Proposed Land Acquisition and Airspace Establishment at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA

Air Quality Conformity Determinations

February 16, 2011

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UNITED STATES MARINE CORPS
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8106

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4F/c-10-0868

19 OCT 2010

Mr. Alan De Salvio
Mojave Desert Air Quality Management District
14306 Park Avenue
Victorville, California 92392-2383

Dear Mr. De Salvio:

SUBJECT: REQUEST FOR CONFORMITY ANALYSIS REVIEW AND DETERMINATION

The United States Marine Corps is currently analyzing an expansion of the existing training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, California. In support of this proposed action, the Marine Corps has prepared a Conformity Analysis of air emissions associated with the proposed expansion to satisfy the Clean Air Act (CAA) Conformity Rule requirements. We believe these emissions are in conformity with your agency's plan to attain National Ambient Air Quality Standards on schedule for Ozone and Particulate Matter 10.

Therefore, we respectfully request that you review our enclosed Conformity Analysis and provide comments regarding whether it is of adequate content to demonstrate compliance with District Rule 2002. If you agree with these findings, please provide a letter to that effect per District Rules 2002(H)(1)(e)(i)(B) and 2002(H)(1)(d)(i). This documentation is necessary for us to satisfy both our CAA and National Environmental Policy Act (NEPA) requirements.

We also ask that you forward the letter and project Conformity Analysis to the California Air Resources Board for their concurrence in accordance with 40 C.F.R. § 93.158(a)(5)(i)(B) and 40 C.F.R. § 93.158(a)(4)(i).

Each individual federal action which, by itself, exceeds de *minimus* thresholds for one or more regulated emissions, must demonstrate conformity. This request for an attainment plan revision applies specifically to the Combat Center expansion analysis and is not meant to be a comprehensive inventory of potential future military growth in the Western Mojave Desert.

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If you have any questions, please feel free to contact Mrs. Erin Adarns, Natural Resources and Environmental Affairs, at (760)830-7726.

Sincerely,

(for)

MAJOR W. M. Rowley
Director, NREA
Acting

Enclosures: 1. Conformity Application Analysis
2. LAAE Emissions Calculations
3. Dispersion Modeling Analysis

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Land Acquisition

CONFORMITY EVALUATION
LAND ACQUISITION AND AIRSPACE ESTABLISHMENT PROPOSED ACTION
MARINE CORPS COMBAT CENTER TWENTYNINE PALMS

1.0 INTRODUCTION

The following presents a Clean Air Act (CAA) general conformity evaluation for the Land Acquisition and Airspace Establishment (LAS) action at Marine Corps Combat Center Twentynine Palms (Combat Center), as proposed by the Department of Navy (Navy). Included in this evaluation are the conformity applicability analysis for the proposed action and the methods used to demonstrate this action's conformity with the CAA and specifically with the California State Implementation Plan (SIP).

This evaluation presents conformity determinations for emissions of ozone precursors and particulate matter less than 10 microns in diameter (PM_{10}). The area where the proposed project will occur lies in areas of the Mojave Desert Air Basin (MDAB) which have been designated by the U.S. Environmental Protection Agency (EPA) as nonattainment for ozone and PM_{10}. This fact triggers the General Conformity Rule found in Section 176(c) of the CAA (42 U.S.C. § 7506(c)) (40 C.F.R. 93.153(b); MDAQMD Rule 2002(A)(3)(v)).

As part of the LAS action, the Navy proposes to establish a large-scale training range facility at the Combat Center that would accommodate sustained, combined-arms, live-fire, and maneuver training exercises for all elements of a Marine Expeditionary Brigade (MEB). To accomplish this goal, the Marine Corps would acquire additional lands adjacent to the existing Combat Center. The LAS action proposes two MEB exercises per year that would last 24 days each. The Navy published the Notice of Intent to prepare an Environmental Impact Statement (EIS) for the LAS on October 30, 2008 in the Federal Register and the Navy plans to release the Draft EIS to the public in December 2010. This conformity evaluation focuses on Alternative 6 in the Draft EIS, which would acquire lands to the west and southeast of the existing Combat Center.

2.0 CLEAN AIR ACT CONFORMITY REQUIREMENTS

"No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an (approved SIP)" 42 U.S.C. 7506(c). "Conformity" means *inter alia* conformity to the applicable SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards (NAAQS) and achieving expeditious attainment of such standards, and the proposed action will not cause or contribute to any new violation of any standard in any area. *Id.*

To implement this mandate, the EPA promulgated the conformity rule for general federal actions. These Federal General Conformity Rules are found at 40 C.F.R. §§ 150-165. California's SIP responsibilities in the area of the proposed action are delegated to the Mojave Desert Air Quality Management District (MDAQMD). The portion of the California SIP implementing Section 176(c) of the CAA is MDAQMD Rule 2002.

When EPA approves a SIP, or portion of a SIP, a conformity evaluation is governed by the approved SIP criteria and procedures. The Federal conformity regulations apply only for the portions, if any, of the part 93 requirements not contained in the SIP conformity provisions approved by EPA. In addition, any previously applicable implementation plan conformity requirements remain enforceable until the EPA approves the revision to the applicable SIP to specifically include the revised requirements or remove requirements.

2.1 Purpose and Applicability of the General Conformity Rule

Both Federal and State General Conformity Rules require the Navy to analyze this proposed action according to standardized procedures. General conformity rules apply to federal actions affecting areas that are in nonattainment of a NAAQS and to designated maintenance areas (attainment areas that have been reclassified from a previous nonattainment status and which are required to prepare an air quality maintenance plan). Conformity requirements apply specifically to the emissions for which a given area has been designated nonattainment.

Conformity analysis focuses on the net increase in emissions from a proposed action compared to existing, historical baseline conditions. Conformity analysis is limited to those direct and indirect emissions over which the federal agency has responsibility and control. Lastly, conformity analysis is not required to address emissions that are not reasonably foreseeable or quantifiable.

Conformity determinations are required when the annual direct and indirect emissions from a proposed federal action exceed an applicable *de minimis* threshold. The conformity *de minimis* thresholds vary by emission and by the severity of nonattainment conditions in the region affected by the proposed action. The EPA has designated the area which this proposed action will affect as a severe nonattainment area for ozone and its precursors and a moderate nonattainment area for PM_{10}. As a result, MDAQMD Rule 2002(A)(3)(a)(ii)(A) sets the *de minimus* thresholds applicable to this action at 25 tons per year of an ozone precursor and 100 tons per year of PM_{10}.

The general conformity rule identifies several categories of actions that are presumed to result in no net emissions increase or in an emissions increase that will clearly be less than any applicable *de minimis* level. MDAQMD Rule 2002(D). These types of activities are exempt from the requirements of the general conformity rule and are primarily routine administrative, planning, financial, and property disposal or maintenance actions.

Air emissions produced from construction and operation of the proposed action would occur within the existing and proposed boundaries of the Combat Center. This area lies within the MDAB, which includes all but the southwest corner of San Bernardino County and the eastern portions of Riverside, Los Angeles, and Kern Counties. Presently, the MDAB attains the NAAQS for all criteria pollutants except ozone and PM_{10}.

3.0 PROJECT CONFORMITY APPLICABILITY ANALYSIS

The LAS proposed action would produce emissions within the MDAB project region due to both construction and operational activities. The following presents emissions estimates and the conformity applicability analysis for the proposed action, which is Project Alternative 6 in the LAS EIS. Attachment 1 of this conformity evaluation documents the calculations of emissions for this proposed action.

Construction

Construction activities associated with the proposed action would include (1) construction of about 30 miles of unpaved roads and (2) installation of three communication towers in the west study area. Air quality impacts due to proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions ($PM_{10}/PM_{2.5}$) due to the operation of equipment on exposed soil. Construction activity data developed by Combat Center staff were used to estimate proposed combustive and fugitive dust emissions (MAGTF Training Command 2010). This conformity analysis assumes that all construction activities would occur in year 2013, prior to initiation of the proposed training exercises in 2015.

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors*, *AP-42*, *Volume I* (EPA 1995 and 2006), the *OFFROAD2007 Model* for off-road construction equipment (ARB 2006a), the *EMFAC2007 Model* for on-road vehicles (ARB 2006b), and the Navy Aircraft Environmental Support Office (AESO) for helicopter emission rates (AESO 2000a and 2000b).

The analysis reduced fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control. These BMPs include the following:

1. Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.

2. Minimize the amount of disturbed ground area at any given time.

3. Suspend all soil disturbance activities when winds exceed 25 miles per hour (mph) or when visible dust plumes emanate from the site and then stabilize all disturbed areas with water application.

4. Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

Table 1 presents a summary of the conformity-related emissions that would occur from construction of the proposed action within the MDAB. These data show that annual VOC, NO_x, and PM_{10} emissions from proposed construction activities would be well below the conformity *de minimis* thresholds. Consequently, construction emissions are not expected to cause or contribute to any delay of attainment or any new NAAQS exceedance.

Table 1. Annual Conformity-Related Emissions due to Construction of the LAS Proposed Action within the MDAB.

CONSTRUCTION ACTIVITY	*ANNUAL EMISSIONS (TONS)* [(1)]		
	VOC	***NOx***	***PM10***
Development of Unpaved Roads	0.08	0.83	0.45
Installation of Communication Towers	0.09	0.12	0.53
Total Annual Emissions (1)	**0.17**	**0.96**	**0.98**
MDAB Conformity *de minimis* Level	**25**	**25**	**100**
Exceeds *de minimis* Level?	No	No	No

Note: (1) All emissions are assumed to occur in calendar year 2013.

Operations

Air quality impacts associated with proposed operations would occur from (1) combustive emissions due to the use of fossil fuel-powered mobile sources and ordnance and (2) fugitive dust emissions ($PM_{10}/PM_{2.5}$) due to disturbances on exposed soils. Combustive emission sources associated with proposed operations would include (1) aircraft during landing and take-off (LTOs) and cruising modes below 3,000 feet AGL, (2) tactical vehicles (TVs), (3) tactical support equipment (TSE), (4) use of ordnance, and (5) personnel on-road commutes. Proposed aircraft LTOs, operations of TVs/TSE on exposed soils, and use of ordnance would generate fugitive dust emissions. The proposed training exercises would begin in year 2015 and would produce the same level of emissions for each future year of operation.

Operational data used to calculate proposed operational emissions were obtained from the Marine Corps (as presented in EIS Section 2.4) and the project airspace and noise analyses. Factors used to calculate combustive emissions for proposed sources were obtained from the AESO (AESO 1999, 2000a, 2000c, 2001a, 2001b, and 2002); the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) (IERA 2002); the *OFFROAD2007* Model, the *EMFAC2007 Model* for on-road vehicles; the *Calendar Year 2007 Comprehensive Emissions Inventory Plan for Marine Corps Air Ground Combat Center Twentynine Palms* (United States Army Corps of Engineers Sacramento District and Combat Center 2008); and the *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (EPA 2006).

Lands proposed for acquisition currently generate emissions from recreational activities and the use of off-highway vehicles (OHV). The proposed action would displace some of these existing recreational activities and their associated emissions from the MDAB. Therefore, to estimate the net change in emissions due to the proposed action, the analysis subtracted portions of existing emissions displaced from these areas from the emission increases associated with the proposed action. Sources of air emissions that occur in these areas include (1) combustive emissions due to vehicular usage, camp fires, propane stoves, and portable diesel- and gasoline-powered generators and (2) fugitive dust emissions generated from the use of vehicles on unpaved surfaces. The Johnson Valley OHV Area within the west study area has the highest recreational usage and therefore generates the highest amount of emissions within any of the lands proposed for acquisition. Activity data used to estimate emissions from these activities were developed from visitor usage data obtained from the BLM, as presented in EIS Section 3.2 (BLM and The

Environmental Company [TEC] 2010). Table 2 presents a summary of the existing emissions that occur within the west and south study areas.

To determine the amount of existing recreational activities that the proposed action would displace from the west study area, the analysis considered the following factors: (1) the type of visitor usage (events vs. dispersed), (2) the amount of area affected by the proposed action, and (3) the amount of time per year that the proposed action would close this area to the public. These factors determined that (1) 85 percent of the existing activities and associated emissions would re-locate elsewhere within the MDAB ozone nonattainment area and (2) 87 percent of the existing activities and associated emissions would re-locate elsewhere within the MDAB PM_{10} nonattainment area. Therefore, the analysis subtracted (1) 15 percent of the VOC and NO_x emissions and (2) 13 percent of the PM_{10} emissions generated in the west area from the emission increases associated with the proposed action to estimate the net change in emissions due to the proposed action. Since the proposed training exercises would not occur until year 2015, the analysis took into consideration the

Table 2. Existing Emissions within Lands Acquired by the Proposed LAS

AREA/ACTIVITY	*ANNUAL EMISSIONS (TONS)*		
	VOC	***NO_x***	***PM_{10}***
West Study Area			
Vehicles – Combustive	5.83	3.79	0.20
Vehicles – Dust	---	---	957.26
Gasoline-powered Generator	3.02	1.54	0.10
Propane Stoves	0.01	0.08	0.00
Camp Fires	2.14	---	4.66
Total – West Area	**11.00**	**5.40**	**962.23**
South Study Area			
Vehicles – Combustive	0.02	0.01	0.00
Vehicles – Dust	---	---	3.62
Total - South Area	**0.02**	**0.01**	**3.62**

Notes: Developed from visitor usage data source (BLM and TEC 2010).

usages expected for Johnson Valley at this time (BLM and TEC 2010). This future baseline equates to a 16 percent increase in usage and associated emissions for the west area in 2015, compared to 2010 levels.

In the south study area, the proposed action would displace all of the existing recreational activities and their associated emissions from this area, but 90 percent of these activities and emissions would re-locate elsewhere within the MDAB ozone and PM_{10} nonattainment areas (BLM and TEC 2010). Therefore, the analysis subtracted 10 percent of the existing emissions from this area from the emission increases associated with the proposed action to estimate the net change in emissions due to the proposed action.

Table 3 presents a summary of annual emissions that would occur from operations of the proposed action within the MDAB PM_{10} and ozone nonattainment areas. These data show that operations of the proposed action would result in a net increase in VOC, NO_x, and PM_{10} emissions within the MDAB that would exceed their applicability conformity *de minimis* thresholds. Therefore, pursuant to MDAQMD Rule 2002, the Navy is required to perform a conformity determination to

demonstrate how emissions of ozone precursors and PM_{10} from operations of the LAS proposed action will conform to the CAA and the California SIP.

