air pollution control
SANTA BARBARA COUNTY

# 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 and the requested throughput is 1,000,000 gallons/year or more.

2. The station is existing and the requested throughput increase would result in a total throughput of 1,000,000 gallons/year or more.

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 or if this is a new/rebuilt station.

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. The fixed cost for this review is $1,500 and is due with submittal of the permit application. Instructions for completing the HRA can be found in Attachments A-C of this document.

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Is the facility is 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 | | |

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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 dispensers[2] (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.
[2] See Attachment A to determine the center of the dispensers.

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**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[3]. 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 _____

[3] See note at bottom of page 4 regarding schools.

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

☐ Health Risk Assessment Evaluation Fee (Fee = $1,500 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 C for more details).

☐ Electronic HARP 2 files (see Attachment C 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)**
- Island/dispenser locations (**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).

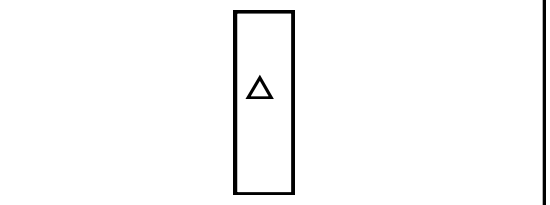
☐ If the gasoline station is located within 1000 feet of a school (k-12), provide the UTM coordinates for the property boundaries of all schools listed in District Form -03.

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

## ATTACHMENT A

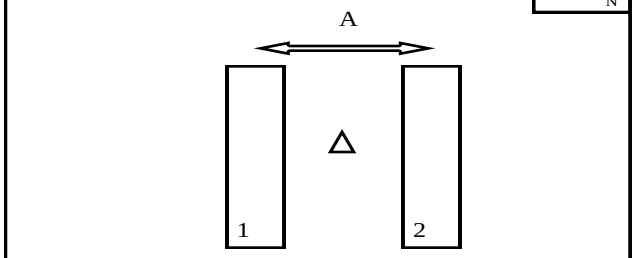
## Layouts for the Center of the Dispensers

**Figure 1**



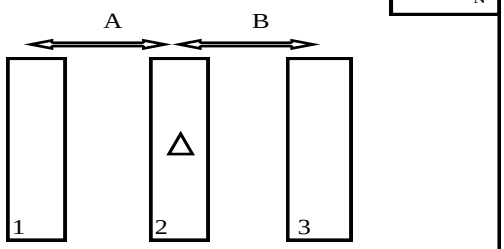

△ = Appropriate center of the island

**Figure 2**



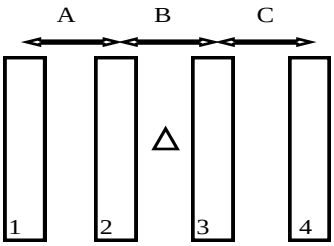

△ = Approximate center of the combination of islands
A = Distance (ft) between Islands 1 & 2

**Figure 3**



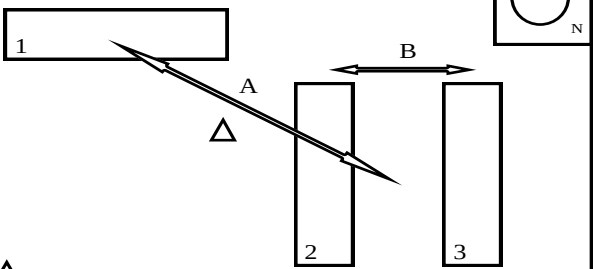

△ = Appropriate center of the combination of Islands
A = Distance (ft) between Island No. 1 & 2
B = Distance (ft) between Island No. 2 & 3

**Figure 4**



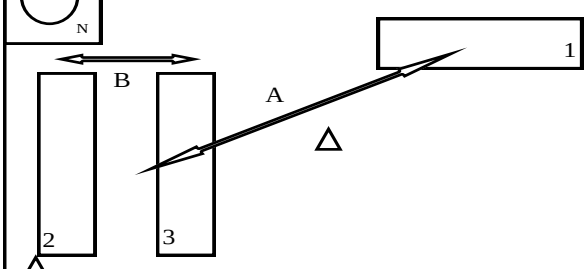

△ = Approximate center of the combination of Islands
A = Distance (ft) between Island No. 1 & 2
B = Distance (ft) between Island No. 2 & 3
C = Distance (ft) between Island No. 3 & 4

**Figure 5**




△ = Approximate center of the combination of Islands
A = Distance (ft) between the center of Island No. 1 and the center of Island No. 2 & 3
B = Distance (ft) between Island No. 2 and 3

