# APPENDIX F
# AIR QUALITY

This appendix contains the Air Quality Technical Report which provides supporting documentation for the assessment of air quality impacts.

**THIS PAGE INTENTIONALLY LEFT BLANK**

# AIR QUALITY TECHNICAL REPORT

# FINAL

Updated July 2012

**Prepared for:**

Environmental Impact Statement/Environmental Impact Report
of the
Proposed Extension of Runway 13/31
at

## GNOSS FIELD
## NOVATO, CALIFORNIA

**Prepared by:**

Landrum & Brown, Incorporated
11279 Cornell Park Road
Cincinnati, Ohio 45242

**THIS PAGE INTENTIONALLY LEFT BLANK**

# TABLE OF CONTENTS



# LIST OF FIGURES

# LIST OF TABLES

# TABLE OF CONTENTS CONTINUED

## LIST OF TABLES

# TABLE OF CONTENTS CONTINUED

## LIST OF TABLES

# 1. INTRODUCTION

The purpose of this Air Quality Technical Report is to provide supporting documentation for both the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) being prepared by the FAA and Marin County for the improvement project proposed for the Marin County Airport- Gnoss Field (DVO or Airport). DVO is owned and operated by Marin County, California and is shown in **Figure 1, Marin County Airport – Gnoss Field**. The Airport is located in unincorporated Marin County north of the City of Novato, California and serves an essential regional transportation resource by providing general aviation facilities in the northern portion of the San Francisco Bay area. DVO has a single runway (Runway 13-31) oriented northwest-southeast that measures 3,300 feet long.

**Figure 1**
**MARIN COUNTY AIRPORT - GNOSS FIELD**

Source: www.airnav.com

In order to better accommodate existing airport users and to enhance the safety of the DVO runway environment, the airport's sponsor, Marin County, has proposed the following improvements which are referred to as the Sponsor's Proposed Action:

- Extend Runway 13-31 to the northwest 1,100 feet to a total new length of 4,400 feet with Runway Safety Areas (RSAs) that meet current FAA guidelines;
- Extend the corresponding taxiway to the full length of the runway;
- Extend the levee and realign the drainage system; and
- Reprogram the navigational aids that pilots use to land at the Airport to reflect the extended runway.

In addition to the Sponsor's Proposed Action two other alternatives are evaluated in this air quality analysis. As a requirement of NEPA, a no action alternative must be carried forward in the assessment of environmental impacts. Therefore, Alternative A is the No Action Alternative. The Sponsor's Proposed Action is Alternative B as described above. Alternative C extends the runway to the southeast by 1,100 feet. However from the preliminary review of the environmental impacts, associated costs, and the need to purchase large amounts of land, Alternative C was not carried forward for detailed analysis. Alternative D extends the runway to the southeast by 240 feet and to the northwest by 860 feet for a total length of 4,400 feet. Alternatives D would meet current FAA guidelines regarding RSA's and would also require extension of the corresponding taxiways and levee, realignment of the drainage system, and reprogramming of the navigational aids.

The objective of this air quality analysis is to provide the information necessary to determine whether Alternative B Sponsor's Proposed Action or any of the alternatives under consideration would have the potential to cause significant adverse air quality impacts in Marin County. A detailed glossary of terms is provided in **Attachment 1,** *Glossary*.

## 1.1 AGENCY COORDINATION

The air quality coordination process was initiated in April 2009 and included coordination with the FAA, the Marin County, the Bay Area Air Quality Management District (BAAQMD), California Environmental Protection Agency Air Resources Board (CARB), U.S. Environmental Protection Agency (USEPA) Region 9, the Metropolitan Transportation Commission, and the Association of Bay Area Governments. The goal of the air quality scoping process was to:

- Familiarize agencies with the scope of the Alternative B Sponsor's Proposed Action and identify any issues of concern to participating agencies early in the process;
- Engage in data exchange of information necessary to complete the air quality assessment; and
- Obtain concurrence on procedure and methodology prior to the publication of the EIS/EIR.

The initial air quality scoping meeting was conducted on April 22, 2009 at the BAAQMD's offices. Materials from the meeting are provided in **Attachment 2,** *Agency Coordination*.

## 1.2 MARIN COUNTY AIR QUALITY STATUS

DVO is located in Marin County which is included in the Federal San Francisco Bay Intrastate Air Quality Region.[1] The region does not currently meet the Federal eight hour standard for healthful levels of ozone and has been designated by the USEPA

[1] USEPA, 40 CFR Part 81, Section 81.21, *San Francisco Bay Intrastate Air Quality Control Region*, January 16, 1981.

as a marginal nonattainment area for ozone.[2] Further, USEPA has determined the County exceeds the 24 hour standard for emissions of fine particulate matter ($PM_{2.5}$). In the past Marin County was been designated as nonattainment for Carbon Monoxide (CO) but in April 1998 the Bay Area was redesignated to attainment and now operate under a maintenance plan in order to prevent emissions from reaching an unhealthy level.

Marin County is also located within the Bay Area Air Quality Management District (BAAQMD) of California. California maintains more stringent standards than the USEPA for which the County must adhere called the California Ambient Air Quality Standards. Marin County has been designated by the BAAQMD as nonattainment for the eight-hour and one-hour standards for ozone, the annual arithmetic mean and the twenty four-hour standards for coarse particulate matter ($PM_{10}$), and the annual arithmetic mean standard for $PM_{2.5}$.[3]

The BAAQMD is responsible for assuring the National Ambient Air Quality Standards (NAAQS) and the CAAQS are attained. Under the California Environmental Quality Act (CEQA) it must be demonstrated that a proposed project would not violate any air quality standard (Federal or District) and that it may not contribute substantially to an existing or projected air quality violation.

[2] USEPA website, http://www.epa.gov/oar/oaqps/greenbk, accessed April 2009.
[3] BAAQMD website, http://www.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, accessed April 2009.

# 2. REGULATORY OVERVIEW

This air quality assessment of the Alternative B Sponsor's Proposed Action and the alternatives, including a General Conformity evaluation, was conducted in accordance with the guidelines provided in the most recent versions of the *Air Quality Procedures for Civilian Airports & Air Force Bases,*[4] FAA Order 5050.4B[5], *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, and *BAAQMD CEQA Guidelines: Accessing the Air Quality Impacts of Project and Plans*, which together with the guidelines of FAA Order 1050.1E,[6] *Environmental Impacts: Policies and Procedures*, constitute compliance with all the relevant provisions of NEPA, California Environmental Quality Act (CEQA), and the Clean Air Act (CAA), including the 1990 Amendments.

## 2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The CAA, including the 1990 Amendments, provides for the establishment of standards and programs to evaluate, achieve, and maintain acceptable air quality in the U.S. Under the CAA, the USEPA established a set of standards, or criteria, for six pollutants determined to be potentially harmful to human health and welfare.[7] The USEPA considers the presence of the following six criteria pollutants to be indicators of air quality:

- Ozone ($O_3$);
- Carbon monoxide (CO);
- Nitrogen dioxide ($NO_2$);
- Particulate matter ($PM_{10}$ and $PM_{2.5}$);[8]
- Sulfur dioxide ($SO_2$); and,
- Lead (Pb).

A description of the criteria pollutants is found in **Attachment 1,** *Glossary*. The standards for the criteria pollutants, known as the National Ambient Air Quality Standards (NAAQS), are summarized in **Table 2-1**. For each of the criteria pollutants, the USEPA established primary standards intended to protect public health, and secondary standards for the protection of other aspects of public welfare, such as preventing materials damage, preventing crop and vegetation damage, and assuring good visibility. Areas of the country where air pollution levels consistently exceed these standards may be designated nonattainment by the USEPA.

---

4 Federal Aviation Administration, *Air Quality Procedures for Civilian Airports & Air Bases*, April 1997; and Addendum, September 2004.

5 FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, April 28, 2006.

6 FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, June 8, 2004.

7 USEPA, Code of Federal Regulations, Title 40, Part 50 (40 CFR Part 50) *National Primary and Secondary Ambient Air Quality Standards (*NAAQS), July 2011.

8 $PM_{10}$ and $PM_{2.5}$ are airborne inhalable particles that are less than ten micrometers (coarse particles) and less than 2.5 micrometers (fine particles) in diameter, respectively.

A nonattainment area is a homogeneous geographical area[9] (usually referred to as an air quality control region) that is in violation of one or more NAAQS and has been designated as nonattainment by the USEPA as provided for under the CAA. Some regulatory provisions, for instance, the CAA conformity regulations, apply only to areas designated as nonattainment or maintenance.

**Table 2-1**
**NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)**

| POLLUTANT | AVERAGING PERIOD | PRIMARY STANDARDS | SECONDARY STANDARDS |
|---|---|---|---|
| Sulfur Dioxide ($SO_2$) | Annual Arithmetic Mean<br>24-Hour Average<br>3-Hour Average | 0.03 PPM (80 μg/m$^3$)<br>0.14 PPM (365 μg/m$^3$)<br>None | None<br>None<br>0.50 PPM (1,300 μg/m$^3$) |
| Particulate Matter ($PM_{10}$) | 24-Hour Average | 150 μg/m$^3$ | Same as Primary |
| Particulate Matter ($PM_{2.5}$) | Annual Arithmetic Mean (1997 Std)[1]<br>24-Hour Average (2006 Std)[1] | 15 μg/m$^3$<br>35μg/m$^3$ | Same as Primary |
| Carbon Monoxide (CO) | 8-Hour Average<br>1-Hour Average | 9 PPM (10 mg/m$^3$)<br>35 PPM (40 mg/m$^3$) | None |
| Ozone ($O_3$) | 8-Hour Average (1997 Std)[2]<br>8-Hour Average (2008 Std)[2]<br>1-Hour Average (revoked)[3] | 0.084 PPM<br>0.075 PPM<br>0.12 PPM | Same as Primary |
| Nitrogen Dioxide ($NO_2$) | 1-Hour Daily Maximum[4]<br>Annual Arithmetic Mean | 0.080-0.100 PPM[4]<br>0.053 PPM (100 μg/m$^3$) | Same as Primary |
| Lead (Pb) | Rolling 3-Month Average[5]<br>3-Month Arithmetic Mean[5] | 0.15 μg/m$^3$<br>1.5 μg/m$^3$ | Same as Primary |

Notes: PPM is parts per million; Std is Standard.
μg/m$^3$ is micrograms per cubic meter.
mg/m$^3$ is milligrams per cubic meter (for CO only)

[1] 71 FR 61144 (October 17, 2006) lowered the 24-hour $PM_{2.5}$ standard to 35 μg/m$^3$ and retained the 1997 annual $PM_{2.5}$ standard at 15 μg/m$^3$. EPA issued attainment status designations for the 24-Hour average 35 μg/m$^3$ standard on December 22, 2008. EPA has designated the Bay Area as nonattainment for the 24 -Hour 35 μg/m$^3$ PM2.5 standard.

[2] 69 FR 23858 (April 30, 2004) designated the nonattainment areas for the 8-hour ozone standard of 0.08 PPM, including Marin County California (Classified as Subpart 2/Marginal). 69 FR 34080-34085 (June 18, 2004) Amended April 30, 2004 Notice. 62 FR 38894 (July 18, 1997) proposed the 1997 8-hour average ozone standard at 0.08 PPM. 73 FR 16436 (March 27, 2008) lowered the 8-hour ozone standard to 0.075 PPM and revised the 1997 standard to three decimal places, 0.084 PPM.

[3] The national 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

[4] 74 FR 34404 (July 15, 2009) proposes a new one-hour standard for $NO_2$ in the range of 80 parts per billion (PPB) or 0.080 PPM to 0.100 PPM and solicits comments in the Federal Register notice. Expect final promulgation of the revised standard in January 2010.

[5] 73 FR 66964 (November 12, 2008) revises the standard to a rolling 3-month average of 0.15 μg/m$^3$. Previous standard of 1.5 μg/m$^3$ remains in effect until November 2009. Nonattainment areas will be designated by USEPA by January 2012; states must meet the new standard by January 2017.

Sources: USEPA, 40 CFR Part 50.4 through Part 50.13, *National Primary and Secondary Ambient Air Quality Standards* (July 1, 2011).
71 FR 61144, *Final Rule National Ambient Air Quality Standards for Particulate Matter* (October 17, 2006); revisions to the standards for $PM_{10}$ and $PM_{2.5}$.
73 FR 16436, *Final Rule National Ambient Air Quality Standards for Ozone* (Thursday, March 27, 2008).
73 FR 66964 (November 12, 2008) and USEPA *Fact Sheet: Final Revisions to the National Ambient Air Quality Standards for Lead*, available at http://www.epa.gov/air/lead/pdfs/20081015pbfactsheet.pdf
BAAQMD website Air Quality Standards and Attainment Statushttp://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm accessed September 2009.

[9] A homogeneous geographical area, with regard to air quality, is an area, not necessarily bounded by state lines, where the air quality characteristics have been shown to be similar over the whole area. This may include several counties, encompassing more than one state, or may be a very small area within a single county.

A maintenance area describes the air quality designation of an area previously designated nonattainment by the USEPA and subsequently redesignated attainment after emissions are reduced. Such an area remains designated as maintenance for a period up to 20 years at which time the state can apply for redesignation to attainment, provided that the NAAQS were sufficiently maintained throughout the maintenance period.

According to FAA guidelines[10] that establish procedures to meet NEPA requirements, an air quality assessment prepared pursuant to NEPA regulations should include an analysis and conclusions of a Federal action's impacts on air quality, as quoted in **Table 2-2**.

**Table 2-2**
**NEPA COMPLIANCE FOR AIRPORT FEDERAL ACTIONS**

| ***Environmental Impacts: Policies and Procedures***<br>**FAA Order 1050.1E, Section 2, *Air Quality* Paragraph 2.1(c), *Requirements:*** |
|---|
| When a NEPA analysis is needed, the Proposed Action's impact on air quality is assessed by evaluating the impact of the Proposed Action on the NAAQS. The Proposed Action's "build" and "no-build" emissions are inventoried for each reasonable alternative. Normally, further analysis would not be required for pollutants where emissions do not exceed General Conformity [*de minimis*] thresholds. |

Note: National Environmental Policy Act, (NEPA). National Ambient Air Quality Standards, (NAAQS).
Federal Aviation Administration, (FAA).
Source: FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, Appendix A, Section 2, *Air Quality*, June 8, 2004.

At a minimum, an inventory would be prepared reflecting emissions under the baseline (no action) conditions, and a separate inventory would be prepared describing emissions due to the Alternative B Sponsor's Proposed Action conditions. The net emissions derived from the comparison of the two inventories indicate the relative impact to air quality. Generally, when a Federal action will not result in net emissions that equal or exceed the requirements under the CAA General Conformity regulations, a comparative evaluation of the Federal action to the NAAQS, which requires dispersion analysis, is not necessary, and the Federal action is assumed to comply with the NAAQS.

## 2.2 CALIFORNIA AMBIENT AIR QUALITY STANDARDS

The CAA requires the USEPA to set the NAAQS for the nation; however, the CAA permits states to adopt additional or more stringent standards as needed. The California Air Resources Board (CARB) established such standards, or criteria, for the same six pollutants as the NAAQS. These standards known as California Ambient Air Quality Standards (CAAQS), are summarized in **Table 2-3**. Areas of the state where air pollution levels consistently exceed these standards may be designated nonattainment by CARB.

[10] FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, Appendix A, Section 2 *Air Quality*, June 8, 2004.

**Table 2-3**
**CALIFORNIA AMBIENT AIR QUALITY STANDARDS (CAAQS)**

| POLLUTANT | AVERAGING PERIOD | STANDARD |
|---|---|---|
| Carbon Monoxide (CO) | 8-Hour Average<br>1-Hour Average | 9 PPM<br>20 PPM |
| Lead (Pb) | 30-Day Average | 1.5 $\mu g/m^3$ |
| Nitrogen Dioxide ($NO_2$) | Annual Arithmetic Mean<br>1-Hour Average | 0.18 PPM<br>0.030 PPM |
| Particulate Matter ($PM_{10}$) | Annual Arithmetic Mean<br>24-Hour Average | 20 $\mu g/m^3$<br>50 $\mu g/m^3$ |
| Particulate Matter ($PM_{2.5}$) | Annual Arithmetic Mean | 12 $\mu g/m^3$ |
| Ozone ($O_3$) | 8-Hour Average<br>1-Hour Average | 0.070 PPM<br>0.09 PPM |
| Sulfur Dioxide ($SO_2$) | 24-Hour Average<br>1-Hour Average | 0.04 PPM<br>0.25 PPM |

Notes: PPM is parts per million; Std is Standard.
$\mu g/m^3$ is micrograms per cubic meter.
Sources: CARB Website, *Ambient Air Quality Standards*, accessed at http://www.arb.ca.gov/research/aaqs/aaqs2.pdf, April 2009.

## 2.3 CLEAN AIR ACT CONFORMITY REGULATIONS

When a Federal action would not cause annual net emissions that equal or exceed the relevant *de minimis* thresholds for the pollutants of concern, the action would not apply under the General Conformity Rule and further analysis to prepare a General Conformity Determination would not be required. Further, the USEPA has determined that an action with *de minimis* annual net emissions would not cause an exceedence of the NAAQS, a dispersion analysis to show compliance to the NAAQS would not be required.[11] Under these circumstances, no further analysis under the CAA or NEPA would be required.

The USEPA promulgated the conformity regulations on November 24, 1993[12] to assist Federal agencies in complying with the State Implementation Plan by specifying rules for two categories of Federal actions: transportation actions and general actions. The two rules have separate and distinct applicability and evaluation requirements. Transportation conformity applies to highway and transit projects, and general conformity regulations apply to all other Federal actions that are not transportation projects, such as airport improvement projects.

[11] FAA, *Air Quality Procedures for Civilian Airports and Air Force Bases*, April 1997, quoted from Section 2.5.1, *National Ambient Air Quality Standards* (*NAAQS) Assessment*, "If the action is in a nonattainment or maintenance area and exempt or presumed to conform under conformity requirements, it is assumed that a NAAQS assessment is not required for an airport or air base action since it is unlikely the action's pollutant concentrations would exceed the NAAQS."

[12] 58 FR 62188, dated November 24, 1993.

## 2.4 STATE IMPLEMENTATION PLAN

According to the CAA, each state must provide the USEPA with a State Implementation Plan (SIP). The SIP must include a strategy for air quality improvement in local areas for each criteria pollutant that exceeds the NAAQS. The SIP must also include a plan to maintain acceptable air quality in areas that do not exceed the NAAQS.

The California SIP is made up of a series of plans for each of the major air basins in the state. The Final Bay Area 2010 Clean Air Plan[13] was adopted on September 15, 2010. The 2010 Bay Area Clean Air Plan updated the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone. The Bay Area 2010 Clean Air Plan (CAP) provides a comprehensive plan to improve air quality, protect public health, and protect the climate. The plan proposes a control strategy to reduce four types of air pollutants – ozone, particulate matter (PM), air toxics, and greenhouse gases – in a multi-pollutant framework.

Any airport project should show consistency with the locally adopted air plan to avoid impacts under CEQA. More importantly, any airport project receiving Federal funding must show conformity with the current air plan that has been approved by the USEPA to receive those funds. The local air plan contains assumptions about population, housing, the transportation network, and the associated regional air emissions. Additionally, the local air plan contains measures and actions that will be implemented to meet the region's air emission goals. Any airport project needs to be consistent with these plans and contain the relevant actions to be considered consistent and in conformity with the SIP.

## 2.5 GENERAL CONFORMITY RULE APPLICABILITY

The General Conformity Rule under the CAA establishes minimum values, referred to as the *de minimis* thresholds, for the criteria and precursor pollutants[14] for the purpose of:

- Identifying Federal actions with project-related emissions that are clearly negligible (*de minimis*);
- Avoiding unreasonable administrative burdens on the sponsoring agency, and;
- Focusing efforts on key actions that would have potential for significant air quality impacts.

[13] Bay Area Air Quality Management District. Final Bay Area Clean Air Plan. September 15, 2010.

[14] Precursor pollutants are pollutants that are involved in the chemical reactions that form the resultant pollutant. Ozone precursor pollutants are $NO_x$, VOC, and $SO_2$, whereas $PM_{2.5}$ precursor pollutants include $NO_x$, VOC, $SO_x$, and ammonia ($NH_3$).

The *de minimis* rates vary depending on the severity of the nonattainment area and further depend on whether the general Federal action is located inside an ozone transport region.[15] California is located outside the ozone transport region. An evaluation relative to the General Conformity Rule (the Rule), published under 40 CFR Part 93,[16] is required only for general Federal actions that would cause emissions of the criteria or precursor pollutants, and are:

- Federally-funded or Federally-approved;
- Not a highway or transit project[17];
- Not identified as an exempt project[18] under the CAA;
- Not a project identified on the approving Federal agency's Presumed to Conform list;[19] and,
- Located within a nonattainment or maintenance area.

Otherwise, if the action is demonstrated to cause emissions that are *de minimis*, the Federal action is not applicable under the Rule.
Alternative B Sponsor's Proposed Action at DVO meets all these conditions and is, therefore, subject to evaluation under the CAA General Conformity Rule. When the action requires evaluation under the General Conformity regulations, the net total direct and indirect emissions due to the Federal action may not equal or exceed the relevant *de minimis* thresholds unless:

- An analytical demonstration is provided that shows the emissions would not exceed the NAAQS; or
- Net emissions are accounted for in the SIP planning emissions budget; or
- Net emissions are otherwise accounted for by applying a solution prescribed under 40 CFR Part 93.158.

The Federal *de minimis* thresholds established under the CAA are given in **Table 2-4**. Alternative B Sponsor's Proposed Action would occur in Marin County, which is designated nonattainment for ozone and $PM_{2.5}$, as well as, being designated as maintenance for CO. Conformity to the *de minimis* thresholds is relevant only with regard to those pollutants and the precursor pollutants for which

---

15 The OTR is a single transport region for ozone (within the meaning of Section 176A(a) of the CAA), comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia, as given at Section 184 of the CAA.

16 USEPA, 40 CFR Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, July 1, 2011.

17 Highway and transit projects are defined under Title 23 U.S. Code and the Federal Transit Act.

18 The DVO Alternative B Sponsor's Proposed Action is not listed as an action exempt from a conformity determination pursuant to 40 CFR Part 93.153(c). An exempt project is one that the USEPA has determined would clearly have no impact on air quality at the facility, and any net increase in emissions would be so small as to be considered negligible.