Table 3. Net Annual Emissions due to Operations of the LAS Proposed Action within the MDAB

ACTIVITY	*ANNUAL EMISSIONS (TONS)* [1]		
	VOC	***NO_x***	***PM_{10}***
Aircraft Operations	25.55	39.77	17.25
Tactical Vehicles (TV)	5.29	64.39	2.33
Tactical Support Equipment (TSE)	1.50	16.43	0.70
Ordnance	1.82	0.28	-
Fugitive Dust – Aircraft	-	-	42.36
Fugitive Dust – TV/TSE	-	-	565.25
Fugitive Dust – Ordnance	-	-	2.49
Personnel On-road Commutes	0.05	1.84	0.02
Annual Emissions	**34.21**	**122.71**	**630.40**
Reduction of West Area Emissions (2)	**(1.90)**	**(0.93)**	**(141.23)**
Reduction of South Area Emissions (3)	**(0.00)**	**(0.00)**	**(0.36)**
Total Net Change - Tons per Year	**32.31**	**121.78**	**488.81**
Conformity *De Minimis* Level	**25**	**25**	**100**
Exceeds Conformity *de minimis* Level?	**Yes**	**Yes**	**Yes**

Note: (1) Proposed emissions would be the same for each year of operation.
(2) Equal to 13/15% of total West Area year 2015 PM10/VOC and NOx emissions.
(3) Equal to 10% of total South Area existing emissions.

4.0 PROJECT CONFORMITY DEMONSTRATION

4.1 Conformity Methods Defined in the General Conformity Rule

MDAQMD Rule 2002(H) identifies several criteria that can be used to demonstrate conformity. Among them include the following:

- Where the MDAQMD determines that an areawide air quality modeling analysis is not needed, local air quality modeling analysis establishes that the total direct and indirect emissions from the proposed action meet the following requirements: (a) adhere to the Procedures for Conformity Determinations of General Federal Actions contained in MDAQMD Rule 2002(I) and (b) the action does not cause or contribute to any new violation of any standard in any area or increase the frequency or severity of any existing violation (MDAQMD Rule 2002(H)(1)(d)(i)).Where the EPA has approved a revision to an area's attainment or maintenance demonstration after 1990, the proposed action may be determined to conform when MDAQMD makes a written commitment to revise its SIP attainment plan. The MDAQMD commitment must include the following (MDAQMD Rule 2002(H)(1)(e)(i)):

    1. A specific schedule for adoption and submittal of a revision to the applicable implementation plan which would achieve the needed emission reductions prior to the time emissions from the Federal action would occur;

2. Identification of specific measures for incorporation into the applicable implementation plan which would result in a level of emissions which, together with all other emissions in the nonattainment or maintenance area, would not exceed any emissions budget specified in the applicable implementation plan;

3. A demonstration that all existing applicable implementation plan requirements are being implemented in the area for the pollutants affected by the Federal action, and that local authority to implement additional requirements has been fully pursued;

4. A determination that the responsible Federal agencies have required all reasonable mitigation measures associated with their action; and

5. Written documentation including all air quality analyses supporting the conformity determination.

4.2 Conformity of Proposed Action with Respect to Ozone Precursor Emissions

The following summarizes the conformity demonstration for ozone precursor emissions associated with the LAS proposed action. This analysis is based upon (1) a review of historical emissions estimated for the Combat Center, (2) a review of recent MDAQMD ozone attainment plans, and (3) consultation with MDAQMD staff.

In 2008, the MDAQMD completed its *Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area*) (*2008 Plan*), which maps a pathway to attainment of the 8-hour ozone NAAQS of 0.084 parts per million (ppm) (MDAQMD 2008). Emissions from the LAS proposed action are not specifically accounted for in this or any earlier MDAQMD attainment plan. However, the planning assumptions and principles applied in this plan are a useful tool to justify the conclusion that ozone precursor emissions will not cause or contribute to any new NAAQS violations, to any increase in severity of current conditions or delay reasonable further progress of the air basin toward attainment of the ozone NAAQS.

To satisfy the requirements of MDAQMD Rule 2002(H)(1)(e)(i)(B) and the Federal General Conformity Rules (40 C.F.R. §§ 93.150-165), the Navy formally requests the MDAQMD to provide a written commitment to include the ozone precursor emissions from the proposed LAS action into a revision of its ozone attainment plan in the California SIP revision. Because the Federal General Conformity Rules specifically require the approval of "the State agency responsible for the applicable SIP" and because recent MDAQMD attainment plans have not been approved by the EPA, the Navy respectfully asks the MDAQMD to forward its commitment to the California Air Resources Board (CARB) for their concurrence. This conformity evaluation and the emission calculations presented in Attachment 1 form the basis of project emissions data that are needed for this process. Once the MDAQMD and CARB commit to revising the California SIP according to the requirements in MDAQMD Rule 2002 and the General Federal Conformity Rules, the proposed action would conform to the SIP.

4.3 Conformity of Proposed Action with Respect to PM_{10} Emissions

The following summarizes the conformity demonstration of PM_{10} emissions for the LAS proposed action. This analysis is based upon (1) a review of historical emissions estimated for the Combat Center, (2) a review of MDAQMD PM_{10} attainment plans, and (3) consultation with the MDAQMD.

To satisfy the requirements of MDAQMD Rule 2002(H)(1)(d)(i), a dispersion modeling analysis was performed which demonstrates that PM_{10} emissions from the LAS proposed action would not contribute to an exceedance of the PM_{10} NAAQS. The following summarizes the methods and results of this analysis.

Project PM_{10} Dispersion Modeling Analysis

An air dispersion analysis was performed with the use of the EPA American Meteorological Society/EPA Regulatory Model (AERMOD) to estimate the ambient impact of PM_{10} emissions that would occur from the LAS proposed action. The AERMOD is a guideline model required by the EPA for use in regulatory air quality impact evaluations (EPA 2010). The AERMOD has the ability to simulate the various physical characteristics of stationary and mobile sources of emissions associated with the proposed LAS MEB exercises. The modeling methodologies are consistent with the guidelines of the EPA, ARB, and generally approved practices to assess proposed air pollutant concentrations. Regulatory default options appropriate for rural conditions were utilized for the modeling simulations. Attachment 2 of this conformity evaluation documents the details of this analysis.

The AERMOD analysis was performed in two steps. First, the analysis estimated PM_{10} impacts along the entire length of the proposed Combat Center boundary. Secondly, at the location of maximum impact along this boundary, a refined analysis was performed to evaluate off-site PM_{10} impacts.

Source Emission Rates

The analysis evaluated a scenario of peak daily PM_{10} emissions that would reasonably occur from the MEB exercises. This scenario would correspond to the final day of the 24-day MEB exercise (the FINEX). The FINEX would converge on a single objective point in the proposed West Area and therefore would produce the densest amount of PM_{10} emissions during the entire MEB exercise. The FINEX also would occur in close proximity to the boundary of the Combat Center. For these reasons, the FINEX would produce the highest off-site ambient PM_{10} impacts from the MEB exercises. Figure 2-10d in Attachment 2 shows the operational locations of the MEB exercise within the Combat Center.

The analysis assumed that peak daily PM_{10} emissions from the FINEX would occur from the following activity: (1) five percent of the annual aircraft operations, (2) seven percent of the annual TV/TSE operations, and (3) eight percent of the annual ordnance usages. In addition, the analysis assumed that 50 percent of the peak daily PM_{10} emissions during the FINEX would occur in the West Area and 25 percent each would occur in the central and east portions of the Combat Center. Tables A2-1 through A2-9 in Attachment 2 present estimations of the peak hourly PM_{10} emission rates for each source used in the AERMOD analysis.

Physical Simulations of Emission Sources

Due to the mobile nature of emission sources that would take part in the proposed MEB exercises, the analysis simulated both combustive and fugitive dust emissions from these sources as a series of volume sources. Figure A-1 in Attachment 2 shows the center points of the locations of these sources within the proposed Combat Center boundary. Each volume source has a side length of 2.5 kilometers (km) and a vertical height of 100 meters (m).

Source/Receptor Locations

Source base elevations were determined from USGS Digital Elevation Model (DEM) data. The horizontal locations of each source were defined in terms of Universal Transverse Mercator (UTM) coordinates.

The initial AERMOD analysis evaluated PM_{10} impacts along the proposed boundary of the Combat Center with the use of receptor points spaced about every 250 m. The analysis of maximum off-site PM_{10} impacts used a receptor spacing of 500 meters that extended approximately 10 km away from the Combat Center boundary. Figures A-1 and A-2 in Attachment 2 illustrate the receptor fields used in the AERMOD analysis.

Meteorological Data

Surface meteorological data needed for use in the modeling analysis were obtained from site-specific conditions recorded at the Combat Center Mainside ambient air monitoring station. Upper air meteorological data needed for use in the modeling analysis were obtained from conditions recorded at Desert Rock, Nevada, about 140 miles north of the Combat Center. Due to interruptions in the operations of these meteorological stations, the most recent calendar year that contained contiguous matching surface and upper air data with at least a 90 percent annual data recovery rate was 2004. The AERMET routine was used to process these meteorological data into a form suitable for use in the modeling analysis. Figure A-3 in Attachment 2 presents a wind rose generated for the Mainside station surface winds used in the analysis.

Background PM_{10} Values

The maximum PM_{10} concentration predicted by AERMOD was added to a background PM_{10} concentration to produce a total project impact for use in comparison to the 24-hour PM_{10} NAAQS. The Combat Center operated a PM_{10} sampling network from 1996 through 2005 and restarted this program in 2008. Data collected from the Emerson station, just northwest of Emerson Dry Lake and along the western boundary of the Combat Center, were used to define the background PM_{10} concentration for the PM_{10} impact analysis. This station was chosen over other stations operated at the Combat Center, as it is the closest station to the maximum PM_{10} impact location predicted by AERMOD for the proposed action.

To determine compliance with the NAAQS, EPA guidance recommends use of the highest value monitored in the area of analysis during the most recent 3-year period to define the background pollutant level (EPA 2003). The most recent 3-year period of monitoring at the Emerson station occurred from 2002 through 2005. The maximum 24-hour PM_{10} value recorded during this period was 52 $u g/m^3$, excluding any PM_{10} samples recorded when winds exceeded 15 miles per hour (mph) averaged over an hour, or instantaneous gusts of 25 mph, per MDAQMD Rule 403 guidelines.

The background 24-hour PM_{10} value of 52 ug/m3 defined for the analysis domain is deemed to be overly conservative. This is the case for the following reasons:

1. PM_{10} concentrations collected at the Emerson air monitoring station often contain PM_{10} emissions generated from existing activities within the (1) Johnson Valley OHV Area and (2) Combat Center. Operation of the proposed MEB exercises would eliminate any concurrent activities and associated PM_{10} emissions from these areas.

2. The top 10 project PM_{10} impacts predicted by AERMOD occurred during days of relatively low wind speeds. The maximum daily average wind speed for any of these days was 5.2 mph recorded at the Mainside monitoring station. The maximum 24-hour PM_{10} value recorded at the Mainside continuous PM_{10} sampler on these 10 days was 23 $u g/m^3$. In addition, analysis of PM_{10} values recorded at the Emerson station from 2002 through 2005 determined that no 24-hour PM_{10} concentration exceeded 23 $u g/m^3$ when the average daily wind speed was 5.2 mph or less.

Therefore, use of a 24-hour PM_{10} background value that is lower than 52 ug/m^3 is deemed reasonable for this impact analysis.

Analysis Results

The AERMOD analysis predicted that operation of Alternative 6 would produce a maximum 24-hour PM_{10} impact of 97 $u g/m^3$ on the boundary line of the proposed Combat Center West Area. Addition of the background PM_{10} value of 52 $u g/m^3$ would produce a total project PM_{10} impact of 149 $u g/m^3$. This impact would not exceed the 24-hour PM_{10} NAAQS of 150 $u g/m^3$, as shown in Table A-2.1.

Figure A-1 shows the results of the initial PM_{10} impact analysis for locations along the entire Combat Center boundary proposed under Alternative 6. These data show that the area of maximum PM_{10} impact would occur along the southwest boundary of the proposed Combat Center West Area. Figure A-2 shows the refined analysis of off-site PM_{10} impacts. These data show that PM_{10} impact values quickly decrease with distance from the Combat Center boundary. In addition, the impact value of 90 $u g/m^3$ extends only slightly beyond the Combat Center boundary and covers roughly 0.5 square km. Taking this into consideration and the fact that the analysis uses an overly conservative PM_{10} background value, it is reasonable to conclude that Alternative 6 would produce a total project 24-hour PM_{10} impact on public lands of no more than 140 $u g/m^3$. Based upon these results, it is concluded that the proposed LAS MEB exercises would comply with the PM_{10} NAAQS.

Table A-2.1. Maximum PM_{10} Impact Predicted for the LAS Alternative 6

Pollutant	*Averaging Period*	*Maximum Impact ($\mu g/m^3$)*	*Background Concentration ($\mu g/m^3$)*	*Total Impact ($\mu g/m^3$)*	*NAAQS*
PM_{10}	24-hour	97	52	149	150

Conservative Factors in Analysis

The following lists the factors that make the total project 24-hour PM_{10} impact of 149 $u g/m^3$ a conservative prediction:

1. The FINEX emissions scenario evaluated in the analysis is based upon activity levels for equipment, aircraft, and ordnance usage and areas of operation that are maximized to produce overly conservative ambient PM_{10} impacts to public lands. In addition, this peak day scenario would occur only 2 days per year.

2. The background PM_{10} concentration of 52 *u*g/m^3 obtained from the Emerson air monitoring station may contain PM_{10} emissions generated from existing activities within the Johnson Valley OHV Area and Combat Center. Therefore, use of a background value of 52 *u*g/m^3 may double count ambient PM_{10} that would not be present during operation of the proposed MEB exercises.

3. The top 10 project PM_{10} impacts predicted by AERMOD occurred during days of relatively low wind speeds. Data collected at the Combat Center show a trend of decreasing ambient PM_{10} concentrations with decreasing wind speed. For these 10 days, the maximum 24-hour PM_{10} value recorded at the Mainside station was 23 *u*g/m^3. In addition, PM_{10} concentrations recorded at the Emerson station during wind conditions that occurred on these 10 days also did not exceed 23 *u*g/m^3. Therefore, use of a background PM_{10} value of 52 *u*g/m^3 in the analysis for conditions of low winds speeds is overly conservative.

Therefore, it is reasoned that the proposed MEB exercises would produce a 24-hour PM_{10} impact to public lands that would be less than 149 *u*g/m^3.

4.4 Conclusions

MDAQMD Rule 2002(H)(3) requires that, notwithstanding any other requirements of this section, no proposed action subject to this rule can be determined to conform if it is inconsistent with any requirement or milestone contained in the applicable implementation plan, with the achievement of "reasonable further progress" schedule, or with assumptions specified in attainment or maintenance demonstrations. Our analysis shows the emissions associated with the proposed action conform to the specific requirements of the rules pertaining to PM_{10} and ozone precursors. These emissions also conform to the general requirements in MDAQMD Rule 2002(H)(3). For these reasons, we conclude the proposed action conforms to the MDAQMD and California air quality plans.

5.0 REFERENCES

Aircraft Environmental Support Office (AESO). 1999. Aircraft Emissions Estimates: AH-1 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5. AESO Memorandum Report No. 9824A.

