**0.4514**	**0.4514**	**1.3000e-004**	**0.0000**	**0.4542**

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-005	2.0000e-005	1.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0219	0.0219	0.0000	0.0000	0.0220
Total	**1.0000e-005**	**2.0000e-005**	**1.9000e-004**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0219**	**0.0219**	**0.0000**	**0.0000**	**0.0220**

3.3 Site Preparation - 2014

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					2.7000e-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	7.2000e-004	7.2400e-003	3.7000e-003	0.0000		4.5000e-004	4.5000e-004		4.1000e-004	4.1000e-004	0.0000	0.4514	0.4514	1.3000e-004	0.0000	0.4542
Total	**7.2000e-004**	**7.2400e-003**	**3.7000e-003**	**0.0000**	**2.7000e-004**	**4.5000e-004**	**7.2000e-004**	**3.0000e-005**	**4.1000e-004**	**4.4000e-004**	**0.0000**	**0.4514**	**0.4514**	**1.3000e-004**	**0.0000**	**0.4542**

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-005	2.0000e-005	1.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0219	0.0219	0.0000	0.0000	0.0220
Total	**1.0000e-005**	**2.0000e-005**	**1.9000e-004**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0219**	**0.0219**	**0.0000**	**0.0000**	**0.0220**

3.4 Grading - 2014

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	1.4900e-003	0.0125	8.8500e-003	1.0000e-005		9.3000e-004	9.3000e-004		8.9000e-004	8.9000e-004	0.0000	1.0952	1.0952	2.3000e-004	0.0000	1.1000
Total	**1.4900e-003**	**0.0125**	**8.8500e-003**	**1.0000e-005**	**7.5000e-004**	**9.3000e-004**	**1.6800e-003**	**4.1000e-004**	**8.9000e-004**	**1.3000e-003**	**0.0000**	**1.0952**	**1.0952**	**2.3000e-004**	**0.0000**	**1.1000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	7.0000e-005	7.4000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0877	0.0877	1.0000e-005	0.0000	0.0878
Total	**6.0000e-005**	**7.0000e-005**	**7.4000e-004**	**0.0000**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0877**	**0.0877**	**1.0000e-005**	**0.0000**	**0.0878**

3.4 Grading - 2014

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					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	1.4900e-003	0.0125	8.8500e-003	1.0000e-005		9.3000e-004	9.3000e-004		8.9000e-004	8.9000e-004	0.0000	1.0952	1.0952	2.3000e-004	0.0000	1.1000
Total	**1.4900e-003**	**0.0125**	**8.8500e-003**	**1.0000e-005**	**7.5000e-004**	**9.3000e-004**	**1.6800e-003**	**4.1000e-004**	**8.9000e-004**	**1.3000e-003**	**0.0000**	**1.0952**	**1.0952**	**2.3000e-004**	**0.0000**	**1.1000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	7.0000e-005	7.4000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0877	0.0877	1.0000e-005	0.0000	0.0878
Total	**6.0000e-005**	**7.0000e-005**	**7.4000e-004**	**0.0000**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0877**	**0.0877**	**1.0000e-005**	**0.0000**	**0.0878**

3.5 Building Construction - 2014

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	0.0747	0.7417	0.4171	5.7000e-004		0.0517	0.0517		0.0475	0.0475	0.0000	54.6284	54.6284	0.0161	0.0000	54.9674
Total	**0.0747**	**0.7417**	**0.4171**	**5.7000e-004**		**0.0517**	**0.0517**		**0.0475**	**0.0475**	**0.0000**	**54.6284**	**54.6284**	**0.0161**	**0.0000**	**54.9674**

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	2.8000e-004	3.7000e-004	3.7100e-003	1.0000e-005	4.5000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4384	0.4384	3.0000e-005	0.0000	0.4390
Total	**2.8000e-004**	**3.7000e-004**	**3.7100e-003**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**4.6000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.4384**	**0.4384**	**3.0000e-005**	**0.0000**	**0.4390**

3.5 Building Construction - 2014

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	0.0747	0.7417	0.4171	5.7000e-004		0.0517	0.0517		0.0475	0.0475	0.0000	54.6283	54.6283	0.0161	0.0000	54.9673
Total	**0.0747**	**0.7417**	**0.4171**	**5.7000e-004**		**0.0517**	**0.0517**		**0.0475**	**0.0475**	**0.0000**	**54.6283**	**54.6283**	**0.0161**	**0.0000**	**54.9673**

