

6.4 AIR QUALITY

The assessment of air quality is intended to show the potential impacts that may result from the construction and operation of a proposed replacement airport at St. George, Utah. Air quality assessments for airport projects are typically limited to the consideration of Federal and state regulatory requirements under the National Environmental Policy Act (NEPA) and the Clean Air Act (CAA, including the 1990 amendments). St. George is located southwest of Zion National Park, an area designated by the National Park Service⁹ as a Class I area. Class I areas are Federally-protected areas valued for their scenic vistas and include national parks, wilderness areas, and fish and wildlife refuges.

6.4.1 REGULATORY SETTING

The impacts to air quality were determined in accordance with the guidelines provided in the Federal Aviation Administration (FAA) *Air Quality Procedures for Civilian Airports & Air Force Bases*,¹⁰ and FAA Order 5050.4A, *Airport Environmental Handbook*, which together with the guidelines of FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, constitute compliance with all the relevant provisions of NEPA and the CAA.

6.4.1.1 National Ambient Air Quality Standards

The CAA provides for the establishment of standards and programs to evaluate, achieve, and maintain acceptable air quality in the U.S. Under the CAA, the U.S. Environmental Protection Agency (USEPA) established a set of standards, or criteria, for seven pollutants determined to be harmful to human health and welfare.¹¹ The USEPA considers the presence of the following six criteria pollutants to be indicators of air quality:

- Ozone (O₃)
- Carbon monoxide (CO)
- Nitrogen dioxide (NO₂)
- Particulate matter (PM₁₀ and PM_{2.5})¹²
- Sulfur dioxide (SO₂)
- Lead (Pb)

The standards for the criteria pollutants are known as the National Ambient Air Quality Standards (NAAQS).¹³ 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

⁹ National Park Service (NPS), information available on the NPS Web site at www.nps.gov.

¹⁰ FAA and USAF, *Air Quality Procedures for Civilian Airports & Air Force Bases*, April 1997.

¹¹ 40 CFR Part 50 *National Primary and Secondary Ambient Air Quality Standards (NAAQS)*.

¹² PM₁₀ and PM_{2.5} are airborne inhalable particles that are less than 10 microns and less than 2.5 microns in diameter, respectively.

¹³ "Ambient air" is defined as that portion of the atmosphere, external to buildings, to which the general public has access. The air that is within the fenced in or guarded area of facility property is not ambient.

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.

A nonattainment area is a homogeneous geographical area¹⁴ (usually referred to as an air quality control region, AQCR) 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 of the CAA apply only to areas designated as nonattainment or maintenance. A maintenance area describes the air quality designation of an area previously designated nonattainment by the USEPA and subsequently redesignated attainment after emissions were 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. The NAAQS, which are adopted by reference in the *Utah Air Quality Rules*,¹⁵ are presented in **Table 6.10, National Ambient Air Quality Standards (NAAQS)**.

The FAA established screening criteria to determine the need for detailed dispersion analyses to compare the level of pollutants caused by an FAA action to the NAAQS, as recommended under NEPA. The criteria describe the basis for determining whether proposed actions would have the potential to exceed the NAAQS, worsen an existing NAAQS violation, or delay the attainment of any NAAQS.

The screening criteria specify that airports serving fewer than 2.6 million annual passengers (MAP),¹⁶ or providing for fewer than 180,000 annual combined general aviation (GA) and air taxi aircraft operations, lack the potential to cause adverse air quality impacts and would not be required to prepare an analysis to demonstrate compliance to the NAAQS.¹⁷

The maximum combined GA and air taxi operations projected for the proposed replacement airport at St. George through 2020 would be 41,430 assuming the completion of the replacement airport; and in 2020 there would be 212,600 projected annual passengers accommodated at the proposed replacement airport.¹⁸

¹⁴ 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.

¹⁵ Utah Administrative Code, Rule 307-101, *General Requirements*, Section R307-101-1, Utah Division of Air Quality, *Air Quality Rules*, incorporated into the Utah Administrative Code at Chapter R307, effective August 3, 2004.

¹⁶ Annual passengers are counted as including enplanements and deplanements, including transfers, but excluding through passengers.

¹⁷ FAA and U.S. Air Force, *Air Quality Procedures for Civilian Airports & Air Force Bases*, Section 2.3.4 *NAAQS Assessment-General*, April 1997; FAA, *Environmental Impacts: Policies and Procedures*, Order 1050.1E, Appendix A, Section 2.1(c), June 8, 2004.

¹⁸ **Appendix E, Aviation Activity Forecasts, Table E.1, St. George EIS Forecast: Revenue Enplanements Forecast and Table E.5 and Table E.6, Fleet Mix Forecast – Existing Airport and Proposed Replacement Airport Scenario** in the Draft EIS.

Table 6.10
NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Averaging Period	Primary Standards	Secondary Standards
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean	0.03 PPM	None
	24-Hour Average	0.14 PPM	None
	3-Hour Average	None	0.50 PPM
Particulate Matter (PM ₁₀)	Annual Arithmetic Mean	50 µg/m ³	50 µg/m ³
	24-Hour Average	150 µg/m ³	150 µg/m ³
Particulate Matter (PM _{2.5})	Annual Arithmetic Mean	15 µg/m ³	15 µg/m ³
	24-Hour Average	65 µg/m ³	65 µg/m ³
Carbon Monoxide (CO)	8-Hour Average	9 PPM	None
	1-Hour Average	35 PPM	None
Ozone (O ₃)	8-Hour Average	0.08 PPM	0.08 PPM
	1-Hour Average	0.12 PPM	0.12 PPM
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean	0.053 PPM	0.053 PPM
Lead (Pb) ¹	3-Month Arithmetic Mean	1.5 µg/m ³	1.5 µg/m ³

Note: PPM is parts per million
µg/m³ is micrograms per cubic meter

¹ Airborne lead in urban areas is primarily emitted by vehicles using leaded fuels. The chief source of lead emissions at airports would be the combustion of leaded aviation gasoline in small piston-engine GA aircraft. However, the USEPA and FAA have determined that an exceedance of the lead standard would be unlikely at an airport because of the use of low-lead fuel for piston-engine aircraft. Therefore, emissions of lead were not considered in this analysis.

Sources: 40 CFR Parts 50.4 through 50.12.

FAA and USAF, *Air Quality Procedures for Civilian Airports & Air Force Bases*, April 1997.

USEPA, *Clean Air Rules of 2000*, April 15, 2004, at www.epa.gov/cleanair2004 and www.epa.gov/ozonedesignations/finrulefs.htm.

Utah Administrative Code, Rule 307-101, *General Requirements*, Section R307-101-1, Utah Division Of Air Quality, *Air Quality Rules*, Incorporated Into The Utah Administrative Code At Chapter R307, Effective August 3, 2004.

These statistics are below the screening criteria; therefore, an analysis to demonstrate NAAQS compliance is not required for the proposed replacement airport at St. George.

6.4.1.2 Utah Air Quality Rules

According to provisions of the CAA, each state must provide the USEPA with a State Implementation Plan (SIP) that includes a plan to improve the air quality in areas that do not meet the NAAQS, and which will also maintain acceptable air quality in areas that are not exceeding the NAAQS. Both the existing airport and the proposed replacement airport site are located in Washington County, which is included in the Four Corners Interstate AQCR located in extreme southwest Utah.¹⁹ Washington County meets all NAAQS for the criteria pollutants²⁰ and therefore, is not specifically considered in the Utah SIP. However, Washington County must comply with Utah's air program, known as the *Air Quality Rules*, which includes strategies intended to maintain acceptable air quality in areas of attainment,

¹⁹ 40 CFR Part 81.121 *Four Corners Interstate Air Quality Control Region*.