____. 2000a. Aircraft Emissions Estimates: H-53 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5. AESO Memorandum Report No. 9822, Revision C.

____. 2000b. Aircraft Emissions Estimates: H-53 Mission Operations Using JP-5. AESO Memorandum Report No. 9960, Revision B.

____. 2000c. Aircraft Emissions Estimates: HH/UH-1N Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5. AESO Memorandum Report No. 9904A.

____. 2001a. Aircraft Emissions Estimates: C-130 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5. AESO Memorandum Report No. 2000-09, Revision B.

____. 2001b. Aircraft Emissions Estimates: V-22 Landing and Take-off Cycle and In-Frame Engine Maintenance Testing Using JP-5. AESO Memorandum Report No. 9946, Revision E.

____. 2002. Aircraft Emission Estimates: F/A-18 Landing and Take-off Cycle and In-Frame, Maintenance Testing Using JP-5. AESO Memorandum Report No. 9815, Revision E.

Air Force Institute for Environmental, Safety & Occupational Health Risk Analysis. 2002. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations.

BLM and TEC. 2010. Summary of Assumptions and Input Variables for the Land Acquisition and Airspace Establishment EIS: Recreation/Socioeconomics and AQ Analyses.

California Air Resources Board. 2006a. Off-Road Emissions Inventory Program. OFFROAD2007. Web site http://www.arb.ca.gov/msei/offroad/offroad.htm.

____. 2006b. EMFAC2007 Release. Web site http://www.arb.ca.gov/msei/onroad/latest_version.htm.

Mojave Desert Air Quality Management District. 2008. MDAQMD Federal 8-Hour Ozone Attainment Plan - (Western Mojave DesertNon-attainment Area).

____. 2009. California Environmental Quality Act (CEQA) and Federal Conformity Guidelines. Table 1 – Designations and Classifications. Planning and Rule Making Section - Surveillance Section.

MAGTF Training Command. 2010. Construction Equipment Usage for Proposed Road Construction – Excel spreadsheet provided by Kris Schulze, P.E., Civil Engineer, G4 Public Works Division.

NAVFAC Southwest and Combat Center. 2010. Calendar Year 2009 Comprehensive Emissions Inventory Report for Marine Corps Air Ground Combat Center Twentynine Palms.

United States Army Corps of Engineers Sacramento District and Combat Center. 2008. Calendar Year 2007 Comprehensive Emissions Inventory Plan for Marine Corps Air Ground Combat Center Twentynine Palms. Prepared by URS Corporation.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors, AP-42, Volume I. Section 13.2.3, Heavy Construction Operations. Web site http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-3.pdf.

____. 2003. Revision to the Guideline on Air Quality Models: Adoption of a Preferred Long Range Transport Model and Other Revisions; Final Rule, 68 F.R. 17254 (April 15, 2003) available at http://edocket.access.gpo.gov/2003/pdf/03-8542.pdf.

____. 2006. Compilation of Air Pollutant Emission Factors, AP-42, Volume I. Sections 13.2.1 and 13.2.2, Paved and Unpaved Roads. Web site http://www.epa.gov/ttn/chief/ap42/ch13/index.html.

_____. 2010. Preferred/Recommended Models. Web site http://www.epa.gov/ttn/scram/dispersion_prefrec.htm. Accessed August 23, 2010.

____. 2010a. Revisions to the General Conformity Regulations; Final Rule, 75 F.R. 17253 (April 5, 2010) available at ***http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480ad0505***.

____. 2010b. Fact Sheet - Proposal to Revise the National Ambient Air Quality Standards for Ozone. Web site http://www.epa.gov/air/ozonepollution/pdfs/fs20100106std.pdf.

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ATTACHMENT A

29 Palms LAS Conformity Determinations

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ATTACHMENT A-1

Conformity Emission Calculations

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Attachment A1 - Conformity Emission Calculations - 29 Palms LAS EIS Proposed Action Alternative 6

Table A1-1. Year 2010 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

Area	Total Annual Visitor-Days	Total Annual Visitor Days			Days per Overnight Use	Total Annual Visitors		
		OHV Day Use	Overnight	Non-OHV Day Use		OHV Day Use	Overnight	Non-OHV Day Use
Johnson Valley	291,348	49,945	233,078	8,324	2.5	49,945	93,231	8,324
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table A1-2. Emission Source Data for Existing Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	Annual Vehicle Trips	VMT/ Trip	Annual VMT	Vehicle Weight (Tons)
OHV Day Use				
Transport vehicle	24,973	20	499,454	1
OHVs	6,243	24	146,715	0.50
Motorcycles	18,730	24	440,144	0.05
Overnight				
Transport vehicle	31,077	30	932,314	2
OHV	11,654	44	513,501	0.50
Motorcycle	34,962	44	1,540,503	0.05
Generator - Gasoline (1) (2)	31,077	3	93,231	
Propane Stoves (1) (3)	31,077	2	62,154	
Fire (4)	31,077	20	621,542	
Non-OHV Day Use				
Transport vehicle	4,162	20	83,242	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-3. Emission Source Data for Existing Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-4. Emission Source Data for Existing Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

Assumptions:

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table A1-5. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	159	4,371	515	6	-	53	49	530,725	46	-
Transport vehicle - dust						335,039	33,504			
OHVs	47	1,284	151	2	-	16	14	155,900	14	-
OHVs - dust						72,046	7,205			
Motorcycles	2,436	21,250	1,184	2	-	38	35	136,817	199	-
Motorcycles - dust						76,689	7,669			
Overnight										
Transport vehicle	296	8,160	962	10	-	99	91	990,686	86	-
Transport vehicle - dust						854,331	85,433			
OHVs	163	4,494	530	6	-	54	50	545,651	48	-
OHVs - dust						252,161	25,216			
Motorcycles	8,524	74,376	4,143	7	-	132	122	478,860	696	-
Motorcycles - dust						268,411	26,841			
Generator - Gasoline	6,039	1,947	3,077	165	-	202	186	302,070	-	-
Propane Stoves	12	93	162	1	9	9	9	155,386	2	11
Fire	4,289	64,019	-	-	14,295	9,323	8,080	-	3,854	-
Non-OHV Day Use										
Transport vehicle	26	729	86	1	-	9	8	88,454	8	-
Transport vehicle - dust						55,840	5,584			
Total - Johnson Valley	*21,990*	*180,723*	*10,810*	*199*	*14,304*	*1,924,451*	*200,094*	*3,384,549*	*4,953*	*11*
East Area										
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
South Area										
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	*-*	*7,246*	*726*	*13,189*	*4*	*-*
Total Emissions - Pounds	*22,061*	*181,429*	*10,858*	*200*	*14,307*	*1,936,353*	*201,288*	*3,405,688*	*4,960*	*11*

Table A1-6. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	0.08	2.19	0.26	0.00	-	0.03	0.02	265.36	0.02	-
Transport vehicle - dust	-	-	-	-	-	167.52	16.75	-	-	-
OHVs	0.02	0.64	0.08	0.00	-	0.01	0.01	77.95	0.01	-
OHVs - dust	-	-	-	-	-	36.02	3.60	-	-	-
Motorcycles	1.22	10.63	0.59	0.00	-	0.02	0.02	68.41	0.10	-
Motorcycles - dust	-	-	-	-	-	38.34	3.83	-	-	-
Overnight										
Transport vehicle	0.15	4.08	0.48	0.01	-	0.05	0.05	495.34	0.04	-
Transport vehicle - dust	-	-	-	-	-	427.17	42.72	-	-	-
OHVs	0.08	2.25	0.26	0.00	-	0.03	0.02	272.83	0.02	-
OHVs - dust	-	-	-	-	-	126.08	12.61	-	-	-
Motorcycles	4.26	37.19	2.07	0.00	-	0.07	0.06	239.43	0.35	-
Motorcycles - dust	-	-	-	-	-	134.21	13.42	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Fire	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Non-OHV Day Use										
Transport vehicle	0.01	0.36	0.04	0.00	-	0.00	0.00	44.23	0.00	-
Transport vehicle - dust						27.92	2.79			
Total - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
East Area										
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	*-*	*3.62*	*0.36*	*6.59*	*0.00*	*-*
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table A1-7. Existing Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	5.83	57.33	3.79	0.02	-	0.20	0.18	1,463.55	0.55	-
Vehicles - Dust	-	-	-	-	-	957.26	95.73	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Camp Fires	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Subtotal - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	*-*	*3.62*	*0.36*	*6.59*	*0.00*	*-*
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table A1-8. Emission Factors for Existing Sources within Acquired Lands - 29 Palms LAS EIS.

Source	Emission Factors										Notes
	VOC	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	
Liquid Propane Gas Combustion	1.00	7.50	13.00	0.11	0.70	0.70	0.70	12,500	0.20	0.90	(1)
Camp Fires	13.80	206.00			46.00	30.00	26.00		12.40		(2)
Generator - Gasoline	0.02	0.01	0.01	0.00		0.00	0.00	1.08			(3)
Light Duty Truck - 2010	0.14	3.97	0.47	0.01		0.05	0.04	482	0.04		(4)
Motorcycle - 2010	2.51	21.90	1.22	0.00		0.04	0.04	141	0.21		(5)
Light Duty Truck - 2015	0.08	2.68	0.30	0.01		0.05	0.05	483	0.04		(6)
Motorcycle - 2015	2.24	17.76	1.17	0.00		0.03	0.03	149	0.20		(7)
Vehicle Dust - 4WD						0.49	0.05				(8)
Vehicle Dust - Day Use Transport Vehicle						0.67	0.07				(9)
Vehicle Dust - Motorcycle						0.17	0.02				(10)
Vehicle Dust - Overnight Transport Vehicle						0.92	0.09				(11)

Notes:

(1) U.S. EPA AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion (lb/1,000 gal)

(2) U.S. EPA AP-42 Section 13.1-3 - Wildfires and Prescribed Burning (lb/ton)

(3) U.S. EPA AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines (lb/hp-hr)

(4) Statewide average for light duty truck, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(5) Statewide average for motorcycle, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(6) Statewide average for light duty truck, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(7) Statewide average for motorcycle, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(8) Fugitive Dust from Unpaved Roads Emission Factors for OHV (lb/VMT) EPA AP-42, Section 13.2.2.

(9) Fugitive Dust from Unpaved Roads Emission Factors for Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

(10) Fugitive Dust from Unpaved Roads Emission Factors for motorcycles (lb/VMT) EPA AP-42, Section 13.2.2.

(11) Fugitive Dust from Unpaved Roads Emission Factors for Overnight Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

Vehicle Travel Unpaved = ((k(s/12)^a)*((W/3)^b)

k (PM_{10})	1.50	k ($PM_{2.5}$)	0.15
s	8.50	surface material silt content (%)	
a	0.90		
b	0.45		
W_O	0.50	average weight OHV (tons)	
W_{TV}	1.00	average weight Transport Vehicles (tons)	
W_M	0.05	average weight Motorcycles (tons)	
W_{TV2}	2.00	average weight Overnight Transport Vehicles (tons)	

Table A1-9. Year 2015 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

Area	Total Annual Visitor-Days	Total Annual Visitor Days			Days per Overnight Use	Total Annual Visitors		
		OHV Day Use	Overnight	Non-OHV Day Use		OHV Day Use	Overnight	Non-OHV Day Use
Johnson Valley	336,975	57,767	269,580	9,628	2.5	57,767	107,832	9,628
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table A1-10. Emission Source Data for Year 2015 Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	Annual Vehicle Trips	VMT/ Trip	Annual VMT	Vehicle Weight (Tons)
OHV Day Use				
Transport vehicle	28,884	20	577,671	1
OHVs	7,221	24	169,691	0.50
Motorcycles	21,663	24	509,073	0.05
Overnight				
Transport vehicle	35,944	30	1,078,320	2
OHV	13,479	44	593,918	0.50
Motorcycle	40,437	44	1,781,755	0.05
Generator - Gasoline (1) (2)	35,944	3	107,832	
Propane Stoves (1) (3)	35,944	2	71,888	
Fire (4)	35,944	20	718,880	
Non-OHV Day Use				
Transport vehicle	4,814	20	96,279	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-11. Emission Source Data for Year 2015 Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-12. Emission Source Data for Year 2015 Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

Assumptions:

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table A1-13. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	183	5,056	596	6	-	61	56	613,840	53	-
Transport vehicle - dust						387,509	38,751			
OHVs	54	1,485	175	2	-	18	17	180,315	16	-
OHVs - dust						83,329	8,333			
Motorcycles	2,817	24,578	1,369	2	-	44	40	158,244	230	-
Motorcycles - dust						88,699	8,870			
Overnight										
Transport vehicle	342	9,438	1,113	12	-	114	105	1,145,834	100	-
Transport vehicle - dust						988,125	98,812			
OHVs	189	5,198	613	7	-	63	58	631,104	55	-
OHVs - dust						291,651	29,165			
Motorcycles	9,859	86,024	4,792	8	-	153	141	553,853	805	-
Motorcycles - dust						310,445	31,045			
Generator - Gasoline	6,985	2,252	3,558	191	-	233	215	349,376	-	-
Propane Stoves	14	108	187	2	10	10	10	179,720	3	13
Fire	4,960	74,045	-	-	16,534	10,783	9,345	-	4,457	-
Non-OHV Day Use										
Transport vehicle	31	843	99	1	-	10	9	102,307	9	-
Transport vehicle - dust						64,585	6,458			
Total - Johnson Valley	*25,434*	*209,026*	*12,503*	*231*	*16,544*	*2,225,832*	*231,430*	*3,914,591*	*5,728*	*13*
East Area										
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
South Area										
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	-	*7,246*	*726*	*13,189*	*4*	-
Total Emissions - Pounds	*25,504*	*209,732*	*12,551*	*231*	*16,547*	*2,237,735*	*232,625*	*3,935,730*	*5,736*	*13*

Table A1-14. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	0.09	2.53	0.30	0.00	-	0.03	0.03	306.92	0.03	-
Transport vehicle - dust	-	-	-	-	-	193.75	19.38	-	-	-
OHVs	0.03	0.74	0.09	0.00	-	0.01	0.01	90.16	0.01	-
OHVs - dust	-	-	-	-	-	41.66	4.17	-	-	-
Motorcycles	1.41	12.29	0.68	0.00	-	0.02	0.02	79.12	0.12	-
Motorcycles - dust	-	-	-	-	-	44.35	4.43	-	-	-
Overnight										
Transport vehicle	0.17	4.72	0.56	0.01	-	0.06	0.05	572.92	0.05	-
Transport vehicle - dust	-	-	-	-	-	494.06	49.41	-	-	-
OHVs	0.09	2.60	0.31	0.00	-	0.03	0.03	315.55	0.03	-
OHVs - dust	-	-	-	-	-	145.83	14.58	-	-	-
Motorcycles	4.93	43.01	2.40	0.00	-	0.08	0.07	276.93	0.40	-
Motorcycles - dust	-	-	-	-	-	155.22	15.52	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Fire	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Non-OHV Day Use										
Transport vehicle	0.02	0.42	0.05	0.00	-	0.01	0.00	51.15	0.00	-
Transport vehicle - dust						32.29	3.23			
Total - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
East Area										
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	*-*	*3.62*	*0.36*	*6.59*	*0.00*	*-*
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table A1-15. Year 2015 Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,692.75	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Subtotal - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	*-*	*3.62*	*0.36*	*6.59*	*0.00*	*-*
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table A1-16. Fraction of Events Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	1.00	-	1.00	0.17	-	1.00	0.17
2	0.60	-	1.00	0.10	-	1.00	0.10
4	0.15	-	1.00	0.03	-	1.00	0.03
5	0.15	-	1.00	0.03	-	1.00	0.03
6	0.60	-	1.00	0.10	-	1.00	0.10

Note: 17 percent of the annual visitor usage occurs from events.