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	2.8000e-004	3.7000e-004	3.7100e-003	1.0000e-005	4.5000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.4384	0.4384	3.0000e-005	0.0000	0.4390
Total	**2.8000e-004**	**3.7000e-004**	**3.7100e-003**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**4.6000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.4384**	**0.4384**	**3.0000e-005**	**0.0000**	**0.4390**

3.6 Paving - 2014

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	3.0800e-003	0.0296	0.0184	3.0000e-005		1.8600e-003	1.8600e-003		1.7200e-003	1.7200e-003	0.0000	2.5022	2.5022	6.7000e-004	0.0000	2.5164
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0800e-003**	**0.0296**	**0.0184**	**3.0000e-005**		**1.8600e-003**	**1.8600e-003**		**1.7200e-003**	**1.7200e-003**	**0.0000**	**2.5022**	**2.5022**	**6.7000e-004**	**0.0000**	**2.5164**

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	2.5000e-004	3.4000e-004	3.3400e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3946	0.3946	3.0000e-005	0.0000	0.3951
Total	**2.5000e-004**	**3.4000e-004**	**3.3400e-003**	**0.0000**	**4.1000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3946**	**0.3946**	**3.0000e-005**	**0.0000**	**0.3951**

3.6 Paving - 2014

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	3.0800e-003	0.0296	0.0184	3.0000e-005		1.8600e-003	1.8600e-003		1.7200e-003	1.7200e-003	0.0000	2.5022	2.5022	6.7000e-004	0.0000	2.5164
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0800e-003**	**0.0296**	**0.0184**	**3.0000e-005**		**1.8600e-003**	**1.8600e-003**		**1.7200e-003**	**1.7200e-003**	**0.0000**	**2.5022**	**2.5022**	**6.7000e-004**	**0.0000**	**2.5164**

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	2.5000e-004	3.4000e-004	3.3400e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3946	0.3946	3.0000e-005	0.0000	0.3951
Total	**2.5000e-004**	**3.4000e-004**	**3.3400e-003**	**0.0000**	**4.1000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3946**	**0.3946**	**3.0000e-005**	**0.0000**	**0.3951**

3.7 Architectural Coating - 2014

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	0.0157					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.1200e-003	6.9400e-003	4.8000e-003	1.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	0.6383	0.6383	9.0000e-005	0.0000	0.6402
Total	**0.0168**	**6.9400e-003**	**4.8000e-003**	**1.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**0.6383**	**0.6383**	**9.0000e-005**	**0.0000**	**0.6402**

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**

3.7 Architectural Coating - 2014

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	0.0157					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.1200e-003	6.9400e-003	4.8000e-003	1.0000e-005		6.1000e-004	6.1000e-004		6.1000e-004	6.1000e-004	0.0000	0.6383	0.6383	9.0000e-005	0.0000	0.6402
Total	**0.0168**	**6.9400e-003**	**4.8000e-003**	**1.0000e-005**		**6.1000e-004**	**6.1000e-004**		**6.1000e-004**	**6.1000e-004**	**0.0000**	**0.6383**	**0.6383**	**9.0000e-005**	**0.0000**	**0.6402**

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	1.6143	1.6155	9.8908	8.8800e-003	0.5535	0.0177	0.5712	0.1486	0.0162	0.1647	0.0000	720.1958	720.1958	0.0484	0.0000	721.2122
Unmitigated	1.6143	1.6155	9.8908	8.8800e-003	0.5535	0.0177	0.5712	0.1486	0.0162	0.1647	0.0000	720.1958	720.1958	0.0484	0.0000	721.2122

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Gasoline/Service Station	2,604.48	2,604.48	2604.48	1,500,619	1,500,619
Total	2,604.48	2,604.48	2,604.48	1,500,619	1,500,619

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Gasoline/Service Station	9.50	7.30	7.30	2.00	79.00	19.00	14	27	59

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.473156	0.077101	0.180447	0.153254	0.061890	0.009298	0.018424	0.009367	0.002574	0.002539	0.008564	0.000535	0.002852

