Gasoline Station
Health Risk Assessment
Application Form -25T

Santa Barbara County Air Pollution Control District
260 N. San Antonio Road, Suite A
Santa Barbara, CA 93110-1315

GENERAL: This form must be accompanied by a completed District Form -25 and a completed health risk assessment (HRA). Mail the completed form(s) and appropriate filing fees to the Santa Barbara County Air Pollution Control District (District) at the above address. This form is required for gasoline station permit applications that meet any of the criteria below:

1. The station is new/rebuilt.

2. A throughput increase is requested at an existing station.

3. The station is located within 1000 feet of the outer boundary of a school (k-12), and the permitting action will result in an increase in permitted emissions (including any new/rebuilt stations).

4. The station has been identified by the District as posing a concern to public health.

The applicant is required to perform the HRA and submit this completed form. The District will review all work done by the applicant and/or their consultant on a cost reimbursable basis pursuant to District Rule 210 – Fees. Instructions for completing the HRA can be found in Attachments A and B of this document.

If you have any questions, please contact the District at toxics@sbcapcd.org.

Is the facility open for refueling 24/7?
☐ Yes
☐ No, and the operating hours are indicated in the table below:

Day of the Week	Opening Time	Closing Time
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

Is the Pressure Vent Valve (PV Valve) located on top of a building?

☐ Yes
☐ No

What is the height of the PV Valve above grade in feet? ________________________________

UTM coordinates[1] of the PV Valve (Easting, Northing): ________________________________

UTM coordinates of center of the canopy (Easting, Northing): ___________________________

Building Information. Complete the table below with the UTM coordinates of the buildings. If the building has more than four corners, use additional points to describe the building. Label the additional points. If there are multiple buildings on the property, attach a separate table.

What is the height of the building above grade in feet? ________________________________

Building Location	UTM Easting (m)	UTM Northing (m)
SW Corner		
NW Corner		
NE Corner		
SE Corner		

Property boundary. Complete the table below with the UTM coordinates of the property boundary. If the facility boundary has more than four corners, use additional points to describe the facility. Attach a separate table if necessary. Label the additional points.

Boundary Location	UTM Easting (m)	UTM Northing (m)
SW Corner		
NW Corner		
NE Corner		
SE Corner		

[1] Denote which datum, WGS84 or NAD83, is used. Use the same datum for all UTMs. UTMs must be in meters.

Receptors. Provide the UTM coordinates in the table below of the nearest worker and residential receptors in all four directions (N/S/E/W) and any applicable sensitive receptors, including daycare facilities, hospitals, elder care facilities, and schools[2]. Attach a separate table if necessary.

Receptor Name or Address	UTM Easting	UTM Northing

Applicant/Preparer Certification Statement

All applications are required to be signed by a responsible official who works for the owner/operator of the permitted equipment. The person who prepares the application also must sign the permit application. The preparer may be an employee of the owner/operator or an authorized agent (contractor/consultant) working on behalf of the owner/operator.

I certify that all information contained herein and information submitted with this application is true and correct.

signature of owner/operator responsible official ______ date ______

print name of owner/operator responsible official ______ employer name ______

I certify that all information contained herein and information submitted with this application is true and correct.

signature of application preparer ______ date ______

print name of application preparer ______ employer name ______

[2] If the gasoline station is located within 1000 feet of a school (k-12), provide the UTM coordinates for the property boundaries of all schools listed in District Form -03.

Application Checklist (Have you submitted all the required information? Please check off the boxes)

☐ Health Risk Assessment cost reimbursement deposit of $3000 for the District to review the applicant-provided Health Risk Assessment.

☐ Completed District Form -25 (and any other forms, attachments, or fees required by District Form -25).

☐ Completed Health Risk Assessment and Report (see Attachment B for more details).

☐ Electronic HARP 2 files (see Attachment B for more details).

