Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS): Forward Operating Base (FOB) Brassfield-Mora and Vicinity, Iraq
Calendar Years: (2003 to 2009)

AUTHORITY: This periodic occupational and environmental monitoring summary (POEMS) has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, 6055.05, and JCSM (MCM) 0028-07, *See REFERENCES.*

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of Occupational and Environmental Health (OEH) risk for FOB Brassfield-Mora, Iraq and vicinity that includes Patrol Base (PB) Olson and PB Razor. It presents a qualitative summary of health risks identified at this location and their potential medical implications. The report is based on the available information collected from 01 December 2003 through 17 August 2009 to include deployment OEH surveillance sampling and monitoring data (e.g., air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases.

This assessment assumes that environmental sampling at FOB Brassfield-Mora and vicinity during this period was performed at representative exposure points selected to characterize health risks at the *population–level*. Due to the nature of environmental sampling, the data upon which this report is based may not be fully representative of all the fluctuations in environmental quality or capture unique occurrences. While one might expect health risks pertaining to historic or future conditions at this site to be similar to those described in this report, the health risk assessment is limited to 01 December 2003 through 17 August 2009.

The POEMS can be useful to inform healthcare providers and others of environmental conditions experienced by individuals deployed to FOB Brassfield-Mora and vicinity during the period of this assessment. However, it does not represent an individual exposure profile. Individual exposures depend on many variables such as; how long, how often, where, and what someone is doing while working and/or spending time outside. Individual outdoor activities and associated routes of exposure are extremely variable and cannot be identified from or during environmental sampling. Individuals who sought medical treatment related to OEH exposures while deployed should have exposure/treatment noted in their medical record on a Standard Form (SF) 600 (Chronological Record of Medical Care).

SITE DESCRIPTION: FOB Brassfield-Mora was located approximately 10 km north of the town of Samarra. It was the site of one of a few Army-only dining facilities in the area of operations. The area surrounding FOB Brassfield-Mora includes both farm fields and empty desert. PB Olson and PB Razor received all of their life support from FOB Brassfield-Mora. The roads on FOB Brassfield-Mora were mostly gravel, while the roads on PB Olson and PB Razor were mostly covered with dirt. However, due to the small size and slow movement of traffic, dust generation was not significant. Although grain and sugar had previously been stored on FOB Brassfield-Mora, just grain was stored there.

SUMMARY: Conditions that may pose a Moderate or greater health risk are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at FOB Brassfield-Mora and vicinity. As indicated in the detailed sections that follow Table 2, controls established to reduce health risk were factored into this assessment. In some cases, e.g., ambient air, specific controls are noted, but not routinely available/feasible.

Table 1: Summary of Occupational and Environmental Conditions with MODERATE or Greater Health Risk

Short-term health risks & medical implications:

The following hazards may be associated with potential acute health effects in some personnel during deployment at FOB Brassfield-Mora and vicinity that includes PB Olson and PB Razor:

Inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}), food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E); other endemic diseases (cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne, leptospirosis, schistosomiasis, Tuberculosis (TB), rabies, Q fever); and heat stress. For food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E), if ingesting local food and water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, typhoid/paratyphoid fever, brucellosis, hepatitis E). Risks from food/waterborne diseases may have been reduced with preventive medicine controls and mitigation, which includes hepatitis A and typhoid fever vaccinations and only drinking from approved water sources in accordance with standing CENTCOM policy. For other vector-borne endemic diseases (cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne), these diseases may constitute a significant risk due to exposure to biting vectors; risk reduced to 'Low' by proper wear of the treated uniform, application of repellent to exposed skin, bed net use, and appropriate chemoprophylaxis, as well as minimizing areas of standing water and other vector-breeding areas. For water contact diseases (leptospirosis, schistosomiasis), activities involving extensive contact with surface water increase risk. For respiratory diseases (TB), personnel in close-quarter conditions could have been at risk for person-to-person spread. Animal contact diseases (rabies, Q fever), pose year-round risk. For heat stress, risk can be greater during months of May through September, and greater for susceptible persons including those older than 45, of low fitness level, unacclimatized, or with underlying medical conditions. Risks from heat stress may have been reduced with preventive medicine controls, work-rest cycles, proper hydration and nutrition, and mitigation.

Air quality: For inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}), the PM_{10} overall short-term risk was 'Not evaluated for 2003, 2004, 2005, and 2009; Low for 2006 and 2007; and Low to Moderate for 2008.' For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), the $PM_{2.5}$ overall short-term risk was 'Not evaluated for 2003-2008; and Low for 2009.' However, exposures to PM_{10} and $PM_{2.5}$ may vary, as conditions may vary, and may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel while at this site, particularly exposures to high levels of dust such as during high winds or dust storms. For PM_{10} and $PM_{2.5}$, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio-pulmonary conditions) are at greatest risk of developing notable health effects. For burn pits, although the short-term risk for PM_{10} and for $PM_{2.5}$ was not evaluated due to 'no data available,' there were burn pits utilized at or around FOB Brassfield-Mora and vicinity – see section 10.7. For burn pits, exposures may vary, and exposure to high levels of PM_{10} and to $PM_{2.5}$ in the smoke may also result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel and certain subgroups while at this site. Although most short-term health effects from exposure to particulate matter and burn pit smoke should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation during their time at FOB Brassfield-Mora and vicinity. Personnel who reported with symptoms or required treatment while at this site should have exposure and treatment noted in medical record (e.g., electronic medical record and/or on a Standard Form (SF) 600 (*Chronological Record of Medical Care*).

Long-term health risks & medical implications:

The following hazards may be associated with potential long-term health effects in some personnel during deployment at FOB Brassfield-Mora and vicinity that includes PB Olson and PB Razor:

Air quality: For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), the overall long-term risk was 'Not evaluated for 2003-2008; Moderate for 2009.' Inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) was not evaluated for long-term risk due to no available health guidelines. However, the area was a dusty desert environment, and conditions may have varied. In addition, for burn pits, although the long-term risk for PM_{10} and for $PM_{2.5}$ was not evaluated due to 'no data available,' there were burn pits present at or around FOB Brassfield-Mora and vicinity, and conditions may have varied – see section 10.7.

For inhalational exposure to high levels of dust, PM_{10} and $PM_{2.5}$, such as during high winds or dust storms, and for exposure to burn pit smoke, it is considered possible that some otherwise healthy personnel who were exposed for a long-term period to dust and particulate matter could develop certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. While the dust and particulate matter exposures and exposures to burn pits are acknowledged, at this time there were no specific recommended, post-deployment medical surveillance evaluations or treatments. Providers should still consider overall individual health status (e.g., any underlying conditions/susceptibilities) and any potential unique individual exposures (such as burn pits/barrels, incinerators, occupational or specific personal dosimeter data) when assessing individual concerns. Certain individuals may need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Table 2. Population-Based Health Risk Estimates - FOB Brassfield-Mora and vicinity that includes PB Olson and PB Razor [1, 2]