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	5.9337	5.9337	2.7000e-004	6.0000e-005	5.9566
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	5.9337	5.9337	2.7000e-004	6.0000e-005	5.9566
NaturalGas Mitigated	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	3.3040	3.3040	6.0000e-005	6.0000e-005	3.3241
NaturalGas Unmitigated	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	3.3040	3.3040	6.0000e-005	6.0000e-005	3.3241

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	61913.7	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	3.3040	3.3040	6.0000e-005	6.0000e-005	3.3241
Total		**3.3000e-004**	**3.0300e-003**	**2.5500e-003**	**2.0000e-005**		**2.3000e-004**	**2.3000e-004**		**2.3000e-004**	**2.3000e-004**	**0.0000**	**3.3040**	**3.3040**	**6.0000e-005**	**6.0000e-005**	**3.3241**

5.2 Energy by Land Use - NaturalGas

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	61913.7	3.3000e-004	3.0300e-003	2.5500e-003	2.0000e-005		2.3000e-004	2.3000e-004		2.3000e-004	2.3000e-004	0.0000	3.3040	3.3040	6.0000e-005	6.0000e-005	3.3241
Total		**3.3000e-004**	**3.0300e-003**	**2.5500e-003**	**2.0000e-005**		**2.3000e-004**	**2.3000e-004**		**2.3000e-004**	**2.3000e-004**	**0.0000**	**3.3040**	**3.3040**	**6.0000e-005**	**6.0000e-005**	**3.3241**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Gasoline/Service Station	20397	5.9337	2.7000e-004	6.0000e-005	5.9566
Total		**5.9337**	**2.7000e-004**	**6.0000e-005**	**5.9566**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Gasoline/Service Station	20397	5.9337	2.7000e-004	6.0000e-005	5.9566
Total		**5.9337**	**2.7000e-004**	**6.0000e-005**	**5.9566**

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	3.0000e-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	3.0000e-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	2.0000e-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	3.0000e-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**	**3.0000e-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					
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	2.0000e-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	3.0000e-004
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
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**	**3.0000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.5346	6.9400e-003	1.7000e-004	0.7324
Unmitigated	0.5346	6.9500e-003	1.7000e-004	0.7325

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	0.5346	6.9500e-003	1.7000e-004	0.7325
Total		**0.5346**	**6.9500e-003**	**1.7000e-004**	**0.7325**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Gasoline/Service Station	0.21251 / 0.130248	0.5346	6.9400e-003	1.7000e-004	0.7324
Total		**0.5346**	**6.9400e-003**	**1.7000e-004**	**0.7324**

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	3.9214
Unmitigated	1.7498	0.1034	0.0000	3.9214

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	3.9214
Total		**1.7498**	**0.1034**	**0.0000**	**3.9214**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Gasoline/Service Station	8.62	1.7498	0.1034	0.0000	3.9214
Total		**1.7498**	**0.1034**	**0.0000**	**3.9214**

9.0 Operational Offroad

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

Safeway, Petaluma, CA -Construction
DPM Construction Emissions and Modeling Emission Rates

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 ($g/s/m^2$)
2014	Construction	0.0558	CON_DPM	111.6	0.03397	4.28E-03	2,956	1.45E-06

Notes:
Emissions assumed to be evenly distributed over each construction areas

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

Safeway, Petaluma, CA _Construction
PM2.5 Fugitive Dust Construction Emissions for Modeling

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)	DPM Emission Rate $g/s/m^2$
2014	Construction	CON_FUG	0.00197	3.9	0.00120	1.51E-04	2,956	5.11E-08

Notes:
Emissions assumed to be evenly distributed over each construction areas

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

Safeway, Petaluma, CA - 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 1.0E6

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

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

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)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Values

Parameter	Child	Adult
CPF =	1.10E+00	1.10E+00
DBR =	581	302
A =	1	1
EF =	350	350
AT =	25,550	25,550