☐ Plot Plan. Submit a plot plan drawing (required size: 17" by 11"), with:

- Dimensions and **true North** direction indicated showing the overall site with cross streets
- Buildings (**with UTM coordinates shown**)
- Property boundary (**with UTM coordinates shown**)
- Pressure vent valve (**with UTM coordinates shown)**
- Canopy location (**with UTM coordinates shown**)
- Identification of adjacent property owners
- Identify any schools located within 1000 feet of the gasoline station and the location of the nearest business and residential receptors in all four directions (N/S/E/W).

☐ If the gasoline station is located within 1000 feet of a school (k-12), provide the UTM coordinates for the property boundaries of all schools listed in District Form -03.

PLEASE NOTE THAT FAILURE TO COMPLETELY PROVIDE ALL REQUIRED INFORMATION WILL RESULT IN YOUR APPLICATION BEING RETURNED OR DEEMED INCOMPLETE.

ATTACHMENT A

ROC and Toxic Emissions

Emission Sources

ROC and toxic emissions are released in five processes at a gasoline dispensing facility (GDF):

1) Loading emissions occur at the PV Valve during gasoline delivery to the tanks.
2) Breathing emissions occur at the PV Valve due to changes in temperature and pressure in the underground storage tank.
3) Refueling emissions occur at the gas pump during vehicle fueling. During the fueling process, gasoline vapors are emitted from the space due to a poor seal between the nozzle and the vehicle.
4) Spillage emissions occur on the ground at the dispenser from the nozzle.
5) Hose permeation emissions are caused by the migration of liquid gasoline through the outer GDF hose material and to the atmosphere through permeation.

Emission Factors

Santa Barbara County Air Pollution Control District's ROC emission factors used to calculate emissions from these processes for a GDF with Phase I EVR and Phase II EVR are shown below in Table A1. (For other GDF system types, use the appropriate emission factors from this spreadsheet: https://www.ourair.org/wp-content/uploads/GDF-Emissions-ver-3.0.xls. All GDFs should use the hose permeation emission factors shown in Table A1 based on the type of system at that particular facility.)

Table A1. Distribution for HRA Modeling – GDF ROC Emission Factors for Underground Tanks with Phase I EVR and Phase II EVR

Subcategory	ROC Emission Factor	Units
Loading	0.150	(lb/1000 gal)
Breathing	0.024	(lb/1000 gal)
Refueling	0.356	(lb/1000 gal)
Spillage	0.240	(lb/1000 gal)
Hose Permeation – System Types:		
Assist Controlled with EVR	0.47 0.001	(lb/year-per hose) (lb/day-per hose)
Balance	3.74 0.010	(lb/year-per hose) (lb/day-per hose)

Use the appropriate ROC emission factor from Table A1 with the weight percentage of each toxic substance in gasoline to calculate toxic emissions from each process. The toxic weight percentages shown in Tables A2 and A3 below are from CARB and CAPCOA's *Gasoline Service Station Industrywide Risk Assessment Technical Guidance* (https://ww2.arb.ca.gov/sites/default/files/2022-03/Draft%202022%20Gas%20Station%20IWG%20-%20Technical%20Guidance_ADA%20Compliant.pdf). The values in Table A2 should be used for the annual emission calculations and the values in Table A3 should be used for the maximum hourly emission calculations.

ATTACHMENT A

ROC and Benzene Emissions

Table A2. Toxic Weight Percentages in Gasoline for Annual Emission Calculations

Toxic Substance	Substance Weight Percentage in Liquid	Substance Weight Percentage in Vapor
Benzene	0.707	0.457
Ethyl Benzene	1.29	0.107
n-Hexane	1.86	1.82
Naphthalene	0.174	0.000445
Propylene	0.000122	0.003594
Toluene	5.63	1.11
Xylenes	6.59	0.409

Table A3. Toxic Weight Percentages in Gasoline for Maximum Hourly Emission Calculations

Toxic Substance	Substance Weight Percentage in Liquid	Substance Weight Percentage in Vapor
Benzene	0.702	0.549
Toluene	5.80	1.35
Xylenes	6.91	0.509