19 The provisions of the CAA allow a Federal agency to submit a list of actions demonstrated to have low emissions that would have no potential to cause an exceedence of the NAAQS and are presumed to conform to the CAA conformity regulations. This list would be referred to as the "Presumed to Conform" list.

the area is nonattainment or maintenance. Notably, there are no *de minimis* thresholds to which a Federal agency would compare ozone emissions. This is because ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants[20] $NO_x$ and VOC in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, $NO_x$, and VOC.

Although $PM_{2.5}$ is sometimes emitted directly, fine particle emissions can form resulting from chemical reactions involving emissions of the $PM_{2.5}$ precursor pollutants $NO_x$, VOC, $SO_x$, and ammonia ($NH_3$).[21] Therefore, the net emissions of $PM_{2.5}$ and the precursor pollutants $SO_x$, $NO_x$, and VOC would be evaluated with regard to General Conformity.

As such, the pollutants of concern for the project proposed at DVO are CO, $NO_X$, VOC, $PM_{10}$, $PM_{2.5}$, and $SO_X$. If the evaluation of the Alternative B Sponsor's Proposed Action at DVO were to show that any of these thresholds could potentially be equaled or exceeded on an annual basis, additional, more detailed analysis to demonstrate conformity would be required, which is referred to as a General Conformity Determination.[22] Conversely, if the General Conformity evaluation were to show that none of the relevant thresholds were equaled or exceeded, the Alternative B Sponsor's Proposed Action at DVO would be presumed to conform under the CAA and NEPA.

[20] In ozone maintenance areas $SO_2$ may be considered a precursor pollutant. The airport is included in an ozone nonattainment area, where the USEPA has not designated $SO_2$ as a precursor pollutant.

[21] Emissions of $NH_3$ are generally associated with commercial animal agriculture, including feeding operations. Therefore, emissions of $NH_3$ were not included in this analysis.

[22] 40 CFR Part 93.153.

## Table 2-4
## FEDERAL *DE MINIMIS* THRESHOLDS

| CRITERIA AND PRECURSOR POLLUTANTS | TYPE AND SEVERITY OF NONATTAINMENT AREA | TONS PER YEAR THRESHOLD |
|---|---|---|
| Ozone (VOC or $NO_x$)[1] | Serious nonattainment | 50 |
| | Severe nonattainment | 25 |
| | Extreme nonattainment | 10 |
| | Other areas outside an ozone transport region | 100 |
| Ozone ($NO_x$)[1] | Marginal and moderate nonattainment inside an ozone transport regions[2] | 100 |
| | Maintenance | 100 |
| Ozone (VOC)[1] | Marginal and moderate nonattainment inside an ozone transport region[2] | 50 |
| | Maintenance within an ozone transport region[2] | 50 |
| | Maintenance outside an ozone transport region[2] | 100 |
| Carbon monoxide (CO) | All nonattainment & maintenance | 100 |
| Sulfur dioxide ($SO_2$) | All nonattainment & maintenance | 100 |
| Nitrogen dioxide ($NO_2$) | All nonattainment & maintenance | 100 |
| Coarse particulate matter ($PM_{10}$) | Serious nonattainment | 70 |
| | Moderate nonattainment and maintenance | 100 |
| Fine particulate matter ($PM_{2.5}$) (VOC, $NO_x$, $NH_3$, and $SO_x$)[3] | All nonattainment and maintenance | 100 |
| Lead (Pb) | All nonattainment and maintenance | 25 |

Notes: Federal thresholds that are shaded are applicable to this project.
Code of Federal Regulations (CFR), Title 40, *Protection of the Environment*.
USEPA defines *de minimis* as emissions that are so low as to be considered insignificant and negligible.
Volatile organic compounds (VOC); Nitrogen oxides ($NO_x$); Ammonia ($NH_3$); Sulfur oxides ($SO_x$).

[1] The rate of increase of ozone emissions is not evaluated for a project-level environmental review because the formation of ozone occurs on a regional level and is the result of the photochemical reaction of $NO_x$ and VOC in the presence of abundant sunlight and heat. Therefore, USEPA considers the increasing rates of $NO_x$ and VOC emissions to reflect the likelihood of ozone formation on a project level.

[2] An OTR is a single transport region for ozone, comprised of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia.

[3] For the purposes of General Conformity applicability, VOC's and $NH_3$ emissions are only considered $PM_{2.5}$ precursors in nonattainment areas where either a State or USEPA has made a finding that the pollutants significantly contribute to the $PM_{2.5}$ problem in the area. In addition, $NO_X$ emissions are always considered a $PM_{2.5}$ precursor unless the State and USEPA make a finding that $NO_X$ emissions from sources in the State do not significantly contribute to $PM_{2.5}$ in the area. Refer to 74 FR 17003, April 5, 2006.

Sources: USEPA, 40 CFR Part 93.153(b)(1) & (2), March 25, 2008.
USEPA, 40 CFR Part 51.853, March 25, 2008.

## 2.6 REGIONAL SIGNIFICANCE UNDER GENERAL CONFORMITY

A regionally significant Federal action under the CAA is one where the total direct and indirect emissions (net emissions) represent greater than ten percent of the total emissions of any pollutant in the nonattainment or maintenance area, as provided in the SIP emissions budget. The EPA has recently removed the requirement for the regionally significant test in the most recent change to the General Conformity Regulations effect on July 6, 2010.[23] Therefore, the regionally significant test does not apply to the alternatives under consideration at DVO.

## 2.7 TRANSPORTATION CONFORMITY RULE APPLICABILITY

Although airport improvement projects are usually considered under the General Conformity regulations, there can be elements of a proposed action or its alternatives that may require an analysis to demonstrate Transportation Conformity, such as actions relating to transportation plans, programs, projects developed, funded, or approved under Title 23 United States Code (U.S.C.) or the Federal Transit Act,[24] or involve Federal highways. In such case, the sponsoring Federal agency would be required to coordinate with the Federal Highway Administration (FHWA), the State Department of Transportation (DOT), and the local metropolitan planning organization (MPO) to assist in completing a Transportation Conformity evaluation.

As with General Conformity, Transportation Conformity regulations apply only to Federal actions located within a nonattainment or maintenance area. The alternatives under consideration at DVO would not have any effect on regional transportation plans or programs, and no involvement with Federal highways. Therefore, the Transportation Conformity regulations would not apply.

## 2.8 BAAQMD THRESHOLDS

In addition to the thresholds with respect to General Conformity, Alternative B Sponsor's Proposed Action and Alternative D would be limited by thresholds found in **Table 2-5** identified by the BAAQMD in their recently updated Air Quality Guidelines[25]. Should the emissions caused by Alternative B Sponsor's Proposed Action or Alternative D exceed the annual or daily thresholds, it would be considered to have a significant air quality impact.

[23] (USEPA. 6560-50-P [EPA-HQ-OAR-2006-0669; FRL-9131-7] RIN 2060-AH93 Revisions to the General Conformity regulations. 40 CFR Parts 51 and 93 pgs 52 and 53.

[24] USEPA, 40 CFR Part 93.153, *Applicability*, July 1, 2011.

[25] Bay Area Air Quality Management District, CEQA Air Quality Guidelines. June 2010.

**Table 2-5**
**BAAQMD THRESHOLDS**

| POLLUTANTS | Tons/Year | Pounds/Day |
|---|---|---|
| Reactive Organic Gases (ROG) | 10 | 54 |
| Nitrogen Oxides ($NO_X$) | 10 | 54 |
| Coarse Particulate Matter ($PM_{10}$) | 15 | 82 |
| Fine Particulate Matter ($PM_{2.5}$) | 10 | 54 |

Note: Reactive organic gases (ROG) are a subset of total organic gases (TOG), where TOG is multiplied by the fraction of reactive organic gases (FROG) to obtain ROG. The EDMS computer program provides an accounting of TOG, the larger set of organic gases, versus ROG. Therefore, for the purposes of this analysis, TOG will be assumed to reflect ROG.
Source: BAAQMD, CEQA Air Quality Guidelines, June 2010.

The BAAQMD has thresholds of significance for construction emissions. If daily maximum construction emissions exceed the applicable thresholds provided in **Table 2-6** the proposed action would likely result in a significant cumulative impact.

**Table 2-6**
**BAAQMD THRESHOLDS FOR CONSTRUCTION**

| POLLUTANTS | Daily Maximum Emissions Pounds/Day |
|---|---|
| Reactive Organic Gases (ROG) | 54 |
| Nitrogen Oxides ($NO_X$) | 54 |
| Coarse Particulate Matter ($PM_{10}$) | 82 |
| Fine Particulate Matter ($PM_{2.5}$) | 54 |

Note: The daily maximum emission thresholds for PM10 and PM2.5 applies to construction exhaust emissions only.
Source: BAAQMD, CEQA Air Quality Guidelines, June 2010.

The BAAQMD also has thresholds of significance for GHG emissions in the CEQA Guidelines. If annual emissions of operational-related GHGs would exceed 1,100 metric tons per year of CO2e, the proposed project would result in a significant cumulative impact.

## 2.9 CEQA THRESHOLDS

Appendix G of the *CEQA Guidelines* contains a list of effects that will normally be considered significant to climate and air quality. These include:

- A project that will "violate any ambient air quality standard or contribute substantially to an existing or projected air quality violation,"
- A project that conflicts "with or obstruct[s] implementation of the applicable air quality plan,"
- A project that results "in a cumulatively considerable net increase in any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors),"
- A project that exposes "sensitive receptors to substantial pollutant concentrations,"
- A project that creates "objectionable odors affecting a substantial number of people."

Appendix G of the *CEQA Guidelines* also addresses GHG emissions. The *CEQA Guidelines* indicate that a project could have a significant impact if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment,
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

## 2.10 INDIRECT SOURCE REVIEW

Some states require an air quality review when a Federal action has the potential to cause an increase in net emissions from indirect sources. Indirect sources cause emissions that occur later in time or are farther removed from the Federal action. The state requirement is referred to as the Indirect Source Review (ISR) and each state requiring an ISR sets thresholds for increased operation of the indirect sources. When a Federal action has the potential to exceed these thresholds, an ISR is required to assess the character and impact of the additional emissions, which is separate from the analyses required under NEPA or the CAA. According to FAA, *Air Quality Procedures for Airports and Air Force Bases*,[26] proposed projects in Marin County would not require an ISR analysis.

[26] FAA, *Air Quality Procedures for Civilian Airports & Air Force Bases*, Appendix J, April 1997.

# 3. ASSESSMENT METHODOLOGY

This section describes the methodology used to calculate emissions of the criteria and precursor pollutants as well as greenhouse gas emissions and hazardous air pollutants.

## 3.1 WEATHER

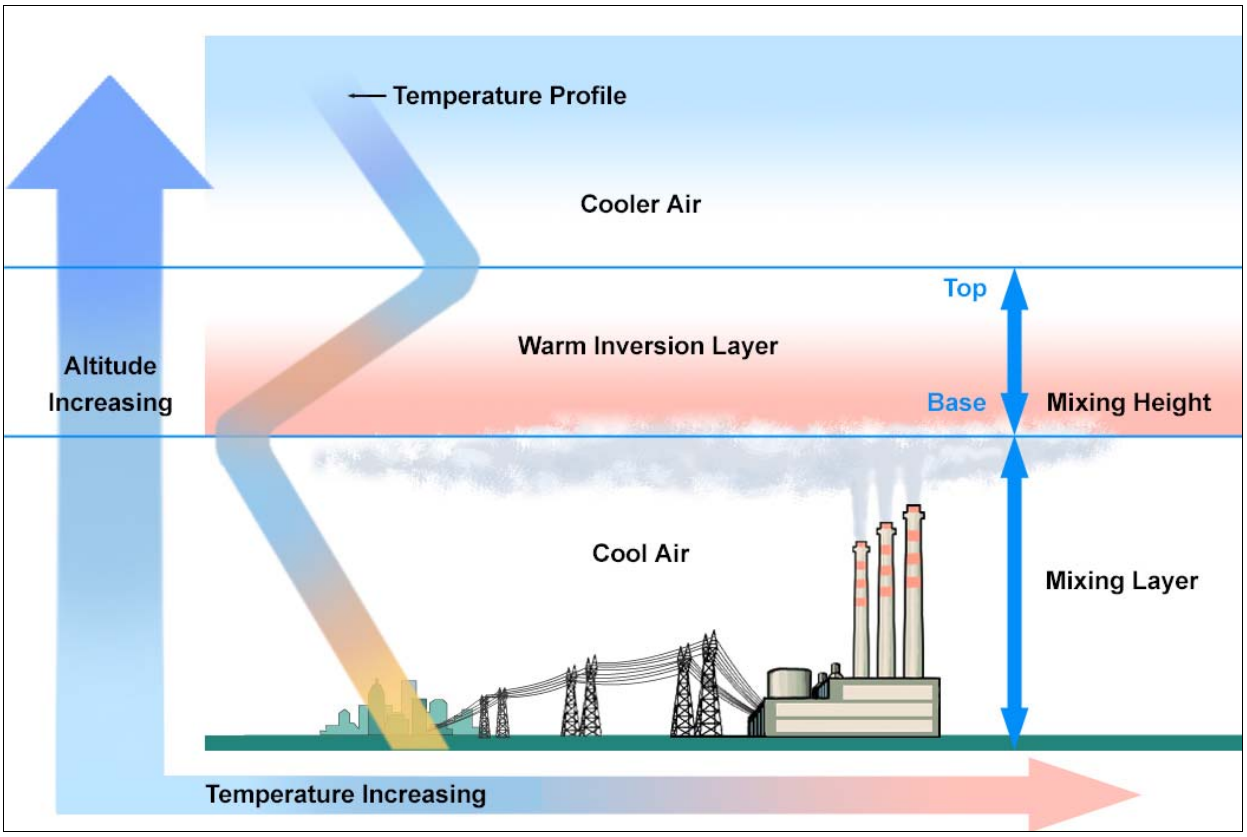
According to the BAAQMD[27], the weather of Marin County consists of the following:

> *Marin County is bounded on the west by the Pacific Ocean, on the east by San Pablo Bay, on the south by the Golden Gate and on the north by the Petaluma Gap. Most of Marin's population lives in the eastern part of the county, in small, sheltered valleys. These valleys act like a series of miniature air basins. Although there are a few mountains above 1500 feet, most of the terrain is only 800 to 1000 feet high, which usually is not high enough to block the marine layer. Because of the wedge shape of the county, northeast Marin County is further from the ocean than is the southeastern section. This extra distance from the ocean allows the marine air to be moderated by bayside conditions as it travels to northeastern Marin County. In southern Marin the distance from the ocean is short and elevations are lower, resulting in higher incidence of maritime air in that area.*
>
> *Air pollution potential is highest in eastern Marin County, where most of population is located in semi-sheltered valleys. In the southeast, the influence of marine air keeps pollution levels low. As development moves further north, there is greater potential for air pollution to build up because the valleys are more sheltered from the sea breeze. While Marin County does not have many polluting industries, the air quality on its eastern side — especially along the U.S. 101 corridor — may be affected by emissions from increasing motor vehicle use within and through the county.*

Local meteorology can affect pollutant concentrations depending on the severity of temperature inversions that occur. A temperature inversion occurs when the upper air is warmer than the air near the ground. This causes air pollutants released at the surface to be trapped beneath the level where the air begins to warm. An illustration of a temperature inversion is shown in **Figure 2**, ***Temperature Inversion*****.**

[27] Bay Area Air Quality Management District, *BAAQMD CEQA Air Quality Guidelines*. Appendix C. June 2010.

**FIGURE 2**
**TEMPERATURE INVERSION**




The FAA-required and USEPA-approved Emissions and Dispersion Modeling System version 5.1 (EDMS) was used for estimating emissions from airport-specific sources. The calculation of emissions from aircraft assumes that aircraft operate only within the mixing layer, below the mixing height, where the emissions may influence ground-based pollutant concentrations. The mixing height, combined with the angle of approach (usually 3 degrees above the horizon) and the departure angle, determines the total time an aircraft operates during approach and climbout.

In order to properly estimate the emissions inventories, information regarding the weather must be obtained, particularly the mixing height, temperature, barometric pressure, wind direction, ceiling height and visibility. For this air quality analysis at DVO, the closest weather station with mixing height data was determined to be at Oakland, California. [28] **Table 3-1** shows the mixing height for the Oakland station used for this analysis.

[28] USEPA, Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the contiguous United States, AP-101, January 1972, Table B-1 *Mean Seasonal and Annual Morning and Afternoon Mixing Heights and Wind Speeds for NOP [no precipitation] and All Cases*.

**Table 3-1**
**MIXING HEIGHTS FOR OAKLAND, CALIFORNIA**

| Season | Morning | | Afternoon | |
|---|---|---|---|---|
| | Meters | Feet | Meters | Feet |
| Winter | 453 | 1,486 | 709 | 2,326 |
| Spring | 763 | 2,503 | 1,121 | 3,678 |
| Summer | 527 | 1,729 | 644 | 2,113 |
| Autumn | 508 | 1,667 | 770 | 2,526 |
| Annual | 563 | 1,846 | 811 | 2,661 |
| Average Annual Mixing Height | 687 Meters or 2,254 feet | | | |

Notes: Average Annual Height is the average of the annual morning and annual afternoon mixing heights.
One meter is equal to 3.281 feet.
Using the guidance provided by USEPA, Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the contiguous United States, AP-101, January 1972, Table B-1 *Mean Seasonal and Annual Morning and Afternoon Mixing Heights and Wind Speeds for NOP [no precipitation] and All Cases, it was* determined that the location of the nearest station to Gnoss Field with mixing height data is at Oakland, California. For the noise analysis in Appendix E, Napa Airport data was used because it was the closest site to Gnoss Field that had long-term temperature and humidity data.

Source: USEPA, Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the contiguous United States, AP-101, January 1972, Table B-1 *Mean Seasonal and Annual Morning and Afternoon Mixing Heights and Wind Speeds for NOP [no precipitation] and All Cases*.

## 3.2 AIRCRAFT

At all airports, including the General Aviation (GA) airport DVO, the number of aircraft operations directly affects emissions. **Table 3-2** shows the annual operations by aircraft category for each year in the study.

**Table 3-2**
**ANNUAL OPERATIONS BY AIRCRAFT CATEGORY**

| | Annual Operations | | |
|---|---|---|---|
| **Aircraft Category** | **2008** | **2018** | **2023** |
| Single Engine Piston | 74,387 | 87,437 | 97,616 |
| Multi Engine Piston | 3,847 | 4,522 | 5,049 |
| Turbine | 6,839 | 8,039 | 8,975 |
| Rotorcraft | 427 | 502 | 560 |
| **TOTAL** | **85,500** | **100,500** | **112,200** |

Source: L&B Analysis, 2009.

For the existing baseline (2008) there are a total of 85,500 annual operations. Operations from the single engine piston type of aircraft made up 87 percent of the total. In 2018 there would be 100,500 annual operations, an approximate seventeen percent increase from the baseline. In 2023 there would be 112,200 operations, an approximate eleven percent increase from 2018.

In order to properly estimate emissions, the landing take-off cycles (LTOs) of each particular aircraft is needed. An LTO consists of the approach, landing roll, taxi to and from the gate/terminal/or parking area, idle time, takeoff, and climbout. An LTO is defined as one arrival operation and one departure operation. Therefore 85,500 annual operations in 2008 would equal 42,750 LTO's.

From the aircraft category a representative aircraft that operated at DVO was selected and then entered into EDMS with the corresponding LTOs. **Table 3-3** shows the Annual LTOs per aircraft for each year in the study. An illustration of the representative aircraft is shown in **Figure 3**, ***Representative Aircraft*.**

**Table 3-3**
**LTOs BY AIRCRAFT**

| | | Annual Landing Take Off Cycles | | |
|---|---|---|---|---|
| **Aircraft Category** | **Representative Aircraft** | **2008** | **2018** | **2023** |
| Single Engine Piston | Cessna 172 | 12,398 | 14,573 | 16,269 |
| | Cessna 182 | 12,398 | 14,573 | 16,269 |
| | Piper PA-28 Cherokee | 12,398 | 14,573 | 16,269 |
| Multi Engine Piston | Piper PA-34 Seneca | 1,924 | 2,261 | 2,525 |
| Turbine | Raytheon Super KingAir 300 | 1,140 | 1,340 | 1,496 |
| | Cessna 525 CitationJet | 1,140 | 1,340 | 1,496 |
| | Cessna 560 Citation Excel | 1,140 | 1,340 | 1,496 |
| Rotorcraft | Sikorsky S-76 Spirit | 213 | 250 | 280 |
| **TOTAL** | | **42,750** | **50,250** | **56,100** |

Source: L&B Analysis, 2009

**Figure 3**
**REPRESENTATIVE AIRCRAFT**


Source: L&B Analysis, 2009 and www.airliners.net

Alternative B Sponsor's Proposed Action and Alternative D would not have the potential to increase the number of aircraft using DVO beyond what is forecasted; therefore, an increase of aircraft operations in the future would be the result of the natural forecasted growth of the Airport. The Future No Action alternatives and the various build alternatives would have the same number of aircraft operations.

## 3.3 TAXI TIMES

The average taxi in and taxi out time is dependent on the airfield configuration. Taxi distances for DVO were developed for aircraft traveling to each runway end. A central aircraft parking area was used in the calculation of taxi times. This area represents the main aircraft tie down area located near the Airport Management Office. The existing distance from the central aircraft parking area to Runway End 13 was determined to be 3,050 feet and the distance from the central aircraft parking area to Runway End 31 was determined to be 1,281 feet. For a taxi speed of ten miles per hour, an average taxi in and taxi out time of 2 minutes and 58 seconds was calculated for the 2008 Existing condition and the future No Action Alternatives. The total average taxi in and taxi out time for the Airport was applied to each aircraft in the fleet list for the calculation of the emissions inventory.