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
AIR			
Particulate matter less than 10 micrometers in diameter (PM_{10})	Short-term: Low for overall 2003-2009. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated. Low to Moderate for 2008 particularly, Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Low for 2003-2009. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.
	Long-term: No health guidelines		Long-term: No health guidelines
Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)	Short-term: Low for overall 2003-2009. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Low for 2003-2009. A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.
	Long-term: Moderate for overall 2003-2009. Development of chronic health conditions could occur in generally healthy troops. Those with history of asthma or cardiopulmonary disease are at particular risk.		Long-term: Low for 2003-2009. A small percentage of personnel may be at increased risk for developing chronic conditions. Particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).
Metals	Short-term: None identified		Short-term: None identified
	Long-term: None identified		Long-term: None identified
Volatile Organic Compounds (VOC)	Short-term: None identified for overall 2003-2009.		Short-term: None identified for overall 2003-2009.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.
SOIL			
Metals	Short-term: Not an identified source of health risk.		Short-term: Not an identified source of health risk.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.
Organic Compounds	Short-term: Not an identified source of health risk.		Short-term: Not an identified source of health risk.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.
Inorganic Compounds	Short-term: Not an identified source of health risk.		Short-term: Not an identified source of health risk.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
WATER			
Consumed Water (Water Used for Drinking)	Short-term: None identified for overall 2003-2009.	U.S. Army Public Health Command (USAPHC) former U.S. Army Veterinary Command (VETCOM) approved bottled water and potable water only from approved water sources	Short-term: None identified for overall 2003-2009.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.
Water for Other Purposes	Short-term: None identified for overall 2003-2009.	Water treated in accordance with standards applicable to its intended use	Short-term: None identified for overall 2003-2009.
	Long-term: None identified for overall 2003-2009.		Long-term: None identified for overall 2003-2009.
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: Variable, (bacterial diarrhea, hepatitis A, typhoid fever) to Moderate (diarrhea-cholera, diarrhea-protozoal, brucellosis and hepatitis E). If local food/water were consumed, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (Hepatitis A, Typhoid fever, Brucellosis, Hepatitis E).	Preventive measures include Hepatitis A and Typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none
	Long-term: none identified		Long-term: No data available
Arthropod Vector Borne	Short-term: Variable, Moderate for leishmaniasis-cutaneous, Crimean-Congo hemorrhagic fever, sandfly fever and typhus-miteborne; Low for West Nile fever, and Plague.	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin, and bed net use, minimizing areas of standing water and appropriate chemoprophylaxis.	Short-term: Low
	Long-term: Low (Leishmaniasis-visceral infection)		Long-term: No data available
Water-Contact (e.g. wading, swimming)	Short-term: Moderate for leptospirosis and schistosomiasis.	Recreational swimming in surface waters not likely in this area of Iraq during this time period	Short-term: Moderate for leptospirosis and schistosomiasis.
	Long-term: No data available		Long-term: No data available
Respiratory	Short-term: Variable; Moderate for tuberculosis (TB) to Low for meningococcal meningitis.	Providing adequate living and work space; medical screening; vaccination	Short-term: Low
	Long-term: No data available		Long-term: No data available
Animal Contact	Short-term: Variable; Moderate for rabies and Q-fever, and Low for Anthrax and H5N1 avian influenza.	Prohibiting contact with, adoption, or feeding of feral animals IAW U.S. Central Command (CENTCOM) General Order (GO) 1B. Risks are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW The Center for Disease Control's (CDC) Advisory Committee on Immunization Practices guidance.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects. Long-term: No data available	Risk reduced by avoiding contact, proper wear of uniform (especially footwear), and proper and timely treatment.	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects. Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Variable; Risk of heat injury is Extremely High for June – September, High for May, and Low for all other months. Long-term: Low, The long-term risk was Low. However, the risk may be greater to certain susceptible persons– those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.	Work-rest cycles, proper hydration and nutrition, and Wet Bulb Globe Temperature (WBGT) monitoring.	Short-term: Variable; Risk of heat injury in unacclimatized or susceptible personnel could be High for May – October, and Low for all other months. Long-term: Low, The long-term risk is Low. However, the risk may be greater to certain susceptible persons– those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.
Cold	Short-term: Low risk of cold stress/injury. Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.	Risks from cold stress reduced with protective measures such as use of the buddy system, limiting exposure during cold weather, proper hydration and nutrition, and proper wear of issued protective clothing.	Short-term: Low risk of cold stress/injury. Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.
UNIQUE/INCIDENTS /CONCERNS			
Burn Pits	For particulate matter (PM_{10} and $PM_{2.5}$), Short-term: No data available Long-term: No data available For Volatile Organic Compounds (VOC), Short-term and long-term: none identified for overall 2003-2009	Risks reduced by limiting strenuous physical activities when air quality was especially poor; and action such as closing tent flaps, windows, and doors. Other control measures included locating burn pits downwind of prevailing winds, increased distance from troop populations, and improved waste segregation and management techniques.	For particulate matters (PM_{10} and $PM_{2.5}$), Short-term: No data available Long-term: No data available For Volatile Organic Compounds (VOC), Short-term and long-term: none identified for overall 2003-2009

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]

[1]This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational environment conditions at FOB Brassfield-Mora and vicinity that includes PB Olson and PB Razor. It does not represent an individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may have been present in the environment, if a person did not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may have been no health risk. Alternatively, a person at a specific location may have experienced a unique exposure which could result in a significant individual exposure. Any such person seeking medical care should have their specific exposure documented in an SF600.

[2] This assessment is based on specific environmental sampling data and reports obtained from 01 December 2003 through 17 August 2009. Sampling locations are assumed to be representative of exposure points for the camp population but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

[3]This Summary Table is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at FOB Brassfield-Mora and vicinity. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The health risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability of the exposure that would produce such health effects. Details can be obtained from the APHC/ U.S. Army Institute of Public Health AIPH. Where applicable, "None Identified" is used when though a potential exposure is identified, and no health risks of either a specific acute or chronic health effects are determined. More detailed descriptions of OEH exposures that are evaluated but determined to pose no health risk are discussed in the following sections of this report.

[4]Health risks in this Summary Table are based on quantitative surveillance thresholds (e.g. endemic disease rates; host/vector/pathogen surveillance) or screening levels, e.g. Military Exposure Guidelines (MEGs) for chemicals. Some previous assessment reports may provide slightly inconsistent health risk estimates because quantitative criteria such as MEGs may have changed since the samples were originally evaluated and/or because this assessment makes use of all historic site data while previous reports may have only been based on a select few samples.

1 Discussion of Health Risks at FOB Brassfield-Mora and vicinity, Iraq by Source

The following sections provide additional information about the OEH conditions summarized above. All risk assessments were performed using the methodology described in the U.S. Army Public Health Command Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230, reference 9). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

2 Air

2.1 Site-Specific Sources Identified

FOB Brassfield-Mora and vicinity was situated in a dusty semi-arid desert environment. Inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms, may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel. Additionally, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) are at greatest risk of developing notable health effects.

2.2 Particulate matter

Particulate matter (PM) is a complex mixture of extremely small particles suspended in the air. The PM includes solid particles and liquid droplets emitted directly into the air by sources such as: power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include sand, soil, metals, volatile organic compounds (VOC), allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM composition and particle size vary considerably depending on the source. Generally, PM of health concern is divided into two fractions: PM_{10}, which includes coarse particles with a diameter of 10 micrometers or less, and fine particles less than 2.5 micrometers ($PM_{2.5}$), which can reach the deepest regions of the lungs when inhaled. Exposure to excessive PM is linked to a variety of potential health effects.

2.3 Particulate matter, less than10 micrometers (PM_{10})

2.3.1 Exposure Guidelines:

Short Term (24-hour) PM_{10} (micrograms per cubic meter, $\mu g/m^3$):

- Negligible MEG = 250
- Marginal MEG = 420
- Critical MEG = 600

Long-term PM_{10} MEG ($\mu g/m^3$):

- Not defined and not available.

2.3.2 Sample data/Notes:

While a Deployment Particulate Sampler (DPS) was primarily used to collect PM_{10} samples from 2006 to 2008, another air sampler, the Mini-Vol, was also used to sample PM_{10} in 2006 and 2007. No valid PM_{10} samples were collected in 2003, 2004, 2005, and 2009.

In 2006: Two PM_{10} samples were collected with the DPS at FOB Brassfield-Mora with a range of 24-hour PM_{10} concentrations of 191 $\mu g/m^3$ – 221 $\mu g/m^3$ and an average concentration of 208 $\mu g/m^3$. A total of nine PM_{10} samples were collected with the Mini-Vol at all sites (n=5 at FOB Brassfield-Mora, n=2 at PB Olson, and n=2 at PB Razor) with a range of 24-hour PM_{10} concentrations of 52 $\mu g/m^3$ – 303 $\mu g/m^3$ and an average concentration of 146 $\mu g/m^3$.

In 2007: Four PM_{10} samples were collected with the DPS at FOB Brassfield-Mora (n=2) and PB Olson (n=2) with a range of 24-hour PM_{10} concentrations of 56 $\mu g/m^3$ – 292 $\mu g/m^3$ and an average concentration of 149 $\mu g/m^3$. A total of seven PM_{10} samples were collected with the Mini-Vol at FOB Brassfield-Mora (n=6) and PB Olson (n=1) with a range of 24-hour PM_{10} concentrations of 41 $\mu g/m^3$ – 334 $\mu g/m^3$ and an average concentration of 142 $\mu g/m^3$.

In 2008: Seven PM_{10} samples were collected with the DPS at FOB Brassfield-Mora with a range of 24-hour PM_{10} concentrations of 73 $\mu g/m^3$ – 680 $\mu g/m^3$ and an average concentration of 309 $\mu g/m^3$.

The overall range of 24-hour PM_{10} concentrations measured with DPS and Mini-Vol (n=29) at FOB Brassfield-Mora and vicinity from 2003 to 2009 was 41-680 $\mu g/m^3$ and the average concentration was 189 $\mu g/m^3$.