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Year	Exposure Exposure Duration (years)	Child - Exposure Information DPM Conc (ug/m3) Year	Annual	Child Exposure Adjust Factor	Child Cancer Risk (per million)	Adult - Exposure Information Modeled DPM Conc (ug/m3) Year	Annual	Adult Exposure Adjust Factor	Adult Cancer Risk (per million)	Fugitive PM2.5	Total PM2.5
1	1	2014	0.0203	10	1.77	2014	0.0203	1	0.09	0.0009	0.021
2	1	0	0.0000	10	0.00		0.0000	1	0.00		
3	1		0.0000	4.75	0.00		0.0000	1	0.00		
4	1		0.0000	3	0.00		0.0000	1	0.00		
5	1		0.0000	3	0.00		0.0000	1	0.00		
6	1		0.0000	3	0.00		0.0000	1	0.00		
7	1		0.0000	3	0.00		0.0000	1	0.00		
8	1		0.0000	3	0.00		0.0000	1	0.00		
9	1		0.0000	3	0.00		0.0000	1	0.00		
10	1		0.0000	3	0.00		0.0000	1	0.00		
11	1		0.0000	3	0.00		0.0000	1	0.00		
12	1		0.0000	3	0.00		0.0000	1	0.00		
13	1		0.0000	3	0.00		0.0000	1	0.00		
14	1		0.0000	3	0.00		0.0000	1	0.00		
15	1		0.0000	3	0.00		0.0000	1	0.00		
16	1		0.0000	3	0.00		0.0000	1	0.00		
17	1		0.0000	1.5	0.00		0.0000	1	0.00		
18	1		0.0000	1	0.00		0.0000	1	0.00		
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65	1		0.0000	1	0.00		0.0000	1	0.00		
66	1		0.0000	1	0.00		0.0000	1	0.00		
67	1		0.0000	1	0.00		0.0000	1	0.00		
68	1		0.0000	1	0.00		0.0000	1	0.00		
69	1		0.0000	1	0.00		0.0000	1	0.00		
70	1		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk					**1.77**				**0.09**		

Safeway, Petaluma, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
School Child Receptor Locations

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

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

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

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)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Values

Parameter	Child	Adult
CPF =	1.10E+00	1.10E+00
DBR =	581	302
A =	1	1
EF =	350	350
AT =	25,550	25,550

Construction Cancer Risk by Year - Student Exposure

Year	Exposure Exposure Duration (years)	Student - Exposure Information DPM Conc (ug/m3) Year	Conc	Exposure Adjust Factor*	Student Cancer Risk (per million)	Fugitive PM2.5	Total PM2.5
1	1	2014	0.2765	3	7.26	0.0141	0.291
2	1		0.0000	3	0.00		
3	1		0.0000	3	0.00		
4	1		0.000	3	0.00		
5	1		0.000	3	0.00		
6	1		0.000	3	0.00		
7	1		0.000	1	0.00		
8	1		0.000	1	0.00		
9	1		0.000	1	0.00		
10	1		0.000	1	0.00		
11	1		0.000	1	0.00		
12	1		0.000	1	0.00		
13	1		0.000	1	0.00		
14	1		0.000	1	0.00		
15	1		0.000	1	0.00		
16	1		0.000	1	0.00		
17	1		0.000	1	0.00		
18	1		0.000	1	0.00		
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.•	.•	.•	.•	.•	.•		
65	1		0.000	1	0.00		
66	1		0.000	1	0.00		
67	1		0.000	1	0.00		
68	1		0.000	1	0.00		
69	1		0.000	1	0.00		
70	1		0.000	1	0.00		
Total Increased Cancer Risk					**7.3**		

* Assumes that students at school are 16 years of age or younger for entire construction period

Attachment 2: Operational Emissions Modeling and Dispersion Modeling Information

Emissions From Queing at Gas Station

EMFAC 2011
2015 Estimated Annual Emission Rates
EMFAC 2011 Vehicle Categories
San Francisco Bay Area AIR BASIN
Bay Area AQMD

Area	CalYr	Season	Veh	Fuel	Speed	VMT	Assumed % of Vehicles	TOG_RUNEX	TOG Evap RL	Total PM2.5 RUNEX
San Francisco Bay Area	2015	Annual	LDA	GAS	5	76041	0.58	0.2798	0.0634	0.0113
San Francisco Bay Area	2015	Annual	LDT	GAS	5	8469.9	0.25	0.4291	0.1252	0.0143
San Francisco Bay Area	2015	Annual	MDT	GAS	5	24575	0.17	0.6891	0.1524	0.0316
		Average 5 mph Emission Rate						0.3867	0.0940	0.0155
		IdleVehicle Emission Rate =						1.934	0.470	0.078
								gram/hr	*based on 5 mph emission rate for 1 hour (5 miles)*	
		Assume 12 vehicles constantly idling per peak demand hour =						23.20	5.64	0.93
								gram/hr		
		Assume peak demand hour is 10% of daily emission rate =						232.02	56.40	9.30
								gram/day		
								0.51	0.12	0.02
								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 - 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)	(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	950,635	0.0207	0.0733	0.2759	0.0943	19	2695	0.51	11	39	289	50	1.60E-03	5.65E-03	4.17E-02	7.27E-03
East Route	East	Default	950,635	0.0207	0.0733	0.2759	0.0943	19	1876	0.36	8	27	289	35	1.11E-03	3.93E-03	4.17E-02	5.06E-03

