

# **APPENDIX G**

## **AIR QUALITY**

- *Air Quality Evaluation Information*



# ERIE INTERNATIONAL AIRPORT, TOM RIDGE FIELD

## ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED EXTENSION OF RUNWAY 6-24

### Appendix G Air Quality Evaluation Files

Airport Project  
Environmental Assessment

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## 1.0 DESCRIPTION OF AIR QUALITY MODEL

### Operational Modifications and The Emissions and Dispersion Modeling System (EDMS):

The Emissions and Dispersion Modeling System (EDMS) Version 4.21 was developed by the FAA and United States Air Force to be used as the required model for air quality analysis for operations at civilian airports and military bases. EDMS output provides both an emissions inventory and pollutant dispersion concentrations. The operational sources of pollutants considered in the model are comprehensive and include on-site cars on roadways and in parking lots on airport property, aircraft, aircraft ground support equipment, fuel storage, training fires, and building heating systems. From these sources EDMS calculates total emissions released and concentrations of several air pollutants (i.e., carbon monoxide (CO), hydrocarbons (HC, including total, non-methane and Volatile Organic Compounds [VOC]), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), and particulates (PM-10 and 2.5)).

The dispersion portion of EDMS requires the user to provide data on source emissions and meteorology. EDMS can process point, line, and area sources at an airport. The user builds a database within EDMS, entering the required data about the airport layout and various sources. Source and receptor locations are included in EDMS by a standard X-Y coordinate system. EDMS then converts the source information into emission rates from which an inventory can be prepared. The dispersion analysis requires surface and upper air meteorological data. The required data include temperature, cloud cover, wind speed, and wind direction. These can be input manually or with data files from the National Climatic Data Center. The dispersion model uses EPA's AERMOD model and its meteorological preprocessor AERMET.

### Modeling Methodology

Modeling for the ERI consisted of the existing condition (2004), opening year (2010), and design year (2020) –to coincide with the 20-year planning period (2000-2020). Specifically, the following cases were analyzed:

1. Existing Condition (2004)
2. Alternative 1 (No action - 2010)
3. Alternative 3 (2010)
4. Alternative 1 (No-Action - 2020)
5. Alternative 3 (2020)

### Emission Source Data and Critical Assumptions

EDMS has the ability to model various pollution sources related to airport activity. For this analysis, the pollution sources that were modeled were aircraft, aircraft ground support vehicles, public vehicles (roadways and parking), storage tanks, training fires, and building heat sources. Substantial data about each source were required to properly model the sources. The following provides a discussion of the data required, and where the data were obtained for this study. The output files for each case are presented in the Section 3 of this technical file and show the results of the run.

### Aircraft Data

The modeling of aircraft sources requires the entry of the location of the runways, taxiways, terminal gate used, and ground support equipment used with each type of plane. The number of operations per year and the length of time each aircraft spends taxiing is required. Operational

fleet mix was obtained from the noise report for consistency. The aircraft modeled and the total average number of annual landing/takeoff cycles (LTO) and Touch and Go's (TGO) are presented in the following table:

**Table 1 - Average Number of Annual Aircraft LTOs and TGOs**

Aircraft	Year—2004	Year—2010	Year—2020
727-100	4	4	7
727-200	4	52	7
737-200	11	11	15
737-700	3	3	4
DC9	3	262	263
757-200 PW	0	0	26
757-200 RR	0	0	26
Lear 35	646	716	807
Beech 58 Baron	1457	1526	1697
Cessna 206 Turbo	1780	1369	2003
Beech 1900	2468	2610	3041
Canadair CL600	157	168	270
Cessna Citation 3	164	172	186
Cessna Citation X	44	44	139
Mitsubishi MU300-10	1190	1281	1386
Bombardier CRJ	2292	2365	2595
Embraer 145 ER	161	168	183
Embraer 145 LR	150	157	172
Fairchild Dor 328 Jet	730	756	825
Saab 340	1146	1183	1296
Bell 212 Huey Helicopter	730	800	861
Astra Gulfstream 100	73	80	88
Cessna Citation 2	36	40	44
Dassault Falcon 20	190	139	0
Dassault Falcon 50	36	44	44
Gulfstream V	47	73	73
Cessna 172	11,100	12,059	12,786
Cessna 206	745	813	880
Single Engine Fixed Prop	818	898	967
Single Engine Variable Prop	1230	1347	1449
Cessna 441	409	449	482
Single Engine Variable Turboprop	409	449	482
Gulfstream IV	11	29	29
C-130 Hercules LM	464	1059	1088

Note 1: Fleet mix taken from the noise analysis and appropriate aircraft type identifiers were taken from the EDMS input names.

Note 2: Local GA and Military ops were assigned as Touch and Go's, similar to noise model runs. Itinerant GA and Military ops were all LTO's.