2.3.3 Short-term health risks:

Not evaluated for 2003, 2004, 2005 and 2009 due to a lack of sampling data.

Low for 2006: The short-term PM_{10} health risk assessment is Low based on average and peak PM_{10} sample concentrations and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities (Reference 9, Table 3-2). Daily average health risk levels for PM_{10} show no hazard for 89% and low health risk for 11% of the time. Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average PM_{10} concentrations and the hazard severity for peak PM_{10} concentrations in samples were negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only

mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

Low for 2007: The short-term PM_{10} health risk assessment is Low based on average and peak PM_{10} sample concentrations and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities (Reference 9, Table 3-2). Daily average health risk levels for PM_{10} show no hazard for 82% and low health risk for 18% of the time. Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average PM_{10} concentrations and the hazard severity for peak PM_{10} concentrations in samples were negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

Low to Moderate for 2008: The short-term PM_{10} health risk assessment is Low based on average PM_{10} sample concentrations and the likelihood of exposure at these hazard severity levels, and Moderate based on peak PM_{10} sample concentrations and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities, while a moderate health risk expects degraded mission capabilities in terms of the required mission standard and will result in reduced mission capability if hazards occurring during the mission (Reference 9, Table 3-2). Daily average health risk levels for PM_{10} show no hazard for 57%, low health risk for 29%, and moderate health risk for 14% of the time. Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average PM_{10} concentrations was negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

The hazard severity for peak PM_{10} concentrations was critical. At this severity level, most if not all personnel will experience very notable eye, nose, and throat irritation and respiratory effects. Visual acuity is impaired, as is overall aerobic capacity. Some personnel will not be able to perform assigned duties. Some lost-duty days are expected. Those with a history of asthma or cardiopulmonary disease will experience more severe symptoms. Conditions may also result in adverse, non-health related material/logistical impacts (Reference 9, Table 3-10).

None to Low for 2003-2009: Although the short-term PM_{10} health risk assessments for years of 2003, 2004, 2005 and 2009 are not evaluated due to a lack of sampling data, the overall short-term PM_{10} health risk assessment for FOB Brassfield-Mora and vicinity from 2003 to 2009 is None based on the average valid PM_{10} sample concentrations and the likelihood of exposure at these hazard severity levels, and Low based on the peak valid PM_{10} sample concentration and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities (Reference 9, Table 3-2). Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average PM_{10} concentrations and the hazard severity for peak PM_{10} concentrations in samples were negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

2.3.4 Long-term health risk:

Not Evaluated-no available health guidelines. The U. S. Environmental Protection Agency (EPA) has retracted its long-term standard (national ambient air quality standards, NAAQS) for PM_{10} due to an inability to clearly link chronic health effects with chronic PM_{10} exposure levels.

2.4 Particulate Matter, less than 2.5 micrometers ($PM_{2.5}$)

2.4.1 Exposure Guidelines:

Short Term (24-hour) $PM_{2.5}$ ($\mu g/m^3$):

- Negligible MEG = 65
- Marginal MEG = 250
- Critical MEG = 500

Long-term (1year) $PM_{2.5}$ MEGs ($\mu g/m^3$):

- Negligible MEG = 15
- Marginal MEG = 65.

2.4.2 Sample data/Notes:

Three valid $PM_{2.5}$ air samples were collected only at FOB Brassfield-Mora in 2009 with the range of 24-hour $PM_{2.5}$ concentrations from 141$\mu g/m^3$ to 230 $\mu g/m^3$ and an average concentration of 156 $\mu g/m^3$. No valid $PM_{2.5}$ air samples were collected at other camps or in other years.

2.4.3 Short-term health risks:

Not evaluated for 2003-2008 due to a lack of sampling data.

Low for 2009: The short-term $PM_{2.5}$ health risk assessment is Low based on average and peak $PM_{2.5}$ sample concentrations and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities (Reference 9, Table 3-2). Daily average health risk levels for $PM_{2.5}$ show low health risk for 100% of the time. Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average $PM_{2.5}$ concentrations and the hazard severity for peak $PM_{2.5}$ concentrations were negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

Low for 2003-2009: Although the short-term $PM_{2.5}$ health risk assessments for years of 2003-2008 are not evaluated due to a lack of sampling data, the overall short-term $PM_{2.5}$ health risk assessment for Brassfield-Mora from 2003 to 2009 is Low based on average and peak valid $PM_{2.5}$ sample concentrations and the likelihood of exposure at these hazard severity levels. A low health risk suggests few, if any, personnel will be affected with little or no effect on mission capabilities (Reference 9, Table 3-2). Daily average health risk levels for $PM_{2.5}$ show low health risk for 100% of the time. Confidence in the short-term PM_{10} health risk assessment is low (Reference 9, Table 3-6).

The hazard severity for average valid $PM_{2.5}$ concentrations and the hazard severity for peak $PM_{2.5}$ concentrations were negligible. During exposures at this hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated (Reference 9, Table 3-10).

2.4.4 Long-term health risks:

Not evaluated for 2003-2008 due to a lack of sampling data.

Moderate for 2009: The long-term health risk assessment is Moderate based on the average $PM_{2.5}$ concentration and the likelihood of exposure at this hazard severity level. A Moderate health risk level suggests that long-term exposure to $PM_{2.5}$ is expected to have limited future medical surveillance activities and related resources anticipated (Reference 9, Table 3-3). Confidence in the long-term $PM_{2.5}$ health risk assessment is low (Reference 9, Table 3-6).

The hazard severity was marginal for average $PM_{2.5}$ sample concentrations. The results suggest that with repeated exposures above the marginal hazard severity threshold, it is plausible that development of chronic health conditions such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, atherosclerosis, or other cardiopulmonary diseases could occur in generally healthy troops. Those with a history of asthma or cardiopulmonary disease are considered to be at particular risk. To help decrease chronic effects of PM exposure during the fall/winter months, efforts should be made to avoid or mitigate (i.e., use of increased levels of personal protective equipment) prolonged outdoor exposure and added sources of PM (burn pits, generators, motor pool, etc.). This guideline is an uncertain screening value - it is not a known health effects concentration. (Reference 9, Table 3-11).

Moderate for 2003-2009: Although the long-term $PM_{2.5}$ health risk assessments for years of 2003-2008 are not evaluated due to a lack of sampling data, the overall long-term health risk assessment is Moderate based on the average $PM_{2.5}$ concentration and the likelihood of exposure at this hazard severity level. A Moderate health risk level suggests that long-term exposure to $PM_{2.5}$ is expected to have limited future medical surveillance activities and related resources anticipated (Reference 9, Table 3-3). Confidence in the long-term $PM_{2.5}$ health risk assessment is low (Reference 9, Table 3-6).

The hazard severity was marginal for average $PM_{2.5}$ sample concentrations. The results suggest that with repeated exposures above the marginal hazard severity threshold, it is plausible that development of chronic health conditions such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, atherosclerosis, or other cardiopulmonary diseases could occur in generally healthy troops. Those with a history of asthma or cardiopulmonary disease are considered to be at particular risk. To help decrease chronic effects of PM exposure during the fall/winter months, efforts should be made to avoid or mitigate (i.e., use of increased levels of personal protective equipment) prolonged outdoor exposure and added sources of PM (burn pits, generators, motor pool, etc.). This guideline is an uncertain screening value - it is not a known health effects concentration. (Reference 9, Table 3-11).

2.5 Airborne Metals

2.5.1 Sample data/Notes:

All valid $PM_{2.5}$ or PM_{10} airborne metal samples that were collected at FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 were lower than their respective 1-year negligible MEGs.

2.5.2 Short-term and long-term health risks:

None identified for 2003-2009 based on the available sampling data.

2.6 Volatile Organic Compounds (VOC)

2.6.1 Exposure Guidelines:

Short-Term (8-hour) 1,3,5-Trimethylbenzene MEGs ($\mu g/m^3$):

- Negligible MEG = 221,210

Long-term (1-year) 1,3,5-Trimethylbenzene MEGs ($\mu g/m^3$):

- Negligible MEG = 6.85

Short-Term (1-hour) 1,3,5-Trimethylbenzene MEGs ($\mu g/m^3$):

- Negligible MEG = 690,000

2.6.2 Sample data/Notes:

Valid VOC air samples were collected at all sites in 2006 and at FOB Brassfield-Mora and PB Olson in 2007. No valid VOC air samples were collected in years of 2003, 2004, 2005, 2008, and 2009. Four individual VOC samples collected in 2006 and 2007 were detected with 1,3,5-Trimethylbenzene at concentrations above the 1-year long-term MEG. However, the average concentration among all the VOC samples in those years did not exceed the long-term (chronic) negligible MEGs, and the peak concentrations detected in those years did not exceed the short-term (acute) negligible MEGs as well.