Annual Emissions Sample Calculation

A sample calculation is provided below for annual loading emissions of benzene for a throughput of 1,000,000 gal/year for a facility with 8 balance hoses. Breathing, refueling, and spillage emissions are calculated using the same methodology, based on the toxic substance's weight percentage in gasoline vapor. However, spillage emissions are calculated using the weight percentages of toxic substance in liquid gasoline; see the sample calculation for benzene below. A sample calculation is also provided for annual benzene emissions from hose permeation.

$$\boldsymbol{Anuual\ Benzene\ Emissions_{Loading}}$$

$$= \left(1,000,000\ \frac{gal}{yr}\right) * \left(\frac{0.150\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00457\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 0.686\ \frac{lb\ benzene}{yr}$$

$$\boldsymbol{Anuual\ Benzene\ Emissions_{Spillage}}$$

$$= \left(1,000,000\ \frac{gal}{yr}\right) * \left(\frac{0.240\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00707\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 1.70\ \frac{lb\ benzene}{yr}$$

$$\boldsymbol{Anuual\ Benzene\ Emissions_{Hose\ Permeation}}$$

$$= \left(3.74\ \frac{lb\ ROC}{yr - balance\ hose}\right) * (8\ balance\ hoses) * \left(\frac{0.00457\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 0.137\ \frac{lb\ benzene}{yr}$$

ATTACHMENT A

ROC and Benzene Emissions

Maximum Hourly Emissions

To calculate the maximum hourly emissions, maximum hourly bulk transfer volume and maximum hourly dispensing volume are required. The Phase I operation of loading varies by the bulk transfer volume. A fuel delivery creates the maximum hourly loading emissions. The maximum legal gasoline delivery volume is a truck pulling two 4,400-gallon tankers. It is reasonable to assume that only one 8,800-gallon loading event occurs during one hour. The Phase II operations of breathing, refueling and spillage vary by dispensing volume. As maximum hourly throughput is often difficult to estimate, an alternative is to estimate maximum hourly throughput based on the annual throughput, as shown in Table A4.

Table A4. Estimated Maximum Hourly Throughput Based on Annual Throughput for GDFs

Annual Throughput (Million gallons)	*Phase I Hourly Throughput*	*Phase II Hourly Throughput*
	Phase I Loading Throughput (gal/hr)	Phase II Estimated Hourly Throughput (gal/hr)
< 1	8,800	500
1 - < 3	8,800	700
3 - < 5	8,800	1,000
5 - < 10	8,800	2,000
≥ 10	8,800	4,000

Maximum Hourly Emissions Sample Calculation

A sample calculation is provided below for calculating the maximum hourly benzene emissions for a throughput of 1,000,000 gal/year at a GDF with 8 balance hoses. The maximum hourly emission calculation is not linear; do not scale the emissions shown below by the annual throughput. For loading, breathing, refueling and spillage, calculate the maximum hourly emissions based on the estimated hourly throughput, using the values from Table A4. For hose permeation, calculate the maximum hourly emissions based on the emission factors in Table A1 and the hose type.

$$\boldsymbol{Maximum\ Hourly\ Benzene\ Emissions_{Loading}}$$

$$= \left(8,800\ \frac{gal}{hr}\right) * \left(\frac{0.150\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00549\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 0.00725\ \frac{lb\ benzene}{hr}$$

$$\boldsymbol{Maximum\ Hourly\ Benzene\ Emissions_{Breathing}}$$

$$= \left(700\ \frac{gal}{hr}\right) * \left(\frac{0.024\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00549\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 9.22 \times 10^{-5}\ \frac{lb\ benzene}{hr}$$

ATTACHMENT A

ROC and Benzene Emissions

$$\textit{Maximum Hourly Benzene Emissions}_{Refueling}$$

$$= \left(700\ \frac{gal}{hr}\right) * \left(\frac{0.356\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00549\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 0.00137\ \frac{lb\ benzene}{hr}$$

$$\textit{Maximum Hourly Benzene Emissions}_{Spillage}$$

$$= \left(700\ \frac{gal}{hr}\right) * \left(\frac{0.240\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.00702\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 0.00118\ \frac{lb\ benzene}{hr}$$

