

Technical Memorandum regarding potential air quality impacts from implementing the interim relocation of two F-16 FTUs to either Holloman AFB, NM or JBSA-Lackland (Kelly Field, TX)

During the preparation of the Environmental Assessment (EA) for the interim relocation of two Formal Training Units (FTUs) from Hill Air Force Base (AFB) to either Holloman AFB or JBSA-Lackland (Kelly Field), an analysis of potential air quality impacts was conducted. Based on that analysis it was determined that no significant air quality impacts would occur and the detailed analysis is provided in this Technical Memorandum rather than in the EA.

1.0 AIR QUALITY

1.1 Introduction

This appendix provides the following analyses of potential air quality impacts:

- Criteria pollutant emissions analysis
- Greenhouse gas analysis.

1.2 Clean Air Conformity

The 1990 amendments to the Clean Air Act (CAA) require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP) in a nonattainment area. The SIP provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS); it includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of the standards. The federal agency responsible for a proposed action is required to determine if its proposed action conforms to the applicable SIP.

The U.S. Environmental Protection Agency (EPA) has developed conformity regulations that are applicable to non-transportation projects in a nonattainment or maintenance area under the "general conformity" regulations (40 CFR Parts 6, 51 and 93) (U.S. EPA, 1993). However, the Proposed Action would take place at Holloman Air Force Base (AFB), Otero County, New Mexico or Joint Base San Antonio (JBSA)-Lackland (Kelly Field) in San Antonio, Texas; both areas are currently designated as an attainment/unclassified area for all criteria pollutants. Therefore, the general conformity rule does not apply.

1.3 Emissions Determination

The attainment pollutants (i.e., VOC, NO_x, PM_{2.5}, PM₁₀, and SO₂) and greenhouse gas emissions in terms of CO₂ levels as a result of the Proposed Action under two alternatives were estimated. These emissions include direct and indirect emissions potentially resulting from the following construction and operation activities:

- Use of diesel-powered nonroad equipment
- Movement of trucks during renovation activities
- Flight operation of additional F-16 fighter jets to be temporarily based at either Holloman AFB or JBSA-Lackland (Kelly Field).

1.3.1 Proposed Renovation/Construction Emissions

1.3.1.1 Proposed Renovation/Construction Activities Resource Data Estimates

An estimate to identify equipment, material and manpower requirements for the renovation/construction associated with multiple projects included in the F-16 Interim Relocation project was made. Estimates as to crew and equipment requirements and productivity are based on data presented in:

- “2003 RSMeans Facilities Construction Cost Data,” R.S. Means Co., Inc., 2003
- “2011 RSMeans Facilities Construction Cost Data,” R.S. Means Co., Inc., 2011.

The proposed work includes various renovation and construction projects assumed to take place during calendar year 2017 in order to support relocation of the F-16 fighter groups.

There are two alternatives; Alternative 1 involves relocation of F-16s from Hill AFB to Holloman AFB; Alternative 2 involves relocation to JBSA-Lackland (Kelly Field). Several of the buildings which would be used in either relocation alternative require no renovation or other construction work, while several other buildings would require work varying from minor interior modifications to larger-scale interior work involving demolition and reconstruction. Generally speaking, it is assumed significant central systems (boilers, chiller, backup generators, etc.) already exist to the extent they are required, and project-specific work would include only installation of new distribution systems (piping, wiring, fixtures, etc.). Only specific project requiring construction work are addressed; any buildings proposed for reuse in support of the F-16 relocation project, but which require no renovation or other construction are omitted from the analysis.