In 2006 a total of 20 valid VOC air samples were collected with 14 samples at FOB Brassfield-Mora, four at PB Olson, and two at PB Razor. Among them, nine VOC air samples (n=6 at FOB Brassfield-Mora, and n=3 at PB Olson) contained 1,3,5-Trimethylbenzene at concentrations higher than the Limit of Quantitation (LOQ), the minimum concentration that can be reported with a specified degree of confidence, with an average concentration of 4.81 $\mu g/m^3$ and a peak concentration of 10.60 $\mu g/m^3$. Three of the nine VOC samples contained 1,3,5-Trimethylbenzene at concentrations from 6.95 $\mu g/m^3$ to 10.60 $\mu g/m^3$ exceeding the 1-year long-term MEGs of 6.85 $\mu g/m^3$.

In 2007 a total of six valid VOC air samples were collected, two at FOB Brassfield-Mora and four at PB Olson. Among them, three VOC air samples (n=1 at FOB Brassfield-Mora, and n=2 at PB Olson) had detectable levels of 1,3,5-Trimethylbenzene with its average concentration of 4.35 $\mu g/m^3$ and peak concentration of 7.07 $\mu g/m^3$. Only one VOC sample that contained 1,3,5-Trimethylbenzene at concentration of 7.07 $\mu g/m^3$ exceeded the 1-year long-term MEGs of 6.85 $\mu g/m^3$ in this year.

For all the valid VOC samples collected in 2006 and 2007 combined, the average concentration of 1,3,5-Trimethylbenzene (n=12) was 4.69 $\mu g/m^3$ and the peak concentration was 10.60 $\mu g/m^3$ at FOB Brassfield-Mora and vicinity. The above values were considered to represent the overall average measure and peak measures for 1,3,5-Trimethylbenzene at FOB Brassfield-Mora and vicinity from 2003 to 2009.

2.6.3 Short-term health risks:

Not evaluated for years of 2003, 2004, 2005, 2008, and 2009 due to unavailable sampling data.

None identified for 2006 and 2007. No peak parameters exceeded short-term (8-hour or 1-hour) Negligible MEGs.

The overall short-term VOC health risk at FOB Brassfield-Mora and vicinity from 2003 to 2009 was none based on the available sampling data. No peak parameters exceeded short-term (8-hour or 1-hour) Negligible MEGs.

2.6.4 Long-term health risks:

Not evaluated for years of 2003, 2004, 2005, 2008, and 2009 due to unavailable sampling data.

None identified for 2006 and 2007 based on the available sampling data. No year-round average parameters exceeded long-term Negligible MEGs.

The overall long-term VOC health risk at FOB Brassfield-Mora and vicinity from 2003 to 2009 was none based on the available sampling data. No average parameters exceeded long-term (1-year) Negligible MEGs.

3 Soil

3.1 Site-Specific Sources Identified

The primary soil contamination exposure pathways are dermal contact and dust inhalation. Typical parameters analyzed for included Semi Volatile Organic Compounds (SVOCs), heavy metals, Polychlorinated biphenyls (PCBs), pesticides, herbicides. If the contaminant was known or suspected, other parameters may have been analyzed for (e.g., total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) near fuel spills).

3.2 Exposure Guidelines:

Long-Term (1-year) Naphthalene MEGs (milligrams per cubic meter, mg/m^3):

- Negligible MEG = 18.2

3.3 Sample data/Notes:

Valid surface soil samples were collected in 2003, 2005, 2006, 2008, and 2009. No valid samples were collected in 2004 and 2007. Valid samples were collected to assess OEH health risk to deployed personnel. In 2006, naphthalene was found to exceed the 1-year MEGs.

In 2003 a total of three surface soil samples were collected at FOB Brassfield-Mora. The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for all samples. For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

In 2005 a total of two surface soil samples were collected at FOB Brassfield-Mora (n=1) and PB Olson (n=1). The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for both samples. For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

In 2006 a total of 15 surface soil samples were collected at all sites, FOB Brassfield-Mora (n=9), PB Olson (n=3), and PB Razor (n=3). Five of the nine samples collected at FOB Brassfield-Mora from September 2006 to November 2006 were found to contain naphthalene exceeding the 1-year MEGs, with average concentration of 80 mg/m^3 and peak concentration of 130 mg/m^3. All these samples of high concentration of naphthalene (n=5) were collected at fuel spill sites within the FOB. All other samples (n=10) did not exceed the 1-year MEGs. The percent of the population exposed to soil and associated dust in the entire sampled areas was > 75% for three samples, 50 – 75% for three samples, 25 <50% for three samples, and < 10% for six samples. Particularly in the fuel-spilled areas where naphthalene was found with high concentrations, less than 10% of personnel were reported to be

possibly exposed. For the risk assessment, personnel are assumed to remain at FOB Brassfield-Mora and vicinity for 6 months to 1 year.

In 2008 a total of five surface soil samples were collected at FOB Brassfield-Mora (n=3) and PB Olson (n=2). The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for two samples and 50 – 75% for three samples. For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

In 2009 one surface soil sample was collected at FOB Brassfield-Mora. The percent of the population exposed to soil and associated dust in the sampled area was > 75%. For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

For all the valid samples collected at FOB Brassfield-Mora and vicinity from 2003 to 2009, no other parameters exceeded 1-year MEGs except for the naphthalene. Naphthalene with its average concentration and peak concentration measured in 2006 was then utilized to assess the overall health risk of soils in Brassfield-Mora and vicinity from 2003 to 2009. Since no further reports indicate whether the spilled areas had been cleaned up, the health risks resulting from naphthalene are then retained for further health risk assessments.

Naphthalene may most likely present short-term risks. As the Agency for Toxic Substances and Disease Registry (ATSDR) of the Center for Disease Control and Prevention (CDC) highlights, naphthalene evaporates easily, and can weakly attach to soil or pass through soil into underground water. In air, moisture and sunlight break it down within one day. In water, bacteria break it down or it evaporates into the air. Most naphthalene will be gone from water within two weeks. In soil, microorganisms break it down into carbon monoxide in one to three months (Reference 12).

3.4 Short-term health risk:

Not an identified source of health risk for 2003 to 2009.

Although naphthalene may present short-term health risks, sampling data for soil are currently not evaluated for short term (acute) health risks. The soil MEGs for short-term exposures were not developed; unless obvious odors, dead or discolored vegetation, or free chemical product are observed, soil contamination is not anticipated to be an immediate or severe hazard (Reference 9, Section 2.3.3).

3.5 Long-term health risk:

Not evaluated for years of 2004 and 2007 due to unavailable sampling data

None identified based on available sample data for years of 2003, 2005, 2008, and 2009. No parameters exceeded 1-year Negligible MEGs. Confidence in the long-term health risk assessment is low (Reference 9, Table 3-6).

None for 2006: Naphthalene does not exhibit long-term (chronic) health risks due to its lack of persistence in soil as discussed above. Additionally, direct long-term dermal contact with contaminated soil was unlikely to occur due to personal protective gears (i.e., combat boots and work gloves) worn during the late autumn (October-November) when the fuel was found to spill on ground. The confidence for the risk assessment is medium (Reference 9, Table 3-6).

The overall long-term soil health risk at FOB Brassfield-Mora and vicinity from 2003 to 2009 was none based on the available sampling data.

4 Water

In order to assess the health risk to U.S. personnel from exposure to water in theater, the APHC identified the most probable exposure pathways. These are based on the administrative information provided on the field data sheets submitted with the samples taken over the time period being evaluated. Based on the information provided from the field, all samples for untreated water samples were associated with source water for treatment and no exposure pathways were associated with those samples. Therefore, untreated samples are not assessed as potential health hazards. It is assumed that 100% of all U.S. personnel at FOB Brassfield-Mora and vicinity will be directly exposed to Reverse Osmosis Water Purification Unit (ROWPU) treated and disinfected fresh bulk water, since this classification of water is primarily used for personal hygiene, showering, cooking, and for use at vehicle wash racks. Field data sheets indicate that bottled water was the only approved source of drinking water.

4.1 Drinking Water: Bottled or Packaged Water

4.1.1 Site-Specific Sources Identified

There could have been multiple bottled water brands used at FOB Brassfield-Mora and vicinity during the timeframe. However, Nestle® was the only bottled water that was documented at the Defense Occupational and Environmental Health Readiness System (DOEHRS), or the Military Exposure Surveillance Library (MESL) at the above locations from 2003 to 2009. Nestle® was the trademark belonging to Société des Produits Nestlé S.A., a part of the Nestlé Group that produced bottled drinking water.