²⁰ Information provided through personal communication with Mr. Robert Dalley, Utah Department of Environmental Quality, Division of Air Quality, October 2004.

including protection of Class I areas, such as Zion National Park, and other sensitive areas in southwest Utah such as the Dixie National Forest, which includes the Pine Valley Mountain Wilderness area, and requirements for the minimization and prevention of the dispersion of fugitive dust during construction. There are no other provisions of Utah's *Air Quality Rules* that apply to the proposed replacement airport.

The only areas of nonattainment or maintenance in Utah are in the northern third of the state, in the vicinity of Provo, Salt Lake City, and Ogden. Portions of these areas have been designated by the USEPA as nonattainment or maintenance for O₃, CO, PM₁₀, and SO₂.²¹ Air quality monitoring in Utah has collected PM_{2.5} emissions data for over four years and results show that concentrations of PM_{2.5} are below the Federal standards at every air quality monitor in Utah equipped to detect PM_{2.5} particles.²²

6.4.1.3 Conformity Regulations

To ensure that Federal projects will comply with the CAA and not interfere with the goals of the applicable SIP, the CAA established the Transportation Conformity Rule for Federal highway and transit projects, and established the General Conformity Rule for all other general Federal actions, including airport improvement projects. The conformity rules were established to assist Federal agencies in complying with Section 176(c)(1) of the CAA and conforming to SIP requirements, such as those described in Utah's *Air Quality Rules*.

General Conformity

The General Conformity Rule, published under 40 CFR Part 93,²³ applies to Federally-funded or Federally-approved actions located within nonattainment or maintenance areas, except for highway and transit projects and other projects specifically identified by the USEPA as exempt²⁴ under the CAA.

Implementation of the proposed replacement airport requires Federal approval, is not a highway or transit project, and is not statutorily exempt. However, the airport does not meet the attainment criteria because neither the airport, nor the

²¹ Data provided by the USEPA *Green Book: Nonattainment Areas for Criteria Pollutants* as of September 27, 2004, available at www.epa.gov/airprog/oar/oaqps/greenbk, accessed October 25, 2004.

²² Utah Division of Air Quality, *Report to the Public*, available at www.airquality.utah.gov, accessed on October 26, 2004.

²³ 40 CFR Part 93, Subpart B *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*. The Utah *Air Quality Rules* adopt the provisions of the General Conformity Rule (40 CFR Part 93, Subpart B) and the General Conformity Rule is incorporated by reference into the Utah *Air Quality Rules* at R307-115-1.

²⁴ The St. George 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, and any net increase in emissions would be so small as to be considered negligible.

site for the airport, is located within a nonattainment or maintenance area for any of the criteria pollutants. Therefore, the requirements under general conformity do not apply to the proposed replacement airport at St. George.²⁵

Transportation Conformity

The Transportation Conformity Rule, published under 40 CFR Part 51, applies to highway and transit projects located in areas of nonattainment or maintenance for the transportation-related criteria pollutants, which are O₃, CO, NO₂, and PM₁₀. Highway and transit projects applicable under transportation conformity are funded by or receive approval from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA).

Some elements of airport development projects occasionally receive funding from the FHWA or the FTA, or require approval by those agencies, although this is quite rare. Thus, most projects at airports are not subject to the Transportation Conformity Rule. The proposed replacement airport does not include any Federal highway or transit projects. Therefore, the requirements under transportation conformity do not apply to the proposed replacement airport at St. George.

6.4.1.4 Hazardous Air Pollutants (HAPs)

The scope of an air quality assessment for a proposed airport project is driven by the provisions of NEPA, the Clean Air Act, including the 1990 Amendments (CAA), and any state regulations relevant to air quality assessments of Federal actions at airports. The methodology and procedure for assessing impacts to air quality due to FAA actions are provided in the guidelines published by the FAA and USEPA, and are influenced by comments received during public scoping meetings.

An air toxics analysis, or a hazardous air pollutants (HAPs) evaluation, was not included in the air quality assessment in the Draft EIS for several reasons, including the fact that the St. George area is in complete attainment with the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. This is a clear indicator that HAPs, like the criteria pollutants, would not be potential issues. Other pertinent factors are the relative lack of urban density and industrialization that would contribute to higher background levels and population exposure.

In addition, it should be noted that no comments were received during the scoping period from either the public or government agencies with regard to conducting a HAPs analysis. Moreover, the FAA is not aware of any state or local regulations that require a HAPs analysis as part of an airport EIS.

6.4.1.5 Agency Coordination

Agency coordination with regard to the air quality assessment for the EIS took place when the Draft EIS was made available to all relevant Federal, state, and local air agencies during the public review period and is documented in the Final EIS (see **Appendix R, Comments/Responses**). The regional council of governments with responsibility for air quality issues in Washington County is the

²⁵ 40 CFR Part 93, Subpart B, Section 93.153(b).

Five County Association of Governments (FCAOG) in St. George, Utah. The authority to administer the provisions of the CAA in Utah resides with the Utah Air Quality Board (the Board). The Utah Department of Environmental Quality (UDEQ) Division of Air Quality serves as the staff for the Board, which is located in Salt Lake City, Utah. Federal oversight for air quality in the State of Utah is the responsibility of USEPA Region 8, headquartered in Denver, Colorado.

6.4.2 AIR EMISSIONS INVENTORY METHODOLOGY

The potential net emissions impact of constructing and operating a replacement airport at St. George was calculated by preparing a construction equipment emissions inventory and separate emissions inventories for both the existing and proposed replacement airports for each future year, 2010 and 2020, and comparing the results. The emissions inventories considered both direct and indirect emissions. Technical data, assumptions, reference material, and computer modeling datasheets supporting the air quality assessment is provided in **Appendix H, Air Quality Technical Data**, in the Final EIS.

6.4.2.1 Construction

Final engineering for the construction projects involved with the proposed replacement airport has not yet been undertaken. Thus, the analysis of construction emissions must rely on estimates of the type and quantity of construction equipment likely to be involved in the project. The list of construction equipment anticipated to be necessary was based on the description of individual construction projects given in the *Site Selection and Master Plan, St. George Municipal Airport (1998 Master Plan)* for the replacement airport,²⁶ and further based on airport construction projects of similar size and scope that were successfully reviewed in previous airport environmental documents.

The construction inventory included consideration of over thirty separate construction tasks associated with building and runway construction. The evaluation of each construction task included emissions resulting from common procedures such as site preparation, electrical installation, excavation, and painting. The details of the calculations are given in **Attachment H-1 of Appendix H, Air Quality**, in the Final EIS.

For each unit of construction equipment, the horsepower, load factor, and emissions factors were assigned using USEPA-approved data. The total emissions for each individual construction project were calculated using a Microsoft® EXCEL 2000 spreadsheet and the following equation:

$$M_{pe} = H_c \times HP_e \times LF_e \times EF_{pe}$$

Where, M_{pe} is the mass of emissions (M) of a specific pollutant (p), for a specific unit of equipment (e); H_c is the operating time in hours (H) for the specific construction project (c) for which the unit of equipment would be operated; HP_e is the horsepower (HP) of the specific unit (e); LF_e is the load factor (LF) of the unit (e);

²⁶ City of St. George, *Site Selection and Master Plan, St. George Municipal Airport*, prepared by Creamer & Noble Engineers and Barnard Dunkelberg & Company, October 1998.

and EF_{pe} is the average emissions factor (EF) of the specific pollutant (p) in grams per horsepower-hour, for the specific unit of equipment (e).²⁷ The emissions from each individual construction project were summed together to determine the total construction emissions from the proposed replacement airport.