Alternative 1: Holloman AFB

- Building 297, renovation to convert building from a non-destructive inspection laboratory to an Aircraft Maintenance Unit; area to be renovated is 11,051 Square Feet (SF).
 - Interior Demolition: assuming large urban project under 20 mile haul route with demolition of a building with 40-foot building height, resulting demolition volume of 442,040 Cubic Feet (CF).
 - Renovation: assume minimal and incidental construction due to primary building use as a hangar.
- Building 811, renovation to convert building to include two sensitive compartmented information facility (SCIF) vaults; are to be renovated is 56,908 SF.
 - Interior Demolition: assume 20-foot building height with demolition volume of 1,138,160 CF.
 - Renovation: assume minimal and incidental construction to reuse existing walls.
- Building 1062, renovation to convert building to create two 4,000-SF mission planning vaults and a secure briefing room (area not specified; assume 2,000 SF).
 - Interior Demolition: assume 20-foot building height with demolition volume of 200,000 CF.
 - Renovation: assume minimal and incidental construction to reuse existing walls.
- Building 1063, renovation to convert building contractor back shops, total area is 24,863 SF.
 - Interior Demolition: assume 20-foot building height with demolition volume of 497,260 CF.
 - Renovation: assume minimal and incidental construction to reuse existing walls.

- Building 1065, to convert building from warehouse to simulator facility contractor back shops, total area is 4,600 SF.
 - Interior Demolition: Assume none since current use is as warehouse (e.g., no existing internal partitioning).
 - Renovation: assume minimal and incidental construction to reuse existing walls.

Alternative 2: JBSA-Lackland (Kelly Field)

- Building 917, Construct two concrete pads and pre-engineered shelters for additional Unit Training Devices; size not specified but assume 1,000 SF per pad required.
 - Assume slab on grade 15-inch thick, 2,000 SF.
 - Assume pre-engineered steel building, 20-foot wide, 24-foot eave height, 2,000 SF.
- Building 932, renovation to support office space, 4,000 SF total.
 - Demolition: assume 15-foot building height, so volume is 60,000 CF.
 - Interior construction and finishes
 - Interior utility installations
 - Electrical and lighting, based on wall length, calculated at 770 LF
 - Plumbing
 - Communications
- Building 1470, interior renovations to support storage; work is assumed to be minimal and limited to demolition of any existing interior partitions.
 - Demolition: assume 20-foot building height and 40,000 SF floor area, so volume is 800,000 CF.
- Building 1502, interior renovations to support use as flight shack; work is assumed to be minimal and limited to demolition of any existing interior partitions.
 - Demolition: assume 20-foot building height and 1,500 SF floor area, so volume is 30,000 CF.
- Building 1530, interior renovations to support storage; work is assumed to be minimal and limited to demolition of any existing interior partitions.
 - Demolition: assume 20-foot building height and 413,264 SF floor area, so volume is 8,265,280 CF.
- Building 1600, renovation to support office space, 8,377 SF total.
 - Demolition: assume 15-foot building height, so volume is 125,655 CF.
 - Interior construction and finishes
 - Interior wall assembly
 - Painting
 - Door assemblies
 - Subfloor
 - Flooring
 - Ceiling
 - Interior utility installations
 - Electrical and lighting, based on wall length, calculated at 1,600 LF
 - Plumbing
 - Communications

- Building 1610, minor ceiling modifications and bird netting installation is assumed to be negligible. Major work includes provision of back shop areas and addition of a metal pre-engineered structure. Also assume a pre-engineered building installed to provide explosives storage. Sizes not specified; assume demolition in 20,000 SF of floor area to create back shop areas and installation of two 2,000 SF pre-engineered buildings.
 - Demolition: assume 15-foot building height, so volume is 125,655 CF.
 - Pre-engineered steel building, 20-foot wide, 24-foot eave height, 4,000 SF.

- Building 1612, minor work to abate peeling paint and repainting is considered negligible. Installation of tool crib and battery shop assumed to be in the form of two pre-engineered buildings to be installed within the hangar.
 - Pre-engineered steel building, 20-foot wide, 24-foot eave height, 4,000 SF (2 x 2,000 SF installations).