Although an increase in aircraft operations would not occur as a result of the Proposed Action there would be a potential increase in annual emissions as a result of the proposed runway extensions in Alternative B Sponsor's Proposed Action and Alternative D. The proposed extensions would increase taxi distance and taxi time and therefore total emissions from aircraft operations. It is expected that Alternative B Sponsor's Proposed Action would have an increased taxi time over Alternative D because the extension of Alternative B Sponsor's Proposed Action increases the distance from the central aircraft parking area to the runway ends as compared to Alternative D. For Alternative B Sponsor's Proposed Action, an average taxi in and taxi out time of 3 minutes and 28 seconds was calculated and for Alternative D an average taxi in and taxi out time of 3 minutes and 25 seconds was calculated. The total average taxi in and taxi out time was applied to each aircraft in the future fleet list for the applicable alternative for the calculation of the emissions inventory.

## 3.4 AIRCRAFT PERFORMANCE

DVO is used by a variety of aircraft types, each with different runway length requirements. In the runway length analysis[29], takeoff runway length requirements for the representative aircraft were calculated under various conditions using the Flight Planning Manuals or the Pilot's Operating Handbooks for each aircraft type. The takeoff runway length requirements for each of the aircraft in the fleet mix for the "standard day" (59 degrees Fahrenheit) and "hot day" (82 degrees Fahrenheit) were determined for DVO. As daily temperatures increase toward typical summer high temperatures, additional runway length is required because aircraft performance declines as temperatures increase. Hot day temperatures are typically used when computing runway length requirements and were used in this air quality analysis to determine aircraft takeoff weight.

Some aircraft operating into or out of DVO must take a weight penalty with the current 3,300 foot runway configuration. These weight penalties are typically achieved through reduced fuel loads or payloads, which may require an intermediate stop prior to reaching the intended destination. Currently the turbine representative aircrafts, Super KingAir 300, Cessna 525 CitationJet, and the Cessna 560 Citation Excel, take a payload penalty due the length of the runway under "hot day" conditions. According to the runway length analysis the payload penalty results in these turbine aircraft under the 2008 Existing Conditions only being able to have 90, 93, and 92 percent of the maximum takeoff weight (MTOW) respectively. The reduced maximum takeoff weights were also used in the Future No Action alternatives.

For Alternative B Sponsor's Proposed Action and Alternative D, 100 percent of MTOW for all aircraft was used in EDMS because these alternatives provide additional runway length and allow the turbine aircraft to completely fill up with fuel in order to reach their destination.

[29] Runway Length Analysis, Landrum & Brown, March 2009.

## 3.5 FUEL CONSUMPTION

Emissions from fuel storage and handling were based on annual fuel consumption. Annual fuel usage data for Jet A fuel and one hundred octane low lead (100LL) Aviation Gasoline (AvGas) were provided by Marin County for the 2008 Existing Conditions. Fuel throughputs for future no action analysis years were projected using the growth in aircraft operations. The annual fuel throughputs used for the No action alternatives are presented in **Table 3-4**.

**Table 3-4**
**FUEL CONSUMPTION NO ACTION**

| | Existing 2008 (Gallons) | | Projected 2018 No Action (Gallons) | | Projected 2023 No Action (Gallons) | |
|---|---|---|---|---|---|---|
| | Jet A | AvGas | Jet A | AvGas | Jet A | AvGas |
| January | 17,300 | 4,648 | 20,335 | 5,463 | 22,702 | 6,099 |
| February | 18,591 | 6,810 | 21,853 | 8,005 | 24,397 | 8,937 |
| March | 19,654 | 7,768 | 23,102 | 9,131 | 25,792 | 10,194 |
| April | 15,660 | 6,486 | 18,407 | 7,624 | 20,550 | 8,511 |
| May | 16,500 | 8,521 | 19,395 | 10,016 | 21,653 | 11,182 |
| June | 12,584 | 8,590 | 14,792 | 10,097 | 16,514 | 11,272 |
| July | 12,239 | 7,290 | 14,386 | 8,569 | 16,061 | 9,567 |
| August | 13,154 | 7,464 | 15,462 | 8,773 | 17,262 | 9,795 |
| September | 10,774 | 6,278 | 12,664 | 7,379 | 14,139 | 8,238 |
| October | 12,363 | 5,089 | 14,532 | 5,982 | 16,224 | 6,678 |
| November | 7,360 | 3,590 | 8,651 | 4,220 | 9,658 | 4,711 |
| December | 11,739 | 2,724 | 13,798 | 3,202 | 15,405 | 3,575 |
| **Total** | **167,918** | **75,258** | **197,377** | **88,461** | **220,356** | **98,760** |

Note: Fuel consumption projections are based on Aircraft operations. There is a 17.5% increase from 2008 to 2018 and a 11.6% increase from 2018 to 2023.
Source: Marin County Airport and L&B Analysis, 2009

For this analysis it was assumed the proposed longer runway in Alternative B and Alternative D would allow aircraft to have additional fuel onboard. The build alternatives are projected to have an approximate nine percent increase of JetA fuel throughput over the No Action cases because the Super KingAir 300, Cessna 525 CitationJet, and the Cessna 560 Citation Excel aircraft will not have to take a payload penalty and will be able to takeoff with 100% MTOW.

In addition to additional fuel being used on takeoff, aircraft will be consuming more fuel during taxi in and taxi out on the proposed runway and taxiway extensions. Alternative B will have an increase in annual fuel consumption as compared to Alternative D because the extension of Alternative B Sponsor's Proposed Action increases the distance from the central aircraft parking area to the runway ends as

compared to Alternative D. Fuel usage during the additional taxi in and taxi out was added to the increase due to 100% MTOW to determine annual fuel throughputs. The annual fuel throughputs for the build alternatives are presented in **Table 3-5**.

**Table 3-5**
**FUEL CONSUMPTION BUILD ALTERNATIVES**

| | Projected 2018 (Gallons) | | Projected 2023 (Gallons) | |
|---|---|---|---|---|
| | Jet A | AvGas | Jet A | AvGas |
| Alternative B | 220,780 | 90,105 | 246,484 | 100,477 |
| Alternative D | 220,538 | 90,034 | 246,213 | 100,404 |

Source: L&B Analysis, 2009

## 3.6 GROUND SUPPORT EQUIPMENT

Ground support equipment (GSE) is used to service aircraft between flights. Data relating to GSE was obtained from the Airport. The Airport has two fuel trucks, one gasoline powered, and one diesel powered. These fuel trucks are self-contained, and have their own pumps, filters, hoses, and other equipment. These GSE were assigned in EDMS to each aircraft. The gasoline powered fuel truck was assigned to the turbine aircraft and the diesel fuel truck was assigned to the piston aircraft. In addition, the Airport has one diesel mowing tractor that uses less than 500 gallons of fuel per year. It is expected that with Alternative B or Alternative D the mowing tractor would consume up to 750 gallons of fuel per year.

## 3.7 GROUND ACCESS VEHICLES

Data relating to motor vehicles traversing the airport's access roadways were obtained from Marin County Public Works. Emissions were determined from ground access vehicles traveling on Airport Road and vehicles traveling into and out of the Airport's main parking lot. The distance traveled by ground access vehicles one way on Airport Road was determined to be 0.19 miles. Vehicle Miles Traveled (VMT's) were determined using the average daily traffic count on Airport Road, the speed limit of Airport Road (25 miles per hour), and the distance. Future vehicle traffic volumes on Airport Road were projected assuming the increase in the number of vehicles at the Airport would be directly related to projected increases in aircraft annual operations.

The distance traveled by ground access vehicles in parking lots was determined to be 0.20 miles by measuring the distance from the entrance of the main parking lot to the last parking place in the lot to represent a conservative emissions estimate. The analysis did not consider employee parking because the number of employee vehicle trips was determined to be insignificant and is not expected to change with any of the alternatives. Average daily traffic provided in **Table 3-6** accounts for east bound and west bound traffic; therefore, the number of ground access vehicles accessing the parking lot was assumed to be half of the average daily traffic or 168 vehicles for the existing conditions. VMT's were determined using the average

daily traffic count in parking lots, the average speed of the vehicles in the parking lots (10 miles per hour), and the distance. Future vehicle traffic volumes in parking lots were projected assuming the increase in the number of vehicles at the Airport would be directly related to projected increases in aircraft annual operations.

**Table 3-6**
**AVERAGE DAILY TRAFFIC**

| | 2008 | 2018 | 2023 |
|---|---|---|---|
| Airport Road | 335 | 394 | 440 |
| Parking Lot | 168 | 197 | 220 |

Note: Totals represent West Bound and East Bound traffic.
Source: Marin County Public Works and L&B Analysis, 2009

Alternative B Sponsor's Proposed Action and Alternative D would not have the potential to increase the number of ground access vehicles using DVO beyond the No Action conditions. The Future No Action alternatives and the various build alternatives would have the same number of ground access vehicles on Airport Road and in the parking lots. There would be no increase in VMTs or vehicle trips due to the Proposed Action or the build alternatives.

## 3.8 STATIONARY SOURCES

The primary sources of electrical and natural gas energy consumption at DVO include the administration building, the hangars, and lighting for the airfield and public parking areas. The existing facilities are heated by natural gas boiler and cooled by electric chiller. Stationary sources modeled in EDMS for this analysis included the natural gas boiler and two 12,000 gallon capacity fuel storage tanks (one for Jet A fuel and one for Avgas). The fuel throughputs were converted to kiloliters and input into EDMS.

Energy consumption for future no action analysis years were projected using the growth in aircraft operations. It is assumed that the number of airport users increases with or without the proposed improvements.

While no new buildings or hangars are proposed, both Alternative B Sponsor's Proposed Action and Alternative D would increase the demand for electricity above the No Action alternatives due to the need to provide power to edge lighting along the extended runway and taxiway.

## 3.9 PARTICULATE MATTER EMISSIONS FACTORS

EDMS does not contain particulate matter emissions factors for all aircraft. For DVO's specific fleet mix, EDMS only had particulate matter emissions factors for the Cessna 525 CitationJet and the Cessna 560 Citation Excel. Therefore, emissions factors from the USEPA's AP42 Table II-1-9 were used in the calculations of $PM_{10}$ and $PM_{2.5}$ emissions.[30]

## 3.10 LEAD EMISSIONS

The primary source of lead (Pb) emissions at DVO would be the combustion of AvGas in small piston-engine general aviation aircraft. Turbine aircraft were considered to use Jet A and therefore had no lead emissions. Single and multi-engine aircraft were considered to use 100LL Avgas. EDMS does not currently calculate lead emissions from piston-powered aircraft, and thus, it is not a readily available tool for determining airport lead inventories related to aircraft operations. The USEPA's *Lead Emissions from the use of leaded Aviation Gasoline in the US Technical Support Document* was used as the basis to determine lead emissions at DVO for the existing conditions and the various alternatives. [31]

The USEPA's methodology requires as input the number of operations of piston-engine aircraft, fuel consumption rates by aircraft during the LTO, the concentration of lead in the fuel, and the retention of lead in the engine and oil.

Using national averages, USEPA estimated for the National Emissions Inventory (NEI) that aircraft at DVO emitted 0.4 tons of lead per year during the LTO. However, for this air quality analysis specific data was available concerning the fleet mix percentages of aircraft and specific times in mode at DVO. There are continuing efforts to reduce or eliminate lead from Avgas for piston engine aircraft. Lead emissions for future years would be less than calculated in this EIS if the amount of lead in Avgas is reduced or eliminated.

## 3.11 ROG vs. TOG

Reactive organic gases (ROG) are a subset of total organic gases (TOG), where TOG is multiplied by the fraction of reactive organic gases (FROG) to obtain ROG. The EDMS computer program provides an accounting of TOG, the larger set of organic gases, versus ROG. Therefore, for the purposes of this analysis, TOG will be assumed to reflect ROG.

---

30 USEPA. *AP 42 Supplement A to Compilation of Air Pollutant Emission Factors Volume II: Mobile Sources*. Table II-1-9 Emission factors per aircraft per landing/takeoff cycle-civil aircraft. January 1991.

31 USEPA. *Lead Emissions from the Use of Leaded Aviation Gasoline in the United States*. Technical Support Document . EPA420-R-08-020. October 2008.

# 4. EXISTING CONDITIONS

An emission inventory was prepared for the Existing Conditions (2008) using the FAA Emissions and Dispersion Modeling System (EDMS), version 5.1. The model estimates the rate of emissions of the criteria and precursor pollutants in short tons per year.

The primary sources of air emissions at airports are aircraft, ground support equipment (GSE), stationary sources, and ground access vehicles traveling on roadways and in parking facilities. The results of the emission inventory are provided in **Table 4-1**. The greatest overall emission contribution comes from aircraft operations, which represent 82.9 percent of total emissions in 2008. Emissions of Pb, $PM_{10}$ and $PM_{2.5}$ are also produced primarily by aircraft engines. Stationary sources account for 15.7 percent of total emissions in 2008.

**Table 4-1**
**EXISTING CONDITIONS (2008) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| Aircraft | 147.50 | 10.70 | 11.09 | 1.04 | 0.41 | 9.54 | 9.54 | 0.11 |
| GSE | 0.69 | 0.16 | 0.17 | 1.14 | 0.04 | 0.03 | 0.03 | NA |
| GAV in Parking Facilities | 0.32 | 0.04 | 0.05 | 0.04 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.26 | 0.02 | 0.02 | 0.04 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.08 | 17.16 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **149.30** | **28.00** | **28.49** | **3.48** | **0.46** | **9.62** | **9.62** | **0.11** |

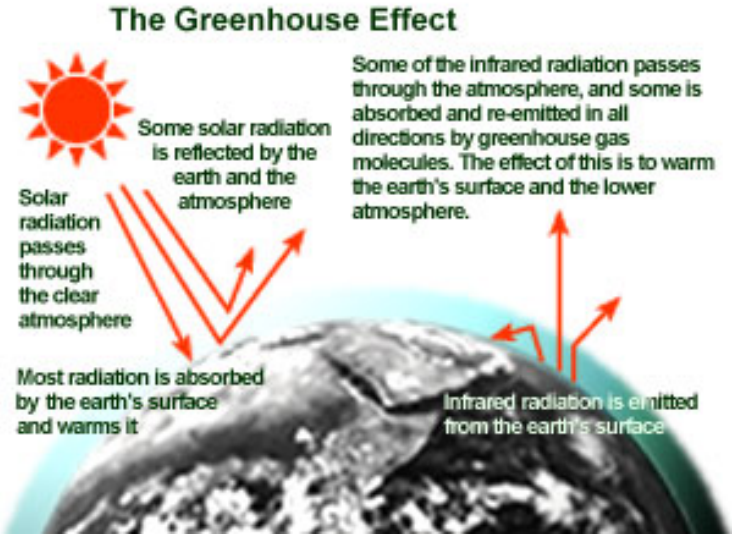
CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
NA = Not applicable
Source: EDMS ver. 5.1, L&B Analysis, 2009.

## 4.1 GREENHOUSE GAS EMISSIONS

According to most international reviews, aviation emissions comprise a small but potentially important percentage of human made greenhouse gases and other emissions that contribute to global warming.

Greenhouse gases are gases that trap heat in the earth's atmosphere as shown in **Figure 4, *Greenhouse Effect***. Both naturally occurring and man-made greenhouse gases primarily include water vapor ($H_2O$), carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Sources that require fuel or power at an airport are the primary sources that would generate greenhouse gases. Aircraft are probably the most often cited air pollutant source, but they produce the same types of emissions as ground access vehicles (GAV).

**Figure 4**
**GREENHOUSE EFFECT**




Source: U.S. EPA.

Different chemical species that are emitted such as $CO_2$, $CH_4$, and $N_2O$ have a different effect on climate. The equivalency method is a way to show relative impacts on climate change of different chemical species. Carbon Dioxide equivalent (CO2e) for this analysis was calculated using global warming potential (GWP) factors provided by the Intergovernmental Panel on Climate Control's Fourth Assessment Report. CO2e are reported in annual metric tons.

The results of the GHG emission inventory are provided in **Table 4-2**.

**Table 4-2**
**EXISTING CONDITIONS (2008) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (short tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 1,462.92 | 0.24 | 0.04 |
| | Aircraft LTO | 998.88 | 0.40 | 0.02 |
| Public | GAV Roadways | 9.50 | 0.0003 | 0.0001 |
| | GAV Parking Lots | 5.21 | 0.0011 | 0.0015 |
| Airport Operator | Stationary Sources | 32.36 | 0.001 | 0.0003 |
| **Grand Total** | | **2,508.86** | **0.64** | **0.07** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 4-3**.

**Table 4-3**
**EXISTING CONDITIONS (2008) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 2,233.30 | 0.58 | 0.06 |
| GAV | 13.34 | 0.00 | 0.00 |
| Stationary Sources | 29.36 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 2,276.00 | 14.44 | 18.09 |
| Total | **2,308.93** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

## 4.2 HAZARDOUS AIR POLLUTANTS

Hazardous air pollutants (HAPs) are gaseous organic and inorganic chemicals, compounds, and particulate matter that may be carcinogenic (known or suspected to cause cancer) or non-carcinogenic (known or suspected to cause other adverse health effects). These substances are believed to cause unique exposure risks because of the innate toxicity of each substance. The 188 substances listed in CAA Section 112 have a variety of toxic effects causing major health concerns relating to, among others, the nervous and reproductive systems, and lung and liver diseases.

The health effects from exposure to HAPs in the ambient air are influenced by the regional meteorology. Higher winds have a tendency to dilute the vaporized pollutants downwind but may also increase the volatilization rate of some liquids.[32] Greater wind speeds may also increase the concentration of nonvolatile contaminants absorbed and adsorbed[33] to soil and dust. Atmospheric instability, which relates to vertical motions in the air, may increase the dispersion of contaminants throughout various vertical levels whereas downwind contaminant concentrations are usually higher when stable atmospheric conditions exist. Precipitation reduces overall airborne contaminants by removing the particles from the air and volatile contaminants emit at lower rates from wet soil than from dry soil. In addition, solar radiation and temperature can also affect the volatilization of liquids. When considering the parameters that affect the formation and dispersion of HAPs, it is clear that health effects from HAP emissions is appropriately assessed on a regional level and not confined to a project-level analysis of a single source.

EDMS currently calculates emissions for 394 speciated hydrocarbons. From the 394 speciated hydrocarbons 45 of them are considered to be HAPs, while the rest are non-toxic compounds. The FAA has identified 19 HAPs related to aircraft operations. These 19 HAPS are presented in **Table 4-4**.

[32] Keith, Lawrence H., et al., Handbook of Air Toxics – Sampling, Analysis, and Properties, 1995.

[33] A substance that is attracted to a surface and remains concentrated on the surface is adsorbed, whereas absorption occurs when the substance is not only retained on the surface but also passes through the surface to become distributed throughout.

## Table 4-4
## EXISTING CONDITIONS (2008) HAPS EMISSIONS INVENTORY

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Ground Access Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.176 | 0.000 | N/A | N/A | **0.176** |
| 2-methylnaphthalene | 0.017 | N/A | N/A | N/A | **0.017** |
| Acetaldehyde | 0.454 | 0.000 | 0.003 | N/A | **0.457** |
| Acetone | 0.099 | N/A | N/A | N/A | **0.099** |
| Acrolein | 0.250 | 0.000 | N/A | N/A | **0.250** |
| Benzaldehyde | 0.051 | N/A | 0.001 | N/A | **0.052** |
| Benzene | 0.181 | 0.002 | 0.001 | 0.556 | **0.740** |
| Ethylbenzene | 0.018 | N/A | 0.000 | 0.683 | **0.701** |
| Formaldehyde | 1.347 | 0.000 | 0.008 | 0.006 | **1.361** |
| Isopropylbenzene (cumene) | 0.000 | N/A | N/A | 0.055 | **0.055** |
| Methyl alcohol | 0.149 | N/A | N/A | N/A | **0.149** |
| Methyl naphthalenes | 0.010 | N/A | N/A | 0.107 | **0.117** |
| N-heptane | 0.007 | N/A | 0.001 | 0.315 | **0.323** |
| Naphthalene | 0.057 | N/A | N/A | 0.134 | **0.191** |
| Phenol (carbolic acid) | 0.065 | N/A | N/A | N/A | **0.065** |
| Propionaldehyde | 0.081 | N/A | 0.002 | N/A | **0.083** |
| Styrene | 0.034 | N/A | N/A | 0.029 | **0.063** |
| Toluene | 0.064 | N/A | 0.002 | 2.560 | **2.626** |
| Xylene | 0.047 | N/A | 0.002 | 3.637 | **3.686** |

N/A = Not Applicable
GSE = Ground Support Equipment
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

# 5. CONSTRUCTION

In accordance with Federal Aviation Administration (FAA) Order 1050.1E, *Environmental Impacts: Policies and Procedures*, the impacts to the environment due to construction activities must be assessed when preparing an EIS. Construction impacts are commonly short-term and temporary in nature. In addition BAAQMD regulations require an assessment of construction emissions. An inventory of emissions from the use of construction equipment was prepared using the computer model URBEMIS 2007, version 9.2.4. The model uses the California Air Resources Board's EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions.

## 5.1 PHASING

Final engineering for Alternative B Sponsor's Proposed Action is not complete. Therefore, the analysis of construction emissions was based on estimates included in a preliminary design report[34] prepared for Marin County. The preliminary estimates based on FAA criteria contained in AC 150-5320-6D, *Airport Pavement Design and Evaluation*, provided the quantity of construction materials likely to be involved in the construction of Alternative B Sponsor's Proposed Action.

Construction of Alternative B Sponsor's Proposed Action would only occur after the Draft EIS/EIR and Final EIS/EIR are publicly released and when FAA and Marin County have issued a decision. The preliminary design report did not provide a schedule for construction. Therefore, for the purposes of this air quality analysis and to estimate emissions, a preliminary schedule was developed.[35] An actual construction schedule would be developed upon final engineering.

Gnoss Field is situated on reclaimed marshlands which lie on the eastern flank of low lying coastal foothills. The Airport site and properties to the north of it are nearly flat with elevations close to sea level. Several meandering sloughs and excavated drainage channels are adjacent to the site and connect with the Petaluma River to the east. A system of levees with pumps for flood protection surrounds the site.