4.1.2 Sample data/Notes:

To assess the potential for adverse health effects to troops, the following assumptions were made about dose and duration: A conservative (protective) assumption was that personnel routinely ingested 15 L/day of bottled water for up to 365 days (1-year). It was further assumed that control measures were not used. A total of one valid bottled water sample was collected at FOB Brassfield-Mora in 2008 for health risk assessment.

4.1.3 Short-term and long-term health risk:

Not evaluated for years of 2003-2007 and 2009 due to unavailable sampling data

None identified for year of 2008 based on available sample data. All parameters in the sample were below their respective short and long-term Negligible MEGs.

The overall short-term and long-term risks for drinking water are not identified for 2003 to 2009 based on available sample data. All parameters in the sample were below their respective short and long-term Negligible MEGs.

4.2 Non-Drinking Water: Disinfected

4.2.1 Site-Specific Sources Identified

Although the primary route of exposure for most microorganisms is ingestion of contaminated water, dermal exposure to some microorganisms, chemicals, and biologicals may also cause adverse health effects. Complete exposure pathways would include drinking, brushing teeth, personal hygiene,

cooking, providing medical and dental care using a contaminated water supply or during dermal contact at vehicle or aircraft wash racks.

4.2.2 Sample data/Notes:

To assess the potential for adverse health effects to troops the following assumptions were made about dose and duration: All U.S. personnel at this location were expected to remain at this site for approximately 1 year. A conservative (protective) assumption is that personnel routinely consumed less than 5L/day of non-drinking water for up to 365 days (1-year). It is further assumed that control measures and/or personal protective equipment were not used. Valid disinfected water (Non-Drinking) samples were collected in 2004, 2006, 2007, 2008, and 2009. No chemicals were detected at levels above the short or long-term MEGs.

In 2004 one treated non-drinking water sample was collected at FOB Brassfield-Mora with all parameters lower than 1-year non-drinking MEGs.

In 2006 a total of six treated non-drinking water samples (n=4 at FOB Brassfield-Mora, n=1 at PB Olson, and n=1 at PB Razor) were collected with all parameters lower than 1-year non-drinking MEGs.

In 2007 a total of two treated non-drinking water sample (n=1 at FOB Brassfield-Mora and n=1 at PB Olson) was collected at PB Olson with all parameters lower than 1-year non-drinking MEGs.

In 2008 a total of three treated non-drinking water samples (n=2 at FOB Brassfield-Mora and n=1 at PB Olson) were collected with all parameters lower than 1-year non-drinking MEGs.

In 2009 a total of four treated non-drinking water samples (n=3 at FOB Brassfield-Mora and n=1 at PB Olson) were collected with all parameters lower than 1-year non-drinking MEGs.

4.2.3 Short and long-term health risks:

Not evaluated for years of 2003 and 2005 due to unavailable sampling data

None identified for years of 2004 and 2006-2009 based on available sample data. All collected samples were below the short and long-term Negligible MEGs.

The overall short-term and long-term risks for non-drinking water are not identified for 2003 to 2009 based on available sample data. All parameters in the sample were below their respective short and long-term Negligible MEGs.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear (CBRN) Weapons

No specific hazard sources were documented in the DOEHRS, or the MESL from 01 December 2003 to 17 August 2009 timeframe.

5.2 Depleted Uranium (DU)

No specific hazard sources were documented in the DOEHRS, or MESL from 01 December 2003 to 17 August 2009 timeframe.

5.3 Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 01 December 2003 to 17 August 2009 timeframe.

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 01 December 2003 to 17 August 2009 timeframe.

6 Endemic Disease

This document lists the endemic diseases reported in the region, its specific health risks and severity and general health information about the diseases. USCENTCOM MOD 11 (Reference 11) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this POEMS.

6.1 Foodborne and Waterborne Diseases

Food borne and waterborne diseases in the area are transmitted through the consumption of local food and water. Local unapproved food and water sources (including ice) are heavily contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service Members have little or no natural immunity. Effective host nation disease surveillance does not exist within the country. Only a small fraction of diseases are identified or reported in host nation personnel. Diarrheal diseases are expected to temporarily incapacitate a very high percentage of U.S. personnel within days if local food, water, or ice is consumed. Hepatitis A and typhoid fever infections typically cause prolonged illness in a smaller percentage of unvaccinated personnel. Vaccinations are required for DOD personnel and contractors. In addition, although not specifically assessed in this document, significant outbreaks of viral gastroenteritis (e.g., norovirus) and food poisoning (e.g., *Bacillus cereus*, *Clostridium perfringens*, *Staphylococcus*) may occur. Key disease risks are summarized below:

Mitigation strategies were in place and included consuming food and water from approved sources, vaccinations (when available), frequent hand washing and general sanitation practices.

6.1.1 Diarrheal diseases (bacteriological)

High, mitigated to Low: Diarrheal diseases are expected to temporarily incapacitate a very high percentage of personnel (potentially over 50% per month) within days if local food, water, or ice is consumed. Field conditions (including lack of hand washing and primitive sanitation) may facilitate person-to-person spread and epidemics. Typically mild disease treated in outpatient setting; recovery and return to duty in less than 72 hours with appropriate therapy. A small proportion of infections may require greater than 72 hours limited duty, or hospitalization. Bacterial diarrhea can be mitigated to low risk when countermeasures are used.

6.1.2 Hepatitis A, typhoid/paratyphoid fever, and diarrhea-protozoal

High, mitigated to Low: Unmitigated health risk to U.S. personnel is high year round for hepatitis A and typhoid/paratyphoid fever, and Moderate for diarrhea-protozoal. Mitigation was in place to reduce the risks to low. Hepatitis A, typhoid/paratyphoid fever, and diarrhea-protozoal disease may cause prolonged illness in a small percentage of personnel (less than 1% per month). Although much rarer, other potential diseases in this area that are also considered a Moderate risk include: hepatitis E, diarrhea-cholera, and brucellosis.

6.1.3 Short-term Health Risks:

Low: The overall unmitigated short-term risk associated with food borne and waterborne diseases are considered High (bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever) to Moderate (diarrhea-cholera, diarrhea-protozoal, brucellosis, and hepatitis E) if local food or water is consumed. Preventive Medicine measures reduced the risk to Low. Confidence in the health risk estimate is high.

6.1.4 Long-term Health Risks:

None identified based on available data.

6.2 Arthropod Vector-Borne Diseases

During the warmer months, the climate and ecological habitat support populations of arthropod vectors, including mosquitoes, ticks, mites, and sandflies. Significant disease transmission is sustained countrywide, including urban areas. Mitigation strategies were in place and included proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets and chemoprophylaxis (when applicable). Additional methods included the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.1 Malaria

None: Indigenous transmission of malaria in Iraq was eliminated as of 2008, reducing risk among personnel exposed to mosquito bites to none.

6.2.2 Leishmaniasis

Moderate, mitigated to Low: The disease risk is Moderate during the warmer months when sandflies are most prevalent, but reduced to low with mitigation measures. Leishmaniasis is transmitted by sand flies. There are two forms of the disease; cutaneous (acute form) and visceral (a more latent form of the disease). The leishmaniasis parasites may survive for years in infected individuals and this infection may go unrecognized by physicians in the U.S. when infections become symptomatic years later. Cutaneous infection is unlikely to be debilitating, though lesions may be disfiguring. Visceral leishmaniasis disease can cause severe febrile illness which typically requires hospitalization with convalescence over 7 days.

6.2.3 Crimean-Congo hemorrhagic fever

Moderate, mitigated to Low: Unmitigated risk is moderate, but reduced to low with mitigation measures. Crimean-Congo hemorrhagic fever occurs in rare cases (less than 0.1% per month attack rate in indigenous personnel) and is transmitted by tick bites or occupational contact with blood or secretions from infected animals. The disease typically requires intensive care with fatality rates from 5% to 50%.

6.2.4 Sandfly fever

Moderate, mitigated to Low: Sandfly fever has a Moderate risk with potential disease rates from 1% to 10% per month under worst case conditions. Mitigation measures reduced the risk to low. The disease is transmitted by sandflies and occurs more commonly in children though adults are still at risk. Sandfly fever disease typically resulted in debilitating febrile illness requiring 1 to 7 days of supportive care followed by return to duty.