Utah's *Air Quality Rules* specify that fugitive dust must be minimized and the dispersion of fugitive particulate matter be prevented.²⁸ Construction emissions from the Proposed Project will contribute to fugitive emissions of particulate matter in combination with the Southern Corridor and other nearby development. Therefore, the City of St. George would ensure that all possible measures would be taken to reduce fugitive dust 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 the FAA *Standards for Specifying Construction of Airports*.²⁹ The following methods of controlling dust and other airborne particles will be implemented to the maximum possible extent:

- Minimizing the exposed area of erodible earth
- Applying temporary mulch with or without seeding to exposed erodible earth
- Using water sprinkler trucks for material piles and unpaved haul roads
- Use of particulate trap exhaust filters
- Use of B20 biodiesel fuel or on-road highway-grade ultra-low-sulfur diesel fuel, and oxidation catalysts
- Reduction of idling of diesel engines
- Using covered haul trucks to move construction material
- Using dust palliatives or penetration asphalt on haul roads
- Using plastic sheet coverings for material piles

The complete list of assumptions and calculations used to prepare the construction equipment emissions inventory is presented in **Appendix H** in the Final EIS.

6.4.2.2 Aircraft Activity

The aircraft emission inventories were prepared using the FAA-required and USEPA-approved Emissions and Dispersion Modeling System (EDMS) Version 4.4,³⁰ which quantifies emissions of CO, sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC), and particulate matter (PM₁₀ and PM_{2.5}) for aircraft engines, ground support equipment (GSE) and auxiliary power units (APUs).

The emissions inventory for aircraft operations focused on the specific aircraft types operating at the existing airport and was based on the types of aircraft and operational levels reported in **Appendix E, Aviation Activity Forecasts**, in the

²⁷ USEPA, *Nonroad Engine and Vehicle Emission Study – Report (NEVES)*, Sec. 2.1, November 1991.

²⁸ Utah Administrative Code, Rule 307-205, *Emission Standards: Fugitive Emissions and Fugitive Dust*, Section R307-205-3, *Fugitive Dust*, August 3, 2004.

²⁹ FAA, *Standards for Specifying Construction of Airports*, Item P-156 *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, AC 150/5370-10A, February 17, 1989.

³⁰ FAA, *Emissions and Dispersion Modeling System, Version 4.4, 2005*.

Draft EIS, and on the information used for the analysis in **Section 6.2, Airport Noise**, in the Final EIS.³¹ Not every aircraft identified in **Appendix E** (Draft EIS) or in the noise analysis is available in the EDMS database. Therefore, substitutions were made from the EDMS database that best represent the emissions of the aircraft listed in **Appendix E** (Draft EIS) or in the noise analysis. The analysis of aircraft emissions is based on landing and takeoff cycles (LTOs), where an LTO is the combination of the four modes of aircraft operation: takeoff, climb out, approach, and idle, where idle operations include aircraft taxi and departure queues. The number of annual LTOs and touch-and-go's (TGOs) that were included in computer modeling are shown in **Table 6.11, Annual Aircraft Landing and Takeoff Cycles**.

Aircraft emissions depend on the amount of time the aircraft is operating during the four modes of operation comprising an LTO. The times-in-mode vary depending on aircraft type and are based on aircraft performance. The times-in-mode are shown in **Table 6.12, Times-In-Mode by Aircraft Type**. The time-in-mode for idle/taxi/departure queue time varies depending on the size of the airport and was estimated for St. George based on airports of similar size and operational characteristics. The idle/taxi/departure queue times in mode for the project alternatives is given in **Table 6.13, Times-in-Mode for Total Idle/Taxi/Departure Queue**.

³¹ **Appendix E, Aviation Activity Forecasts, Table E.4, Fleet Mix Forecast – Both Scenarios**, in the Draft EIS.

Table 6.11
ANNUAL AIRCRAFT LANDING AND TAKEOFF CYCLES

Aircraft Category & Type		Engine Fuel type	Annual LTOs				
			Existing 2003	ALTERNATIVES		2020	
				2010			
			No-Action	Replacement Airport	No-Action	Replacement Airport	
Commercial	Canadair Reg-700	Jet A	0	0	0	0	613
	Embraer ERJ 135/140	Jet A	0	0	1,928	0	1,840
	FH227 Fairchild F27 Friendship	Jet A	0	0	0	0	613
	Swearingen Merlin	Jet A	3,028	3,660	1,542	4,955	614
	Jetstream 32	Jet A	132	156	156	156	156
Cargo	Pilatus PC-6 Porter	Jet A	263	260	260	260	260
	Piper Navajo ¹	AvGas	2,351	2,345	2,345	2,345	2,345
	Swearingen Metro 2	Jet A	132	156	156	156	156
	Cessna Citation II	Jet A	135	155	155	169	169
Air Taxi	Gulfstream IV	Jet A	137	158	158	170	170
	Gulfstream V	Jet A	137	158	158	170	170
	H-2 Seasprite Helicopter ²	Jet A	2	9	9	20	20
	Learjet 35/36	Jet A	137	158	158	170	170
	UH-1N Iroquois Helicopter ²	Jet A	21	28	29	31	31
	Cessna 172 Skyhawk	AvGas	12,562	13,758	13,758	15,473	15,473
GA ³	Piper Aztec	AvGas	2,738	2,738	2,738	2,738	2,738
	Robinson R22 Helicopter	AvGas	1,825	1,825	1,825	1,825	1,825
Military	C-21-A (military Learjet)	Jet A	35	35	35	35	35
	H-2 Super Seasprite Helicopter	Jet A	35	35	35	35	35
	King Air 200	Jet A	35	35	35	35	35
Annual LTOs²			23,705	25,669	25,480	28,743	27,468
Annual TGO Operations			9,125	9,125	9,125	9,125	9,125

Note: Jet A: Jet fuel; AvGas: Aviation Gasoline, 100 Low Lead (LL); GA: general aviation.

¹ Includes 1,825 annual LTOs that account for the taxi and queue time during TGO operations throughout the year.

² Air tour operations.

³ Annual LTOs represent one-half of the annual operations for each year of analysis, where one arrival and one departure reflect two separate operations, and together reflect one LTO cycle.

Sources: City of St. George, St. George Municipal Airport, October 2004.
Landrum & Brown analysis, October 2004.

Table 6.12
TIMES-IN-MODE BY AIRCRAFT CATEGORY

Aircraft Category	Time-In-Mode (minutes per LTO)		
	Approach	Climb Out	Takeoff
Aztec	8.07	3.34	0.98
C-21-A	5.7	2.4	1.09
Canadair Reg-700	5.92	1.28	0.96
Cessna 172 Skyhawk	11.18	6.16	1.75
CITATION II	7.03	1.85	0.93
Embraer ERJ 135/140	6.23	2.66	0.84
FH-227	8.8	3.81	1.18
Gulfstream IV	5.61	1.1	0.69
Gulfstream V	5.79	1.08	0.79
H-2 Seasprite Helicopter	10.78	8.51	2.27
H-2 Super Seasprite	10.78	8.51	2.27
Jetstream 32	8.8	3.81	1.18
King Air 200	12.52	2.06	0.82
Learjet 35/36	6.47	1.34	0.74
Navajo	8.07	3.34	0.98
Navajo	8.07	3.34	0.98
Porter PC6/B2	12.52	2.06	0.82
Robinson R22	10.31	8.13	2.17
Swearingen Merlin	8.47	1.52	0.9
Swearingen Metro 2	12.52	2.06	0.82
UH-1N Iroquois Helicopter	10.78	8.51	2.27

Source: FAA, Emissions and Dispersion Modeling System (EDMS), Version 4.4, 2005.