The drainage system for the existing Airport consists of ditches around the airfield inside the perimeter levees, as well as ditches outside the levees. The airport has been designed so runoff will flow by gravity to ditches along the perimeter of the runway and operation areas. The interior ditches on the west side of the runway flow northwest, continue around the north end of the runway, and flow southeast to an area near the existing windsock. The interior ditches on the south end of the Airport flow north to the junction near the windsock. From this point, the flows join and move east towards the Petaluma River. The water leaves the Airport through a culvert in the perimeter levee. The water is eventually pumped into the Black John

[34] Preliminary Design Report Runway Extension Gnoss Field Marin County, California FAA AIP Project No. 3-06-0167-08. Cortright & Seibold, December 20, 2002.

[35] An 18-month construction schedule was developed by Landrum & Brown based on airport construction projects of similar size and scope that were successfully reviewed in previous airport environmental documents.

Slough and then to the Petaluma River. The 20 horsepower pump with a capacity of one acre foot per hour is owned, operated, and maintained by Rancho Del Pantoano. A drainage agreement is maintained between Marin County and the private property owners under which the County contributes toward the cost of operation and maintenance.

According to the preliminary design[36] it is estimated that adding the 1,100-foot runway extension will not overload the existing airfield ditch system under reasonably expected average rainfall amounts. However, extension of the levees to the northwest to contain the 1,100-foot runway extension will cut off one of the major natural drainage courses across the site. In order to avoid the levees diking this flow, an outside perimeter ditch would need to be constructed in both Alternative B and Alternative D to redirect the surface flow around the extended north end of the levee. This ditch would reconnect with natural drainage courses down stream from the Airport levee system so surface water may continue from west to east toward the Petaluma River.

Construction of Alternative B Sponsor's Proposed Action and Alternative D would cause temporary emissions due to the use of construction equipment for the following phases.

**Phase 1 - Drainage Ditch and Levee Realignment /Extension *(Duration 5 months)***

Neither the southern Runway Safety Area (RSA) construction for Alternative B nor the runway extension to the south in Alternative D is expected to impact the drainage or levee system on the Runway 31 end. However, both Alternative B Sponsor's Proposed Action and Alternative D would require the realignment and extension of the drainage ditch and levee system around the north end of the airport. It is assumed that construction would include excavation of the new drainage ditch to a maximum depth of two feet. Material excavated from the drainage ditch extension would be used as fill for the new levee system.

The total project area to be disturbed is estimated to be 28.90 acres for Alternative B Sponsor's Proposed Action and 30.55 acres for Alternative D with the maximum area to be disturbed per day estimated to be 7.23 acres and 7.64 acres respectively (based upon 25% of total area being disturbed at any one time).[37] Extension of the perimeter levees would require 50,000 cubic yards of compacted fill to be imported. These estimated fill volumes do not include an allowance for settlement and/or consolidation as the new material would be placed over existing bay mud.

[36] Preliminary Design Report Runway Extension Gnoss Field Marin County, California FAA AIP Project No. 3-06-0167-08. Cortright & Seibold, December 20, 2002.

[37] Sacramento Metropolitan Air Quality Management District (SMAQMD) recommends estimating "maximum daily acreage disturbed" at 25 percent of the total acreage unless the project is less than 10 acres. For projects that are less than 10 acres, SMAQMD assumes the contractor will actually construct the whole site concurrently. Therefore, for those projects, "maximum daily acreage disturbed" should equal total project acreage.

Therefore the total estimated fill for the levee realignment/extension was estimated at 72,513 cy for Alternative B Sponsor's Proposed Action and 72,787 cy for Alternative D.

**Phase 2- Earthwork/ Import of Fill material *(Duration 5 months)***

The total project area to be disturbed is estimated to be the same as for the Drainage Ditch and Levee Realignment /Extension (28.90 acres for Alternative B Sponsor's Proposed Action and 30.55 acres for Alternative D). The amount of fill material to be imported for the runway extension was determined from the design profile, the pavement structural section width, and side slopes required to meet FAA design standards and the existing site topography. The net finished volume of fill compacted-in-place calculated in the preliminary design report for both the runway and parallel taxiway construction is approximately 45,000 cy. It is expected that fill settlement and/or bay mud consolidation could require an additional 25% to 50% of fill. Therefore the total estimated fill for the earthwork was estimated at 67,500 cy.

**Phase 3 – Fine site grading/ Extension of Utilities *(Duration 2 months)***

The total project area to be fine graded is estimated to be the same as for the earthwork (28.90 acres for Alternative B Sponsor's Proposed Action and 30.55 acres for Alternative D). No fill material for Alternative B and Alternative D would be imported during fine site grading. During this phase construction would include trenching and backfill for the utilities (additional runway lighting).

**Phase 4 – Preparation of sub base *(Duration 1.5 months)***

The area to be disturbed was calculated by using the proposed runway and taxiway length (1,100 feet), the proposed runway width (75 feet), the taxiway width (35 feet), and the RSA areas (240 feet by 75 feet for one RSA). Ten percent was added to the areas in order to be conservative. Alternative B and Alternative D would have the same sub base prep area because the overall runway and taxiway extension lengths and widths are the same. The total project area to be disturbed is estimated to be 4.0 acres with the maximum area to be disturbed per day estimated to be 4.0 acres.[38] The preliminary design report calculated the sub base could be prepared with one foot of aggregate material. Preparation of the sub base would require 8,368 cubic yards[39] of aggregate to be imported.

[38] Sacramento Metropolitan Air Quality Management District (SMAQMD) recommends estimating "maximum daily acreage disturbed" at 25 percent of the total acreage unless the project is less than 10 acres. For projects that are less than 10 acres, SMAQMD assumes the contractor will actually construct the whole site concurrently. Therefore, for those projects, "maximum daily acreage disturbed" should equal total project acreage.

[39] Preliminary Design Report Runway Extension Gnoss Field Marin County, California FAA AIP Project No. 3-06-0167-08. Cortright & Seibold dated December 20, 2002 reports 5,800 cy of aggregate for sub base.

**Phase 5 – Preparation of base *(Duration 1.5 months)***

The area to be disturbed was calculated the same as for the preparation of the sub base. Alternative B and Alternative D would have the same base prep area because the overall runway and taxiway extension lengths and widths are the same. The preliminary design report calculated the base could be prepared with 0.5 foot of aggregate material. Preparation of the sub base would require 4,184 cubic yards[40] of aggregate to be imported.

**Phase 6 – Runway, Taxiway, and RSA Paving *(Duration 3 months)***

After the preparation of the base is complete, application of up to 0.2 feet of asphalt overlay (surface coat paving) would commence. The area to be disturbed was calculated the same as for the preparation of the sub base. The total project area to be disturbed for Alternative B is estimated to be 4.0 acres.

Alternative D would require additional paving since the existing access roadway must be relocated to clear the object free area. Only an estimated 455 feet of the access road would need to be relocated. Therefore the total acreage to be paved for Alternative D is 4.1 acres.

Completion of all phases would involve using typical construction vehicles. The number of vehicles would vary due to project timing, funding, budget constraints, weather, scope of work, and other unforeseen factors, but the types of equipment would remain relatively constant. Equipment common to all of the phases would be tractor loaders/backhoes, rubber tired bulldozers, dump trucks, excavators, trenchers, graders, pavers, rollers, and water trucks.

[40] Preliminary Design Report Runway Extension Gnoss Field Marin County, California FAA AIP Project No. 3-06-0167-08. Cortright & Seibold dated December 20, 2002 reports 2,900 cy of aggregate for base.

## 5.2 CONSTRUCTION EMISSIONS

The daily construction emissions for each phase of Alternative B Sponsor's Proposed Action construction are provided in **Table 5-1.** The maximum daily construction emission for the entire project is listed in bold.

**Table 5-1**
**ALTERNATIVE B MAXIMUM DAILY CONSTRUCTION EMISSIONS**

| EMISSION SOURCES | MAXIMUM DAILY CONSTRUCTION EMISSIONS (Pounds per day) | | | |
|---|---|---|---|---|
| | ROG | NOx | $PM_{10}$ | $PM_{2.5}$ |
| **BAAQMD Threshold** | **54** | **54** | **82** | **54** |
| Phase 1 Drainage Ditch and Levee Realignment/Extension | 3.85 | 34.96 | 1.52 | 1.40 |
| Phase 2 Earthwork/Fill Material | 4.10 | 36.36 | 1.67 | 1.54 |
| Phase 3 Fine Site Grading / Extension of Utilities | **4.85** | **37.15** | **1.92** | **1.76** |
| Phase 4 Sub base Prep | 3.39 | 28.07 | 1.36 | 1.25 |
| Phase 5 Base Prep | 3.15 | 24.87 | 1.25 | 1.15 |
| Phase 6 Runway/Taxiway/RSA Paving | 2.03 | 11.71 | 0.96 | 0.88 |

ROG: Reactive Organic Gases
NOx: Nitrogen Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
RSA: Runway Safety Area
Note: The daily maximum emissions for PM10 and PM2.5 are for construction exhaust emissions only.
Source: URBEMIS ver 9.2.4, L&B Analysis, 2009.

The construction emissions inventory for Alternative B Sponsor's Proposed Action is provided in **Table 5-2.**

**Table 5-2**
**ALTERNATIVE B CONSTRUCTION EMISSIONS INVENTORY**

| EMISSION SOURCES | CONSTRUCTION EMISSIONS (tons per year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | **CO** | **VOC** | **ROG** | **$NO_x$** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Federal Threshold** | **100** | **100** | **NA** | **100** | **100** | **NA** | **100** |
| **BAAQMD Threshold** | **NA** | **NA** | **10** | **10** | **NA** | **15** | **10** |
| Phase 1 Drainage Ditch and Levee Realignment/Extension | 1.04 | NA | 0.21 | 1.89 | 0.00 | 0.08 | 0.08 |
| Phase 2 Earthwork/Fill Material | 1.12 | NA | 0.23 | 2.00 | 0.00 | 0.09 | 0.08 |
| Phase 3 Fine Site Grading / Extension of Utilities | 0.48 | NA | 0.10 | 0.80 | 0.00 | 0.04 | 0.04 |
| **Year 1 Sub Total** | **2.64** | **NA** | **0.54** | **4.69** | **0.00** | **0.22** | **0.20** |
| Phase 4 Sub base Prep | 0.28 | NA | 0.05 | 0.45 | 0.00 | 0.02 | 0.02 |
| Phase 5 Base Prep | 0.26 | NA | 0.05 | 0.40 | 0.00 | 0.02 | 0.02 |
| Phase 6 Runway/Taxiway/RSA Paving | 0.29 | NA | 0.07 | 0.38 | 0.00 | 0.03 | 0.03 |
| **Year 2 Sub Total** | **0.83** | **NA** | **0.17** | **1.23** | **0.00** | **0.07** | **0.07** |

CO: Carbon monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
RSA: Runway Safety Area
Total emissions may not sum exactly due to rounding.
NA=Not applicable
Note: PM10 and PM2.5 values are for construction exhaust emissions only.
Source: URBEMIS ver 9.2.4, L&B Analysis, 2009.

The daily construction emissions for each phase of Alternative D construction are provided in **Table 5-3**. The maximum daily construction emission for the entire project is listed in bold.

**Table 5-3**
**ALTERNATIVE D MAXIMUM DAILY CONSTRUCTION EMISSIONS**

| EMISSION SOURCES | MAXIMUM DAILY CONSTRUCTION EMISSIONS (Pounds per day) | | | |
|---|---|---|---|---|
| | ROG | NOx | $PM_{10}$ | $PM_{2.5}$ |
| **BAAQMD Threshold** | **54** | **54** | **82** | **54** |
| Phase 1 Drainage Ditch and Levee Realignment/Extension | 3.85 | 35.01 | 1.52 | 1.40 |
| Phase 2 Earthwork/Fill Material | 4.10 | 36.36 | 1.67 | 1.54 |
| Phase 3 Fine Site Grading / Extension of Utilities | **4.85** | **37.15** | **1.92** | **1.76** |
| Phase 4 Sub base Prep | 3.39 | 28.07 | 1.36 | 1.25 |
| Phase 5 Base Prep | 3.15 | 24.87 | 1.25 | 1.15 |
| Phase 6 Runway/Taxiway/RSA Paving | 2.03 | 11.71 | 0.96 | 0.88 |

ROG: Reactive Organic Gases
NOx: Nitrogen Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
RSA: Runway Safety Area
Note: The daily maximum emissions for PM10 and PM2.5 are for construction exhaust emissions only.
Source: URBEMIS ver 9.2.4, L&B Analysis, 2009.

The construction emissions inventory for Alternative D is provided in **Table 5-4**.

**Table 5-4**
**ALTERNATIVE D CONSTRUCTION EMISSIONS INVENTORY**

| EMISSION SOURCES | CONSTRUCTION EMISSIONS (tons per year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | VOC | ROG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ |
| **Federal Threshold** | **100** | **100** | **NA** | **100** | **100** | **NA** | **100** |
| **BAAQMD Threshold** | **NA** | **NA** | **10** | **10** | **NA** | **15** | **10** |
| Phase 1 Drainage Ditch and Levee Realignment/ Extension | 1.04 | NA | 0.21 | 1.89 | 0.00 | 0.08 | 0.08 |
| Phase 2 Earthwork/Fill Material | 1.12 | NA | 0.23 | 2.00 | 0.00 | 0.09 | 0.08 |
| Phase 3 Fine Site Grading / Extension of Utilities | 0.48 | NA | 0.10 | 0.80 | 0.00 | 0.04 | 0.04 |
| **Year 1 Sub Total** | **2.64** | **NA** | **0.54** | **4.69** | **0.00** | **0.22** | **0.20** |
| Phase 4 Sub base Prep | 0.28 | NA | 0.05 | 0.45 | 0.00 | 0.02 | 0.02 |
| Phase 5 Base Prep | 0.26 | NA | 0.05 | 0.40 | 0.00 | 0.02 | 0.02 |
| Phase 6 Runway/Taxiway/RSA Paving | 0.29 | NA | 0.07 | 0.38 | 0.00 | 0.03 | 0.03 |
| **Year 2 Sub Total** | **0.83** | **NA** | **0.17** | **1.23** | **0.00** | **0.07** | **0.07** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
RSA: Runway Safety Area
Total emissions may not sum exactly due to rounding.
NA=Not applicable
Note: PM10 and PM2.5 values are for construction exhaust emissions only.
Source: URBEMIS ver 9.2.4, L&B Analysis, 2009.

## 5.3 MITIGATION

While the construction activity due to the Alternative B or D would not exceed CAA or BAAQMD thresholds for significance, fugitive dust would be generated during project construction which has the potential to affect open space areas and adjacent and nearby properties.

### 5.3.1 BAAQMD Mitigation Measures

The BAAQMD recommends the use of the following basic construction mitigation measures whether or not construction related emissions exceed applicable thresholds of significance including:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- 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.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible.
- Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- 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 [CCR]). Clear signage shall be provided for construction workers at all access points.
- 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.
- 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.

### 5.3.2 Federal Mitigation Measures

In addition to the BAAQMD mitigation measures, Marin County shall ensure that all possible measures would be taken to reduce fugitive emissions during construction by requiring the construction contractor to submit a proposed method of erosion and dust control, and disposal of waste materials pursuant to guidelines included in FAA, *Standards for Specifying Construction of Airports*[41] including:

- Exposing the minimum area of erodible earth.
- Applying temporary mulch with or without seeding.
- Using water sprinkler trucks.
- Using covered haul trucks.
- Using dust palliatives or penetration asphalt on haul roads.
- Using plastic sheet coverings.

[41] FAA, *Standards for Specifying Construction of Airports*, Item P-156, *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, AC 150/5370-10E (September 30, 2009).

# 6. MODELING RESULTS

## 6.1 2018 ALTERNATIVE A: NO ACTION

Alternative A is the No Action alternative for 2018. Airport physical conditions such as the airfield configuration are assumed to be unchanged and therefore consistent with the 2008 Existing Conditions. However, with or without the development of a runway alternative, air traffic is projected to increase each year and by 2018 the number of annual aircraft operations will be higher as compared to 2008 Existing Conditions. As such, the higher number of annual aircraft operations in 2018 would increase emissions due to aircraft as compared to 2008 Existing Conditions.

The inventory for this alternative provided in **Table 6.1-1** shows the greatest overall emission contribution comes from aircraft operations, which represent 85.6 percent of total emissions. Emissions of Pb, $PM_{10}$ and $PM_{2.5}$ are also produced primarily by aircraft engines. Stationary sources account for 13.9 percent of total emissions.

**Table 6.1-1**
**ALTERNATIVE A (2018) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **CO** | **VOC** | **TOG** | **$NO_x$** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** |
| Aircraft | 173.36 | 12.57 | 13.04 | 1.22 | 0.49 | 11.21 | 11.21 | 0.13 |
| GSE | 0.52 | 0.08 | 0.08 | 0.19 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.25 | 0.03 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.21 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.13 | 17.21 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **174.87** | **29.82** | **30.37** | **2.67** | **0.50** | **11.27** | **11.27** | **0.13** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009

The results of the GHG emission inventory for this alternative are provided in **Table 6.1-2**.

**Table 6.1-2**
**ALTERNATIVE A (2018) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 1,719.70 | 0.28 | 0.05 |
| | Aircraft LTO | 1,173.99 | 0.47 | 0.03 |
| Public | GAV Roadways | 11.16 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.12 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 36.57 | 0.002 | 0.0003 |
| **Grand Total** | | **2,947.55** | **0.75** | **0.08** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.1-3**.

**Table 6.1-3**
**ALTERNATIVE A (2018) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 2,625.11 | 0.68 | 0.07 |
| GAV | 15.68 | 0.00 | 0.00 |
| Stationary Sources | 33.18 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 2,673.97 | 17.00 | 21.77 |
| Total | **2,712.74** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.1-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

**Table 6.1-4**
**ALTERNATIVE A (2018) HAPS EMISSIONS INVENTORY**

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Motor Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.207 | 0.000 | N/A | N/A | **0.207** |
| 2-methylnaphthalene | 0.020 | N/A | N/A | N/A | **0.020** |
| Acetaldehyde | 0.533 | 0.000 | 0.002 | N/A | **0.535** |
| Acetone | 0.116 | N/A | N/A | N/A | **0.116** |
| Acrolein | 0.294 | 0.000 | N/A | N/A | **0.294** |
| Benzaldehyde | 0.060 | N/A | 0.000 | N/A | **0.060** |
| Benzene | 0.212 | 0.001 | 0.000 | 0.557 | **0.770** |
| Ethylbenzene | 0.021 | N/A | 0.000 | 0.685 | **0.706** |
| Formaldehyde | 1.583 | 0.000 | 0.005 | 0.006 | **1.594** |
| Isopropylbenzene (cumene) | 0.000 | N/A | N/A | 0.056 | **0.056** |
| Methyl alcohol | 0.175 | N/A | N/A | N/A | **0.175** |
| Methyl naphthalenes | 0.012 | N/A | N/A | 0.108 | **0.120** |
| N-heptane | 0.008 | N/A | 0.000 | 0.316 | **0.324** |
| Naphthalene | 0.067 | N/A | N/A | 0.135 | **0.202** |
| Phenol (carbolic acid) | 0.076 | N/A | N/A | N/A | **0.076** |
| Propionaldehyde | 0.095 | N/A | 0.001 | N/A | **0.096** |
| Styrene | 0.040 | N/A | N/A | 0.029 | **0.069** |
| Toluene | 0.076 | N/A | 0.001 | 2.568 | **2.645** |
| Xylene | 0.056 | N/A | 0.000 | 3.648 | **3.704** |

GSE = Ground Support Equipment
N/A = Not Applicable
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

## 6.2 2018 ALTERNATIVE B: SPONSOR'S PROPOSED PROJECT

Alternative B is the Sponsor's Proposed Project and includes the 1,100 foot extension of Runway 13/31 to the northwest. With or without the implementation of this alternative the number of annual aircraft operations for Alternative B would be the same as for the 2018 Alternative A (No Action). The annual number of ground access vehicles in parking lots and on roadways would also be the same as for the 2018 Alternative A (No Action). However, emissions due to aircraft will change as compared to the 2018 Alternative A (No Action) because the extension of the runway will cause a change in taxi time. This alternative will result in an increase in average aircraft taxi time as compared to the 2018 Alternative A (No Action). Longer taxi times increase annual aircraft emissions.

The inventory for this alternative provided in **Table 6.2-1** shows the greatest overall emission contribution comes from aircraft operations, which represent 86.1 percent of total emissions. Emissions of Pb, $PM_{10}$ and $PM_{2.5}$ are also produced primarily by aircraft engines. Stationary sources account for 13.4 percent of total emissions.

**Table 6.2-1**
**ALTERNATIVE B (2018) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **CO** | **VOC** | **TOG** | **$NO_x$** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** |
| Aircraft | 179.54 | 14.40 | 14.90 | 1.32 | 0.53 | 11.24 | 11.24 | 0.13 |
| GSE | 0.52 | 0.08 | 0.08 | 0.19 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.25 | 0.03 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.21 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.14 | 17.22 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **181.05** | **31.66** | **32.24** | **2.77** | **0.54** | **11.30** | **11.30** | **0.13** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
NA = Not applicable/Not available
Source: EDMS ver. 5.1, L&B Analysis, 2009.

The results of the GHG emission inventory for this alternative are provided in **Table 6.2-2**.

**Table 6.2-2**
**ALTERNATIVE B (2018) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 1,881.92 | 0.28 | 0.06 |
| | Aircraft LTO | 1,273.70 | 0.48 | 0.03 |
| Public | GAV Roadways | 11.16 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.12 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 38.60 | 0.002 | 0.0003 |
| **Grand Total** | | **3,211.51** | **0.77** | **0.09** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.2-3**.