6.2.5 Sindbis (and Sindbis-like viruses)

Low: Sindbis and sindbis-like viruses are maintained in a bird-mosquito cycle in rural areas and occasionally cause limited outbreaks among humans. The viruses are transmitted by a variety of *Culex* mosquito species found primarily in rural areas. A variety of bird species may serve as reservoirs or amplifying hosts. Extremely rare cases (less than 0.01% per month attack rate) could have occurred seasonally (April - November). Debilitating febrile illness is often accompanied by rash, and typically requires 1 to 7 days of supportive care; significant arthralgias may persist for several weeks or more in some cases. This disease is associated with a low health risk estimate.

6.2.6 *Rickettsioses, tickborne (spotted fever group)*

Low: Rare cases (less than 0.1% per month) of rickettsioses disease are possible among personnel exposed to tick bites. Rickettsioses are transmitted by multiple species of hard ticks, including *Rhipicephalus* spp., which are associated with dogs. Other species of ticks, including *Ixodes* are also capable of transmitting rickettsial pathogens in this group. In addition to dogs, various rodents and other animals also may serve as reservoirs. Ticks are most prevalent from April through November. Incidents can result in debilitating febrile illness, which may require 1 to 7 days of supportive care followed by return to duty. The health risk of rickettsial disease is Low.

6.2.7 *Typhus-murine (fleaborne)*

Low: Typhus-murine has a Low risk estimate and is assessed as present, but at unknown levels. Rare cases are possible among personnel exposed to rodents (particularly rats) and flea bites. Incidents may result in debilitating febrile illness typically requiring 1 to 7 days of supportive care followed by return to duty.

6.2.8 West Nile fever

Low: West Nile fever is present. The disease is maintained by the bird population and transmitted to humans via mosquito vector. Typically, infections in young, healthy adults are asymptomatic although fever, headache, tiredness, body aches (occasionally with a skin rash on trunk of body), and swollen lymph glands can occur. This disease is associated with a low risk estimate.

6.2.9 Short -term health risks:

Low: The unmitigated risk is moderate for leishmaniasis - cutaneous (acute), Crimean-Congo hemorrhagic fever, and sandfly fever; Low for, sindbis, rickettsioses-tickborne, typhus-fleaborne, and West Nile fever. No hazard from malaria (2008 - 2011). Risk is reduced to Low by proper wear of the uniform and application of repellent to exposed skin. Confidence in the risk estimate is high.

6.2.10 Long -term health risks:

Low: The unmitigated risk is moderate for leishmaniasis-visceral (chronic). Risk is reduced to Low by proper wear of the uniform and application of repellent to exposed skin. Confidence in the risk estimate is high.

6.3 Water Contact Diseases

Tactical operations or recreational activities that involve extensive contact with surface water such as lakes, streams, rivers, or flooded fields may result in significant exposure to leptospirosis and schistosomiasis. Arid portions of Iraq without permanent or persistent bodies of surface water do not

support transmission of leptospirosis or schistosomiasis. Risk was restricted primarily to areas along rivers and lakes. These diseases can debilitate personnel for up to a week or more. Leptospirosis risk typically increases during flooding. In addition, although not specifically assessed in this document, bodies of surface water are likely to be contaminated with human and animal waste. Activities, such as wading or swimming may result in exposure to enteric diseases including diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact also may lead to the development of a variety of potentially debilitating skin conditions including bacterial or fungal dermatitis. Mitigation strategies were in place and included avoiding water contact and recreational water activities, proper wear of uniform (especially footwear), and protective coverings for cuts/abraded skin.

6.3.1 Leptospirosis

Moderate, mitigated to Low: Human infections occur seasonally (typically April through November) through exposure to water or soil contaminated by infected animals and is associated with wading, and swimming in contaminated, untreated open water. The occurrence of flooding after heavy rainfall facilitates the spread of the organism because as water saturates the environment leptospirosis present in the soil passes directly into surface waters. Leptospirosis can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Infection may also occur from ingestion of contaminated water. The acute, generalized illness associated with infection may mimic other tropical diseases (for example, dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may result in personnel being temporarily debilitated with leptospirosis. This disease is associated with a Moderate health risk estimate.

6.3.2 Schistosomiasis

Moderate, mitigated to Low: Humans are the principal reservoir for schistosomes; humans shed schistosome eggs in urine or feces. Animals such as cattle and water buffalo may also be significant reservoirs. Rare cases (less than 0.1% per month attack rate) may occur seasonally (typically April through November) among personnel wading or swimming in lakes, streams, or irrigated fields which were frequently contaminated with human and animal waste containing schistosome eggs. In groups with prolonged exposure to heavily contaminated foci, attack rates may exceed 10%. Exceptionally heavy concentrations of schistosomes may occur in discrete foci, which were difficult to distinguish from less contaminated areas. In non-immune personnel exposed to such foci, rates of acute schistosomiasis may be over 50%. Mild infections are generally asymptomatic. In very heavy acute infections, a febrile illness (acute schistosomiasis) may occur, especially with *Schistosoma japonicum* and *S. mansoni*, requiring hospitalization and convalescence over 7 days. This disease is associated with a Moderate health risk estimate.

6.3.3 Short -term health risks:

Low: Unmitigated Health risk of schistosomiasis and leptospirosis is Moderate during warmer months. Mitigation measures reduce the risk to Low. Confidence in the health risk estimate is high.

6.3.4 Long -term health risks:

None identified based on available data.

6.4 Respiratory Diseases

Although not specifically assessed in this document, deployed U.S. forces may be exposed to a wide

variety of common respiratory infections in the local population. These include influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, and others. The U.S. military populations living in close-quarter conditions are at risk for substantial person-to-person spread of respiratory pathogens. Influenza is of particular concern because of its ability to debilitate large numbers of unvaccinated personnel for several days. Mitigation strategies were in place and included routine medical screenings, vaccination, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, implementation of proper Personal Protective Equipment (PPE) when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis (TB)

Moderate, mitigated to Low: Potential health risk to U.S. personnel is Moderate, mitigated to Low, year round. Transmission typically requires close and prolonged contact with an active case of pulmonary or laryngeal TB, although it also can occur with more incidental contact. The Army Surgeon General has defined increased risk in deployed Soldiers as indoor exposure to locals or third country nationals of greater than one hour per week in a highly endemic active TB region. Additional mitigation included active case isolation in negative pressure rooms, where available.

6.4.2 Meningococcal meningitis

Low: Meningococcal meningitis poses a Low risk and is transmitted from person to person through droplets of respiratory or throat secretions. Close and prolonged contact facilitates the spread of this disease. Meningococcal meningitis is potentially a very severe disease typically requiring intensive care; fatalities may occur in 5-15% of cases.

6.4.3 Short-term health risks:

Low: Moderate (TB) to Low (for meningococcal meningitis). Overall risk was reduced to Low with mitigation measures. Confidence in the health risk estimate is high.

6.4.4 Long-term health risks:

None identified based on available data. Tuberculosis is evaluated as part of the Post Deployment Health Assessment (PDHA). A TB skin test is required post-deployment if potentially exposed and is based upon individual service policies.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Moderate, mitigated to Low: Rabies posed a year-round moderate risk in Iraq. Prevalence of rabies in local animals was well above U.S. levels due to the lack of organized control programs. Dogs were the primary reservoir of rabies in Iraq, and a frequent source of human exposure. Rabies is transmitted by exposure to the virus-laden saliva of an infected animal, typically through bites, but could occur from scratches contaminated with the saliva. No cases of rabies acquired in Iraq have been identified in US Service Members to date. The vast majority (>99%) of persons who develop rabies disease will do so within a year after a risk exposure. There have been rare reports of individuals presenting with rabies disease up to six years or more after their last known risk exposure. Mitigation strategies included command emphasis of CENTCOM GO 1B, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

6.5.2 Anthrax

Low: Anthrax cases are rare in indigenous personnel, and pose a Low risk to U.S. personnel. Anthrax is a naturally occurring infection; cutaneous anthrax is transmitted by direct contact with infected animals or carcasses, including hides. Eating undercooked infected meat may result in contracting gastrointestinal anthrax. Pulmonary anthrax is contracted through inhalation of spores and is extremely rare. Mitigation measures included vaccination, consuming approved food sources, proper food preparation and cooking temperatures, avoidance of animals and farms, dust abatement when working in these areas, vaccinations, and proper PPE for personnel working with animals.