**Figure 6**

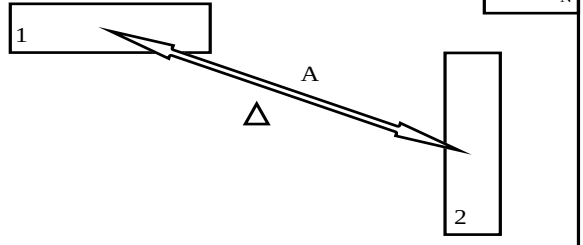



△ = Approximate center of the combination of Islands
A = Distance (ft) between the center of Island No. 1 and the center of Island No. 2 & 3
B = Distance (ft) between Island No. 2 & 3

## ATTACHMENT A (Continued)

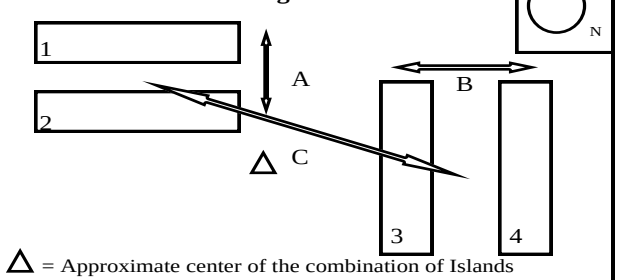
## Layouts for the Center of the Dispensers

**Figure 7**



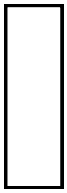

△ = Approximate center of the combination of Islands
A = Distance (ft ) between the center of Island No. 1 and the center of Island No. 2

**Figure 8**




△ = Approximate center of the combination of Islands
A = Distance (ft ) between Island No. 1 & 2
B = Distance (ft) between Island No. 3 & 4
C = Distance (ft) between the center of Island No. 1 and 2 and the center of Island No. 3 & 4

**Legend**



= Fuel Pump Island

△ = Approximate center of the combination of Islands

## ATTACHMENT B

## ROC and Benzene Emissions

### Emission Sources

ROC and benzene 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 the volume of tank;
3) Refueling emissions occur at the vehicle's tank that is being refueled;
4) Spillage emissions occur on the ground at the dispenser from the nozzle; and
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 1.

**Table 1. 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<br>0.001 | (lb/year-per hose)<br>(lb/day-per hose) |
| Balance | 3.74<br>0.010 | (lb/year-per hose)<br>(lb/day-per hose) |

Use the appropriate ROC emission factor from Table 1 with the weight fraction of benzene in gasoline to calculate benzene emissions from each process. CAPCOA's *Gasoline Service Station Industrywide Risk Assessment Guidelines*[4] (http://www.arb.ca.gov/ab2588/rrap-iwra/gasiwra.pdf) lists the weight percent of benzene in the gasoline vapor as 0.3 percent and the weight percent of benzene in the gasoline liquid as 1.0 percent.

### Annual Emissions Sample Calculation

A sample calculation is provided below for annual loading emissions 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. However, spillage emissions are calculated using the weight percent of benzene in liquid gasoline. A sample calculation is also provided for annual benzene emissions from hose permeation.

[4] CAPCOA and CARB are in the process of updating the health risk assessment modeling protocol for gasoline service stations. Form -25T will be updated upon release of the revised modeling protocol. Contact the District for current modeling requirements.

$$\textbf{Anuual Benzene Emissions}_{Loading} = \left(1,000,000\frac{gal}{yr}\right) * \left(\frac{0.15\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 0.45\ \frac{lb\ benzene}{yr}$$

$$\textbf{Anuual Benzene Emissions}_{Hose\ Permeation}$$
$$= \left(3.74\ \frac{lb\ ROC}{yr - balance\ hose}\right) * (8\ balance\ hoses) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right) = 0.09\ \frac{lb\ benzene}{yr}$$

**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 2.

**Table 2. 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 annual throughput by the emissions shown below. For loading, breathing, refueling and spillage, calculate the maximum hourly emissions based on the annual throughput, using the values from Table 2. For hose permeation, calculate the maximum hourly emissions based on the emission factors in Table 1 and the hose type.

$$\textbf{Max Hourly Benzene Emissions}_{Loading} = \left(8,800\frac{gal}{hr}\right) * \left(\frac{0.15\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 0.00396\ \frac{lb\ benzene}{hr}$$

**ATTACHMENT B (Continued)**

**ROC and Benzene Emissions**

$$\textbf{Max Hourly Benzene Emissions}_{\textbf{Refueling}} = \left(700\frac{gal}{hr}\right) * \left(\frac{0.356\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 7.48\ \text{x}\ 10^{-4}\ \frac{lb\ benzene}{hr}$$

$$\textbf{Max Hourly Benzene Emissions}_{\textbf{Breathing}} = \left(700\frac{gal}{hr}\right) * \left(\frac{0.024\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 5.04\ \text{x}\ 10^{-5}\ \frac{lb\ benzene}{hr}$$

$$\textbf{Max Hourly Benzene Emissions}_{\textbf{Spillage}} = \left(700\frac{gal}{hr}\right) * \left(\frac{0.24\ lb\ ROC}{1000\ gal}\right) * \left(\frac{0.01\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 0.00168\ \frac{lb\ benzene}{hr}$$

$$\textbf{Max Hourly Benzene Emissions}_{\textbf{Hose Permeation}}$$
$$= \left(0.010\frac{lb\ ROC}{day - balance\ hose}\right) * (8\ balance\ hoses) * \left(\frac{1\ day}{24\ hour}\right) * \left(\frac{0.003\ lb\ benzene}{1\ lb\ ROC}\right)$$
$$= 1.00\ \text{x}\ 10^{-5}\ \frac{lb\ benzene}{hr}$$