Table 6.13
TIMES-IN-MODE FOR TOTAL IDLE/TAXI/DEPARTURE QUEUE

Time-In-Mode for Idle/Taxi/Queue (minutes)				
Existing 2003	2010		2020	
	No-Action	Replacement Airport	No-Action	Replacement Airport
6.0	7.0	9.0	8.0	11.0

Source: Landrum & Brown analysis, 2004

Under the Proposed Replacement Airport condition in 2010, more than half of the commercial turboprop operations are projected to be replaced by regional jets. By 2020, a larger percentage of turboprops would be replaced as more regional jets are introduced into service at the replacement airport. As the annual number of passenger enplanements is projected to increase, the number of annual commercial operations would decrease due to the higher seat capacity of the larger jets. The higher seat capacity of the regional jet would result in almost 200 fewer annual operations of commercial aircraft in 2010. This would result in fewer emissions, as jet engines emit much less CO and VOC than turboprop engines. At the same time, however, emissions attributable to the projected increase in GA and air taxi operations will increase over time, which will occur with or without the proposed replacement airport.

6.4.2.3 Ground Support Equipment (GSE)

Emissions from the use of GSE are dependent on the number of annual operations of each unique aircraft type, such as commercial, cargo, GA, and air taxi. The GSE assignments for each aircraft category are given in **Table 6.14, GSE Assignments**.

Table 6.14
GROUND SERVICE EQUIPMENT (GSE) ASSIGNMENTS

Aircraft Category	GSE Name	GSE Fuel Type	Operating Time (minutes per LTO)	HP	LF
Commercial	Aircraft Tractor	D	5.00	86	80%
	Baggage Tractor	G	35.00	107	55%
	Catering Truck	D	10.00	71	53%
	Fuel Truck	D	20.00	175	25%
	Ground Power Unit	D	40.00	71	75%
	Lavatory Truck ¹	D	15.00	56	25%
	Service Truck	D	15.00	235	20%
Cargo	Belt Loader	G	30.00	107	50%
	Fuel Truck	D	10.00	175	25%
	Ground Power Unit	D	40.00	71	75%
General Aviation, Helicopters, and Military	Fuel Truck	D	10.00	175	25%
	Ground Power Unit	D	40.00	71	75%
Air Tour Helicopters	Fuel Truck	D	10.00	175	25%
Air Taxi	Aircraft Tractor	D	5.00	86	80%
	Fuel Truck	D	20.00	175	25%
	Ground Power Unit	G	40.00	107	75%

Note: GSE: ground support equipment; LTO: landing and takeoff cycle
 HP: horsepower
 LF: load factor
 D: diesel fuel
 G: gasoline

¹ Not the Swearingen Merlin aircraft.

Sources: FAA, Emissions and Dispersion Modeling System (EDMS) Version 4.4, 2005.
 Landrum & Brown analysis, 2004.

6.4.2.4 Fuel Storage Tanks

Aviation fuel, such as Jet A and AvGas, is trucked to the existing SGU, transferred into fuel storage tanks, and delivered to aircraft either by a refueler truck or a self-service dispenser. A full-service fixed-base operator (FBO) at SGU provides a refueler truck to deliver and dispense Jet A and AvGas fuel to the aircraft. AvGas is also available from a self-service dispenser (automated fueling station) available to aircraft³² in a fashion similar to the familiar system used to deliver motor gasoline to cars, but designed specifically to fuel aircraft.

The existing airport uses three horizontal above-ground fuel storage tanks: two 12,000-gallon tanks for AvGas (100LL) fuel and one 12,000-gallon tank for Jet A fuel.³³ The storage tanks are approximately eight feet wide and 32 feet in length. Although final planning is not yet complete, it is assumed that the proposed replacement airport would use the same type of fuel storage system as the existing airport.

Air emissions from the transfer of fuel from storage tanks to aircraft depend on the annual throughput of fuel.³⁴ The throughput of Jet A fuel and AvGas for the existing airport in 2003 was provided by the City of St. George. The projected fuel throughput for the 2010 and 2020 No-Action and Proposed Replacement Airport alternatives was based on aircraft operations projected for 2010 and 2020, with the application of the ratio of 2003 aircraft operations to the actual 2003 fuel throughput, by fuel type. A new fueling service offered by Air Superiority, which was not providing service at SGU in 2003, is expected to initiate service in 2005. Therefore, the demand for Jet A and AvGas was assumed to be met equally after 2005 by two providers - Air Superiority and Direct Aviation. The volume of fuel used at the airport is given in **Table 6.15, Fuel Storage Capacity**.

The requirement for Jet A fuel reflects the projected increase of jet operations under the Proposed Replacement Airport condition and the decrease in annual operations due to the increased seat capacity of the larger aircraft in use by 2020.

6.4.2.5 Parking Lots

An estimate of the annual number of vehicles entering each parking lot in 2003 was provided by the City of St. George. This information, combined with the data provided in **Appendix E** (Draft EIS) was used to project the annual number of vehicles entering the parking lots as shown in **Table 6.16, Parking Lot Vehicle Counts**.

³² AirNav, LLC, available on the worldwide web at www.airnav.com, for KSGU, St. George Municipal Airport, St. George, Utah, USA. FAA information effective November 25, 2004, accessed November 29, 2004.

³³ City of St. George, *St. George Municipal Airport 2004 Bulk Fuel Delivery Report*, November 2004.

³⁴ USEPA, *Compilation of Air Pollutant Emission Factors*, AP42, Volume I.

Table 6.15
FUEL STORAGE CAPACITY

Service Owner	Fuel Type	Fuel Throughput (gallons per year)				
		Existing 2003	2010		2020	
			No-Action	Replacement Airport	No-Action	Replacement Airport
Direct Aviation	AvGas	200,938	107,240	107,240	117,002	117,002
	Jet A	747,803	441,500	424,611	561,052	447,722
St. George Aviation	AvGas	68,885	73,528	73,528	80,221	80,221
Air Superiority	AvGas	NA	107,240	107,240	117,002	117,002
	Jet A	NA	441,500	424,611	561,052	447,722
Total Fuel Throughput		1,017,626	1,171,007	1,137,230	1,436,329	1,209,668

Note: AvGas: Aviation gasoline

JP4: Jet aviation fuel (kerosene)

NA: Service not provided in 2003. Service expected to begin in 2005.

Source: St. George Municipal Airport, 2004 Bulk Fuel Delivery Report.

Landrum & Brown analysis, 2004.

Table 6.16
PARKING LOT VEHICLE COUNTS

Parking Lot Location	Annual Number of Vehicles Entering Lot				
	Existing 2003	2010		2020	
		No-Action	Replacement Airport	No-Action	Replacement Airport
Passenger Terminal	40,000	51,686	68,885	72,395	103,284
Cargo Hangar	10,950	11,366	11,366	11,366	11,366
Executive Hangar	10,950	12,600	12,600	13,600	13,600
FBO Hangar	18,250	19,524	19,524	21,352	21,352
Large T-Hangar	9,125	9,762	9,762	10,676	10,676
Total Vehicles	89,275	104,938	122,137	129,389	160,278

Note: FBO: Fixed-base operator.

Sources: City of St. George, St. George Municipal Airport, October 2004.

Appendix E, Aviation Activity Forecasts (Draft EIS).

Landrum & Brown analysis, 2004.

For the passenger terminal, the ratio of passenger enplanements to vehicles entering the terminal parking lot in 2003³⁵ was calculated and applied to the 2010 and 2020 forecasts of annual enplanements to compute vehicle projections for the No-Action Alternative and the Proposed Replacement Airport Alternative. For the

³⁵ See **Appendix H, Air Quality Technical Data.**

cargo parking lot, the 2003 all-cargo operations were used to calculate the ratio; for the executive hangar parking lot, the 2003 air taxi operations were used; for the FBO hangar and large T-hangar parking lots, the 2003 general aviation operations were used to calculate the ratio. The ratios were applied to the projected cargo, air taxi, and general aviation operations for the 2010 and 2020 No-Action Alternative and the Proposed Replacement Airport Alternative.

For the analysis, the annual number of vehicles projected to enter each parking lot was applied to the USEPA MOBILE6.2 vehicle emissions indices (in grams per vehicle). The evaluation of emissions from vehicles in parking lots assumed a national vehicle fleet mix (all types, all fuels, all ages).