- Building 1614, renovations to 4,272 SF for reuse as maintenance equipment shop, installation of gun vault and installation of additional ventilation and power.
 - Assume renovation of fire department area into use as maintenance shop consists primarily of demolition of the existing fire department area to create a large open area.; assume 15-foot building height, so volume is 64,080 CF.
 - For gun vault, assume a pre-engineered steel building, 20-foot wide, 24-foot eave height, 2,000 SF.
 - For additional ventilation, including HVAC, rooftop, single zone, electric cool, 20 ton.
 - Assume installation of additional power line is negligible.
 - For renovation as shop area:
 - Assume that all utilities are provided via floor boxes. 9 floor boxes provided (1 per 500 SF floor area).
 - Lighting fixtures
 - Pull boxes, assume 9 floor mounts (one per 500 SF), Outlet box, in concrete, 2 gang.
 - Conduit, use 1-1/2" galvanized steel, assume 150 LF average run, 1,350 LF total.
 - Assume no new plumbed locations (shop would reuse existing plumbing).
 - Cat 5 unshielded twisted pair (UTP) (telecom), assume 4 per floor box.
 - Cat 5 UTP jacks, 36 jacks total.

- Building 1618, renovation to support office space, 8,000 SF total.
 - Demolition: assume 15-foot building height, so volume is 125,655 CF.
 - Interior construction and finishes
 - Interior wall assembly
 - Painting
 - Door assemblies
 - Subfloor
 - Flooring
 - Ceiling
 - Interior utility installations
 - Electrical and lighting, based on wall length, calculated at 1,600 LF
 - Plumbing
 - Communications

In addition to building renovation, approximately 4,500 linear feet of security fencing would be installed. The security fence would replace portions of the existing security fence in the area and would be approximately 6 feet in height consisting of chain-link fencing with three strands of barb wire along the top and support posts placed approximately 20 feet apart.

1.3.1.2 Equipment Operations and Emissions

Estimates of equipment emissions were based on the estimated hours of usage and emission factors for each motorized source for the project. Emission factors for each pollutant related to heavy-duty diesel equipment were obtained from the U.S. EPA's Motor Vehicle Emission Simulator (MOVES) 2014a emission factor model (U.S. EPA, 2015).

The U.S. EPA recommends the following formula to calculate hourly emissions for the "ith" pollutant from non-road engine sources, including tractors:

$$M_i = N \times HP \times EF_i$$

where:

- M_i = mass of emissions of ith pollutants during inventory period;
- N = source population (units);
- HP = average rated horsepower; and
- EF_i = average emissions of ith pollutant per unit of use (e.g., grams per horsepower-hour).

Estimated emissions from operation of nonroad equipment are presented in Tables 1 and 2 for Holloman AFB and JBSA-Lackland (Kelly Field), respectively.

1.3.1.3 Construction On-road Vehicle Operations and Emissions

MOVES2014a emission factor model was used to predict truck emission factors for both criteria and hazardous pollutants (U.S. EPA, 2015). The national default input parameters applicable for the Holloman AFB and JBSA-Lackland (Kelly Field) area where the project site would be located were used in emissions factor modeling. Estimated emissions from operation of trucks associated with each element are presented in Tables 3 and 4 for Holloman AFB and JBSA-Lackland (Kelly Field) Alternatives, respectively.

1.3.1.4 Fugitive Dust Emissions

In addition to construction vehicle and equipment exhaust emissions as discussed above, the earth disturbance and paved road surface fugitive dust emissions would also be generated from material handling and maneuvering of vehicles and equipment. The U.S. EPA AP-42, *Compilation of Air Pollution Emission Factors* (U.S. EPA, 1995), was used to predict fugitive dust emissions from vehicles traveling on paved roads. Total paved road emissions are summarized in Tables 5 and 6 for Holloman AFB and JBSA-Lackland (Kelly Field) Alternatives, respectively.

1.3.1.5 Total Construction Emissions

Total combined construction emissions with potential to occur within 2017 construction period including both on-site equipment and on-road vehicle operational emissions are summarized in Table 7.

1.3.2 Proposed Operation Emissions

After the completion of construction activities, two additional F-16 squadrons would operate in a similar manner as the based squadron and result in additional aircraft flight operational emissions at each alternative base.