Note: (1) = Total visitors that remain

Table A1-17. Fraction of Dispersed-Use Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	0.75	0.90	0.10	0.06	0.81	0.19	0.12
2	0.25	0.90	0.10	0.02	0.81	0.19	0.04
4 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
4 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
4 - Total				0.015			0.028
5 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
5 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
5 - Total				0.015			0.028
6	0.30	0.90	0.10	0.02	0.81	0.19	0.05

Note: 83 percent of the annual visitor usage occurs from dispersed-use.

Note: (1) = Total visitors that remain

??? ???

Table A1-18. Fraction of All Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County*		*% of Total JV out of C*			*% of Total JV out of NA*
1	0.79			0.23			0.29
2	0.31			0.12			0.14
4 - Total	0.17			0.04			0.05
5 - Total	0.17			0.04			0.05
6	0.25			0.13			0.15

Note: 17/83 percent of the annual visitor usage occurs from events/dispersed-use.

Note: (1) = Total visitors that remain

Table A1-19. Year 2015 Future Baseline Emissions Relocated from Johnson Valley - 29 Palms LAS EIS Project Alternatives (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,693	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Gasoline-powered Generator	3.49	1.13	1.78	0.10	-	0.12	0.11	175	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	90	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Total Johnson Valley Emissions - Year 2015	12.72	104.51	6.25	0.12	8.27	1,112.92	115.72	1,957	2.86	0.01
Total Eliminated from MDAB - Alternative 1 (1)	2.95	24.27	1.45	0.03	1.92	258.47	26.87	454.58	0.67	0.00
Total Eliminated from MDAB - Alternative 2 (1)	1.56	12.83	0.77	0.01	1.02	136.61	14.20	240.26	0.35	0.00
Total Eliminated from MDAB - Alternative 4 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 5 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 6 (1)	1.61	13.26	0.79	0.01	1.05	141.23	14.68	248.38	0.36	0.00
Total Eliminated from MDAB O3 NA - Alternative 6 (1)	1.90	15.60	0.93	0.02	1.24	166.17	17.28	292.24	0.43	0.00

Note: (1) = These emissions deducted from the increase in emissions from each project alternative to produce net change in emissions.

Table A1-20. Emission Source Data for Road Construction - 29 Palms LAS EIS Proposed Alternative 6

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hp-Hrs*
3000 Gal Water Truck	400	0.60	2	8	30	115,200
Motor Grader - 14 Foot Blade	275	0.80	1	8	30	52,800
Rubber Wheeled Compactor	400	0.80	1	8	30	76,800
Fugitive Dust	NA	NA	1	NA	30	30
On-Road Trucks						
Activity/Equipment Type	*Vehicle Weight*	*Miles per Round Trip*	*Daily Trips*		*Total Work Days*	*Total Miles*
Equipment Delivery Truck		200	1		2	400

Table A1-21. Emission Source Data for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternative 6

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hours*
Forklift	67	0.40	1	4	5	536
Helicopters						
Activity/Equipment Type			*Number Active*	*Cruising (Hrs)*	*# of LTOs*	*# of Rock and Blocks (1)*
Helicopter - Skycrane			1	5	12	120
Helicopter - Huey (1)			1	2	10	50
On-Road Trucks						
Activity/Equipment Type	*Vehicle Wt. (Tons)*	*Miles per Round Trip*			*Total Trips*	*Total Miles*
Heavy Duty Truck (2)		100			10	1,000

Notes: (1) For Huey, # of Rock and Blocks = # of TGOs.

(2) Assume 10% of total VMT would occur on unpaved road.

Table A1-22. Offroad Construction Equipment Emission Factors - 29 Palms LAS EIS Project Alternatives

Project Year 2010/Source Type	*Fuel Type*	*Emission Factors (Grams/Horsepower-Hour)*							*References*
		VOC	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*	
Off-Road Equipment - <15 Hp	D	0.45	2.14	2.87	0.01	0.15	0.15	0.14	(1)
Off-Road Equipment - 16-24 Hp	D	0.49	1.52	2.76	0.00	0.16	0.16	0.14	(1)
Off-Road Equipment - 25-50 Hp	D	1.49	3.87	3.44	0.00	0.35	0.45	0.33	(1)
Off-Road Equipment - 51-120 Hp	D	0.66	2.36	4.05	0.00	0.36	0.30	0.33	(1)
Off-Road Equipment - 121-175 Hp	D	0.47	2.02	3.75	0.00	0.21	0.22	0.19	(1)
Off-Road Equipment - 176-250 Hp	D	0.34	0.97	3.60	0.00	0.13	0.15	0.12	(1)
Off-Road Equipment - 251-500 Hp	D	0.29	1.08	3.03	0.00	0.11	0.15	0.10	(1)
Off-Road Equipment - 501-750 Hp	D	0.31	1.18	3.25	0.00	0.12	0.15	0.11	(1)
Off-Road Equipment - >750 Hp	D	0.37	1.45	4.28	0.00	0.13	0.13	0.12	(1)
On-road Truck - Idle (Gms/Hr)	D	13.69	48.45	104.13	0.06	1.76	1.58	1.20	(2)
On-road Truck - 5 mph (Gms/Mi)	D	12.10	25.26	37.29	0.04	2.31	2.08	1.57	(2)
On-road Truck - 25 mph (Gms/Mi)	D	1.50	7.95	15.51	0.02	0.65	0.59	0.44	(2)
On-road Truck - 55 mph (Gms/Mi)	D	0.81	4.66	14.53	0.02	0.58	0.52	0.39	(2)
On-Road Trucks - Composite (Gms/Mi)	D	9.42	20.77	31.79	0.04	1.89	1.70	1.29	(2)
On-Road Trucks - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	- - -	8.89	2.57	0.39	(3)
Disturbed Ground - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	- - -	55.00	27.50	2.75	(4)
Helicopter - Skycrane - Cruise		3.84	22.11	4.41	0.45	1.99			(5)
Helicopter - Skycrane - LTO		6.81	21.37	1.07	0.15	1.36			(5)
Helicopter - Skycrane - Rocks and Blocks		0.41	3.01	0.91	0.08	0.38			(5)
Helicopter - Skycrane - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	- - -	123.22	61.61	24.64	(6)
Helicopter - Huey - Cruise		0.37	4.41	4.15	0.35	0.65			(7)
Helicopter - Huey - LTO		2.17	1.90	1.02	0.10	0.19			(7)
Helicopter - Huey - TGO		0.06	0.76	0.96	0.08	0.15			(7)
Helicopter - Huey - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	- - -	11.28	5.64	2.26	(6)

Notes: (1) Composites developed from Offroad emission factors obtained from URBEMIS 2007 for project year 2010.

(2) Heavy duty diesel truck running emission factors developed from EMFAC2007 (CARB 2006b). Units in gms/mile calculated for project year 2010. Composite emission factors based on a round trip of 75% at 55 mph, 20% at 25 mph, and 5% at 5 mph. Units in grams/mile. Although not shown in these calculations, emissions from 15 minutes of idling mode included for each truck round trip.

(3) See Table A1-7. Units in Lb/VMT.

(4) Units in lbs/acre-day from section 11.2.3 of AP-42 (USEPA 1995). Emissions reduced by 50% from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control

(5) AESO 2000a and b for a CH-46E. Cruise units in lb/hr and LTO/Rocks and Blocks/TGO units in lb/event.

(6) See Table A1-17, R-2501 Section. Units in Lb/LTO.

(7) EPA 1992. Cruise units in lb/hr and LTO/Rocks and Blocks units in lb.

Table A1-23. Total Road Construction Emissions - 29 Palms LAS EIS Proposed Alternative 6

	Total Pounds						
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*
3000 Gal Water Truck	73.85	274.97	770.26	0.82	28.19	38.10	25.94
Motor Grader - 14 Foot Blade	33.85	126.03	353.04	0.37	12.92	17.46	11.89
Rubber Wheeled Compactor	49.23	183.31	513.51	0.54	18.79	25.40	17.29
Fugitive Dust	--	--	--	--	1,650	825	83
Subtotal	*157*	*584*	*1,637*	*2*	*1,710*	*906*	*138*
On-Road Vehicles							
Equipment Delivery Truck	8.30	18.31	28.04	0.03	1.67	1.50	1.13
On-Road Vehicles -Subtotal	*8.30*	*18.31*	*28.04*	*0.03*	*1.67*	*1.50*	*1.13*
Total Emissions (Pounds)	165	603	1,665	2	1,712	907	139

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table A1-24. Emissions for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternative 6

	Total Pounds						
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*
Forklift	0.8	2.8	4.8	0.0	0.4	0.4	0.4
Subtotal	*0.8*	*2.8*	*4.8*	*0.0*	*0.4*	*0.4*	*0.4*
Helicopters							
Helicopter - Skycrane - Cruise	19.2	110.6	22.1	2.3	10.0	-	-
Helicopter - Skycrane - LTO	81.7	256.4	12.8	1.8	16.3	-	-
Helicopter - Skycrane - Rocks and Blocks	49.2	361.2	109.2	9.6	45.6	-	-
Helicopter - Skycrane - Fugitive Dust	-	-	-	-	1,478.6	739.3	295.7
Helicopter - Huey - Cruise	0.7	8.8	8.3	0.7	1.3	-	-
Helicopter - Huey - LTO	21.7	19.0	10.2	1.0	1.9	-	-
Helicopter - Huey - TGO	3.1	37.9	48.1	4.1	7.5	-	-
Helicopter - Huey - Fugitive Dust	-	-	-	-	112.8	56.4	22.6
Subtotal	*175.7*	*794.0*	*210.7*	*19.4*	*1,674.0*	*795.7*	*318.3*
On-Road Vehicles							
Equipment Delivery Truck	2.2	12.1	32.6	0.0	1.3	1.2	0.9
Equipment Delivery Truck - Fugitive Dust	-	-	-	-	889.3	257.0	39.4
On-Road Vehicles -Subtotal	*2.2*	*12.1*	*32.6*	*0.0*	*890.6*	*258.2*	*40.3*
Total Emissions (Pounds)	178.6	808.8	248.1	19.5	2,565.0	1,054.3	359.0

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for Helicopters - LTOs

Emission Factor (lb/LTO) x Number of LTOs = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table A1-25. Emission Source Data for Tactical Vehicles/Support Equipment - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Activity/Equipment Type	*Number of Vehicles*	*Annual VMT*	*Miles per Gallon*	*Total Gallons*	*Hp*	*Total Hp-Hr (1)*
Tactical Vehicles						
Medium Tactical Vehicle Replacement	348	228,814	3.85	59,432	250	1,188,644
High-Mobility Multipurpose Wheeled Vehicle	785	393,386	14.00	28,099	150	561,980
Logistics Vehicle System	198	75,094	2.00	37,547	445	750,940
Internally Transportable Vehicle	50	18,156	14.00	1,297	71	25,937
M60A1 Bridge Vehicle	4	2,580	0.33	7,818		
Amphibious Assault Vehicle	187	87,550	0.75	116,733	425	2,334,667
(Variants)	87	34,694	5.17	6,711	275	134,213
M88A2 Hercules Recovery Vehicle	12	1,290	0.33	3,909		
High-Mobility Artillery Rocket System	6	70	3.85	18	330	364
Abrams M1A1 Main Battle Tank	44	16,354	0.33	49,558		
Joint Assault Bridge	5	1,858	0.33	5,632		
Assault Breacher Vehicle	5	3,000	0.36	8,333		
Tactical Support Equipment (2)						
	Number of Vehicles	*Hp*	*Hours per Year*	*Total Hp-Hr*		
Medium Crawler Tractor	5	118	120	70,800		
Excavator, Combat	12	295	120	424,800		
Grader	2	150	120	36,000		
Armored Tractor	3	118	120	42,480		
D7 Bulldozer	5	200	120	120,000		
Armored Backhoe	12	295	120	424,800		
Extended Boom Forklift	4	150	120	72,000		
Light Capacity Rough Terrain Truck Forklift	2	110	120	26,400		
Tractor, Rubber Tired, Articulated Steering	10	185	120	222,000		

Notes: (1) Based upon a fuel usage rate of 0.051 gallons per Hp-Hr.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table A1-26. Tactical Vehicles/Support Equipment Emission Factors - 29 Palms LAS EIS Proposed Alternative 6

Source Type	Emission Factors (Pounds/1000 Gallons)							Reference
	ROG	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	
Tank Vehicles and ABV								
Abrams Tank/Bridge Vehicles	0.06	0.45	118.80	0.51	1.56	1.56	1.52	(1)
Assault Breacher Vehicle	14.10	101.60	170.88	13.96	1.71	1.71	1.57	(2)
Other Tactical Vehicles/TSE								
	Emission Factors (Grams/Horsepower-Hour)							
121-250 Hp	0.94	4.40	10.84	1.32	0.44	0.43	0.43	(3)
>250 Hp	0.95	4.20	10.84	1.32	0.42	0.41	0.41	(3)

Notes: (1) From 2007 CEIP Appendix D.11, page 6.

(2) FEA for Proposed ABV Action at MCAGCC (2003).

(3) From 2007 CEIP Appendix D.11, page 7.

(4) GHG Emission Factors for (a) Tank Vehicles and ABVs from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate and (b) other TV/TSE from OFFROAD2007 Model.