6.4.2.6 Roadways

The estimates of the annual number of vehicles traveling on the roadways accessing the existing airport and the proposed replacement airport were assumed to be the same as the total number of vehicles entering the parking lots under the corresponding alternatives as described in **Section 6.4.2.5, Parking Lots**.

The annual number of vehicles accessing the existing airport in 2003, and the number of vehicles projected to access either airport in the future is shown in **Table 6.17, Roadway Traffic Volumes**. The existing airport is located in the northwest portion of St. George, whereas the proposed replacement airport would be located southeast of the city. **The average driving distance that passengers and employees would likely drive to the replacement airport would be approximately 13 miles, one way.**

For the analysis, the annual number of vehicles projected to travel the access roadways was applied to the USEPA MOBILE6.2 vehicle emissions indices (in grams per vehicle) and assumed a national vehicle fleet mix (all types, all fuels, all ages).

Table 6.17
ROADWAY TRAFFIC VOLUMES

Source	Annual Number of Vehicles Traveling the Access Roadways				
	Existing 2003	2010		2020	
		No-Action	Replacement Airport	No-Action	Replacement Airport
Vehicles	89,275	104,938	122,137	129,389	160,278

Sources: City of St. George, St. George Municipal Airport, October 2004.

Appendix E, Aviation Activity Forecasts (Draft EIS).

Landrum & Brown analysis, 2004.

6.4.2.7 Boilers

Buildings proposed for the replacement airport include a passenger terminal, several hangars, a maintenance facility, and an Aircraft Rescue and Fire Fighting (ARFF) facility. Some of these buildings are replacements for buildings at the

existing airport and are intended for similar use but are larger than the existing buildings. A few of the buildings proposed for construction at the replacement airport would provide services not available at the existing airport. Overall, the buildings proposed for the replacement airport would require heating for an additional 438,000 square feet of space as compared to the square footage of the buildings at the existing airport.

Boilers for the buildings at the existing airport are powered by natural gas.³⁶ Therefore, it is anticipated that natural gas boilers would also be used to power buildings at the proposed replacement airport.³⁷ A summary of the fuel throughput for each existing and proposed building is given in **Table 6.18, Annual Fuel Throughput for Boilers.**

Table 6.18
ANNUAL FUEL THROUGHPUT FOR BOILERS

Facility	Fuel Throughput (million cubic feet of natural gas per year)				
	Existing 2003	2010		2020	
		No-Action	Replacement Airport	No-Action	Replacement Airport
Terminal Building	5.32	5.32	12.21	5.32	12.21
Executive Hangar	42.29	42.29	109.84	42.29	109.84
FBO Hangar	10.04	10.04	72.98	10.04	72.98
T-Hangar	11.73	11.73	40.06	11.73	40.06
Dixie College Hangar	2.69	2.69	NA	2.69	NA
Large Hangar	NA	NA	79.27	NA	79.27
Cargo Hangar	NA	NA	20.13	NA	20.13
Maintenance Facility	NA	NA	4.37	NA	4.37
ARFF	NA	NA	3.27	NA	3.27
Total Fuel Throughput	72.07	72.07	342.13	72.07	342.13

Note: FBO: Fixed-base operator
ARFF: Aircraft Rescue and Fire Fighting facility
NA: Not applicable under current and No-Action alternatives because the facilities are proposed for the replacement airport site and there are no comparable facilities at the existing airport; or, not applicable under the Proposed Replacement Airport Alternative because the facility exists at the current airport but the service would not be provided at the replacement airport.

Sources: City of St. George, St. George Municipal Airport, October 2004.
Landrum & Brown analysis, 2004.

The use of wall-fired boilers,³⁸ with a capacity of less than 100 million British thermal units per hour (BTU/hr) was assumed for heating each building under existing conditions, the No-Action Alternative, and the Proposed Replacement

³⁶ USEPA, AP 42, Section 1.4 *Natural Gas Combustion*.

³⁷ The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (BTU/scf), usually varying from 950 to 1,050 BTU/scf.

³⁸ A wall-fired boiler has burners arranged on the walls of the furnace. The burners have discrete, individual flames that extend perpendicularly into the furnace area. 40 CFR Part 76.2 *Wall-fired boiler*.

Airport Alternative. The amount of fuel required to heat the buildings was based on the square footage of each building and calculated assuming the boilers would operate at maximum capacity every day of the year, an assumption that tends to over-predict the volume of fuel throughput. Under the No-Action Alternative, the buildings at the existing airport are not expected to change in size or use over time; therefore, the estimated fuel throughput for the current condition and the No-Action Alternative in the future is assumed the same for all years. Similarly, the fuel throughput for the proposed buildings at the replacement airport would be the same in both future years. Emissions indices and calculation methodology were obtained from the USEPA *Compilation of Air Pollutant Emission Factors, Volume I, Stationary Point and Area Sources* (AP 42).

6.4.2.8 Airport Rescue and Firefighting (ARFF)

Emissions from the operation of the ARFF facility at the proposed replacement airport depend on the type and volume of fuel burned for training at the facility. Assuming that the proposed ARFF would be constructed to include a live-burn arena that uses propane fuel, and assuming employees participate in four burn exercises per year, assuming a total of 2,000 gallons of propane is required for each training exercise, a total of 8,000 gallons of propane would be burned each year. The volume of fuel burned would remain the same with or without development of the proposed replacement airport. The emissions calculations were performed using the FAA EDMS computer model, which has the capability to incorporate this input data, and apply USEPA-approved emissions factors for propane.

6.4.2.9 EDMS Modeling Parameters

Setting up each EDMS scenario for emissions modeling requires the input of meteorological data and modeling parameters specific to emissions inventories.

Meteorology

The outside ambient temperature affects the emissions factors for motor vehicles and GSE. Therefore, the calculation of emissions requires the use of the local annual average temperature. The average annual temperature for St. George is 62.3 degrees Fahrenheit, which was used for the analysis.³⁹

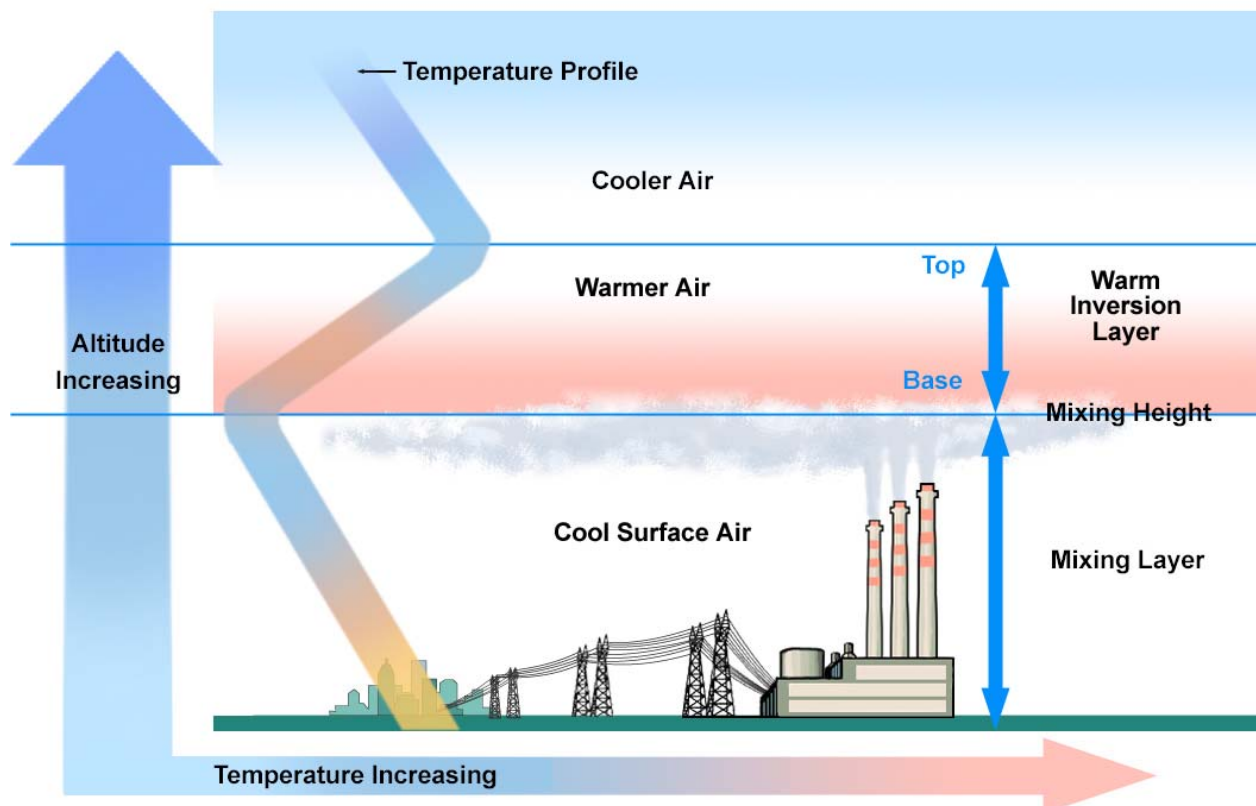
Local⁴⁰ emissions from aircraft are considered to occur only while aircraft operate in the lower-level atmosphere, referred to as the mixing layer, which is the area from the surface of the earth to the base of a temperature inversion. The mixing layer is depicted in **Figure 6.1, Temperature Inversion**. The base of the temperature inversion is referred to as the mixing height. Air and pollutants mix freely within the mixing layer but are "capped" at the mixing height.