Although air pollutant emissions occur during all phases of aircraft operation (parking, idling, and in-flight), only those emissions emitted in the lower atmosphere's mixing layer have the potential to result in ground-level ambient air quality impacts. The mixing layer is the air layer extending from ground level up to the point at which the vertical mixing of pollutants decreases significantly. The U.S. EPA recommends that a default mixing layer of 3,000 feet be used in aircraft emission calculations (U.S. EPA, 1992). Consistent with this recommendation, aircraft emissions released above 3,000 feet were not included in the estimate.

Aircraft engines emit criteria pollutants during all phases of aircraft operation. Operation types include: arrival, departures, climb out, pattern flight that includes touch and go operations, and engine maintenance runups. The methodology for estimating aircraft emissions involves the evaluation of many variables, including:

- The type of operations conducted;
- The number of arrivals, departures, and patterns; and the;
- Determination of time in mode of operation used for each type of aircraft; and
- Determination of frequency, power setting, and time of each test during engine maintenance runups.

Procedures to calculate emissions for each aircraft type typically include the following steps:

- Obtain emission factors;
- Consider the range of operation types for each aircraft;
- Apply the applicable aircraft operating mode and respective time in mode associated with annual flight operations; and
- Apply engine power setting, testing mode and time, and annual frequencies of engine maintenance runups.

Aircraft engine emission factors developed by the Air Force as provided in *Air Emissions Guide for Air Force Mobile Sources* (Air Force Civil Engineer Center, 2013) were used in estimating the additional F-16 flight operational emissions associated with flight and engine runups as summarized in Tables 8 and 9 under the Holloman AFB Alternative and 10 and 11 under the JBSA-Lackland (Kelly Field) Alternative, respectively. Total increases in annual operational emissions are presented in Table 12.

1.4 Summary

Since the increase in aircraft emissions would occur within the airspace below 3,000 feet within and beyond the installation boundary, for comparison purposes, the emissions inventories from Otero County where Holloman AFB is located and Bexar County where JBSA-Lackland (Kelly Field) is located were used.

The comparisons between net annual emission increases from additional F-16 flight operations and the respective county where the installation is located are presented in Tables 13 and 14 for the Holloman AFB Alternative and the JBSA-Lackland (Kelly Field) Alternative, respectively.

The predicted worst-case greenhouse gas (GHG) emissions are below the Council on Environmental Quality suggested assessment threshold of 25,000 metric tons per year (tpy), the impact on GHG emissions and climate change is not considered significant. Moreover, on a global scale for which GHG and climate change impact is assessed, the increases under each alternative is somewhat offset by the comparable reduction of emissions at Hill AFB where these two F-16 squadrons would move from. The net change in greenhouse gas emissions on a global scale would be minimal.

Table 1. Construction Equipment Emissions – Holloman AFB

Equipment Type	Number of Units	Days	Hours	Horsepower (hp)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
					VOC	NOx	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂	VOC	NOx	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂
Construction Equipment Emissions																		
Crane, 33 ton	1	114	912	152	0.205	1.819	0.503	0.120	0.123	0.003	530.5	0.031	0.278	0.077	0.018	0.019	0.000	80.987
Front end loader, TM, 2.5cy	1	114	912	128	0.234	2.079	2.0	0.250	0.258	0.003	595.5	0.030	0.267	0.257	0.032	0.033	0.000	76.561
Total Emissions												0.061	0.545	0.334	0.050	0.052	0.001	157.5

Table 2. Construction Equipment Emissions – JBSA-Lackland (Kelly Field)