Table A1-27. Total Tactical Vehicles/Support Equipment Emissions - 29 Palms LAS EIS Proposed Alternative 6

Activity/Equipment Type	*Pounds per Year*						
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles							
Medium Tactical Vehicle Replacement	2,489	11,006	28,406	3,459	1,101	1,074	1,074
High-Mobility Multipurpose Wheeled Vehicle	1,165	5,451	13,430	1,635	545	533	533
Logistics Vehicle System	1,573	6,953	17,946	2,185	695	679	679
Internally Transportable Vehicle	54	252	620	75	25	25	25
M60A1 Bridge Vehicle	0	4	929	4	12	12	12
Amphibious Assault Vehicle	4,890	21,617	55,793	6,794	2,162	2,110	2,110
Light Armored Vehicle (Variants)	281	1,302	3,207	391	130	127	127
M88A2 Hercules Recovery Vehicle	0	2	464	2	6	6	6
High-Mobility Artillery Rocket System	1	3	9	1	0	0	0
Abrams M1A1 Main Battle Tank	3	22	5,887	25	77	77	75
Joint Assault Bridge	0	3	669	3	9	9	9
Assault Breacher Vehicle	118	847	1,424	116	14	14	13
Subtotal - Pounds	10,574	47,461	128,784	14,691	4,777	4,667	4,663
Tactical Support Equipment							
Medium Crawler Tractor	147	147	147	147	147	147	147
Excavator, Combat	890	3,933	10,152	1,236	393	384	384
Grader	75	333	860	105	33	33	33
Armored Tractor	89	393	1,015	124	39	38	38
D7 Bulldozer	251	1,111	2,868	349	111	108	108
Armored Backhoe	890	3,933	10,152	1,236	393	384	384
Extended Boom Forklift	149	698	1,721	210	70	68	68
Light Capacity Rough Terrain Truck Forklift	55	256	631	77	26	25	25
Multipurpose Vehicles	460	2,153	5,305	646	215	210	210
Subtotal - Pounds	3,006	12,959	32,850	4,129	1,428	1,398	1,398
Total Emissions (Pounds)	13,579	60,420	161,635	18,820	6,205	6,065	6,061
Total Emissions (Tons) [1]	6.79	30.21	80.82	9.41	3.10	3.03	3.03

Calculation of Annual Emissions for Tactical and Support Equipment

Emission Factor (g/hp-hr) x total Hp-hrs x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Abrams Tank/Bridge Vehicles and Assault Breacher Vehicle

Emission Factor (lbs/1000 gals) x Total Gals x 1 /1000 = Annual Emissions (lb/yr)

Table A1-28. On-Road Vehicle Data for Personnel/Equipment Transport - 29 Palms LAS EIS Project Alternatives

Activity/Equipment Type	*Annual # of Vehicle Round Trips*	*Miles/Round Trip (1)*	*Total Annual Miles*
On-Road Transport			
Buses	800	90	72,000
Tractor-Trailer/Convoyed Vehicles	200	90	18,000

Notes: (1) Equal to distance travelled within the MDAB - all trips would originate from March Air Reserve Base and Camp Pendleton.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table A1-29. On-Road Vehicle Transport Emission Factors - 29 Palms LAS EIS Project Alternatives

Source Type/Activity	*Emission Factors (Grams/Mile)*							*Reference*
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	
Urban Bus								
25 MPH	0.94	8.43	15.78	0.02		0.26	0.24	(1)
55 MPH	0.46	6.01	21.96	0.02		0.16	0.14	(1)
Composite Trip (1)	0.56	6.49	20.72	0.02	-	0.18	0.16	(1)
Heavy Diesel Truck								
25 MPH	0.80	5.63	10.33	0.02		0.41	0.37	(1)
55 MPH	0.45	3.67	10.00	0.01		0.37	0.34	(1)
Composite Trip (1)	0.52	4.06	10.07	0.01	-	0.38	0.35	(1)

Notes: (1) Assumes statewide average fleets for year 2013. Obtained from ARB EMFAC2007 Model (ARB 2006). PM inlcudes comb

(2) Composite factors based on a trip of 80% 25 mph and 20% 55 mph.

Table A1-30. Total On-Road Vehicle Personnel/Equipment Transport Emissions - 29 Palms LAS EIS Project Alternative

Equipment Type	*Pounds per Year*						
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles							
Buses	88	1,031	3,290	3	-	28	26
Tractor-Trailer/Convoyed Vehicles	21	161	399	0	-	15	14
Total Emissions (Pounds)	109	1,192	3,689	4	-	43	40
Total Emissions (Tons)	0.05	0.60	1.84	0.00	-	0.02	0.02

Table A1-31. Emission Source Data for Tactical Vehicles/Support Equipment - Unpaved Road Dust - 29 Palms LAS EIS Proposed Alternative 6

Equipment Type	Weight (Tons)	Unpaved Emission Factor (Lb/VMT) PM	PM 10	PM 2.5	Annual VMT	% Unpaved Travel (1)	Unpaved VMT
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	6.51	1.88	0.29	228,814	90%	205,933
High-Mobility Multipurpose Wheeled Vehicle	3.0	3.79	1.09	0.17	393,386	50%	196,693
Logistics Vehicle System	20.0	8.89	2.57	0.39	75,094	50%	37,547
Internally Transportable Vehicle	3.5	4.06	1.17	0.18	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	15.63	4.52	0.69	2,580	90%	2,322
Amphibious Assault Vehicle	30.6	10.77	3.11	0.48	87,550	90%	78,795
Light Armored Vehicle (Variants)	14.1	7.60	2.20	0.34	34,694	90%	31,225
M88A2 HERCULES Recovery Vehicle	70.0	15.63	4.52	0.69	1,290	90%	1,161
High-Mobility Artillery Rocket System	12.0	7.07	2.04	0.31	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	15.63	4.52	0.69	16,354	90%	14,719
Joint Assault Bridge	70.0	15.63	4.52	0.69	1,858	90%	1,673
Assault Breacher Vehicle	55.0	14.02	4.05	0.62	3,000	90%	2,700
Tactical Support Equipment							
Ground Disturbance (2)	1	110.0	55.0	5.5	48		

Notes: (1) Percentage of unpaved roads from 2007 CEIP Appendix D.13.

(2) Weight = daily disturbed acreage and Annual VMT = total annual days of disturbance. Emission factors in lb/acre-day.

Table A1-32. Emission Source Data for Tactical Vehicles/Support Equipment - Paved Road Dust - 29 Palms LAS EIS Proposed Alternative 6

Equipment Type	Weight (Tons)	Paved Emission Factor (Lb/VMT) PM	PM 10	PM 2.5	Annual VMT	% Paved Travel (1)	Paved VMT
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	0.07	0.01	0.002	228,814	10%	22,881
High-Mobility Multipurpose Wheeled Vehicle	3.0	0.01	0.00	-	393,386	50%	196,693
Logistics Vehicle System	20.0	0.20	0.04	0.006	75,094	50%	37,547
Internally Transportable Vehicle	3.5	0.01	0.00	0.000	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	1.32	0.26	0.038	2,580	10%	258
Amphibious Assault Vehicle	30.6	0.38	0.07	0.011	87,550	10%	8,755
Light Armored Vehicle (Variants)	14.1	0.12	0.02	0.003	34,694	10%	3,469
M88A2 HERCULES Recovery Vehicle	70.0	1.32	0.26	0.038	1,290	10%	129
High-Mobility Artillery Rocket System	12.0	0.09	0.02	0.002	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	1.32	0.26	0.038	16,354	10%	1,635
Joint Assault Bridge	70.0	1.32	0.26	0.038	1,858	10%	186
Assault Breacher Vehicle	55.0	0.92	0.18	0.027	3,000	10%	300

Notes: (1) Percentage of paved roads from 2007 CEIP Appendix D.13.

(2) US EPA 42 13.2.1, sL - 0.1, k(PM10) - 0.016, k(PM2.5) - 0.0024, C(PM10) - 0.00047, C(PM2.5) - 0.00036

Table A1-33. Annual Fugitive Dust Emissions for Tactical Vehicles - Unpaved Roads - 29 Palms LAS EIS Proposed Alternative 6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	670.28	193.71	29.70
High-Mobility Multipurpose Wheeled Vehicle	372.41	107.63	16.50
Logistics Vehicle System	166.94	48.25	7.40
Internally Transportable Vehicle	18.42	5.32	0.82
M60A1 Bridge Vehicle	18.14	5.24	0.80
Amphibious Assault Vehicle	424.23	122.61	18.80
Light Armored Vehicle (Variants)	118.62	34.28	5.26
M88A2 HERCULES Recovery Vehicle	9.07	2.62	0.40
High-Mobility Artillery Rocket System	0.12	0.04	0.01
Abrams M1A1 Main Battle Tank	115.00	33.24	5.10
Joint Assault Bridge	13.07	3.78	0.58
Assault Breacher Vehicle	18.93	5.47	0.84
Subtotal	1,945.24	562.19	86.20
Tactical Support Equipment			
Ground Disturbance	2.64	1.32	0.13
Subtotal	2.64	1.32	0.13
Total Emissions	1,947.88	563.51	86.33

Table A1-34. Annual Fugitive Dust Emissions for Tactical Vehicles - Paved Roads - 29 Palms LAS EIS Proposed Alternative 6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	0.81	0.15	0.02
High-Mobility Multipurpose Wheeled Vehicle	1.10	0.18	-
Logistics Vehicle System	3.77	0.73	0.10
Internally Transportable Vehicle	0.06	0.01	0.00
M60A1 Bridge Vehicle	0.17	0.03	0.00
Amphibious Assault Vehicle	1.67	0.32	0.05
Light Armored Vehicle (Variants)	0.21	0.04	0.01
M88A2 HERCULES Recovery Vehicle	0.09	0.02	0.00
High-Mobility Artillery Rocket System	0.00	0.00	0.00
Abrams M1A1 Main Battle Tank	1.08	0.21	0.03
Joint Assault Bridge	0.12	0.02	0.00
Assault Breacher Vehicle	0.14	0.03	0.00
Total Emissions	9.22	1.75	0.22
Total Emissions - Paved and Unpaved Roads	1,957.10	565.25	86.56

Table A1-35. Proposed MCAGCC Aircraft Operations and Emissions - Airspaces - 29 Palms LAS EIS Project Alternatives

	Sorties				Tons per Year					
Aircraft Type	*Annual*	*Fraction Below 3,000 AGL*	*Total Duration (Min.)*	*Duration Below 3,000 AGL (Min.)*	*ROG/HC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*
F/A-18 C/D	484	0.07	90	6.3	0.07	0.41	1.14	0.07	1.07	1.07
F-35	152	0.07	90	6.3	0.02	0.13	0.36	0.02	0.34	0.34
Joint FW (1)	4	0.07	90	6.3	0.00	0.00	0.05	0.00	0.00	0.01
KC-130	136	0.07	180	12.6	0.03	0.12	0.65	0.03	0.29	0.29
AV-8B	300	0.07	78	5.5	0.37	4.28	4.18	0.03	0.52	0.52
AH-1	546	0.99	90	89.1	0.19	3.63	1.91	0.14	1.45	1.45
UH-1	546	0.99	90	89.1	0.04	0.26	1.77	0.12	1.24	1.24
CH-53E	232	0.99	90	89.1	0.12	1.64	6.21	0.31	1.70	1.70
MV-22	268	0.69	120	82.8	0.01	0.45	6.59	0.23	0.89	0.89
Joint RW (2)	320	0.99	12	11.9	0.02	0.28	0.15	0.01	0.11	0.11
EA-6B	74	-	120	-	-	-	-	-	-	-
Joint AR (3)	36	-	240	-	-	-	-	-	-	-
UAS	240	-	600	-						
Total	3,338		1,890		0.86	11.20	23.01	0.95	7.62	7.63

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table A1-36. Proposed Aircraft Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Location/Aircraft Type	Annual Sorties	Tons per Year					
		ROG/HC	CO	NOx	SO2	PM10	PM2.5
EAF							
F/A-18 C/D	484	13.17	34.61	3.86	0.22	4.02	4.02
F-35	152	4.14	10.87	1.21	0.07	1.26	1.26
Joint FW (1)	4	0.01	0.05	0.02	0.00	0.00	0.00
KC-130	136	0.52	1.01	1.18	0.06	0.61	0.61
AV-8B	300	2.62	2.93	1.72	0.13	0.23	0.23
AH-1	546	0.09	1.93	0.57	0.05	0.49	0.49
UH-1	546	0.18	0.91	0.35	0.03	0.32	0.32
CH-53E	232	1.30	2.65	1.03	0.08	0.44	0.44
MV-22	268	1.54	0.73	1.54	0.01	0.27	0.27
Joint RW (2)	320	0.05	1.13	0.33	0.03	0.29	0.29
EA-6B	74	0.83	1.70	0.45	0.04	0.07	0.07
Joint AR (3)	36	0.06	1.86	0.59	0.09	0.62	0.62
UAS	240	-	-	-	-	-	-
Subtotal	3,338	24.53	60.38	12.86	0.80	8.63	8.63
R-2501							
AH-1	1,092	0.02	0.38	0.17	0.01	0.14	0.14
UH-1	1,092	0.01	0.16	0.31	0.03	0.25	0.25
CH-53E	464	0.12	0.45	0.93	0.05	0.28	0.28
MV-22	536	0.00	0.08	2.38	0.06	0.25	0.25
Joint RW (2)	640	0.01	0.22	0.10	0.01	0.08	0.08
Subtotal	3,184	0.16	1.29	3.90	0.16	1.00	1.00
Total - LTOs	6,522	24.69	61.67	16.76	0.96	9.62	9.62

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table A1-37. Proposed Fugitive Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Aircraft Type/Location	Annual Sorties	Tons per Year	
		PM10	PM2.5
EAF			
AH-1	546	0.35	0.14
UH-1	546	0.08	0.03
CH-53E	232	1.59	0.64
MV-22	268	0.26	0.10
Joint RW (2)	320	0.21	0.08
Subtotal	1,912	2.50	1.00
R-2501			
AH-1	1,092	12.71	5.08
UH-1	1,092	3.08	1.23
CH-53E	464	14.29	5.72
MV-22	536	2.33	0.93
Joint RW (2)	640	7.45	2.98
Subtotal	3,824	39.86	15.94
Total	5,736	42.36	16.94

Table A1-38. Aircraft Emission Factors - Airspace Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	*Engine Type*	*# Engines*	*Engine Power Setting*	*Fuel Flow/ Engine (Lb/Hr)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*CH4*	*N2O*	*Source of EF*
					Pounds/1000 Pounds Fuel									
F/A-18 C/D	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	Intermediate	7,617	0.14	0.91	30.89	0.96	2.06	6.36	3,096	0.10	0.09	F-16 as a surrogate
KC-130	T56-A-16	4	8,000 Q	1,300	0.36	1.58	8.75	0.40	3.97	3.97	3,096	0.10	0.09	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	Intermediate	6,186	4.33	50.73	49.49	0.40	6.19	6.19	3,096	0.10	0.09	EPA (1992), p. 187
AH-1	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	2	58% Q - Climbout	363	0.13	0.88	6.02	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	70% Q - Cruise	1,488	0.15	2.13	8.08	0.40	2.21	2.21	3,096	0.10	0.09	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	Helo (16°) Cruise	1,530	0.01	0.79	11.64	0.40	1.58	1.58	3,096	0.10	0.09	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AH-1 as a surrogate
EA-6B	J52-P408	2	Intermediate	5,752	3.85	18.29	48.20	0.96	5.75	5.75	3,096	0.10	0.09	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	Intermediate	5,650	0.03	1.61	13.53	0.96	0.65	0.65	3,096	0.10	0.09	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate Action Registry 2009).