³⁹ Annual average temperature for St. George, Utah, National Climatic Data Center (NCDC), *NCDC 1961-1990 Monthly Normals*, available on the internet at www.wrcc.dri.edu.

⁴⁰ The local-area inventory considers emissions from sources operating in the general vicinity of the Federal action.

In a standard atmosphere, the outside ambient air temperature decreases with height, as shown by the temperature profile near the surface in **Figure 6.1**. When warmer air overruns an area of cool surface air, the temperature profile of the layer aloft is inverted and the temperature increases with height, as depicted by the warm inversion layer in **Figure 6.1**. As altitude increases, the temperature profile eventually returns to normal, with temperatures decreasing as altitude increases. The altitude at which this occurs depends on the depth of the inversion.

Figure 6.1
TEMPERATURE INVERSION



Air tends to rise within the warm inversion layer because it is warmer than the air below the mixing height, and the cooler air below the mixing height near the surface tends to sink. This meteorological phenomenon describes a very stable atmosphere where air and pollutants are trapped under the inversion layer.⁴¹ The mixing height and depth of the inversion layer typically vary from morning to afternoon, but the mixing height generally averages about 3,000 feet above ground level in the U.S.

The calculation of emissions from aircraft in the vicinity of an airport considers only the time that aircraft operate within the mixing layer, below the mixing height, where the emissions may influence ground-based pollutant concentrations at and

⁴¹ C. Donald Ahrens, *Meteorology Today: An Introduction to Weather, Climate, and the Environment*, 6th Ed., Pacific Grove, CA, 2000.

near the airport. The calculation of the length of time that aircraft operate below the mixing layer on approach and during climb-out depends on the mixing height and the approach and departure angles. Approach mode begins when the aircraft is positioned at the mixing height at some point distant from the airport along what is usually a three-degree approach angle; approach mode is simulated to continue along the approach angle until the aircraft descends to touchdown on the runway. On climb-out, aircraft emissions are calculated beginning from 1,000 feet above the ground along the departure angle, continuing until the aircraft reaches the mixing height. Consequently, the designation of the mixing height is relevant to the correct calculation of approach time and climb-out time and is ultimately critical to determining total emissions from aircraft operations.

Mixing heights are calculated at selected National Weather Service upper-air stations (co-located with forecast offices) in the morning (1200 Universal Coordinated Time, UTC)⁴² and again in the afternoon (0000 UTC, midnight). However, the air quality modeling for an emissions inventory allows for the use of just one value to reflect the mixing height for the calculation of emissions for all aircraft. The USEPA provides guidance on the daily morning and afternoon mixing heights calculated at the National Weather Service upper-air stations in Report AP 101, *Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States*. According to the AP 101,⁴³ the annual average mixing height for southwest Utah is 4,757 feet above ground level.

Modeling Parameters

The USEPA sets emissions standards for motor vehicle emissions that decrease with each new model year. The EDMS incorporates this data by using the USEPA MOBILE6.2 motor vehicle emissions factor model to calculate emissions indices for motor vehicles and GSE relative to the year of the study. Therefore, the three study years, 2003, 2010, and 2020, were specified in the air quality modeling analysis.

6.4.3 SUMMARY OF FINDINGS AND DISCUSSION OF RESULTS

The inventory of construction emissions is given in **Table 6.19, Construction Emissions Inventory**. Details of the methodology and calculations for the construction emissions inventory is given in **Attachment H-1 to Appendix H, Air Quality**, in the Final EIS. Although a construction schedule has not been determined, construction is assumed to be complete before 2010 and is projected to occur over a three-year period. Construction equipment use non-road engines powered by gasoline and diesel fuel. Gasoline combustion causes higher emissions

⁴² Coordinated Universal Time, UTC, sometimes referred to as Greenwich Mean Time (GMT), or Zulu time (Z), is the local time at the Greenwich Observatory outside London, England, the location of the prime meridian (zero degrees longitude), and is based on the atomic clock. All upper-air observations in the U.S. are conducted at or near 0000 UTC (midnight) and 1200 UTC (noon) so that all upper-air observations commence at approximately the same time providing a "snapshot" of the weather across the U.S. The "morning" upper-air observations in the U.S. generally coincide with the noon hour (1200 UTC) in Greenwich; the "afternoon" observations in the U.S. generally coincide with the midnight (0000 UTC) observation in Greenwich.

⁴³ USEPA, *Mixing Height, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States (AP-101)*, Figure 1 and Figure 6 for southwest Utah, January 1972.

of CO, whereas diesel combustion causes higher emissions of NO_x. Considering the volume of soil that would be disturbed to construct the proposed replacement airport and the number of buildings proposed for construction, an inventory with relatively high levels of CO and NO_x would be expected. These emissions would be temporary and would be mitigated as the construction contractor complies with the guidelines in the FAA *Standards for Specifying Construction at Airports*.⁴⁴

Table 6.19
CONSTRUCTION EMISSIONS INVENTORY

Emissions Source	Total Emissions to Construct the Replacement Airport (tons)					
	CO	VOC	NO _x	SO _x	PM ₁₀	TOTAL
Construction Equipment	581.31	83.11	315.65	37.69	33.78	1,051.54

Source: Landrum & Brown analysis, 2004.

Under existing conditions and with or without construction of the proposed replacement airport, at least 87 percent of the annual operations are piston-engine and turboprop aircraft as opposed to jet aircraft.⁴⁵ Piston-powered and turboprop aircraft emit much higher levels of CO and VOC than jet-turbofan engines. As a result there are more emissions of CO at the existing airport than any other criteria pollutant or precursor pollutants, which for ozone are NO_x and VOC. This can be seen in the modeling results shown in the following tables:

- **Table 6.20, Emissions Inventory Results: Existing Conditions 2003**
- **Table 6.21, Emissions Inventory Results: 2010 No-Action Alternative and Proposed Replacement Airport**
- **Table 6.22, Emissions Inventory Results: 2020 No-Action Alternative and Proposed Replacement Airport**

6.4.3.1 Emissions Impact from Aircraft, Ground Support Equipment (GSE), and Auxiliary Power Units (APUs)

The results of the emissions inventories clearly show that CO is the predominant pollutant caused primarily by the operation of aircraft and GSE. The CO emissions from aircraft and GSE represent 82 percent to 89 percent of total emissions depending on the alternative, as indicated in **Table 6.20 through Table 6.22**.