[1] Default EMFAC2011 vehicle mix for LDA, LDT, and MDT
[2] Annual one-way trips
[3] Emissin factors developed from EMFAC2011 for San Francisco Bay Area Air Basin
[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

Safeway, Petaluma - Operational Emissions - Fuel Delivery Truck DPM Emissions 2015

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)	(miles)	Annual DPM Emissions (lb/year)	Average Hourly Emissions (lb/hr)
Gas truck Route	TRUCKS	Gas Station	HHDT	2	730	0.10745	24	3132	0.59	0.103	1.17E-05

[1] HHDT = heavy heavy duty truck
[2] Annual trips - Based on 365 days of operation
[3] Emission factor from EMFAC2011 for San Francisco Bay Area Air Basin for operation in 2015 and assumes all trucks are diesel.
[4] Gas truck delivery hours assumed to be 24 hours per day, 365 days per year

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
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 (70-year exposure)	0.06	1.15	0.94	2.15
Student (9-year exposure)	0.01	0.85	1.43	2.29

Maximum Non-Cancer Health Effects

	Maximum Chronic Hazard Index			
Sensitive Receptor Type	**DPM Trucks**	**Benzene GDF**	**TOG Total**	**Total Hazard Index**
Off-Site Residential (70-year exposure)	2.40E-05	0.000	1.66E-03	0.002
Student (9-year exposure)	4.80E-05	0.003	9.16E-03	0.012
	Maximum Acute Hazard Index			
Sensitive Receptor Type	**DPM Trucks**	**Benzene GDF**	**TOG Total**	**Total Hazard Index**
Off-Site Residential (70-year exposure)	-	0.002	0.012	0.014
Student (9-year exposure)	-	0.002	0.013	0.015
	Maximum Annual PM2.5 (µg/m^3)			
Sensitive Receptor Type	**PM2.5 Trucks**	**PM2.5 Idling**	**PM2.5 Travel**	**Total PM2.5**
Off-Site Residential (70-year exposure)	1.20E-04	0.003	0.025	0.028
Student (9-year exposure)	2.40E-04	0.019	0.070	0.090

Safeway, Petaluma - Gasoline Station Emissions
Benzene Cancer Risk and PM2.5 From Gasoline Station Operation

Modeling Information	
Model:	ISCST3
Sources	Gas Station Emissions
Source Type	Volume
Number of Sources	8
Receptor Height (m)	1.5 m
Meteorological Data	Petaluma Airport 1991 - 1995
Volume Source Parameters	
Volume Dimensions (L x W x H)	13 m x 13 m x 4 m
Release Height (m)	0 m for spillage and 1 m for refueling

Cancer Risk Calculation Method

Inhalation Dose = C_{air} x DBR x A x HD x EF x ED x 10^{-6} / AT

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)
HD = daily exposure (hours/day/24)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Inhalation Dose Factors

	Value[1]							
Exposure Type	**DBR (L/kg BW-day)**	**A (-)**	**Exposure (hr/day)**	**Exposure (days/week)**	**Exposure (week/year)**	**EF (days/yr)**	**ED (Years)**	**AT (days)**
Residential (70-Year)	302	1	24	7	50	350	70	25,550
Student (9-Year)	581	1	10	5	36	180	9	25,550

[1] Default values recommended by Bay Area Air Quality Management District

Cancer Risk (per million) = Inhalation Dose x CRAF x CPF x 10^6
= URF x Cair

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
CRAF = Cancer Risk Adjustment Factor
URF =Unit risk factor (cancer risk per $\mu g/m^3$)