### Roadways and Parking Lot Sources

Two motor vehicle sources were modeled: roadways and parking lots. The data that were required to model the roadways were the location of the roads, the number of vehicles per year in each road, and the speed of the vehicles. The vehicle counts were based on information obtained from a traffic analysis completed in 2000 by Gannett Fleming. Assumptions on how many vehicles enter the airport are based on peak hour activity and data from ERI regarding daily traffic activity in the parking lots that are monitored by the airport.

Parking facilities were also studied. The number of parking spaces for each lot on Airport property was calculated. It also included location and number of vehicles entering and leaving the parking lot. Parking lot types included long and short-term lots, rental car parking, and employee lot.

The future roadway traffic was determined by multiplying the existing traffic volumes by growth rate calculated from the terminal area forecast, which was forecast using projected enplanement data.

#### Storage Tanks

Modeling of petroleum storage tanks required data regarding the location of the tank, type of fuel, and the amount of fuel stored in the tank annually. Information regarding fuel tanks was obtained from speaking with the fixed base operator and the airfield foreman.

#### Training Fires

Modeling of training fires requires data regarding the location of the fire pit, amount of fuel burned, type of fuel burned, temperature of fire, and diameter of fire.

## **2.0 EMISSIONS INVENTORY AND DISPERSION RESULTS**

### Emissions Inventory

The emissions inventory represents the sum of all the operational pollution sources on airport property for a year. The FAA is required to assure that an applicable proposed action in a non-attainment or maintenance area conforms to the state's plan to meet federal air quality standards. Federal actions subject to conformity are divided into two categories: Transportation Conformity and General Conformity, which is applicable to this project. To conform, the emission inventory from the project must be within the general conformity threshold values (de minimis levels).

The area's status of the criteria pollutants must be determined for conformity. If a pollutant is classified as non-attainment or maintenance, the general conformity emission thresholds, as set forth in 40 CFR Part 93 need to be identified. ERI, located in Erie County, Pennsylvania, is an attainment area for all NAAQS criteria pollutants except ozone (1-hour classification as marginal non-attainment and 8-hour classification of Subpart 1 non-attainment).

Neither the EDMS nor the Nonroad Engine and Vehicle Emission Study have the ability to compute the annual emission inventory of ozone. Therefore, NO<sub>x</sub> and HC (VOC), the precursors of ozone, are used for the annual inventory analysis.

For HC (VOCs), the operational activities associated with Alternative 3 (2010) would produce less than 0.001 tons annually over Alternative 1 (2010). For the year 2020, the operational activities associated with Alternative 3 (2020) would also produce less than 0.001 tons annually over Alternative 1 (2020). The highest HC impacts from Alternative 3 construction activities are anticipated during the first year of construction, with 3.615 tons. Note: Since HC is not listed in the general conformity, the de minimis value of 50 tons per year was used for comparison. The change in emissions are well below the listed value of 50 tons per year. Therefore, there is no conformity impact to HC (VOCs).

For NOx, the operational activities associated with Alternative 3 (2010) would produce less than 0.001 tons annually over Alternative 1 (2010). For the year 2020, the operational activities associated with Alternative 3 (2020) would produce less than 0.001 tons annually over Alternative 1 (2020). The highest NOx impacts from Alternative 3 construction activities are anticipated during the first year of construction, 15.647 tons. NOx is listed in the general conformity de minimis levels at 100 tons per year. The emissions change is well below the listed value of 100 tons per year. Therefore, there is no conformity impact to NOx.

The results in tons per year (tpy) are shown in Table 2 below.

**Table 2 - Summary of Operational Annual Emission Inventory Results  
(in tpy)**

Alternative	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM-10
Existing Condition (2004)	431.192	32.041	32.163	3.695	0.298
Alternative 1 (2010)	470.789	34.927	37.631	4.411	0.452
Alternative 3 (2010)	470.789	34.927	37.631	4.411	0.452
2010 Alt 3 vs. 2010 Alt 1*	<0.001	<0.001	<0.001	<0.001	<0.001
Alternative 1 (2020)	510.983	37.598	38.634	4.570	0.687
Alternative 3 (2020)	510.983	37.598	38.634	4.570	0.687
2020 Alt 3 vs. 2020 Alt 1*	<0.001	<0.001	<0.001	<0.001	<0.001

tpy = tons per year

\*de minimis levels for the following nonattainment pollutants are as follows:

VOC @ 50 tons per year.

NOx @ 100 tons per year.

De minimis levels are not established for pollutants that are in attainment of the NAAQS. Therefore, they do not apply.