Equipment Type	Number of Units	Days	Hours	Horsepower (hp)	Emission Factor (grams/hp-hour)							Emission Rate (tons)						
					VOC	NOx	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂	VOC	NOx	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂
Construction Equipment Emissions																		
Compressor, 250 cfm	1	62	496	80	0.280	2.600	1.532	0.217	0.224	0.003	589.6	0.012	0.114	0.067	0.010	0.010	0.000	25.8
Crane, 90 ton	1	50	400	250	0.191	1.672	0.371	0.072	0.074	0.003	530.5	0.021	0.184	0.041	0.008	0.008	0.000	58.4
Crane, 33 ton	1	470	3760	152	0.205	1.819	0.503	0.120	0.123	0.003	530.5	0.129	1.145	0.316	0.075	0.078	0.002	333.9
Front end loader, TM, 2.5cy	1	470	3760	128	0.204	1.734	0.737	0.168	0.174	0.003	536.3	0.108	0.919	0.391	0.089	0.092	0.002	284.2
Total Emissions												0.237	2.064	0.707	0.165	0.170	0.004	618.1

Table 3. Construction Vehicle Emissions – Holloman AFB

			Emission Factor (lb/mi)							Emission (tons)						
	Number of Delivery	Total Miles	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Car	2486	20	0.307	1.091	5.882	0.037	0.097	0.003	402.3	0.017	0.060	0.322	0.002	0.005	0.000	22.0
Truck	460	20	0.886	17.850	4.8	1.063	1.466	0.018	2154.8	0.009	0.181	0.048	0.011	0.015	0.000	21.8
Total motor vehicle emissions										0.026	0.241	0.370	0.013	0.020	0.000	43.8

Note: ¹ The unit is in metric tons converted from short tons.

Table 4. Construction Vehicle Emissions – JBSA-Lackland (Kelly Field)

			Emission Factor (lb/mi)							Emission (tons)						
	Number of Delivery	Total Miles	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Car	5499	20	0.338	0.945	5.926	0.028	0.087	0.003	420.8	0.041	0.114	0.718	0.003	0.011	0.000	51.0
Truck	1199	20	0.886	15.422	4.8	1.063	1.466	0.018	2246.0	0.023	0.407	0.126	0.028	0.039	0.000	59.3
Total motor vehicle emissions										0.064	0.522	0.844	0.031	0.049	0.001	110.3

Note: ¹ The unit is in metric tons converted from short tons.

Table 5. Construction Vehicle Paved Road Fugitive Dust Resuspension Emissions – Holloman AFB

Vehicle Type	Number of Units	Total Roundtrip Miles/Veh	PM ₁₀ Emission Factor lb/VMT	PM _{2.5} Emission Factor lb/VMT	PM ₁₀ Emissions lb/veh	PM _{2.5} Emissions lb/veh	PM ₁₀ Emissions ton	PM _{2.5} Emissions ton
Trucks	460	20	0.04	0.01	0.89	0.22	0.21	0.05
Cars	2486	20	0.003	0.001	0.06	0.01	0.07	0.02
Total Paved Road Emissions							0.28	0.07

Table 6. Construction Vehicle Paved Road Fugitive Dust Resuspension Emissions – JBSA-Lackland (Kelly Field)

Vehicle Type	Number of Units	Total Roundtrip miles/veh	PM ₁₀ Emission Factor lb/VMT	PM _{2.5} Emission Factor lb/VMT	PM ₁₀ Emissions lb/veh	PM _{2.5} Emissions lb/veh	PM ₁₀ Emissions ton	PM _{2.5} Emissions ton
Trucks	1199	20	0.04	0.01	0.89	0.22	0.54	0.13
Cars	5499	20	0.003	0.001	0.06	0.01	0.15	0.04
Total Paved Road Emissions							0.69	0.17

Table 7. Total Construction Emissions

Pollutant (tons)						
VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Holloman AFB Alternative						
0.1	0.8	0.7	0.1	0.4	0.0	201.3
JB San Antonio-Lackland Alternative						
0.3	2.6	1.6	0.4	0.9	0.0	728.4

Note: ¹ The unit is in metric tons converted from short tons.