Unit Risk Factor for Benzene

Exposure Type	**CPF $(mg/kg\text{-}day)^{-1}$**	**CRAF (-)**	**URF *Benzene***
Residential (70-Yr Exposure)	1.00E-01	1.7	**49.2**
Student (9-Year)	1.00E-01	3	**4.6**

Model Results and Maximum Cancer Risks

Receptor Type	**1-Hour Benzene Concentration (µg/m3)**	**Annual Average Concentration PM2.5 (µg/m3)**	**Annual Average Concentration Benzene (µg/m3)**	**Benzene Cancer Risk (per million)**	**Benzene Acute Hazard Index**	**Benzene Chronic Hazard Index**
Off-Site Residential (70-year exposure)	2.40	0	0.02327	**1.15**	**0.0018**	**0.0004**
Student (9-year exposure)	2.80	0	0.18489	**0.85**	**0.0022**	**0.0031**

Reference Exposure Levels (REL)

	Reference Exposure Level ($\mu g/m^3$)	
Compound	**Acute (1-hour)**	**Chronic (annual average)**
Benzene	1,300	60

Source: BAAQMD, *Recommended Methods for Screeing Local Risks and Hazards* , May 2012

Safeway, Petaluma
TOG Cancer Risk and PM2.5 From Station Operation and Customer Vehicles

Modeling Information	
Model:	ISCST3
Sources	Gas Station & Warehouse Delivery Trucks
Source Type	Line-Volume
Number of Sources	4 for starting TOG and 2 for idle and evap TOG and 1 for PM2.5 idle
Receptor Height (m)	1.5 m
Meteorological Data Petaluma Airport 1991 - 1995	
Line-Volume Source Parameters	
Volume Dimensions (L x W x H)*	13 m x 13 m x 4 m for starting TOG and 16 m x 16 m x 2 m for idle TOG & PM2.5 and evap TOG
Release Height (m)	1 m

* Each line source is made up of a series of individual volume sources along the travel route

Cancer Risk Calculation Method

Inhalation Dose = C_{air} x DBR x A x HD x EF x ED x 10^{-6} / AT

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)
HD = daily exposure (hours/day/24)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Inhalation Dose Factors

	Value[1]							
Exposure Type	**DBR (L/kg BW-day)**	**A (-)**	**Exposure (hr/day)**	**Exposure (days/week)**	**Exposure (week/year)**	**EF (days/yr)**	**ED (Years)**	**AT (days)**
Residential (70-Year)	302	1	24	7	50	350	70	25,550
Student (9-Year)	581	1	10	5	36	180	9	25,550

[1] Default values recommended by Bay Area Air Quality Management District

Cancer Risk (per million) = URF x Cair

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
CRAF = Cancer Risk Adjustment Factor
URF =Unit risk factor (cancer risk per $\mu g/m^3$)

Unit Risk Factor for DPM

	CPF	CRAF	URF* x CRAF	
Exposure Type	**$(mg/kg\text{-}day)^{-1}$**	**(-)**	***TOG Exhaust***	***TOG Evap Loss***
Residential (70-Yr Exposure)	-	1.7	**3.08**	**0.18**
Student (9-Year)	-	3	**0.70**	**0.04**

* BAAQMD, *Recommended Methods for Screeing Local Risks and Hazards* , May 2012

Model Results and Maximum Cancer Risks

East Traffic Route

	Maximum Annual Average Concentration			Cancer Risk	Cancer Risk	Total
Receptor Type	**PM2.5 (µg/m3)**	**TOG-Exhaust (µg/m3)**	**TOG-Run Loss (µg/m3)**	**TOG-Exhaust (per million)**	**TOG-Run Loss (per million)**	**Cancer Risk (per million)**
Off-Site Residential (70-year exposure)	0.0156	0.300	0.075	0.92	0.01	**0.94**
Student (9-year exposure)	0.04240	2.02	0.221	1.41	0.01	**1.42**

	Maximum 1-Hour Concentration		Acute Hazard Index			Chronic Hazard Index		
Receptor Type	**TOG-Exhaust (µg/m3)**	**TOG-Run Loss (µg/m3)**	**TOG Exhaust**	**TOG Evaporative**	**TOG Total**	**TOG Exhaust**	**TOG Evaporative**	**TOG Total**
Off-Site Residential (70-year exposure)	28.04	2.64	0.009	0.003	**0.012**	0.001	0.001	**0.002**
Student (9-year exposure)	24.97	4.28	0.008	0.006	**0.013**	0.007	0.002	**0.009**