Dispersion Analysis

The EDMS model was also run to compute the dispersion concentration of the air pollutants at 20 receptor sites. This NAAQS Assessment was performed to analyze if the pollutant concentrations met the current air quality standards for NEPA. Table 3 shows the highest pollutant concentration for the highest site. It also shows that all of the modeled criteria pollutants met the NAAQS standards for all Alternative scenarios. Table 3 also shows a summary comparing the NAAQS standards to the highest pollutant concentrations for the existing conditions (2004), Alternative 1 (2010 and 2020), and Alternative 3 (2010 and 2020). The electronic EDMS 4.21 files are included in the project technical file [Appendix].

Please also note that the current version of the EDMS model does not produce a dispersion output for both Ozone and PM10. However, NO<sub>x</sub>, a precursor of ozone, has an output and a criteria standard for comparison. It was below the standard. Also, for PM10, please note that a previous version of EDMS used in the original study indicated an Annual Arithmetic Mean of approximately 0.3 for all scenarios (standard of 50) and a 24-hour average ranging from 1.2-1.4 for all scenarios (standard of 150). It is highly likely that if a working PM10 calculation is reintegrated into updated versions of EDMS, then the predicted levels will also be well below the applicable standards.

**Table 3 - Summary of EDMS Dispersion Analysis Results (worst receptor locations)**

Parameter	CO		NO <sub>x</sub>	SO <sub>x</sub>			PM-2.5	
	8-hr. avg.	1-hr. avg.	AAM	AAM	24-hr. avg.	3-hr. avg.	AAM	24-hr. avg.
NAAQS µg/m <sup>3</sup>	10,000	40,000	100	80	365	1300	15	65
Existing Condition (2004)	3,840	8,757	7.8	0.5	3.8	18.8	0.1	0.9
Alternative 1 (2010)	4,494	9,735	8.4	0.7	4.0	19.0	0.3	1.4
Alternative 3 (2010)	4,494	9,735	8.4	0.7	4.0	19.0	0.3	1.4
Alternative 1 (2020)	5,492	12,735	9.7	0.8	4.1	13.4	0.6	3.1
Alternative 3 (2020)	5,492	12,735	9.7	0.8	4.1	13.4	0.6	3.1

General Notes:

- (1) EDMS 4.21 does not produce an Ozone concentration.
- (2) EDMS 4.21 does not produce a PM-10 output
- (3) AAM = Annual Arithmetic Mean
- (4) NAAQS = National Ambient Air Quality Standards

Potential Impacts

Based on the results of the study, review of the NAAQS, and emission thresholds, the impacts of all Alternative scenarios are predicted to be below both the applicable de minimis levels and NAAQS. The predicted changes are well below the de minimis and meet the NAAQS because there are no fleet changes, on-site operational changes to parking lots, access roads, and stationary sources resulting from the proposed action. The only change is the runway/taxiway extension.

Mitigation

As mentioned, impacts to air quality generated from implementation of the proposed project are below both the de minimis levels and/or the NAAQS, as applicable. Therefore, mitigation is not proposed from the direct proposed action.

Temporary construction-related impacts will be minimized according to FAA rules and regulations. Construction minimization activities are suggested to include water sprinkling trucks, covered haul trucks, exposing a minimum area of land, and idling restrictions for trucks and other construction equipment.

### 3.0 CONSTRUCTION AIR QUALITY ANALYSIS

#### Construction Activities and Nonroad Engine and Vehicle Emission Study – Report:

Nonroad Engine and Vehicle Emission Study Report by the United States Environmental Protection Agency was developed to quantify the emissions that nonroad vehicles and engines contribute. The study provides emission rates associated with various equipment within 10 categories. The categories relevant to this project include lawn and garden equipment, construction equipment, and logging equipment. Emission rates for particulate matter (PM), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and hydrocarbons (HC) are listed for each piece of specific equipment.

#### Nonroad Results

Construction emissions for Alternative 3 were calculated. Construction impacts for Alternative 1 [no action] were not calculated. To determine the impacts of construction activities, a preliminary estimate of effort required for the performance of construction activities was calculated. Specific equipment with corresponding days and hours of operation to complete construction tasks were assigned; subsequently, the corresponding emission rates and estimated hours of operation were used to develop emission inventories for construction activities. It is expected that construction activities will be completed over a two year period. The emissions associated with construction activities are temporary impacts seen only during the construction years (and prior to 2010 and 2020, of course). Table 4 shows the inventories in tons for each year of construction.

**Table 4 - Summary of Emissions for Construction Activities  
(tons)**

<b>Alternative 3 Construction</b>	<b>CO</b>	<b>HC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>	<b>PM</b>
First Year Construction	12.901	3.615	15.647	1.491	1.6485
Second Year Construction	4.115	0.895	9.069	0.873	0.7965

**APPENDIX A [CD]**

**EDMS 4.21 files for all analysis scenarios.**