**Table 6.2-3**
**ALTERNATIVE B (2018) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 2,862.73 | 0.69 | 0.08 |
| GAV | 15.68 | 0.00 | 0.00 |
| Stationary Sources | 35.02 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 2,913.43 | 17.45 | 24.00 |
| Total | **2,954.87** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.2-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

**Table 6.2-4**
**ALTERNATIVE B (2018) HAPS EMISSIONS INVENTORY**

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Motor Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.238 | 0.000 | N/A | N/A | **0.238** |
| 2-methylnaphthalene | 0.023 | N/A | N/A | N/A | **0.023** |
| Acetaldehyde | 0.613 | 0.000 | 0.002 | N/A | **0.615** |
| Acetone | 0.128 | N/A | N/A | N/A | **0.128** |
| Acrolein | 0.339 | 0.000 | N/A | N/A | **0.339** |
| Benzaldehyde | 0.069 | N/A | 0.000 | N/A | **0.069** |
| Benzene | 0.244 | 0.001 | 0.000 | 0.558 | **0.803** |
| Ethylbenzene | 0.024 | N/A | 0.000 | 0.686 | **0.710** |
| Formaldehyde | 1.816 | 0.000 | 0.005 | 0.006 | **1.827** |
| Isopropylbenzene (cumene) | 0.000 | N/A | N/A | 0.056 | **0.056** |
| Methyl alcohol | 0.205 | N/A | N/A | N/A | **0.205** |
| Methyl naphthalenes | 0.013 | N/A | N/A | 0.108 | **0.121** |
| N-heptane | 0.009 | N/A | 0.000 | 0.316 | **0.325** |
| Naphthalene | 0.077 | N/A | N/A | 0.135 | **0.212** |
| Phenol (carbolic acid) | 0.089 | N/A | N/A | N/A | **0.089** |
| Propionaldehyde | 0.109 | N/A | 0.001 | N/A | **0.110** |
| Styrene | 0.046 | N/A | N/A | 0.029 | **0.075** |
| Toluene | 0.087 | N/A | 0.001 | 2.569 | **2.657** |
| Xylene | 0.064 | N/A | 0.000 | 3.650 | **3.714** |

GSE = Ground Support Equipment
N/A = Not Applicable
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

## 6.3 2018 ALTERNATIVE D: EXTEND RUNWAY TO THE SOUTHEAST BY 240 FEET AND TO THE NORTHWEST BY 860 FEET

Alternative D extends the runway to the southeast by 240 feet and to the northwest by 860 feet. Alternative D also requires extension of the corresponding taxiways, levee extension, realignment of the drainage, and reprogramming the navigational aids. The inventory for this alternative provided in **Table 6.3-1** shows the greatest overall emission contribution comes from aircraft operations, which represent 86.1 percent of total emissions. Emissions of Pb, $PM_{10}$ and $PM_{2.5}$ are also produced primarily by aircraft engines. Stationary sources account for 13.4 percent of total emissions.

**Table 6.3-1**
**ALTERNATIVE D (2018) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| Aircraft | 179.28 | 14.32 | 14.82 | 1.31 | 0.53 | 11.24 | 11.24 | 0.13 |
| GSE | 0.52 | 0.08 | 0.08 | 0.19 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.25 | 0.03 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.21 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.14 | 17.22 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **180.79** | **31.58** | **32.16** | **2.77** | **0.54** | **11.30** | **11.30** | **0.13** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
NA = Not applicable/Not available
Source: EDMS ver. 5.1, L&B Analysis, 2009.

The results of the GHG emission inventory for this alternative are provided in **Table 6.3-2**.

**Table 6.3-2**
**ALTERNATIVE D (2018) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 1,881.92 | 0.28 | 0.06 |
| | Aircraft LTO | 1,270.50 | 0.48 | 0.03 |
| Public | GAV Roadways | 11.16 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.12 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 38.60 | 0.002 | 0.0003 |
| **Grand Total** | | **3,208.30** | **0.77** | **0.09** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.3-3**.

**Table 6.3-3**
**ALTERNATIVE D (2018) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 2,859.82 | 0.69 | 0.08 |
| GAV | 15.68 | 0.00 | 0.00 |
| Stationary Sources | 35.02 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 2,910.52 | 17.44 | 23.97 |
| **Total** | **2,951.92** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.3-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

**Table 6.3-4**
**ALTERNATIVE D (2018) HAPS EMISSIONS INVENTORY**

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Motor Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.237 | 0.000 | N/A | N/A | **0.237** |
| 2-methylnaphthalene | 0.023 | N/A | N/A | N/A | **0.023** |
| Acetaldehyde | 0.610 | 0.000 | 0.002 | N/A | **0.612** |
| Acetone | 0.128 | N/A | N/A | N/A | **0.128** |
| Acrolein | 0.337 | 0.000 | N/A | N/A | **0.337** |
| Benzaldehyde | 0.069 | N/A | 0.000 | N/A | **0.069** |
| Benzene | 0.243 | 0.001 | 0.000 | 0.558 | **0.802** |
| Ethylbenzene | 0.024 | N/A | 0.000 | 0.686 | **0.710** |
| Formaldehyde | 1.806 | 0.000 | 0.005 | 0.006 | **1.817** |
| Isopropylbenzene (cumene) | 0.000 | N/A | N/A | 0.056 | **0.056** |
| Methyl alcohol | 0.204 | N/A | N/A | N/A | **0.204** |
| Methyl naphthalenes | 0.013 | N/A | N/A | 0.108 | **0.121** |
| N-heptane | 0.009 | N/A | 0.000 | 0.316 | **0.325** |
| Naphthalene | 0.076 | N/A | N/A | 0.135 | **0.211** |
| Phenol (carbolic acid) | 0.088 | N/A | N/A | N/A | **0.088** |
| Propionaldehyde | 0.109 | N/A | 0.001 | N/A | **0.110** |
| Styrene | 0.046 | N/A | N/A | 0.029 | **0.075** |
| Toluene | 0.087 | N/A | 0.001 | 2.569 | **2.657** |
| Xylene | 0.063 | N/A | 0.000 | 3.650 | **3.713** |

N/A = Not Applicable
GSE = Ground Support Equipment
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

## 6.4 2023 ALTERNATIVE A: NO ACTION

Alternative A is the No Action alternative for 2023. Airport physical conditions such as the airfield configuration are assumed to be unchanged and therefore consistent with the 2008 Existing Conditions. However, with or without the development of a runway alternative, air traffic is projected to increase each year and by 2023 the number of annual aircraft operations will be higher as compared to 2008 Existing Conditions. As such, the higher number of annual aircraft operations in 2023 would increase emissions due to aircraft as compared to 2008 Existing Conditions.

The inventory for this alternative provided in **Table 6.4-1** shows the greatest overall emission contribution comes from aircraft operations.

**Table 6.4-1**
**ALTERNATIVE A (2023) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| Aircraft | 193.57 | 14.04 | 14.56 | 1.36 | 0.54 | 12.52 | 12.52 | 0.14 |
| GSE | 0.56 | 0.07 | 0.07 | 0.11 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.27 | 0.02 | 0.03 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.23 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.18 | 17.25 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **195.14** | **31.33** | **31.92** | **2.72** | **0.56** | **12.58** | **12.58** | **0.14** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009

The results of the GHG emission inventory for this alternative are provided in **Table 6.4-2**.

**Table 6.4-2**
**ALTERNATIVE A (2023) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 1,919.64 | 0.31 | 0.06 |
| | Aircraft LTO | 1,310.92 | 0.52 | 0.03 |
| Public | GAV Roadways | 12.46 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.83 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 40.83 | 0.002 | 0.0003 |
| **Grand Total** | | **3,290.69** | **0.84** | **0.09** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.4-3**.

**Table 6.4-3**
**ALTERNATIVE A (2023) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 2,930.72 | 0.76 | 0.08 |
| GAV | 17.50 | 0.00 | 0.00 |
| Stationary Sources | 37.04 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 2,985.26 | 18.97 | 24.24 |
| Total | **3,028.48** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.4-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

**Table 6.4-4**
**ALTERNATIVE A (2023) HAPS EMISSIONS INVENTORY**

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Motor Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.231 | 0.000 | N/A | N/A | **0.231** |
| 2-methylnaphthalene | 0.022 | N/A | N/A | N/A | **0.022** |
| Acetaldehyde | 0.595 | 0.000 | 0.002 | N/A | **0.597** |
| Acetone | 0.130 | N/A | N/A | N/A | **0.130** |
| Acrolein | 0.329 | 0.000 | N/A | N/A | **0.329** |
| Benzaldehyde | 0.067 | N/A | 0.000 | N/A | **0.067** |
| Benzene | 0.237 | 0.001 | 0.000 | 0.559 | **0.797** |
| Ethylbenzene | 0.023 | N/A | 0.000 | 0.687 | **0.710** |
| Formaldehyde | 1.768 | 0.000 | 0.005 | 0.006 | **1.779** |
| Isopropylbenzene (cumene) | 0.000 | N/A | N/A | 0.056 | **0.056** |
| Methyl alcohol | 0.195 | N/A | N/A | N/A | **0.195** |
| Methyl naphthalenes | 0.014 | N/A | N/A | 0.108 | **0.122** |
| N-heptane | 0.009 | N/A | 0.000 | 0.316 | **0.325** |
| Naphthalene | 0.074 | N/A | N/A | 0.135 | **0.209** |
| Phenol (carbolic acid) | 0.085 | N/A | N/A | N/A | **0.085** |
| Propionaldehyde | 0.106 | N/A | 0.001 | N/A | **0.107** |
| Styrene | 0.045 | N/A | N/A | 0.029 | **0.074** |
| Toluene | 0.085 | N/A | 0.000 | 2.575 | **2.660** |
| Xylene | 0.063 | N/A | 0.000 | 3.658 | **3.721** |

GSE = Ground Support Equipment
N/A = Not Applicable
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

## 6.5 2023 ALTERNATIVE B: SPONSOR'S PROPOSED PROJECT

Alternative B is the Sponsor's Proposed Project and includes the 1,100 foot extension of Runway 13/31 to the northwest. With or without the implementation of this alternative the number of annual aircraft operations for Alternative B would be the same as for the 2023 Alternative A (No Action). The annual number of ground access vehicles in parking lots and on roadways would also be the same as for the 2023 Alternative A (No Action). However, emissions due to aircraft will change as compared to the 2023 Alternative A (No Action) because the extension of the runway will cause a change in taxi time. This alternative will result in an increase in average aircraft taxi time as compared to the 2023 Alternative A (No Action). Longer taxi times increase annual aircraft emissions.

The inventory for this alternative provided in **Table 6.5-1** shows the greatest overall emission contribution comes from aircraft operations.

**Table 6.5-1**
**ALTERNATIVE B (2023) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| Aircraft | 200.46 | 16.08 | 16.64 | 1.47 | 0.59 | 12.55 | 12.55 | 0.15 |
| GSE | 0.56 | 0.07 | 0.07 | 0.11 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.27 | 0.02 | 0.03 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.23 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.18 | 17.26 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **202.03** | **33.37** | **34.01** | **2.83** | **0.61** | **12.61** | **12.61** | **0.15** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
NA = Not applicable/Not available
Source: EDMS ver. 5.1, L&B Analysis, 2009.

The results of the GHG emission inventory for this alternative are provided in **Table 6.5-2**.

**Table 6.5-2**
**ALTERNATIVE B (2023) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 2,099.66 | 0.31 | 0.06 |
| | Aircraft LTO | 1,422.26 | 0.54 | 0.03 |
| Public | GAV Roadways | 12.46 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.83 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 43.10 | 0.002 | 0.0004 |
| **Grand Total** | | **3,584.31** | **0.86** | **0.10** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.5-3**.

**Table 6.5-3**
**ALTERNATIVE B (2023) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 3,195.03 | 0.77 | 0.09 |
| GAV | 17.50 | 0.00 | 0.00 |
| Stationary Sources | 39.10 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 3,251.63 | 19.46 | 26.72 |
| Total | **3,297.81** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.5-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

**Table 6.5-4**
**ALTERNATIVE B (2023) HAPS EMISSIONS INVENTORY**

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | Aircraft | Motor Vehicles | GSE | Stationary Sources | Total |
| 1,3-butadiene | 0.266 | 0.000 | N/A | N/A | **0.266** |
| 2-methylnaphthalene | 0.026 | N/A | N/A | N/A | **0.026** |
| Acetaldehyde | 0.684 | 0.000 | 0.002 | N/A | **0.686** |
| Acetone | 0.143 | N/A | N/A | N/A | **0.143** |
| Acrolein | 0.379 | 0.000 | N/A | N/A | **0.379** |
| Benzaldehyde | 0.077 | N/A | 0.000 | N/A | **0.077** |
| Benzene | 0.272 | 0.001 | 0.000 | 0.559 | **0.832** |
| Ethylbenzene | 0.027 | N/A | 0.000 | 0.687 | **0.714** |
| Formaldehyde | 2.028 | 0.000 | 0.005 | 0.006 | **2.039** |
| Isopropylbenzene (cumene) | 0.001 | N/A | N/A | 0.056 | **0.057** |
| Methyl alcohol | 0.229 | N/A | N/A | N/A | **0.229** |
| Methyl naphthalenes | 0.015 | N/A | N/A | 0.108 | **0.123** |
| N-heptane | 0.010 | N/A | 0.000 | 0.317 | **0.327** |
| Naphthalene | 0.085 | N/A | N/A | 0.135 | **0.220** |
| Phenol (carbolic acid) | 0.099 | N/A | N/A | N/A | **0.099** |
| Propionaldehyde | 0.122 | N/A | 0.001 | N/A | **0.123** |
| Styrene | 0.051 | N/A | N/A | 0.029 | **0.080** |
| Toluene | 0.098 | N/A | 0.000 | 2.576 | **2.674** |
| Xylene | 0.071 | N/A | 0.000 | 3.659 | **3.730** |

GSE = Ground Support Equipment
N/A = Not Applicable
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

## 6.6 2023 ALTERNATIVE D: EXTEND RUNWAY TO THE SOUTHEAST BY 240 FEET AND TO THE NORTHWEST BY 860 FEET

Alternative D extends the runway to the southeast by 240 feet and to the northwest by 860 feet. Alternative D also requires extension of the corresponding taxiways, levee extension, realignment of the drainage, and reprogramming the navigational aids. The inventory for this alternative provided in **Table 6.6-1** shows the greatest overall emission contribution comes from aircraft operations.

**Table 6.6-1**
**ALTERNATIVE D (2023) EMISSIONS INVENTORY**

| EMISSION SOURCES | ANNUAL EMISSIONS (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| Aircraft | 200.17 | 16.00 | 16.55 | 1.47 | 0.59 | 12.55 | 12.55 | 0.15 |
| GSE | 0.56 | 0.07 | 0.07 | 0.11 | 0.01 | 0.01 | 0.01 | NA |
| GAV in Parking Facilities | 0.27 | 0.02 | 0.03 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| GAV on Roadways | 0.23 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | NA |
| Stationary Sources | 0.52 | 17.18 | 17.26 | 1.22 | 0.00 | 0.05 | 0.05 | NA |
| **TOTAL** | **201.75** | **33.29** | **33.92** | **2.83** | **0.60** | **12.61** | **12.61** | **0.15** |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
GSE: Ground Service Equipment
GAV: Ground Access Vehicles
Total emissions may not sum exactly due to rounding.
NA = Not applicable/Not available
Source: EDMS ver. 5.1, L&B Analysis, 2009.

The results of the GHG emission inventory for this alternative are provided in **Table 6.6-2**.

**Table 6.6-2**
**ALTERNATIVE D (2023) GHG EMISSIONS INVENTORY**

| Owning/Controlling Entity | Emissions Sources | ANNUAL EMISSIONS (tons per year) | | |
|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ |
| Tenants | Aircraft Cruise | 2,099.71 | 0.31 | 0.06 |
| | Aircraft LTO | 1,418.68 | 0.54 | 0.03 |
| Public | GAV Roadways | 12.46 | 0.0005 | 0.0001 |
| | GAV Parking Lots | 6.83 | 0.0013 | 0.0019 |
| Airport Operator | Stationary Sources | 43.10 | 0.002 | 0.0004 |
| **Grand Total** | | **3,580.78** | **0.86** | **0.10** |

LTO: Landing Takeoff Cycle
GAV: Ground Access Vehicles
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

In order to determine CO2 equivalent all emissions sources were summed. Totals were converted from short to metric tons (1 short ton = 0.907184 metric tons) and then multiplied by the Global Warming Potential provided in the IPCC Fourth Assessment Report. The results are provided in **Table 6.6-3**.

**Table 6.6-3**
**ALTERNATIVE D (2023) CO2 EQUIVALENT**

| Metrics | Annual Metric Tons | | |
|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ |
| Aircraft | 3,191.82 | 0.77 | 0.09 |
| GAV | 17.50 | 0.00 | 0.00 |
| Stationary Sources | 39.10 | 0.00 | 0.00 |
| $GWP_{100}$ | *1.00* | *25.00* | *298.00* |
| $CO_{2e}$ | 3,248.42 | 19.44 | 26.69 |
| **Total** | **3,294.56** | | |

GAV: Ground Access Vehicles
GWP: Global Warming Potential
CO2e: Carbon Dioxide equivalent
CO2: Carbon Dioxide
CH4: Methane
N20: Nitrogen Dioxide (nitrous oxide)
Total emissions may not sum exactly due to rounding.
Source: IPCC Fourth Assessment Report and L&B Analysis, 2009

The HAP inventory for this alternative is provided in **Table 6.6-4.** This inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

## Table 6.6-4
## ALTERNATIVE D (2023) HAPS EMISSIONS INVENTORY

| TYPES OF HAZARDOUS AIR POLLUTANTS | ANNUAL HAP EMISSIONS BY SOURCE (tons per year) | | | | |
|---|---|---|---|---|---|
| | **Aircraft** | **Motor Vehicles** | **GSE** | **Stationary Sources** | **Total** |
| 1,3-butadiene | 0.264 | 0.000 | N/A | N/A | **0.264** |
| 2-methylnaphthalene | 0.026 | N/A | N/A | N/A | **0.026** |
| Acetaldehyde | 0.681 | 0.000 | 0.002 | N/A | **0.683** |
| Acetone | 0.143 | N/A | N/A | N/A | **0.143** |
| Acrolein | 0.377 | 0.000 | N/A | N/A | **0.377** |
| Benzaldehyde | 0.077 | N/A | 0.000 | N/A | **0.077** |
| Benzene | 0.271 | 0.001 | 0.000 | 0.559 | **0.831** |
| Ethylbenzene | 0.027 | N/A | 0.000 | 0.687 | **0.714** |
| Formaldehyde | 2.017 | 0.000 | 0.005 | 0.006 | **2.028** |
| Isopropylbenzene (cumene) | 0.001 | N/A | N/A | 0.056 | **0.057** |
| Methyl alcohol | 0.228 | N/A | N/A | N/A | **0.228** |
| Methyl naphthalenes | 0.014 | N/A | N/A | 0.108 | **0.122** |
| N-heptane | 0.010 | N/A | 0.000 | 0.317 | **0.327** |
| Naphthalene | 0.085 | N/A | N/A | 0.135 | **0.220** |
| Phenol (carbolic acid) | 0.099 | N/A | N/A | N/A | **0.099** |
| Propionaldehyde | 0.121 | N/A | 0.001 | N/A | **0.122** |
| Styrene | 0.051 | N/A | N/A | 0.029 | **0.080** |
| Toluene | 0.097 | N/A | 0.000 | 2.576 | **2.673** |
| Xylene | 0.071 | N/A | 0.000 | 3.659 | **3.730** |

N/A = Not Applicable
GSE = Ground Support Equipment
Xylene is assumed to be the sum of O-xylene, M-xylene, and M & P-xylene.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1 Landrum & Brown Analysis, 2009.

# 7. DISCUSSION OF DETERMINATIONS

## 7.1 TOTAL EMISSIONS

The results of the computer modeling to estimate air emissions resulting from the construction and operation of the Airport under the various alternatives are provided in **Table 7-1**.

**Table 7-1**
**TOTAL ANNUAL EMISSIONS**

| ALTERNATIVES | TOTAL ANNUAL EMISSIONS FROM ALL AIRPORT-RELATED SOURCES (in tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| **2008** | | | | | | | | |
| Existing Conditions | 149.30 | 28.00 | 28.49 | 3.48 | 0.46 | 9.62 | 9.62 | 0.11 |
| **Year 1 Construction** | | | | | | | | |
| Alternative B | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| Alternative D | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| **Year 2 Construction** | | | | | | | | |
| Alternative B | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| Alternative D | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| **2018** | | | | | | | | |
| Alternative A | 174.87 | 29.82 | 30.37 | 2.67 | 0.50 | 11.27 | 11.27 | 0.13 |
| Alternative B | 181.05 | 31.66 | 32.24 | 2.77 | 0.54 | 11.30 | 11.30 | 0.13 |
| Alternative D | 180.79 | 31.58 | 32.16 | 2.77 | 0.54 | 11.30 | 11.30 | 0.13 |
| **2023** | | | | | | | | |
| Alternative A | 195.14 | 31.33 | 31.92 | 2.72 | 0.56 | 12.58 | 12.57 | 0.14 |
| Alternative B | 202.03 | 33.37 | 34.01 | 2.83 | 0.61 | 12.61 | 12.61 | 0.15 |
| Alternative D | 201.75 | 33.29 | 33.92 | 2.83 | 0.60 | 12.61 | 12.61 | 0.15 |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
NA: Not Available/Not Applicable
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

The results of the emission inventory prepared for each alternative were compared to the results of the existing conditions and to the baseline alternative (Alternative A) of the same future year to disclose the potential increase in emissions caused by each project alternative. Annual net emissions are provided in **Table 7-2** and **Table 7-3**.

**Table 7-2**
**ANNUAL NET IMPACT OF CRITERIA AND PRECURSOR POLLUTANT EMISSIONS (ALTERNATIVES COMPARED TO 2008 EXISTING CONDITIONS)**

| ALTERNATIVES | IMPACT OF CRITERIA AND PRECURSOR POLLUTANT EMISSIONS (in tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| **Federal Threshold** | **100** | **100** | **NA** | **100** | **100** | **NA** | **100** | **NA** |
| **BAAQMD Threshold** | **NA** | **NA** | **10** | **10** | **NA** | **15** | **10** | **NA** |
| **Year 1 Construction** | | | | | | | | |
| Alternative B | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| Alternative D | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| **Year 2 Construction** | | | | | | | | |
| Alternative B | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| Alternative D | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| **2018** | | | | | | | | |
| Alternative A | 25.57 | 1.82 | 1.88 | -0.81 | 0.04 | 1.65 | 1.65 | 0.02 |
| Alternative B | 31.75 | 3.65 | 3.75 | -0.71 | 0.08 | 1.68 | 1.68 | 0.02 |
| Alternative D | 31.49 | 3.58 | 3.67 | -0.71 | 0.08 | 1.68 | 1.68 | 0.02 |
| **2023** | | | | | | | | |
| Alternative A | 45.84 | 3.32 | 3.44 | -0.75 | 0.10 | 2.96 | 2.96 | 0.03 |
| Alternative B | 52.74 | 5.37 | 5.53 | -0.64 | 0.14 | 2.99 | 2.99 | 0.04 |
| Alternative D | 52.45 | 5.28 | 5.44 | -0.65 | 0.14 | 2.99 | 2.99 | 0.04 |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
NA: Not Available/Not Applicable
Total emissions may not sum exactly due to rounding.
PM10 and PM2.5 values are for construction exhaust emissions only.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

NOx emissions decrease in the future years as compared to the existing conditions because emissions factors applied in EDMS for ground access vehicles decrease in future years. CO emissions from the various alternatives increase as compared to the existing conditions due primarily to the increase in aircraft operations at DVO.