Table 8. Increase in Flight Operational Emissions – Holloman AFB

	Number of Operation	Fuel Rate (gal/op)	Emission Factor (lb/1000 gal)							Emission (tons)						
			VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ ¹
Idle (Taxi)	9,600	538.39	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	20.5	91.2	11.9	2.7	5.3	4.8	8,405.2
Approach	24,960	223.83	5.12	1.92	12.53	1.06	2.63	2.37	3,252.46	14.3	5.4	35.0	3.0	7.3	6.6	9,085.2
Intermediate	24,960	76.93	2.89	0.86	22.18	1.06	2.06	1.85	3,252.46	2.8	0.8	21.3	1.0	2.0	1.8	3,122.8
Military/takeoff	9,600	64.53	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.6	0.3	9.1	0.3	0.4	0.4	1007.4
Total increase in aircraft emissions										38.15	97.68	77.29	7.05	15.06	13.55	19,614

Note: ¹ The unit is in metric tons converted from short tons.

Table 9. Increase in Engine Runup Operational Emissions – Holloman AFB

	Frequency	Fuel Rate (gal/op)	Emission Factor (lb/1000 gal)							Emission (tons)						
			VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ ¹
Takeoff Roll Runup - Military	9,600	40.33	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.3	0.2	5.7	0.2	0.3	0.2	629.6
Flight Line Maintenance - Idle	52	180.67	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.2	0.0	0.0	0.0	0.0	15.3
Flight Line Maintenance - Military	52	403.29	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.3	0.0	0.0	0.0	34.1
Flight Line Maintenance - Idle	208	271.00	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.2	1.0	0.1	0.0	0.1	0.1	91.7
Trim Pad Maintenance - Idle	104	180.67	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.1	0.3	0.0	0.0	0.0	0.0	30.6
Trim Pad Maintenance - Military	104	1,626.61	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.2	0.1	2.5	0.1	0.1	0.1	275.1
Trim Pad Maintenance - A/B	104	3,473.50	1.53	11.99	8.37	1.06	1.15	1.04	3,252.46	0.3	2.2	1.5	0.2	0.2	0.2	587.5
Total increase in engine runup emissions										1.13	3.91	10.17	0.54	0.68	0.61	1,509

Note: ¹ The unit is in metric tons converted from short tons.

Table 10. Increase in Flight Operational Emissions – JBSA-Lackland (Kelly Field)

	Number of Operation	Fuel Rate (gal/op)	Emission Factor (lb/1000 gal)							Emission (tons)						
			VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ ¹
Idle (Taxi)	7,776	538.39	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	16.6	73.9	9.6	2.2	4.3	3.9	6,808.2
Approach	27,216	223.83	5.12	1.92	12.53	1.06	2.63	2.37	3,252.46	15.6	5.8	38.2	3.2	8.0	7.2	9,906.4
Intermediate	27,216	76.93	2.89	0.86	22.18	1.06	2.06	1.85	3,252.46	3.0	0.9	23.2	1.1	2.2	1.9	3,405.0
Military/takeoff	7,776	64.53	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.4	0.2	7.4	0.3	0.3	0.3	816.0
Total increase in aircraft emissions										35.69	80.86	78.39	6.82	14.81	13.33	18,992

Note: ¹ The unit is in metric tons converted from short tons.

Table 11. Increase in Engine Runup Operational Emissions – JBSA-Lackland (Kelly Field)

	Frequency	Fuel Rate (gal/op)	Emission Factor (lb/1000 gal)							Emission (tons)						
			VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ ¹
Hush House Maintenance - Idle	48	542.00	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.1	0.5	0.1	0.0	0.0	0.0	42.3
Hush House Maintenance - Intermediate	48	7,693.33	2.89	0.86	22.18	1.06	2.06	1.85	3,252.46	0.5	0.2	4.1	0.2	0.4	0.3	600.5
Trim Pad Engine Operational Checkout - Idle	6	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Trim Pad Engine Operational Checkout - Military	6	1,720.71	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.2	0.0	0.0	0.0	16.8
Trim Pad Interface checkout - Idle	20	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.1	0.0	0.0	0.0	0.0	7.6
Trim Pad Primary/Secondary checkout - Idle	2	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Augmentor Operational checkout - Idle	30	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.1	0.0	0.0	0.0	0.0	11.5
Augmentor Operational checkout - Military	30	1,720.71	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.8	0.0	0.0	0.0	83.9
Trim Pad Intermediate checkout - Idle	6	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Trim Pad Intermediate checkout - Military	6	376.41	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	3.7