The high level of CO is caused by the use of piston-engine and turboprop aircraft and to a lesser extent, the operation of GSE, many of which use gasoline-powered engines with high CO emissions.

⁴⁴ FAA, *Standards for Specifying Construction of Airports*, Item P-156 *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, AC 150/5370-10A, February 17, 1989.

⁴⁵ Piston-engine and turboprop aircraft represent 97.3 percent of operations under existing conditions, 97.2 percent and 89.0 percent for the 2010 No-Action Alternative and Proposed Replacement Airport, respectively, and 97.3 percent and 87.6 percent for the 2020 No-Action Alternative and Proposed Replacement Airport, respectively.

Table 6.20
EMISSIONS INVENTORY RESULTS - EXISTING CONDITIONS 2003

Alternative, and Source Type	Emissions Source	Existing Conditions Emissions (tons per year)					
		CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
Existing Conditions	Aircraft	742.46	13.08	3.60	0.43	5.59	5.59
	GSE/APU	52.74	2.42	8.33	1.04	0.39	0.38
	Parking Lots	0.93	0.16	0.07	0.00	0.00	0.00
Mobile Sources	Roadway	5.60	0.50	0.56	0.02	0.02	.01
	<i>Total Emissions from Mobile Sources</i>	<i>801.73</i>	<i>16.16</i>	<i>12.56</i>	<i>1.49</i>	<i>6.00</i>	<i>5.98</i>
Existing Conditions	Fuel Storage		2.60				
	Boilers	2.45	0.34	3.01	0.02	0.23	0.23
	<i>Total Emissions from Stationary Sources</i>	<i>2.45</i>	<i>2.94</i>	<i>3.01</i>	<i>0.02</i>	<i>0.23</i>	<i>0.23</i>
TOTAL EXISTING CONDITIONS EMISSIONS (890.30 TONS PER YEAR)		804.18	19.10	15.57	1.51	6.23	6.21

Note: Columns may not sum exactly due to rounding.
 GSE: ground support equipment.
 APU: Auxiliary power unit.
 The existing airport does not operate an Aircraft Rescue and Fire Fighting (ARFF) facility.
 Values of 0.00 denote emissions less than 0.005 tons per year.

Source: FAA, Emissions and Dispersion Modeling System, Version 4.4, 2005.
 Landrum & Brown analysis, 2004.

**Table 6.21
EMISSIONS INVENTORY RESULTS - 2010 NO-ACTION ALTERNATIVE AND PROPOSED REPLACEMENT AIRPORT**

Year, Alternative, and Source Type	Emissions Source	2010 Emissions (tons per year)					
		CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
2010 No-Action Mobile Sources	Aircraft	760.60	14.79	4.17	0.51	6.06	6.06
	GSE/APU	61.55	2.62	5.94	1.11	0.46	0.46
	Parking Lots	0.44	0.07	0.04	0.00	0.00	0.00
	Roadway	2.78	0.24	0.34	0.00	0.01	0.01
	<i>Total Emissions from Mobile Sources</i>	<i>825.37</i>	<i>17.72</i>	<i>10.49</i>	<i>1.62</i>	<i>6.53</i>	<i>6.53</i>
2010 No-Action Stationary Sources	Fuel Storage		3.85				
	Boilers	2.93	0.41	3.60	0.02	0.27	0.27
	<i>Total Emissions from Stationary Sources</i>	<i>2.93</i>	<i>4.25</i>	<i>3.60</i>	<i>0.02</i>	<i>0.27</i>	<i>0.27</i>
TOTAL 2010 NO-ACTION EMISSIONS (922.86 TONS PER YEAR)		828.30	21.97	14.09	1.64	6.8	6.8
2010 Proposed Replacement Airport Mobile Sources	Aircraft	770.93	14.21	9.75	0.96	6.97	6.97
	GSE/APU	59.04	2.53	5.87	1.10	0.46	0.46
	Parking Lots	0.51	0.08	0.05	0.00	0.00	0.00
	Roadway	36.20	2.96	4.49	0.03	0.16	0.10
	<i>Total Emissions from Mobile Sources</i>	<i>866.68</i>	<i>19.78</i>	<i>20.16</i>	<i>2.09</i>	<i>7.59</i>	<i>7.53</i>
2010 Proposed Replacement Airport Stationary Sources	Fuel Storage		2.81				
	Boilers	14.24	1.97	17.53	0.11	1.31	1.31
	ARFF	0.14	0.13	0.03	0.00	0.47	0.47
	<i>Total Emissions from Stationary Sources</i>	<i>14.38</i>	<i>4.91</i>	<i>17.56</i>	<i>0.11</i>	<i>1.78</i>	<i>1.78</i>
TOTAL 2010 PROPOSED REPLACEMENT AIRPORT EMISSIONS (1,014.01 TONS PER YEAR)		881.06	24.69	37.72	2.20	9.37	9.31
NET DIFFERENCE IN 2010 EMISSIONS (+91.15 TONS PER YEAR)		+52.76	+2.71	+23.61	+0.56	+2.57	+2.51

Note: Columns may not sum exactly due to rounding. GSE: ground support equipment. APU: Auxiliary power unit. ARFF: Aircraft Rescue and Fire Fighting facility.

Values of 0.00 denote emissions less than 0.005 tons per year.

Source: FAA, Emissions and Dispersion Modeling System, Version 4.4, 2005. Landrum & Brown analysis, 2004.

Table 6.22
Emissions inventory results - 2020 No-Action Alternative and Proposed Replacement Airport

Year, Alternative, and Source Type	Emissions Source	2020 Emissions (tons per year)					
		CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
2020 No-Action Mobile Sources	Aircraft	785.64	17.59	4.91	0.62	6.78	6.78
	GSE/APU	78.96	3.17	5.20	1.22	0.73	0.71
	Parking Lots	0.39	0.05	0.02	0.00	0.00	0.00
	Roadway	2.50	0.17	0.17	0.00	0.01	0.01
	<i>Total Emissions from Mobile Sources</i>	867.49	20.98	10.30	1.84	7.52	7.52
2020 No-Action Stationary Sources	Fuel Storage		3.92				
	Boilers	2.92	0.41	3.60	0.02	0.27	0.27
	<i>Total Emissions from Stationary Sources</i>	2.93	4.33	3.60	0.02	0.27	0.27
TOTAL 2010 NO-ACTION EMISSIONS (976.97 TONS PER YEAR)		870.42	25.31	13.90	1.86	7.79	7.76
2020 Proposed Replacement Airport Mobile Sources	Aircraft	806.46	15.54	12.32	1.33	7.27	7.27
	GSE/APU	62.71	2.58	4.83	1.17	0.67	0.67
	Parking Lots	0.49	0.06	0.03	0.00	0.00	0.00
	Roadway	34.67	2.20	2.34	0.05	0.15	0.08
	<i>Total Emissions from Mobile Sources</i>	904.33	20.38	19.52	2.55	8.09	8.02
2020 Proposed Replacement Airport Stationary Sources	Fuel Storage		3.87				
	Boilers	14.24	1.97	17.53	0.11	1.31	1.31
	ARFF	0.14	0.13	0.03	0.00	0.47	0.47
	<i>Total Emissions from Stationary Sources</i>	14.38	5.97	17.56	0.11	1.78	1.78
TOTAL 2020 PROPOSED REPLACEMENT AIRPORT EMISSIONS (1,056.87 TONS PER YEAR)		918.71	26.34	37.08	2.66	9.87	9.80
NET DIFFERENCE IN 2020 EMISSIONS (+79.90 TONS PER YEAR)		+48.29	+1.04	+23.18	+0.79	+2.08	+2.01

Note: Columns may not sum exactly due to rounding. GSE: ground support equipment. APU: Auxiliary power unit. ARFF: Aircraft Rescue and Fire Fighting facility.
 Values of 0.00 denote emissions less than 0.005 tons per year.