**Table 7-3**
**ANNUAL NET IMPACT OF CRITERIA AND PRECURSOR POLLUTANT EMISSIONS (ALTERNATIVES COMPARED TO NO ACTION OF THE SAME YEAR)**

| ALTERNATIVES | IMPACT OF CRITERIA AND PRECURSOR POLLUTANT EMISSIONS (in tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO | VOC | TOG | $NO_x$ | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | Pb |
| **Federal Threshold** | **100** | **100** | **NA** | **100** | **100** | **NA** | **100** | **NA** |
| **BAAQMD Threshold** | **NA** | **NA** | **10** | **10** | **NA** | **15** | **10** | **NA** |
| **Year 1 Construction** | | | | | | | | |
| Alternative B | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| Alternative D | 2.64 | NA | 0.54 | 4.69 | 0.00 | 0.22 | 0.20 | NA |
| **Year 2 Construction** | | | | | | | | |
| Alternative B | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| Alternative D | 0.83 | NA | 0.17 | 1.23 | 0.00 | 0.07 | 0.07 | NA |
| **2018** | | | | | | | | |
| Alternative B | 6.18 | 1.83 | 1.87 | 0.10 | 0.04 | 0.03 | 0.03 | 0.00 |
| Alternative D | 5.92 | 1.76 | 1.79 | 0.10 | 0.04 | 0.03 | 0.03 | 0.00 |
| **2023** | | | | | | | | |
| Alternative B | 6.89 | 2.05 | 2.09 | 0.11 | 0.05 | 0.03 | 0.03 | 0.01 |
| Alternative D | 6.61 | 1.96 | 2.00 | 0.11 | 0.04 | 0.03 | 0.03 | 0.01 |

CO: Carbon Monoxide
VOC: Volatile Organic Compounds
TOG: Total Organic Gases
NOx: Nitrogen Oxides
SOx: Sulfur Oxides
PM10: Course particulate matter
PM2.5: Fine particulate matter
Pb: Lead
Total emissions may not sum exactly due to rounding.
NA: Not Available/Not Applicable
Note: PM10 and PM2.5 values are for construction exhaust emissions only.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

Annual net GHG emissions are provided in **Table 7-4**.

**Table 7-4**
**ANNUAL NET IMPACT OF GHG EMISSIONS (ALTERNATIVES COMPARED TO 2008 EXISTING CONDITIONS)**

| ANNUAL NET EMISSIONS | |
|---|---|
| **CO2e (metric tons per year)** | |
| BAAQMD Threshold | 1,100 |
| **Construction Year 1** | |
| Alternative B | 716.19 |
| Alternative D | 716.74 |
| **Construction Year 2** | |
| Alternative B | 176.67 |
| Alternative D | 176.73 |
| **2018** | |
| Alternative A | 403.81 |
| Alternative B | 645.94 |
| Alternative D | 642.99 |
| **2023** | |
| Alternative A | 719.55 |
| Alternative B | 988.88 |
| Alternative D | 985.63 |

CO2e is Carbon Dioxide equivalent.
Total emissions may not sum exactly due to rounding.
Source: EDMS ver. 5.1, L&B Analysis, 2009.

### 7.1.2 Existing Plus Project Conditions

The recent court case of Sunnyvale West Neighborhood Association v. City of Sunnyvale City Council confirmed the CEQA requirement to compare the existing condition to an existing plus project scenario. For this project, the existing plus project scenario would consist of the airport operating at current aircraft operational levels with the proposed improvements to the airport facilities. Most notably, the existing plus project case results in slightly longer taxi times and a corresponding increase in emissions over the existing case. In Table 7-2, the Alternative B for 2018 best reflects the change in emissions that would occur between existing and existing plus project conditions. The change in emissions are low, and below all significance thresholds. Therefore, the Alternative B does not result in any significant emission increases based on existing conditions versus existing plus project comparison.

## 7.2 FEDERAL THRESHOLDS OF SIGNIFICANCE

As shown in Table 7-3, neither construction nor operation of Alternative B Sponsor's Proposed Action or Alternative D would cause annual net emissions that would equal or exceed the relevant Federal *de minimis* thresholds as identified in Table 2-4 for the pollutants of concern.

## 7.3 CALIFORNIA BAY AREA AIR QUALITY MANAGEMENT DISTRICT THRESHOLDS OF SIGNIFICANCE

As shown in Table 7-3, neither construction nor operation of Alternative B Sponsor's Proposed Action or Alternative D would cause annual net emissions that would equal or exceed the relevant BAAQMD *de minimis* thresholds as identified in Table 2-5 for the pollutants of concern. Construction emissions for Alternative B Sponsor's Proposed Action and Alternative D would not exceed BAAQMD daily emissions thresholds.

### 7.3.1 Greenhouse Gas Thresholds of Significance

The evaluation of GHG emissions showed that neither construction nor operation of Alternative B Sponsor's Proposed Action or Alternative D would cause annual net GHG emissions that would equal or exceed the BAAQMD *de minimis* thresholds of 1,100 metric tons per year.

### 7.3.2 Local Carbon Monoxide Concentrations

Neither the Alternative B Sponsor's Proposed Action nor Alternative D would cause vehicle emissions of CO on roadways or in parking lots to exceed 550 pounds per day (0.275 tons per day or 100 tons per year). In addition none of the alternatives would be expected to produce significant traffic congestion; impact signalized intersections or roadway links operating at Level of Service (LOS) D, E, or F, or would cause a decline to the existing LOS.

### 7.3.3 Odors

While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints. Alternative B Sponsor's Proposed Action and Alternative D do not involve siting a new odor source near an existing sensitive receptor or siting a new sensitive receptor near an existing odor source. None of alternatives under consideration include construction or operation of wastewater treatment plants, landfills, confined animal facilities, compositing stations, food manufacturing plants, refineries or chemical plants. None of alternatives under consideration have the potential to cause odor emissions or expose members of the public to objectionable odors.

### 7.3.4 Toxic Air Contaminants

None of the alternatives under consideration have the potential to expose sensitive receptors or the general public to substantial levels of toxic air contaminants. Construction of Alternative B Sponsor's Proposed Action would cause temporary emissions due to the use of construction equipment and could result in the generation of diesel particulate matter. However construction generated emissions of diesel PM are anticipated to occur away from any sensitive receptors.

### 7.3.5 Accidental Releases/Acutely Hazardous Air Emissions

None of the alternatives under consideration have the potential for accidental releases of acutely hazardous materials. Neither Alternative B Sponsor's Proposed Action nor Alternative D use or store acutely hazardous materials located near sensitive receptors or result in sensitive receptors being located near any existing facilities using or storing acutely hazardous materials.

### 7.3.6 Adaption to Climate Change

The potential for flooding and erosion associated with climate change pose a threat to communities along the California coast and there is compelling evidence that these risks will increase in the future. Data presented in *The Impacts of Sea Level Rise on the California Coast*[42] project mean sea level along the California coast will rise from 1.0 to 1.4 meters by the year 2100. Rising seas put new areas at risk of flooding and increase the likelihood and intensity of floods in areas that are already at risk.

According to the preliminary design[43] it is estimated that adding the 1,100-foot runway extension will not overload the existing airfield ditch system. After construction, the ditch system would reconnect with natural drainage courses down stream from the Airport levee system so surface water may continue from west to east toward the Petaluma River. The Airport levee system has a height of 5 feet and would provide protection from an increased risk of flooding and erosion due to climate change. Therefore, the neither Alternative B Sponsor's Proposed Action nor Alternative D would have an adverse impact to climate change.

## 7.4 CUMULATIVE IMPACTS

Cumulative impacts are those impacts that can be reasonably expected to occur as a result of implementation of the Alternative B Sponsor's Proposed Action or Alternative D, in combination with the impacts from other past, present, and reasonably foreseeable future activities, development, and/or projects that may be connected by geography or time.[44]

The results of this air quality analysis show that implementation of the Alternative B Sponsor's Proposed Action or Alternative D would result in *de minimis* (negligible and insignificant)[45] increases in air emissions.

---

[42] California Climate Change Center. *The Impacts of Sea Level Rise on the California Coast*. Executive Summary. March 2009.

[43] Preliminary Design Report Runway Extension Gnoss Field Marin County, California FAA AIP Project No. 3-06-0167-08. Cortright & Seibold, December 20, 2002.

[44] *Considering Cumulative Impacts Under the National Environmental Policy Act*, Council on Environmental Quality, January 1997.

[45] A Federal action that is demonstrated to cause de minimis emissions is defined as having negligible or insignificant impacts; reference FAA, Air Quality Procedures for Civilian Airports & Air Force Bases, see Glossary entry for "de minimis," April 1997; and Addendum, September 2004.

Net emissions caused by the construction and implementation of the Proposed Action or Alternative D would not cause a violation of any NAAQS, delay the attainment of any NAAQS, or worsen any existing NAAQS violation. Therefore, the de minimis emissions defined for any of the alternatives, when combined with present and future projects, will not have the potential to change the current status of the air quality in Marin County and will not result in significant cumulative impacts. As necessary, mitigation procedures would be implemented to minimize potential impacts that would occur during construction.

Under CEQA, upon determining if a project does not individually have significant operational air quality impacts, the determination of significant cumulative impact should be based on an evaluation of the consistency of the proposed project with the local general plan and of the general plan with the regional air quality plan.

In addition as shown in Table 7-4, neither Alternative B Sponsor's Proposed Action nor Alternative D would exceed the BAAQMD GHG thresholds.

### 7.4.1 Consistency with Local Plans

The Marin Countywide Plan guides the conservation and development of Marin County. The Plan sets a target to maintain Gnoss Field as the County's civilian airport facility in accordance with the adopted Airport Master Plan. Alternative B Sponsor's Proposed Action would be consistent with the Marin Countywide Plan.

In addition to the Countywide Plan, Marin County adopted a resolution in 2002 that recognizes both the gravity of global warming and the responsibility for local action. The resolution committed Marin County to analyze greenhouse gas emissions, set a reduction target, develop a local action plan, and implement the local action plan. Marin County did develop a local action plan[46] and as a result of analyzing emissions from internal government operations as well as Marin County as a whole, a target was made to voluntarily reduce greenhouse gas emissions 15% - 20% below 1990 levels by the year 2020 for internal government and 15% countywide. According to the plan, internal measures already implemented by the Marin County Department of Public Works will likely result in the County's achievement of the internal reduction target. Marin County remains proactive in implementing GHG emissions reduction projects in County buildings.

### 7.4.2 Consistency with Clean Air Plan

Alternative B Sponsor's Proposed Action and Alternative D would not increase vehicle miles traveled (VMTs) or vehicle trips greater than the increase in population projected for Marin County. The Marin Countywide Plan's meets or exceeds the Clean Air Plan's transportation control measures as listed in below.

[46] Marin County Community Development Agency. *Marin County Greenhouse Gas Reduction Plan*. October 2006.

**GOAL AIR-3 Reduction of Vehicle-Generated Pollutants**.

Reduce vehicle trips and emissions, and improve vehicle efficiency, as means of limiting the volume of pollutants generated by traffic.

**Policy AIR-3.1 Institute Transportation Control Measures**.

Support a transportation program that reduces vehicle trips, increases ridesharing, and meets or exceeds the Transportation Control Measures recommended by BAAQMD in the most recent Clean Air Plan to reduce pollutants generated by vehicle use.

In addition Marin's Countywide plan provides buffer zones around sources of odors, toxics, and accidental releases and does not require a general plan amendment. Marin's Countywide plan and Greenhouse Gas Reduction plan are consistent with the Final Bay Area 2010 Clean Air Plan. Therefore, Alternative B Sponsor's Proposed Action and all of the alternatives would not individually have any significant impacts and no further analysis regarding cumulative impacts is necessary.

## 7.5 GENERAL CONFORMITY EVALUATION

The evaluation of General Conformity showed that annual net emissions caused by operation and construction of Alternative B Sponsor's Proposed Action, would not equal or exceed the relevant *de minimis* thresholds for the pollutants of concern. Therefore, the General Conformity Rule does not apply to Alternative B Sponsor's Proposed Action or Alternative D and there is no requirement for a General Conformity Determination under regulations of the CAA. Further, Alternative B Sponsor's Proposed Action would cause *de minimis*, or insignificant, emissions and would not have the potential to cause significant adverse air quality impacts in Marin County.

Further, because the emissions caused by Alternative B Sponsor's Proposed Action and the other alternatives are *de minimis*, the project is assumed not to cause an exceedence of the NAAQS[47] or the CAAQS, and there is no requirement to conduct dispersion analysis to compare project-related emissions to the NAAQS or CAAQS. Consequently, Alternative B Sponsor's Proposed Action and the alternatives comply with the provisions of the Clean Air Act, *Clean Air Act Title 1, Section 176(c)(1*). No further analysis or reporting is required under the provisions of the CAA, NEPA or CEQA guidelines.

[47] FAA, *Air Quality Procedures for Civilian Airports and Air Force Bases*, April 1997; and Addendum, September 2004, quoted from Section 2.1.5, *NAAQS Assessment*, "If the action is in a nonattainment or maintenance area and exempt or presumed to conform under conformity requirements, it is assumed that a NAAQS assessment is not required for an airport or air base action since it is unlikely the action's pollutant concentrations would exceed the NAAQS."

# ATTACHMENT 1

# GLOSSARY

Airport planning and the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) process require the use of many technical terms. Some of the most important terms are defined in this section. Terms in *italics* are defined separately in this glossary.

**Air Quality Control Region (AQCR)** An EPA designated interstate or intrastate geographic region that has significant air pollution or the potential for significant air pollution and, due to topography, meteorology, etc., needs a common air quality control strategy. The region includes all the counties that are affected by or have sources that contribute directly to the air quality of that region.

**Attainment Area** – Any area that meets the national primary or secondary ambient air quality standard for a particular criteria pollutant.

**Carbon Monoxide (CO)** - A *criteria pollutant* that is colorless, odorless gas produced through the incomplete combustion of fossil fuels.

**CFRs** – Code of Federal Regulations

**Clean Air Act (CAA)** – The Federal law regulating air quality. The first Clean Air Act (CAA) passed in 1967, required that air quality criteria necessary to protect the public health and welfare be developed. Since 1967, there have been several revisions to the CAA. The Clean Air Act Amendments of 1990 represent the fifth major effort to address clean air legislation.

**Conformity** – The act of meeting Section 176(c)(1) of the CAAA that requires Federal actions to conform to the SIP for air quality. The action may not increase the severity of an existing violation nor can it delay attainment of an standards.

**Criteria Pollutants** – The six air pollutants listed in the CAA for which the USEPA has established health-based limits. The six criteria pollutants are *carbon monoxide, nitrogen dioxide, lead, sulfur dioxide, particulate matter,* and *ozone*.

**De Minimis Thresholds** – The de minimis thresholds are considered the thresholds of significance relative to compliance of net emissions under Federal and state air quality regulations, and in determining the potential for significant air quality impacts caused by a Federal action. They are the minimum rates (tons per year) for *Alternative B Sponsor's Proposed Action* above which a General Conformity Determination would be required. De minimis is defined by the *USEPA* as emissions that are insignificant and negligible, with no potential to cause significant adverse air quality impacts. The applicable rates depend on the severity of the nonattainment designation and whether the project is located within the ozone transport region. Also applicable are rates for precursor pollutants, which are $NO_x$ and VOC for ozone, and $SO_x$ for emissions of $PM_{2.5}$.

**Dispersion** – The process by which atmospheric pollutants disseminate due to wind and vertical stability.

**Emission Factor** – The rate at which pollutants are emitted into the atmosphere by one source or a combination of sources.

**Environmental Impact Statement (EIS)** - A detailed report on proposals for major Federal actions significantly affecting the quality of the human environment, that includes: environmental impact of the Alternative B Sponsor's Proposed Action, any adverse environmental effects which cannot be avoided should the proposal be implemented, alternatives to the proposal, relationship between local short-term uses of the environment and maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources involved in the Alternative B Sponsor's Proposed Action, should it be implemented. Refer to CEQ regulation 40 CFR 1508.11 and National Environmental Policy Act Section 102 (42 USC §4332).

**Federal Aviation Administration (FAA)** - The Federal agency responsible for insuring the safe and efficient use of the nation's airspace, for fostering civil aeronautics and air commerce, and for supporting the requirements of national defense.

**Fugitive Dust** – Dust discharged to the atmosphere in an unconfined flow stream such as that from an unpaved road, storage piles, and heavy construction operations.

**Hydrocarbons (HC)** – Gases that represent unburned and wasted fuel. They come from incomplete combustion of gasoline and from evaporation of petroleum fuels.

**Inversion** – A thermal gradient created by warm air situated above cooler air. An inversion suppresses turbulent mixing and thus limits the upward dispersion of polluted air.

**Lead (Pb)** – A heavy metal that, when ingested or inhaled, affects the blood forming organs, kidneys, and the nervous system. The chief source of this pollutant at airports is the combustion of leaded aviation gasoline in piston-engine aircraft.

**LTO** – LTO refers to an aircraft's landing and takeoff cycle. One aircraft LTO is equivalent to two aircraft operations (one landing and one takeoff). The standard LTO cycle begins when the aircraft crosses into the mixing zone as it approaches the airport on its descent from cruising altitude, lands and taxis to the gate. The cycle continues as the aircraft taxis back out to the runway for takeoff and climbout as its heads out of the mixing zone and back up to cruising altitude. The five specific operating modes in a standard LTO are: approach, taxi/idle-in, taxi/idle-out, takeoff, and climbout. Most aircraft go through this sequence during a complete standard operating cycle.

**Maintenance Area (MA) -** Any geographic area of the United States previously designated nonattainment pursuant the CAA Amendments of 1990 and subsequently redesignated to attainment.

**Mixing Height -** The height of the completely mixed portion of atmosphere that begins at the earth's surface and extends to a few thousand feet overhead where the atmosphere becomes fairly stable.

**Mobile Source -** A moving vehicle that emits pollutants. Such sources include airplanes, automobiles, trucks and ground support equipment.

**National Environmental Policy Act of 1969 (NEPA)** - The original legislation establishing the environmental review process for proposed Federal actions.

**Nitrogen Dioxide ($NO_2$) –** A *criteria pollutant* gas that absorbs sunlight and gives air a reddish-brown color. $NO_2$ is a subset of the larger set of nitrogen oxides (*$NO_X$)*. The gas is reactive and forms when fuel is burned at high temperatures and high pressure. **Nitrogen Oxides ($NO_X$)** – See *$NO_2$*.

**National Ambient Air Quality Standard (NAAQS) -** Air Quality standards established by the EPA to protect human health (primary standards) and to protect property and aesthetics (secondary standards).

**Nonattainment Area–** Any geographical area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for any particular *criteria pollutant*.

**Ozone ($O_3$) –** A *criteria pollutant* which is not directly emitted, rather, ozone is formed in the atmosphere through photochemical reaction with *nitrogen oxides (NOX)*, *volatile organic compounds (VOC)*, sunlight, and heat. It is the primary constituent of smog and problems occur many miles away from the pollutant sources. Due to the fact that ozone is not directly emitted and is a regional phenomenon, emissions of $NO_x$ and VOC are evaluated to indicate the likely formation of ozone. Ozone is not evaluated for a project-level emission inventory.

**Particulate Matter ($PM_{10}$ & $PM_{2.5}$)** – There are two sizes of particulate matter that account for one of the six criteria pollutants. $PM_{10}$, coarse particles with a diameter of 10 micrometers or less, and $PM_{2.5}$, fine particles with a diameter of 2.5 micrometers or less. Emissions of $PM_{2.5}$ is a subset of emissions of $PM_{10}$. Particulate matter can be any particle of these sizes, including dust, dirt, and soot. Particulate matter is directly emitted by engine combustion. $PM_{2.5}$ reacts with precursor pollutants VOC, NO*x*, and $SO_x$ gases to form secondary particles.

**PPM -** Parts per million (106) by volume.

**Precursor Pollutant** – Pollutant which aid in the formation of *criteria pollutants*. *$NO_x$* and *VOC* are precursor pollutants to *ozone* development; *$SO_x$*, $NO_x$, and VOC are precursors to development of *$PM_{2.5}$*.

**Alternative B Sponsor's Proposed Action** – The solution proposal by the proponent to the "problem" that prompted the need for a review of possible environmental impacts. The Alternative B Sponsor's Proposed Action would have a specific purpose and need and a timeline for implementation. The *Environmental Impact Statement (EIS)* must also include reasonable and feasible alternatives to the Alternative B Sponsor's Proposed Action that may also meet the purpose and need of the project sponsor. The Alternative B Sponsor's Proposed Action is a proposal in initial form before undergoing analysis in the EIS process.

**Scoping -** Scoping is an early and open process for determining the scope or range of issues to be addressed in the *Environmental Impact Statement* and identifying the significant issues related to Alternative B Sponsor's Proposed Action. Issues important to the public and local, state, and Federal agencies are solicited through direct mailing, public notices, or meetings.

**State Implementation Plan (SIP)** – A plan stating the strategy the state will use to meet and maintain the Federal air quality standards as required under the Clean Air Act (CAA, including the 1990 Amendments). A SIP includes the projected emission budgets and controls for industrial, area, and mobile sources of pollution.

**Sulfur Dioxide ($SO_2$)** – A *criteria pollutant* formed when fuel containing sulfur, like coal, oil and jet fuel, is burned and is commonly expressed as $SO_X$ since it is a large subset of sulfur dioxides ($SO_2$). $SO_2$ is a colorless gas that is typically identified as having a strong odor. $SO_x$ is a *precursor pollutant* to the formation of $PM_{2.5}$ emissions.