	Frequency	Fuel Rate (gal/op)	Emission Factor (lb/1000 gal)							Emission (tons)						
			VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ ¹
Trim Pad Minimum augmentor checkout - Idle	26	234.87	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.1	0.0	0.0	0.0	0.0	9.9
Trim Pad Minimum augmentor checkout - Military	26	1,720.71	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.7	0.0	0.0	0.0	72.8
Trim Pad Oil consumption checkout - Idle	6	542.00	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.1	0.0	0.0	0.0	0.0	5.3
Trim Pad Oil consumption checkout - Intermediate	6	2,404.17	2.89	0.86	22.18	1.06	2.06	1.85	3,252.46	0.0	0.0	0.2	0.0	0.0	0.0	23.5
Trim Pad Oil consumption checkout - Military	6	8,872.42	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.8	0.0	0.0	0.0	86.6
Trim Pad Oil contamination checkout - Idle	4	180.67	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Trim Pad Oil contamination checkout - Military	4	3,226.33	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.2	0.0	0.0	0.0	21.0
Trim Pad Isolation checkout - Idle	4	252.93	7.94	35.3	4.61	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	1.6
Trim Pad Isolation checkout - Intermediate	4	673.17	2.89	0.86	22.18	1.06	2.06	1.85	3,252.46	0.0	0.0	0.0	0.0	0.0	0.0	4.4
Trim Pad Isolation checkout - Military	4	2,258.43	1.79	0.86	29.32	1.06	1.33	1.2	3,252.46	0.0	0.0	0.1	0.0	0.0	0.0	14.7
Total increase in engine runup emissions										0.93	1.17	7.10	0.33	0.57	0.52	919

Note: ¹ The unit is in metric tons converted from short tons.

Table 12. Total Operational Emissions

Pollutant (tons)						
VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Holloman AFB Alternative						
39.28	101.59	87.46	14.16	15.74	7.59	21,123
JB San Antonio-Lackland Alternative						
36.62	82.03	85.49	13.85	15.38	7.15	19,911

Note: ¹ The unit is in metric tons converted from short tons.

Table 13. Total Net and Net Percent Increase in Emissions – Holloman AFB

Annual Emissions (tons)							
Alternative	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Proposed Action Construction Year	0.1	0.8	0.7	0.1	0.4	0.0	201.3
Proposed Action Operational Year	39.28	101.59	87.46	14.16	15.74	7.59	21,123
2014 Otero County Emissions Inventory ²	89,278	3,665	30,800	2,859	22,511	50	535,527
Maximum Worst-case Year Net Percent Increase over Baseline Stationary Source Annual Emissions Inventory (%)	0.04	2.77	0.28	0.50	0.07	15.13	3.94

Note: ¹ The unit is in metric tons converted from short tons.

Source: ² <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>.

Table 14. Total Net and Net Percent Increase in Emissions – JBSA-Lackland (Kelly Field)

Annual Emissions (tons)							
Alternative	VOC	NO _x	CO	PM _{2.5}	PM ₁₀	SO ₂	CO ₂ ¹
Proposed Action Construction Year	0.3	2.6	1.6	0.4	0.9	0.0	728.4
Proposed Action Operational Year	36.62	82.03	85.49	13.85	15.38	7.15	19,911
2014 Bexar County Emissions Inventory ²	58,208	38,456	163,161	8,369	47,217	18,656	8,857,238
Maximum Worst-case Year Net Percent Increase over Baseline Annual Emissions Inventory (%)	0.06	0.21	0.05	0.17	0.03	0.04	0.22

Note: ¹ The unit is in metric tons converted from short tons.

Source: ² <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>.

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