6.5.3 Q-Fever

Moderate, mitigated to Low: Potential health risk to U.S. personnel is Moderate, but mitigated to Low, year round. Rare cases are possible among personnel exposed to aerosols from infected animals, with clusters of cases possible in some situations. Significant outbreaks (affecting 1-50%) can occur in personnel with heavy exposure to barnyards or other areas where animals are kept. Unpasteurized milk may also transmit infection. The primary route of exposure is respiratory, with an infectious dose as low as a single organism. Incidence could result in debilitating febrile illness, sometimes presenting as pneumonia, typically requiring 1 to 7 days of inpatient care followed by return to duty. Mitigation strategies in place as listed in paragraph 6.5.2 except for vaccinations.

6.5.4 H5N1 avian influenza

Low: Potential health risk to U.S. personnel is Low. Although H5N1 avian influenza (AI) is easily transmitted among birds, bird-to-human transmission is extremely inefficient. Human-to-human transmission appears to be exceedingly rare, even with relatively close contact. Extremely rare cases (less than 0.01% per month attack rate) could occur. Incidence could result in very severe illness with fatality rate higher than 50 percent in symptomatic cases. Mitigation strategies included avoidance of birds/poultry and proper cooking temperatures for poultry products.

6.5.5 Short-term health risks:

Low: The short-term unmitigated risk is Moderate for rabies, and Q-fever, to Low for anthrax, and H5N1 avian influenza. Mitigation measures reduced the overall risk to Low. Confidence in risk estimate is high.

6.5.6 Long-term health risks:

Low: A Low long term risk exists for rabies because, in rare cases, the incubation period for rabies can be several years.

7 Venomous Animal/Insect

All information was taken directly from the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 2). The species listed below have home ranges that overlap the location of FOB Brassfield-Mora and vicinity, and may present a health risk if they are encountered by personnel. See Section 9 for more information about pesticides and pest control measures.

7.1 Spiders

- *Latrodectus pallidus*: Clinical effects uncertain, but related to medically important species, therefore major envenomation cannot be excluded.

7.2 Scorpions

- *Androctonus crassicauda (black scorpion): Severe envenoming possible and potentially lethal, however most stings cause only severe local pain.*

- *Compsobuthus werneri Odontobuthus doriae*, *Orthochirus iraqus*, and *Orthochirus scrobiculosus*: Clinical effects unknown; there are a number of dangerous Buthid scorpions, but there are also some known to cause minimal effects only. Without clinical data, it is unclear where this species fits within that spectrum.

- *Hemiscorpius lepturus*: Severe envenoming possible, potentially lethal.

- *Hottentotta saulcyi*, *Hottentotta scaber*, and *Hottentotta schach*: Moderate envenoming possible but unlikely to prove lethal.

7.3 Snakes

- *Cerastes gasperettii*: Potentially lethal envenoming, though unlikely.

- *Hemorrhois ravergieri*, *Malpolon monspessulanus*, *Psammophis schokari*, *Pseudocyclophis persicus, Telescopus fallax* and *Telescopus tessellatus*: Clinical effects unknown, but unlikely to cause significant envenomation.

- *Macrovipera lebetina* subspecies e*uphratica* and subspecies *obtusa,and Vipera albicornuta* : Severe envenoming possible, potentially lethal.

- *Platyceps rhodorachis* and *Psammophis lineolatus*: Mild envenoming only, not likely to prove lethal.

- *Walterinnesia aegyptia*: Clinical effects unknown, but potentially lethal envenoming, though unlikely, cannot be excluded.

7.4 Short-term health risk:

Low: If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects. See effects of venom above. Mitigation strategies included avoiding contact, proper wear of uniform (especially footwear), and timely medical treatment. Confidence in the health risk estimate is low (Reference 9, Table 3-6).

7.5 Long-term health risk:

None identified.

8 Heat/Cold Stress

8.1 Heat

Summer (June - September) monthly mean temperatures range from 89 degrees Fahrenheit (°F) to 98 °F with an average temperature of 94 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. The health risk of heat stress/injury based on temperatures alone is Low (< 78 °F) from October – April, high (82-87.9°F) in May, and extremely high

(≥ 88°F) from June to September. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Reference 6). Managing risk of hot weather operations included monitoring work/rest periods, proper hydration, and taking individual risk factors (e.g. acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures

8.1.1 Short-term health risk:

Low to High, mitigated to Low: The risk of heat injury was reduced to low through preventive measures such as work/rest cycles, proper hydration and nutrition, air conditioning, and monitoring Wet Bulb Globe Temperature (WBGT). Based on the mean maximum temperature and the days with temperature larger than 90 °F in a month, the risk of heat injury in unacclimatized or susceptible populations (older, previous history of heat injury, poor physical condition, underlying medical/health conditions), and those under operational constraints (equipment, PPE, vehicles) could be High from May – October, and Low from November – April. Confidence in the health risk estimate is low (Reference 9, Table 3-6).

8.1.2 Long-term health risk:

Low: The long-term risk is Low. However, the risk may be greater for certain susceptible persons– those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions. Long-term health implications from heat injuries are rare but may occur, especially from more serious injuries such as heat stroke. It is possible that high heat in conjunction with various chemical exposures may increase long-term health risks, though specific scientific evidence is not conclusive. Confidence in these risk estimates is medium (Reference 9, Table 3-6).

8.2 Cold

8.2.1 Short-term health risks:

Winter (December - March) temperatures range from 47 °F to 64 °F with an average temperature of 54 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. Because even on warm days a significant drop in temperature after sunset by as much as 40 °F can occur, there is a risk of cold stress/injury in March. The risk assessment for Non-Freezing Cold Injuries (NFCI), such as chilblain, trench foot, and hypothermia, is Low based on historical temperature and precipitation data. Frostbite is unlikely to occur because temperatures rarely drop below freezing. However, personnel may encounter significantly lower temperatures during field operations at higher altitudes. As with heat stress/injuries, cold stress/injuries are largely dependent on operational and individual factors instead of environmental factors alone.

Low: The health risk of cold injury is Low. Confidence in the health risk estimate is medium.

8.1.2 Long-term health risk:

Low: The health risk of cold injury is Low. Confidence in the health risk estimate is high.

9 Noise

9.1 Continuous

No specific continuous noise hazard sources were documented in the DOEHRS or MESL for FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 timeframe.

According to the Base Camp Assessments (BCA) found in MESL, hearing protection was used and the noise level detected within the FOB met the standards without exceeding 85 dBA on routine basis or living area.

9.1.1 Short and long-term health risks:

Not evaluated

9.2 Impulse

No specific impulse noise hazard sources were documented in the DOEHRS or MESL for FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 timeframe.

According to the Base Camp Assessments (BCA) found in MESL, hearing protection was used and the noise level detected within the FOB met the standards without exceeding 85 dBA on routine basis or living area.

9.2.1 Short-term and Long-term health risks:

Not evaluated.

10 Unique Incidents/Concerns

10.1 Potential environmental contamination sources

DoD personnel are exposed to various chemical, physical, ergonomic, and biological hazards in the course of performing their mission. These types of hazards depend on the mission of the unit and the operations and tasks which the personnel are required to perform to complete their mission. The health risk associated with these hazards depends on a number of elements including what materials are used, how long the exposure last, what is done to the material, the environment where the task or operation is performed, and what controls are used. The hazards can include exposures to heavy metal particulates (e.g. lead, cadmium, manganese, chromium, and iron oxide), solvents, fuels, oils, and gases (e.g. carbon monoxide, carbon dioxide, oxides of nitrogen, and oxides of sulfur). Most of these exposures occur when performing maintenance task such as painting, grinding, welding, engine repair, or movement through contaminated areas. Exposures to these occupational hazards can occur through inhalation (air), skin contact, or ingestion; however exposures through air are generally associated with the highest health risk.

10.2 Waste Sites/Waste Disposal

At FOB Brassfield-Mora, waste water and solid waste were handled by contractor Kellogg Brown & Root (KBR). Solid wastes were sent to incinerators or burn pits for disposal. Hazardous wastes were stored and sent to the adjacent FOB Speicher for disposal.

At PB Razor, waste water was reported to be hauled and disposed into the Tigris River. Solid waste was incinerated within burn-out latrines. Hazardous waste was sent to FOB Speicher for disposal.

At PB Olson, no official reports were found in DOEHRS or MESL to identify or confirm the methods of waste disposal at PB Olson from 2003 to 2009. However, the solid wastes could likely be burned on site in a small burn pit and the medical wastes were hauled to FOB Speicher based on the similar waste disposal methods used in the adjacent FOB Brassfield-Mora and PB Razor.