Table A1-39. Aircraft Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Fuel Usage (Pounds per LTO)	Pounds/LTO VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	Source of EF
F/A-18 C/D	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	1,207	4.74	23.33	9.89	1.12	2.17	2.17	3,737	0.12	0.11	USAF IERA 2002
KC-130	T56-A-16	4	2,367	7.65	14.79	17.35	0.95	9.03	9.03	7,329	0.24	0.21	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	1,137	17.49	19.55	11.48	0.84	1.55	1.55	3,520	0.11	0.10	EPA (1992), p. 187
AH-1	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	1	280	0.67	3.32	1.28	0.11	1.18	1.18	867	0.03	0.02	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	1,746	11.24	22.86	8.86	0.70	3.76	3.76	5,406	0.18	0.15	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	1,464	11.51	5.44	11.51	0.08	2.01	2.01	4,533	0.15	0.13	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AH-1 as a surrogate
EA-6B	J52-P408	2	1,819	22.55	45.91	12.10	0.98	1.82	1.82	5,632	0.18	0.16	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	5,399	3.33	103.38	32.90	5.13	34.49	34.49	16,716	0.54	0.47	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 (California Climate Action Registry 2009).

Table A1-40. Aircraft Emission Factors - Pad Landings - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Fuel Usage (Pounds per Landing)	Pounds/Landing									Source of EF
				VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	
AH-1	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AESO Memo Rpt 9961, 7/99
UH-1 (4)	T53-L-13B	1	159	0.02	0.30	0.57	0.05	0.46	0.46	492.3	0.02	0.01	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	540	0.52	1.94	4.03	0.22	1.19	1.19	1,671.9	0.05	0.05	AESO Memo Rpt 9960, Revision B, 4/00
MV-22	T406-AD-400	2	592	0.01	0.29	8.87	0.24	0.94	0.94	1,832.9	0.06	0.05	AESO Memo Rpt 2000-09B, 1/01
Joint RW (2)	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AH-1 as a surrogate

Notes: (1) Equal to hover, climbout, descent, and approach modes.

Table A1-41. Aircraft Fugitive Dust Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Soil Silt Content (%)	Rain Days per Year	% of Time Wind Speed > 12 Knots	Exposed Area (Acres)	PM10	PM2.5	Location of EF	Source of EF
					Pounds/Landing or Take O			
EAF								
AH-1	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.04	0.04	0.30	0.12	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.16	0.45	13.72	5.49	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.02	0.51	1.94	0.78	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
R-2501								
AH-1	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.08	0.37	5.64	2.26	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.32	1.01	61.61	24.64	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.04	1.14	8.69	3.48	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations

Table A1-42. Total Proposed Aircraft Emissions within all MCAGCC Airspaces - 29 Palms LAS EIS Project Alternatives

Airspace	*Tons per Year*					
	ROG/HC	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*
Airspaces	0.86	11.20	23.01	0.95	7.62	7.63
EAF LTOs	24.53	60.38	12.86	0.80	8.63	8.63
Range LTOs	0.16	1.29	3.90	0.16	1.00	1.00
Prop Wash - Fugitive Dust					42.36	16.94
Total	25.55	72.87	39.77	1.91	59.60	34.20

Table A1-43. Proposed Ground Forces Annual Ordnances - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Activity	*Item #*	Usage	Units	Weight/Unit (Lb)	Total Explosive Weight (Tons)
Ground Forces Munitions					
Cartridges Smaller than 30 mm	A059, A063, A064, A131, A576, A976	936,270	EA		
Cartridges 30-75 mm	B519, B535, B576, B630, B643, B647	24,242	EA		
Cartridges 75 mm and Larger	C784, C785, C868, C870, C871, C995	11,468	EA	3.06	17.52
Projectiles, Canisters, and Chargers	D505, D528, D532, D533, D541, D544, D579	38,332	EA	4.96	95.00
Grenades	G878, G930, G940, G945	666	EA		
Rockets, Rocket Motors, and Igniters	HX05, HX07, J143	144	EA	0.11	0.01
Mines and Smoke Pots	K143	144	EA	0.22	0.02
Signals and Simulators	L312, L314, L324	360	EA		
Blasting Caps, Demo. Charges, and Detonators	M Series - Detonating cord	8,829	Ft	0.01	0.02
Blasting Caps, Demo. Charges, and Detonators	M Series - Other explosives	8,829	EA		
Fuses and Primers	N289, N340, N523	24,642	EA	0.003	0.04
Guided Missiles	PB99, WF10	144	EA	1.59	0.11
Total		1,057,160			

Table A1-44. Air-Delivered Munitions Used During MEB Exercises - 29 Palms LAS EIS Project Alternatives

	Identification Code	Usage	Units	Weight/Unit	Total Explosive Weight (Tons)
Unguided Munitions					
General Purpose Bomb (25 Lb) - Inert	MK-76 (Inert)	1,950	EA		
General Purpose Bomb (500 Lb)	MK-82	1,020	EA	154.00	78.54
General Purpose Bomb (1,000 Lb) Inert	MK-83 (Inert)	156	EA		
General Purpose Bomb (1,000 Lb)	MK-83	132	EA	165.50	10.92
General Purpose Bomb (2,000 Lb)	MK-84	36	EA	331.00	5.96
Inert Practice Bomb	BDU-45 (Inert)	360	EA		
2.75-inch Rocket	HE/WP/RP Rocket	8,400	EA	0.91	3.84
5-inch Zuni Rocket	HE/WP/ILLUM Rocket	792	EA	4.95	1.96
Guided Munitions [1]					
Hellfire missile	MK-114	72	EA	17.60	0.63
Laser Guided Bomb (500 lb)	GBU-12	432	EA	154.00	33.26
Laser Guided Bomb (1000 lb)	GBU-16	54	EA	165.50	4.47
Laser Guided Bomb (2000 lb)	GBU-10	4	EA	331.00	0.66
Joint Direct Attack Munitions (250 lb)	GB-38 version 4	252	EA	77.00	9.70
Joint Direct Attack Munitions (500 lb)	GBU-38, GBU-54	576	EA	154.00	44.35
Joint Direct Attack Munitions (1000 lb)	GBU-32	24	EA	165.50	1.99
Joint Direct Attack Munitions (2000 lb)	GBU-31	64	EA	331.00	10.59
Hard Target Penetrator	GBU-24	4	EA	331.00	0.66
Small Diameter Missile	GBU-39	24	EA	38.00	0.46
TOW Missile	BGM-71	84	EA	7.92	0.33
Laser Guided Training Round	-	432	EA	0.0066	0.001
Penetrator (500 lb)	BLU-111	384	EA	154.00	29.57
Aircraft Gun Systems Munitions					
20 mm	-	198,000	EA		
25 mm	-	181,000	EA		
7.62 mm	-	336,000	EA	0.002	0.32
.50 Cal	-	790,000	EA	0.01	4.29
Chaff and Flares					
Chaff (Assorted)	-	6,400	EA	0.01	0.04
Flares (Assorted)	-	20,862	EA	0.001	0.01

Table A1-45. Ordnance Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Pounds per Item or (lb/ton of Explosive)*						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.95E-06	1.60E-03	8.50E-05	--	1.08E-06	5.60E-07	3.23E-08
Cartridges 30-75 mm	2.99E-06	3.50E-04	3.59E-05	--	8.22E-07	4.27E-07	2.47E-08
Cartridges 75 mm and Larger	0.85	82.0	9.25	--	4.10E-03	2.13E-03	1.23E-04
Projectiles, Canisters, and Chargers	11.44	777	0.57	--	5.12E-02	2.66E-02	1.54E-03
Grenades	2.39E-05	1.75E-04	4.15E-05	--	3.29E-06	1.71E-06	9.86E-08
Rockets, Rocket Motors, and Igniters	3.26	309	7.28	--	1.74E-02	9.05E-03	5.22E-04
Mines and Smoke Pots	0.58	223.61	0.00	--	2.06E-02	1.07E-02	6.18E-04
Signals and Simulators	0.00	0.01	0.01	--	5.66E-05	2.94E-05	1.70E-06
M Series - Detonating cord	1.21	252.47	0.00	--	4.00E-05	2.08E-05	1.20E-06
M Series - Other explosives	-	0.01	0.01	--	3.44E-03	1.79E-03	1.03E-04
Fuses and Primers	3.44	170.00	-	--	5.70E-06	2.96E-06	1.71E-07
Guided Missiles (3)	3.48	263.66	53.00	--	0.0137	0.0071	0.0004

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) Used PA45 Surface Attack MGM-51C, from Appendix D.9 of the 2007 CEIP

Table A1-46. Air Delivered Munitions Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Pollutant	*Pounds per Item or (lb/ton of Explosive)*						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
General Purpose Bomb (2,000 Lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Inert Practice Bomb							
2.75-inch Rocket	11.73	796.00	0.00	--	0.010	0.005	0.0003
5-inch Zuni Rocket	3.91	429.67	0.00	--	0.067	0.035	0.002
Guided Munitions							
Hellfire missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Bomb (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Laser Guided Bomb (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Laser Guided Bomb (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Joint Direct Attack Munitions (250 lb)	11.73	796.00	0.00	--	0.26	0.14	0.01
Joint Direct Attack Munitions (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Joint Direct Attack Munitions (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Joint Direct Attack Munitions (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Hard Target Penetrator	7.01	554.89	0.00	--	2.72	1.41	0.08
Small Diameter Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
TOW Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Training Round	0.90	77.00	0.00	--	0.26	0.14	0.01
Penetrator (500 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Aircraft Gun Systems Munitions							
20 mm	0.0002	0.03	0.0004	--	2.00E-05	1.04E-05	6.01E-07
25 mm	-	0.06	-	--	5.48E-05	2.85E-05	1.64E-06
7.62 mm	86.44	125.82	5.97	--	1.77E-06	9.19E-07	5.30E-08
.50 Cal	0.55	92.38	19.88	--	8.70E-06	4.52E-06	2.61E-07
Chaff and Flares							
Chaff (Smokeless Powder)	0.49	159.33	17.67	--	3.28E-05	1.71E-05	9.84E-07
Flares	1.64	117.00	17.67	--	2.89E-06	1.50E-06	8.68E-08

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) TOG Emission factors were converted from ROG by multiplying by 0.82

Table A1-47. Proposed Ground Forces Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Annual Emissions (Pounds/Year)*						
	ROG	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.4	1,498.0	79.6	--	1.0	0.5	0.0
Cartridges 30-75 mm	0.1	8.5	0.9	--	0.0	0.0	0.0
Cartridges 75 mm and Larger	14.9	1,437.1	162.1	--	47.1	24.5	1.4
Projectiles, Canisters, and Chargers	1,086.6	73,846.4	54.2	--	1,962.6	1,019.6	59.0
Grenades	0.0	0.1	0.0	--	0.0	0.0	0.0
Rockets, Rocket Motors, and Igniters	0.0	2.5	0.1	--	2.5	1.3	0.1
Mines and Smoke Pots	0.0	3.5	-	--	3.0	1.5	0.1
Signals and Simulators	-	3.6	3.6	--	0.0	0.0	0.0
M Series - Detonating cord	0.0	6.1	-	--	0.4	0.2	0.0
M Series - Other explosives	-	88.3	88.3	--	30.4	15.8	0.9
Fuses and Primers	0.1	6.3	-	--	0.1	0.1	0.0
Guided Missiles [1]	0.4	30.2	6.1	--	2.0	1.0	0.1
Total Ground Forces Emissions - Pounds	1,110	76,931	395	-	2,049	1,065	62
Total Ground Forces Emissions - Tons	0.55	38.47	0.20	-	1.02	0.53	0.03

Table A1-48. Air Delivered Munitions Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Pounds/Year*						
	ROG	CO	NOx	SO2	PM	PM_{10}	$PM_{2.5}$
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	921.0	62,517.8	-	--	538.6	279.5	16.1
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	76.6	6,061.1	-	--	179.5	93.3	5.4
General Purpose Bomb (2,000 Lb)	41.8	3,306.1	-	--			
Inert Practice Bomb							
2.75-inch Rocket	45.0	3,055.7	-	--	86.5	45.1	2.5
5-inch Zuni Rocket	7.7	842.7	-	--	52.7	27.4	1.6
Guided Munitions							
Hellfire missile	2.5	272.2	-	--	1.0	0.5	0.0
Laser Guided Bomb (500 lb)	390.1	26,478.1	-	--	228.1	118.4	6.8
Laser Guided Bomb (1000 lb)	31.3	2,479.5	-	--	73.4	38.2	2.2
Laser Guided Bomb (2000 lb)	4.6	367.3	-	--	10.9	5.7	0.3
Joint Direct Attack Munitions (250 lb)	113.8	7,722.8	-	--	66.5	34.5	2.0
Joint Direct Attack Munitions (500 lb)	520.1	35,304.2	-	--	304.1	157.8	9.1
Joint Direct Attack Munitions (1000 lb)	13.9	1,102.0	-	--	32.6	17.0	1.0
Joint Direct Attack Munitions (2000 lb)	74.3	5,877.4	-	--	174.1	90.5	5.2
Hard Target Penetrator	4.6	367.3	-	--	10.9	5.7	0.3
Small Diameter Missile	1.8	195.9	-	--	0.3	0.2	0.0
TOW Missile	1.3	142.9	-	--	1.2	0.6	0.0
Laser Guided Training Round	0.0	0.1	-	--	114.0	59.2	3.4
Penetrator (500 lb)	207.4	16,407.1	-	--	1,044.5	543.0	31.3
Aircraft Gun Systems Munitions							
20 mm	40.6	5,940.0	85.1	--	4.0	2.1	0.1
25 mm	-	9,955.0	-	--	9.9	5.2	0.3
7.62 mm	27.7	40.3	1.9	--	0.6	0.3	0.0
.50 Cal	2.4	396.2	85.2	--	6.9	3.6	0.2
Chaff and Flares							
Chaff (Smokeless Powder)	0.0	6.7	0.7	--	0.2	0.1	0.0
Flares	0.0	0.7	0.1	--	0.1	0.0	0.0
Total Air-Delivered Emissions - Pounds	2,528	188,839	173	-	2,941	1,528	88
Total Air-Delivered Emissions - Tons	1.26	94.42	0.09	-	1.47	0.76	0.04
Total Combustive Ordnance Emissions - Pounds	3,638	265,770	568	-	4,990	2,592	150
Total Combustive Ordnance Emissions - Tons	1.82	132.88	0.28	-	2.49	1.30	0.07

Table A1-49. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 6

	Annual Emissions (Tons per Year)						
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Road Construction							
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03
Fugitive Dust						0.41	0.04
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07
Communication Tower Construction							
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25
MEB Exercises							
Tactical Vehicles	5.29	23.73	64.39	7.35		2.33	2.33
Tactical Support Equipment	1.50	6.48	16.43	2.06		0.70	0.70
Fugitive Dust						565.25	86.56
Subtotal	6.79	30.21	80.82	9.41		568.29	89.59
Aircraft Operations							
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00
Fugitive Dust						42.36	16.94
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20
Ordnance Activities							
Combustive	1.82	132.88	0.28				
Fugitive						2.49	1.30
Subtotal	1.82	132.88	0.28			2.49	1.30
Personnel Commutes							
On-road Vehicles	0.05	0.60	1.84	0.00		0.02	0.02
Total Operations - Tons per Year (1)	34.21	236.56	122.71	11.33		630.40	125.10
Reduction of West Area Emissions - Tons per Year (2)	(1.90)	(15.60)	(0.93)	(0.02)		(141.23)	(17.28)
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)
Total Operations Net Change - Tons per Year (1)	32.31	220.94	121.78	11.31		488.81	107.78
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 6 would eliminate 13/15% of year 2015 PM10/VOC and NOx emissions from Johnson Valley.