**Sulfur Oxides ($SO_X$)** – See $SO_2$.

**Total Organic Gases (TOG) -** This term includes all hydrocarbon compounds in an emission sample. See also HC and VOC. These terms are not interchangeable.

**Vehicle Miles Traveled (VMT) –** The sum of distances traveled by all motor vehicles in a specified region. VMT is equal to the total number of vehicle trips multiplied by the trip distance (measured in miles). This sum is used in computing an emission inventory for motor vehicles.

**Volatile Organic Compound (VOC)** – Gases that are emitted from solids or liquids, such as fuel storage, paint, and cleaning fluids. VOC include a variety of chemicals, some which can have short and long-term adverse health effects. VOCs are *precursor pollutants* that react with heat, sunlight and *nitrogen oxides ($NO_x$* to form *ozone ($O_3$)*. VOC also mix with other gases to form $PM_{2.5}$. VOCs are a subset of TOGs.

# ATTACHMENT 2
# AGENCY COORDINATION

This attachment includes the following:

**Agency Scoping Meeting #1**

1) Email Invitation from Douglas Pomeroy, FAA to Air Quality Agency Representatives, Subject: Agency invitation air quality scoping meeting, Runway Extension Environmental Impact Statement and Environmental Impact Report for Gnoss Field Airport, Marin County, on April 22, 2009, 10:00am Sent: Friday, March 20, 2009 7:11PM
2) Letter from Douglas Pomeroy, FAA to Air Quality Agency Representatives, Subject: Invitation to Gnoss Field Airport, Marin County, California, Runway Extension Project, Environmental Impact Statement/ Environmental Impact Report, Air Quality Scoping Meeting April 22, 2009, 10:00am. Dated March 27, 2009.
3) Air Quality Scoping Presentation. April 22, 2009.
4) Air Quality Scoping Meeting Summary. April 22, 2009.

**THIS PAGE INTENTIONALLY LEFT BLANK**

# ATTACHMENT 3
# LIST OF PREPARERS

Fred Greve
Managing Director
Mestre Greve Associates Division of Landrum & Brown
27812 El Lazo Road
Laguna Niguel, CA 92677

Matthew Jones
Project Manager
Mestre Greve Associates Division of Landrum & Brown
27812 El Lazo Road
Laguna Niguel, CA 92677

Chris Babb
Senior Consultant
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242

David Billiter
Analyst
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242

**THIS PAGE INTENTIONALLY LEFT BLANK**

# ATTACHMENT 4
# COMPUTER MODELING FILES

The printout of the input and output files for the EDMS and URBEMIS computer modes used to calculate the emissions caused by the various alternatives would be hundreds of pages of data attached to this appendix. Therefore, these files are available electronically upon request.

**THIS PAGE INTENTIONALLY LEFT BLANK**

**From:** Douglas.Pomeroy@faa.gov [mailto:Douglas.Pomeroy@faa.gov]
**Sent:** Friday, March 20, 2009 7:11 PM
**To:** Hanf.lisa@epa.gov; gtholen@baaqmd.gov; mnichols@arb.ca.gov; dkimsey@mtc.ca.gov; ceils@abag.ca.gov; ESteger@co.marin.ca.us; KRobbins@co.marin.ca.us; jraplan@sbcglobal.net
**Cc:** Rob Adams; Sara Hassert
**Subject:** Agency invitation air quality scoping meeting, Runway Extension Environmental Impact Statement and Environmental Impact Report for Gnoss Field Airport, Marin County, on April 22, 2009, 10:00 AM

20 March 2009

Dear Air Quality Authorities:

The Federal Aviation Administration (FAA) is scheduling an Air Quality Scoping Meeting in support of an Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) being prepared for the Gnoss Field Airport in Marin County, California. Marin County has proposed an 1,100-foot extension of Runway 13/31, an extension of the taxiway supporting Runway 13/31, and associated levee construction and realignment of drainage to protect the runway against flooding. The FAA is preparing the EIS in accordance with the National Environmental Policy Act (NEPA) and Marin County is preparing EIR in accordance with the California Environmental Quality Act (CEQA).

Discussion during the meeting will include the methodology for preparing the required air quality analysis. The FAA is requesting your attendance because of your unique expertise concerning the evaluation of air quality impacts and/or air quality assessments in the region. Before the meeting is officially scheduled, the FAA would like to know your availability and to confirm that you are the correct contact for your organization. The tentative date, time, and location for the meeting are as follows:

Date: Wednesday, April 22, 2009

Time: 10:00 AM

Location: Bay Area Air Quality Management District Office, 939 Ellis St., San Francisco, CA 94109 (Contact: Greg Tholen, 415-771-6000 ext 4954)

Please reply to this e-mail by March 27, 2009 to confirm your receipt and to let me know if you will be available on April 22, 2009. If this email is more appropriate for another member of your organization, please forward it to them and cc me at Douglas.Pomeroy@FAA.gov. Once we have everyone's responses, we will send out an official letter notifying you of the meeting.

If you have any questions, please email me or call me at (650) 876-2778 ext 612.

Thank you,

Doug Pomeroy

U.S. Department
of Transportation
**Federal Aviation Administration**

Western-Pacific Region
Airports Division

San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, CA 94010

March 27, 2009

Ms. Lisa Hanf,
U.S. Environmental Protection Agency
Region 9, Air Program
Planning Chief
75 Hawthorne Street
San Francisco, CA 94105

Mr. Greg Tholen
Senior Environmental Planner
Bay Area Air Quality Mgt District
939 Ellis Street
San Francisco, CA 94109

Ms. Mary D. Nichols, Chair
Air Resources Board
California Environmental Protection Agency
P.O. Box 2815
Sacramento, CA 95812

Mr. Eric Steger
Department of Public Works
County of Marin
3501 Civic Center Drive
San Rafael, CA 94903

Mr. Doug Kimsey
Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94607

Mr. Ken Robbins
Airport Manager
Gnoss Field Airport
451-A Airport Road
Novato, CA 94945

Ms. Ceil Scandone
Senior Planner
Association of Bay Area Governments
101 Eighth Street
Oakland, CA 94607

Subject: Invitation to Gnoss Field Airport, Marin County, California, Runway Extension Project, Environmental Impact Statement/Environmental Impact Report, Air Quality Scoping Meeting, April 22, 2009, 10:00 AM.

Dear Agency Representatives:

The Federal Aviation Administration (FAA) has scheduled an Air Quality Scoping Meeting in support of the Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) (State Clearinghouse #2008072037) that are currently being prepared for the Gnoss Field Airport in Marin County, California. Marin County has proposed an 1,100-foot extension of Runway 13/31, an extension of the taxiway supporting Runway 13/31, and associated levee construction and realignment of drainage to protect the runway against flooding. The FAA is preparing the EIS in accordance with the National Environmental Policy Act (NEPA) and Marin County is preparing the EIR in accordance with the California Environmental Quality Act (CEQA).

Discussion during the meeting will include the methodology for preparing the required air quality analysis. The FAA is requesting your attendance because of your unique expertise concerning the evaluation of air quality impacts and/or air quality assessments in the region. The date, time, and location for the meeting are as follows:

**Date: Wednesday, April 22, 2009**

**Time: 10:00 AM**

**Location:** **Bay Area Air Quality Management District Office**
**939 Ellis St., San Francisco, CA 94109 (see map attached)**
**4th Floor West Conference Room**

**Security Note:** Please plan to arrive a few minutes early to allow time to pass through security. Please also bring a photo ID. All visitors must sign-in with security in the main lobby. Security staff will verify your identification and prepare a photo ID for each visitor.

An e-mail announcing this meeting was sent to you on March 20. If this invitation is more appropriate for another member of your organization, please forward it to them and let me know so that the FAA can follow-up with them directly. Additional project information is also available at: www.gnossfieldeis-eir.com

Our FAA point-of-contact for this meeting is Mr. Barry Franklin, 650-876-2778 ext 614 e-mail barry.franklin@faa.gov. I can be reached at 650-876-2778, extension 612, e-mail douglas.pomeroy@faa.gov.

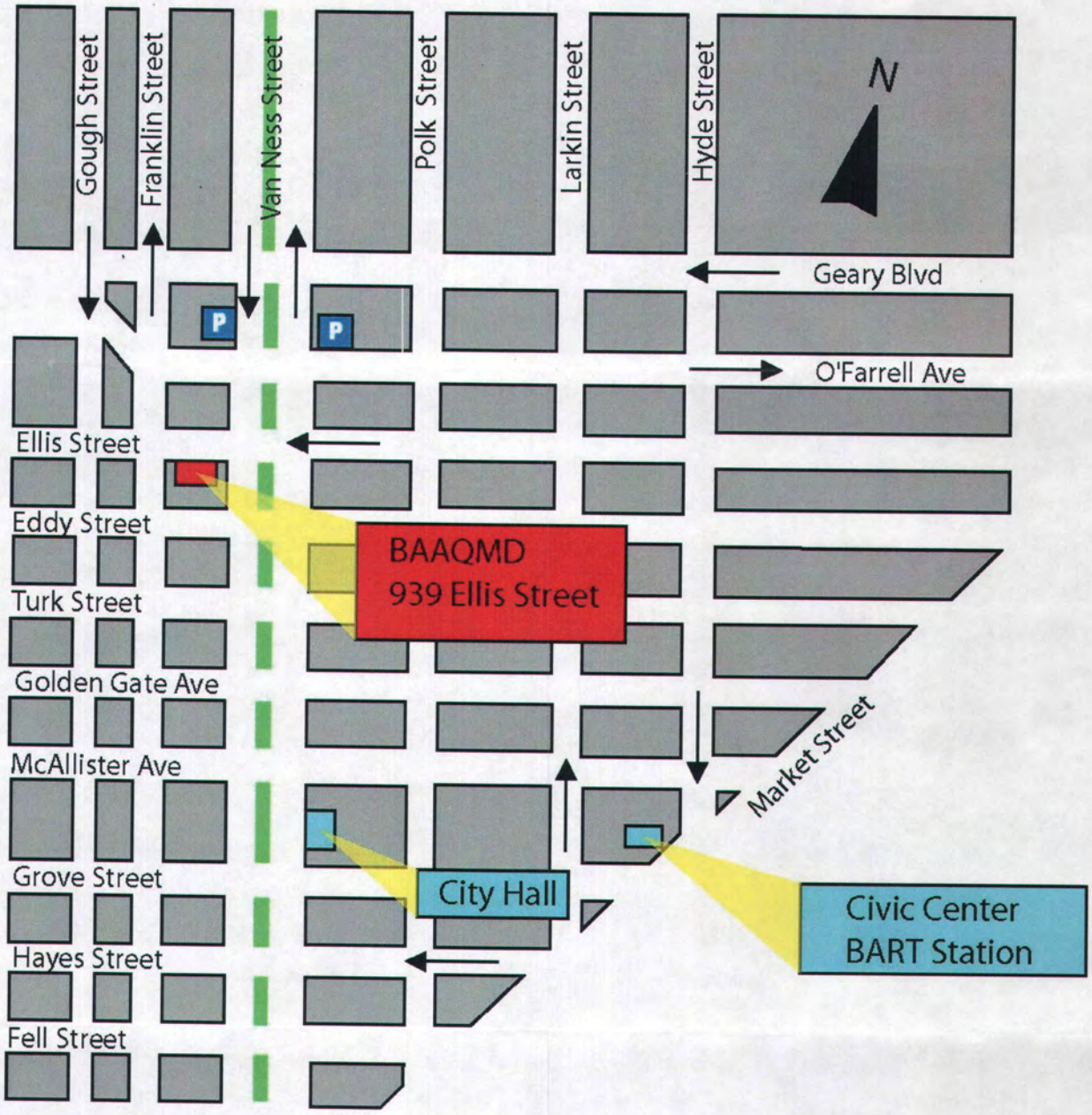
Sincerely,

*original signed by*

Douglas R. Pomeroy
Environmental Protection Specialist

Enclosure

Copy to:
Rob Adams, Landrum & Brown, 11279 Cornell Park Drive, Cincinnati, Ohio 45242 w/encl
John Roberto, John Roberto Associates, P.O. Box 31330, San Francisco, CA 94131 w/encl


Gough Street
Franklin Street
Van Ness Street
Polk Street
Larkin Street
Hyde Street
N
Geary Blvd
O'Farrell Ave
P
P
Ellis Street
Eddy Street
Turk Street
Golden Gate Ave
McAllister Ave
Grove Street
Hayes Street
Fell Street
BAAQMD
939 Ellis Street
Market Street
City Hall
Civic Center
BART Station

Environmental Protection Specialist
FAA, San Francisco Airport District Office

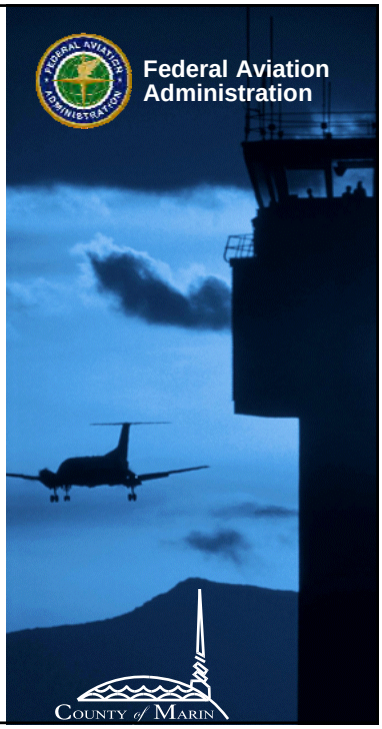
# Air Quality Scoping Meeting

## Environmental Impact Statement / Environmental Impact Report

## Marin County Airport – Gnoss Field

By: FAA Consultant, Landrum & Brown

Date: April 22, 2009




## Thank you to the Bay Area Air Quality Management District for allowing us to hold this scoping meeting at their facilities.

# DRAFT Deliberative Material - DO NOT CITE OR QUOTE

***This scoping material is provided as a draft and should not be considered the final authority for assessing air quality for the EIS/EIR. As the project progresses, additional information is obtained, or changes in planning, may require adjustments to the methodology and procedures.***



# SIGN-IN SHEET

***Fill out contact information or attach your business card. Remember to include your e-mail address!***

# Purpose of Air Quality Scoping

**Accomplish the following goals**

- Introduce the project and the key team members to agencies
- Familiarize agencies with the scope of the proposed action (project)
- Identify issues of concern to participating agencies
- Create a list of contacts within each participating agency
- Exchange data
- Obtain concurrence from the relevant agencies with regard to procedure and methodology



# Agenda

I. Proposed Project Background and Description
II. Marin County Attainment Status
III. Regulations And Guidelines
IV. Air Quality Computer Models
V. Emissions Inventory
VI. Next Steps
VII. Comments and Questions

# I. Project Background

## Marin County Airport – Gnoss Field

- Located in Marin County, California (north of Novato)
- Serves as an important link in the regional transportation network as a reliever airport




# I. Project Background

## Marin County Airport – Gnoss Field

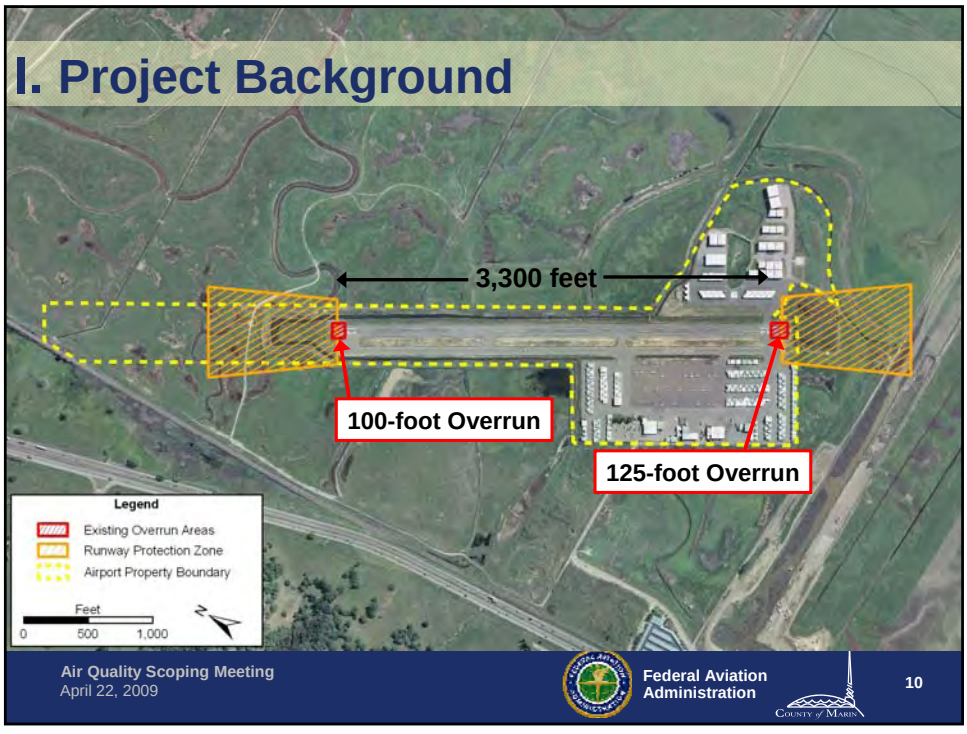
- One runway (Runway 13/31) that is 3,300 feet long
- ~95,000 takeoffs and landings annually
- Single and twin engine propeller aircraft, small business jets
- System of levees protect the runway from flooding

# I. Project Background

## Challenges to overcome

- **The current runway length of 3,300 feet limits the ability of current Airport tenants to operate aircraft at optimum weight for maximum efficiency**
  - Currently requires pilots to restrict the weight of the aircraft well below what the aircraft could accommodate
  - They must either reduce fuel or reduce the passengers and/or cargo
- **The Airport needs to comply with current FAA standards for Runway Safety Areas (RSAs)**
  - Latest FAA guidance calls for 240-foot long by 120-foot wide RSA beyond the end of each runway
  - Currently the Airport has 125-foot overrun (RSA) on the south end and 100-foot overrun (RSA) on the north end



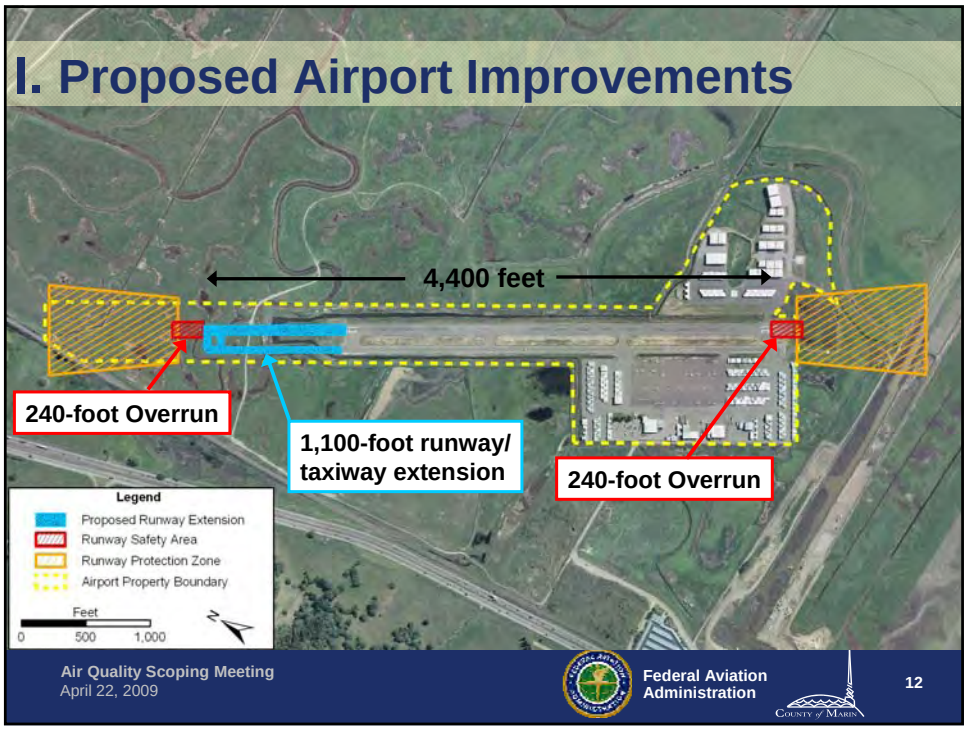


# I. Proposed Airport Improvements

**Marin County, as the owner and operator of Gnoss Field Airport, has proposed the following improvements:**

- Extend Runway 13/31 from 3,300 feet to 4,400 feet with RSAs (i.e. overrun areas) that meet current FAA guidelines
- Extend the corresponding taxiway to the full length of the runway
- Levee extension and realignment of drainage
- Re-program the navigational aids that pilots use to land at the Airport to reflect the extended runway





# I. Environmental Processing

**To comply with the relevant environmental laws, this project requires the preparation of:**

- An **Environmental Impact Statement (EIS)** to comply with the National Environmental Policy Act
- An **Environmental Impact Report (EIR)** to comply with the California Environmental Quality Act
- Other Federal and state laws/acts that are relevant to the project site or type of impacts
  - Section 106 Consultation
  - Department of Transportation 4(f)/303(c)
  - Endangered Species Act
  - Clean Water Act
  - Others

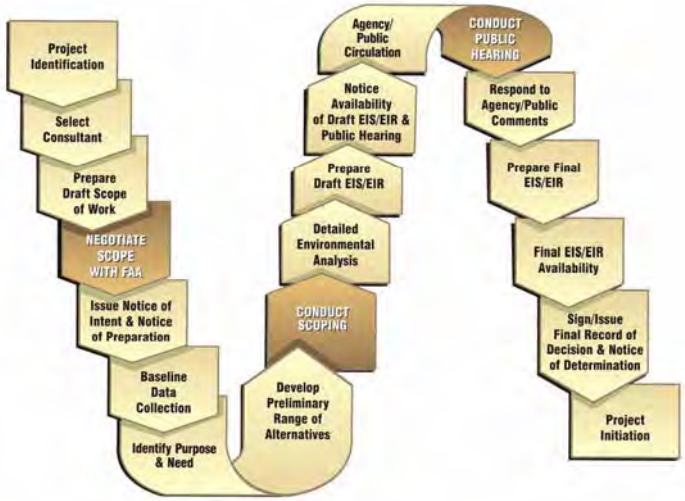


# I. Environmental Processing

**Introduction to Applicant/Agents:**

- **FAA** is the Federal Lead Agency for the NEPA compliance and EIS documentation
- **Marin County** is the State Lead Agency for the CEQA compliance and EIR documentation
- **Landrum & Brown** is the Contractor preparing the EIS/EIR Documentation
  - Sub-consultants that specialize in local environmental resources

# I. EIS/EIR Process






# II. Marin County Federal Attainment Status

- Marin County is marginal nonattainment for the new ***eight-hour ozone*** standard
- Marin County is nonattainment for the **24 hour $PM_{2.5}$** standard
- Also in maintenance for the ***carbon monoxide (CO)*** standard

http://www.epa.gov/airprogm/oar/oaqps/greenbk/

San Francisco Bay Area Intrastate Air Quality Control Region

## II. Marin County State Attainment Status

- Marin County is nonattainment for the ***eight-hour*** *and* ***1-hour ozone*** standard
- Marin County is nonattainment for the ***annual arithmetic mean*** *and* ***24- hour $PM_{10}$*** standard
- Marin County is nonattainment for the ***annual arithmetic mean PM2.5*** standard

Bay Area Air Quality Management District


http://www.baaqmd.gov/pln/air_quality/ambient_air_quality.htm



## II. Pollutants of Concern

For purposes of CAA and CEQA conformity:

- Carbon monoxide (CO)
- Course particulate matter ($PM_{10}$)
- Fine particulate matter ($PM_{2.5}$)
- Sulfur oxides ($SO_X$)
- Nitrogen oxides ($NO_x$)
- Volatile organic compounds (VOC)

These are criteria pollutants for which Marin County does not meet the Federal or state standards, as well as the precursor pollutants to ozone and fine particulate matter formation.