$$\textit{Maximum Hourly Benzene Emissions}_{Hose\ Permeation}$$

$$= \left(0.010\ \frac{lb\ ROC}{day - balance\ hose}\right) * (8\ balance\ hoses) * \left(\frac{1\ day}{24\ hour}\right) * \left(\frac{0.00549\ lb\ benzene}{1\ lb\ ROC}\right)$$

$$= 1.83\ \text{x}\ 10^{-5}\ \frac{lb\ benzene}{hr}$$

ATTACHMENT B

Health Risk Assessment and HRA Report

The health risk assessment (HRA) and HRA report should be completed using the most recent version of the District's Modeling Guidelines for Health Risk Assessments (Form-15i), which can be found here: https://www.ourair.org/wp-content/uploads/apcd-15i.pdf. If the HRA and report fail to comply with these guidelines, they will be returned to the applicant for revision. The sections below discuss requirements that are specific to gasoline dispensing facilities.

Source Modeling Parameters

The modeling parameters for each process should be determined based on CARB and CAPCOA's *Gasoline Service Station Industrywide Risk Assessment Technical Guidance* (CARB/CAPCOA's GDF Guidelines, which can be found here: https://ww2.arb.ca.gov/sites/default/files/2022-03/Draft%202022%20Gas%20Station%20IWG%20-%20Technical%20Guidance_ADA%20Compliant.pdf).

- Use the stack diameter, exit velocity and stack exhaust temperatures from CARB/CAPCOA's GDF Guidelines.
- The default release heights, initial lateral dimensions ($\sigma_{Yinit.}$) and initial vertical dimensions ($\sigma_{Zinit.}$) from CARB/CAPCOA's GDF Guidelines may be used. Alternatively, the applicant may provide the PV Valve stack height and the canopy dimensions to calculate the initial lateral and vertical dimensions. If the PV Valve stack height is above 12 feet, the District may require a permit condition to enforce the height.

Default CARB/CAPCOA Source Parameters

The default source parameter inputs to the dispersion model are shown in Table B1 below.

Table B1. Default Source Parameters for Gasoline Dispensing Facilities

Process	Source Type	Release Height (m)	Stack Temp (K)	Stack Vel (m/s)	Stack Dia (m)	σ_{Yint} (m)	σ_{Zint} (m)
Loading	Point	3.66	291	0.001	0.0508		
Breathing	Point	3.66	289	0.001	0.0508		
Refueling & Hose Permeation	Volume	1.5				3.02	1.86
Spillage[1]	Volume	1.0				3.02	1.86

Initial Lateral and Vertical Dimensions

The default initial lateral and vertical dimensions from CARB/CAPCOA's GDF Guidelines are calculated using the following formulas (default volume source is 4 m high x 13 m long x 13 m wide):

[1] While the spillage emissions occur at the ground level, CARB determined that a volume source release height of 1 meter was representative due to turbulence from moving vehicles and wake effects caused by structures under the canopy (e.g. gasoline dispensers, surrounding vehicles, the vehicle being fueled, etc.).

ATTACHMENT B

Health Risk Assessment and HRA Report

$$Initial\ Lateral\ Dimension\ (\sigma_{Y\ init.}) = \frac{\sqrt{Length\ of\ Canopy * Width\ of\ Canopy}}{4.3}$$

$$\sigma_{Y\ init.} = \frac{\sqrt{13\ m * 13\ m}}{4.3} = 3.02\ m$$

$$Initial\ Vertical\ Dimension\ (\sigma_{Z\ init.}) = \frac{Height\ of\ Canopy}{2.15}$$

$$\sigma_{Z\ init.} = \frac{4\ m}{2.15} = 1.86\ m$$

Building Downwash

Building downwash is required to be included in the model. See Section 3.5 of Form-15i.

Multipathway Analysis

A multipathway analysis is not required for gasoline dispensing facilities because none of the emitted pollutants affect any of the non-inhalation pathways. Therefore, inhalation is the only pathway that must be selected for the risk analysis.

Risk Drivers

The risk driver tables described in Section 5.10 of Form-15i are not required for gasoline dispensing facilities.