(3) Alternative 6 would eliminate 10% of year 2015 emissions from the South Area.

ATTACHMENT A-2

PM_{10} Dispersion Modeling Analyses

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Table A2-1. Dispersion Modeling Scenario for 24-Hour PM10 Emissions - 29 Palms LAS EIS - Alternative 6

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	6.8
Tactical Support Equipment	2.0
Fugitive Dust	1,648.7
Subtotal	1,657.5
Aircraft Operations	
Airspaces	7.9
EAF LTOs	36.0
Range LTOs	2.1
Fugitive Dust - EAF LTOs	10.4
Fugitive Dust - Range LTOs	83.0
Subtotal	139.4
Ordnance Activities	
Combustive	-
Fugitive	16.6
Subtotal	16.6
Total Operations - PPH	1,813.5
Without EAF	1,767.2

Note: These emissions would occur within the West Area.

Table A2-2. Simulation of Combustive/Fugitive Dust PM10 Emissions from TV/TSE- 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	Width (meters)	Area (m2)	#of Sources	Total Source Area (m2)	Indi. Source Area/ Total Source Area	Location Factor (1)	Battalion Factor	Volume Source PM10 Lb/Hr
MEB Exercises								
1a	2,500	6,250,000	1	6,250,000	0.02	0.01	0.67	11.0
1b	2,500	6,250,000	1	6,250,000	0.02	0.02	0.67	22.1
1c	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
1d	2,500	6,250,000	1	6,250,000	0.02	0.09	0.67	99.4
1dE	2,500	6,250,000	1	6,250,000	0.02	0.07	0.67	77.3
1e	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1f	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1g	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
1h	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
1hE	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
1i	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1j	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1k	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
1l	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
1lE	2,500	6,250,000	1	6,250,000	0.02	0.03	0.67	33.1
1m	2,500	6,250,000	1	6,250,000	0.02	0.08	0.33	44.2
1n	2,500	6,250,000	1	6,250,000	0.02	0.08	0.33	44.2
1o	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1p	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
1pE	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1q	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1r	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1s	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
1t	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1tE	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1u	2,500	6,250,000	1	6,250,000	0.02	0.03	0.33	16.6
1v	2,500	6,250,000	1	6,250,000	0.02	0.03	0.33	16.6
1w	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1x	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1xE	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1y	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1z	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1aa	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1bb	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1cc	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1dd	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1ee	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1ff	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1gg	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1hh	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
2	2,500	6,250,000	1	6,250,000	0.02	0.03	0.67	33.1
2n	2,500	6,250,000	1	6,250,000	0.02	0.02	0.67	22.1
3	2,500	6,250,000	1	6,250,000	0.02	0.01	0.67	11.0
4	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
4s	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
5	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
5n	2,500	6,250,000	1	6,250,000	0.02	0.05	0.33	27.6
6	2,500	6,250,000	1	6,250,000	0.02	0.07	0.67	77.3
6n	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7a	2,500	6,250,000	1	6,250,000	0.02	0.08	0.67	88.4
7b	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
7c	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7d	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7e	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7nw	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
Total MEB Exercises				343,750,000	1.00	2.00		1,657

Note: (1) Total amounts to 2.0, as the sources are divided into 2 sectors: one each for 2 battalions and 1 battalion.

Table A2-3. Simulation of Combustive PM10 Emissions from Aircraft Operations in Airspaces - 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Airspaces								
1a	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1b	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1c	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1d	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1dE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1e	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1f	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1g	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1h	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1hE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1i	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1j	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1k	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1l	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1lE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1m	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1n	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1o	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1p	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
1pE	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
2	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
2n	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
3	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
4	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
4s	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
5n	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
6	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
6n	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7a	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
7b	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7c	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
7d	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7e	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
7nw	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
Total Aircraft Operations - Airspaces				212,500,000	1.00	1.00		7.94

Table A2-4. Simulation of PM10 Emissions from Aircraft Ops Range LTOs, Ordnance Usage, and EAF LTOs - 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Range LTOs								
5n	2,500	6,250,000	1	6,250,000	0.50			42.6
7a	2,500	6,250,000	1	6,250,000	0.50			42.6
Total Aircraft Operations - Range LTOs				12,500,000				85.1
Ordnance Activities								
1a	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1b	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1c	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1e	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1f	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1g	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1i	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1j	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1k	2,500	6,250,000	1	6,250,000	0.07	0.04		0.7
2	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
3	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
4	2,500	6,250,000	1	6,250,000	0.07	0.08		1.3
4s	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
6	2,500	6,250,000	1	6,250,000	0.07	0.04		0.7
Total Ordnance Activities				87,500,000	1.00	1.00		16.5
Aircraft Operations - EAF LTOs								
8	2,500	6,250,000	1	6,250,000	1.00			46.4

Table A2-5. Total Combined Volume Source PM10 Emissions - 29 Palms LAS EIS - Alternative 6

Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
1a								13.1
1b								24.2
1c								67.7
1d								99.7
1dE								77.5
1e								13.1
1f								13.1
1g								45.6
1h								66.5
1hE								55.4
1i								34.5
1j								34.5
1k								45.1
1l								55.4
1lE								33.3
1m								44.4
1n								44.4
1o								33.4
1p								22.2
1pE								11.1
1q								33.1
1r								33.1
1s								22.1
1t								11.0
1tE								5.5
1u								16.6
1v								16.6
1w								11.0
1x								5.5
1xE								5.5
1y								11.0
1z								11.0
1aa								5.5
1bb								5.5
1cc								5.5
1dd								5.5
1ee								5.5
1ff								5.5
1gg								5.5
1hh								5.5
2								34.5
2n								22.3
3								12.4
4								12.7
4s								23.3
5								64.9
5n								27.6
6								78.3
6n								44.4
7a								131.2
7b								55.4
7c								44.3
7d								44.4
7e								44.3
7nw								66.5
8								46.4
Total Hourly Emissions								1,813.5

Table A2-6. Dispersion Modeling Scenario for 24-Hour PM10
Emissions in Alternative 6 Central Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	3.4
Tactical Support Equipment	1.0
Fugitive Dust	824.3
Subtotal	828.7
Aircraft Operations	
Airspaces	7.9
EAF LTOs	
Range LTOs	1.0
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	41.5
Subtotal	50.5
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	-
Total Operations - PPH	879.2

Generally = 50% of activity and emissions within West Area.

Table A2-7. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 6 Central Area - 29 Palms LAS EIS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
16a	2,500	6,250,000	1	6,250,000	0.04	32.6
16b	2,500	6,250,000	1	6,250,000	0.04	32.6
16c	2,500	6,250,000	1	6,250,000	0.04	32.6
16d	2,500	6,250,000	1	6,250,000	0.04	32.6
17a	2,500	6,250,000	1	6,250,000	0.04	32.6
17b	2,500	6,250,000	1	6,250,000	0.04	32.6
17c	2,500	6,250,000	1	6,250,000	0.04	32.6
17d	2,500	6,250,000	1	6,250,000	0.04	32.6
26a	2,500	6,250,000	1	6,250,000	0.04	32.6
26b	2,500	6,250,000	1	6,250,000	0.04	32.6
26c	2,500	6,250,000	1	6,250,000	0.04	32.6
26d	2,500	6,250,000	1	6,250,000	0.04	32.6
26e	2,500	6,250,000	1	6,250,000	0.04	32.6
26f	2,500	6,250,000	1	6,250,000	0.04	32.6
26g	2,500	6,250,000	1	6,250,000	0.04	32.6
26h	2,500	6,250,000	1	6,250,000	0.04	32.6
26i	2,500	6,250,000	1	6,250,000	0.04	32.6
26j	2,500	6,250,000	1	6,250,000	0.04	32.6
26k	2,500	6,250,000	1	6,250,000	0.04	32.6
26l	2,500	6,250,000	1	6,250,000	0.04	32.6
26m	2,500	6,250,000	1	6,250,000	0.04	32.6
26n	2,500	6,250,000	1	6,250,000	0.04	32.6
26o	2,500	6,250,000	1	6,250,000	0.04	32.6
26p	2,500	6,250,000	1	6,250,000	0.04	32.6
41	2,500	6,250,000	1	6,250,000	0.04	32.6
42	2,500	6,250,000	1	6,250,000	0.04	32.6
44	2,500	6,250,000	1	6,250,000	0.04	32.6
Total All Sources				168,750,000	1.00	879.2

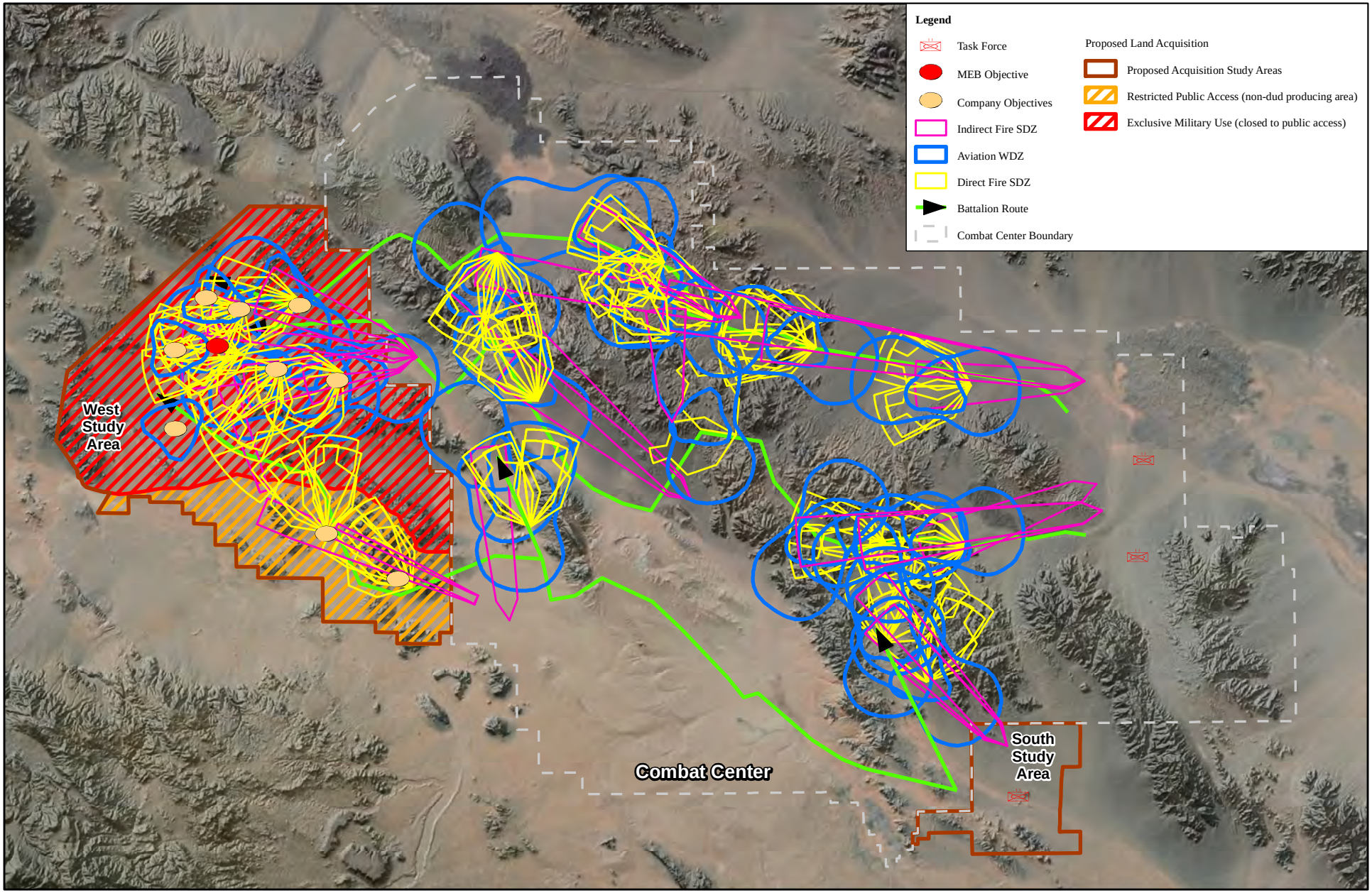
Table A2-8. Dispersion Modeling Scenario for 24-Hour PM10 Emissions in Alternative 6 Eastern Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	3.4
Tactical Support Equipment	1.0
Fugitive Dust	824.3
Subtotal	828.7
Aircraft Operations	
Airspaces	7.9
EAF LTOs	
Range LTOs	1.0
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	41.5
Subtotal	50.5
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	-
Total Operations - PPH	879.2

Generally = 50% of activity and emissions within West Area.