Source: FAA, Emissions and Dispersion Modeling System, Version 4.2, 2004.
 Landrum & Brown analysis, 2004.

Increased operations of piston- and turboprop-powered aircraft in 2010 would increase the level of CO emissions with or without construction of the proposed replacement airport. While NO_x emissions from aircraft increase with the increased number of aircraft operations, particularly jet aircraft, the future Federal emission standards for GSE engines more than offsets the increase caused by aircraft resulting in an overall decrease in NO_x emissions under the future alternatives. The GSE and motor vehicle standards are reflected in the emission factors calculated using MOBILE6.2, the USEPA vehicle emission model.

Operations of jet aircraft would increase under the 2020 Proposed Replacement Airport Alternative accounting for almost 70 percent of commercial operations. An increase in the use of jet engines would cause an increase in NO_x emissions over the 2020 No-Action Alternative.

6.4.3.2 Emissions Impact from Motor Vehicles

Emissions from motor vehicles operating in airport parking lots and on airport access roadways consist primarily of CO but also include VOC, NO_x, SO_x, and PM_{10/2.5}. Although the volume of vehicles increase with each future year, total emissions from motor vehicles would decrease under the No-Action Alternatives due to the lower emission standards required by Federal guidelines. Under the future Proposed Replacement Airport alternatives, total emissions from motor vehicles increases regardless of the required lower emission standards because of the increased distance airport patrons must travel to reach the relocated airport.

6.4.3.3 Emissions Impact from Stationary Sources

Emissions from stationary sources represent a very small portion of total emissions. This is true for both the existing airport and the proposed replacement airport. Stationary sources represent about two percent of total emissions under existing conditions and the No-Action Alternative for 2010 and 2020. Emissions from stationary sources would increase with the proposed replacement airport to about five percent of total emissions in 2010 and 2020 due to the additional requirement for heating the buildings proposed for the replacement airport and from burning fuel at the proposed ARFF facility.

The projected increase in the use of boilers at the proposed replacement airport is due to the additional 438,000 square feet of space in the passenger terminal, and the larger hangars proposed for the replacement airport, which replace similar buildings at the existing airport. The additional spaces at the proposed replacement airport that would require heating also includes facilities not available at the existing airport, including a cargo hangar and an ARFF facility.

Overall, boilers burning natural gas account for the majority of emissions from stationary sources under existing and forecast conditions. There would be an increase in emissions from boilers with the Proposed Replacement Airport Alternative in both the 2010 and 2020 forecast years compared with the No-Action Alternative. This is because of the additional planned space at the replacement airport that would require heating.

Emissions of VOC from fuel storage tanks would increase under the 2010 and 2020 scenarios as compared to the 2003 existing conditions but would decrease with the Proposed Replacement Airport Alternative compared to the No-Action Alternative in each future year. This is because although the number of annual aircraft operations increases under the future No-Action Alternatives, operations decrease with the Proposed Replacement Airport alternatives decreasing the demand for fuel.

The proposed replacement airport includes an ARFF facility that is assumed to require fuel-burning for fire fighter training. The inclusion of the ARFF at the proposed replacement airport would cause emissions comprised of PM_{10/2.5}, and, to a lesser extent, emissions of CO, VOC, NO_x, and SO_x.

6.4.3.4 Discussion of Results

The construction and operation of the proposed replacement airport at St. George would cause an increase in air emissions in Washington County. The greatest impact, although temporary, would be emissions from construction, 1,051.54 tons, as shown in **Table 6.19, Construction Emissions Inventory**. Building a runway and the associated taxiways, apron areas, a roadway, and buildings requires excavation and the use of large types of construction equipment that have high emissions of CO and NO_x. The construction contractor would be required to submit a proposed method of erosion and dust control, and disposal of waste materials pursuant to guidelines included in the FAA's *Standards for Specifying Construction of Airports*³⁸ to mitigate fugitive dust and other emissions from construction.

The increase in total emissions under the Proposed Replacement Airport Alternative in both 2010 and 2020 as compared with the No-Action Alternative for the same years, is shown in **Table 6.23, Emissions Impact Evaluation**.

Table 6.23
EMISSIONS IMPACT EVALUATION

Year	Net Increase in Emissions with the Proposed Replacement Airport (tons per year)						
	CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}	Total
2010	+52.76	+2.71	+23.61	+0.56	+2.57	+2.51	+91.15
2020	+48.29	+1.04	+23.18	+0.79	+2.08	+2.01	+79.90

Source: Landrum & Brown analysis, 2004.

The projected net increase of 91.15 tons per year with under the Proposed Replacement Airport Alternative in 2010 is mostly attributable to net increase of CO emissions from motor vehicles traveling to the replacement airport, which is over 10 miles from the existing airport. Almost 52 percent of the net emissions are caused by the increase in motor vehicle travel. Additional increases in CO and NO_x

³⁸ FAA, *Standards for Specifying Construction of Airports*, Item P-156 *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, AC 150/5370-10A, February 17, 1989.

emissions are caused by the operation of boilers to heat the additional buildings required for the replacement airport. The projected increased use of jet aircraft at the replacement airport also contributes, but to a much lesser degree, to the net increase in NO_x emissions in the future years.

Similar results were seen for emissions in 2020; however, the projected net increase in emissions with the Proposed Replacement Airport Alternative would be less severe, 79.90 tons. The expected increase in emissions from the additional use of boilers would be offset by the change in the aircraft fleet and progressively lower vehicle emission standards.

6.4.4 CONCLUSION

The proposed construction and operation of a replacement airport at St. George would increase the annual rate of emissions of CO, VOC, NO_x, SO_x, and PM_{10/2.5} as indicated in **Table 6.19 and Table 6.23**. However, the projected increase in emissions due to construction would be temporary and would be distributed over a three-year construction period. Net emissions for day-to-day operation of the proposed replacement airport would be much lower than for construction. Furthermore, the net additional emissions with the proposed replacement airport are projected to decline through the forecast period, being less in 2020 than in 2010.

Washington County is designated as attainment for all the criteria pollutants; therefore, the projected net increase in emissions during the temporary construction period and the daily operation of the proposed replacement airport is not required to be reviewed under either the general conformity or transportation conformity regulations of the CAA. Further, an analysis to evaluate the proposed replacement airport for compliance to the NAAQS is not required because the size of the airport indicates a lack of potential for emissions to cause any NAAQS violations.

The CAA Amendments of 1977 provided for the classification of lands for the application of the Prevention of Significant Deterioration (PSD) program. Certain lands where existing good air quality would be considered to be of national importance were designated as Class I areas. In southwest Utah, Zion National Park is a Class I area and is located 20 miles northeast of the proposed replacement airport site. The PSD program applies to specific industries and industrial processes identified by the USEPA that emit or have the potential to emit at least 100 tons per year of any of the criteria pollutants, or may apply to any stationary source that emits or has the potential to emit 250 tons per year of any of the criteria pollutants. Neither the airport at St. George nor the proposed

replacement airport operates or would operate any industrial process included on the USEPA list. Further, the emissions inventory shows that the emissions from stationary sources under any of the proposed alternatives are far below the threshold of 250 tons per year. Therefore, the PSD program would not be applicable to either the existing airport or the proposed replacement airport. Consequently, the proposed relocation of the airport at St. George conforms to the Utah SIP and Section 176(c) of the CAA, is compliant under NEPA regulations, and is not applicable under the PSD program with regard to Zion National Park. Therefore, no further analysis or evaluation is required under either the NEPA or the CAA for the construction and operation of the proposed replacement airport.