Model Results and Maximum Cancer Risks

West Traffic Route

	Maximum Annual Average Concentration			Cancer Risk	Cancer Risk	Total
Receptor Type	**PM2.5 (µg/m3)**	**TOG-Exhaust (µg/m3)**	**TOG-Run Loss (µg/m3)**	**TOG-Exhaust (per million)**	**TOG-Run Loss (per million)**	**Cancer Risk (per million)**
Off-Site Residential (70-year exposure)	0.0167	0.287	0.078	0.88	0.01	**0.90**
Student (9-year exposure)	0.04683	2.03	0.241	1.42	0.01	**1.43**

	Maximum 1-Hour Concentration		Acute Hazard Index			Chronic Hazard Index		
Receptor Type	**TOG-Exhaust (µg/m3)**	**TOG-Run Loss (µg/m3)**	**TOG Exhaust**	**TOG Evaporative**	**TOG Total**	**TOG Exhaust**	**TOG Evaporative**	**TOG Total**
Off-Site Residential (70-year exposure)	28.394	2.87	0.009	0.004	**0.012**	0.001	0.001	**0.002**
Student (9-year exposure)	24.97	4.28	0.008	0.006	**0.013**	0.007	0.002	**0.009**

Reference Exposure Levels (REL)

	Reference Exposure Level ($\mu g/m^3$)	
Compound	**Acute (1-hour)**	**Chronic (annual average)**
TOG - Gasoline Vehicle Exhaust	3,283	284
TOG - Gasoline Vehicle Evaporative Losses	762	120

Source: BAAQMD, *Recommended Methods for Screeing Local Risks and Hazards* , May 2012

Safeway, Petaluma
DPM Cancer Risk and PM2.5 From Delivery Trucks

Modeling Information	
Model:	ISCST3
Sources	Gas Station & Warehouse Delivery Trucks
Source Type	Line-Volume
Number of Sources	1
Receptor Height (m)	1.5 m
Meteorological Data	Petaluma Airport 1991 - 1995
Line-Volume Source Parameters	
Length of Line Source =	954.5 m (3,132 feet)
Volume Dimensions (L x W)*	24 fet x 3,132 feet
Number of volume sources =	66
Release Height (m)	3.4 m (11 feet)

* The line source is made up of a series of individual volume sources along the travel route

Cancer Risk Calculation Method

Inhalation Dose = C_{air} x DBR x A x HD x EF x ED x 10^{-6} / AT

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)
HD = daily exposure (hours/day/24)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Inhalation Dose Factors

	Value[1]							
Exposure Type	**DBR (L/kg BW-day)**	**A (-)**	**Exposure (hr/day)**	**Exposure (days/week)**	**Exposure (week/year)**	**EF (days/yr)**	**ED (Years)**	**AT (days)**
Residential (70-Year)	302	1	24	7	50	350	70	25,550
Student (9-Year)	581	1	10	5	36	180	9	25,550
Worker	149	1	8	5	49	245	40	25,550

[1] Default values recommended by Bay Area Air Quality Management District

Cancer Risk (per million) = Inhalation Dose x CRAF x CPF x 10^6
= URF x Cair

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
CRAF = Cancer Risk Adjustment Factor
URF =Unit risk factor (cancer risk per $\mu g/m^3$)

Unit Risk Factor for DPM

Exposure Type	**CPF $(mg/kg\text{-}day)^{-1}$**	**CRAF (-)**	**URF *DPM***
Residential (70-Yr Exposure)	1.10E+00	1.7	**541.5**
Student (9-Year)	1.10E+00	3	**50.7**

Model Results and Maximum Cancer Risks

Receptor Type	**Annual Average Concentration PM2.5 (µg/m3)**	**DPM (µg/m3)**	**DPM Cancer Risk (per million)**	**DPM* Hazard Index (-)**
Off-Site Residential (70-year exposure)	0.00012	0.00012	**0.06**	**0.0000**
Student (9-year exposure)	0.00024	0.00024	**0.01**	**0.0000**

* Based on a chronic Reference Exposure Level (REL) of 5 $\mu g/m^3$