## ATTACHMENT C

## 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 CAPCOA's *Gasoline Service Station Industrywide Risk Assessment Guidelines*[5] (CAPCOA's GDF Guidelines, which can be found here: http://www.arb.ca.gov/ab2588/rrap-iwra/gasiwra.pdf):

- Use the stack diameter and stack exhaust temperatures from CAPCOA's GDF Guidelines[5].
- The stack gas exit velocity must be calculated according to CAPCOA's GDF Guidelines[5]. An example calculation is shown below.
- The default stack height, and initial vertical and lateral dimensions from CAPCOA's GDF Guidelines[6] may be used. Alternatively, the applicant may provide the PV Valve stack height and the dimensions to calculate the initial vertical and lateral dimensions ($\sigma_{Zint}$, $\sigma_{Yint}$). If the PV Valve stack height is above 12 feet, the District may require a permit condition to enforce the height.

*Default CAPCOA Source Parameters*[6]

The default stack parameter inputs to the dispersion model are as follows:

| Process | Release Height (ft) | Stack Temp (°F) | Stack Vel (fpm) | Stack Dia (ft) | $\sigma_{Yint}$ (ft) | $\sigma_{Zint}$ (ft) |
|---|---|---|---|---|---|---|
| Loading | 12 | 65 | No default | 0.167 | | |
| Breathing | 12 | 60 | No default | 0.167 | | |
| Refueling & Hose Permeation | 3.28 | | | | 9.92 | 6.10 |
| Spillage | 0 | | | | 9.92 | 6.10 |

*Stack Gas Exit Velocity*

The stack gas exit velocity is calculated using the following formula:

$$Velocity = \frac{Vapor\ Mass\ Emission\ Rate}{Cross\ Sectional\ Area\ of\ Stack * Density\ of\ Gasoline\ Vapor}$$

Where:

$$Vapor\ Mass\ Emission\ Rate = Throughput * ROC\ Emission\ Factor$$

$$Cross\ Sectional\ Area\ of\ Stack = \frac{\pi D^2}{4} = \frac{\pi(0.167\ ft)^2}{4} = 0.0219\ ft^2$$

$$Density\ of\ Gasoline\ Vapor = 0.105\ lb/ft^3, from\ Appendix\ D\ of\ CAPCOA's\ Guidelines^5$$

[5] CAPCOA and CARB are in the process of updating the health risk assessment modeling protocol for gasoline service stations. Form -25T will be updated upon release of the revised modeling protocol. Contact the District for current modeling requirements.

*Sample Velocity Calculation*

A sample calculation is provided below for the velocity of loading emissions leaving the PV Valve for a throughput of 1,000,000 gal/year.

$$Velocity = \frac{\left(\frac{1{,}000{,}000\ gal}{yr}\right)\left(\frac{0.15\ lb\ ROC}{1000\ gal}\right)\left(\frac{1\ yr}{365\ day}\right)\left(\frac{1\ day}{24\ hr}\right)\left(\frac{1\ hr}{60\ min}\right)}{0.0219\ ft^2 * 0.105\ lb/ft^3} = 0.124\ fpm$$

*Initial Lateral and Vertical Dimensions*

The default initial lateral and vertical dimensions from CAPCOA's GDF Guidelines[6] are calculated using the following formulas (default volume source is 4 m high x 13 m long x 13 m wide):

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

$$\sigma_{Y\ init.} = \frac{\sqrt{13\ m * 13\ m}}{4.3} = 3.02\ m \text{ or } 9.92\ ft$$

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

$$\sigma_{Z\ init.} = \frac{4\ m}{2.15} = 1.86\ m \text{ or } 6.10\ ft$$

**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 the only pollutant emitted, benzene, is not a multipathway pollutant. Therefore, inhalation is the only pathway that must be selected for the risk analysis.

**Risk Driver**

The risk driver tables described in Section 5.8 of Form-15i are not required for gasoline dispensing facilities.

[6] CAPCOA and CARB are in the process of updating the health risk assessment modeling protocol for gasoline service stations. Form -25T will be updated upon release of the revised modeling protocol. Contact the District for current modeling requirements.