# II. Purpose of the Assessment

## CAA Sec. 176(c)(1) must be satisfied:

(c)(1) No agency shall engage in, support, fund, or approve an action that does not conform to a state implementation plan. Conformity to an implementation plan means:

(A) Conformity to a plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards; and

(B) that the action will not:

(i) Cause or contribute to any new violation of any standard in any area

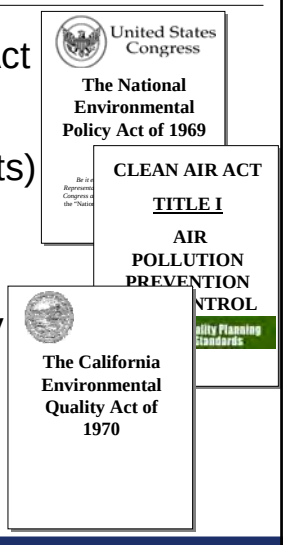
(ii) Increase the frequency or severity of any existing violation of any standard

(iii) Delay timely attainment of any standard or milestone



# III. Regulations and Guidelines

- National Environmental Policy Act (NEPA)
- Clean Air Act (1990 Amendments) CAA Title I, including General Conformity
- California Environmental Quality Act (CEQA)



# III. FAA Guidelines

- FAA *Air Quality Procedures for Civilian Airports & Air Force Bases*
- FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*
- FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*

Assessment prepared pursuant to the FAA *Air Quality Procedures for Civilian Airports & Air Force Bases* will be compliant to NEPA, CAA, FAA guidelines, and USEPA guidelines.



# III. BAAQMD CEQA Guidelines

Assessment prepared pursuant to the BAAQMD CEQA Guidelines will be compliant to CEQA guidelines.


BAAQMD CEQA GUIDELINES
Assessing the Air Quality Impacts of Projects and Plans

December, 1999

http://www.baaqmd.gov/pln/ceqa/index.htm

# III. USEPA - NEPA

- Purpose of NEPA is to disclose the impacts from the Federal Action, unless the action is ***excluded, an emergency, or an advisory***.
- Air quality assessment prepared to determine whether or not a Federal action has the potential to adversely impact air quality.
- Air quality impacts are assessed by evaluating project emissions against the National Ambient Air Quality Standards (NAAQS).



# III. California - CEQA

- Purpose of CEQA is to identify and disclose to decision makers and the public the significant impacts of a proposed project prior to its consideration and approval.
- Air quality impacts are assessed by evaluating project emissions against the California Ambient Air Quality Standards (CAAQS) as well as the NAAQS.
- BAAQMD Thresholds of Significance will be used as primary guide in determining CEQA impacts

# III. Ambient Air Quality Standards

| POLLUTANT | AVERAGING PERIOD | CAAQS | NAAQS | |
|---|---|---|---|---|
| | | | PRIMARY | SECONDARY |
| Carbon Monoxide (CO) | 1-Hour<br>8-Hour | 20 PPM<br>9 PPM | 35 PPM<br>9 PPM | ---<br>--- |
| Nitrogen Dioxide ($NO_2$) | 1-Hour<br>Annual Arithmetic Mean | 0.18 PPM<br>0.030 PPM | ---<br>0.053 PPM | ---<br>0.053 PPM |
| Ozone ($O_3$) | 1-Hour<br>8-Hour | 0.09 PPM<br>0.070 PPM | ---<br>0.075 PPM | ---<br>0.075 PPM |
| Sulfur Dioxide ($SO_x$) | 1-Hour<br>3-Hour<br>24-Hour<br>Annual Arithmetic Mean | 0.25 PPM<br>---<br>0.04 PPM<br>--- | ---<br>---<br>0.14 PPM<br>0.030 PPM | ---<br>0.50 PPM<br>---<br>--- |
| Particulate Matter ($PM_{10}$) | 24-Hour<br>Annual Arithmetic Mean | 50 $\mu g/m^3$<br>20 $\mu g/m^3$ | 150 $\mu g/m^3$<br>--- | 150 $\mu g/m^3$<br>--- |
| Particulate Matter($PM_{2.5}$) | 24-Hour<br>Annual Arithmetic Mean | ---<br>12 $\mu g/m^3$ | 35 $\mu g/m^3$<br>15 m$\mu g/m^3$ | 35 $\mu g/m^3$<br>15 $\mu g/m^3$ |
| Lead (Pb) | 30-day Average<br>Calendar Quarterly<br>Rolling 3-Month | 1.5 $\mu g/m^3$<br>---<br>--- | ---<br>1.5 $\mu g/m^3$<br>0.15 $\mu g/m^3$ | ---<br>1.5 $\mu g/m^3$<br>0.15 $\mu g/m^3$ |



# III. FAA Screening Criteria

Not every airport project requires dispersion analysis to compare project emissions to the NAAQS.

FAA bases the requirement for dispersion analysis on the combined influence of ***annual airport passengers*** and the annual number of ***GA + air taxi operations***.

Criteria: >=2.6 million annual passengers

>=180,000 GA + Air Taxi operations

***Dispersion analysis would not be required for the DVO Proposed Project.***

# III. USEPA – CAA

**Key components to Clean Air Act strategy**

- Ensure Federal funding and approval are for projects that are consistent with air quality goals
- Ensure Federal projects do not worsen air quality or interfere with the purpose of the State Implementation Plan (SIP) to meet and maintain the NAAQS



# III. Compliance to CAA

- Disclose potential for significant air quality impacts from Federal actions depending on attainment status
- General Conformity Rule applies to airport projects

## III. General Conformity Rule

Provides screening criteria (thresholds) to:

- Identify Federal actions that have no potential to cause adverse air quality impacts
- Avoid unreasonable administrative burdens
- Focus on Federal actions that have potential for significant air quality impacts



## III. General Conformity Applicability

Federal actions are subject when the project is:

- Federally-funded or approved
- Not a highway or transit project
- Not exempt or presumed to conform
- Located within a nonattainment area

***DVO Proposed Project is applicable under the General Conformity Rule.***

## III. General Conformity Determination

If net emissions equal or exceed the applicable de minimis thresholds:

- Conduct dispersion analysis for comparison to the NAAQS
- Show the project emissions are accounted for in the SIP
- Apply mitigation that reduces net emissions to zero
- Revise the SIP



## III. Positive Conformity Findings

If net emissions are below the applicable de minimis and BAAQMD thresholds:

- Proposed Project is assumed to conform to the California SIP and no further analysis or reporting is required under CAA General Conformity.
- Results of the analysis are reported in the document.
- No public comment period is required unless the project is regionally significant.

## III. Transportation Conformity

The Proposed Project does not include any transit or Federal highway projects requiring approval by California DOT.

***Therefore, Transportation conformity does not apply.***



## IV. Air Quality Computer Models

The air quality assessment will potentially require the use of 2 air quality models, depending on the sources to be modeled:

- FAA EDMS
- URBEMIS

# IV. Model Inputs

Data for modeling the project's impacts will come from project team members but also from the state and local air agencies.

In addition, the air agencies may offer advice and guidelines for the development of the input data.



# IV. Model Input Anticipated Assumptions

- There would be no additional Vehicle Miles Traveled with the Proposed Project (No impact to intersections or roadways)
- There would be no change in the number of aircraft operations or fleet mix
- No demolition of existing structures
- No new structures proposed (no change to stationary sources)

## IV. Model Input Anticipated Assumptions

- Additional taxi time for aircraft
- Potential increase in fuel use
- Construction emissions



## IV. FAA EDMS

Emissions Inventory and Dispersion Model

- Version 5.1
- FAA-required for airport-specific sources
- USEPA-approved for other sources
- Criteria and precursor pollutants

# IV. Sources Modeled using EDMS

- Aircraft
- GSE
- Stationary Sources including
- Fuel tanks



# IV. Aircraft Fleet

Aircraft information will be derived from the noise analysis, and will be further defined by:

- Aircraft type
- Engine type
- Runway end use

**Example of aircraft queuing**

## IV. Aircraft Taxi and Delay Statistics

- Average taxi time

**Example of aircraft queuing**



## IV. URBEMIS Model

The computer software, URBEMIS 9.2.4 will be used to perform the calculations for ***construction emissions***.

Construction details will be based on the preliminary design report produced in December 2002

# V. Emissions Inventory

Emissions inventories are anticipated to be prepared for:

- 2008 Existing Baseline
- 2013 No Action and Alternatives
- Possibly other inventories
- CAA mandated attainment year, if required
- SIP emission budget year, if required



# V. Emissions Evaluation

- After all data is input, EDMS will be run for the future baseline and all alternatives of the same future year.
- Construction emissions inventory will be prepared.
- Inventories will be compared to determine total emissions

# V. De minimis Thresholds

| CRITERIA/PRECURSOR POLLUTANT | NONATTAINMENT (tons per year) | MAINTENANCE (tons per year) |
|---|---|---|
| **Carbon Monoxide (CO)** | **100** | **100** |
| Particulate Matter ($PM_{2.5}$) | 100 | 100 |
| Particulate Matter ($PM_{10}$) | | 100 |
| Moderate Nonattainment Area | 100 | |
| Serious Nonattainment Area | 70 | |
| Sulfur Dioxide ($SO_2$) | 100 | 100 |
| Nitrogen Dioxide ($NO_2$) | 100 | 100 |
| Ozone ($O_3$) Precursors VOC and $NO_x$ (VOC/$NO_x$) | | |
| Extreme Nonattainment Area | 10/10 | |
| Severe Nonattainment Area | 25/25 | |
| Serious Nonattainment Area | 50/50 | |
| Inside an OTR | | |
| Marginal Nonattainment Area | 50/100 | 50/100 |
| Moderate Nonattainment Area | 50/100 | |
| Outside an OTR | | |
| Marginal Nonattainment Area | 100/100 | 100/100 |
| Moderate Nonattainment Area | 100/100 | |
| Lead (Pb) | 25 | 25 |



# V. BAAQMD Thresholds

The Bay Area Air Quality Management District has developed Thresholds of Significance that will be used to determine potential impacts.

| CRITERIA/PRECURSOR POLLUTANT | Tons/Year | Pounds/Day | Kilogram/day |
|---|---|---|---|
| Reactive Organic Gases | 15 | 80 | 36 |
| $NO_X$ | 15 | 80 | 36 |
| $PM_{10}$ | 15 | 80 | 36 |

# V. Cumulative Impacts

- Cumulative impact analysis will consider past, present, and reasonably foreseeable future projects and
- Will be based on evaluation of the consistency with the local general plan and the most recently adopted Clean Air Plan.



# V. Hazardous Air Pollutants

- EDMS model (Version 5.1) would be utilized to prepare a HAPs inventory. EDMS currently calculates emissions for 395 speciated hydrocarbons. From the 395 speciated hydrocarbons 44 of them are considered to be HAPs, while the other 351 are non toxic compounds.

# V. Greenhouse Gas Emissions

- The analysis will determine the annual rate (tons per year) of carbon dioxide (CO2) emissions attributable to aircraft sources.
- EDMS Version 5.1 would be used to quantify the CO2 emissions inventory for aircraft only.
- URBEMIS will be used to determine C02 emissions from construction
- Mitigation measures will be considered.



# V. Climate Change Analysis

- Effects on climate change may include changes in hydrology, sea level, weather patterns, precipitation rates, and chemical reaction rates.
- A qualitative analysis will be included that will consider how the Proposed Project and its alternatives may or may not increase the factors that result in climate change.

# VII. Next Steps

- Data collection
- Prepare model inputs
- Prepare emissions inventory and compare to thresholds of significance
- Prepare draft Air Quality Technical Report



# VII. Next Steps

**Second Air Quality Meeting**

- In-person to be held after the FAA/Marin County has received and reviewed the draft Air Quality Technical Report.

**Third Air Quality Meeting**

- Telecon to be held after the FAA/Marin County has received and reviewed the Environmental Consequences chapter of the DEIS/DEIR

**Fourth Air Quality Meeting**

- Telecon to be held after the Consultant Team has received and analyzed all public comments on the Draft EIS/EIR.

# VII. Data Requests

- SIP attainment years
- SIP emissions budgets
- 2005 Bay Area Ozone Strategy vs. 2009 Bay Area Clean Air Plan



# VIII. Comments and Questions

**Please provide any additional questions or comments by May 13, 2009 to**:

**Mr. Doug Pomeroy**
Federal Aviation Administration
Western Pacific Region
San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, CA 94010-1303

Telephone: 650-876-2778 ext. 612
Email: Douglas.Pomeroy@faa.gov

# Environmental Impact Statement and Environmental Impact Report
# Proposed Extension of Runway 13/31
# Marin County Airport - Gnoss Field

**Meeting:** Air Quality Scoping Meeting #1

**Date:** 10:00am April 22, 2009

**Location:** Bay Area Air Quality Management District office
939 Ellis St., San Francisco, CA 94109
4th Floor Conference Room

**Invitation List:** Included members from the Bay Area Air Quality Management District, US Environmental Protection Agency Region 9 Air Program, California Environmental Protection Agency Air Resources Board, Metropolitan Transportation Commission, and the Association of Bay Area Governments.

**Attendees:**

**Bay Area Air Quality Management District**
Greg Tholen – Principal Environmental Planner
Bay Area Air Quality Management District
939 Ellis St., San Francisco, CA 94109
(415)749-4954
(415) 749-4741 fax
gtholen@baaqmd.gov

**Federal Aviation Administration**
Barry Franklin – Environmental Protection Specialist (Advisory)
San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, CA 94010-1303
(650) 876-2778 ext. 614
Fax: (650) 876-2733
barry.franklin@faa.gov

**County of Marin**
**Department of Public Works**
Eric Steger, Senior Civil Engineer
3501 Civic Center Drive Room #304
San Rafael, CA 94903
(415) 507-2754
(415)499-3799 fax
esteger@co.marin.ca.us

Ken Robbins, Airport Manager
Marin County Airport
451-A Airport Road
Novato, CA 94945
(415) 897-1754
(415) 819-5285 cell

(415) 897-1264 fax
krobbins@co.marin.ca.us

**John Roberto Associates**
John Roberto
P.O. Box 31330
San Francisco, CA 94131
(415) 586-0224
(415) 334-6843 fax
jraplan@sbcglobal.net

**LANDRUM & BROWN, INCORPORATED**
Rob Adams
Project Manager
11279 Cornell Park Drive
Cincinnati, OH 45242-1811
(513) 530-1201
(513) 530-1278 fax
radams@landrum-brown.com

Fred Greve, P.E.
Managing Director
27812 El Lazo Road,
Laguna Niguel, CA 92677
(949) 349-0671
(949) 349-0679 fax

Chris Babb
11279 Cornell Park Drive
Cincinnati, OH 45242-1811
(513) 530-1275
(513) 530-2275 fax
cbabb@landrum-brown.com

**Purpose of Presentation:**

- Introduce the project and the key team members to the air quality agencies
- Familiarize air quality agencies with the scope of the proposed action
- Identify issues of concern
- Create a list of contacts
- Exchange data
- Obtain concurrence with regard to procedure and methodology

**Project Description:**

Gnoss Field Airport is located in Marin County, California, north of the City of Novato. Marin County is the airport sponsor and lead for the EIR; FAA is the

manager of the EIS process; Landrum & Brown, Inc. is the contractor preparing the EIS-EIR documentation. Gnoss Field Airport currently has one runway (Runway 13/31) that is 3,300 feet long and 75 feet. Marin County has proposed an 1,100-foot extension of Runway 13/31, an extension of the taxiway supporting Runway 13/31, and associated levee construction and realignment of drainage to protect the runway against flooding.

In accordance with the National Environmental Policy Act (NEPA), FAA Orders 5050.4B, *National Environmental Policy Act Implementing Instructions for Airport Actions,* and 1050.1E, *Environmental Impacts Policies and Procedures,* and the laws of the State of California, an environmental review of this project is being prepared to disclose the potential environmental impacts and to identify necessary mitigation.

**Summary:**

The meeting was opened at 10:00 a.m. by Rob Adams, the Project Manager for Landrum & Brown with the introductions of the participants. Mr. Adams reviewed the project background and described the proposed improvements to Gnoss Field. The Proposed Project would not cause any additional vehicle miles traveled and there would be no impact to intersections or roadways. In addition there would be no change in the future no action condition as compared to the Proposed Action in the number of aircraft operations or fleet mix. It was noted that essentially all of the aircraft tie-downs and hangars were occupied, that there were no plans for new spaces, and that this would be an additional factor that would keep operations at current levels. Additionally, Ken Robbins noted that he has heard of some pilots making double trips because they could not carry all of their passengers and a full fuel tank with the current runway. Therefore, there might be some potential for reducing trips. Next Chris Babb went over the current attainment status of Marin County. The various regulations and guidelines applicable to the air quality assessment were discussed. It was noted that based upon FAA screening criteria, dispersion analysis would not be required for the Proposed Project based upon the number of annual airport passengers and the annual number of General Aviation + Air taxi operations. BAAQMD and applicable de minimis thresholds of significance would be used as a primary guide in determining impacts. Mr. Babb stated that the air quality assessment would use FAA's Emissions and Dispersion Modeling System and URBEMIS to calculate emissions. The air quality assessment would also provide a cumulative impacts analysis, an inventory of hazardous air pollutants, a greenhouse gas emissions inventory from aircraft, and a qualitative climate change analysis. The following specific items listed below were discussed.

- There is the potential for EPA to change the standard for **Lead**. It was suggested that the EIS/EIR include a lead analysis due to the use of aviation gas at the airport.

- The Air District is in the process of updating their CEQA Guidelines. The **CEQA Guidelines Update** will review, revise, and develop significance thresholds, assessment methodologies, and mitigation strategies for criteria pollutants, air toxics, odors, and greenhouse gas emissions. The draft is expected in May with anticipated adoption in July 2009. Mr. Tholen pointed out that the study could be prepared under the existing guidelines, but there was general consensus that if the study could use the upcoming guidelines that it would be preferable especially from a public relations standpoint.

- In addition to the use of URBEMIS, the BAAQMD suggested we review the excel spreadsheet **Roadway Construction Emissions Model** Version 6.3.1 available on the Sacramento Air Quality Management district's website.

- The **2005 Bay Area Ozone Strategy** is the currently approved plan. However, the **2009 Bay Area Clean Air Plan** draft is expected to be publicly available in July 2009 with an anticipated adoption likely in October/November 2009. The 2009 Bay Area Clean Air Plan will update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone. The Plan will consider the impacts of ozone control measures on particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan and establish emission control measures to be adopted or implemented in the 2009-2012 timeframe. Mr. Tholen acknowledged that since the air analysis has been started that the 2005 Ozone Strategy could be used.

- Mr. Tholen concurred that if the project is below de minimis thresholds and below BAAQMD thresholds then the project will be in conformity with the SIP.

- Mr. Tholen reported that the BAAQMD is developing greenhouse gas (GHG) emissions threshold recommendations in the CEQA Guidelines update. The greenhouse gas emissions thresholds the BAAQMD are developing are considered interim thresholds until the California Air Resources Board completes their work on developing GHG thresholds, at which time the BAAQMD will reconsider options for a GHG threshold. He suggested the determination of significance for GHG is the responsibility of the lead agency, that GHG should be quantified, and that significant GHG emissions be mitigated to the extent feasible.

Consultation with the CAPCOA (California Air Pollution Control Officers Association) guidelines for potential mitigation measures was encouraged.

- In terms of the air quality analysis, Mr. Tholen pointed out that PM2.5 will be added to the BAAQMD thresholds. That the analysis should provide a qualitative discussion of toxic air contaminants (i.e., diesel particulate) for construction operations. Also potential increase in fuel throughput for the airports fuel storage and fueling services should be included in the assessment.

**Next Steps:**

The next steps for the air quality assessment will be to collect relevant data and develop model inputs. Emissions Inventories will be prepared and compared to the thresholds of significance. A draft air quality technical report will be prepared and submitted to FAA/Marin County for review. Upon their approval a copy of the technical report will be submitted to the air quality agencies for review.

In addition there will be continued coordination with the BAAQMD in order to inform them on the status of the EIS/EIR and to obtain information on the upcoming releases of the revised CEQA Guidelines and the 2009 Bay Area Clean Air Plan.

The next milestone for the agencies will be the submission of the draft air quality technical report. After the agencies have had a chance to review a meeting will be held to discuss any comments. This meeting is anticipated in July/August 2009. The air quality agencies will be notified in advance of the technical report submission and the meeting request.