10.3 Fuel/petroleum products/industrial chemical spills

No specific reports regarding fuel, petroleum products, or industrial chemical spills at FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 were found in DOEHRS or MESL.

However, field exposure notes from soil sampling reports in October and November of 2006 indicated that 20,000 gallons of fuel were spilled on ground at FOB Brassfield-Mora in October 2006. It was raining occasionally for three days after the spill. Liners and sandbags were utilized to prevent further spills on ground. No further reports indicated or confirmed that the spilled spots were cleaned. The adjacent water source was underground well, and located about 400 meters away. It was unlikely contaminated due to the long distance between the water source and spilled spots. One treated non-drinking water sample collected at the water source site in November 2006 confirmed that no health risks were identified.

10.4 Pesticides/Pest Control:

The health risk of exposure to pesticide residues is considered within the framework of typical residential exposure scenarios, based on the types of equipment, techniques, and pesticide products that have been employed, such as enclosed bait stations for rodenticides, various handheld equipment for spot treatments of insecticides and herbicides, and a number of ready-to-use (RTU) methods such as aerosol cans and baits. The control of rodents required the majority of pest management inputs, with the acutely toxic rodenticides staged as solid formulation lethal baits placed in tamper-resistant bait stations indoors and outdoors throughout cantonment areas. Nuisance insects, including biting and stinging insects such as bees, wasps, and ants, also required significant pest management inputs. Use of pesticides targeting these pests generally involved selection of compounds with low mammalian toxicity and short-term residual using pinpoint rather than broadcast application techniques. No specific hazard sources were documented in DOEHRS or MESL data portal. A total of two pesticide application reports in the MESL data portal for FOB Brassfield-Mora and vicinity (December 2003 to August 2009) list the usage of pesticides on the site. For pesticide products applied during this period, the EPA approved label has been archived, providing a framework how each pesticide handled and applied (see below).

10.4.1 Rodenticides

Trapper Glue Board (USEPA Registration number: 12455-WI-1), Talon Weatherblox XT (EPA Registration number: 100-1055), and Talon G (USEPA Registration number: 100-1050) were reported and used by contractor KBR to control rodents at FOB Brassfield-Mora in April and June of 2006.

Besides using the rodenticides, eliminating harborage areas was another measure to control rodents in FOB Brassfield-Mora and vicinity during the time frame.

10.4.2 Insecticides

Insecticides used to control ants, bees, crickets, fleas, flies, lice, mosquitoes, spiders, termites, and wasps included Blue Streak Fly Bait (EPA Registration number: 270-255), Catchmaster Fly Stick (EPA Registration number: 48377-NY-1), Fly Be Gone (EPA Registration number: 082048-zaf-001), Tempo Ultra WP (USEPA Registration number: 3125-390), and Tempo SC Ultra (EPA Registration number: 3125-498). These insecticides were reported to be applied at FOB Brassfield-Mora by contractor KBR in April and June of 2006.

Besides using the insecticides, other measures such as keeping trash containers closed and

minimizing moisture outside food-service areas were used to control insects in FOB Brassfield-Mora and vicinity during the time frame. Additionally, use of permethrin treated uniforms was suggested for Soldiers deployed at FOB Brassfield-Mora and vicinity during the time frame to prevent exposure to insect-borne diseases, such as tick-borne and mosquito-borne diseases.

10.4.3 Short-term and Long-term health risks

Not evaluated due to insufficient data

10.5 Asbestos

No specific Asbestos containing materials (ACM) reports regarding the application of asbestos at FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 were found in DOEHRS or MESL.

10.6 Lead Based Paint

No specific reports regarding the application of lead based paint at FOB Brassfield-Mora and vicinity from 01 December 2003 to 17 August 2009 were found in DOEHRS or MESL.

10.7 Burn Pit

While not specific to FOB Brassfield-Mora and vicinity, the consolidated epidemiological and environmental sampling and studies on burn pits that have been conducted as of the date of this publication have been unable to determine whether an association does or does not exist between exposures to emissions from the burn pits and long-term health effects (Reference 7). The committee's review of the literature and the data suggests that service in Iraq or Afghanistan (i.e., a broader consideration of air pollution than exposure only to burn pit emissions) may be associated with long-term health effects, particularly in susceptible (e.g., those who have asthma) or highly exposed subpopulations, such as those who worked at the burn pit. Such health effects would be due mainly to high ambient concentrations of PM from both natural and anthropogenic sources, including military sources. If that broader exposure to air pollution turns out to be relevant, potentially related health effects of concern are respiratory and cardiovascular effects and cancer. Susceptibility to the PM health effects could be exacerbated by other exposures, such as stress, smoking, local climatic conditions, and co-exposures to other chemicals that affect the same biologic or chemical processes. Individually, the chemicals measured at burn pit sites in the study were generally below concentrations of health concern for general populations in the United States. However, the possibility of exposure to mixtures of the chemicals raises the potential for health outcomes associated with cumulative exposure to combinations of the constituents of burn pit emissions and emissions from other sources.

10.7.1 Particulate matter, less than10 micrometers (PM_{10}) and less than 2.5 micrometers ($PM_{2.5}$)

Although there were PM_{10} or $PM_{2.5}$ air samples that have been collected and reported at FOB Brassfield-Mora and vicinity, there was no valid PM ambient air samples specifically collected at or around the burn pits at the above areas from 01 December 2003 to 17 August 2009.

10.7.1.1 Short-term and long-term health risks:

Not evaluated due to insufficient sampling data.

10.7.2 Volatile Organic Compounds (VOC)

In 2006, a total of four valid VOC air samples were collected around the burn pits (within 25-feet radius) at PB Olson. No parameters exceeded the 1-year negligible MEGs.

In 2007, a total of two valid VOC air samples were collected at the burn pits at PB Olson. No parameters exceeded the 1-year negligible MEGs.

10.7.2.1 Short-term and long-term health risks:

Not evaluated for years of 2003, 2004, 2005, 2008, and 2009 due to unavailable sampling data.

None identified for 2006 and 2007.

The overall short-term and long-term VOC health risk at FOB Brassfield-Mora and vicinity from 2003 to 2009 was none based on the available sampling data.

11 References[1]

1. Casarett and Doull's Toxicology: the Basic Science of Poisons, Chapter 2- Principles of Toxicology; Fifth Edition, McGraw Hill, New York.

2. Clinical Toxinology Resources: http://www.toxinology.com/. University of Adelaide, Australia.

3. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS-EH database) at https://doehrs-ih.csd.disa.mil/Doehrs/. Department of Defense (DoD) Instruction 6490.03, *Deployment Health*, 2006.

4. DoDI 6055.05, Occupational and Environmental Health, 2008.

5. DoD MESL Data Portal: https://mesl.apgea.army.mil/mesl/.Some of the data and reports used may be classified or otherwise have some restricted distribution.

6. Goldman RF. 2001. Introduction to heat-related problems in military operations. *In*: Textbook of military medicine: medical aspects of harsh environments Vol. 1, Pandolf KB, and Burr RE (Eds.), Office of the Surgeon General, Department of the Army, Washington DC.

7. IOM (Institute of Medicine). 2011. Long-term health consequences of exposure to burn pits in Iraq and Afghanistan. Washington, DC: The National Academies Press.

8. Joint Staff Memorandum (MCM) 0028-07, Procedures for Deployment Health Surveillance, 2007.

9. USA PHC TG230, June 2010 Revision.

10. USACHPPM. 2008. Particulate Matter Factsheet; 64-009-0708, 2008.

11. Modification 11 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 2 December 2011.

12. Agency for Toxic Substances and Disease Registry, Public Health Statement for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene, August 2005, http://www.atsdr.cdc.gov/PHS/PHS.asp?id=238&tid=43.

[1] NOTE. The data are currently assessed using the 2010 TG230. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEGs. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air water (soil is only evaluated for long term risk). This is performed by deriving separate short-term and long term population exposure level and estimates (referred to as population exposure point concentrations (PEPC)) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG the risk is Low. If levels are higher than negligible then there is a chemical-specific toxicity and exposure evaluation by appropriate SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15 L/day MEGs are used for the screening while site specific 5-15 L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA) which is derived by multiplying the 5 L/day MEG by a factor of 2.5. This value is used to conservatively assess non drinking uses of water.

12 Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact DoD Force Health Protection and Readiness (FHP & R).
Army Institute of Public Health Phone: (800) 222-9698. http://phc.amedd.army.mil/
Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. http://www-nehc.med.navy.mil
U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam.asp
DoD Force Health Protection and Readiness (FHP & R) Phone: (800) 497-6261. http://fhp.osd.mil