Table A2-9. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 6 Eastern Area - 29 Palms LAS EIS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
29a	2,500	6,250,000	1	6,250,000	0.04	36.6
29b	2,500	6,250,000	1	6,250,000	0.04	36.6
29c	2,500	6,250,000	1	6,250,000	0.04	36.6
29d	2,500	6,250,000	1	6,250,000	0.04	36.6
30a	2,500	6,250,000	1	6,250,000	0.04	36.6
30b	2,500	6,250,000	1	6,250,000	0.04	36.6
30c	2,500	6,250,000	1	6,250,000	0.04	36.6
30d	2,500	6,250,000	1	6,250,000	0.04	36.6
30e	2,500	6,250,000	1	6,250,000	0.04	36.6
30f	2,500	6,250,000	1	6,250,000	0.04	36.6
30g	2,500	6,250,000	1	6,250,000	0.04	36.6
30h	2,500	6,250,000	1	6,250,000	0.04	36.6
30i	2,500	6,250,000	1	6,250,000	0.04	36.6
30j	2,500	6,250,000	1	6,250,000	0.04	36.6
30k	2,500	6,250,000	1	6,250,000	0.04	36.6
30l	2,500	6,250,000	1	6,250,000	0.04	36.6
30m	2,500	6,250,000	1	6,250,000	0.04	36.6
30n	2,500	6,250,000	1	6,250,000	0.04	36.6
30o	2,500	6,250,000	1	6,250,000	0.04	36.6
30p	2,500	6,250,000	1	6,250,000	0.04	36.6
31a	2,500	6,250,000	1	6,250,000	0.04	36.6
31b	2,500	6,250,000	1	6,250,000	0.04	36.6
31c	2,500	6,250,000	1	6,250,000	0.04	36.6
31d	2,500	6,250,000	1	6,250,000	0.04	36.6
Total All Sources				150,000,000	1.00	879.2



Source: MAGTF Training Command 2009

Figure 2-10d
Alternative 6: Representative MEB Final Exercise Scenario

Figure A-1. Maximum 24-Hour PM10 Concentrations Predicted for the LAS MEB Exercises (*ug*/m^3) - Project Alternative 6

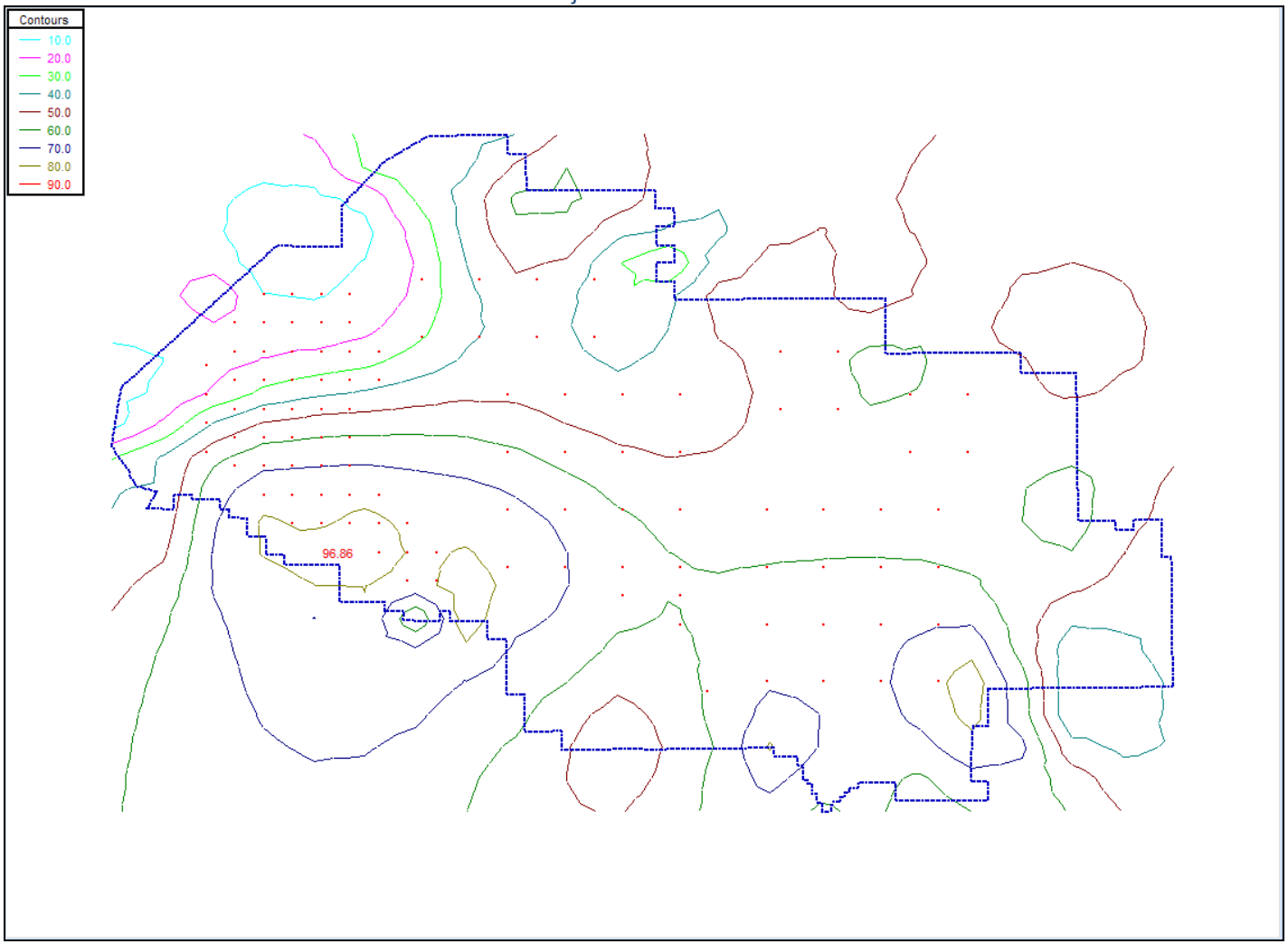


Figure A-2. 24-Hour PM10 Concentrations Predicted at the Maximum Impact Location – LAS MEB Exercise Project Alternative 6 ($\mu g/m^3$)

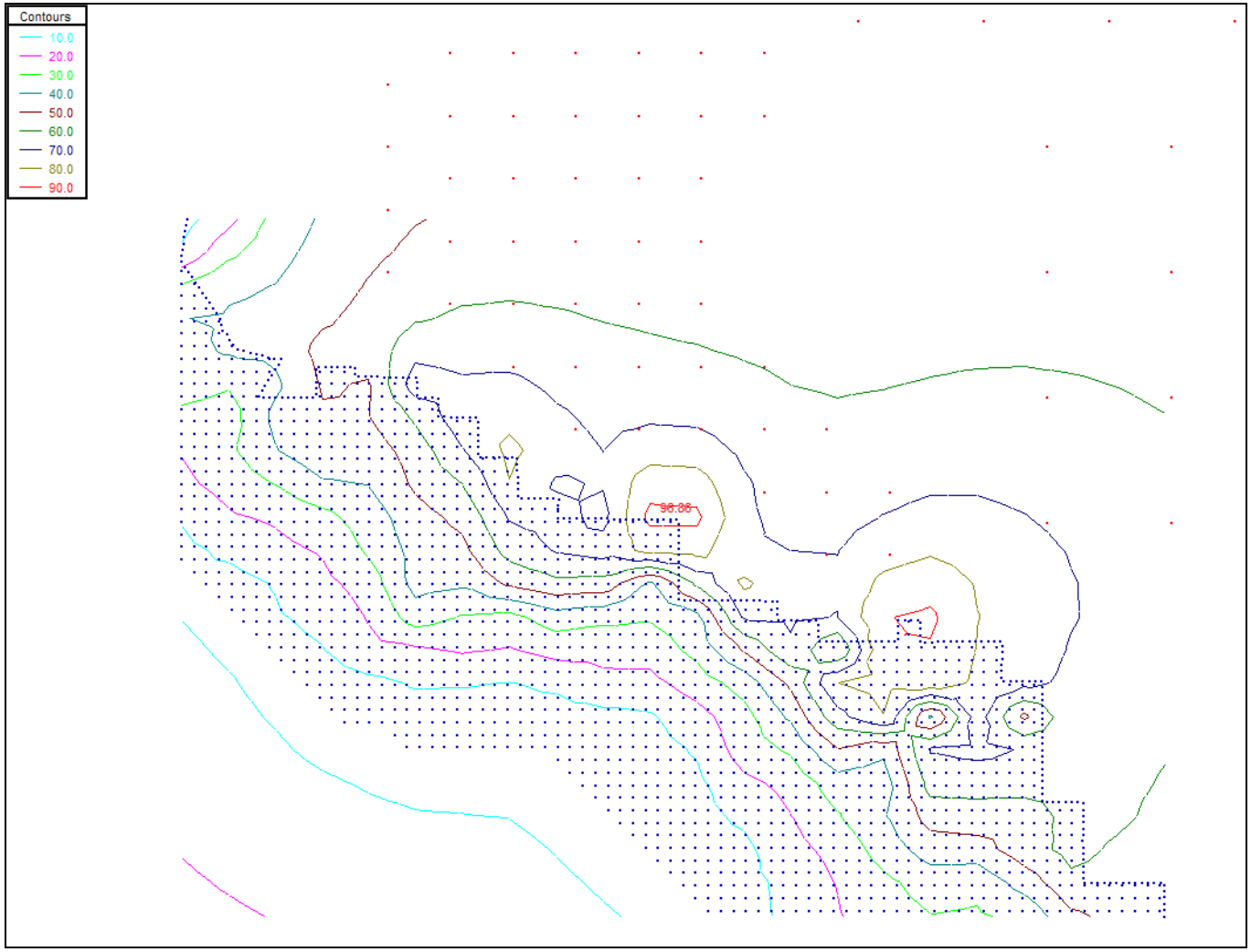
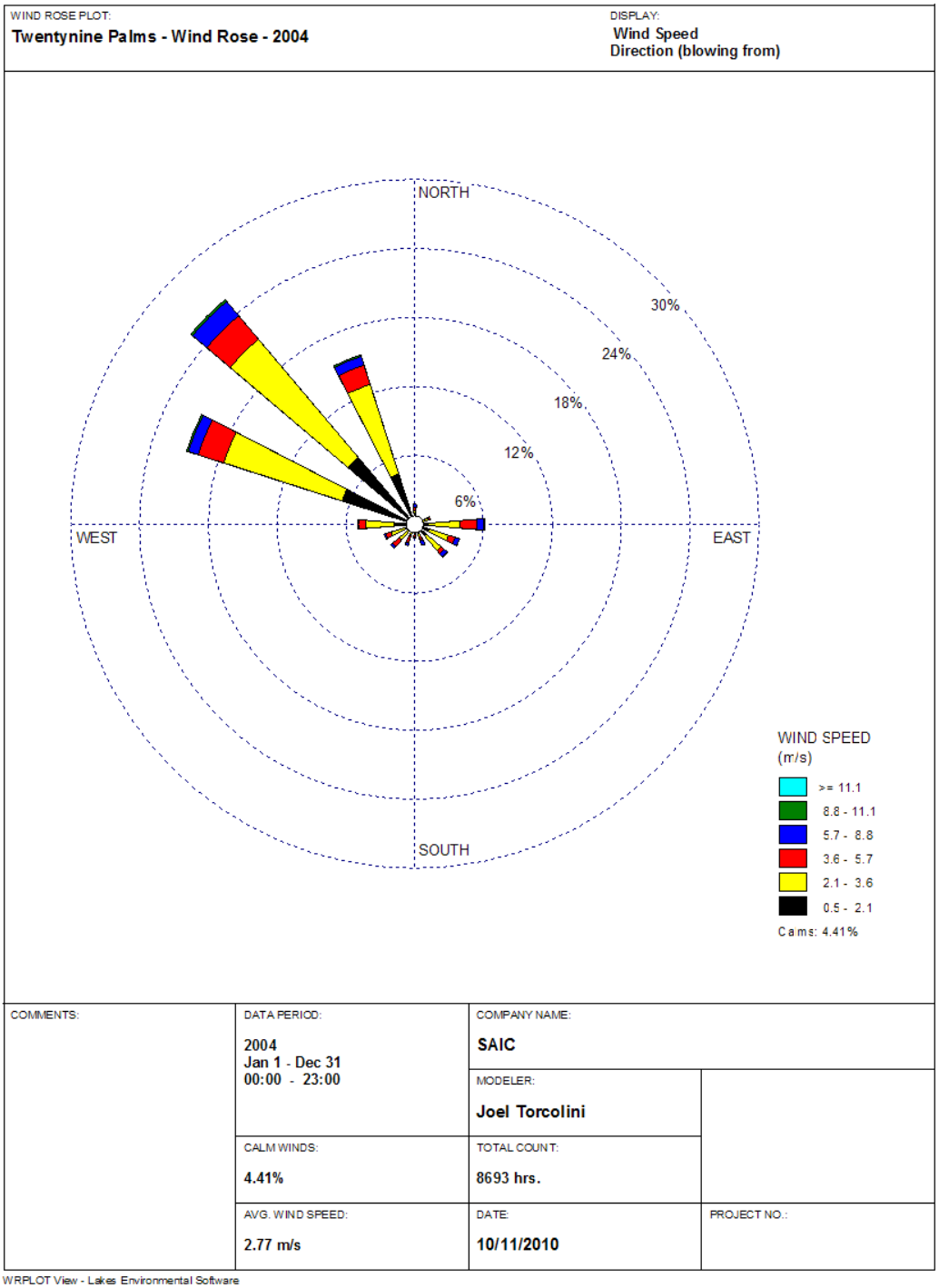


Figure A-3. Wind Rose of MCAGCC Mainside Monitoring Station Winds for 2004



ATTACHMENT A-3

29 Palms LAS Proposed Action Conformity Determinations –
Regulatory Review Status

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Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • fax 760.245.2699
Visit our web site: http://www.rndaqrnd.ca.gov
Eldon Heaston, Executive Director

November 2, 2010

Major W. M. Rowley, Director, NREA
United States Marine Corps
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Box 788100
Twentynine Palms, CA 92278-8106

Re: Request for Conformity Analysis Review and Determination, Land Acquisition and Airspace Establishment Proposed Action

The Mojave Desert Air Quality Management District (MDAQMD) appreciates the opportunity to review the Conformity Evaluation for the Land Acquisition and Airspace Establishment (LAS) action at Marine Corps Combat Center Twentynine Palms (Combat Center), as proposed by the Department of Navy.

The District has reviewed the Conformity Analysis and makes the following determinations in compliance with Rule 2002 ***– General Conformity:***

- The MDAQMD commits to include the ozone precursor emissions from the proposed LAS action into a revision of its ozone attainment plan in the California State Implementation Plan revision pursuant to Rule 2002 §(H)(1)(e)(i)(B).

- The MDAQMD concurs with the dispersion modeling analysis which demonstrates that PM_{10} emissions from the proposed LAS action would not contribute to an exceedance of the PM_{10} NAAQS pursuant to Rule 2002 §(H)(1)(d)(i).

Thank you for allowing the District to provide this input into the proposed Land Acquisition and Airspace Establishment proposed action. If you have any questions regarding this letter, please contact Alan De Salvio, Supervising Air Quality Engineer at extension 6726.

Sincerely,

Alan J. De Salvio
Supervising Air Quality Engineer

cc: Director, USEPA Region IX
Chief, Planning Division, CARB

AJD/tw USMC Conformity Eval.doc

Record of Telephone Conversation

Date: 2 February 2011

Time: 1430

From: Sylvia Oey and Monica Lewis from the California Air Resources Board (CARB); **916-322-8279**

To: Erin Adams, Air Resources Manager at MCAGCC; **760-830-7726**

Subject: Conformity Determination for the Land Acquisition at MCAGCC

Discussion: Ms. Oey and Ms. Lewis called officially notifying MCAGCC that CARB will not be raising any objections to our Conformity Analysis/Land Acquisition Proposal. In other words, they concur with the submitted Conformity Analysis.

Actions: Ms. Adams requested CARB FedEx formal correspondence ASAP outlining their concurrence.

Signature: Erin Adams **Date:** 2/2/2011

Erin Adams

COPY TO:

Chris Proudfoot

Adrianne Saboya

Craig Bloxham

Chris Crabtree